

# Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

TRADE-MARK

Vol. II

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R. D. P. Co. Inc.

CHICAGO, ILL., SATURDAY, OCTOBER 7, 1922

No. 13

## CUTS OUT ALL STATIC

### BURBANK AIR PHONE TALK AIDS FARMERS

SPEAKS TO LARGE AUDIENCE FAR DISTANT

Plant Wizard Addresses Thousands Over Mobile Broadcaster Brought to His Home

(See picture, back page.)

OAKLAND, CALIF.—Radio is more and more penetrating into the countryside to aid the farmer in supplying the American nation with produce. In California the great spread of Radio in the farming districts is due greatly to the large number of broadcasting stations, which furnish not only music and other forms of entertainment but what is more important broadcast market reports and agricultural bulletins.

Due more or less to the great number of farmers possessing receiving sets, Luther Burbank, the nationally-known horticulturist, recently spoke to more farmers in one hour than it would be possible for him to speak to, were he to lecture for a month at various points throughout the farming section of Santa Rosa, where he resides and where he maintains his experimental gardens.

Uses Mobile Broadcaster

The Borch Radio Corporation of Oakland, Calif., recently conceived the idea of having Burbank speak over a portable Radiophone transmitter, mounted in an automobile. The mobile set, call signal KFBN, with a range of about twenty miles, was driven to Burbank's home, where the plant wizard was busily engaged in his garden.

Burbank has written extensively about his research work, but few people have heard him talk. With the event appropriately advertised, and with another automobile equipped with a receiving set and loud speaker to reproduce Burbank's message at Petaluma, Calif., where a county fair was being held, Burbank discoursed for an hour on the care of certain plants, how to eliminate plant diseases, and various other subjects on which he is a recognized authority.

Many Hear Him for First Time

There were many farmers at the fair and in the vicinity who had never heard Burbank talk, although they had followed him closely in the printed word.

While the event attracted considerable attention in this particular locality, it was at once recognized by Radio engineers and believers in the rapid advancement of the nation along agricultural lines as one of the important steps toward linking the farmer with the city by Radio and the

(Continued on page 6)



Major J. O. Mauborgne, army Radio expert of the 6th Corps Area Headquarters, Chicago, who has perfected a new device that, he claims, will eliminate all antenna static. Plans are being formulated rapidly for final tests of the instrument which thus far has proved very successful  
Photo by Chicago American

### FANS' BUGABOO DEFEATED BY ARMY MAJOR

J. O. Mauborgne's Eliminator Successful in Worst of Storms

Will Serve on Every Set

Final Tests of Device to Be Made—Attachment to Cost Less Than \$50

(Special to RADIO DIGEST)

SAN ANTONIO, TEX.—Absolute, positive elimination of all antenna static even during the worst electrical storms has been perfected by Maj. J. O. Mauborgne, army Radio expert from 6th Corps Area Headquarters, Chicago, now in San Antonio on a three weeks' experimental tour of the 8th Corps Area, army officials have announced.

The new device is an improvement on a device previously invented by Major Mauborgne. It is claimed that the attachment can be used with any receiving set on the market and will cost less than \$50.

Plans are going forward rapidly to complete final tests of the apparatus. A corps of Radio experts under Major Roy H. Coles, 8th Corps Signal Officer, are co-operating with Major Mauborgne in the experiments.

Bars Generator Interference

The giant Radio station WUJ at Fort Sam Houston, with 30 kilowatts of power, is less than a quarter of a mile from the laboratory where the experiments are being conducted. The static eliminator has been adjusted so fine that even the starting of the big generator fails to interrupt the short wave Radiophone conversations between the laboratory and the Signal Corps Warehouse, a half mile away.

The latest apparatus is attached to a Radio receiving set between the antenna  
(Continued on page 2)

### "NAVY NIGHT" ONCE A MONTH FOR WJZ

Distinguished Officers to Give Better Conception of Gobs' Work

NEWARK, N. J.—Arrangements have been made by the Navy Department whereby WJZ will set aside one night a month to be known as "Navy Night." On these occasions the navy will be represented by distinguished and well-known officers. The idea of having these prominent men address the people directly is to give the public a better conception of the large amount of work the navy is called upon to do in time of peace as well as to establish a closer relationship between the navy itself and the inland centers of population.

Although the Yosemite valley is surrounded by cliffs from 3,000 to 5,000 feet high, Radio messages have been successfully received there from as far as Honolulu, Hawaii.

### 200 TOWNS HEAR NEW SAN ANTONIO STATION

Texas' First 750-Watt Plant to Be Dedicated Soon

SAN ANTONIO, TEX.—A new 750-watt broadcasting station which promises to give the South its finest concerts will be dedicated to San Antonio in a few weeks. The station was built by the Southern Equipment Company, and tests have brought telegrams from fifteen states in the Middle West and as far south as the City of Mexico to the effect that music sent from the new station was heard in more than 200 different towns. License has been applied for to permit sending on 350, 485 and 400 meters under "Class B" and "Class A" regulations.

At present, there are no stations in Texas using more than 500 watts. The Fort Worth Star-Telegram, Dallas News-Journal and the San Antonio Evening News, each have 500-watt stations.

### FIRES PISTOL SHOT BY SIGNAL ON MORSE KEY

LONDON, ENGLAND.—Interesting novelties were shown recently at the Radio show at the Central Hall, Westminster, S.W., by Major Raymond Phillips. By tapping a signal on an ordinary Morse key he set in motion a motor-horn and a flash-light, while another signal fired a pistol shot. The features of the apparatus is that it is unaffected by other Radio signals in the building.

### AIR WAVES PLAY BIG ROLE IN NEW MOVIE

LOS ANGELES.—Marshall Nellan offers some new possibilities of the Radiophone in his forthcoming picture, "Minnie." In this production, suggested by George Pattullo's story, "Her Man," Radio is employed not only as a means of carrying the voice but also as a medium of conveying power through the air and running distant automobiles, wind-machines, pumps and other machinery.

### CUTS OUT ALL STATIC

(Continued from page 1)

and the primary circuit of the set. In appearance it resembles a complete receiving set in itself. The working of the static eliminator is a secret, although the principal parts have been patented, Major Mauborgne said.

#### Location Ideal for Experiments

Fort Sam Houston is well equipped for experimental purposes, having Kelly Field, Brooks Field, Camp Travis, Camp Normoyle and Camp Bullis in the immediate vicinity so that every point of the compass is available for special testing of various apparatus with nearby camps. There are broadcasting stations at Camp Travis, Brooks Field and Kelly Field as well as at Fort Sam Houston.

The equipment of WUJ will be re-arranged to use one of Major Mauborgne's new static eliminators for receiving. This is expected to re-establish direct communication with Washington, D. C., cut off since the war on account of a great magnetic-static body somewhere between San Antonio and the Atlantic coast.

Communication with Washington is now being carried on by relay from Fort McPherson, Ga. In the opposite direction, Radio communication with Nome, Alaska, is a daily routine job. Dozens of messages are flashed back and forth.

#### New System to Improve WUJ

Station WUJ is control station for 11 principal stations in the 8th Corps Area with 200 smaller stations also in this area. The powerful station uses a 5,200 meter wave length only in transmitting. Under the new system soon to be tested out by Thomas I. King, warrant officer in charge of the station, it may be possible to receive messages on shorter wave lengths while the long waves are being used to send out messages.

It has been impossible to send and receive at the same time in the past because of the powerful force of the 30-kilowatt generator which charges every part of the building with high frequency current. A wire stretched 200 feet at right angles with the antenna 200 feet above the ground, picked up so much direct current that a spark one inch long was caught every time the end of the wire was placed near an iron foot scraper on the step of the Radio station.

An experiment with an underground antenna is being tried out between WUJ and the El Paso, Texas, Radio station of the army. The buried antenna is about 800 yards long, one wire. It is placed so that the end farthest from the Radio station is directly in compass line with El Paso.

### DIRECT 500 TUNNEL BUILDERS BY RADIO

#### Activities of Workers Behind 30 Miles of Sierra Drifts to Be Guided by Signals

By Charles Heston Peirson

In the dizzy altitudes of the high Sierra Madre Mountains of Fresno County, California, Radio will be used this winter to direct the activities of 500 men who will go into camp behind thirty miles of impassable snowdrifts to push forward during the winter the greatest piece of tunnel construction now in progress on the Western hemisphere. This tunnel is a part of the gigantic hydroelectric development project of the Southern California Edison Company, which is carrying on a program for the development of a million and a quarter horsepower of water power electricity derived from the San Joaquin River and Big Creek and other mountain torrents. One magnificent mountain lake over seven miles long has been impounded, and the program includes the impounding of water which will add three more mountain lakes to the chain which will be connected by the Florence Lake tunnel and a tunnel from Huntington Lake to Shaver Lake.

#### Radio to Direct 500 Men

This winter over 5,000 men will be on the job, including the 500 who will be marooned on the upper end of the long tunnel over the crest of the Kaiser Range. The direction of the marooned men will be entirely given by Radio from the headquarters of the resident engineer at Cascada, the construction headquarters; much of the other work will be done under Radio communication.

The success of Radio was so thoroughly demonstrated during last winter, not only in directing the work of the men who were beyond wire communication, but in picking up and carrying on communication with the general offices of the Southern California Edison Company in Los Angeles, a distance of 270 miles from the outposts of operation, that facilities have been greatly improved in preparation for this winter's work and new and expensive apparatus put into service.

#### Radio Succeeds Where Phone Fails

Due to conditions during the winter when snow and sleet storms are prevalent, it was found the telephone lines did not give reliable service. Therefore, Radio communication was decided upon and has proven entirely satisfactory. There are

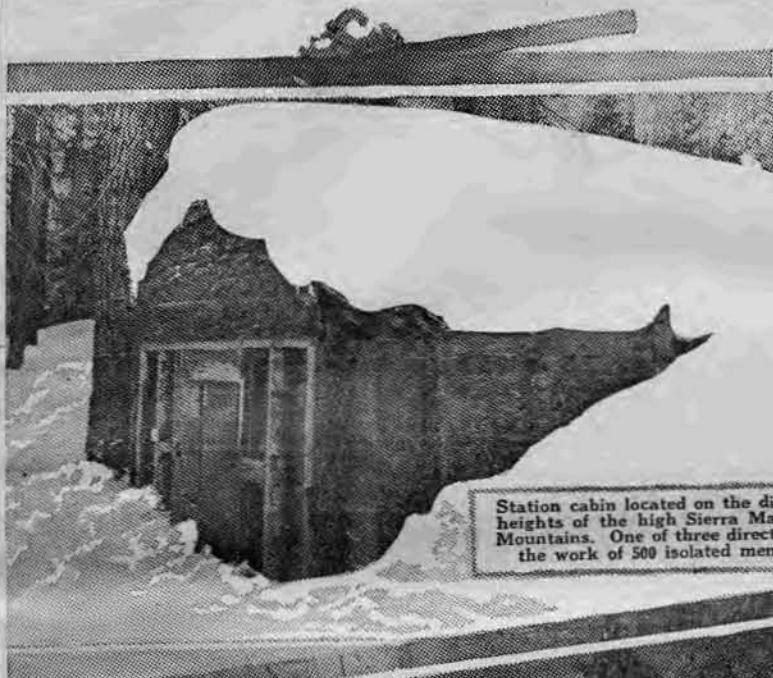
### Jap Officials Are Considering Plans for \$100,000,000 Radio Company

WASHINGTON, D. C.—A Radio company capitalized at 200,000,000 yen, approximately \$100,000,000, soon will be established in Japan, if plans formulated by the Nippon Yusen Kaisha, the Osaka Shosen Kaisha, the Industrial Bank, Suzuki & Co., Takata & Co., Mitsui & Co., Okura & Co., Fujita & Co., Viscount Shibusawa and other Japanese financiers receive the support of the government and are brought to completion. The plans have been laid before Premier Kato and

have received his personal sanction. They will be taken up formally at a later date and from present indications will be approved.

It is desired to form a company that will compare favorably with the Radio Corporation of America, the Marconi Company of Great Britain, and the Telegraph Company of France. The new company will concern itself principally with improving communication between Japan and America.

### SNOWED IN ON DIZZY HEIGHTS



Station cabin located on the dizzy heights of the high Sierra Madre Mountains. One of three directing the work of 500 isolated men.



now three combined Radio, telegraph and telephone stations in operation and one more Radio station is being installed.

Due to the location of the stations and the topography of the country and the fact that little was known regarding Radio communication in a mountainous territory, it was necessary to do considerable experimenting before satisfactory results were obtained. Portable Radiophone sets which had given satisfactory service in the vicinity of Los Angeles were first taken into this territory. Tests showed that to communicate a given distance it was necessary to use about twenty-five times more power than was needed near Los Angeles.

#### Use Half Kilowatt Transmitters

The three transmitters rated at ½ kilowatt each were built originally for continuous wave telegraph, but have since been equipped for telephone or buzzer modulated telegraph. One oscillion tube is used in each set.

To furnish power for the boring of tunnels for the hydraulic development a thirty kilowatt volt transmission line has been built between Cascada and the two outpost mountain camps. The Radio sets give a rapid and reliable means of communication during transmission line trouble and handle switching and operating line orders.

#### Antennae Used

The antenna at Cascada is of the inverted L type, 140 feet high at the free end, 90 feet at the station end, and 120 feet between spreaders. Five No. 8 copper wires spaced four feet apart are used. At Florence Lake portal camp a T type aerial is in use. This is 140 feet high and 175 feet between spreaders. At the construction entrance camp a T aerial 90 feet high and 150 feet between spreaders. The radiation from each of these antennas is about 2.4 amperes at 540 meters, which is the normal operating wave length.

Involved in the work of developing the full electric potentiality of the streams of the High Sierras and conserving their flow for irrigating lands in the San Joaquin valley are many more daring engineering problems, which will necessitate the drilling of other tunnels, the erection of enormous storage dams in the mountain ranges and far beyond lines of transportation, and the constant employment of thousands of men for several years to come. Radio is being put to one of its most practical uses as the medium for transmitting the instructions for the work in this enormous project.

### MINIMIZE CONFLICTS—COMMERCE DEPT. AIM

#### Bureau of Navigation Inspectors to Be Busy

WASHINGTON.—In anticipation of the unprecedented interest in Radio, during the coming season, the Bureau of Navigation, Department of Commerce, is taking steps to minimize interference and insure, as far as possible, strict compliance with the law. The bureau comments upon the fact that the Radio season may be said to begin in September and close in April, in the United States.

Radio inspectors in each of the nine districts, it was announced, have been instructed to cover the principal Radio centers and points where serious interference may be expected. On these trips they will inspect stations for license, examine applicants for operators' licenses and determine whether the transmitting stations are adjusted to meet the requirements of the law.

# Radio Digest Illustrated

TRADE MARK  
Published Weekly by  
RADIO DIGEST PUBLISHING COMPANY  
123 West Madison Street, CHICAGO, ILLINOIS

SUBSCRIPTION RATES  
Yearly.....\$5.00 | Foreign.....\$6.00  
Single Copies, 10 Cents

Entered as second-class matter April 27, 1922, at the postoffice at Chicago, Illinois, under the Act of March 3, 1879.

Vol. II Chicago, October 7, 1922 No. 13

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## Looking Ahead

The sixth of the series by H. M. Towne will appear next week. Mr. Towne for a number of years has been employed in the laboratories of the General Electric Company.

Panel Units for Your Receiving Sets. Details of panel construction will soon begin. This popular feature has been requested by many readers and will be written by Thomas W. Benson.

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

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

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

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# WESTINGHOUSE GETS NEW RADIO 'SUPER'

## C. W. HORN NAMED CHIEF OF OPERATIONS

Takes Charge of KDKA, WJZ, KYW, and WBZ—Was Radio Censor During War

**E. PITTSBURGH, PA.**—C. W. Horn, manager of the Radio division service department, Westinghouse Electric & Manufacturing Company, has been appointed as superintendent of Radio operations of the Westinghouse Company. Mr. Horn succeeds L. R. Krumm, who left the service of the Westinghouse Company to become manager of the Radio department of the Erner-Hopkins Electric Company, of Columbus, Ohio.

In his new position Mr. Horn will have charge of all Radio operations of the Westinghouse Company, including complete charge of the company's four broadcasting stations, KDKA, at East Pittsburgh; WJZ, at Newark, N. J.; KYW, at Chicago and WBZ, at Springfield, Mass.

**Has Thirteen Years Experience**  
Mr. Horn has been interested in Radio for the past thirteen years and knows every phase of Radio development. His Radio experience has taken him to South America, Central America and the West Indies. His experience on ships has been from the time when very few vessels were equipped with Radio until within recent years when every vessel sailing the seas has its Radio set.

During the world war, Mr. Horn served as lieutenant in the Radio communication service of the third naval district. He did important work for the government, including the building and direction of the first group of naval Radio compass stations. These stations have been a considerable aid to the vessels at sea for the ships are enabled to have their exact positions transmitted to them within a few minutes after the ships' officers have requested the ships' locations.

**Was Radio Censor**  
Mr. Horn also served as Radio censor during the war, was on the examining board and acted as material officer for the Radio division of the third naval district. As Radio censor, he kept guard on the air to see that government regulations were enforced during the emergency and that the ether was kept clear for the most important messages.

Mr. Krumm has had many years experience with Radio, but he first came into prominence as chief Radio inspector of the bureau of navigation of the commerce department. When the war broke out he immediately joined the signal corps and served eighteen months in France as lieutenant-colonel on the staff of the chief signal officer, General Edgar Russell. When the war ended, he had command of all Radio operations of the A. E. F. For his war services he was awarded the Distinguished Service Medal by the United States and the Legion D'Honneur by France.

## Spark Coil Disturbers Routed by Finder Sets

Kept In Readiness to Detect Concert Interferences

**SAN ANTONIO, TEX.**—Newspaper publicity routed at least three out of six persons, probably boys, who have been tearing into the air with Ford car spark coils during evening concerts from WCAR, WJAE, AS6, DM7 and other local broadcasters. L. D. Wall, president of the Bexar County Radio Association, is leading the movement to find the culprits. Five very sensitive direction finder sets are kept in readiness each evening so that in case the "sparks" are heard the sender can be located and caught. The offense is punishable by a fine and jail sentence in federal courts.

## JUDGE ADJOURNS HIS COURT BY AIR WAVES

**YACK, N. Y.**—Supreme Court Justice A. S. Tompkins, of Rockland County, adjourned court recently by a Radio message. Justice Tompkins was en route back from Europe. He was to have convened court here at 10 o'clock on a Saturday morning. The court secretary received a Radiogram from the Judge at sea, adjourning the session to 11:30 o'clock.

## SQUABBLE OVER SONG COMPOSERS' RIGHTS

**NEW YORK.**—Conferences are being held between the National Radio Chamber of Commerce and the American Society of Composers, Authors and Publishers to settle the controversy whether or not broadcasting stations using copyrighted songs and manuscripts should pay the composers and authors. The developments are being watched with interest.

# FINDS PHONE WIRES MAKE GOOD AERIAL

## ART'S GROWTH AIDED BY ENGINEER'S DISCOVERY

Declares Hitching of Set to Lines Interferes with Neither Phone Service Nor Radio

(Special to RADIO DIGEST)

**SEATTLE, WASH.**—At a recent meeting of the Independent Telephone Companies of Washington Dean H. V. Carpenter of the State College of Washington school of engineering introduced his discovery that ordinary telephone service wires may be utilized instead of aerial antenna in Radio work, with no interruption of either service.

"Conversations over the ordinary telephone are not heard on the Radio receiving set when phone wires are used for antennae, nor are the Radio messages detected on the phone, so there is no interference or interruption of telephone or Radio service," said Dean Carpenter when discussing the discovery he had made.

### Will Aid Growth of Radio

"This is probably the biggest step yet taken in the popularizing of Radio, for it eliminates the most difficult feature of the receiving station. In cities it is often difficult to string aerial wires where there will be no interference.

"Details of the method recently announced for using telephone service wires as antennae for Radio messages are now available. The system of connections consists simply in connecting two mica condensers of very small capacity in series across the telephone service wires, and attaching the receiving set to the middle point between the condensers. This balances out the ordinary voice currents, and acts as a frequency filter, permitting only the Radio frequency waves to reach the equipment.

### Cannot Hear Phone Conversation

"Permission to use this must be secured from the telephone company, but its application will cause no interference whatever with the telephone service. It is, in fact, quite impossible to tell by ordinary telephone test when the Radio messages are going over the wires. One using the receiving set can hear the telephone call bell and the click of connection, but no message, so there is little interruption there.

"It probably cannot be made to work successfully, so far as simultaneous use of the ordinary telephone and Radio is concerned on farmers' grounded lines. On city lines, however, the two services can be used simultaneously with absolutely no disturbance to the wire; only the noises of switching and ringing are heard on the Radio headset, and these would not make any serious interruption."

## 'FRISCO GETS ADDITION TO BROADCAST STRING

Trust Company Opens KFDB for Business Reports

**SAN FRANCISCO, CAL.**—Another Radio broadcasting station has been added to San Francisco's coterie of stations with the completion of Station KFDB, located on Telegraph Hill. It is owned and operated by the Mercantile Trust Company of this city.

The new apparatus is to be used to provide the territory west of the Rockies with quick reports on commercial, financial and agricultural conditions, according to John S. Drum, president of the company.

The new station is equipped with a small transmitter in which is used a 50-watt oscillator tube, modulator and speech amplifier. The current supplied by motor generators.

The antenna is composed of three cages in parallel, swung from 24-foot spreaders and supported by 110-foot masts. The entire system is remote-controlled.

## LEAVE IT TO THE GIRLS!



These two pretty London girls, enjoying a Radio concert while motoring, have a unique arrangement in the dainty Japanese parasol, which serves them not only as a sunshade but as a loop aerial as well. © Keystone

## Woodrow Wilson's Speeches

### by Radio This Fall, Rumor

**WASHINGTON, D. C.**—Democratic politicians are believed to be making plans for the fall campaign which will include broadcast speeches by ex-President Woodrow Wilson. No definite announcement has been made as yet concerning this, but the rumors current in Washington assert in the most positive way that the words of Woodrow Wilson will be heard on the air this fall.

Compact transmitting sets located at various points in mines and operated from storage batteries may be used in the future to summon help and direct the work of rescuing miners entombed by falling rock, as in the recent Argonaut Mine disaster at Jackson, Cal.

## Remodeled WBT, One of South's Largest, at Work

**CHARLOTTE, N. C.**—Charlotte has one of the largest broadcasting stations in the South since the Southern Radio Corporation opened its remodeled plant, WBT, October 1st. It has the same rating in power as the Atlanta Journal station (WSB) the farthest-carrying of all the Southern stations.

The southern Radio plant has been closed for two months for improvements and enlargement. The new plant will have 500 watts of energy and will employ four 250-watt tubes. Heretofore the station has been heard in Canada and Cuba.

An international union of Radio operators has been founded in Brussels.

## THE ANTENNA BROTHERS

## Spir L. and Lew P.

## The Doc Has a One-Horse Set



# RADIO MAKES BEATS IN WORLD BUSINESS

## U. S. PLANS FOREIGN TRADE "TIP-OFF" SYSTEM

Scheme Aimed to Give American Dealers Jump on Competitors in Other Countries

WASHINGTON.—Tipping off American business men by Radio as to foreign sales openings in order to get the jump on America's competitors for the world's markets, is the commerce department's latest export trade promoting stunt.

Inquiries for American goods coming into the Bureau of Foreign and Domestic Commerce from consuls, commercial attaches and other government representatives in foreign countries are now distributed to New England manufacturers and merchants through the air by the Bureau's Boston Office in collaboration with Station WGI at Medford Hillside, Mass. The service was tried out one night last week for the first time as an experiment. By first mail the next morning several letters were received from nearby firms.

One of the leading New England manufacturers of artificial leather who happened to be listening in that night learned of two possible openings for his goods; one in Mexico and the other in Columbia. He was much pleased and commended the Department of Commerce for taking advantage of "this most valuable time saving device."

### Should Help Out-of-Town Business Men

In the opinion of another New England merchant, the new "sell-it-by-air" service should appeal particularly to the out-of-town manufacturers and merchants who are not in daily contact with the offices maintained by the commerce department in the leading cities. "For example," says this executive, "there are many manufacturers interested in Radio who wish to sell abroad but who are prevented from keeping in constant touch by frequent visits and telephone calls with the trade openings reported to the government agents. As the Radio stations reach many outlying cities it would seem that this service should be of especial value to more distantly situated business men within a wide radius."

Selling American goods in foreign markets through the help of ether waves can

# Over Five Hundred Broadcasting Stations Keep Public Entertained

Wyoming Only State Without Plant—California Leads Procession with 66 Broadcasters—Ohio Second with 34—New York Third with 28—Only Two "B" Licenses

WASHINGTON.—Broadcasting still continues in all but one state in spite of the pessimistic reports from some quarters that this service, which is likened to a fad, is falling off and likely to collapse. On September 21, there were 510 active broadcasting stations, according to a survey by the Radio section of its limited commercial stations operating on 360 meters.

California still leads the procession, with 66 stations sending entertainment, news and information; Ohio is second with 34; New York third, having 28 stations; while Wyoming brings up the rear without a single station. Every other State of the Union has one or more transmitting stations carrying entertainment

be readily extended to other parts of the United States, in the opinion of Dr. Julius Klein, Director of the Bureau of Foreign and Domestic Commerce. Director Klein pointed out that his bureau maintains 34 district and co-operative offices in this country in addition to the Boston branch. The sending out of the information in each case is a problem for the local manager to arrange with some nearby broadcasting station as all of them have been authorized to undertake the work, he said.

## Five San Antonio Stations Give a Continuous Concert

SAN ANTONIO, TEX.—By close co-operation between all five Radio stations equipped for broadcasting in this vicinity, a system has been established which gives a continuous flow of music almost all day and night with interruptions of two minutes for the cooling of sending tubes. WOAI, the new 1,000-mile radius, 750-watt station has the daylight program. Markets, crop and weather reports are given. Two nights each week, WJAE remains silent while WOAI sends an hour of music. WCAR has an hour of music each evening, as also has DM7. AS6 sends only on Tuesday and Friday evenings, using a 480-meter wave length for broadcasting music, a privilege open to army stations.

in some form for the owners of receiving sets.

### Number of Broadcasting Stations by States on September 21, 1922

California	66	Idaho	5
Ohio	34	Rhode Island	5
New York	28	West Virginia	5
Pennsylvania	27	Alabama	4
Texas	25	Maine	4
Washington	23	Utah	4
Missouri	22	Kentucky	4
Illinois	20	Montana	4
Iowa	20	Maryland	4
Nebraska	17	North Carolina	3
Oregon	15	South Dakota	3
Kansas	15	Tennessee	3
Minnesota	12	Nevada	2
Indiana	12	New Mexico	2
Massachusetts	12	North Dakota	2
Michigan	11	Porto Rico	2
New Jersey	11	South Carolina	2
Louisiana	10	Hawaii	2
Wisconsin	10	Vermont	2
Florida	9	Virginia	2
Dist. of Columbia	8	Delaware	1
Oklahoma	8	Mississippi	1
Georgia	7	New Hampshire	1
Arkansas	6	Wyoming	0
Colorado	6		
Arizona	5	Total	510
Connecticut	5		

### Class B Applications

Several applications from larger broadcasting stations for the class "B" license, permitting the use of the 400-meter wave, have been received by the commerce department, but to date only two have been authorized to transmit on this wave. They are the St. Louis Post Dispatch (KSD) and the Westinghouse Station at Chicago (KYW). The officials in charge of the licensing of stations do not anticipate that more than a dozen applications for the class "B" license will be received, as only the most powerful stations carrying high-class entertainment regularly can hope to qualify.

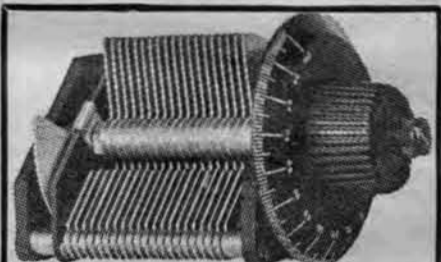
An American Legion station in Nebraska broadcasts lectures on American traditions and American institutions so that foreign born residents within range of the plant may make more rapid progress in Americanization.

# 17 PERMITS TO PUBLIC BROADCAST STATIONS

Total Is for Two Weeks Ending September 23

CHICAGO.—During the two weeks ending September 23, seventeen limited commercial licenses were issued to stations for public service broadcasting. They are as follows:

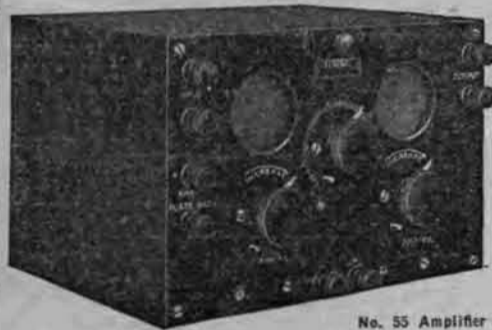
WLAN, Putnam Hardware Co., Houlton, Me.; WMAF, Round Hills Radio Corp., Dartmouth, Mass.; KFCD, Salem Elect. Co., Salem, Ore.; WEAN, Shepard Co., Providence, R. I.; WNAC, Shepard Stores, Boston, Mass.; WLAQ, A. E. Shilling, Kalamazoo, Mich.; WOAI, Southern Equipment Co., San Antonio, Tex.; WLAK, Vermont Farm Machine Co., Bellows Falls, Vt.; WLAT, Chas. G. Bosch Co., Burlington, Ia.; WLAP, W. V. Jordan, Louisville, Ky.; WLAR, Mickel Music Co., Marshalltown, Ia.; WMAC, F. Edward Page, Cazenovia, N. Y.; WGAX, Radio Elect. Co., Washington, O.; WLAX, Greencastle Community Broadcasting Station (Putnam Electric Company), Greencastle, Ind.; WLAS, Hutchinson Grain Radio Co., Hutchinson, Kan.; WPAN, Levy Bros. Dry Goods Co., Houston, Tex.; WMAE, The Tucker Electric Co., Liberal, Kan.



## THE ORIGINAL Vernier Condenser

.0005—\$5.00 With Radion dial .001—\$6.00  
 Plain type—Same high quality  
 23 plate—\$3.00 43 plate—\$3.50  
 BAKELITE PANELS, ALL SIZES  
 TRY OUR RUBBER TUBING  
 Superior to Spaghetti—5c per foot

**Bremer-Tully Radio Co.**  
 Manufacturers—Distributors  
 532-536 South Canal Street Chicago



No. 55 Amplifier

It has been talked about but never fully realized until NOW

# Radio Frequency Amplification

**Federal Radio Frequency Amplifying INSTRUMENTS** are unquestionably the most satisfactory that have yet been devised.



No. 56 Amplifier and Detector

- THEY INCLUDE
- No. 55 Federal Radio Frequency Amplifier ..... \$ 58.00  
(Two stages Radio Frequency Amplification)
  - No. 56 Federal Radio Frequency Amplifier and Detector 52.00  
(One stage Radio Frequency Amplification and Detector)
  - No. 57 Federal Radio Receiver ..... 98.00  
(One stage Radio Frequency, Detector and two stages Audio Frequency)
  - No. 58 Federal D. X. Radio Receiver ..... 116.00  
(One stage Radio Frequency, Detector and two stages Audio Frequency)
  - No. 8 Federal AUDIO FREQUENCY Amplifier and Detector 52.00  
(One stage Audio Frequency and Detector)
  - No. 9 Federal AUDIO FREQUENCY Amplifier ..... 58.00  
(Two stages Audio Frequency)

A combination of No. 55, No. 56, and No. 9 is ideal for use with loop or other restricted antenna.

WRITE FOR BULLETIN No. 119-W

**Federal Telephone & Telegraph Company**  
 BUFFALO, N. Y.  
 CHICAGO BRANCH OFFICE: 805 STEGER BUILDING, CHICAGO, ILL.

# CROSLEY

Better—Costs Less

## Radio Receivers Radio Parts

Catalog on Request

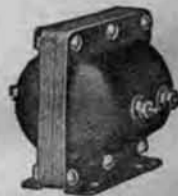


### CROSLEY V-T SOCKET

This socket has been pronounced by many radio engineers the best socket on the market. Ever since its announcement, its success has been phenomenal. Although the success has been largely due to the price, its real popularity is based on its high quality, efficiency, service and practical unbreakability. Patents Pending. Beware of imitators. Made of porcelain for base, or panel mounting—\$.50.

### CROSLEY SHELTRAN

Incorporated in the design of the Crosley Sheltran, are all the characteristics so essential and necessary to obtain the maximum amplification from the modern vacuum tubes used in radio work. These tubes, with their high amplification constant, operate most effectively at large fluctuations of the grid potential. The Crosley Sheltran is designed to accomplish these results and tests have shown that the design is correct to insure maximum efficiency. Completely shielded—9 to 1 ratio. "Better—Costs Less"—\$.40.



Handled by Jobbers and Dealers everywhere. If your Dealer does not handle CROSLEY Instruments, write us direct.

Write for Catalog

**CROSLEY MANUFACTURING CO.**  
 DEPT. RDI 10 CINCINNATI, OHIO

# WGY BROADCASTS "THE WOLF"

## RADIO DRAMA IS A SUCCESS IN 1ST TRIAL

Test of General Electric Plant Opens New Entertainment Field

Voices Carry Faithfully

Shrieks of One Character So Real at Receiving Set Cop Is Roused

By C. H. Huntley

That dramatic productions can be broadcast by Radio with a realism that is marvelous is shown by successful experiments conducted along this line recently at WGY, the broadcasting station of the General Electric Company at Schenectady, N. Y. In fact, so real were the shrieks of one of the characters in a play broadcasted from there recently, as they rang out from a loud speaker at Pittsfield, Mass., that a policeman rapped on the door of the house from which the sounds proceeded and inquired what the trouble was.

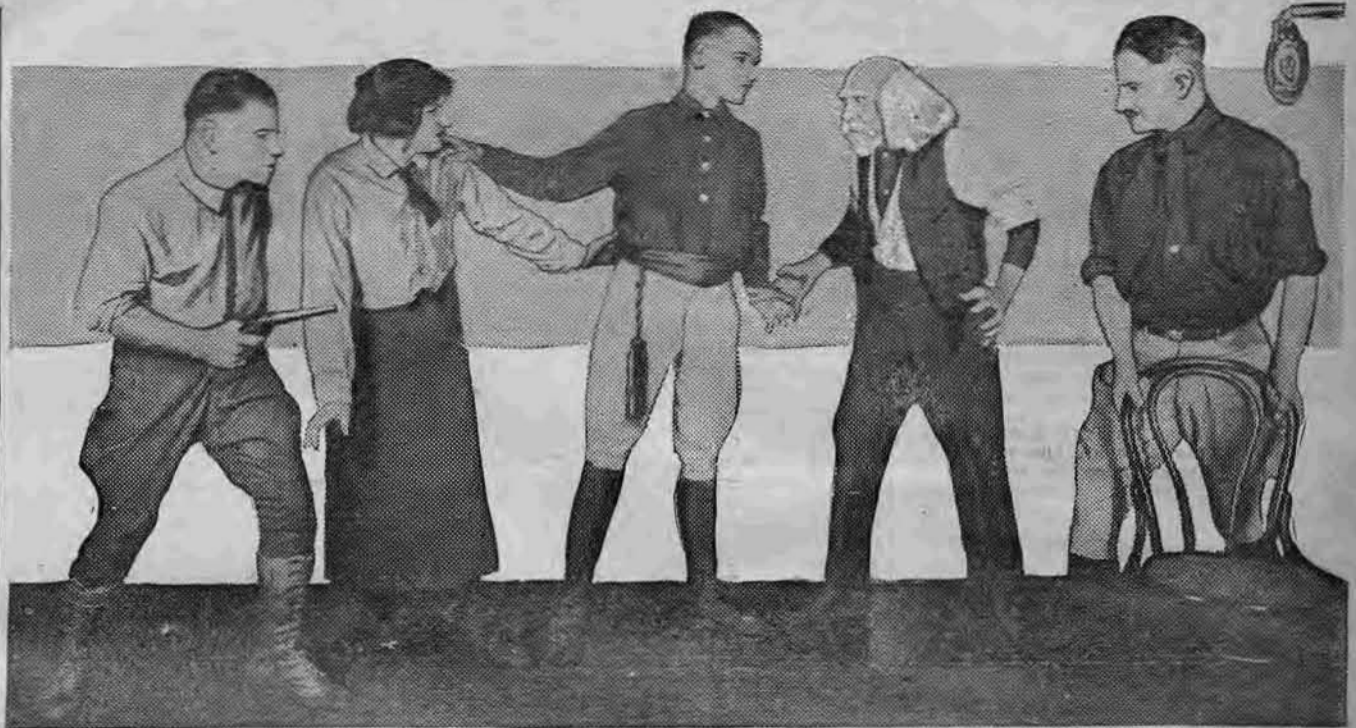
This was during the presentation of Eugene Walter's play, "The Wolf," which was broadcasted through the courtesy of the author. It was produced by a cast headed by Edward H. Smith, who has been heard frequently in readings by the WGY audience. Mr. Smith played the part of McDonald, and was assisted by Frank Finch as Jules Beaubien, Horace Roberts as Ba'tiste le Grand, Viola Karwowska as Hilda McTavish, Henry Miller as Huntley, and James S. B. Mullarkey as Andrew McTavish.

**Describe Period, Scenes, Costumes**

"The Wolf" was presented in three episodes, and preliminary to its presentation, the scenes, period, costumes, and the story "before the play" were explained to the audience.

It was during the third episode, in the big scene of the play, that the suspicious of the Pittsfield policeman were aroused. In this scene Hilda McTavish, a greatly misunderstood young woman, screams "Liar! Liar!" at her father, and mingled with the shrieks are the rough shouts of the woodsmen. A letter to Station WGY from a Pittsfield man who had a receiving set with loud speaker attached tell what impression it made there.

"The Wolf," he wrote, "came over so realistically last night that in the third and final episode a passing policeman thought my wife and I were fighting. He rapped at the door, and when he saw



WGY players presenting Eugene Walters' play, "The Wolf," at the General Electric Company's broadcasting station, Schenectady, N. Y.

what was going on came in to listen to the remainder of the performance."

**Lawyer Closes Windows**

A Schenectady lawyer, who also has a loud speaker attachment to his Radio set, took no chances on a similar visit. Fearing the neighbors might misunderstand the noise, he hurried around the house and closed the windows and doors when the shrieks began. From Hamilton, Ontario, a listener-in wrote: "That dramatic sketch was the most thrilling thing, in a way, that I have ever heard. I have no doubt that some excitable people would be looking around for a club to rescue the poor damsel."

A number of letters have been received by WGY indicating the success of the presentation and expressing the hope that others may follow. This was the first presentation of a play by a broadcasting station, and has been followed by a successful presentation by WGY of "The Garden of Allah," and "Get-Rich-Quick Wallingford."

**Broadcasts Require Good Equipment**

To transmit faithfully music and other forms of entertainment, a broadcasting station must be equipped with apparatus of very high quality. Particular reference has been paid to this point at Station WGY, with the result that its Radio equipment contains numerous refinements not found in many Radio telephone transmitters.

Early in the history of the general use of Radiophone apparatus it was found that while many of the tests of broadcasting music were quite successful, equipment that would give satisfactory speech



Shrieks in this scene from "The Wolf" brought a policeman to a Pittsfield, Mass., home where the drama was being received through a loud speaker.



Edward H. Smith (left) who, with Station WGY players, presented a Radio drama for the first time. Note the costumes and make-up used

quality was not always particularly suitable for music transmission. In consequence, a large amount of experimental work was done to improve the quality of transmission, with the result that both music and voice are now faithfully reproduced.

The entertainment possibilities presented in the field of broadcasting theatrical productions are plain, and are of especial interest to those who by reason of illness, of age, of blindness, or for other reasons are unable to attend the theaters.

**CAPITOL DEPARTMENT STORE OPENS STATION**

Plant Is Second Largest in Washington, D. C.

WASHINGTON.—A new Radio station, WIAX, was opened here a few days ago by Woodward and Lothrop, one of the largest department stores. The plant will be the most powerful one in Washington, with the exception of NOF, the naval air station at Anacostia, D. C. This new station has a 450-watt set which will enable listeners in within a thousand miles of Washington to hear the broadcast programs.

The department store has installed receiving apparatus in several of the public parks of Washington for the entertainment of the crowds that frequent these places. This is the first time a broadcasting station has introduced such an innovation in Washington. The department store plans to broadcast a concert daily from 10:30 to 11:30 a. m., Eastern time, and from 2 to 3 p. m. Special programs are to be broadcasted every Saturday evening at 7:45 o'clock.

**L. & N. ROAD TO RIG SETS IN TRAIN CARS**

Radio Concerts Will Be Part of Southern Lines' Regular Service

NEW ORLEANS, LA.—Through passenger trains of the L. & N. Railroad will give Radio concerts to passengers, as the result of a test completed recently with the arrival in New Orleans of a "Radio" car, equipped for testing the practicability of train concerts. The car, in charge of R. R. Hobbs, superintendent of telegraphy for the railway, arrived from Louisville. The equipment on the car picked up the Louisville Courier-Journal (WHAS) concert program and held it for more than ninety miles out.

Radio concerts will be a regular part of the service given passengers. Installations will be completed within the next few weeks. The equipment for all through trains, including the Pan-American, is already being assembled. The test was made in order to map out the air routes, to ascertain the attitude of the passengers toward the innovation in railway travel, and to find out what stations could be picked up along the way. The experiment was a huge success, officials declared. Concerts came in clearly during the entire trip, not only from WHAS but from stations in Nashville, Birmingham, Montgomery, Mobile and Gulfport. Some of the broadcasts came from a distance of 1,500 miles.

All Radio equipment on the railroad's cars will be in charge of competent operators, and will be for receiving only. The receiving station will be installed on the observation cars of the trains.

## QUEER NAVY CRAFT ETHER LABORATORY

### LANGLEY IS MOTHER SHIP FOR AIRPLANES

Has No Masts or Funnels—Was Named After Pioneer Experimenter in Mechanical Flight

By Carl H. Butman

WASHINGTON.—There is a strange naval craft cruising in Chesapeake Bay. She looks something like a marine dance hall, as her upper deck is broad and flat, and unobstructed. She does not carry the usual masts and funnels; no aerials are visible, yet this curious ship answers to the call NNC, designated in naval Radio or signal language as "Nan Nan Cast." Being mastless, one wonders about her aerials, but there are both permanent and adjustable aerials and Radio masts which can be raised or lowered at will. She is also equipped with much new and novel Radio apparatus.

Although not a Flying Dutchman, she carries a number of flyers and many kinds of flying craft; she is really a home for Flying Seamen.

The vessel is the newly commissioned aircraft carrier Langley, built out of the hull of the old collier Jupiter, the first naval vessel to be equipped with the electric drive. She is now making her "shake-down" or trial cruise in Chesapeake Bay under command of Captain S. A. R. Doyle, U. S. N.

**Named After Pioneer Airplane Inventor**  
The Langley, named after the scientist who was the first practical student of aeronautics and mechanical flight, is a veritable floating landing field and mother ship for air and sea planes, but at the same time she is a sea-going Radio laboratory for the study and development of Radio communication between aircraft and ships.

Her great flying deck, which stretches for 520 feet from stem to stern and is 65 feet wide, prevents the erection of permanent masts for Radio or other purposes—her "top sides" must be clear for the launching and landing of her aircraft. Special telescopic masts have been installed amidships, approximately 250 feet apart, fore and aft, which can be elevated when desired, and housed below decks when planes are being projected into the air by the catapults or alighting from the air on the spacious upper deck.

#### Masts Raise and Lower

The masts, 50 feet in height and used primarily for the Radio aerials, are controlled by hand-operated gears which raise and lower them somewhat as periscopes are operated. When lowered, the aerials are unhooked and stored below or laid alongside the palisades which guard the edges of the flying deck. The masts are elevated simultaneously after the antenna wires are hooked on. This aerial is the principal one used for long distance communication. Auxiliary antennae are carried aft along both port and starboard sides. These antennae are hung outboard on davits which can be swung in like ordinary boat davits, and housed close to the vessel's side when not in use. Primarily these antennae are used to work nearby land stations and aircraft when aloft, as they do not interfere with the operation of the landing deck. At sea with no aircraft aloft, the vessel uses its mast antenna, but when planes are taking off and landing, the auxiliary side antennae are used, although the masts could be raised for transmitting a message and then lowered.

#### Langley's Radio Equipment

Below in the Radio room the ship has a regulation naval 2 K.W. spark set for ordinary traffic work, but there is also a 300-watt tube transmitter, consisting of six 50-watt tubes. This set is adaptable for use either as a Radio telephone or telegraph apparatus with ICW (interrupted continuous wave) or CW (continuous wave). For communication with the aircraft in the vicinity of the mother ship, either on the sea or in the air, the 300-watt set is used.

Another feature of this unique vessel is the plane elevators which raise and lower planes from the storage hold below and the top of the elevators forming part of the ship's deck when they are "down" like the Radio house roof. Forward and aft are the catapults for launching the planes, as well as the arresting gear for stopping them when they land. Most of the usual "top side" equipment of an ordinary ship is below the flying deck, such for example as the pilot house, which is well forward, port and starboard jib cranes for lifting sea planes from the water, the four 5-inch rifles, and deck houses. Her two funnels project from her sides toward the stern, where they may be turned upward, aft or downward to keep the smoke from the upper deck.

WBAY of New York City, the country's first toll broadcasting station, had 100 applicants for its use before arrangements were concluded for the initial broadcasting.

## Book Reviews

**Home Radio—How to Make It.** By A. Hyatt Verrill. This book is particularly adapted for the amateur that desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75c.

**The New Armstrong Super-Regeneration Receiver, How to Construct and Operate It.** By Kenneth Harkness. An eight-page leaflet, giving six diagrams and seven half-tones of the famous receiving sets and hook-up. Price, 50c.

**Radio for the Amateur.** By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, \$1.50.

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

**Radio Engineering Principles.** By Henri Lauer and Harry L. Brown. The book covers thoroughly the operation and characteristics of two and three electrode vacuum tubes, the practical application of the tubes, the generation and control of electric flow, and the conditions which must be obtained to cause a tube to operate in any of its functions. Price, \$3.50.

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## Keepers of Lights Isolated No More

Seaplane and Radio Save Life of Wife of Cape Hatteras Lighthouse Tender

NORFOLK, VA.—Radio and the aeroplane have ended the isolation that has marked those who devote their lives to the keeping of lighthouses and lightships ever since that service was created in the United States. The latest episode of this sort recently brought a husband to the bedside of his wife who had been saved from death only after a six-hour seaplane flight from the lighthouse at Cape Hatteras. The trip, however, was undertaken too late to save her newly born baby, which died shortly after birth.

#### Radio Brings Husband

The airplane brought the wife while Radio summoned the husband. Utah Jeannette, a member of the crew of the buoy tended Columbine of the lighthouse service fleet of tenders in the reaches of Chesapeake bay, was at work when Mrs. Jeannette was taken ill at her home near the Hatteras lighthouse.

If her life was to be saved she had to be taken where she could have hospital care.

The trip to Norfolk was made in six hours, the pilot moderating his normal speed so that the sick woman would receive the maximum of comfort. An ambulance was ordered by Radio, and was in waiting at the naval air station when the landing was made, and she was hurried to the hospital.

## Owner Listens in and Finds His Stolen Set

Mystery Station Without Call Letters Found Guilty

CLEVELAND.—The owner of a transmitting set in this city had it stored with other Radio apparatus, but the whole thing was stolen. Not long after the theft Radio fans heard a new station with no call letters. It could not be located. The owner of the set concluded that it was his property and set about to recover it. He installed a receiving set on an automobile, and night after night toured the city, tuning the set to the pitch of the unknown operator. When the messages grew faint, he changed the direction of the car.

Finally repeated circling of the particular block failed to show any point where messages could be heard more plainly than another.

A youth, whose name is withheld, and who lives in this block, was attracting the attention of all the neighborhood fans with his new Radio set. Persons visited his home every day to see the set. As fellow Radio fans, the owner of the set and his friends also visited the house. There they recognized the stolen apparatus.

## USE NINE-TUBE SET TO ERECT ANTENNA

Famous Inventor's Unique Method Finds Best Direction for Plant's Aerial

COLUMBUS, O.—In preparation of the completion here by October 1 of the powerful broadcasting station of the Superior Radio & Telephone Company, an interesting series of experiments were recently conducted by Earl C. Hansen, famous Radio inventor now visiting in Columbus.

Aided by Herbert Ackerburg, engineer for the company, Mr. Hansen constructed one of the most powerful receiving sets in Columbus, consisting of four stages of Radio frequency amplification, a detector and four stages of audio frequency amplification. A simple loop antenna was attached and the set placed in the exact center of the building. Experiments were then made to determine in which direction the outside interferences were most audible. A circle was laid out and the exact markings found.

#### Use Data to Erect Antenna

Using the data thus secured, the antenna will be constructed on two poles, 60 feet high on the top of the five-story building, in the direction indicating the least possible resistance from outside influences. The antenna will be slightly less than 200 feet in the air. Mr. Hansen was asked to conduct the experiments in view of his experience in such matters. He is the inventor of the piloting cable system whereby ships at sea are directed to harbor, and which has been adopted by the leading European countries and the United States government. He is also the inventor of the "vacuphone," a device that enables partially deaf persons to hear easily, the chief feature of which is the miniature "N" tube, known as the "million dollar tube." It is claimed that this sum was spent in the tube's perfection.

## BURBANK AIR PHONES

(Continued from page 1)

sources of information which he most needs in his work.

Mr. Burbank, after he had finished talking, displayed a remarkable interest in the set which had thrown his words out into space. Neils Borch, operator of the set, explained its functions to him, and was surprised to learn that he had himself a fair knowledge of the theory of Radio. Mr. Burbank declared, however, that he had never realized until then the great possibilities of this means of communication. He said in part:

"This is a clear demonstration that Radio is going to mean as much to the farmer presently as the telephone. Its possibilities are many, and can not be estimated by the average mind."

#### R. C. of A. Has New Office

CHICAGO.—Western headquarters of the Radio Corporation of America has been established at 10 South La Salle street, with Frank R. Carney as western commercial representative. Mr. Carney formerly was director of cable service for the Western Union Telegraph company here.

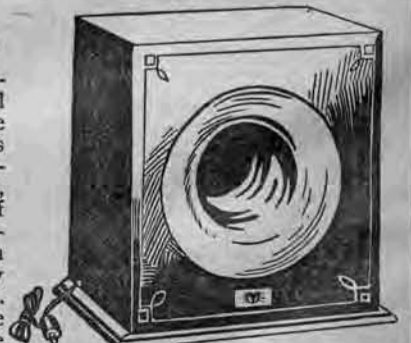
## "ALL-AMERICAN" Amplifying Transformers

Two years of successful use all over the world guarantees permanent satisfaction. Radio and Audio Frequency.  
SEND FOR CIRCULARS  
RAULAND MANUFACTURING CO.  
35 South Dearborn Street Chicago

## The Planet Loud Speaker

The Loud Speaker that has worked a miracle for Radio

A loud speaker Deluxe; produces marvelously clear tones, free from growling, and scratching noises and vibrations. The emitter is cast in one piece, of the famous new Murphy Bell Alloy Metal. Wonderful acoustic properties. The receiver, wiring, cabinet work and other details of construction are the best that can be produced. Skilled workmanship shows in every detail. It can be attached to any standard two-stage amplified receiving set. The Planet Loud Speaker is distinctive in appearance. It is a compact, complete unit included in a beautifully finished mahogany case. The emitter comes in either gold or aluminum finish. The Ram's horn construction of the emitter and the special properties of the Murphy Bell Alloy Metal are features that are exclusive with the Planet Loud Speaker.



Retail price \$40.00

Accurate reproduction; exceedingly free from noise; minimized effect of static disturbances; marvelous quality of tone.

MANUFACTURED BY

PLANET RADIO CORPORATION, 1223 S. Wabash Ave., Chicago

## LOUD SPEAKERS USED AS GUN FIRE CONTROL

May Replace Whistle and Megaphone Signals

PEEKSKILL, N. Y.—An experiment in the use of a loud speaker for field range control was recently successfully conducted by the seventy-first infantry, while in camp at Peekskill, N. Y. The unit consisted of a horn and two-stage amplifier placed at the fire control desk. With a suitable microphone, instructions and commands were given throughout the entire length of the firing line.

The volume was so great that it was successfully heard simultaneously on both flanks, even when rapid fire was in progress. The great success of the experiment leaves little doubt that portable equipment of the type used will supersede the whistle signals and relayed megaphone commands heretofore in use of field rifle ranges. Perfect liaison was obtained between the range officer and all firing points, in a fraction of a second.

#### Listen to Concerts

In addition to the use of the Radio loud speaker, the regimental headquarters company had a very complete military Radio outfit. Concerts each evening from broadcasting stations at Philadelphia, Newark and Schenectady furnished entertainment to the men. Although the camp is located in the mountainous region near the Hudson river and the humidity was high, little trouble was experienced from static.

Another experiment successfully carried out in the camp was a combined Radio and band concert. By means of a loud speaker in the officers' mess a melody was played which was then taken up by the band, showing an interesting contrast between Radio music and the same melodies in the original.

Sir Oliver Lodge, Great Britain's veteran scientist, is devoting considerable time to Radio research work. He believes that broadcasting will become one of the most important elements in everyday life. One of his dreams is that atmosphere may be so electrified that rain may be produced at will.

## Phantom-Circuit

BUILD YOUR OWN. This marvel of mystery with no airt, no loop, no ground brics, in music instead of static showers. We consistently hear concerts on Magnavox from stations 100 miles distant, audible 100 feet from horn. The simplicity of this set will surprise you. No Radio frequency. Complete instructions including photo of circuit sent prepaid for 60c.

YESCO RADIO SHOP, Box 704, Vacaville, Calif.



## Carter "TU-WAY" Radio Plugs

take two head sets and all types cord tip terminals. Price \$1.50. Write for Bulletin on Carter "HOLD-TITE" Jacks and other products.

CARTER RADIO COMPANY, 209 South State Street, CHICAGO

## MYERS

Tubes . . . . . \$5.00  
A. F. Choke Coils . . . 3.50  
Radio Frequency Coils . 3.50  
Receptacles . . . . . 1.00

MAIL ORDERS FILLED

on receipt of Money Order. Parcel Post prepaid

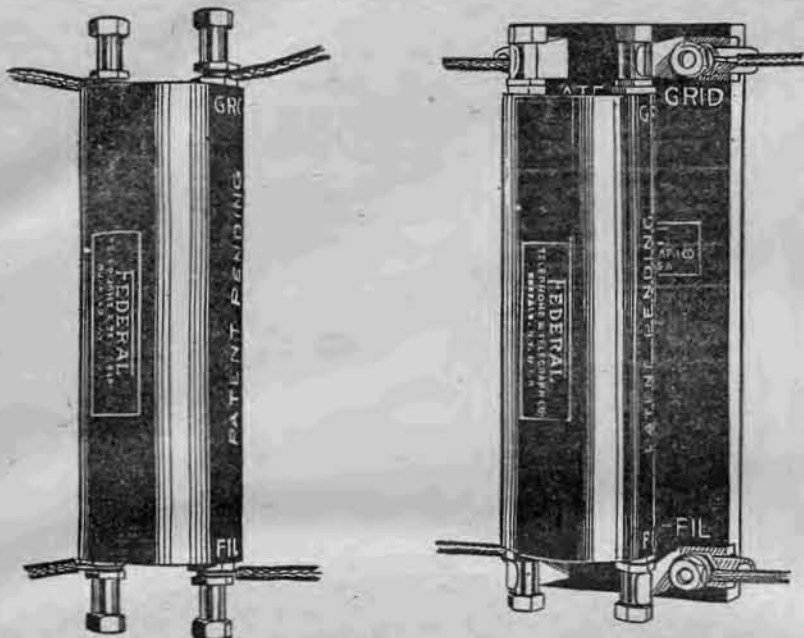
Discounts for Quantity

HUDSON-ROSS

123 W. Madison St., Chicago, Illinois

# The Radiophonist's Mart

## Federal Has New R. F. Transformers



**T**O MANY, the admirable characteristics of Radio frequency amplification, when properly designed, holds much of unusual interest, making possible the satisfactory use over a long mileage range of the loop antenna. Yet, its most important advantage arises from the fact that in the use of the vacuum tube as a detector the response in the telephones in the plate circuit for a given signal voltage applied to the grid is not directly proportional to the voltage applied to the grid. On the other hand, for grid voltages of less than a certain limiting value no response results in the telephones, while for voltages somewhat in excess of this "threshold value" the response is more nearly proportional to the square or some higher power of this voltage.

That is, if by Radio frequency amplification between the antenna circuit and the detector tube, the voltage made available to the grid of the detector tube is doubled while the telephone response is not doubled but is increased to four or more times its original value. Thus not only is it possible to secure greater amplification without serious instability and "howling" through the use of Radio frequency amplification, but by its means, it is also possible to make available signals of such insignificant intensity as would be quite indistinguishable otherwise.

Patient research by the Federal Telephone & Telegraph Company, Buffalo, N. Y., into the underlying principles of such amplification has shown that Radio frequency transformers cannot be constructed to give reasonable amplification at all wave lengths and that the range of wave lengths over which a high degree of amplification can be accomplished is necessarily limited. Only through painstaking research and development is it possible to secure a high degree of amplification over any but a very narrow band of wave lengths.

The Federal Radio frequency transformers pictured above meet the engineering conditions imposed to a remarkable degree and over a greater wave length band than usual. They comprise a new thought in that they are designed at present for three values, amateur, 175 to 300 meters, Radiophone reception, 275 to 600 meters, and a special design for from 500 to 1,000 meters.

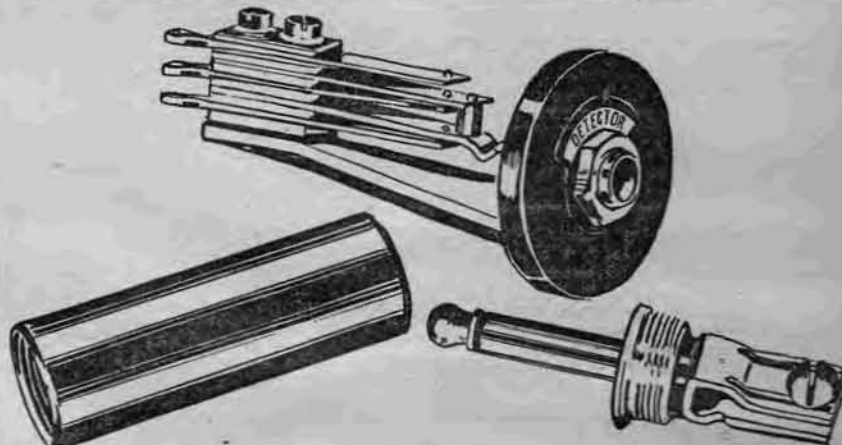
They are designed primarily for use with Radiotron U.V. 200 and 201 tubes or their equivalent. Great care should be taken to see that all connections are as short and direct as possible. Not more than two stages of Radio frequency amplification at most are recommended with receiving equipment using an outside antenna, while three stages may be used for loop antenna.

The transformers are of the iron core type and are incased in hard rubber cases fitted so as to be interchangeable in the receiving circuit through the provision of a mounting block. The mounting blocks have the added advantage of saving the danger from lead burnouts through soldering direct to the transformer.

### Horseshoe Magnet Aids Tube

The sensitivity of an audion tube sometimes may be increased by placing a large horseshoe magnet in a certain position so that the poles of the magnet are on each side of the tube. This probably is due to the magnetic effect upon the moving electrons that flow across from the filament to the plate.

## Hold-Tite Jack Fitted with Nameplate



**T**HE JACK assembly shown in the illustration is the Carter Universal Hold-Tite Radio Jack No. 105, with etched name plate fastened in place, similar to the method used in mounting. These name plates are made to fit on the jack and can be secured with etchings of "telephone," "detector," "1 stage," "2 stage," "3 stage" and "4 stage." It fits around

the jack assembly and is held in place by the adjustable lock knob. They avoid the unnecessary drilling of holes in the panel for name plate mounting or the engraving of same on the panel itself.

The jack is built up with long heavy tapered phosphor bronze contact springs with solid silver contacts. The springs are designed with sufficient contact pressure to hold the plug securely and make good electrical contact. "Micarta" insulation is used between springs. The advantage of this material is in not expanding or contracting, and its ability to withstand 1,000 volts in a break-down test. The tinned terminals project at an angle alternating from one side to the other, thus facilitating the soldering of connections. As a rule the experienced telephone man has little trouble in making good soldering joints between the leads and the spring terminals. To the amateur, however, who is unaccustomed to this sort of work, this wide span of terminal ends possesses considerable advantage in assembly.

The heavy tapered frame is somewhat unusual in design and is so shaped as to avoid the troublesome insulation stack-up between frame and springs. This elimination of unnecessary insulation spacing makes the assembly much more rigid, thus doing away with considerable adjusting usually found necessary in most forms of jacks. Any of the standard forms of plugs can be used in conjunction with this unit, and likewise any of the practical panel thicknesses will do for mounting. The usual variable spacing washers are eliminated without detriment to the appearance of the jack on any panel. In mounting in a panel, it is only necessary to drill a  $\frac{3}{8}$  1-inch hole which will permit sufficient clearance for the shoulder of the nut to act as bearing for the jack. The jacks can be secured with from one to five springs.

### Research for Crystals

Every day engineers are trying to perfect Radio apparatus so that the most inexperienced novices will be able to get the same results from their simple sets that a seasoned professional operator gets from his complicated commercial installation.

The crystal detector is undergoing many changes. Not satisfied with the plain contact detector, Radio men are looking for something better in the laboratories.

In their search for minerals which would rectify they discovered galena, which is a lead sulphite, and many others. Galena was found to work best with a gold or silver wire which touched the crystal surface very lightly. Silicon was found to give best results when the point which was made to bear against was a piece of antimony sharpened to a cone.

But the most sensitive detectors were those which consisted of a mineral element in contact with another. Thus it was found that the copper sulphite crystal commonly called "bornite," in connection with the iron sulphite known as "cahlcopyrite," made an excellent detector combination called "ferro." The common cat whisker was replaced with another mineral, thus increasing the sensitivity of the detector.

### Annealing Hard Copper Wire

If hard drawn copper wire is used for connections in the rear of panels, it will break when bent or it is most sure to break upon removal from the fastening. The end of the wire may be annealed by heating it in a flannel or by applying a coat of tin or solder. The wire can then be bent several times, without its breaking.—W. W. Boes, Milwaukee, Wis.

In England it is proposed to pay the cost of broadcasting through an increased government Radio license fee.

## Dial Chuck Bushing Clutches Shaft



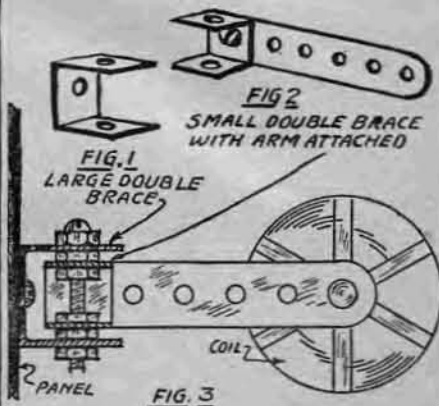
**E**VERY Radio amateur who has ever assembled a set or even purchased a completely assembled set, knows that nine-tenths of the dials furnish constant annoyances by turning loose from the shaft. Again, if the setscrew is tightened too much it may result in either a broken head on the setscrew or stripped threads in the bushing of the dial. For this reason dials that will eliminate the unsightly and troublesome setscrew present a distinct appeal, for with such a dial there will be no need of worrying about splitting the setscrew head or stripping the threads and thus ruining the dial.

The Tait Knob & Dial Company, of New York City, are placing on the market the dial shown in the illustration, patented

June 20, 1922. It is made of a high-grade bakelite. The numeral graduations are made well and are clear cut. Three and four-inch dials are available. For mounting the dial is slipped over the shaft flush with the panel and the graduations are adjusted to the proper angle; holding the dial in place with one hand, the knob is screwed on and tightened. It presents the additional advantage that slight variations in the shaft diameter are taken care of by the self-aligning feature. The thread on the dial bushing is slightly tapered and the bushing is split into four extensions, which are forced evenly against the shaft, thus securing a tight clinching hold without the usual tendency of an eccentric fastening to cause the dial to wobble on the shaft.

### Mecanno Spider Web Mounting

The materials used from the Mecanno set for a simple and efficient spider web coil mounting are as follows:



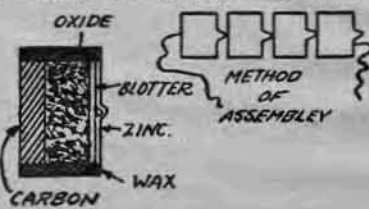
- 1 Small strip  $4\frac{1}{2}$  inches long and  $\frac{1}{2}$  inch wide.
- 1 Large double angle brace.
- 1 Small double angle brace to fit perforated strip.
- 1 Long bolt with five nuts to fit.

The small perforated strip is used for the arm on which the coil is mounted. The arm is attached to a double brace, Fig. 2, and this fits into the larger double brace, Fig. 1, which is fastened to the panel. The nuts are turned down tight enough to keep the arm in place where it is set.—Marcus J. Brown, Atlanta, Ga.

### B Battery for Portable Sets

The main factor of a portable set is small current volume. A small B battery that will work satisfactorily may be made as follows:

Several old dry cells are procured and taken apart. The carbon rods, which are about 1 inch in diameter, are cut into discs  $\frac{1}{8}$ -inch thick. A hack saw may be used for cutting the carbon. Cut discs the



same diameter from some old zinc, or a new sheet. Make a raised portion in the center of each disc with a center punch or the dull end of a nail. Cut discs the same size from heavy blotting paper.

Bore a hole in a  $\frac{1}{2}$ -inch board  $\frac{1}{8}$ -inch larger in diameter than the discs and proceed to assemble as shown. The carbon disc is covered with a layer of the black oxide from the old batteries, about  $\frac{1}{4}$ -inch thick. A disc of blotter, soaked in strong solution of sal ammoniac, is placed on the oxide and then a zinc disc with the raised part up. Sealing wax is poured around the edge and the battery is complete.

Each cell has a potential of about  $1\frac{1}{2}$  volts and the required B voltage can be obtained by piling up the cells the same as in a flashlight.—J. S. Marcus, Philadelphia, Pa.

# Radiophone Broadcasting Stations

## Corrected Every Week.

### HOW TO USE THE NEW DIRECTORY

**T**HE BROADCASTING station directory is much changed with this issue. Every public service broadcasting station is to be found now, not only in the location index, but in the schedule list below. The latter, however is divided, one-half appearing this week, and the other half to appear next week. It is believed the improvement will be greeted as welcome by many readers.

The station schedules, given below, are listed alphabetically by call letters. Following the call is given the city and state, the wave length (PROVIDING a wave length other than 300 meters is used), the miles range of the station, the owner of the station, the schedule of operating hours, and the kind of time used.

The state, city and call list given following the station schedule list is merely an index. One wishing to find the calls of the stations in his vicinity, will find this index useful.

### Station Schedules

**AGI**, Presidio of San Francisco, Cal. 50 mi. Signal Corps, U. S. A. Sun, 7-9 pm, instruction. Pacific.

**ASS**, San Antonio, Tex. 480 only. Camp Travis, U. S. Army. Tues, 7:30-8:30 pm. Thurs, 8:30-9:30 pm. Central.

**CFAC**, Calgary, Alta., Can. G. Welrose Bell.

**CFCA**, Toronto, Canada. 400 only. 500 mi. Toronto Star. Daily ex Sun, 7-9 pm, baseball, stocks, concert. Tues, Fri, 8:30-9:30 pm, concert, address. Eastern.

**CFCB**, Vancouver, Canada. 440 only. 500 mi. Daily Province. Daily ex Sun, 8:30-9:30 pm, news, weather, concert. Pacific.

**CFCE**, Halifax, N. S., Can. Marconi W. T. Co.

**CFCF**, Montreal, Can. 440 only. 200 mi. Marconi Co. Daily, 1-1:30 pm, concert. Mon, Thurs, 8-9 pm, concert. Eastern.

**CFPO**, Fort Frances, Ont., Can. International Radio Develop. Eastern.

**CFTC**, Toronto, Ont., Can. The Bell Telephone Co.

**CHBC**, Calgary, Canada. 410 also. 1,000 mi. W. W. Grant Radio Ltd. (Morning Alberta). Daily, 8:45-10:15 pm, news, stock quotations, music. Mountain.

**CHCA**, Vancouver, B. C., Can. G. Melrose Bell.

**CHCB**, Toronto, Canada. 440 only. 500 mi. Marconi Co. Sun, 8-10 pm, concert. Eastern.

**CHCF**, Winnipeg, Man., Can. G. Melrose Bell.

**CHCG**, Calgary, Canada. 400 only. 200 mi. Western Radio Co. (Calgary Herald). Daily ex Sun, 8:30-4:30 pm, music, news, baseball; 7:45-8:45, music, etc. Sun, 7:45-8:45 pm, church service. Mountain.

**CHCS**, London, Ont., Can. London Radio Shoppe

**CHVC**, Toronto, Canada. 410 only. 200 mi. Metropolitan Motors Co. Daily ex Sat and Sun, 5-8:30 pm, news, concert. Eastern.

**CHXC**, Ottawa, Ont., Can. J. R. Booth Jr.

**CHYK**, Montreal, Que., Can. Northern Elec. Co.

**CJBC**, Montreal, P. Q., Can. 290 and 420. 40 mi. Dupuis Press. Wed, Fri, 9-10 pm or 8-9, music etc. Eastern.

**CJCA**, Edmonton, Canada. 450 only. 500 mi. Edmonton Journal Ltd. Daily ex Sun, every evening, music, bedtime story, news, weather, markets, etc.

**CJCB**, Nelson, B. C., Can. J. G. Bennett.

**CJCD**, Toronto, Canada. 410 only. 200 mi. T. Eaton Co. Daily ex Sat and Sun, 4-4:30 pm, concert. Sat 7-12:30 pm, concert. Eastern.

**CJCE**, Vancouver, B. C., Can. Vancouver Sun.

**CJCF**, Kitchener, Ont., Can. 420 only. 100 mi. News Record Limited. Mon, Tues, Fri, Sat, 9-9:30 pm. Thurs, 8 pm on concert. Eastern.

**CJCG**, Winnipeg, Canada. 410 only. 1,000 mi. Manitoba Free Press. Daily ex Sun, 10-10:30 am, news; 12-1 pm, reports. Mon, Thurs, 8-10 pm, news; 1-15, Tues, 7-8 pm, music. Fri, 5:29-9:45 pm, music. Sun, 8-15 pm, news, other week starting August 30. Central.

**CJCH**, St. John, N. B., Can. McLean Hot & Co.

**CJCN**, Toronto, Ont., Can. Simons, Agnew & Co.

**CJCS**, Halifax, N. S., Can. Eastern Telephone & Telegraph Co.

**CJCG**, London, Ont., Can. London Free Press Print.

**CJNC**, Winnipeg, Man., Can. 400 only. 500 mi. Winnipeg Tribune. Daily ex Sun, 9:30-10 am, 1-2 pm. Mon, 5-6:45 pm. Tues, Fri, 8-10 pm. Thurs, 9-10 am, 7-8 pm. Sun, alternating, starting Aug. 27, 8-10 pm. Central.

**CJSC**, Toronto, Ont., Can. Evening Telegram.

**CKAC**, Montreal, P. Q., Can. 430 only. 2,000 mi. La Presse Pub. Co. Daily 9 am to 11 pm at intervals. Eastern.

**CKCD**, Vancouver, B. C., Can. Daily Province.

**CKCE**, Toronto, Ont., Can. Can. Ind. Telephone Co.

**CKCF**, Regina, Sask., Can. 420 only. 1,500 mi. Leader Pub. Co. Daily ex Sun, 10-10:30 am, news; 1-15, 2-2 pm, markets, news, music. Mon, Wed, Thurs, 7:30-8:15 pm, news, music. Tues, Fri, 7:30-9 pm, concert. Mountain.

**CKCR**, St. John, N. B., Can. 400 only. 150 mi. Jones Electric Radio, Ltd. Daily, 9-10 pm, 60th meridian.

**CKCS**, Montreal, Que., Can. The Bell Telephone Co.

**CKCC**, Hamilton, Ont., Can. Wentworth Radio Supply

**CKCG**, London, Ont., Can. Radio Supply Co. of London.

**CKCZ**, Winnipeg, Man., Can. Saltun Radio Eng. Co.

**DD5**, Denver, Colo. 340 only. 200 mi. Fitzsimons General Hospital. Daily ex Sun, 8:15 pm, weather, news, concert. Thurs, 8:15-9:30 pm, special concert. Mountain.

**DKAT**, San Antonio, Tex. Brooks Field, U. S. Army. Daily ex Sun, 6:30-7:30 pm, music. Sun, 6-7 pm, music. Central.

**DN4**, Denver, Colo. 340 only. 200 mi. Colorado National Guard. Daily ex Sun, 8:15 pm, weather, news, concert. Thurs, 8:15-9:30 pm, special concert. Mountain.

**KFAA**, Pittsburgh, Pa. 1,000 mi. Westinghouse Elec. Mfg. Co. Daily ex Sun, 10-10:15 am, 12:30-1 pm, 2-2:30, 4-4:30, music; 7:30, bedtime story; 7:45, news; 8:30-9:30, music, news. Sat, 3-4 pm, concert. Sun, 10-10:15 am, 3 pm and 7:30, church service. Eastern.

**KFN**, San Francisco, Cal. 455 also. 250 mi. Leo J. Meyberg Co. Daily ex Sun, 11-12 am, 1-2 pm, 4:30-5:30, concert; 7-7:15, weather; 8:30-9, concert. Sat, nothing after 5:30 pm. Sun, 10-11 am, sacred concert. Pacific.

**KDPM**, Cleveland, O. Westinghouse Elec. & Mfg. Co.

**KDPT**, San Diego, Calif. 250 mi. Southern Elec. Co. Daily 7:30-9 pm, news, weather, concert, lecture. Pacific.

**KDYL**, Salt Lake City, U. 485 also. 300 mi. Salt Lake Telegram. Daily ex Sun, 7-8 pm, music, baseball, news, weather; 9-9:30 (occasionally). Sun, 2-3 pm, church service. Mountain.

**KDYM**, San Diego, Calif. Savoy Theater.

**KDYN**, Red Wood City, Calif. Great Western Radio Corp.

**KBYO**, San Diego, Calif. Carlson & Stinson.

**KBYQ**, Portland, Ore. Oregon Inst. of Technology.

**KDZR**, Bellingham, Wash. Bellingham Pub. Co.

**KDZL**, Seattle, Wash. 300 mi. The Rhodes Co. Daily ex Sun, 8:30-4:15 pm. Mon, Wed, Fri, 7:15-8:15 pm. Pacific.

**KDZF**, Los Angeles, Calif. Automobile Club of South California.

**KDZG**, San Francisco, Calif. Cyrus Pierce & Co.

**KDZH**, Fresno, Calif. 485 also. 50 mi. The Herald-Bufford Co. Daily ex Sun, 4-5 pm, news, sports, music. Mon, Wed, Thurs, Sat, Sun, 7-8 pm, music. Tues, 8-9 pm, music. Fri, 8-8:50 pm, music. Sun, 10-11 am, concert. Pacific.

**KDZI**, Wenatchee, Wash. 300 mi. Elec. Supply Co. Daily ex Sun, 4:30-5:30 pm, music. Mon, Wed, Fri, 8-9 pm, concert. Sun, 11-12:30 pm, church service. Pacific.

**KDZJ**, Eugene, Ore. Excelsior Radio Co.

**KDZK**, Reno, Nev. Nevada Radio & Elec. Co.

**KDZL**, Ogden, Utah. Ogden Mountain Radio Corp.

**KDZM**, Centralia, Wash. E. A. Hollingsworth.

**KDZN**, Los Angeles, Calif. Newberry Elec. Corp.

**KDZO**, Denver, Colo. 100 mi. Moore-Hird Radio Co. Mon, Wed, 8:15-9:20 pm, concert. Mountain.

**KDZP**, Bellingham, Wash. Bellingham Pub. Co.

**KDZQ**, Seattle, Wash. Seattle Radio Assn.

**KDZR**, San Francisco, Calif. Claude W. Gerdes.

**KDZS**, San Francisco, Calif. Glad Tidings Tabernacle.

**KDZT**, Everett, Wash. 100 mi. Kinney Bros. & Stepprell. Daily ex Sun, 2:30-3:30 pm, 8-9:30. Pacific.

**KFAH**, Portland, Ore. Pacific Radiophone Co.

**KFAC**, Glendale, Calif. 355 and 485. 250 mi. Daily News. Daily ex Sun, 4:15-5:15 pm, news etc. Mon, Wed, Fri, 7-8 pm, concert. Pacific.

**KFAD**, Phoenix, Ariz. 485 also. 100 mi. Mon, Wed, Fri, 8-9:15 pm, concert, weather, stocks, markets. Sun, morning, church service. Mountain.

**KFAE**, Pullman, Wash. 200 mi. State College of Wash. Program irregular.

**KFAF**, Denver, Colo. 1,800 mi. Western Radio Corp. Sun, Tues, Wed, Fri, Sat, 8-9 pm, music, news, etc. Mountain.

**KFAJ**, Boulder, Colo. Univ. of Colo.

**KFAN**, Moscow, Idaho. The Elec. Shop.

**KFAP**, Butte, Mont. Standard Pub. Co.

**KFAQ**, San Jose, Calif. City of San Jose.

**KFAR**, Hollywood, Calif. Radio Lighting Service Co.

**KFAS**, Reno, Nev. Reno Motor Supply Co.

**KFAT**, Eugene, Ore. S. T. Donohue.

**KFAU**, Boise, Idaho. 485 also. 400 mi. Boise High School. Daily ex Sun, 8-8:10 am, markets; 9:30-9:35, weather; 9:35-10, news, lecture; 12:15-12:20 pm, 1:20-1:30 and 2-2:10, news; 3:15-9, music. Sun, 8:30 pm, weather. Mountain.

**KFAV**, Venice, Calif. Cooke & Chapman.

**KFAW**, Santa Ana, Calif. The Radio Den.

**KFAY**, Central Point, Ore. W. J. Virgin Milling Co.

**KFBA**, Lewiston, Idaho. Ramey & Bryant Radio Co.

**KFBB**, Havre, Mont. P. A. Buttrey & Co.

**KFBC**, San Diego, Calif. 150 mi. W. K. Azbill. Thurs, 7:30-8:10 pm, Pacific.

**KFBD**, Hanford, Calif. 100 mi. Calif. Radio Lab. Daily ex Sun, 8-4 pm, 8-9, Sun, 6-6 pm. Pacific.

**KFBE**, San Luis Obispo, Calif. 50 mi. Cline's Elec. Shop. Daily ex Sun, 4-5 pm. Tues, Fri, 7-8 pm. Sun, 10-11 am. Pacific.

**KFBF**, Butte, Mont. Butte School of Telegraphy.

**KFBG**, Tacoma, Wash. First Presbyterian Church.

**KFBH**, Marshfield, Ore. Thomas Musical Co.

**KFBJ**, Boise, Idaho. 170 mi. Boise Radio Supply Co. Daily ex Sun, 5-5:30 pm, police reports, music. Mon, Wed, Fri, 7:45-8:15 pm, concert. Tues, Thurs, Sat, 8:15-9 pm, concert. Mountain.

**KFBK**, Sacramento, Calif. 300 mi. Kimball-Upton Co. Daily ex Sun, 8-4 pm, concert; 8-6:30, markets, news, Thurs, Sun, 8-9 pm, concert. Pacific.

**KFBL**, Everett, Wash. Lesse Bros.

**KFBM**, Astoria, Ore. Cook & Foster.

**KFBN**, Oakland, Calif. Borch Radio Corp.

**KFBQ**, Prescott, Ariz. Savage Elec. Co.

**KFC**, Phoenix, Wash. 700 mi. Northern Radio & Elec. Co. Daily, eight hours, miscellaneous. Pacific.

**KFCB**, Phoenix, Ariz. 100 mi. Nielsen Radio Supply Co. Mon, Wed, Fri, 8-9 pm, concert. Mountain.

**KFCC**, Wallace, Idaho. Auto Supply Co.

**KFCD**, Salem, Ore. Sales Elec. Co.

**KFDS**, San Francisco, Calif. John D. McKee.

**KFE**, Los Angeles, Calif. 200 mi. Earle C. Anthony, Inc. Daily, 3:15-4:30 pm, music, news; 4:30-5, news. Sun, 9-9:15 pm, music. Pacific.

**KFV**, Yakima, Wash. Foster-Bradbury Radio Stores.

**KFZ**, Spokane, Wash. 300 mi. Duerr Mitchell Elec. Co. Daily ex Sun, 7:30-9:30 pm, concerts and voice. Pacific.

**KGB**, Tacoma, Wash. 200 mi. Wm. A. Mullins Elec. Co. (Tacoma Ledger). Daily, 4-5 pm, 7:30-9:30. Pacific.

**KGC**, Hollywood, Cal. 300 mi. Elec. Lighting Supply Co. Tues, Thurs, Sat, 7:30-8 pm, concert. Pacific.

**KGF**, Pomona, Cal. 150 mi. Pomona Fixture & Wiring Co. Thurs, 7:30-8:15 pm, news, markets, concert. Mountain.

**KGG**, Portland, Ore. 500 mi. Hallock & Watson Radio Service. Daily ex Sun, 4:30-6 and 7-7:30 pm, baseball scores, markets, news. Sat, 9:10 pm, instruction. Sun, 4:30-6 pm, Pacific.

**KGN**, Portland, Ore. 500 mi. Northwestern Radio Mfg. Co. Daily, 12-1 pm, concert, lecture; 2:30-3:30, miscellaneous. Mon, Fri, Sun, 9-10 pm, health bulletins, concert. Tues, 7-7:30 pm, miscellaneous; 8-9, concert. Wed, Thurs, Fri, Sat, 7-7:30 pm, miscellaneous. Pacific.

**KGO**, Altadena, Calif. 300 mi. Altadena Radio Lab. Daily, 1-2 pm, 6-7. Pacific.

**KGU**, Honolulu, Hawaii. 485 also. 150 mi. The Honolulu Advertiser. Daily, 7:30-9 pm. Tues, Thurs, Sat special program. 150th meridian. (Three hours later than Pacific).

**KGW**, Portland, Ore. 200 mi. Ship Owners Radio Service Inc. (Daily Oregonian). Daily, 3:30-4:30 pm, news etc. Mon, Fri, 8:30-9 pm, concert. Wed, 8-10 pm, concert. Fri, 8-9 pm, concert. Sun, 7-8 pm, church service. Pacific.

**KBY**, Lacey, Wash. 180 mi. St. Martinus College. Tues, Fri, Sun, 8:30-9:30 pm, concert, news, Pacific.

**KHD**, Colorado Springs, Colo. 200; 485 meters only. 100 mi. Aldrich Marble & Granite Co. Daily except Sun, 8:15 am, weather, forestry bulletins, etc. Mountain.

**KHJ**, Los Angeles, Calif. 485 also. 50 mi. C. R. Kierulff & Co. (Los Angeles Times). Daily ex Sat and Sun, 1-1:45 pm, 7:15-8, concert, lecture, news. Pacific.

**KIC**, Seattle, Wash. Louis Wanner.

**KJG**, Los Angeles, Calif. 100 mi. Standard Radio Co. Baker Bros. Daily ex Sun, 11:30-12 noon. Mon, 10-11 am. Wed, 9-10 am. Sun, 1-2 pm, 5-6. Pacific.

**KJJ**, Sunnyvale, Cal. 1,000 mi. The Radio Shop. Tues, 3:15-9 pm, concert. Fri, 7:30-8:15 pm, concert. Pacific.

**KJQ**, Stockton, Calif. C. O. Gould.

**KJL**, Los Angeles, Calif. 200 mi. Northwest Radio Service Co. Daily ex Sun, 8-9 pm, miscellaneous. Pacific.

**KJS**, Los Angeles, Calif. 100 mi. Bible Inst. of Los Angeles. Tues, Wed, 12-12:30 pm, sacred music, lecture. Sun, 11:30-12:30 pm, sacred music, sermon. Pacific.

**KLB**, Pasadena, Cal. 300 mi. J. J. Dunn Co. Mon and Wed, 7:30-8:30 pm, concert. Sun, 3-4 pm and 8-9, concert. Pacific.

**KLN**, Del Monte, Calif. Monterey Elec. Shop. Daily, 12-1 pm, weather, markets, news; 7-8 pm, concert. Pacific.

**KLP**, Los Altos, Cal. 1,500 mi. Colin B. Kennedy Co. Mon, 7:30-8:30 pm, industry news, concert. Thurs, 8:30-9 pm, concert. Sun, 4-5 pm, concert. Pacific.

**KLS**, Oakland, Cal. 150 mi. Warner Bros. Daily, 12-1 pm, concert. Sat, 7:30-8:15 pm, concert. Pacific.

**KLX**, Oakland, Calif. Tribune Pub. Co.

**KLZ**, Denver, Colo. 485 also. 200 mi. Reynolds Radio Co. Daily ex Sun, 7:30 pm on, news, markets, bedtime story, concert. Sun, 6-9 pm, church service. Mountain.

**KMC**, Reedley, Calif. 100 mi. Lindsay-Weatherill & Co. Mon, Wed, Fri, 8:30-9 pm, concert. Pacific.

**KMJ**, Fresno, Calif. San Joaquin Light & Power Corp.

**KMO**, Tacoma, Wash. 200 mi. Tacoma Times. (Love Electric Co.) Daily ex Sun, 11-11 pm, 6-7, 9:15-10, concert, news, lecture. Pacific.

**KNI**, Eureka, Calif. T. W. Smith.

**KNJ**, Roswell, N. M. 300 mi. Roswell Public Service Co. Daily ex Sun, 7-9 pm, weather, financial, markets, news. Sun, 7-9 pm, church service. Mountain.

**KNT**, Aberdeen, Wash. 400 mi. Grays Harbor Radio Co. Daily, 5-5:30 pm, 7:30-8:15, news, concert. Pacific.

**KNV**, Los Angeles, Calif. Radio Supply Co.

**KNX**, Los Angeles, Calif. Elec. Lighting Supply Co.

**KOB**, State College, N. M. N. M. College of Agri. and Mechanical Arts.

**KOG**, Los Angeles, Calif. 300 mi. Western Radio Elec. Co. (Evening Herald). Daily, 12:15-12:30 pm, markets; 5-5:30, news. Tues, Wed, Fri, 8:15-9 pm, concert. Pacific.

**KON**, Los Angeles, Calif. 200 mi. Holzwasser Inc. Daily ex Sun, 4-5 pm and 8-8:5, concert, news. Sun, 10-11 am, 4-5 pm and 8:15-9, church service. Pacific.

**KOP**, Detroit, Mich. Detroit Police Dept.

**KQQ**, Modesto, Calif. Evening News.

**KPO**, San Francisco, Calif. Hale Bros.

**KQI**, Berkeley, Calif. Univ. of Calif.

**KQP**, Hood River, Ore. 300 mi. Hood River News. Daily ex Sun, 7 pm, markets, news. Tues, Fri, 8:30-9:15 pm, concert. Sun, 9-9:45 pm, concert. Pacific.

**KQV**, Yakima, Wash. Elec. Power and Appliance Co.

**KQT**, Pittsburgh, Pa. 100 mi. Doubleday-Hill Elec. Co. Daily ex Sat and Sun, 12-12:30 pm, 2:30-3 pm. Mon, Wed, Fri, 10-11 pm. Sat, 12-12:30 pm. Sun, 1-5 pm. Eastern.

**KQW**, San Jose, Cal. 200 mi. Chas. D. Herold. Daily, 7:30-8 pm, Wed, 8:15-9 pm, concert. Pacific.

**KQY**, Portland, Ore. 100 mi. Stubbs Elec. Co. Daily, 1-2 pm, 6-7, miscellaneous. Pacific.

**KRE**, Berkeley, Cal. 100 mi. Maxwell Elec. Co. Sun, 1-2 pm, 6-7 pm, concert. Pacific.

**KSD**, St. Louis, Mo. 40 and 485 only. 1,500 mi. Post-Dispatch. Daily ex Sun, 8:40 am, 9:40, 10:40, 11:40, 12:40 pm, 2:40, markets, stocks, bonds, weather, news; 4, music, news; 8, concert, etc. Sun, 8:15 pm, baseball. Central.

**KSL**, San Francisco, Cal. 50 mi. The Emporium. Daily ex Sun, 10-11 am, concert, news; 2-3 pm, concert, educational talk. Sun, 2-3 pm, concert and educational talk. Pacific.

**KSS**, Long Beach, Calif. 25 mi. Prest & Dean Radio Research Lab. Daily ex Sun, 3:30-4:30 pm, news, concert. Pacific.

**KTW**, Seattle, Wash. 200 mi. First Presbyterian Church. Sun, 12-1 pm, 7:30-10, church service. Pacific.

**KTF**, San Francisco, Cal. 485 also. 1,500 mi. San Francisco Examiner. Daily ex Sun, 3-3:30 pm, and 5:30-6:15, news, etc. Sun, 5-6 pm, news, etc. Pacific.

**KOS**, Los Angeles, Calif. City Dye Wks. and Laundry Co.

**KUY**, El Monte, Calif. 500 mi. Coast Radio Co. Daily ex Sun, 4-4:45 pm, lecture, concert. Mon, 8-9 pm, lecture, concert. Thurs, 8-9 pm, concert. Pacific.

**KVQ**, Sacramento, Calif. 1,000 mi. Jas. McClatchy. Daily ex Sun, 5:30-6:30 pm, concert, news, markets, weather. Wed and Sat, 8-9 concert. Sun, 5-7 pm, concert. Pacific.

**KWG**, Stockton, Cal. 1,500 mi. Portable Wireless Telephone Co. Daily ex Sun, 4-5 pm, news, concert, market. Tues and Fri, 8-9 pm, concert. Sun, 2-3 pm, concert. Pacific.

**KWH**, Los Angeles, Calif. 485 also. 300 mi. Examiner. Daily ex Sat, 12:30 pm, music, news, reports. Daily, 5:30-6:30 pm, music, news. Sunday, 2-3 pm, sacred concert. Pacific.

**KXB**, Modesto, Calif. Herald Pub. Co.

**KXS**, Los Angeles, Calif. Bruun Corp.

**KYF**, San Diego, Calif. Thearic Music Co.

**KYB**, Portland, Ore. 700 mi. W. P. Hawley, Jr. Tues, Thurs, 9-10 pm, concert. Sat, 8-9 pm, concert. Pacific.

**KVI**, Bakersfield, Calif. Bakersfield Californian.

**KVL**, Los Angeles, Cal. 485 also. 1,000 mi. Leo J. Meyberg Co. (Hamburgers). Daily ex Sun, 4-5 pm, concert, markets, weather, news. Mon, Thurs, Sat, 8-9 pm, same program. Pacific.

**KYW**, Chicago, Ill. 485 also. 1,500 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 9:35 am-1:20 pm, market quotations every half hr; 2:15, news, markets; 3, baseball; 4:15 and 6:30, news, final markets and stocks; 7:30, baseball, bedtime story; 7:45, feature; 8-9, concert; 9, news. Sun, 3:30 pm, church service. Central.

**KYY**, San Francisco, Calif. The Radio Telephone Shop.

**KZC**, Seattle, Wash. 50 mi. Public Market & Dept. Store Co. Daily ex Sun, 6:45-7:15 pm, prices of food-stuffs. Pacific.

**KZM**, Oakland, Cal. 200 mi. Preston D. Allen. Daily ex Sun, 7:45-7:59 pm, news, Tues, 7:30-8:15 pm, concert. Fri, 8:15-9 pm, news, concert. Pacific.

**KZN**, Salt Lake City, U. 485 also. 1,000 mi. Deseret News. Daily ex Sun, 3-4 pm, weather, markets, music; 8-9, news, concert. Mountain.

**KZY**, Wenatchee, Wash. Wenatchee Battery & Motor Co.

**KZV**, San Francisco, Cal. 1,500 mi. Atlantic Pacific Radio Supplies Co. Daily ex Sun, 8:30-4:30 pm, concert; 6:15-7 pm, news, Wed, 7:30-8:15 pm, concert. Sat, 8:15-9 pm, concert. Sun, 11-12:15 pm, church service; 3-4 pm, concert. Pacific.

**WAAB**, New Orleans, La. Valdemar Jensen.

**WAAC**, New Orleans, La. Tulane Univ.

**WAAD**, Cincinnati, O. Ohio Mechanics Inst.

**WAAE**, St. Louis, Mo. St. Louis Chamber of Commerce.

**WAAF**, Chicago, Ill. Daily Drivers Journal.

**WAAG**, Shreveport, La. 50 mi. Boudreau Co. Daily ex Sun, 7:30-9 pm, baseball, concert. Central.

**WAAS**, St. Paul, Minn. Commonwealth Elec. Co. 100 mi. Daily ex Sun, 11-11:30 am, 2-2:30 pm, 9-9:20, Central.

**WAAT**, Boston, Mass. 50 mi. Eastern Radio Inst. Mon, Wed, Fri, 9-10 pm, concert. Eastern.

**WAAX**, Milwaukee, Wis. 485 also. 300 mi. Gimbel Bros. Daily ex Sun, 10 am, markets, weather; 11, markets; 12-12:10 pm, markets; 1-2:15, closing markets; 2 and every hr. after, concert, test; 7, weather; 7:15, baseball; 7:30, concert. Central.

**WAAL**, Minneapolis, Minn. Minnesota Tribune Co.

**WAAM**, Newark, N. J. I. R. Nelson Co.

**WAAN**, Columbia, Mo. Univ. of Mo.

**WAAP**, Charleston, W. Va. 10 mi. Radio Service Co. Daily ex Sun, 8:45-7:45 pm, music, news, weather, baseball. Eastern.

**WAAR**, Wichita, Kan. 200 mi. United Elec. Co. Daily, 12-1:30 pm, music, news; 5, weather; 7:15-7:30, sports, markets; 9:45-12, talks, music, and code on C. W.; 10:30, w-ather. Tues, Fri, 8 pm on, concert. etc. Central.

**WAAS**, Decatur, Ga. Georgia Radio Co.

**WAAT**, Jersey City, N. J. 70 mi. Jersey Review. Wed, 7-8 pm, concert, lecture. Sun, 7-8, church service, Eastern.

**WAAY**, Athens, O. 500 mi. Athens Radio Co. Daily, 7-9 pm, miscellaneous. Central.

**WAAB**, Omaha, Neb. 100 mi. 485 also. Omaha Grain Exchange. Daily ex Sun, 8:45 am, 9:45, 10:45, 11:45, 12:30 pm, 8, markets. Central.

**WAAC**, Crafton, Pa. Radio Service Corp.

**WAAY**, Youngstown, O. 300 mi. Yohrling Rayner Music Co. Tues, Thurs, Sat, 8:45 pm, baseball, news; 7:30, music; 8-9, address, music. Eastern.

**WAAZ**, Emporia, Kan. 250 mi. Hollister-Miller Motor Co. Fri, 8:30, 8:15-8:15 pm, market quotations every half hr; 7-8 pm, concert, weather. Sun, church service, 2 pm. Central.

**WAH**, El Dorado, Kans. Midland Refining Co.

**WAJ**, Marshall, Mo. Kelly-Vawter Jewelry Co.

**WAJU**, Yankton, S. D. Yankton College.

**WBAA**, W. Lafayette, Ind. 100 mi. Purdue University. Fri, 8:15-8:30 pm, educational lecture. Other features irregular. Central.

**WBAB**, Syracuse, N. Y. 1,000 mi. Andrew J. Potter. Daily ex Sun, 7-8 pm, concert, baseball, weather, news, bedtime story. Sun, 6:30-7:30 pm, church service, etc. Eastern.

**WBAD**, Minneapolis, Minn. Sterling Elec. Co. (Journal Printing Co.).

**WBAA**, Peoria, Ill. Bradley Polytechnic Inst.

**WBAB**, Moorstown, N. J. Fred M. Middleton.

**WBAG**, Bridgeport, Pa. 485 also. 300 mi. Diamond State Fibre Co. Daily ex Sun, 10:45-11:15 am, weather, markets. Eastern.

**WBAH**, Minneapolis, Minn. The Dayton Co. 100 mi. Daily ex Sun, 1-1:30 pm, 3-3:20, 6-5:20, 9:20-9:40. Central.

**WBAJ**, Toledo, O. 450 also. 500 mi. Marshall-Gerken Co. Tues, Thurs, Sat, 6-7:30 pm, news, bedtime story. 8:00 pm, concert. Eastern.

**WBAM**, New Orleans, La. 100 mi. I. B. Bennyson. Daily ex Sun, 10-11 pm, real estate bulletins, lecture, concert. Central.

**WBAN**, Paterson, N. J. 100 mi. Wireless Phone Corp. Daily ex Sun, 10:30 am, on the hour to 9:30 pm, concert, baseball. Eastern.

**WBAP**, Decatur, Ill. James Millikin Univ.

**WBAP**, Fort Worth, Tex. 485 also. 100 mi. Star Telegram. Daily ex Sun, 8:45-9 am, opening markets; 11-11:30, weather, markets; 1:30-2 pm, closing markets; 3:45-4, news, road conditions; 5:15-5:30, police; 6:30-6:45, baseball, police news; 9:30-10, music. Sun, 11-12:15 pm, church service; 2-2:30 pm, sermonette; 3:30-4, concert; 6:45-7 baseball. Central.

**WBAQ**, South Bend, Ind. 100 mi. Myron L. Harmon. Daily, 5:30-6 pm, news, concert; 8 pm, concert, news, police reports. Sun, 8:30 pm, church services. Central.

**WBAU**, Hamilton, O. Republican Pub. Co.

**WBAV**, Columbus, O. 485 also. 200 mi. Erner & Hopkins Co. Daily ex Sun, 5:30-7:30 pm. Central.

**WBAX**, Marietta, O. Marietta College.

**WBAX**, Wilkes-Barre, Pa. 200 mi. John H. Stenger, Jr. Three nights of week, not regular.

**WBAY**, New York, N. Y. 485 only. 1,500 mi. A. T. & T. Co. Daily, 11-12 am, 4:30-5:30 pm. Thurs, 7:30 pm on Eastern daylight saving.

**WBZA**, Richmond, Va. 300 mi. Times-Dispatch. Daily, 7-9 pm, news, concert, markets, etc. Eastern.

**WBL**, Anthony, Kan. 300 mi. T. & H. Radio Co. Daily ex Sun, 8:50 am, 9:50, 10:50 and 1:15 pm, Kansas grain markets; 1:15, roads, local markets; 7-8, concert, etc. Sun, 4-5, concert. Central.

**WBS**, Newark, N. J. D. W. May (Inc.).

**WBT**, Charlotte, N. C. 485 also. 500 mi. Southern Radio corp. Daily ex Sun, 11 am, weather; 8 pm, baseball, markets. Mon, Wed, Fri, 8:30-9:30 pm, concert. Sun, 11 am, 8 pm, church service. Eastern.

**WBW**, Chicago, Ill. City of Chicago.

**WBZ**, Springfield, Mass. 600 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 7:30 pm, children's hour; 7:45, markets, weather, lecture; 8-9, concert. Sun, 3 and 8, church service. Eastern.

**WCB**, Newburgh, N. Y. 100 mi. Newburgh Daily News. Daily ex Sun, on half hour 12:30-6:30 pm, news, sports, concert; 10:30-11 pm, concert, feature. Eastern.

**WCAC**, Fort Smith, Ark. 500 mi. John E. Fink Jewelry Co. Fri, Sun, 8-10 pm, music, talks, sermon. Central.

**WCAD**, Canton, N. Y. St. Lawrence Univ.

**WCAG**, Pittsburgh, Pa. Kaufman & Baer Co.

**WCAN**, New Orleans, La. Daily Star Pub. Co.

**WCAP**, Columbus, O. 300 mi. Entelch Elec. Co. Tues, Fri, 7-8 pm, concert, bedtime stories. Sat, 3-4 pm, lecture, music. Central.

**WCAI**, San Antonio, Tex. Southern Equipment Co.

**WCAL**, University Place, Neb. Nebr. Wesleyan Univ.

**WCAM**, Houston, Tex. 200 mi. A. P. Daniel. Daily ex Sun, 7-7:15 pm, news, 7:15-8, West, Sat, 8-9 pm, concert. Sun, 8-4 pm, concert. Central.

**WCAN**, Northfield, Minn. 400 mi. St. Olaf College. Fri, 9:15-10 pm, concert, lecture, news. Sun, 8:30-9:30 pm, chapel, music. Central.

**WCAN**, Villanova, Pa. Villanova College.

**WCAN</**



**State, City, Call**

**Alabama:** Birmingham, WLAG, WSY  
Mobile, WEAP  
Montgomery, WKAN

**Arizona:** Phoenix, KDYW, KFAD,  
KFCE  
Prescott, KFBQ  
Tucson, KDZA

**Arkansas:** Fort Smith, WCAK, WGAR  
Little Rock, WCAV,  
WEAX, WSV  
Pine Bluff, WOK

**California:** Altadena, KGO  
Bakersfield, KDZB, KYI  
Berkeley, KQI, KRE  
Del Monte, KLN  
El Monte, KUY  
Eureka, KNI  
Fresno, KDZH, KMJ  
Glendale, KFAC  
Hanford, KFBD  
Hollywood, KFAR, KGC  
Long Beach, KSS  
Los Angeles, KLP  
Los Angeles, KDZD,  
KDZF, KDZP, KFI,  
KHJ, KJC, KJS, KNN,  
KNV, KNX, KOG, KON,  
KUS, KWH, KXS, KYJ  
Modesto, KQO, KXD  
Oakland, KFBN, KLS,  
KLV, KZM,  
Pasadena, KDYR, KLB  
Pomona, KGF  
Redwood City, KMC  
Redwood City, KDYN  
Sacramento, KFBK, KVQ  
San Diego, KDPT, KDYM,  
KDYO, KFBC, KYF  
San Francisco, AGI, KDN,  
KDZG, KDZV, KDZX,  
KFDE, KPO, KSL, KUO,  
KZY  
San Jose, KFAQ, KQW,  
San Luis Obispo, KFBE  
Santa Ana, KFAW  
Stockton, KJQ, KWG  
Sunnyvale, KJJ  
Venice, KFAV

**Colorado:** Boulder, KFAJ  
Colorado Springs, KHD  
Denver, DD5, DN4  
Denver, KFAF, KLZ

**Connecticut:** Bridgeport, WKAX  
Greenwich, WAAQ  
Hartford, WDAK  
New Haven, WCJ, WGAH

**Delaware:** Wilmington, WHAV

**District of Columbia:** Anacostia, NOF  
Washington, WDM,  
WEAS, WHAQ, WIL,  
WJAX, WJH, WMU,  
WPN, WWX, 3YN

**Florida:** Jacksonville, WCAN,  
WDAL  
Miami, WFAW, WYAZ  
Pensacola, WGAN  
Tampa, WDAE, WEAT,  
WHAW  
West Palm Beach, WKAH

**Georgia:** Atlanta, WAAS, WDAW,  
WSB, 4CD  
College Park, WDAJ  
Janesville, WKAY  
Savannah, WGAU, WHAO

**Idaho:** Boise, KFAU, KFBJ  
Lewiston, KFRA  
Moscow, KFAN  
Wallace, KFCC

**Illinois:** Chicago, KYW, WAAF,  
WBU, WDAF, WGAZ,  
WGU, WJAZ, WQX  
Decatur, WBAO, WCAP,  
WHAP  
Peoria, WBAE, WFAP,  
WJAN  
Quincy, WCAW, WCAZ  
Rockford, WJAB, WJAH  
Springfield, WDAK  
Tuscola, WJZ  
Urbana, WRM

**Indiana:** Anderson, WMA  
Fort Wayne, WFAS  
Frankfort, WKAT  
Greencastle, WLAX  
Huntington, WHAY  
Indianapolis, WLK, WOH  
Marion, WIAQ  
Richmond, WOZ  
South Bend, WBAQ, WGAZ  
Terre Haute, WEAC  
West Lafayette, WBAA

**Iowa:** Ames, WOI  
Burlington, WIAS, WLAT  
Cedar Rapids, WJAM,  
WKAA  
Centerville, WDAK  
Davenport, WHAI, WOC  
Des Moines, WGF  
Fort Dodge, WEAB  
Iowa City, WHAA  
Le Mars, WIAU  
Marshalltown, WJAR  
Shenandoah, WGAJ  
Sioux City, WEAU, WHAE  
Vinton, WIAE  
Waterloo, WEAZ, WHAC

**Kansas:** Anthony, WBL  
Atwood, WEAD  
Eldorado, WAH  
Emporia, WAAZ  
Hutchinson, WLAS  
Independence, WFAJ  
Liberia, WMAK  
Lindsborg, WDAK  
Manhattan, WTG  
Salina, WJAD  
Topeka, WJAO  
Wichita, WAAQ, WEAH,  
WEY, WHAN

**State, City, Call**

**Kentucky:** Louisville, WHAS, WKAG,  
WLAP, 9ARU  
Paducah, WIAR

**Louisiana:** New Orleans, WAAB,  
WAAC, WBAM, WCAK,  
WGV, WIAF, WWL  
Shreveport, WAAQ,  
WDAN, WGAQ

**Maine:** Auburn, WMB  
Houlton, WLAN  
Portland, WJAL  
Sanford, WJAR

**Maryland:** Baltimore, WCAO, WEAR,  
WKC

**Massachusetts:** Boston, WAAJ, WFAU,  
WNAC  
Dartmouth, WMAF  
Holyoke, WHAX  
Medford Hillside, WGI  
New Bedford, WDAU  
Springfield, WEZ, WIAP  
Worcester, WCN, WDAS,  
WDAT

**Michigan:** Bay City, WTP  
Dearborn, WWI  
Detroit, KOP, WCX, WWJ  
East Lansing, WHW,  
WKAR  
Flint, WEAA  
Kalamazoo, WLAQ  
Lansing, WHAL  
Saginaw, WIAW

**Minnesota:** Duluth, WJAP  
Hutchinson, WFAN  
Minneapolis, WBAH,  
WCS, WLAG, WLB  
Northfield, WCAL  
St. Cloud, WFAW  
St. Paul, WAAH

**Mississippi:** Corinth, WHAU

**Missouri:** Brentwood, WFAK  
Cameron, WFAQ  
Carrollton, WLAB  
Columbia, WAAN  
Jefferson City, WOS  
Joplin, WHAH, WJAC  
Kansas City, WDAF,  
WHB, WMAJ, WOQ,  
WPE  
Marshall, WJAT  
Rockport, WNAD  
St. Joseph, WEAK  
St. Louis, KSD, WAAE,  
WCK, WEB, WEW  
Springfield, WIAI, WKAS  
Tarkio, WIAT

**Montana:** Butte, KFAP, KFBB  
Great Falls, KDYS  
Havre, KFBB

**Nebraska:** Hastings, WKAM, WLAD  
Lincoln, WCAJ, WFAV,  
WGAT, WJAX, WJAB,  
WKAC, WJAF, WMAH  
Norfolk, WJAG  
Omaha, WAAW, WIAK,  
WNAL, WOU, WOV  
Rushville, WEAV

**Nevada:** Reno, KDZK, KFAS

**New Hampshire:** Berlin, WEAQ  
Laconia, WKAV

**New Jersey:** Atlantic City, WHAR  
Camden, WRP  
Deal Beach, 2XJ  
Jersey City, WAAT  
Moorestown, WBAF  
Newark, WAAW, WBS,  
WJX, WJZ, WOR, 2XAI  
N. Plainfield, WEAM  
Ocean City, WIAD  
Paterson, WBAN

**New Mexico:** Roswell, KNJ  
State College, KOB

**New York:** Albany, WNJ  
Binghamton, WFAX,  
WIAV  
Brooklyn, WGAC  
Buffalo, WGR, WWT  
Canton, WCAD  
Cazenovia, WMAC  
Ithaca, WEAI  
Newburgh, WCAB  
New York, KDOW, WBAY,  
WDAM, WDT, WEAF,  
WVP, WWZ  
Poughkeepsie, WFAF  
Rochester, WHAM, WHQ  
Ridgewood, WHN  
Schenectady, WGY, WRL  
Syracuse, WBAB, WDAI,  
WFAB, WLAH  
Tarrytown, WRW  
Troy, WHAZ  
Utica, WSL  
Waterford, WFAG

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

**North Dakota:** Fargo, WDAY, WKAJ

**Ohio:** Akron, WOE  
Athens, WAAV  
Canton, WWB  
Cincinnati, WAAD,  
WHAG, WIZ, WLW,  
WMH  
Cleveland, KDPM, WHK,  
WJAX  
Columbus, WBAV, WCAH,  
WEAO  
Dayton, WAI, WFO,  
WJAJ  
Defiance, WCAQ  
Fairfield, WL-2  
Granville, WJD  
Hamilton, WBAU, WRK  
Lebanon, WPG  
Marletta, WBAW  
Norwood, WIAL  
Portsmouth, WDAB  
Springfield, WLAM  
Stockdale, WJAK  
Toledo, WBAJ, WHU,  
WJK

**State, City, Call**

Washington C. O., WGAX  
Wooster, WGAU  
Youngstown, WAAV, WMO  
Zanesville, WPL

**Oklahoma:** Muskogee, WDAV  
Okemah, WKAH  
Oklahoma City, WKY,  
WMAB, 5XT  
Tulsa, WGAJ, WLAL  
Yale, WHAT

**Oregon:** Astoria, KFBM  
Central Point, KFAY  
Eugene, KDZJ, KFAT  
Hood River, KQP  
Klamath Falls, KDYU  
Marshfield, KFBH  
Portland, KDYO, KFAB,  
KGG, KGN, KGW, KQV,  
KYG  
Salem, KFCD

**Pennsylvania:** Allentown, WIAN  
Altoona, WGAW  
Bridgeport, WBAQ  
Brownsville, WDAQ  
Clearfield, WPI  
Erie, WJT, WSX  
Harrisburg, WBAL  
Lancaster, WGAL  
McKeesport, WIK  
Parkersburg, 3XW  
Philadelphia, WCAU,  
WDR, WFI, WGL,  
WIP, WOO  
Pittsburgh, KDEA, KQV,  
WAAH, WCAE, WHAF,  
WJAS  
Scranton, WLAO  
Villanova, WCAM  
Wilkes-Barre, WBAX,  
WKAZ

**Rhode Island:** Cranston, WKAP  
Edgewood, WEAG  
East Providence, WKAD  
Pawtucket, IOJ, IXAD  
Providence, WEAN, WJAR

**South Carolina:** Charleston, WFAZ  
Orangeburg, WGAM

**South Dakota:** Rapid City, WCAT  
Sioux Falls, WFAT  
Yankton, WAJU

**Tennessee:** Memphis, WKN, WPO  
Nashville, WDAK

**Texas:** Amarillo, WDAG  
Austin, WCM  
Beaumont, WMAM  
Dallas, WDAO, WFAA,  
WRR  
El Paso, WDAH  
Fort Worth, WBAP, WPA  
Galveston, WHAB, WIAC  
Houston, WCAK, WEAY,  
WEV, WFAL, WGAB,  
WPAN  
Orange, WKAL  
Paris, WTK  
Port Arthur, WFAH  
San Antonio, AS6, DM7,  
WCAR, WJAE, WOAI  
Waco, WJAD, WLAJ  
Wichita Falls, WKAF

**Utah:** Ogden, KDZL  
Salt Lake City, KDYL,  
KDZV, KZN

**Vermont:** Bellows Falls, WLAK  
Burlington, WCAX

**Virginia:** Norfolk, WSN  
Richmond, WBAZ

**Washington:** Aberdeen, KNT  
Bellingham, KDZR  
Centralia, KDZM  
Everett, KDZZ, KFBL  
Lacey, KGY  
Pullman, KFAB  
Seattle, KDZE, KDZT,  
KFC, KHQ, KJR, KTW,  
KZC  
Spokane, KFZ, KOE  
Tacoma, KFBB, KBG,  
KMO  
Wenatchee, KDZI, KZV  
Yakima, KFV, KQT

**West Virginia:** Bluefield, WHAJ  
Charleston, WAAO  
Clarksburg, WHAK  
Huntington, WAAR  
Morgantown, WHD

**Wisconsin:** Beloit, WKAW  
Madison, WGAY, WHA  
Milwaukee, WAAK,  
WCAV, WHAD, WIAO  
Neenah, WIAJ  
Superior, WFAC  
Waupaca, WIAA

**Hawaii:** Honolulu, KDYX, KGU

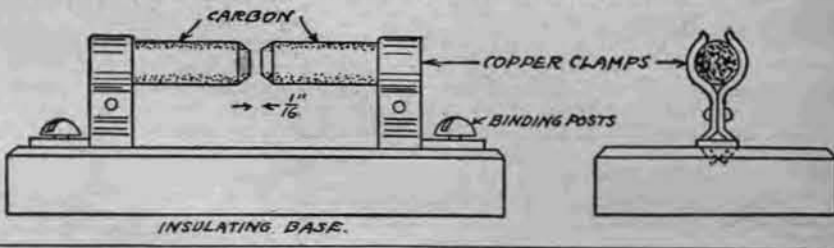
**Porto Rico:** San Juan, WKAQ

**Canada:** Calgary, CHBC, CHCQ,  
CFAC  
Edmonton, CJCA  
Fort Frances, CFPC  
Halifax, CFCE, CJCS  
Hamilton, CKOC  
Kitchener, CJCF  
London, CHCS, CJGC,  
CKQC  
Montreal, CFCF, CHYC,  
CJBC, CKAC, CKCS  
Nelson, CJC  
Ottawa, CHXC  
Regina, CKCK  
St. John, CJCI, CKCR  
Toronto, CFCA, CFTC,  
CHCB, CHCZ, CHVC,  
CJCD, CJCN, CJSC,  
CKCE  
Vancouver, CFCB, CFYC,  
CHCA, CKCD  
Winnipeg, CHCF, CJCG,  
CJNC, CKZC

# Arrester Made of Auto Part

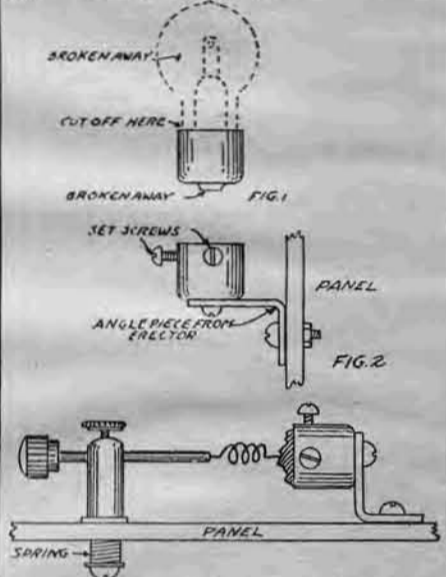
A simple, yet efficient outdoor lighting arrester can be made easily from an ordinary spark intensifier such as is often used on the spark plugs of automobile engines. One of them may be mount-

ed on a base or fastened to any part of the lead in wire and allowed to hang. This arrester takes little time to build and can be put outside as the porcelain will shield the gap from the rain.—Max R. Johnson, Vale, Oregon.



## Old Auto Light Globe Makes Crystal Holder

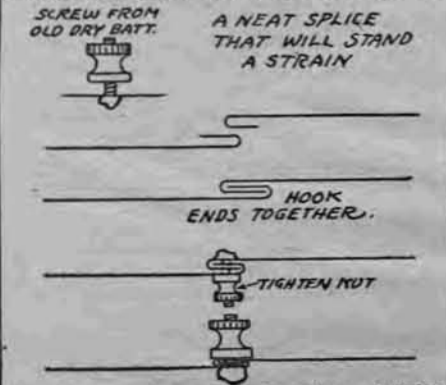
As I was in need of a crystal detector mounting I searched my box of supplies and discarded for material to make one. Finding an old broken electric bulb used on an automobile, Figure 1, removed everything from the base. This was filed down and polished. A mounting was made for the panel as shown in Figure 2. The other end of the mounting was made from an old binding post, a short piece of No. 10 line wire, a catwhisker and the rubber top of another binding post.



The insulation was removed from the wire, and the wire straightened and polished. The catwhisker was soldered to one end of the wire and the rubber binding post knob is sweated with solder to the other end. The whole is mounted on the other binding post as shown. It is best to provide a couple of washers and a spring back of the panel on the bolt that holds the binding post. This makes a neat detector that will suit the requirements of the average amateur.—A. Stanley Dobbs, Chicago, Ill.

## Straps for Quick Hook-Ups

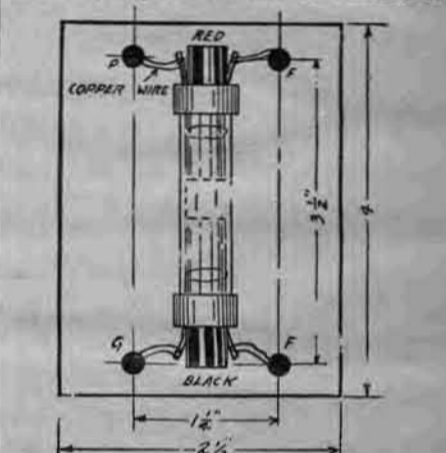
It is quite natural for every experimenter to try out different hook-ups, but it is always a task when all wires must be soldered. My method is to get a thin strip of brass or copper. An old Ford magneto can be unwound for the ribbon which comes off in six-foot lengths. The ribbon, when scraped and cleaned, is then ready for the next operation. It



can be cut into different lengths and holes punched in the wire where connections are to be made. An old leather punch or anything that will punch a 1/8-inch hole may be used. The strips thus punched can be easily connected to the binding posts on the tube socket, condenser or anything used in Radio work. Where it is necessary to splice or join any of the wires it may be done as shown. The screws used may be taken off the zinc of old dry batteries. I have used these connections for some time and I find that it is quicker and neater than any other ordinary connector. If desired, the ribbon may be wrapped with tape.—Urban J. Hanrahan, Charlotte, Iowa.

## How to Save a Dollar on Myers Tube Socket

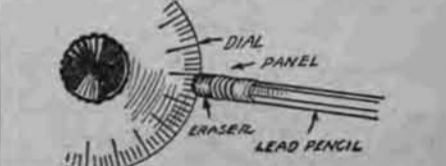
There have been many kinds of homemade sockets for the ordinary audiences, but none has appeared for the new Myers tube. Just for experimental purposes I have made and used a socket for this excellent tube from material I found in my workshop. The base was constructed of wood. However, a piece of slate or bakelite is



better. Holes are marked for the binding posts as shown. A hole is bored in the center for the tip of the bulb. The wire terminals at the ends are bent out slightly and a copper wire given a turn around them. Fasten both ends of the wire under a binding post. The tube will work just as well as if it were mounted in regular holders and base.—B. Caldwell, Boston, Mass.

## Ordinary Pencil Is Vernier

One of the simplest vernier attachments that can be used is shown in the illustration. An ordinary lead pencil is used. One with a metal tip and eraser will serve the purpose best. All that is necessary is to bring the eraser up to the



edge of the dial and rest it on the panel as shown. Turn the pencil to make the adjustment. The rubber of the eraser takes a firm grip on both panel and dial and will make the adjustment very minute. The longer the pencil, the less tendency there is to cause body capacity.—Anthony Tochko, Middletown, Conn.

It is proposed to increase the number of available wave lengths for broadcasting by varying some of the many 350-meter stations by 25 or more meters.

## MICON

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TESTED MICA CONDENSER  
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MFG. BY  
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the only guaranteed noiseless condenser of absolutely constant capacity. It may be had in all sizes from .00025 to .01.

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MICON .005 m.f.d. .... 75c

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**Chas. Freshman Company, Inc.**  
DEPT. G.  
Sole Manufacturers  
290 Hudson Street New York City

# Radio Digest Illustrated

TRADE-MARK

Published by the Radio Digest Publishing Company, Inc.

123 West Madison Street  
Telephone State 4844-4845  
Chicago, Illinois

E. C. RAYNER, Publisher

New York Office

2126 Broadway

58  
PUBLISHED WEEKLY

SUBSCRIPTION RATES

Yearly.....\$5.00 (Foreign.....\$6.00  
Single Copies, 10 Cents

Vol. II Chicago, Saturday, October 7, 1922 No. 13

## Slipshod Methods of Broadcasting

Government Experts Receive Many Complaints  
BROADCAST service in some cities has been such as to make purchasers of receiving sets question the desirability of continuing their interest in Radio. It becomes a question of entertainment that entertains. If the art is left to run wild in the hands of amateur broadcasters it will curtail the advancement of this new science.

Almost every home has a phonograph or pianola so that it is not necessary to tune up a Radio set to listen in on this sort of music or entertainment, especially if the broadcast records or rolls are poor and not of a refined class. Why should a station be allowed to broadcast such music? Then too, just to be filling in space in a program, the singers or persons at the microphone are many times only second-rate talent.

There are many broadcast stations operated by electrical shops, which are more for advertising purposes than for entertainment, and at which there is poor acoustical studio equipment. The persons operating the transmitting apparatus usually know very little about the technical side of Radio. Too many people with nothing to say and who take a long time saying it, are jamming the ether.

These are the many complaints that have come to the government experts who are now analyzing the situation with a purpose in view of bettering the broadcast programs. They are bearing in mind the fact that unless the Radio merchant who runs a broadcasting station takes the complaints seriously and immediately attempts to remedy the defects of his service, the future popularity of the Radiophone may suffer materially.

## Patents in Radio Growing Fast

Receiving Set of Today Still Is Not Perfect

QUITE a few years have passed since the date of the first apparatus patented by Marconi and the latest addition, the Armstrong super-regenerative receiver. Thousands upon thousands of patents have been granted in recent years and Radio has been one of the general subjects. It would appear that there was nothing left to patent. However, the patent office has become so clogged today with applications that extensions in the service are necessary.

Some pessimists believe that the wonderful and useful Radio art of today will never be perfected to any greater degree. We can see ways for many improvements. Engineers are now working diligently to perfect an interference preventer. Such an instrument would enable the fan to pick up any given station and receive therefrom without any interference. There is also need for a static eliminator. Any fan can name many other desirable additions to the set of today.

When it is considered, the Radio art is still young. It has passed only two decades, and while the progress has been enormous, especially within the last two or three years, there are many improvements to be made. For that reason there will be a great number of Radio patents taken out in the coming years.

## Ethics, Not Regulation, Needed

Apply a Little of the Golden Rule

MOST people seldom change from the first impressions they receive from an art or science, literature, speaking, music and the theater. Those who listen in for the first time on a Radiophone and hear "Radio hash" will surely be a hard one to make a sale of a receiving set. He will not be much enthused in the art.

An industry that grows to large proportions sooner or later develops controversies between those engaged in it. Bad feeling results when business men try to obtain the best schedule positions in broadcasting where the present limitation in the number of available wave lengths makes for interference. And too, interference in Radio transmission is not only irritating but is harmful to the growth of the industry.

Regulatory measures are sought to bring about order and a system of operation more or less satisfactory to all. The best results however, will come from something more than regulation. That is co-operation. The wise one realizes that he is but a unit in a huge community of interest, and that what is good of the industry as a whole is for his individual benefit. He readily agrees not only to conform to the formal rules and regulations, but voluntarily extends courtesies. A code of ethics is automatically brought about which will become of general use.

Wave lengths will be increased in number just as soon as legislation is passed and as apparatus becomes more improved. At present, if those who look to Radio for profit will only apply the Golden Rule to their methods, the industry will keep on growing in the right way.

## Condensed

By DIELECTRIC

It happens that some men get their wires mixed while trying to make life's hookup, with the result that their lead-in proves to be the shortest line to prison. I am hoping Radio sets will be installed in as many penal institutions as possible. Perhaps it might be deemed unwise to allow prisoners unrestricted use of broadcasting facilities, though certainly no harm could come from having receiving sets at their disposal. Many of these men will come back into society again. Now, if they have been privileged to become acquainted with the fundamentals of Radio, some of them may be qualified for real usefulness when they are freed. I'm sure Thomas Mott Osborne would o. k. this.

"One, two, three" etc., then in reverse order. Fans will recognize that as the astonishing information given by testing stations, which leads to a remark or two about the National Association of Listeners In, recently formed at Washington, D. C. Certainly no one can object seriously to the testing by broadcasting stations reaching large audiences when it means improving them. But when it comes to interfering with good programs by some station with a very limited range, then it becomes annoying. A special feature of the program outlined for work by this new organization, which will undoubtedly appeal to most of us, is that relating to the suggestion of suitable programs for broadcasting. Such suggestions coming from those most vitally interested should result in considerable benefit to the thousands of listening fans. What are the requirements for active membership Mr. Hedges?

Although China built great walls to keep out the hated foreigners, she never could prevent their Radio messages from being received by anyone fortunate enough to own a set. From latest reports gathered by non-selective three stage, the Chinese are swinging into line along with most of the other nations of the earth. American concerns have entered this new field and will erect high-powered stations in the near future. It is not difficult to conjecture what this will do for ancient China. As the Editor of Radio Digest intimated, all of the nations will be drawn closer together by means of Radio communication.

Chapel services via Radio are not a novelty, it's true, but you get a little thrill even now from picturing an aged mother listening to her son's sermons delivered hundreds of miles away. A Dr. Dodd, in Louisiana, installed a broadcasting set in his church and his mother in Tennessee can tune in the services every Sunday, comfortably seated in her own room. Undoubtedly a good many who are neither old nor ill get their religious teaching right at home through the same headset that brings in the most razzing jass. That's not knocking. It simply shows the diversity of interest fed by Radio, and it also proves that languid mortals really have no excuse for missing a sacred service.

The band leader in his snappy uniform with arms oscillating at high frequency has a lure that nothing can quite replace. Yet many of our city parks are without bands and this lack is to be filled in New York City in the up-to-date way. Loud speakers are to be installed in all the parks so that devotees may enjoy band music broadcast from the station at the Municipal building. This seems to be a practical means of providing entertainment for city dwellers. Even those having sets may find it pleasanter to be out in a cool park listening to the music, while saving their batteries for the long distance reception that every fan strives for.

Someone started the idea of a Radio Christmas which has apparently appealed to many dealers, who are arranging to provide suitable reindeer packages for Yule-time buyers. Boys and girls have always used considerable paper listing the things they want Santa to bring them. This year will see those lists considerably lengthened. Perhaps broadcasting stations will invite the youngsters to mail their requests to Santa Claus in care of them. The Jolly Old Man may send a message over the Radio on Christmas Eve to all good children. As far as grown-ups are concerned I imagine they will consider the usual stocking by the fireplace an excellent receptacle for depositing tubes—of which there can never be too many.

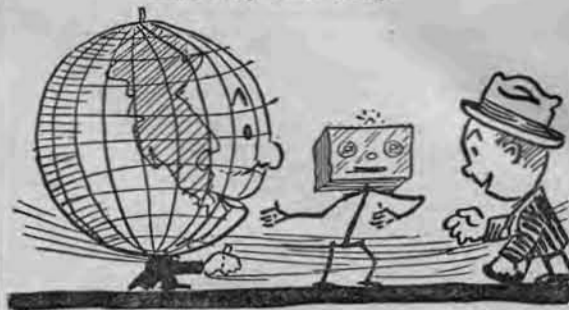
We shall look for something new from WHAZ, the broadcasting station at Rensselaer Polytechnic Institute, Troy, N. Y. The equipment at this station is replete with all the newest devices known to Radio. I am wondering if this oldest engineering college in America will be the discoverer of the newest and most perfect manner of transmitting speech. Students will experiment in studio arrangement for acoustic effects. They also intend trying various color tones to see how the artists react to them. A brilliant red tone should add pep to their performances and I suppose a deep green would produce soporific effects for lullabies. Some of you fans might try putting red cloth around your VTs to see if it would coax more snap into the reception.

I predict some jam in the waves used by inventors when Dr. Pratt gets into full swing with his contest over priority rights. The three-electrode vacuum tube will well nigh swell up and explode with importance over this sudden extreme notoriety. Perhaps some inventors will figuratively follow suit, if Dr. Pratt wins out. Some colored folk have great difficulty in establishing the true date of their birth. The triode tube seems to have taken on some color since this Chicago X-ray authority made his startling claims. Now this sort of gossip news is worth a whole evening's broadcasting, however, I shall save some for another day.

## RADIO INDI-GEST

### What the Wild Waves Say

The telegraph and telephone  
Are now quite out of date,  
The Radio is now the thing  
The news to indicate.  
Just tune in your set,  
And let the ether bring  
Syncopated music,  
And every other thing.



Vaudeville jokes  
And songs galore,  
How to bring up babies,  
And the baseball score.  
Doctor Windbag's version  
Of the Sermon on the Mount,  
And Dempsey's latest way  
To make 'em take the count.  
What the weather's goin' to be  
A week or so ahead,  
The time to set your clock by,  
And Conan Doyle on "The Dead."  
Some Bedtime Stories,  
To make the kiddies go asleep,  
And all the latest happenings  
Out on the briny deep.  
The best kind of fertilizer  
To make the garden grow,  
Crop reports and other things  
The farmers ought to know.  
The very latest quotation  
On the price of German marks,  
And the proper care to take  
Of flowering shrubs in city parks.  
The way Lloyd George is handling  
England's ship of state,  
And who some movie star has taken  
For his latest mate.  
Some famous chef's directions  
For making angel cake,  
And the latest drowning accident  
From bathing in the lake.  
Wall Street's finance gossip,  
Sunday's Golden Text,  
And where the coal is coming from  
The winter after next.  
The calculated distance  
From the earth to Mars,  
And just what Chink is uppermost  
In China's civil wars.  
Oh, it's all there in the ether,  
Everything you want to hear,  
Just turn the tuning gadget  
And clamp the phones upon your ear.  
R. E. D. Cobourg, Toronto Star.

### Say It with Flowers

A paragrapher writes: "If this Radio telephone business is carried much further, it won't be safe to carry on a conversation without using the deaf and dumb alphabet." What about television, with which it will be possible to see the talker's hands in the distance?

### It Gets 'Em Young

"Kiddies desert their dolls for Radio," says one paper. Doll-less babies!

### Oh My, What If He Coughed



The Radiot who lives next door to us says he was fixing up a midget set for exhibition purposes when he sneezed and blew out a fuse.—Galveston News.

### It may be Comedy to Some Folks, But It's Tragedy to Me

Dear Indi—Station WGI broadcasts setting up exercises every morn at 7:00 p. d. early. Then comes weight reducing exercises, followed by weight increasing exercises. I wanted to shade off a few so I took the first two in the series, but failing to hear the announcer tell when the weight increasing exercises started, I went right straight through them too. Net result, I gained two pounds. Something's gotta be done about this.  
—Snake Eyes.

# Use of the Radio Receiving Set in the Home

## Part V—Other Regenerative Circuits

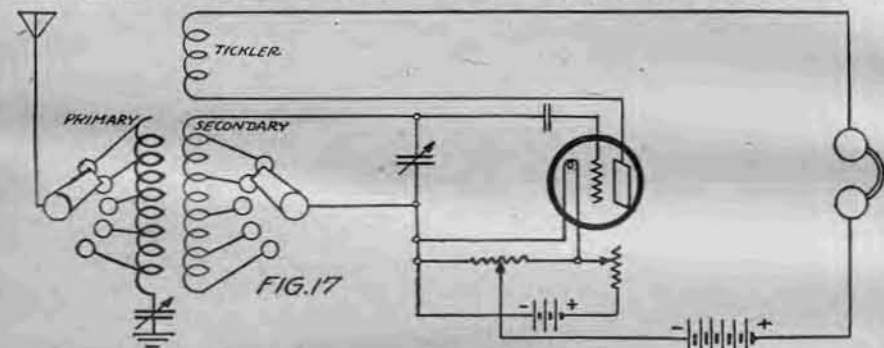
By H. M. Towne

THE PRECEDING installment of this series dealt with regenerative receiving sets using the single-circuit system of tuning. The regenerative principles apply alike to the two-circuit tuning system. It has been pointed out previously that the two-circuit tuner affords somewhat greater selectivity and is for this reason often preferred.

Regeneration with the two-circuit tuner is accomplished by coupling the tickler inductor to the secondary inductor of the tuner. There are, therefore, three individual inductors called primary, secondary and tickler. The primary is connected in the antenna-to-ground circuit, while the secondary is inductively coupled to the primary, using variable coupling, and its terminals connected to the grid and filament of the detector tube. The tickler is inductively coupled to the secondary using variable coupling and is connected in the plate circuit so that energy from the output is inductively fed back to the secondary which is in the input circuit of the vacuum tube.

### Connections for the Circuit

The connections for such a circuit are shown in Figure 17. There are few, if any, two-circuit tuners on the market which are provided with the tickler or feed-back coil on the secondary. The decision for the two-circuit inductively cou-



pled regenerative set therefore generally calls for a homemade tuning outfit.

The simplest combination is bad when the spider web of inductors is used. The mounting will be exactly as previously shown in Figure 14, but there will be another coil mounted permanently between the two coils shown. The middle and stationary coil will be the secondary, and it will have the primary on one side of it and the tickler on the other side, both arranged for variable coupling with the secondary.

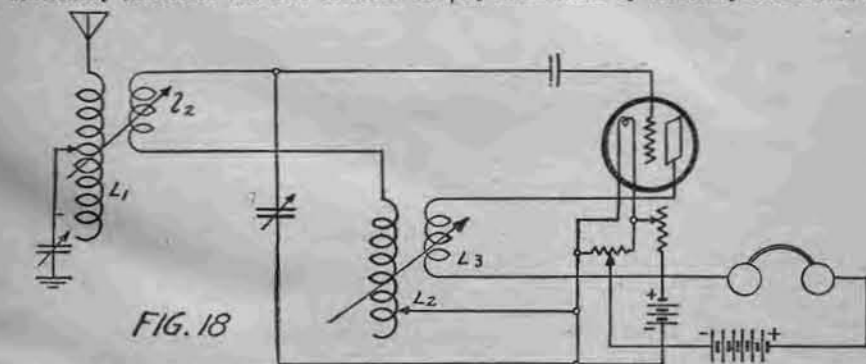
### Description of Tuner

The primary for use with average size antenna will have about 50 turns tapped at every 10th turn and the secondary will consist of 50 or 60 turns tapped every 10 turns. The tickler may consist of 50 turns with or without taps, as desired. The taps on the secondary, however, must be brought out to a multipoint switch which may be mounted directly under the coils.

The switch cannot be mounted on the secondary, as was done in the case of the primary, as it would interfere with getting close coupling between the tickler and secondary. The spider web coils may be mounted on the back of a panel if desired. With this mounting the multi-point switches should go on the front of the panel.

### Cylindrical Type of Coils

If the cylindrical type of coils is desired, a convenient two-circuit tuner for panel mounting is that shown diagrammatically in Figure 18. In this there are two stationary inductors and two movable in-



ductors. The stationary coils are  $L_1$  and  $L_2$ , which are primary and secondary, respectively. A part of the secondary is represented by 10 turns on a rotor indicated  $L_3$  which is located inside the coil  $L_1$ . These few turns provide for the variable coupling between the inductor  $L_1$  and the total secondary  $L_2 + L_3$ . That is, instead of having all of the secondary on a rotor and coupled with the primary, the greater part of it is wound on a separate form similar to the primary, and the coupling between them is obtained by the small number of turns indicated  $L_3$ . For broad-

casting wave lengths, about 8 or 10 turns serve very well to couple the secondary and primary. Thus the rotor for  $L_3$  can be a cylinder just about 1 inch long, which will fit inside the main  $L_1$  cylinder.

The tickler coil is wound on a form which rotates inside the secondary. It should contain about 60 turns and may be tapped if so desired. If a potentiometer is to be used the control will be sufficiently accurate without the taps on the tickler. The form for the tickler will depend upon the size of the wire, but a cylinder or rotor with about  $1\frac{1}{2}$  inches of winding space is usually enough.

### Selective Tuning

As shown in the diagram, there are taps on the primary and secondary. It will also be seen that a second variable condenser is used across the total secondary. This combination enables very selective tuning, but it requires a little experience to make adjustments quickly. There are a total of eight adjustable controls, counting the filament rheostat and potentiometer. The circuit, therefore, is not to be recommended to the beginner, but to one who has had enough experience with the simple single-circuit regenerative receiver to reason out the sequence of adjustments.

### Tuned Grid and Plate Circuit

One regenerative circuit which has been used quite extensively by amateurs for

selective short wave reception is the so-called tuned grid and plate circuit. This is shown diagrammatically in Figure 19. It consists of the usual two-circuit tuner, and in addition, two variable inductors,  $V_1$  and  $V_2$ , which are inserted in the grid and plate circuits respectively. These should be preferably of the variometer type. Suitable variometers are available at most any Radio supply store. The variometers  $V_1$  and  $V_2$  are adjusted to the incoming waves and the regenerative effect is produced in the following manner:

### Tuning Operation

When a voltage or charge is applied to the grid by an incoming wave, the plate current suddenly increases or decreases, depending on the sign of the charge. This change in plate current through  $V_2$  induces a voltage across  $V_1$  which opposes the potential of the plate or B battery. This has the effect of momentarily changing the grid voltage since the grid is located in the electrostatic field between the plate and filament. This change or variation of grid voltage is always in the same direction as would be produced by the incoming wave, and the result is, therefore, regeneration. This type of circuit requires quite a little skill to operate, but when it is understood, will prove very selective. It is not, however, to be generally recommended for broadcast reception.

For the average conditions the simple single-circuit regenerative tuner as described in the preceding installment of this series, will give better results, and its operation and adjustment may be readily understood by most any member of the

household. This can hardly be said of the circuits in Figures 17 and 18.

### Body Capacity Effect

There is one undesirable feature which attends most any type of regenerative receiving circuit and that is the effect of body capacity. This effect shows up more pronounced when the vacuum tube is on the verge of, or actually in, the oscillating state. An adjustment of any regenerative circuit for the maximum signal intensity without distortion, renders the combination sensitive to any change of capacitance between the circuit and surrounding

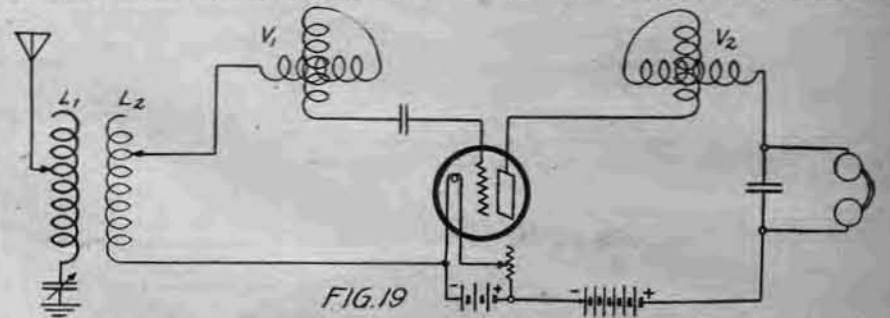
bodies, whether they be grounded or isolated.

A movement of the hand toward, or away from, the circuit may effect a decided change in the tune of the circuit. Quite frequently we find operators of regenera-

the circuit which is nearest to ground potential.

### Enclosing Instruments in Metal Cases

The ideal method of overcoming body capacity effects is to enclose all of the instruments in a metal case or cabinet, or



one having entire metal lining, and to have only the control knobs on the exterior. By grounding the case or lining, the effects of body capacitance are eliminated as the grounded case shields all parts of the circuit from any change of capacitance between it and exterior bodies. More will be said on shielding of panel mounted sets in a later installment.

(Continued in October 14 issue)

### Proper Flux for Soldering

When making soldered connections for tuning coils, vacuum tube detectors, or amplifiers, it is advised not to use acid flux or prepared soldering paste. The slightest trace of acid or alkali at the junction of the solder and the copper will generate local currents which can be heard in the receivers, in the same manner as static. For good, reliable soldering, use a resin flux or resin-core solder.—P. J. M.

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# Phonograph Supplies Detector Parts

## Reproducer Head Makes Light Contact Possible

It takes a great deal of joy out of a crystal set when a goodly portion of the music is lost through adjusting the cat whisker. Then when it is set it may be lost again through vibration. My patience was very much tried until I made an adjuster as shown in the illustration. I call

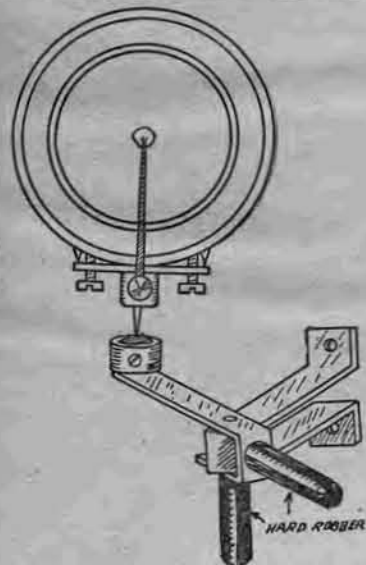
## WORKSHOP KINKS? EARN A DOLLAR—

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

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

it "phonograph reproducer crystal detector."

Those who will take the time to make one of these detectors will be surprised at the Clear tone in music and code and



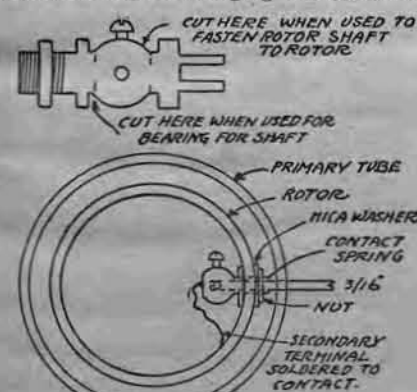
they will hear broadcasting stations they never heard with cat whiskers.

An old phonograph reproducer can be bought cheaply. It does not matter if the disk is broken for it can be replaced by cutting a disk of fiber and fastening a small screw in the center and putting this in the place of the diaphragm disk. Fasten one strand taken from a No. 2 picture frame wire to the screw and the opposite end to a small coil spring which is attached to a bracket with a No. 22 copper wire. The copper wire is soldered to the strand of picture wire and the other end to the binding post of the receiver.

The bracket for the crystal cup can be made any size. However, the detail is given in the drawing. It gives a good hold on a crystal 1/8-inch square.—J. Wagner, San Francisco, Cal.

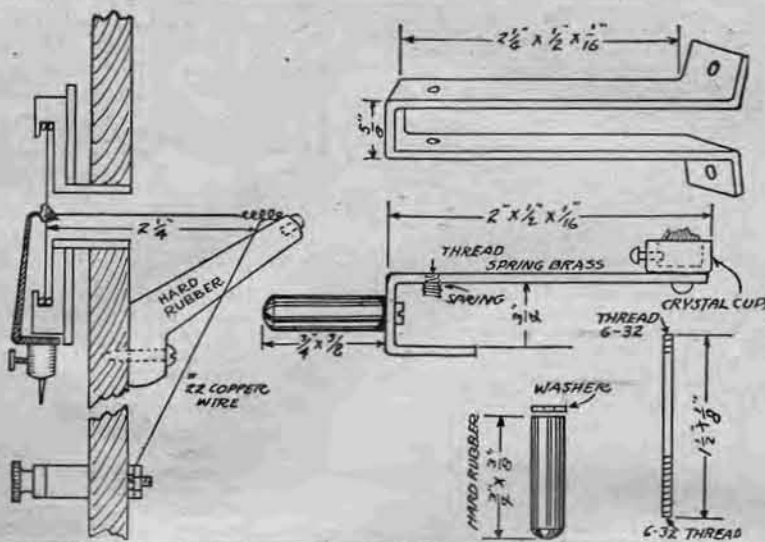
## Securing Shaft to Rotor

The greatest difficulty for the home worker in constructing variometers and variocouplers is to find a simple and reliable means of securing the rotor shaft to the rotor and of bringing out the second



ary terminals in a manner which will provide positive electrical contact and still permit proper rotation of the rotor for necessary adjustment. The sketch shows how I overcame these difficulties. A brass contact taken from an ordinary

## DETAILS OF DETECTOR PARTS



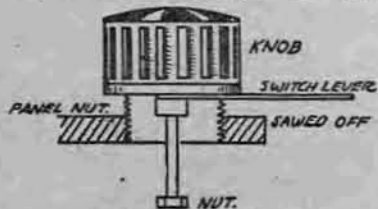
discarded knife switch is shown. Two of these were secured and the ends cut off on the dotted lines, retaining the part tapped for a small machine screw. The method of attaching it to the rotor is clearly shown, mica washers being used between the nut and winding for insulation. The rotor shaft is inserted in the hole in the center of the switch contact and secured in any desired position by the machine screw. The secondary terminals may then be soldered to the contact. A brass spring may be mounted in any convenient position, one end of it bearing on the brass nut holding the contact to the rotor. The other end of the brass spring is provided with a binding post for holding the connecting wires. If the builder wishes he may use hollow brass tubing for the back shaft of the rotor and run the terminal wires through the tubing to the binding posts outside, care being taken to have these wires properly insulated.

If the builder wishes good bearings for the rotor shaft for use in the primary or stationary tube they can be made by cutting off the threaded part and collar only of these contacts and inserting them in the stationary tube, securing them in the same manner as before mentioned.

The center part of these contacts are already drilled and it is a simple matter to make an inductance switch from one of them, by soldering a brass contact arm to them and using a machine screw for a pivot and brass upholstering tacks for switch points.—P. Starck, Sterling, Ill.

## Switch Lever Knobs

The caps from old storage batteries are made of just the right kind of material for a shaft or lever knob on Radio panels. Make a hole in the center large enough for a bolt to pass through. The switch



lever is made from a piece of sheet brass cut to the proper shape. A machine screw of the proper size and length is run through the hole and nuts used on the end to fasten the knob and switch lever in place, also to hold it on the panel.—Jerome Magnuson, Albert Lea, Minn.

## Aerial Wires

Every amateur knows that stranded wire is preferable to the usual hard drawn copper for aerials because of three things, namely, its carrying surface, flexibility and strength are greater. On the other hand it costs about twice as much as hard drawn copper, and the Radio dealer usually does not have it in stock. The best way is to make your own aerial.

Usually the experimenter has some No. 18, 22 or smaller wire laying around the home shop. If one doesn't have the wire on hand, he can purchase enough No. 22 wire to make the length of stranded wire desired with one or more feet to spare. No. 22 is the proper size, but with other sizes follow the numbers given in the table.

Size of Wire	Number of Strands
18.....	3
19.....	4
20.....	5
21.....	6
22.....	7
23.....	8
24.....	10
25.....	12

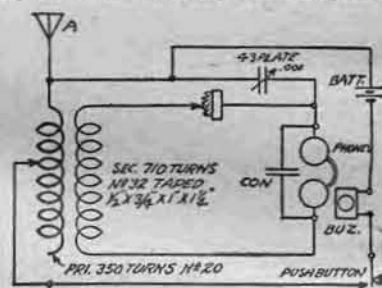
It is advisable not to use anything smaller than No. 25. Use bare wire if pos-

sible. Always allow a few feet extra for the length taken up by the twist.

Adjust the right amount of wire in the right lengths and size and fasten one end of them securely to some object. Place the other end in the chuck of your hand drill, then after pulling the wire taut, gradually wind them up by turning the handle the same as in drilling. Do not twist the wires too tightly. This aerial will equal any stranded wire.—Vernon Hagelin, Geneseo, Ill.

## Crystal Circuit with Coupler

The circuit shown in the diagram will help all amateurs using loose coupler with



a high magnetic field and with a variable condenser cut in, as shown. The buzzer circuit also will allow the operator of the set to find a sensitive spot before he connects up his set, thus doing away with the interference.—Darwin C. Allen, Chicago.

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9270 Retail Radio Dealers U.S. . . . . per M \$ 7.50  
1014 Radio Manufacturers . . . . . per list 10.00  
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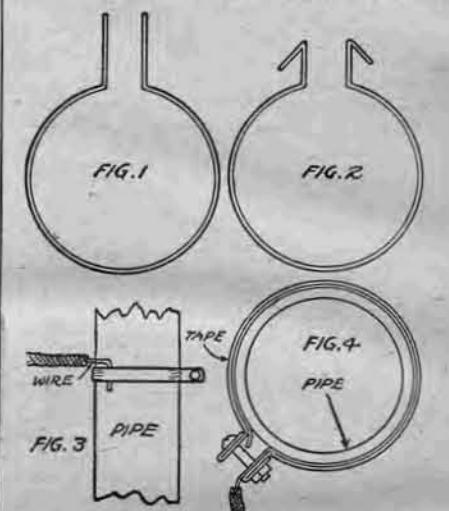
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Chicago, Ill.

## No-Solder Ground Clamp Uses Brass Carpet Tape

The illustration shows a way to make a good ground connection to pipes without the use of solder. Procure a piece of brass carpet tape and place it around the pipe (Figure 1), allowing it to overlap about 1 1/2 inches. Cut it off and bend the ends as shown in Figure 2, leaving a space of about 1/4 inch of the pipe uncovered. Drive a nail through the projecting lugs, or otherwise punch holes to take a small stove bolt. The wire is at-



tached as shown in Figure 3 or around the bolt as in Figure 4.—Melville Davis, Portage la Prairie, Can.

## Coating for Pasteboard Tubes

When using cardboard tubes for coils some kind of coating must be applied to prevent moisture entering and to furnish an insulation. One way to do this is to heat a sufficient amount of sealing wax in a pan and dip the tube into this wax so that it will cover the pasteboard in a thin layer, then let it harden. Apply a coat of shellac before putting on the winding. After the winding apply another coat of shellac. This makes a good tube on which to wind honeycomb coils and variocouplers.—Ralph Dury, Columbus, Ohio.

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# Simple Instructions for the Beginner

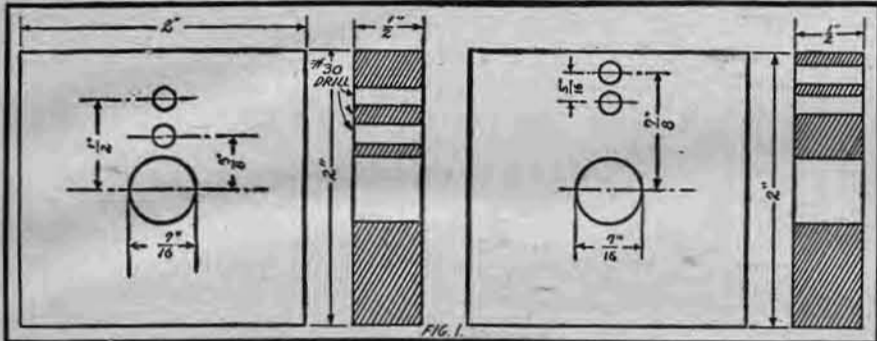
By Harry J. Marx

## How to Make an A. F. Transformer

**I**N CONSTRUCTING the herewith described audio frequency transformer, the maker will require two end blocks, 2 inches x 2 inches x 1/2 inch, either hardwood, rubber or other form of insulating material; one-half pound of about No. 22, soft iron core wire in lengths of three inches; a piece of black fiber 1/2 inch thick, cut 3 inches x 12 inches; two pieces of brass 2 inches x 1/2 inch x 1/8 inch thick; one-half pound of No. 40 single cotton covered copper wire; four binding posts and about 24 inches of insulating tape.

### Making the End Blocks

The first step is the construction of the two end plates illustrated in Figure 1.

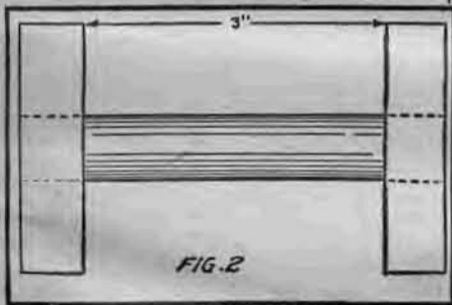


These are made up of either hardwood, hard rubber, or any of the numerous insulating materials on the market and should be cut two inches square and one-half inch thick. The center core hole should be drilled 7/16 inch in diameter and the two small holes are made with a No. 30 drill.

It will be noted that the small holes are located differently in the two end blocks. The one side is for the primary wires and the other side for the secondary wires. The edges of these holes should be well rounded to avoid chafing of the fine wire, ultimately causing a break which may make it rather difficult to connect to the wire after the winding is completed.

### Placing the Core

The end pieces are next mounted on a bundle of core wires as illustrated in Figure 2. The space between the end plates is three inches. Care should be



taken to see that these core wires are kept perfectly straight and parallel. It is suggested that the wires be slightly moistened with oil to avoid rust.

After the end plates are properly spaced, the core should be wrapped twice around with two layers of waxed paper. This should exactly fill the space between the end blocks in order to avoid short-circuiting the wires on the core.

### Coil Winding Procedure

For convenience it would be advisable to let the core wires project from one end plate one inch. This will permit mounting in a lathe chuck, thus facilitating the coil winding. The supply spool

from which the wire is unwound should rotate with a slight friction in order to avoid any tendency of spinning and thus accumulating an unnecessary length of loose wire. Care should be taken not to attempt winding too rapidly. Start slowly and gradually increase the speed as the work proceeds.

The primary winding should be wound in smooth consecutive layers until the diameter is 1 1/2 of an inch. In calipering this diameter, the sharp ends of the calipers should not scratch or damage the insulation on the wire. Kinks in the wire must be avoided. In fact a kink should be treated as a break and the two ends should be twisted together, soldered, and then wrapped with a thin piece of silk.

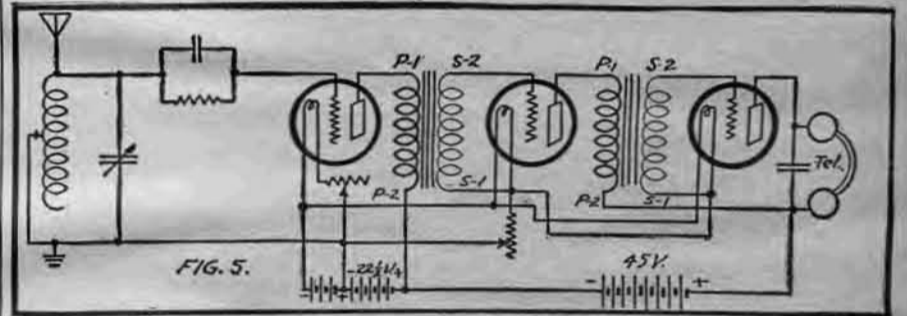
The wire must be wound on evenly by running slowly from end to end. This method of winding avoids any comparatively large difference of potential between layers. After the primary wind-

ing has been completed it should be tested for continuity with a milliammeter or galvanometer and a 6-volt battery. The ends of the primary winding should project through the two holes nearest to the core hole. It may be advisable to solder a heavier gauge wire to the ends of the coil in order to avoid the tendency to break.

### The Secondary Winding

After the completion of the primary winding, two or three layers of paraffin paper should be wrapped around the primary winding in order to insulate thoroughly the two windings from one another and form a level bed for the secondary. It may be necessary to tie this paper in position. The string can afterwards be taken off as the first layer of the secondary winding takes its place.

The secondary coil is wound as before to a diameter of 1 3/4 inches. More care will need be taken than with the primary as the larger diameter and the resultant higher feeding speed will make it more difficult to get smooth layers.



As before, the beginning and end should be reinforced with a heavier gauge wire and then led out through the plate with the outermost holes. After completing the secondary winding, cover it with a layer or two of paraffin paper and then wind tightly with tape. The strip of 1/2 of an inch fiber is then wound around the coil and held in place with some strong adhesive glue. If tied into place a smooth lap will result. This will give a clean and neat appearance to the coil and will also protect the windings from injury.

### Mounting on Base

The complete coil should then be mounted on a wooden or fiber base plate and fastened in place by means of four angles as illustrated in Figure 3. The

ends of the primary and secondary windings are secured to binding posts and should be marked as follows:

The outermost layer of the primary winding should be marked P1, the lower side or inner layer is marked P2, the high side or outer end of the secondary winding is marked S1, and the inner layer S2. Both windings should be in the same direction.

The direction in which the windings are connected up in the amplifier circuit is important, first, to get the proper direction of fluctuation of potential to the grid in the secondary, and second, to get the correct capacity coupling between the tubes.

### Hook-Up or Circuit Used

In Figure 5, is given a hook-up illustrating the connections for using two transformers. This circuit is designed for the amateur who desires to construct most of his own apparatus and provides for the minimum number of instruments. For tuning a single or double-slide tuner is indicated. This can be made easily

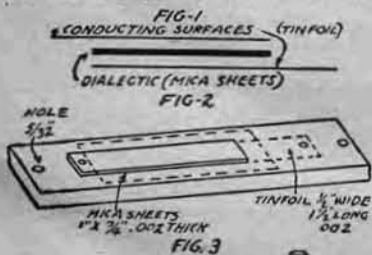
by any amateur. A 43-plate variable condenser is shunted across the secondary circuit for proper control of its wave length. The usual grid leak and condenser combination is used in the grid circuit. An individual rheostat is shown for the detector tube while the filaments of both amplifier tubes are controlled by one additional rheostat. A 22 1/2-volt B battery is used for the detector plate circuit while a 45-volt battery added in series gives a total of 67 1/2 volts in the plate circuits of the two amplifier tubes. A .001 mfd. phone condenser is shunted across the telephone binding posts. This circuit is designed for loud speaker work on local reception, but for long distance reception the use of Radio frequency amplification will probably be necessary.

## Home-made Fixed Condenser

The fixed condenser is a simple piece of apparatus to make. It consists of two or more conducting surfaces separated by a dielectric such as mica sheets, glass or paraffin paper as shown in Figure 1.

A condenser used in a single circuit receiver employing a crystal detector or rectifier should have a capacity of about .002 microfarads. The following materials will be required:

Two binding posts; one hard rubber



base 2 1/2 inches long, 3/4 inch wide and 1/4 inch thick; one hard rubber cover 1 1/2 inches long, 3/4 inch wide and 1/4 inch thick; seven sheets of tin foil 1 1/2 inches long, and 1/2 inch wide (may be purchased from a florist); seven sheets of mica 1 inch long, 3/4 inch wide and .002 inch thick. Drill four holes in the hard rubber base 3/8 inch in diameter, as shown in Figure 2. Punch a hole in one end of each of the tin foil strips to take the screw of a binding post, allowing about 1/8 inch wall at

the end. Build the condenser up in this fashion. Mount the two binding post screws in the base as shown. Place a mica sheet so that it will be 1/4 inch from either end. Place a piece of tin foil so that the screw will pass through the hole on the right. Place another piece of mica directly over the first and on the tin foil. The next piece of tin foil is placed so that the screw of the binding post passes through it on the left end. Repeat this operation until the seven sheets of tin foil and mica are in place. With this construction you have three strips of tin foil connected with the binding post on the left and four on the right.

The cover is drilled like the base so that the binding post screws will pass through it and all is assembled as shown in Figure 3. Tighten up the binding posts to compress the tin foil and mica sheeting, thereby increasing the efficiency of the condenser.

## Experiments for Your Set

Interest in Radio never flags and the pranks that radiated energy plays on the fan never ceases. Here are a few stunts you may try if you possess a sensitive two-circuit tube set:

Tune in a powerful local transmitting station, and then take off your aerial from your set. Your reception will be as strong with your ground connection alone if you have several feet of ground wire leading to your set. Your set is really perched on the top of your primary oscillating circuit instead of between your aerial and your ground. Adjust your tuning a bit. Next take off your ground connection and hook on your aerial. Signals come in wonderfully strong without a ground.

Now take off both aerial and ground and you will still receive audible signals if you have considerable area of shields at-

tached to your ground post, the shields and circuits absorb enough energy to give a loud reception of concerts, two stages of amplification give a signal strength equal to the detector tube with normal hook-up. Now with your aerial and ground off the set take hold of the ground wire with your hand or the aerial and notice the volume increases greatly. Next take a piece of wire, place it on the floor and attach it to your ground post and note increase of volume. When you grasp the ground wire in your hand and stand a few feet away from your disconnected set your body becomes part of the oscillating circuit and radiates energy to the wiring and shielding of your set.

The performance of these stunts demands close tuning of about the same degree as for bringing in a distant station with a normal hook-up. Bear in mind these are just stunts, and that good reception requires the usual equipment of ground and some lead of wire above or below your set.

My experience is that it is better not to ground the shielding when operating under ordinary conditions, it seems to broaden the tuning of the set. If grounded the shielding is part of the primary circuit, and fills with energy, the capacity effects of which seem to render the tuning less sharp.—S. L. Steele, Chicago, Ill.

## Truck for Storage Battery

Many a Radio fan has found it a difficult task to drag a heavy storage battery from under the Radio table when it is time for recharging or to do other work. This moving became so irksome that I devised a truck for my battery.

I secured a board which is slightly longer and wider than the battery base. In my case this board was 14 inches long, 10 inches wide and 1 inch thick. Two other pieces of wood 10 inches long and

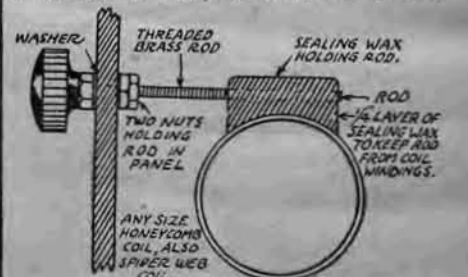
2 inches square were procured and nailed across the ends of the baseboard. Holes were then drilled about 2 inches from the end of the two end pieces. These holes are for holding casters, such as those used on beds. The battery is placed on this truck. It can be pushed around easily.—Quentin C. Vine, Urbana, Ill.

## Paint Poor Insulator

When building a receiving set do not use any paint on the wooden parts. Most paints contain lead or carbon and tend to short circuit the feeble current received. Good, clear varnish or shellac should be used.

## Honeycomb Coil Mounting

The illustration shows a way to make a honeycomb coil mounting that will be of service to many an amateur. It con-



sists of a brass rod threaded its full length and then fitted with a knob and washer on the outside of the panel and two nuts on the inside. Sealing wax is applied to the rod end, over the threads, and to the coil. If properly molded while hot, the wax will make a very neat mounting and will present a good appearance to the set.—A. Kieffer, Baraboo, Wisc.

# One Evening to Make B Storage Battery

By Thomas W. Benson

IT IS quite difficult to make a storage battery suitable for filament lighting, but a storage B can be built by anyone with few tools and little trouble. Since small currents are required for the plate circuit of a tube the capacity can be small and still obtain good results. A battery made according to the following description will meet the requirements of most Radio enthusiasts and can be built in one evening.

It is well to build the battery in thirty-volt units. A detector tube often functions better with a little more than 22½ volts, and where amplifiers are used two or more units in series can be employed.

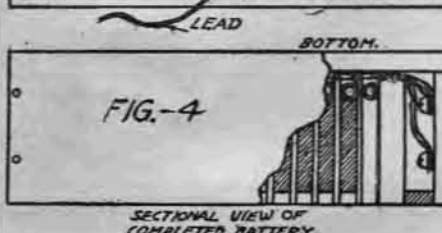
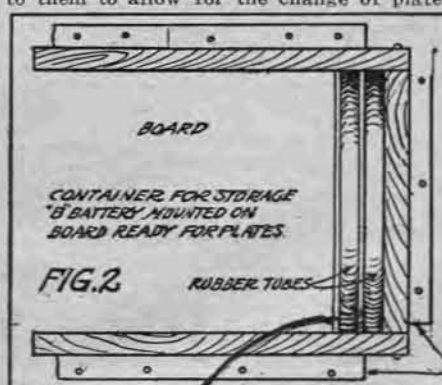
### Material Needed

To build a thirty-volt unit, cut sixteen pieces of ¼-inch sheet lead 4 inches long and 2 inches wide. Obtain 8½ feet of rubber tubing ¼ inch in outside diameter. Cut the tubing into 6-inch lengths.

From white pine or poplar make a box without bottom, 4 inches wide, 2½ inches deep and 5½ inches long, inside dimensions. Put this together with brass screws, leaving one end loose.

Lay this box on a smooth board, nailing cleats to the board to keep it from slipping, as shown in the illustration. Turn

**Assembly Procedure**  
Eight of the plates have leads soldered to them to allow for the change of plate



voltage. It is a little trick to solder the leads, but it can be done as follows:

Cut the leads 8 inches long from No. 18 fixture wire and bare one end. Lay the lead plate on a flat piece of iron, scrape the spot where the lead is to be soldered and apply paste to the lead wire and lead plate. Now with a well-heated soldering iron quickly solder the connection. If the iron is hot enough the joint will be soldered before the plate melts because the iron extracts the heat from the lead plate rapidly.

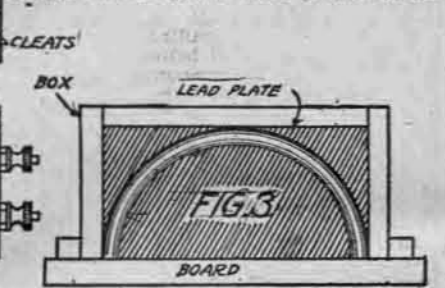
When all the leads are soldered the assembly can be completed. First take a length of rubber tubing, bend it into a semi-circle, and lay it against the end of the box nearest with the ends down, then lay one of the lead plates with lead attached against the tube. This is the negative pole of the battery. Insert another tube, then a plain plate, and so on until all the plain lead plates are in place. Continue, placing tubes and plates with leads, until the sixteen plates are in place. Put the last tube outside the last plate

and finally put the end of the box in place, tying it there with a cord, if necessary. you will now have the box filled with alternate tubes and plates.

### Plates Squeezed Together

Make sure the lead plates are all touching the lower board and that the tubes are as far down as they will go, then with a large C-clamp compress the loose end of the box, squeezing the tubes and plates tightly together. The clamp should be tightened until the distance between the inside ends of the box is 4¼ inches. The loose end is then fastened in place with brass wood screws and the clamp removed.

Without disturbing the box, melt some storage battery sealing compound rather thin and pour it between the lead plates, making sure it runs well down along the curved rubber tubes. Pour it slowly, fill-



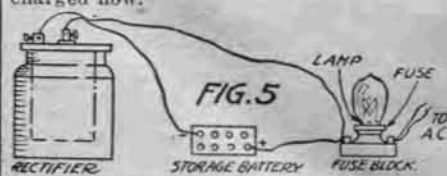
ing all the corners carefully, until it reaches the edges of the lead plates. Allow the compound to harden thoroughly, then turn the box over and fill up the spaces at each end between the end plates and the box.

### Tap Switch Construction

This completes the battery structure proper. It now remains to mount a small bakelite or fibre panel having eight binding posts on the edges of the protruding sides of the box. The leads from the plates should be run to these eight posts, notching the bottom of the wood partition so that the wires come flush with the ends and sides of the box. A wood bottom is then fitted and the open space back of the terminal panel having another block of wood inserted. The woodwork should be given two or three coats of asphaltum or other acid resisting paint.

It will be apparent in this form of construction that the one plate forms both a negative and positive and acts as a cell wall at the same time. The spaces between the plates are filled to within ¼

inch of the top with a solution of two parts of distilled water to one of chemically pure sulphuric acid. The battery can be charged now.



### Rectifier for Charging

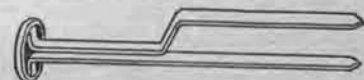
An electrolytic rectifier suitable for use with this battery can be made from an old wet battery. Instead of a zinc rod use an aluminum rod of the same dimensions and fill the jar two-thirds full of a saturated solution of baking soda, to which has been added four or five drops of sulphuric acid. Connect as shown in the diagram, using a 100-watt lamp as resistance.

The battery is connected so that the leads come from the positive end and is charged till it starts to gas. Then discharge it through an electric bell till the bell stops ringing. Repeat this, charging and discharging three or four times and the battery will be ready then for service in the set. Repeated charges and discharges will gradually increase the capacity of the battery.

It should be kept in a place where it is not liable to be disturbed. To prevent evaporation cover it loosely on top with a sheet of glass, which will allow of inspection from time to time.

### Tweezers for Crystal Mounting

As I desired to change my galena crystal for another, I did not want to touch it with my fingers, but I had nothing in the form of pliers for use in picking it up. Tweezers were the tool I needed, but none could be found. In looking for

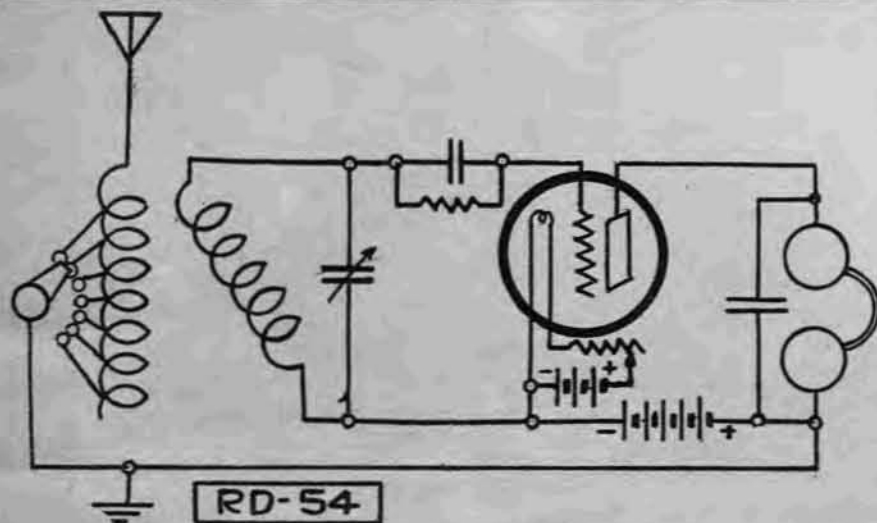


these tools I found a long paper fastener of the kind shown in the illustration. One leg of this device is longer than the other and I bent it into the shape shown in the illustration. This was used the same as tweezers to pick up the crystal.—Clem Frohnapple, Hammond, Ind.

### WIRE TABLE—B. & S. Gauges in Mils and Millimeters

B. & S. Gauge	Diam. in Mils. at 20°C.	Diam. in mm. at 20°C.	B. & S. Gauge	Diam. in Mils. at 20°C.	Diam. in mm. at 20°C.
0000	460.0	11.68	19	35.89	0.9118
000	409.6	10.40	20	31.96	.8118
00	364.8	9.266	21	28.46	.7230
0	324.9	8.252	22	25.35	.6438
1	289.3	7.348	23	22.57	.5733
2	257.6	6.544	24	20.10	.5106
3	229.4	5.827	25	17.90	.4547
4	204.3	5.189	26	15.94	.4049
5	181.9	4.621	27	14.20	.3606
6	162.0	4.115	28	12.64	.3211
7	144.3	3.665	29	11.26	.2859
8	128.5	3.264	30	10.03	.2546
9	114.4	2.906	31	8.928	.2268
10	101.9	2.588	32	7.950	.2019
11	90.74	2.283	33	7.095	.1798
12	80.81	2.053	34	6.305	.1601
13	71.96	1.828	35	5.615	.1426
14	64.08	1.628	36	5.000	.1270
15	57.07	1.450	37	4.453	.1131
16	50.82	1.291	38	3.965	.1007
17	45.26	1.150	39	3.531	.08969
18	40.30	1.024	40	3.145	.07987

## HOOK-UPS R.D.-53-54



R.D.-54

One reader has requested a hook-up using one variocoupler, one variable condenser and other necessary equipment. This type of hook-up has been published so often that we are giving it in a slightly different form to relieve the monotony.

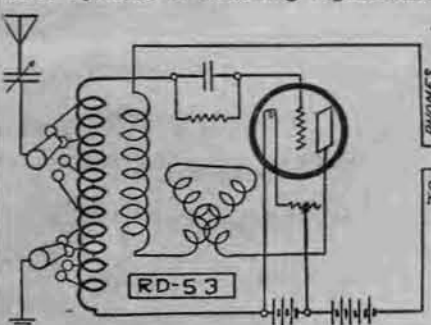
In the hook-up illustrated, the connections are the same as usually shown except for the wire between the primary, ground and the plate circuit. This, of course, makes the set regenerative. The variocoupler is of the usual type and a 43- or 23-plate variable condenser is shunted across the secondary circuit. The usual size grid leak and condenser is employed. A slight alteration is that the negatives of both batteries are connected together. The plate battery is the 22½-volt size. The receivers are shunted with a fixed phone condenser.

It will be found, in tuning this circuit, that the adjustments of primary and secondary are a little more critical than usual. The filament rheostat will also be found much more sensitive.

R.D.-53

This hook-up was submitted by Dr. B. F. Morrow, 859 Seventh Avenue, New York City, with the following comment: "The diagram will probably interest many of your readers, particularly those

who are constantly searching for increased volume from their Radio receiving set. It consists of a combination of the 'tuned plate' and the 'tickle feed back' systems of obtaining regeneration.



Great care must be exercised in the manipulation of the dial of the filament rheostat. The latter should never be turned on at maximum. I shall be glad to hear of any comment on this method of double regeneration."

The variable condenser in the antenna circuit has a capacity of .001 mfd. The tuning apparatus is a variocoupler of

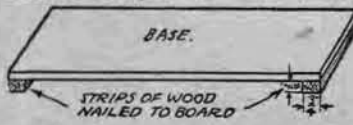
which the secondary is used as a tickler in addition to which a variometer is inserted in the plate circuit. The primary of the variocoupler has a double set of taps for both rough and fine adjustments. The grid leak has a resistance of .5 megohms and the grid condenser capacity is a .00025 mfd. A detector vacuum tube (UV 200) is used with 22½ volts in the plate circuit. Except for the double regeneration control idea, the circuit is no different from the usual regenerative type.

### ENAMELED WIRE—Weight and Resistance Table

B. & S. No.	Weight per 1000 Feet	Feet per Pound	RESISTANCE IN OHMS	
			Per 1000 Feet	Per Pound
12	19.9	50.3	1.57	.079
13	15.8	63.4	1.97	.125
14	12.5	79.8	2.49	.199
15	9.93	101.	3.14	.316
16	7.88	127.	3.96	.502
17	6.25	160.	4.99	.798
18	4.96	202.	6.29	1.27
19	3.94	254.	7.93	2.01
20	3.12	320.	10.0	3.20
21	2.48	403.	12.6	5.09
22	1.97	508.	15.9	8.08
23	1.56	640.	20.1	12.8
24	1.24	806.	25.3	20.4
25	.994	1016.	31.9	32.4
26	.782	1279.	40.2	51.4
27	.621	1610.	50.7	81.6
28	.493	2030.	63.9	130.
29	.392	2553.	80.6	205.
30	.311	3220.	101.	327.
31	.247	4049.	128.	519.
32	.196	5108.	162.	826.
33	.155	6447.	204.	1314.
34	.123	8107.	257.	2084.
35	.098	10240.	324.	3319.
36	.078	12870.	409.	5261.
37	.061	16280.	515.	8388.
38	.049	20470.	650.	13300.
39	.0438	26170.	819.	21450.
40	.031	32590.	1033.	33670.

### Protecting Wires Under Bases

Many an amateur in making his crystal set mounts it on a base. In most cases he finds some wiring must be done under the base. In constant use the wires are apt to become scraped or broken, causing



short-circuits or a broken wire. To prevent the scraping of the wires, nail a strip of wood on each end of the base, as shown in the sketch. Dimensions and construction are clearly shown.—Harry Kaufman, Toledo, Ohio.

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# Questions and Answers

## Tuning Weak

(865) TCN  
I have been getting your paper and think it is the stuff. I would like to ask a question. I have a short wave regenerative set composed of variocoupler, grid variometer, plate variometer, 23-plate variable condenser and tube. I also have a two-step amplifier, and the trouble is that I can tune in on WWJ, KDKA, WRR, DD5 and other distant stations and get them very clear, but when I try to get stations close to home like the Kansas City Star (KSD) I cannot tune them in fine enough or something else, for it is not clear; part of the time the music is clear and other times it is all a jumble and I can hardly ever get the voice to come out clear enough that I can thoroughly understand what is being said. Can you suggest anything that will help me out? I will sure appreciate anything that you can suggest.

A.—Your tuning is weak. Shunt a 43-plate variable condenser across the primary and the 23-plate across the secondary.

## Improvement on Original

(911) HWG  
I have a question which I hope is a legitimate one for an interested reader of the RADIO DIGEST to ask.

1. Could you tell me if the circuit S-17, which was shown in an article by Evans E. Plummer in the July 22, 1922, issue of RADIO DIGEST, is the one that Major Armstrong used in his original demonstration at the Auditorium of the Engineering Societies Building in New York City on June 7?

2. And do you think that a person who has had no previous experience could construct, for the most part, this set and operate with any degree of success? I hate to start wrong. I would appreciate a word in the right direction, if you would be so kind.

A.—Yes, with improvements. Armstrong made the latter at his lecture before the Radio Club of New York.

2. Hardly. If you are a beginner, I would suggest that you start out with a simple single-tube regenerative circuit. Don't try the tricks until you learn the first steps. We all have to learn to walk before we can run.

## Equivalent Inductance

(912) EPB  
1. Are honeycomb coils meant to be used throughout in the Armstrong Super-Regenerator, as shown in the RADIO DIGEST, volume two, issue three? If not, please give dimensions of wire coils, etc.

2. What is the effective receiving radius of this set?

3. Does the one stage of audio frequency amplification shown in the second diagram materially increase receiving radius?

4. Is the circuit as good as or better than a circuit employing two stages of Radio frequency amplification a heterodyne and a modulator tube instead of a detector (making due allowance for the difference in number of tubes employed).

A.—1. Yes, or use coils with equivalent values in millihenries inductance. It will be cheaper to buy unmounted coils. See issues No. 9 and No. 10, June 10th and June 17th, page 13, both issues.

2. I have heard it receive 700 miles with a loop aerial.

3. No, it acts as more of a power amplifier for loud speaker.

4. When working at its best, yes. I prefer the older circuit, however.

## Construction Details

(913) HDK  
I am very much interested in the new Armstrong super-regenerative circuit described in RADIO DIGEST, July 29th, 1922, issue, page 11.

1. In working this circuit, will you please state the relative mounting positions (in relation to each other) of the various duo-lateral coils, transformer, tubes, etc. That is, can the circuit be arranged with all coils parallel, or should some be at right angles, separated, or which would be the correct procedure necessary to obtain the most efficient results of the circuit? What are the constructional details of L-6?

2. I note your comments on the use of a loud speaker in the second circuit. Do you mean a speaker of the Magnavox type or will one of the Silvertone variety answer?

A.—1. Figure 2, page 11, July 29th, is rather leaky. Read pages 6 and 7, August 12th number, for best data. In August 12th issue, CK, the iron-core choke coil can be a Ford spark coil core and primary.

2. Either are all right. Magnavox, of course, with separately excited field, gives more "noise."

## Variocoupler in Super-Regenerative

(910) CB  
Am taking the liberty of asking you a few questions. In your issue of July 29th you publish two Armstrong super-regenerative circuits, page 11.

1. In the circuit Figure 1 will a common variocoupler with the proper winding be allowed for "L" and "L-3"?

2. Can "L3," "L4" and "L5" be homemade coils or must they be duo-lateral coils?

3. In placing this circuit in a cabinet, what are the relative positions of L3, L4 and L5?

4. Are these positions fixed or variable?

5. Please give size of tubes and size and number of turns of wire if L3, L4 and L5 can be homemade. Please specify No. 24 SCC wire if convenient.

6. What are the best vacuum tubes for this set?

A.—1. Yes. Double the number of turns on the secondary.

2. Yes, they can be homemade. Wind them to the same value as corresponding honeycomb coils.

3. All are at right angles to one another.

4. They are fixed.

5. Wind L3 to 125 millihenries inductance, L4 to 10 millihenries, and L5 to 175 millihenries. I believe it would be cheaper to buy the unmounted honeycomb coils than attempt to wind them.

6. UV-201 Radiotrons will work. Western Electric "J" or "E" tubes are better. Hard tubes are needed.

## Super-Regenerative Queries

(908) EBR  
In your issue of the 29th of July you give a diagram of the Armstrong Super-Regenerator (page 11). I would like to ask a few questions which I hope you will be good enough to answer.

1. Should coils L-4 and L-5 be close coupled and arranged for variation of couplings like the secondary and tickler, or independent of one another?

2. Should both tubes (Figure 1) be UV-201 amplifying tubes? Will Myer tubes work?

3. Is a grid leak condenser necessary or advisable?

4. Would any advantage be derived by using outdoor aerial and coupled primary coil? My outfit has 3 spider-web coils, primary 25, secondary 50 and tickler 100 turns. I receive very good from a radius of 600 to 700 miles with an A & P detector and one UV-201 tube. Would this new hook-up improve my range and loudness?

A.—1. L-4 and L-5, Figure 1, are at right angles, NOT inductively related.

2. Yes, or better Western Electric J or E tubes. The harder the better. Myer tubes should work fine.

3. Not at all. Don't use any.

4. Yes and no. The circuit radiates very much energy. Try it anyway with your spider-web coils, coupling primary and secondary very loose, and secondary and tickler very close. I think it will improve your range.

## Rectifier for Charging

(475) CG  
I have taken a great liking to your question and answer page and now I will appreciate a little information. I have a 6-volt storage battery and I wonder if a person couldn't make a rectifier and charge it himself.

I understand that a rectifier can be made by taking two quart jars and inserting 2 lead plates 1/2x3x8 inches into each, and filling the jars with water and adding a tablespoonful of 20 Mule Team Borax to each next putting a binding post on each plate. Plates should not touch each other. Alternating current goes in one plate in each jar and comes out direct current in the two remaining plates.

To charge a 6-volt storage battery would it be necessary for me to step down the 110 volts A. C. to 6 volts A. C. through a transformer then send it through the rectifier into the storage battery? Perhaps you could show me a different way of doing this.

A.—Your plan for rectifying is correct. Step down to 6 volts before rectifying.

## Amplifying Volume

(915) LAA  
Would you be so kind as to answer a few questions in regard to the new Armstrong super-regenerative hook-up?

1. I have noticed that most every hook-up, although being practically the same, states that different amplifying volumes ranging from 5000 to 50,000,000 times may be obtained. Therefore, I would like to know the best hook-up and what volume I can expect.

2. In the enclosed circuit, which was published by the Radio World on page 6 of July 8th number (also in the other circuit), could coils Nos. 1, 2 and 3 be (1 and 2) a variocoupler, and No. 3 a variometer, or should they be duo-lateral coils? Should the loop be connected at X?

3. In circuit No. 1 it shows the negative of the C battery connected to the grid of the second tube and circuit No. 2 the negative connected to the grid of both tubes. Which is correct?

4. Is this an audio, or Radio frequency circuit, or both?

5. Can a Weston car ammeter reading 0 to 30 amps. be converted into a voltmeter, reading 0 to 8 or 10 V's? This ammeter sells for \$3.50. It is new, and I would like to use it for a filament voltmeter?

A.—1. Best hook-up has been given in August 12th number, pages 6 and 7. Volume in phones is equivalent to three stages of Radio frequency amplification, detector, and two stages of audio.

2. Coils 1, 2 and 3 can be three honeycomb coils in triple mounting, or coil 1 can be primary, 2 secondary, and 3 tickler coil of a variocoupler having tickler coil. Variometer alone cannot be used to tickle plate, as a close coupling is needed between secondary and tickler. Loose coupling is wanted between 1 and 2. Loop should be shunted across ends of 2.

3. Either. The grid bias may be neces-

sary or may not. This depends entirely on the characteristic curves of the two hard tubes used.

4. In fact, it is a Radio frequency circuit, employing regeneration, which generation is balanced out by the second tube (oscillator) circuit oscillations, which occur with lag, at about 10,000 to 15,000 cycles per second.

5. It could, but would require an experienced instrument man's services. I would not recommend your making the change.

Note:—RADIO DIGEST, August 12th, pages 6 and 7, gives more information.

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# Radio

## Illustrated



Little tots are taking much interest in the bedtime stories by Radio. By this method they receive the best story telling talent. Three-year-old Walter G. Estay is shown here in the act of tuning in for his bedtime story © K. & H.



The London (England) police use a game for practice in catching criminals. The Radiophone takes part in the game in getting details for location on the miniature landscape © Int.



America has gone into the real game of catching criminals and the chief is giving the alarm and description of the person sought © Int.



Luther Burbank, 'Fast Wizard' broadcast from KFRN, his mobile station, at his home. Nils Berch, owner, told farmers some tricks about agriculture in his speech © Int.