

More Than 250,000 Copies This Issue—"Fastest Growing Radio Magazine"; Low Loss, What It Is and Why—by Fournier; Super-Het; Beginners' Helps

# Radio Digest

EVERY WEEK

PROGRAMS Illustrated

TEN CENTS

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

Vol. XI

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SATURDAY, NOVEMBER 15, 1924

No. 6

## BUILDS BEST SUPER-HET

### KHJ FINDS SOLUTION TO QUESTION OF PAY

EXPERIENCE PROVES THAT PROGRAMS ARE BETTER

Artists Being Paid Indirectly By Donor of Program—Government Reaches a Similar Conclusion

WASHINGTON.—Has the answer to the question "Who Shall Pay for Radio Broadcasting," reached a satisfactory settlement? The department of commerce year book seems to think that it has.

The introduction of the commercial element into Radio broadcasting, is probably the most important development during the past year. Previously all broadcasters sent out programs at their own expense, but recently some stations established a fixed rate per hour for the use of their transmitters.

"It now appears possible," the year book states, "that the cost of broadcasting may be borne more and more by those

(Continued on page 2)



Left, Lenore Everett, KGO dramatic player heard recently in the comedy-drama "Homing," broadcast from KGO. Above, Dorothy Raye, celebrated songster in the "Around the Rainbow" show at Mann's Million Dollar Gardens, broadcast from WQJ. Right, Lotta May Kelly, feature on the "Nite Cap" program at WJAX.

### TESTS PROVE TWO CONTROL SET PERFECT

Cuts Through All Locals

Designer, J. G. Ryan, Tells Radiophans How to Build—Gets Both Coasts Regular

So simple a child can operate it, the most practical super-heterodyne has been developed at last in the laboratories of Radio Digest. The new wonder set, designed and built by John G. Ryan, Radio engineer of repute, not alone is simple to operate but just as simple to construct.

In tests made over a period of ninety days coast to coast reception has been regular.

Simple to operate and construct, the efficient set is built from the fewest possible number of parts. Its cost will not exceed \$78.00, and additional accessories, most of which are already possessed by the average Radiophan, cannot possibly cost more than \$76.40.

Selectivity is one of its prime assets. (Continued on page 2)



### SOOTH COPS WITH TENDER SAW SOLOS

BOSTON.—Nothing surprises the director of a station any more. The other night someone called WEBB during a dance program and requested that they "play something soothing for the benefit of the Hingham police." So when the program ended, Stanley Greenlaw got out his saw and pounded out "Ole Black Joe" and a few more "soothers" for the law and order department.

### Lambdin Kay Enters Movies to Show How Stations Work

ATLANTA, Ga.—Movie acting is the latest role that Lambdin Kay, announcer at WSB, has had to play as part of the day's work at the broadcasting station.

He was the entire cast of characters in a one-man production filmed by an Atlanta theater as part of a Radio fantasia. He was shown in action before the microphone giving WSB's familiar salutation to the world while an impersonator simultaneously gave the call from behind the scene.

### Convicts Broadcast Direct from State Penitentiary

PHILADELPHIA.—Early last spring amplifying apparatus was installed inside the bleak walls of the Eastern State Penitentiary in this city, and connected by telephone lines to Station WIP.

Done as an experiment, the first broadcast caused much excitement. Three thousand telegrams poured into the studio offering congratulations and begging for more.

It was tried again recently, with even greater success than the first broadcast.

# NEW TRANSMITTING SYSTEM DEVELOPED

## INTERCHANGEABLE CODES CONTINUALLY ALTERED

### Receiving Apparatus Automatically Responds to Change—Sends Message Written Similar to Typewriter

LONDON.—A new system of transmitting commercial intelligence and news by Radio, which is directly transferred from a typewriter in the transmitting station to the tape which spins out written characters in the receiving office, has been discovered. The discovery is due to the enterprise of two German scientists, but its exploitation and the development of its possibilities were quickly seized upon by William Dubilier, the well-known Radio manufacturer.

The machine consists of a typewriter, a registering apparatus, and an assembly of eight compartments, each containing what looks like a transformer built on top of a magneto. At the head of each compartment are movable rods which send out the message by means of musical notes.

#### Uses Interchangeable Code

The receiving apparatus looks even simpler—a four-tube set, a box full of plugs and wires, and a camera-like mechanism, with a motor attachment; besides this, the wheel around which the tape runs. Secrecy is obtained by means of the fact that countless combinations can be used at will. The receiving apparatus automatically responds to the change, so that in the event of any suspicion arising that messages are being tapped their method of despatch can be immediately altered.

Not only can the time periods be changed between the notes, but the combination of notes used can be changed at will, so that the transmitter may be changed automatically every few words without in any way affecting the operation of the receiving apparatus. Since transmission is effected by means of musical notes, atmospheric—the bugbear of Radio—are eliminated.

The potentialities of the invention to business houses, which have so far fought shy of Radio because of its lack of secrecy, are enormous. Big stores can transact business between headquarters and all their branches in this way with utmost secrecy, changing their code from day to day.

## BEST OF SUPER-HETS

(Continued from page 1)

Chicago, as is known to all local listeners, is one of the most trying cities for a receiving set. So many local stations are on the air nightly as to make out of town reception practically impossible except on Monday night when Chicago stations are silent.

But the Radio Digest super-het proved equal to the task.

The set was moved from one congested ether locality to another. Every test proved it capable of cutting through the worst of interference.

#### Eliminate Unnecessary Controls

Satisfied that the set was super selective, the next problem was to eliminate all but the absolutely necessary controls so that even the uninitiated listener in could operate it satisfactorily.

After considerable work in designing the result was a super-heterodyne with but two tuning controls, a rheostat and a potentiometer. The two tuning controls are for condensers, one of which tunes the loop aerial and the other, the oscillator.

John G. Ryan, the designer and builder of the set, now tells how anyone may duplicate it. His story appears on page 21 of this issue.

## KHJ HAS PAID TALENT

(Continued from page 1)

wishing to reach the great audience available through this system of communication."

Station KHJ, believes that they have found a solution to the question. They reiterate the statements made by the Departmental year book. "Uncle John" Daggett, director of the station stated that at the time KHJ first went on the air, an appeal was made for the artists to come and appear before the microphone for the good that they could do.

Practically every program now presented over KHJ is being put on by some bank, store or industry of Los Angeles, or vicinity. The artists are being paid by the donor of the programs, not as much as they usually get for regular performances, but enough to feel that they are being paid for their work, and that it is not charity.

KHJ has always been noted for the level excellence of its programs and it is thought this new scheme, evolved through expediency and experience, will bring even a higher class of entertainment to the listeners in.

## DUBILIER'S NEW SECRECY DEVICE



William Dubilier, well-known condenser manufacturer, has recently brought to the attention of others a Radio secrecy code transmitter and receiver invented by two German scientists. Commercial news and intelligence is typed on what appears to be an ordinary typewriter, which in turn sends out a jargon of code. This is picked up by a special receiver and converted to the proper written words on a tape. P. & A. Photo.

### Announcers Rile Fans

WASHINGTON, D. C.—Local Radiophans are complaining that announcers for the various stations in signing off are slurring over the calls of their stations so that many times the letters are not understandable. This is causing trouble to

some of the "travelfans" who are trying to make a record on stations received.

One of the bugs in discussing the problem compared the signing off of some stations to the careless way in which some letter writers sign their names. That is, the signing off is unintelligible.

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## Looking Ahead

The Simplest Possible Super-Het's Wiring Diagram will be shown next week by John G. Ryan. He will show the easiest method of wiring this excellent super-heterodyne. If you want the least amount of trouble, watch for this article.

Constructing Various Types of Low Loss Inductances will be the text of the next article written by Jacques Fournier on "Low Loss," What It Is and Why." Low loss fans should read this article.

Operating and Trouble Shooting for the Owner of an Atwater Kent Model 20 Receiver, will be shown in a coming issue. Many points on receiving will be taken into consideration and it is written so anyone can operate a set of this type.

Regenerative Radio Frequency Hook-Up, a feature to appear in our next issue shows an excellent method of combining Radio frequency with regeneration. Selectivity is gained, as well as added signal strength.

Newsstands Don't Always Have One Left

WHEN YOU WANT

# Radio Digest

YOU WANT IT!

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Publisher Radio Digest,  
510 N. Dearborn St.,  
Chicago, Illinois.

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

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Address .....

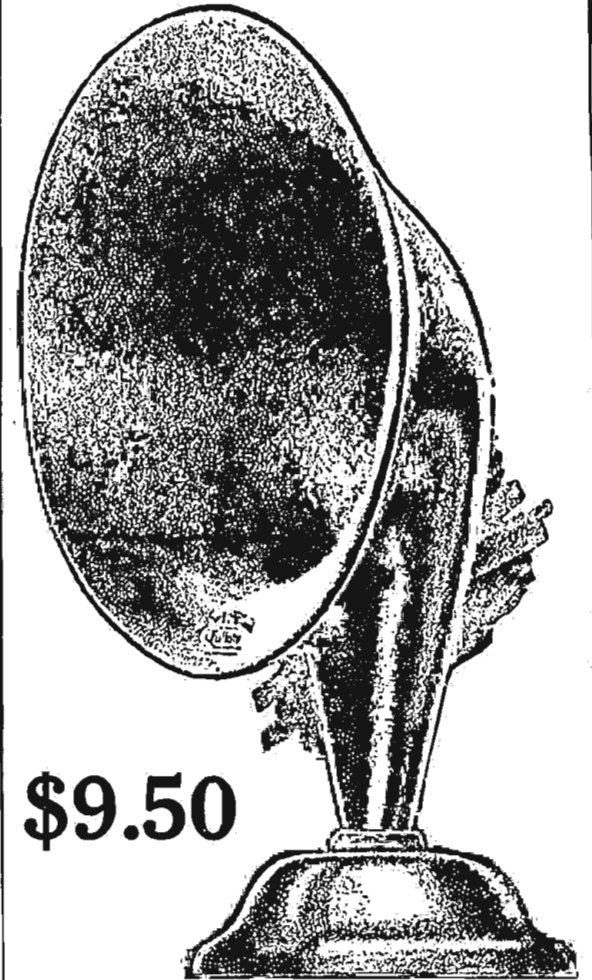
City.....State .....

# Fultone

Trade Mark

## The Ford of Loud Speakers

Fultone has been thoroughly tested on regenerative, reflex, tuned radio frequency and super-heterodyne receivers and has proven its ability to handle both faint programs from distant stations and the roaring volume of the locals. This it does without distortion, without blasting and with a pleasing absence of tinny or other metallic noises.



### \$9.50

If your dealer cannot supply you, send money order or check for \$9.50

**HALL & WELLS, Inc.**  
128 N. Wells St. Chicago, Ill.

## Of Course It's a CROSLLEY Radio

Better—Costs—Less

For ease of tuning, selectivity and long distant reception, you can't beat a Crosley. Actual performances prove this day in and day out.

Here are what a few of the happy Crosley users say:

Apponag, Rhode Island.  
"I purchased my Crosley one tube No. 50 around the first of August and I think it is my duty to express my satisfaction of its performance during the warm spell. Have heard New York, Boston, Pittsburgh, Cincinnati, Chicago, Detroit, Ottawa, Canada, and many other stations."

Dallas, Texas.  
"The set, Model 51, has already surpassed my greatest expectations. On the night of September 13th, Oakland, California, was received with sufficient volume to be clearly heard throughout seven rooms. Kansas City, Chicago and many other stations were received with respectively greater volume."

Chicago, Illinois.  
"My Tridyn has done all that you claimed for it. The first silent night, Monday, September 22nd, using only two tubes, I pulled in twenty-eight stations. On the following night with most of the Chicago stations going full blast, using two tubes, I pulled in Memphis, Cincinnati, Dallas and Omaha."

(Names upon request)  
These are only a few of the thousands of unsolicited letters that come to us. You, too, can enjoy similar results with a Crosley. And the cost of any Crosley is remarkably low.

**BEFORE YOU BUY—COMPARE YOUR CHOICE WILL BE A CROSLLEY**

Crosley Regenerative Receivers are licensed under Armstrong U. S. Patent 1,113,149. Prices West of the Rockies add 10 per cent

For Sale By Good Dealers Everywhere



**Crosley One Tube Model 50, \$14.50**  
With tube and Crosley Phones \$22.25

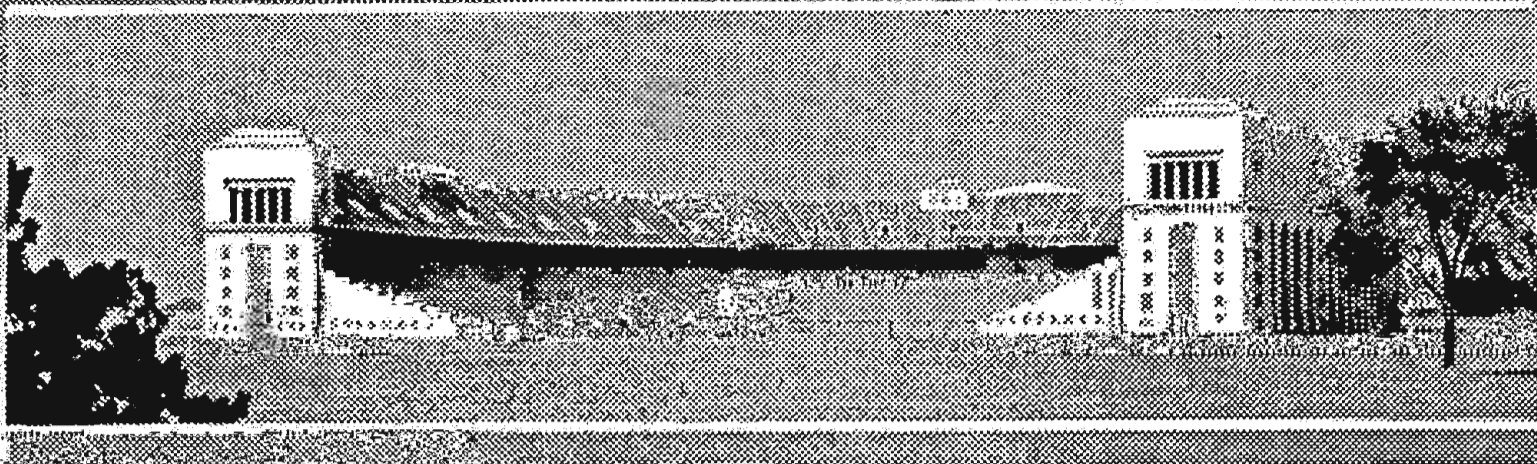
Write For Complete Catalog

**The Crosley Radio Corporation**  
Powel Crosley, Jr., President

11493 Alfred Street - Cincinnati, O.  
Crosley Owns and Operates Broadcasting Station WLW

# WEAO BROADCASTS GRIDIRON CONTESTS

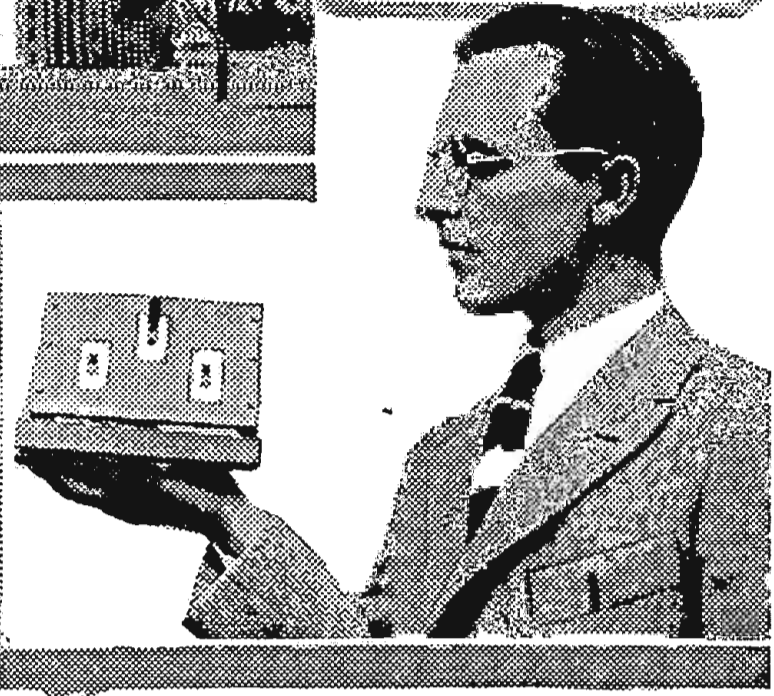
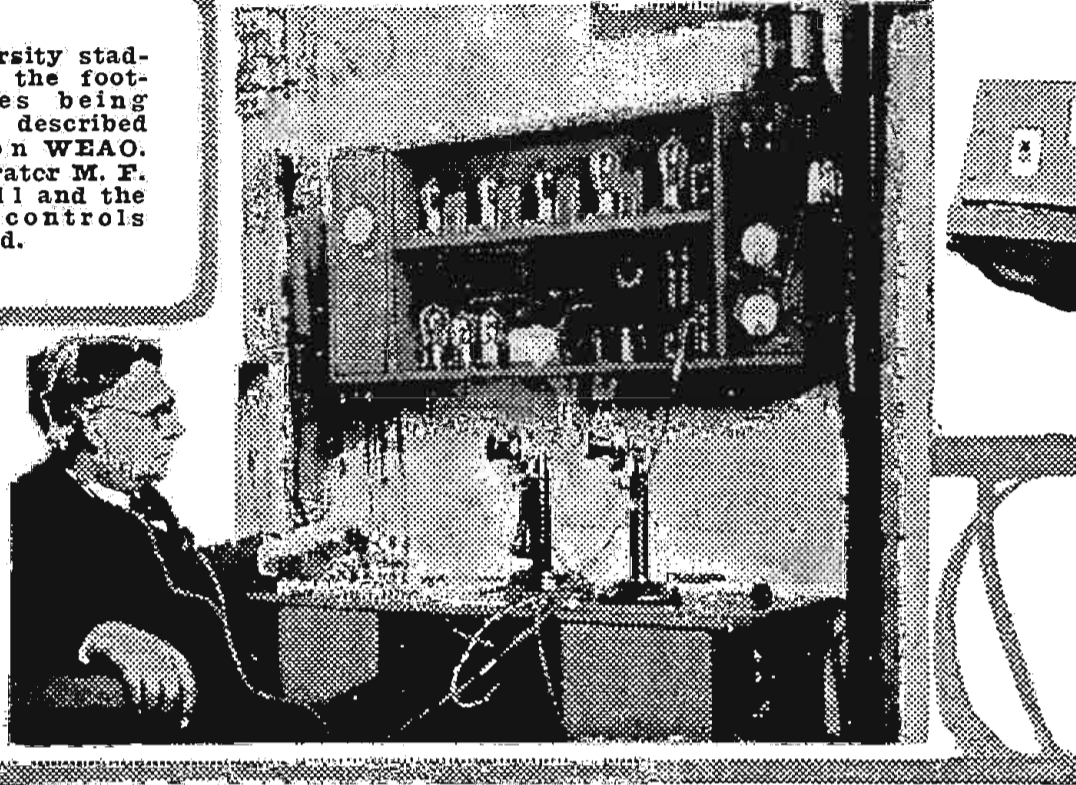
A. Lee Henderson, announcer who described the football games play by play, giving the fans who listen in the thrill of a lifetime.



Engineer R. C. Higgy, holding the instrument which controls the lines running from the stadium to the operating room, and which carries the story of the game.



Ohio University stadium where the football games being played are described by Station WEAO. Below, Operator M. F. McDowell and the amplifying controls used.



## RADIO FIELD GROWS FAST, REPORT SAYS

MANY COMPANIES ARE FINANCIALLY SOUND

Midwest Economic Institute Shows Promising Future for Industry Not Even Thought One Once

CHICAGO.—Coincidental with the fourth anniversary of Radiocasting now being celebrated, comes a statement from the Midwest Economic Institute which tells in interesting fashion the immense growth and present financial stability of the Radio industry.

According to the institute Radiocasting has so appealed to the public imagination, not only in this country but continental Europe, to such a degree that in England, where Radio has become a national fad almost to the same extent as in America, some 900,000 receiving licenses have been issued and the total number of listeners in is around 4,000,000. And it is interesting to note that the American invisible audience is now estimated conservatively at 5,000,000 persons.

**Becoming Financially Sound Fast**  
"Another interesting angle of the Radio industry," the report of the Midwest Economic Institute continues, "is the financial side of the question. A few years ago the Radio Corporation of America was practically alone in the field so far as financing through issued securities was concerned, but today there are about a dozen such corporations aligned with all the other large corporate enterprises representing the industries of the country in the financial markets.

"That the whole industry has benefited by this financial set-up is evidenced by exhaustive reports published in the latest Poor's and Moody's manuals of such companies as DeForest Radio company, Dubilier Condenser and Radio, Hazeltine, Ware Radio, J. W. Jones Radio, Tower Radio, Marconi Wireless and Mareoni of Canada, Limited, and others who are among the leading manufacturing concerns which have been working at capacity to supply the demand of the public for equipment and whose earnings and future prospects augur prosperity ahead.

**Surprising Statistics on Industry**  
"Four years ago the Radio industry was not considered of sufficient importance to give it an individual classification in the field of business. It was grouped under electrical products, along with electrical toys. When broadcasting started many hailed it as a fad that would live only for a brief period. Today it is considered one of the first industries of the world and that sales of Radio equipment are not likely to reach a saturation point for at least ten years.

"It is surprising to note that now there are more than 3,000 manufacturers of Radio supplies in the United States, 1,000 distributors and 27,000 retailers. More than 250,000 persons are connected directly or indirectly with Radio industry. All told Radio business approximating \$115,000,000 was done in this country last year, and \$50,000,000 of this was in vacuum tubes alone."

## Ohio State Uses Elaborate Scheme for Announcing Gridiron Contests

Special Studio Gives Vision of Field for Announcing Plays as They Are Made—Nine Microphones Allow Listeners in to Hear Cheering and University Bands

By Alton D. Spencer

COLUMBUS, Ohio.—What is believed to be the most elaborate arrangement ever made by any broadcasting station for sending out the results of an athletic event are those used at the Ohio Stadium, the largest in the Big Ten football conference. Ohio state's broadcasting station, WEAO, furnishes the power that carries the sound picture gridiron contests to a host of listeners.

Profiting by the experience of one season of broadcasting home games, attaches of the station have set the stage at the stadium and behind the brick walls of the engineering laboratory, where the plant is located. This gives the maximum of efficiency in giving the running story of the games and snatches of cheering and band music—as complete a picture as can be obtained without being in actual attendance.

**Eliminate Relay Announcers**  
The greatest improvement made in the system is the elimination of relay announcers. This system was discarded partly because of the difficulty of getting a dyed-in-the-wool football fan away from the game long enough to do the announcing at the studio. Last year it became necessary once or twice to put one unskilled in "gridiron" phraseology on the line, with uncomplimentary results.

The system employed this fall centers all announcing, cheering, band music and customary sounds of the game in a tiny white booth located in the middle of the west press box at the stadium. It connects directly with the broadcasting station.

Nine microphones send the audible impressions picked up into a miniature switchboard at the announcer's booth. Eight of these are located in the upper tiers or aprons at the east and west centers of the stadium. The ninth is for the exclusive use of the announcers. In addition to wires from the "cheering microphones," lines connecting with assistants located at the benches of the rival teams flow into the booth.

Seated at a table just below the plate glass window of the little house, Announcer A. Lee Henderson and Engineer Robert C. Higgy have complete control of the situation. From their window they have a comprehensive view of the game and the happenings in the big horseshoe. What cannot be seen is relayed to them by the two information scouts camping on the team benches. At the station, located about two blocks away, Operator M. F. McDowell and his assistant, A. M. Rose, handle the intricate transmitting apparatus and the control of sound volume, which is accomplished through an adaptation of certain telephone equipment to the needs of Radio.

**Connect All Incoming Lines**  
The stadium broadcasting headquarters is an innovation, being simply a small studio for the announcer. The walls are padded and draped with studio cloth, making it as nearly soundproof as it is possible. All incoming lines connect with a small switchboard designed by Mr. Higgy for this purpose. By the pressure of a button, the voice of Announcer Henderson comes through without interference. Other switches bring in either or both of the "cheering microphones."

## PLAN HUGE OPENING FOR CHICAGO SHOW

INTERNATIONAL EXHIBITS FORM GRAND DISPLAY

Amateur Set Builder's Contest Attracting Nation Wide Attention—Many New Devices Promised

CHICAGO.—Fans throughout the middle west are anxiously awaiting the opening of the Third Annual Chicago Radio show which takes place on Tuesday afternoon, November 18, and continues until midnight, Sunday, November 23, at the Coliseum in this city.

The exhibits, which will all be of the De Luxe variety, will completely fill the huge building and all of its additions, occupying nearly one hundred thousand square feet of floor space.

Notable among the exhibits will be some French receivers, tubes and battery eliminators, recently perfected by a celebrated French electrical wizard, which threaten to revolutionize Radio reception. These startling devices, which are not yet on the market, will be given their first public demonstration here.

**Contest for Set Builders**  
In addition to the vast number of manufacturers' displays through which they will introduce their new models to the enthusiasts of this country, there will also be several extremely interesting novelty exhibits, including a "New Inventions' Department," a "Practical Miniature Model Exhibit" and an "Amateur Set Builder's Contest." The latter is attracting nation wide attention and entries are coming in from all parts of the American continent.

Feature programs will be broadcast every afternoon and evening direct from the special studio which has been installed in the south balcony of the Coliseum. Six of the most powerful broadcasting stations in Chicago will contribute talent.

**Financiers Interested**  
Confidential representatives of the world's most important banking houses will also be in constant attendance, looking for opportunities to finance new and feasible Radio inventions. One eastern capitalist has authorized his Chicago representative to invest a large sum in five of the most promising local companies, the selection to be made after a careful investigation, which will begin on the opening night of the show.

Numerous Italian and Japanese sets will be on exhibit. Many of these arrived too late to be shown at the New York show, and will be seen here for the first time in the United States.

## New Transmitter Operates Like Pistol; Is Portable

LONDON, Eng.—A new transmitter has been invented here recently, which can be carried about and used for summoning help in case of an attack by robbers or other distressing occasions. The set is operated much like firing a pistol, and sends a signal which can be picked up at moderate distances by any receiving set.

### STATIONS IN ORDER OF WAVE LENGTHS USED

Meters	Call	Meters	Call	Meters	Call	Meters	Call	Meters	Call	Meters	Call
240	WBBG	283	WTAY	341	CHYC	370	WEBH	423	KPO	469	WRC
263	WGAQ	286	KFKB	341	KFKX	370	WGN	423	WBAV	476	WBAP
266	KFNH	286	KFGZ	345	WCBH	380	WGY	423	WLW	476	WFAP
268	KIPT	286	WAAW	345	WLS	380	WHAZ	425	CKAC	484	WHAA
270	KQV	286	WJAS	360	KGU	385	WOAI	429	WSB	484	WOC
273	WBBR	286	WKBF	360	KJS	390	WJAX	430	CFAC	492	KGW
273	WEBJ	286	WTAS	360	KOB	390	WTAM	435	ATN	492	WEAF
273	WEB	291	KFKX	360	WBT	395	KHJ	435	CNRO	500	WMC
273	WMAK	294	WEAO	360	WCAJ	395	WDAR	435	NAA	509	KLX
273	WRW	303	WEEI	360	WCAL	395	WFI	440	CFCN	509	WIP
278	WJJD	306	KFDM	360	WEAY	400	CFCA	441	WOS	509	WOO
278	WLBL	309	WMH	360	WGI	400	PWX	448	WQJ	510	CYL
278	WNAC	309	WSAI	360	WHA	400	WHAS	448	WMAQ	517	WCX
278	WRBC	312	KGO	360	WHN	405	WJY	450	CKY	517	WWJ
280	WCAJ	319	WGR	360	WJAR	405	WOR	455	KFOA	526	WHO
283	KFMX	326	KDKA	360	WKAQ	410	CKCD	455	WJZ	526	WNYC
283	WCAJ	330	CYX	360	WOI	411	WDAF	462	WCAE	526	WOAW
283	WCAJ	330	KFAE	360	WRL	411	WHB	463	KPI	536	KYW
283	WHK	337	WBZ	370	CYB	417	WCCO	469	WCAP	546	KSD

# Here it is! all ready to tune in

All you have to do is to use and enjoy it

SOME people like to spend days and weeks "collecting" a radio receiver part by part, and putting the whole together. Most people don't. They like an instrument to be ready—and each part of it known to be beyond challenge. They like a beautiful case that helps to furnish a room. They don't want the bother of stringing wires or of assembling parts. They want certain, quick results as soon as they receive their instrument.

Such people gravitate naturally toward the De Forest D-12 Radiophone. From the very beginning you get splendid results with it, even if you are an admitted "greenhorn." Yet such is the technical skill embodied in it that whether you are expert or otherwise you can go forward progressively with this instrument; you can fully realize the wizardry of radio as it calls the mysterious voices from the brimming radioways.

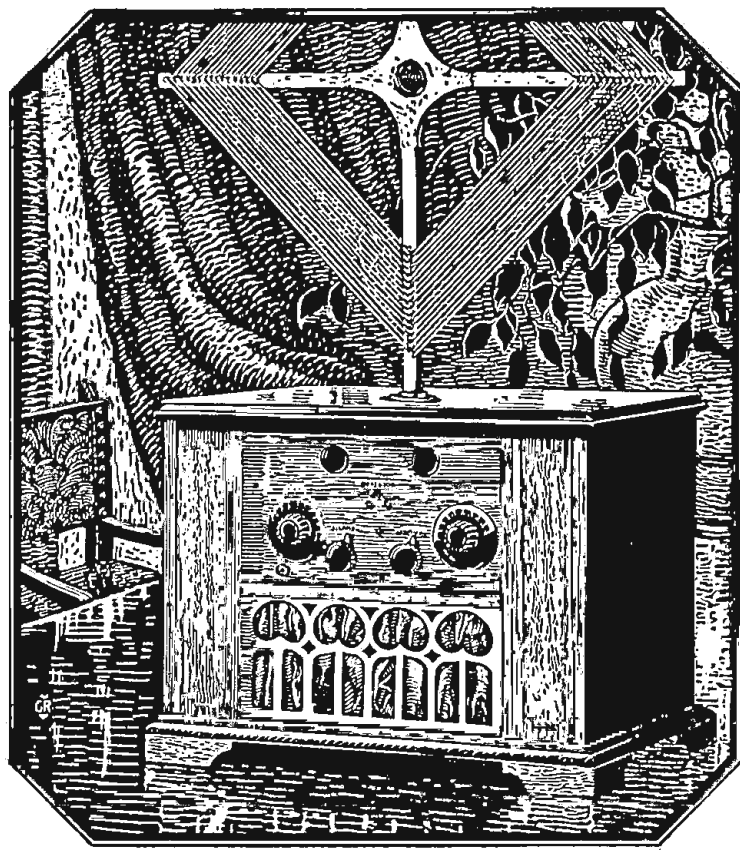
That the De Forest Radiophone is the standard in the radio world you probably know; for Dr. Lee De Forest, the great creative genius of radio, is its sponsor. A cheap machine it is not—though it costs about one-third less than any other that produces anything like equal results. An economical instrument it is. Sound engineering principles have given it a really surprising range; and this without any outside or inside wire, any ground wire. Also, the De Forest is conveniently movable from room to room.

Remember that the purchase of the De Forest D-12 gives you at one price everything that is required to make it usable in your own home. There is nothing extra that you need buy. It contains tubes—batteries—loud speaker—loop—everything necessary.

### It will pay you to look up a De Forest Agent

De Forest from first to last stands for all that is substantial and thorough and fundamentally right in radio.

De Forest agents are qualified to give sound and practical advice and help in radio. When you find a De Forest agent you find a man who knows radio—a man who has given us his word that he will see that every instrument he sells is thoroughly inspected and properly serviced after the sale. Avail yourself of his help. He desires, as do we, that you should get the fullest enjoyment and satisfaction from your instrument.



DE FOREST RADIO COMPANY  
Jersey City, N. J.

### Prices on De Forest D-12 Radiophones Complete

Including loop, self-contained loud speaker, four De Forest tubes, A and B batteries, and all equipment ready to operate.

#### With Dry Batteries

In two-tone gray and black  
Fabrikoid cabinet - - - - \$161.20  
In two-tone Mahogany cabinet - 176.20

#### With Storage Batteries

In two-tone gray and black  
Fabrikoid cabinet - - - - \$180.00  
In two-tone Mahogany cabinet - 195.00

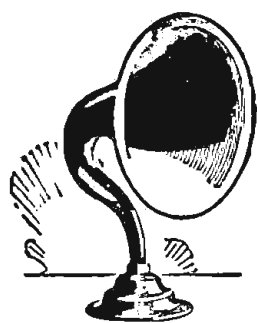
#### De Forest D-14 Radiophones

In burl walnut cabinet with loop and loud speaker built in. Price, including five DV-2 tubes, four B batteries, and storage battery \$371.50

# DE FOREST RADIOPHONE

TRADE MARK REG.

TRADE MARK REG.



De Forest  
(Separate)  
Loud Speaker

### For beauty and clear reproduction—

Use the De Forest Loud Speaker. In this instrument are all the best qualities of phonograph and telephone receivers adapted to radio. It reproduces naturally, brilliantly, without distortion, your favorite music, the voices of your favorite speakers and entertainers. The adjustment of the reproducing unit assures uniform response over entire range of audible frequencies. Its horn is shaped to retain the full brilliancy of the original sound, and also to add volume. Every De Forest Loud Speaker is guaranteed free from defects. Sold by authorized De Forest dealers only. Price with 6 feet of cord, \$25.00.

### Every set deserves De Forest Tubes

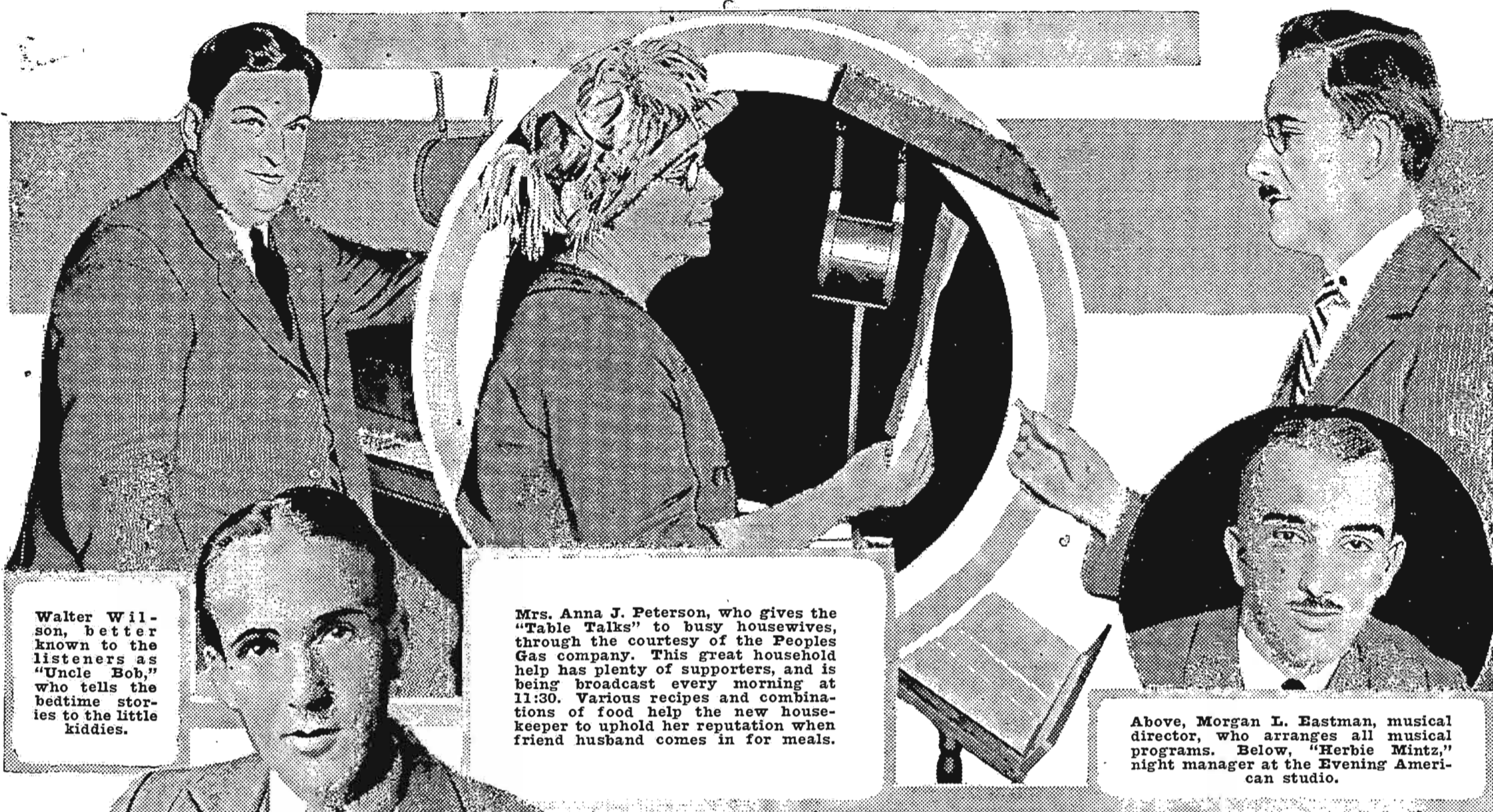
The original three-electrode vacuum tube that made present-day radio possible was a De Forest. Today, as in the past, De Forest tubes are unsurpassed for giving volume and beauty and clearness of tone reproduction. They are economical of current and have unusual long life.

De Forest tubes can be used with all standard circuits. The DV-3 is for use with dry cells, the DV-2 with storage batteries. They are guaranteed against defects in material and workmanship. Sold only by authorized De Forest dealers. Price \$4.00.



De Forest DV-2 Tube  
for use with Storage  
Batteries.

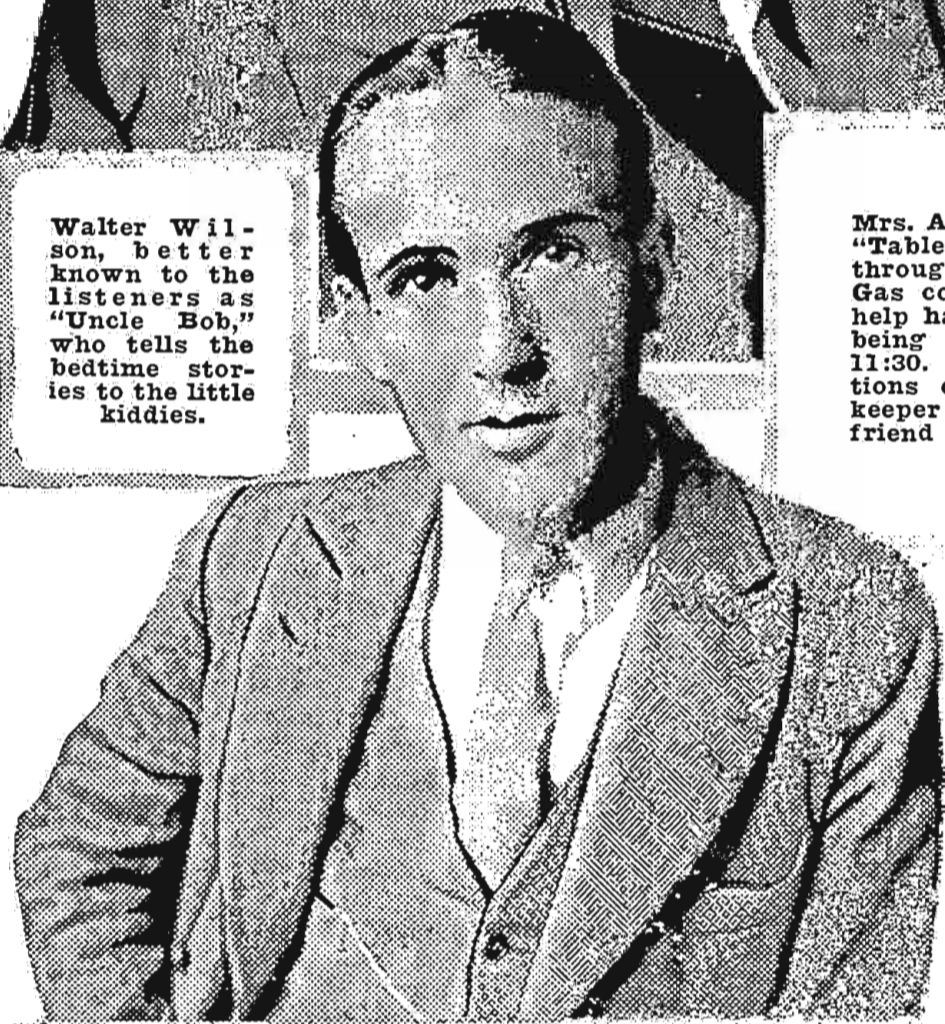
# KYW—Pioneer Station of the Middle West



Walter Wilson, better known to the listeners as "Uncle Bob," who tells the bedtime stories to the little kiddies.

Mrs. Anna J. Peterson, who gives the "Table Talks" to busy housewives, through the courtesy of the Peoples Gas company. This great household help has plenty of supporters, and is being broadcast every morning at 11:30. Various recipes and combinations of food help the new housekeeper to uphold her reputation when friend husband comes in for meals.

Above, Morgan L. Eastman, musical director, who arranges all musical programs. Below, "Herbie Mintz," night manager at the Evening American studio.



## Home of the "World Crier"

By E. E. Mattson

**K**YW—the pioneer broadcasting station of the West.

On Armistice day, this year the Westinghouse station at Chicago will celebrate its third birthday, after three years of amazing changes and growth.

From a station that needed for its operation only four men and one woman, KYW has grown to a point where nearly thirty persons are required to run the programs and keep in condition the broadcasting equipment. The four men who have been with KYW from the beginning are still members of the staff. They are, Walter C. Evans, now chief engineer, Wilson J. Wetherbee, director, Morgan L. Eastman, musical director and B. G. Swift, assistant musical director. The young lady who helped to pioneer Radio in Chicago is likewise still a member of the staff. She is none other than Miss Sallie Menkes.

Today there is a 24-hour service, seven days a week—news, markets and late sport features

when the regular shows are not in progress.

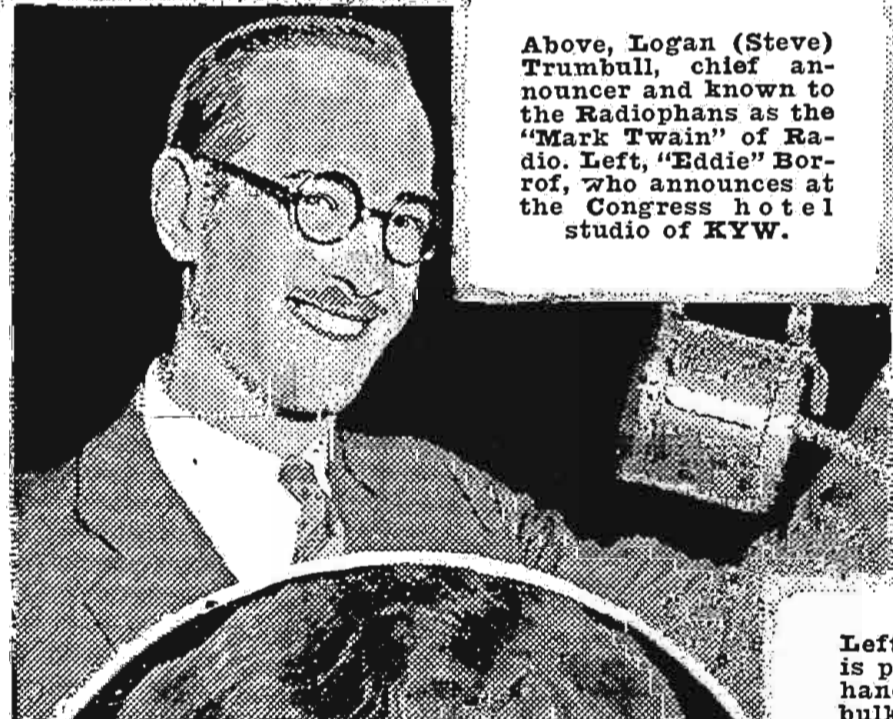
The first broadcasting by KYW was done from the stage of the Auditorium on November 11, 1921. Mary Garden addressed the comparatively few receiving set owners in the middle West. Edith Mason gave them a solo. Broadcasting was inaugurated in Chicago.

Two days later KYW started broadcasting grand opera. Even with the limited equipment then available, two steel poles, a span of wire on the roof of the Edison building, and the handful of broadcasting material in the operating room, the station broadcast every opera of the season.

It was in June of the following year that the present impressive aerial, that may be seen on top of the building, was erected.

The original studio was on the eighteenth floor of the Edison building. In April, 1922, the studio was moved to the room now occupied. The operating equipment, and it is massive compared

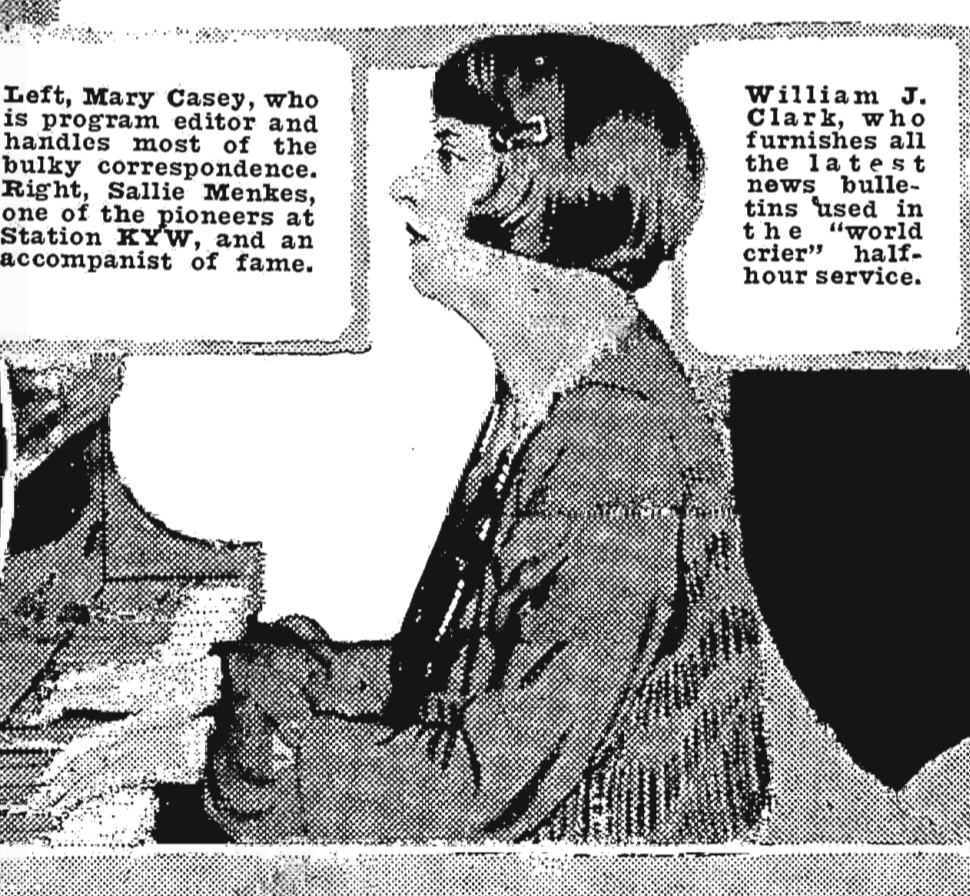
(Continued on page 11)



Above, Logan (Steve) Trumbull, chief announcer and known to the Radiophans as the "Mark Twain" of Radio. Left, "Eddie" Borrof, who announces at the Congress hotel studio of KYW.



Left, Mary Casey, who is program editor and handles most of the bulky correspondence. Right, Sallie Menkes, one of the pioneers at Station KYW, and an accompanist of fame.

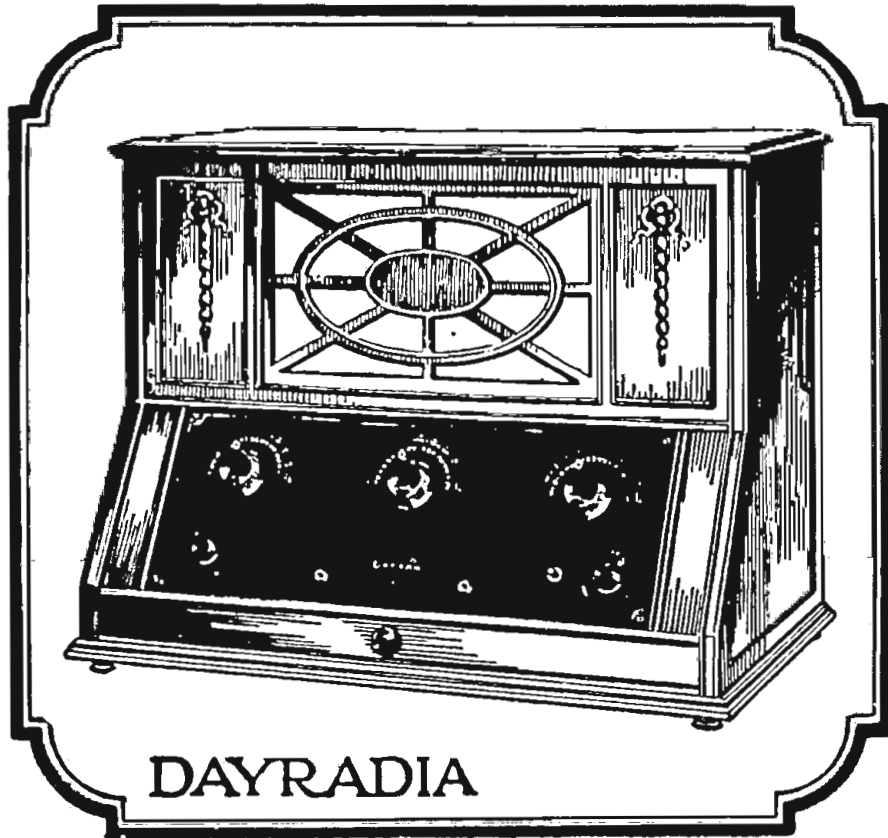


William J. Clark, who furnishes all the latest news bulletins used in the "world crier" half-hour service.

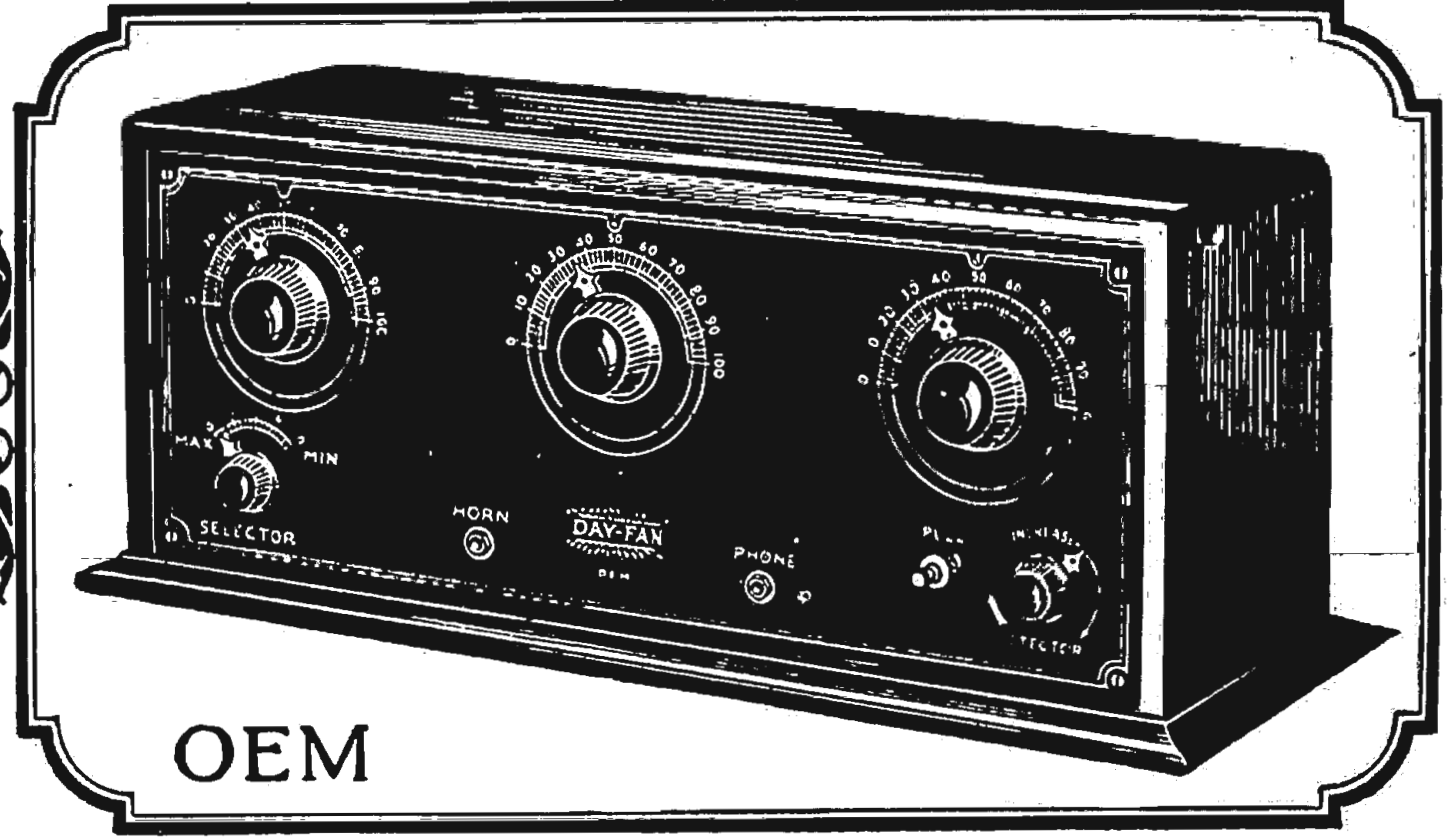


# The DAY-FAN Line

*There is a DAY-FAN set for every home*



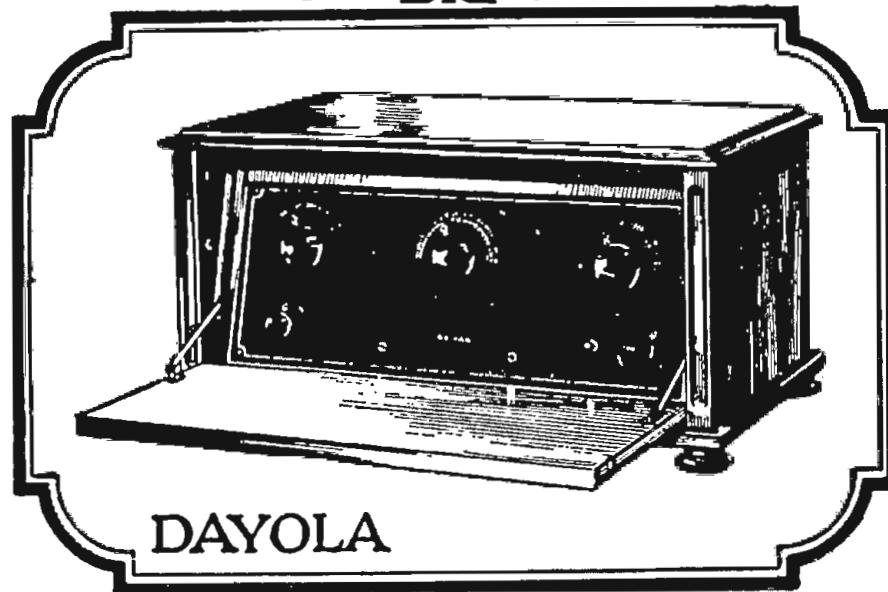
DAYRADIA



OEM

The OEM-7  
four tubes, \$98.00

The OEM-11  
three tubes, \$90.00

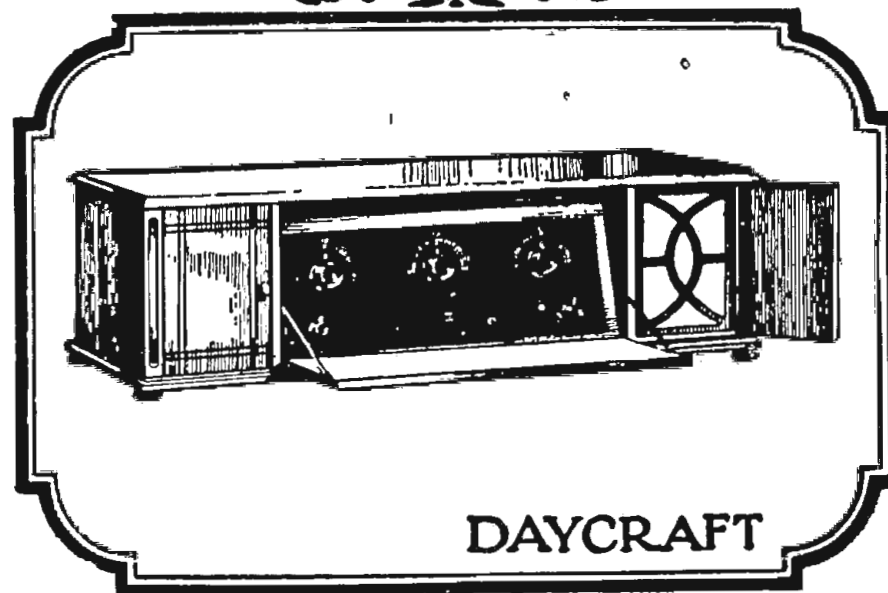


DAYOLA

The DAYOLA complete (except tubes) with A & B batteries and special silent, built-in recharging equipment.  
\$225.00

**E**VERY set, regardless of price, has that important and distinctive DAY-FAN achievement—

**ALL DIAL SETTINGS THE SAME  
FOR EVERY SET, EVERYWHERE,  
ON EVERY ANTENNA**



DAYCRAFT

The DAYOLA with B battery compartment.  
\$125.00

The DAYCRAFT with built-in phonograph loud speaker and B battery compartment.  
\$160.00

You don't have to log DAY-FAN sets. A complete list of all stations with corresponding dial settings for the wave length is given with each set. Simply turn the pointers to desired station—and listen in.

There is a model for every taste and purse, and each one embodies the same remarkable qualities of tone, volume, selectivity, simplicity of operation and beauty which distinguish the DAY-FAN OEM Receivers.



DAYTONIA

The DAYTONIA complete (except tubes) with A & B batteries and special silent built-in recharging equipment.  
\$285.00

*Write for Literature*

**The DAYTON FAN & MOTOR CO.**

*Manufacturers of High-Grade Electrical  
Apparatus for more than 35 Years*

DAYTON, OHIO

## UNIQUE CONTEST ON AIR FOR WGR'S FANS

### LISTENERS MAKE UP OWN SELECTIONS TO PLAY

Prize Offered to Program Which Meets With Public Approval—Contest Open to All

BUFFALO, N. Y.—Here is a new kind of a contest! It is designed to give the Radio audience a chance to pick its own programs.

The original idea was that of Harold Gieser, director of the Vincent Lopez Hotel Statler dance orchestra, broadcasting from WGR.

The listening public is invited to pick out their favorite selections from those played by Gieser's band of jazz artists and make up what listener considers to be, from his own personal viewpoint, an ideal program.

He is then to mail this program, arranged the way he thinks it should be played, to Harold Gieser, in care of Station WGR.

After a certain period of time has elapsed, which will be announced later, the plan being to give everyone a fair chance to hear all or most of the Lopez selections, Mr. Gieser's orchestra will play the programs submitted. At this time the Radio audience will be asked to listen to the different submitted pro-



Harold Gieser

grams and, after an announced period of time, write in, telling which program they liked the best.

#### Winner to Receive Photograph

The one whose program is the subject of the greatest number of approval letters will be declared the winner. An announcement will be made to that effect on the air and in The Radio Digest, and the winner will receive a large autographed photograph of the Vincent Lopez orchestra, including Harold Gieser himself. Duplicate awards will be made in case of tie.

The idea of this contest is to give Mr. Gieser and his men an opportunity to study more closely the likes and dislikes of WGR's Radio audience and to make the listening public actually feel to a greater degree the very great interest which Mr. Gieser and all those working with him, has in the Radio audience.

#### Appoint Musical Director

CHICAGO.—All music of WBCN, the Southtown Economist station now building on the south side, will be under the direct supervision of Guy Shrigley, a musician of years' standing in the Chicago field.

## Football Radiocasts

November 15

California-Nevada at California, KLK (509).

Harvard-Brown, WBZ (337).  
Michigan-Ohio at Columbus, WEAO (294).

Minnesota-Illinois at St. Paul, WCCO (417).

Nebraska-Notre Dame, WGN, (370).

New Mexico-State College, KOB (360).

Northwestern - Chicago at Chicago, KVVY (536), WMAQ (448).

Pitt-W. & J. at Pittsburgh, WCAE (462).

Princeton-Yale at Princeton, WEAJ, (492), WEEL (303), WGY (390), WJZ (455).

Wisconsin-Iowa at Wisconsin, WHA (360).

November 22

Boston College-Vermont, WBZ (337).

Harvard-Yale at New Haven, WEAJ, (492), WGY (380), WJZ (455).

Illinois-Ohio at Urbana, WBAV (423), WGN (370), WRM (360).

## NO STUDIO NEEDED BY INDIANAPOLIS STATION

Hoosier Capital Back on Air with 250 Watts

INDIANAPOLIS, Ind. — Represented for over a year now by only a low power broadcasting station, Indianapolis can be tuned in nationally again since the recent opening of WFBI, 250 watts, 268 meters, the Merchants Heat and Light company here.

The new broadcaster is unique in that it has no studio.

Programs are picked up from stations such as KDKA, WGY and others on a special five tube receiving set and are relayed direct through WFBI. C. A. Portman, chief engineer and builder of the station, announces the call of the station being relayed as well as his own.

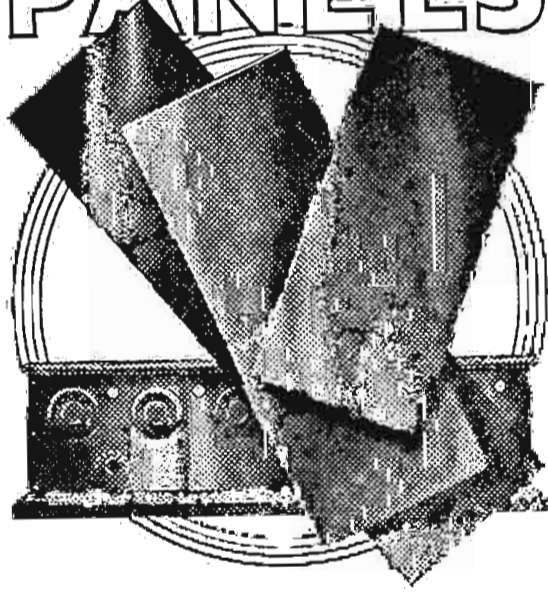
Iowa-Michigan, WWJ (517).

Minnesota-Vanderbilt at Minneapolis, WCCO (41).

Wisconsin-Chicago at Chicago, KYW (536), WMAQ (448).

## ELECTRASOTE PANELS

TRADE MARK



Clear reception and selectivity are what every radio fan wants. To obtain these advantages, every part should be chosen wisely — beginning with the panel.

Electrasote Panels are unaffected by climatic conditions, they will not warp or change color. Due to their electrical qualities they reduce surface leakage to a minimum. And yet they cost less than other standard panels.

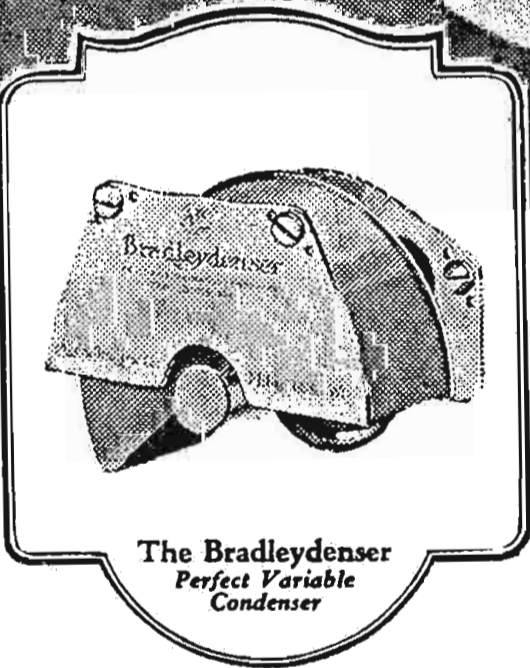
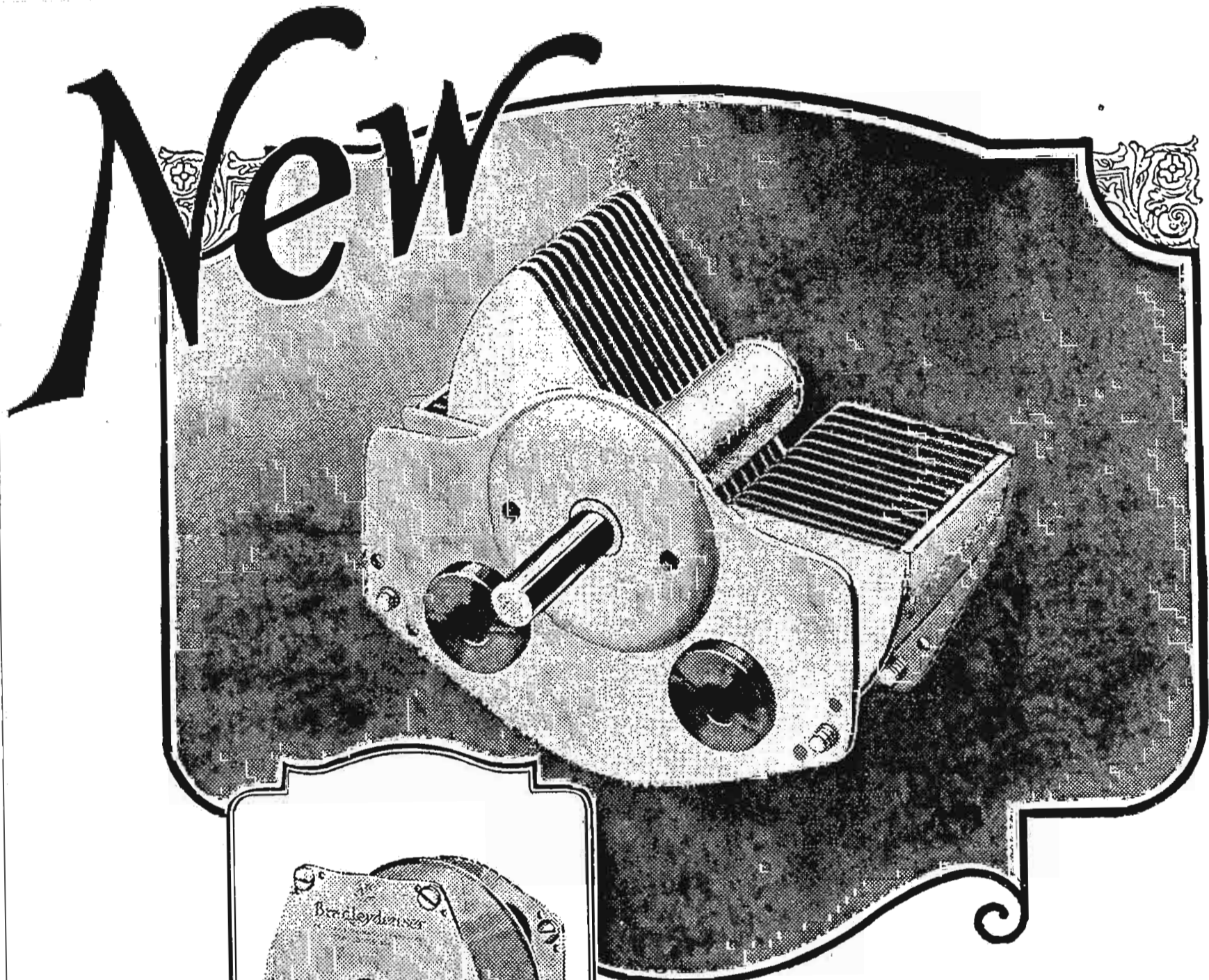
Electrasote is one of the famous 'sote' products introduced by The Pantasote Company, Inc.

M. M. FLERON & SON, Inc.

Sole Sales Agents

Trenton, - New Jersey

On sale at good Radio Dealers



The Bradleydenser  
Perfect Variable  
Condenser

## The Bradleydenser PERFECT VARIABLE CONDENSER

Brass Plates—Grounded Rotor—Low Loss

PERFECTION to the last detail! Even the unique bearing of the new Bradleydenser is a marked improvement over the older types. The rugged brass plates, the grounded rotor construction, and the new detachable dust shield are other details that serve to increase the high-frequency efficiency of the Bradleydenser. Exhaustive laboratory tests reveal exceptional improvements in efficiency. In fact, the Bradleydenser sets a new low record for losses. It tunes the weakest oscillations with the least energy loss, and, therefore, increases the range of any set. There are many other new and striking features of the Bradleydenser. Our new literature explains them, fully. Send for our latest bulletin on the Bradleydenser today.

Allen-Bradley Co.  
Electric Controlling Apparatus

290  
Greenfield  
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Milwaukee,  
Wis.

Standard Carton

The Bradleydenser is sold in the well-known Allen-Bradley checkered box by all leading radio dealers and jobbers.

Baltimore  
Birmingham  
Boston

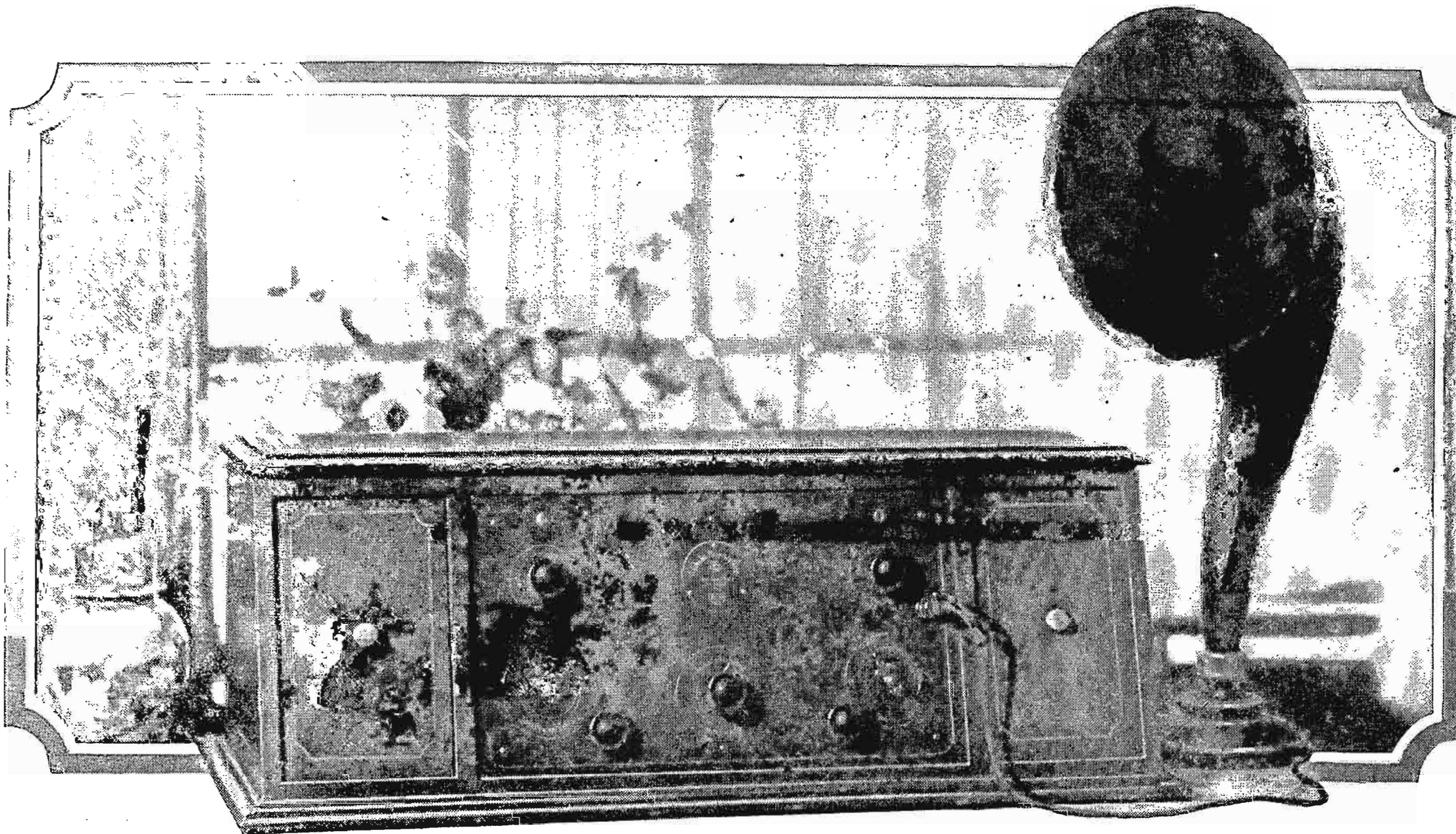
Buffalo  
Chicago  
Cincinnati

Cleveland  
Denver  
Detroit

Knoxville  
Los Angeles  
New York

Philadelphia  
Pittsburgh  
Saint Louis

Saint Paul  
San Francisco  
Seattle



# Radiola Regenoflex —for tone quality!

Distance. Selectivity. Non-radiation. Records of performance. All these have made a name for the Regenoflex. But its greatest fame is for *tone quality!* No background noises—no harsh sounds of reproduction. *Clear, true tone!*

The day is past when distance has a charm to cover harshness. Distance reception is no longer an achievement. You must have distance *and clearness.* Concerts and music from far stations must be music when they come in—as worth hearing as where they are played. Speeches must be clear, voices recognizable, humanly real. It is through the achievement of this clearness and reality that the Regenoflex has earned its greatest claim of fame.

**Radiola Regenoflex**

with compartments to hold the batteries; with 4 Radiotrons WD-11 and Radiola Loudspeaker. Complete except batteries and antenna.....\$191

Same without Radiotrons and Loudspeaker.....\$150



This symbol of quality is your protection.

*"There's a Radiola for every purse"*

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Sales Offices:

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28 Geary Street, San Francisco, Cal.

# Radiola

REG. U.S. PAT. OFF.

Or send for the booklet yourself for Christmas ideas

RADIO CORPORATION OF AMERICA  
Dept. 1911 (Address office nearest you)  
Please send a Christmas booklet on Radiolas to

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Street \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ R.F.D. \_\_\_\_\_



# NAVY ALLOWS USE OF RADIO PATENTS

## ATTORNEY GENERAL STONE HANDS DOWN OPINION

### Reflex and Radio Frequency Sets Are Released for General Manufacture Independents

CHICAGO.—Attorney General Harlan F. Stone and the judge advocate general of the U. S. Navy, assisted by Congressman Fred Britten of Chicago, have recently accomplished a notable work in licensing independent Radio manufacturers to use the navy-owned German patents in making sets.

The German patents held by the navy cover the manufacture of both reflex and Radio frequency sets.

During the war the U. S. Navy confiscated and later purchased a number of German Radio patents, among which was the famous Schloemilch and Von Bronck patent. Inasmuch as these patents covered the principle of the reflex and Radio frequency circuits, independent Radio manufacturers' hands were tied.

Without licenses to manufacture under these patents all sets built that utilized either of these principles were infringements. Now, however, with the recent promise of the judge advocate general of the navy to issue licenses to use these patents, set makers will have no obstacle in their path.

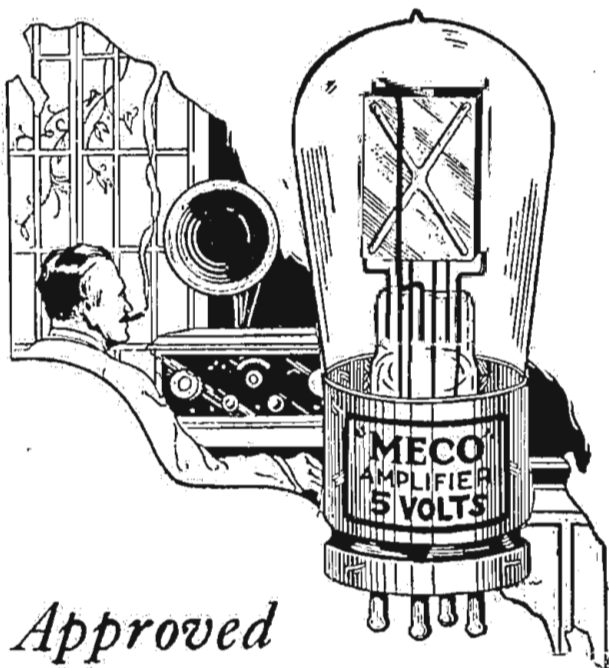
### Alaska Fan Hears Station WQJ Broadcasting Program

CHICAGO.—Word has been received at Station WQJ, located in this city, that the program broadcast on the evening of October 21, was received with excellent volume at Petersburg, Alaska.

J. L. MacKechnie, was the Radiophan who was listening in and heard them.

"Your program is coming in here clear with slight interference" the letter said, "and Jerry Sullivan has just finished singing 'I'm sorry,' this was at 8:45 p. m. Alaskan time."

The distance from Chicago to Petersburg is approximately 2,467 miles figured on the great circle.



### Approved The Country Over

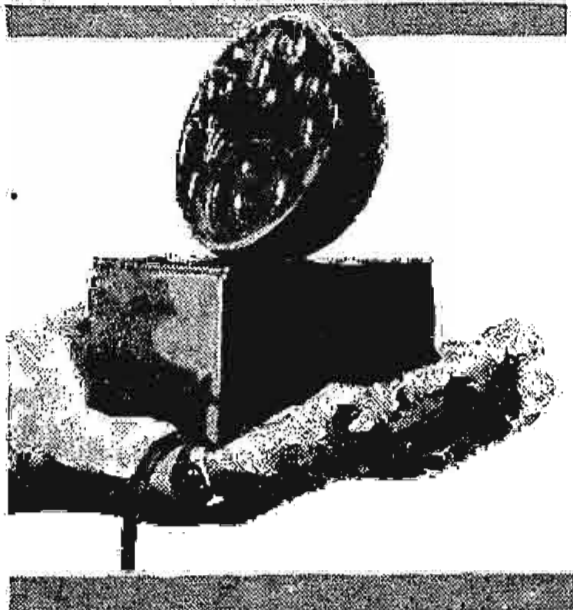
To gain the approval of thousands of critical radiophans in every part of the country MECO Tubes have had to produce greater volume without impairing clear, distinct, receptive tones. That they have done this is attested by the increasing number of receiving sets that use no other tubes. Look for the name "MECO" on the base of the tubes you buy.

MECO Tubes operate in any receiving set, in 5-volt and 3-volt sizes with large or small bases. Your dealer has MECO Tubes at standard prices or can get them from recognized jobbers.

Metropolitan Electric Co. Des Moines, Iowa



### Smallest Loud Talker



World's smallest loud speaker emits music clear and distinct despite its size. Entire unit is enclosed in a celluloid receptacle.

At Moscow, Russian crowds are now treated to open air Radio concerts.

### WAHG Appeals to Voters and Gives Final Returns

RICHMOND HILL, N. Y.—Appealing to every voter to do his or her duty and cast a ballot, WAHG, A. H. Grebe and company station here was on the air election day from five o'clock in the morning until the wee hours of the following day.

Throughout the day, as for several weeks prior to the election, political leaders gave short talks, emphasizing the necessity of voting. In the evening WAHG gave complete election returns direct from Republican national headquarters.

The new station, opened only recently, was heard nation wide according to letters received following the election day program. A wave length of 316 meters is used.

### KDKA Officials Hold Party on Station's Anniversary

PITTSBURGH.—Though KDKA's birthday fell on November 2, the officials of the station did not hold a formal birthday program until November 3, when they presented a continuous program of broadcast features lasting from 12:30 noon until after midnight.

### Football Fans Will Hear "Old-Timers"

#### Famous Players and Coaches to Talk Between Halves

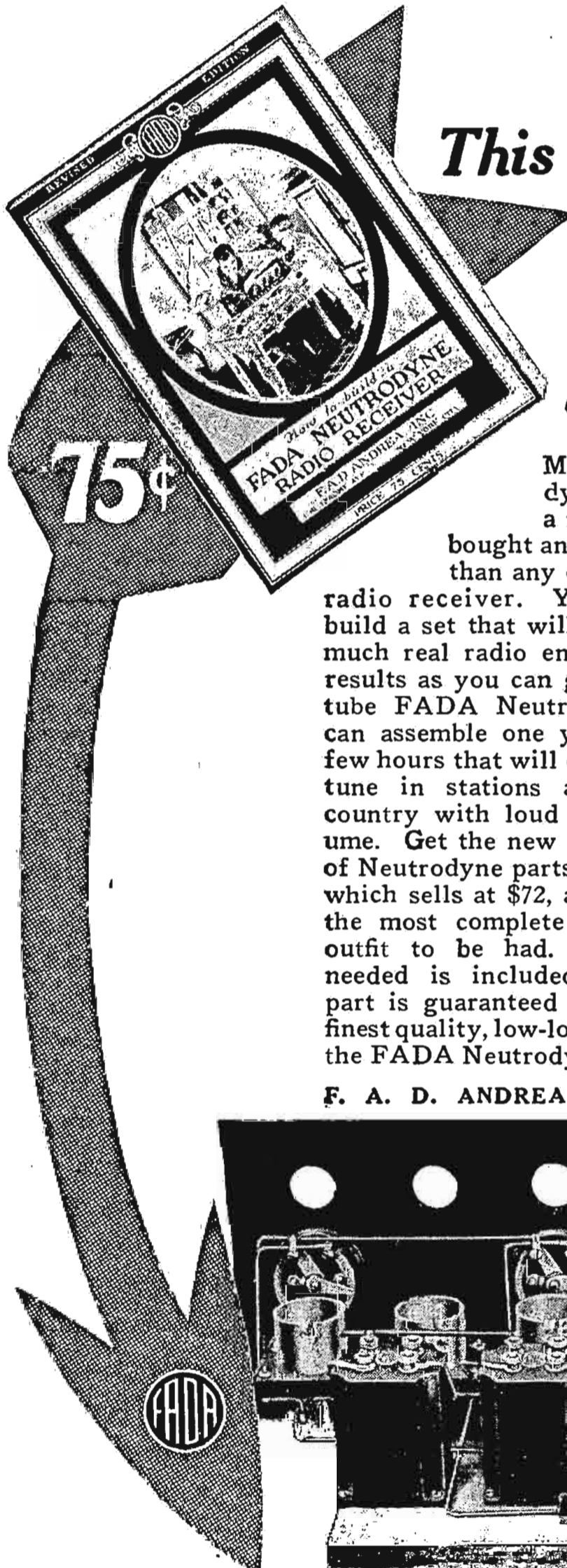
OAKLAND, Cal.—College football fans who tune in on KGO Saturday evening, November 22, will hear the familiar voices of seven "old-time" football players and coaches in various phases of the big game between the University of California and Stanford University teams, played at the California Memorial stadium on Saturday afternoon.

Walt Christie, veteran track coach of the University of California, will introduce each speaker before the microphone.

Here are the old-timers who will be heard: Walter Christie, Paul M. Downing, "Greek" Howard, "Billy" Harrelson, Ollie Snedigar, Percy Hall and "Slip" Madigan.

### Argentina Adopts Regulations

WASHINGTON, D. C.—New government broadcasting regulations have just been made public in Argentina. These regulations provide that all stations are to be divided into two classes, Class A and Class B.



## This book makes it easy to build a

# FADA

## 5-tube Neutrodyne

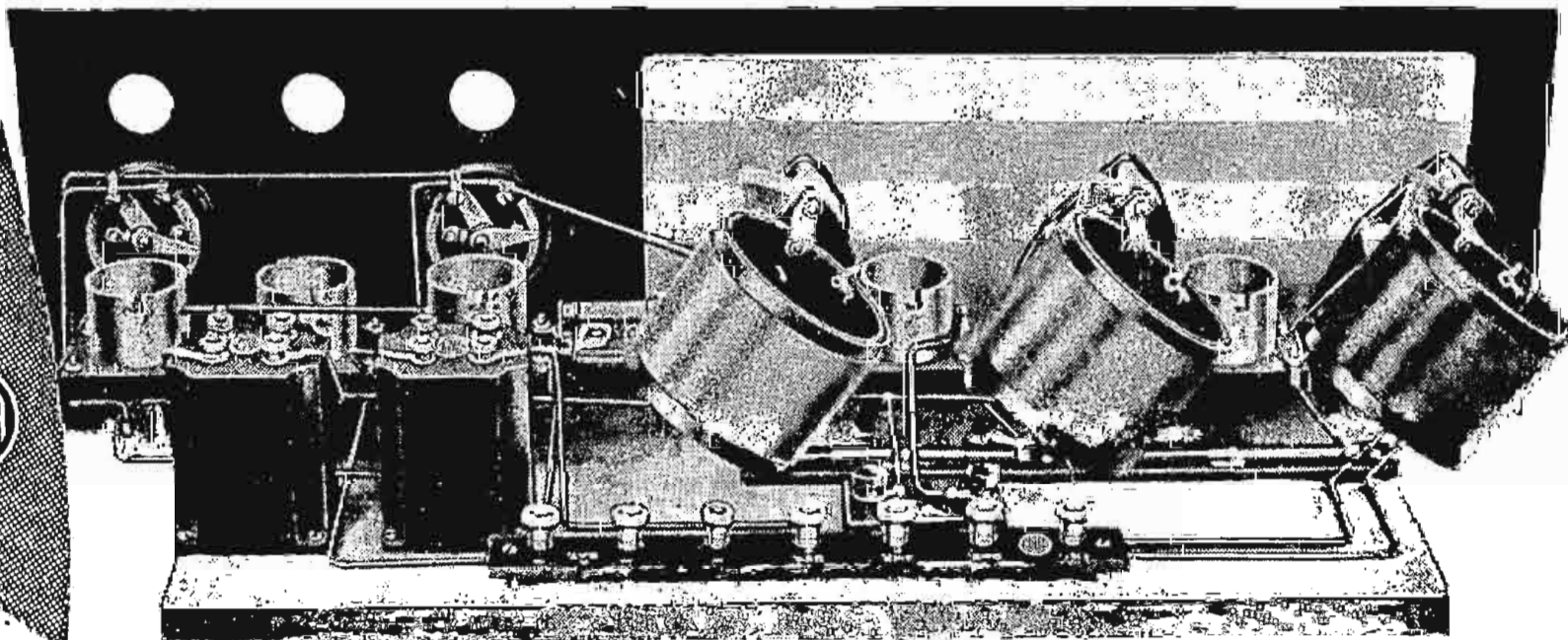
MORE Neutrodyne receivers are being bought and made today than any other type of radio receiver. You couldn't build a set that will give you as much real radio enjoyment and results as you can get on a five-tube FADA Neutrodyne. You can assemble one yourself in a few hours that will enable you to tune in stations all over the country with loud speaker volume. Get the new FADA outfit of Neutrodyne parts (No. 169-A), which sells at \$72, and you have the most complete Neutrodyne outfit to be had. Everything needed is included and every part is guaranteed to be of the finest quality, low-loss type. Buy the FADA Neutrodyne outfit and

with it you get the new FADA book:

### "How to Build a FADA Neutrodyne Radio Receiver"

This is the fifth edition. Revised completely and enlarged to seventy-six pages. Fifty-three pages with illustrations that make every detail of the assembling and operation of the five-tube FADA set easy and sure. Thirty pages devoted to "trouble shooting"—this alone is worth the whole price of the book to the owner of any receiver. In addition the book has a large picture wiring diagram; also a full-size drilling template. Free with every FADA outfit, or can be purchased separately for 75 cents from your dealer—or you can use the coupon below.

F. A. D. ANDREA, INC., 1581 JEROME AVENUE, NEW YORK



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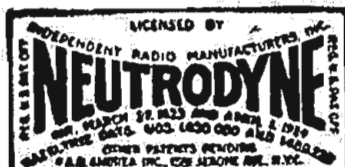
Send us this coupon with 75c and the new FADA book will be forwarded by return mail.

Gentlemen: Enclosed find seventy-five cents Stamps P. O. Order for which send me your book on "How to Build a FADA Neutrodyne Radio Receiver."

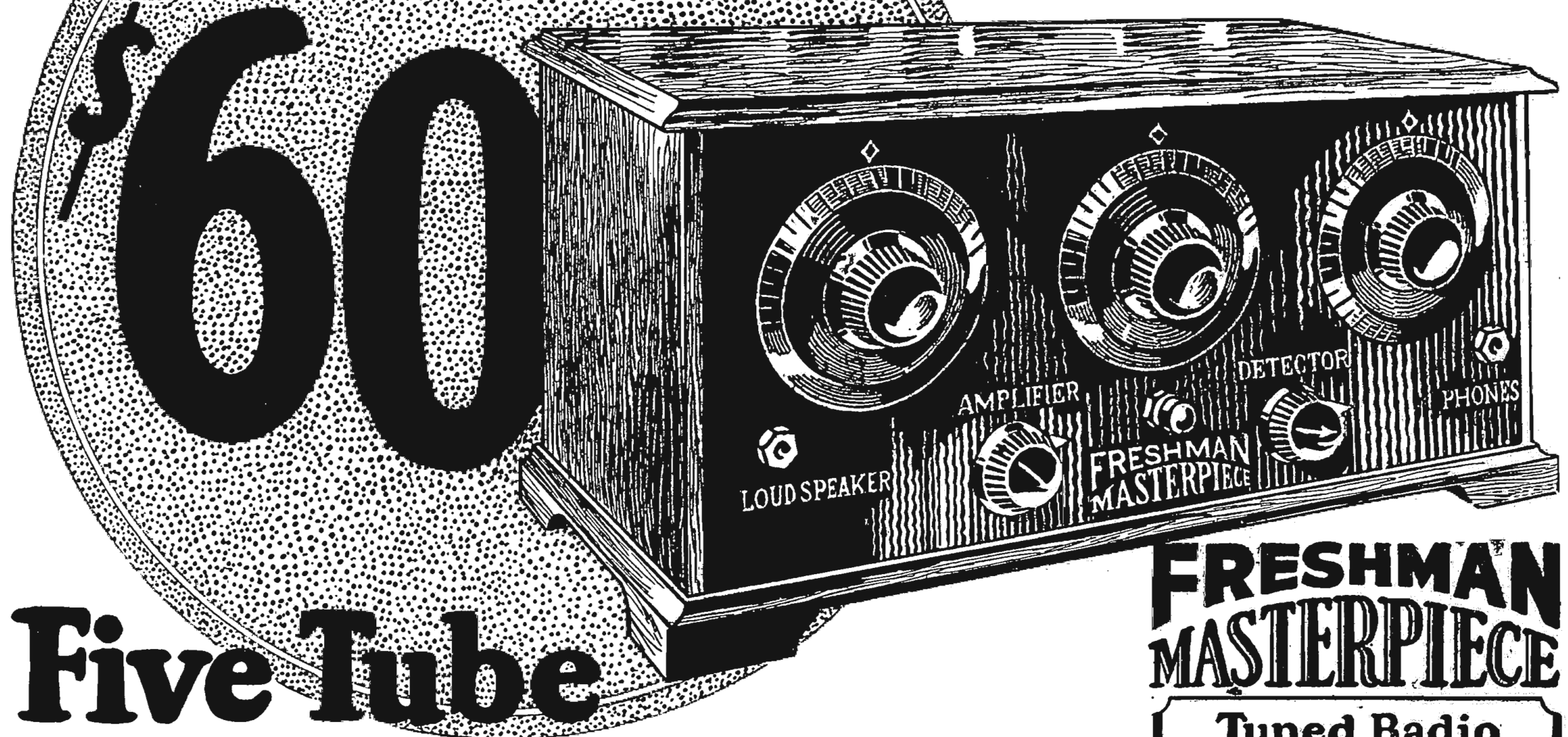
Name.....

Street Address or R. F. D.....

City or Town..... State.....



# FRESHMAN MASTERPIECE



## Five Tube Tuned Radio Frequency

The Greatest Value Ever Offered  
in a Radio Receiving Set

Built of the finest low loss materials, in a beautiful genuine solid mahogany cabinet, it is attractive enough to grace the finest of rooms and economical enough for the most modest.

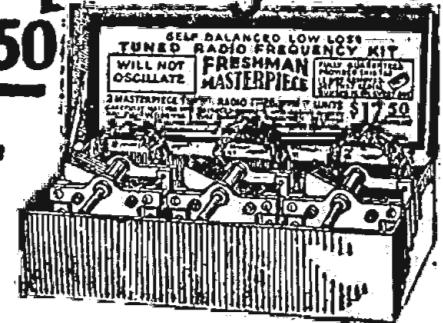
The Masterpiece is the equal, if not the superior, of any 5-tube set on the market regardless of price. Brings in even the most distant stations with remarkable clarity and volume. So selective that you can pick up any station you want—night after night—at the same points on the dials.

*WHAT'S MORE, It Is the Easiest Set in the World to Operate.*

All genuine Freshman Masterpiece Sets have a serial number and trade-mark riveted on the sub-panel. The Receiver is not guaranteed if number has been removed or tampered with.

### FRESHMAN MASTERPIECE

Tuned Radio  
Frequency Kit  
**\$17.50**



No Neutralizing  
or Balancing Con-  
densers Required

With these marvelous units you can easily build a five-tube tuned Radio Frequency Receiver that will be highly selective as well as a remarkable distance-getter, bringing in all stations with pleasing clarity and volume.

Kit consists of 3 Masterpiece Tuned Radio Frequency Units carefully matched and balanced. Complete with wiring diagram and instructions for building any 5-tube tuned radio frequency receiver, and also drilling template for proper mounting.

Each and every Freshman Masterpiece Coil bears a serial number and trademark—our guarantee of electrical and mechanical perfection. For your protection demand only the genuine.

HAVE YOUR DEALER INSTALL ONE IN YOUR HOME

**Chas. Freshman Co. Inc.**  
*Radio & Condenser Products*

106 Seventh Ave., New York, U.S.A.

**STATION KYW; PIONEER**

(Continued from page 5)

with the original broadcasting set, is still housed on the roof.

As more and more programs were booked and broadcast, a larger and larger staff was needed. Mr. Wetherbee originated the "World Crier" service, the first news service ever to be broadcast. At first the news was broadcast only over a three and a half hour period. Today the Radiophan may tune in on KYW on every hour and half hour throughout the 24 hours, and hear the latest news bulletins.

Nor have the other forms of entertainment been neglected. There is a studio fully equipped in the Hearst building, on the tenth floor. Two afternoon frolics, popular music shows given on Tuesday and Thursday afternoons, are broadcast from this studio, as are four night shows each week, midnight revues on Wednesday and Friday night and the "Evening at Home" shows Tuesday and Thursday.

There is a third studio in the Congress hotel where each Saturday night a program of classical music of a high order is broadcast. Besides this feature, KYW calls upon the Congress hotel each evening, with the exception, of course, of Sunday night, and of Monday, silent night, for a half hour's dinner music. This, at the present time, is being furnished by Joska De Barbara's celebrated Continental orchestra, and by Paul Whiteman's Collegian orchestra.

The daily half hour visit of Walter Wilson (Uncle Bob) with the kiddies, is not a new venture. Uncle Bob's humor and fun is just what the children seek.

He is always in close touch with them—he tells them stories and sings songs. The letters he receives, only serve to show the immense family of happy youngsters who daily await his 6:30 o'clock bedtime story.

To the ever busy housewives, comes that few minutes of relaxation each day, when they tune in Mrs. Anna J. Peterson. KYW broadcasts daily Mrs. Peterson's "Table Talks," whereby the housewife pleats daily menus.

On Wednesday and Friday of each week, for the benefit of theater goers, KYW has inaugurated its "Radio Review."

A word as to the personnel of the station. It has long since been impossible for Mr. Wetherbee, Mr. Evans, Mr. Eastman and Mr. Swift, to do all of this work. There is now an assistant director, Harold A. (Shorty) Fall. There is not one, but several, announcers. There is Logan (Steve) Trumbull, chief announcer; Edwin Borrof, who in addition to his work announcing the eight o'clock classical music show from the Edison building, is in charge of that studio, and the studio in the Congress hotel; there is Ransom Sherman, who has recently been added to the staff to announce one frolic a week, and otherwise entertain with saxophone and piano.

Herbert S. Mintz, known to the Radio world as "Our Herbie," is in charge of the Evening American studio. He bears the title of night manager of the Evening American-Westinghouse KYW feature service. Herbie's duties are many. In this same studio Frank Clark holds the post of program editor, Mack Howard makes himself generally useful, and

"Bobbie" Brown stands by with the overseas ukulele, ever ready to entertain. All of these are staff men. Surely everybody has heard of "Art" Linick, creator of the Radio comedy song, "Mrs. Schlagenhauer."

And, ah! The ladies. In addition to Miss Menkes, are two others attached to KYW, and they both have important roles. There is Mary Casey, program editor and Mrs. Anna La Porte, who handles most of the bulky correspondence.

Had names been mentioned in the order of their importance, the roster of the engineering army would have appeared sooner.

Mr. Evans, engineer in charge, is assisted by the following licensed operators: D. A. Myer, Charles C. Hines, E. H. Gager, H. E. Randol, John Michaels, D. A. Johnson, J. C. Howard, C. W. Sheets and F. A. Hill.

**WGR Orchestra on Records**

BUFFALO.—M. A. Rigg, Jr., general manager of WGR, announces that the Vincent Lopez Hotel Statler dance orchestra of which Harold Gieser is director, has been made exclusive Cameo record artists. This orchestra is one of the chief regular features at WGR. It is reported that the first recording will be done so that the first release will be in December.

**Ames Has Course in Set Building**

State College to Give One Week's Instruction—Students Required to Furnish Own Material

AMES, Ia.—A Radio construction short course will be given at Iowa State college, beginning at 1:00 p. m. Monday, November 17, and closing at 12:00 o'clock Saturday, November 22.

This course is open to anyone interested in Radio who wishes to spend a week on the construction of a receiving set. There are no fees of any kind, the only requirement being that each person furnish the parts necessary for the set he decides to build.

Work will be under the direction of competent instructors, and any of the popular types of receiving sets may be constructed. Only a limited number can be accommodated. If you wish to attend, it is important that you register with Engineering Extension department, Iowa State college, Ames, Iowa.



**This Amazing Five Tube Set has Only One Dial to Tune**

Just ONE Dial to turn to get coast to coast range. Just ONE Dial to adjust to get perfect tone reception. Just ONE Dial to tune to get the utmost in selectivity.

Here—at last—is a five tube tuned radio frequency Receiver with a decidedly different and distinctive simplicity of design. It is a beautiful set—beautifully made,—and with its simple ONE Dial Control it will do anything any other five tube set will do,—and do it easier, quicker and better.

**The Mohawk Tunes Out Local Stations**

And Brings in Distant Ones Easy

Just ONE Dial to turn on the MOHAWK, and as you turn it you tune in station after station covering the complete range of radiocasting wave lengths. It cuts out the nearby stations with ease and brings in the distant ones clear and distinct. You can operate it with an aerial of any length,—inside or outside,—without making adjustments and it will give satisfactory results under varying conditions.

**The Mohawk 5-Tube Receiver**

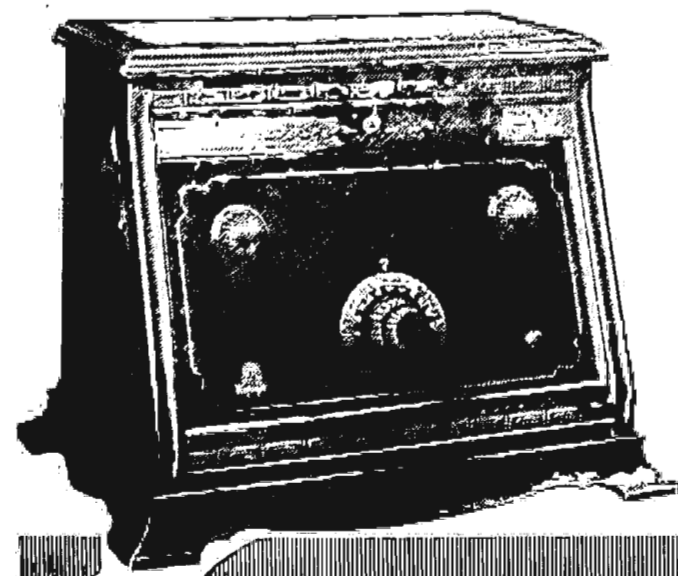
Built in a distinctive period type walnut cabinet, here is a Radio set which will instantly appeal to the artistic taste of the most critical. Yet its beauty is not "only skin deep." The quality goes clear through. If you want the last word in Radio Receiving Sets, don't fail to see the MOHAWK,—hear it, and try it, before you buy. You might pay more for a Radio set,—but you cannot buy a better one than the MOHAWK.

Ask your dealer about MOHAWK. If he does not have it, accept no substitute. Write us. Descriptive circular sent FREE on request.

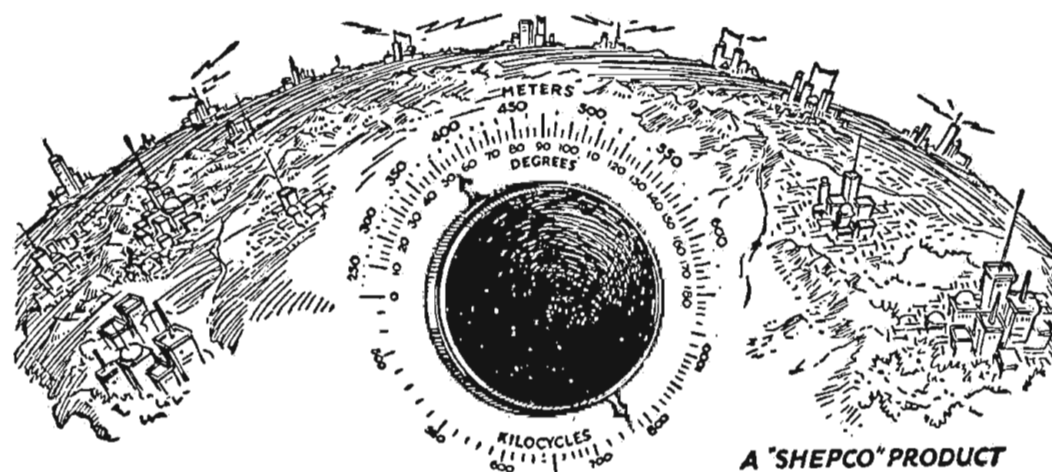
**MOHAWK ELECTRIC CORPORATION**

2224 Diversey Boulevard CHICAGO, ILL.

Dealers and Distributors Wanted Everywhere



**Like An Instantaneous Tour**



A "SHEPCO" PRODUCT

**Thermiodyne** TF6

**14 Points of Thermiodyne Supremacy**

**TURN THERMIO-DYNE'S SINGLE CONTROL**—the stations SNAP IN—one after another—like a tour of the country, with a clarity and purity of tone you've never heard equalled.

**THE** supreme six tube receiver; easy to operate—a marvel in performance. Insist on a comparative demonstration.

Beautifully built in exquisite genuine mahogany cabinet with ample space for all batteries for dry cell operation.

**\$140**

See It At The Chicago Show

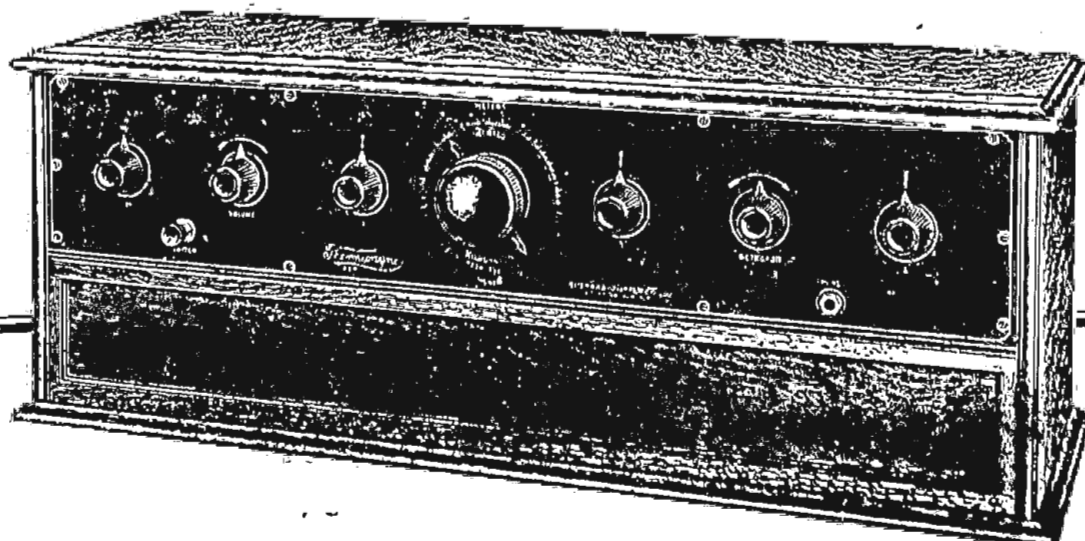
Made and fully guaranteed by

**SHEPARD-POTTER CO., Inc.**

Dept. D., 35 So. River St.

PLATTSBURGH, N. Y.

**IF IT'S IN THE AIR, THERMIODYNE GETS IT**



Tower's

# The Biggest

## Tower's Scientific

\$2.95

Every set tested  
and approved by  
government licensed  
radio operators

# Radio Value

TOWER'S Scientifics are used by MILLIONS, being approved by all newspapers, magazines and technical laboratories wherever submitted.

Tower's *Scientific* Headsets are guaranteed to be made of the best materials money can buy--- highest test enamel, insulated magnet wire, best grade five-foot tinsel cord, unbreakable caps, polished aluminum cases, using the famous scientific head-band constructed for maximum comfort.

*If your dealer cannot supply you, order direct by post card, and we will ship immediately Parcel Post, C. O. D., plus a few cents postage.*

THE TOWER MFG. CORP. 98 BROOKLINE AVE. Dept. W BOSTON, MASS.

**Scientific**

# NOVEL THEATER AT WLS AMUSES FANS

### ALL PERFORMERS UNDER TEN YEARS OF AGE

Known to Public as Big Ford and Little Glenn's Woodshed Theater Lullaby Players

CHICAGO.—Ford Rush and Glenn Rowell, star performers at Station WLS, have introduced an innovation to the Radio public. Recently they started to tell the little tots in a chatty way, how they were building a woodshed piece by piece, and when it was completed, it turned out to be a little tots' theater.

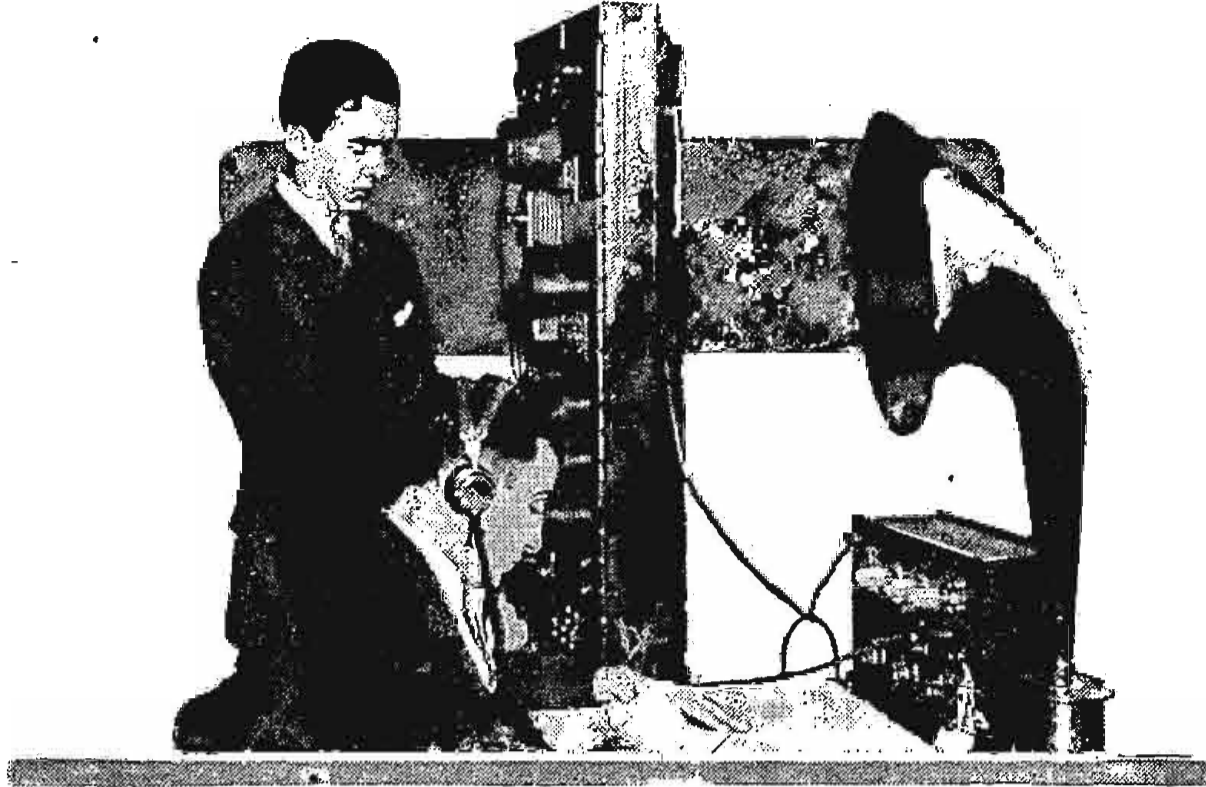
On November 6, Chicago children all under 10 years of age, put on their first playlet called "Robinson Crusoe's Princess." The troupe was introduced as "Big Ford and Little Glenn's Woodshed Theater Lullaby Players." Their second playlet was produced on November 13, and was called "Going to School in Mother Goose Land."

Future playlets to be staged by the "Woodshed Theater Lullaby Players" are as follows: November 20, "Mr. and Mrs. Robin Hood Find a Winter Home" and November 27, "The Sleeping Beauty." The program starts at 7 o'clock and lasts for twenty minutes.

#### Future Dramas and Readings

Many other musical selections and dramatic readings to be given from Station WLS in the future are: November 15, "WLS Hears New Talent" and Big Ford and Little Glenn's Lullaby Trip to Egypt; November 18, Little Billy Yeo, Jr., (six years old) in comedy readings, "Bald Headed Man," "His Baby Brother" and "Dirty Hands;" November 19, Oliver Wendell Holmes, reading by Oxley Taylor; November 20, musical version of Italian opera "Cavaliere Rusticana," directed by Robert W. Stevens; November 22, "WLS Has Choir Rehearsal" and Big Ford and Little Glenn's Lullaby Trip to Japan; November 25, "Much Ado About Nothing," musical scores arranged and played by Glenn Rowell "Why" and "The Highwayman" by Noyes; November 26, John

## GIMBEL'S NEW STATION—WGBS



Station WGBS, the first station in New York city to use storage batteries exclusively for power, went on the air recently with excellent program. Photo shows R. C. Powell, chief operator working the amplifier, while F. Vecchio, another operator is at the receiver.

Russel Lowell, reading by Oxley Taylor, musical readings by Virginia Stanton accompanied by Ruth Marie Marcotte; November 27, musical version of the American opera "National," directed by Robert W. Stevens; November 29, "WLS Goes to the Circus" and Big Ford and Little Glenn's Lullaby Trip to Russia.

#### Broadcast Food Prices

NEW YORK.—Whenever there is a certain food which seems to be flooding the market, Station WNYC will broadcast to housewives just what it is, also the cost. This idea came from a member of the food commission at a recent meeting, and met with instantaneous approval.

## Sarnoff Speaks for High Power

### R.C.A. Manager Defends Test of Giant Station to Secure Better Broadcasting

OAKLAND, Calif.—"The problem of super-broadcasting, like any other department of progress, will be settled upon the principle of public service," said David Sarnoff, vice president and general manager of the Radio Corporation of America, broadcasting recently from KGO, General Electric station located here.

Speaking in defense of giant radiocasters, Mr. Sarnoff continued:

"The problem of interference need not stand in the way of better broadcasting, for the third national Radio conference has wisely recommended that high power broadcasting stations shall be located outside and at some distance from the populous centers.

"I regard super-broadcasting as a stimulating form of competition to other systems of national broadcasting. It provides an effective substitute for wire line networks connecting a multitude of low power stations.

"I can say that we are ready and willing to demonstrate the measure of service that super-broadcasting can render by erecting an experimental station, suitably located, that will prove the promise which super-broadcasting holds."

**At Last!**  
the  
**RADIO**  
Set You Have Been Waiting For  
**Trans-Continental RADIOPHONE**

**No Outside Wires  
No Storage Batteries  
No Extras to Buy**

The TRANS-CONTINENTAL RADIOPHONE, which is one of the most simple and clearest toned radio sets you have ever listened to, is the latest achievement of Mr. D. P. Coats of Chicago.

This radio outfit is entirely different from all others and just the kind of a set you have been waiting for. No outside wires needed. No troublesome storage batteries. It is built complete in a beautiful mahogany finished cabinet. Console type, with the loud speaker built right in so the entire family can listen to it just like a phonograph. No unsightly wires, or batteries lying around—no wires to connect up—no extras to buy. Everything is inside the cabinet. It is a real piece of furniture. You can set this attractive Radio Set in any room in the house and it will harmonize with your best furniture perfectly.

**HUNDREDS OF SETS IN USE**  
Read what some of the owners say:  
H. M. Ross of West Virginia says: "I got Chicago, Kansas City, Detroit, Washington, Pittsburgh and others. Am delighted with the Trans-Continental."  
E. C. Patterson of Texas, says: "My father gets local stations so loud he can hear them out in the yard. He also gets Chicago, Omaha, and all the 'strong' stations on his loud speaker."

**Complete in a Console Type Cabinet Like a Phonograph**

### Hear Music and Talking 1000 Miles Away

The TRANS-CONTINENTAL RADIOPHONE is guaranteed to have a range of 1000 miles and it will "tune in" stations covering all broadcasting wave lengths within a thousand-mile radius of your home. It is a 4-tube set—yet so simple in construction, so compact in make-up—so loud and clear in tone, and yet so easy to operate that even a child can use it without any trouble whatever. Just imagine the unique pleasure of sitting with your family or friends in your

### Special Introductory Offer

40% Off Regular Price on Demonstration Outfits

To quickly introduce his wonderful TRANS-CONTINENTAL Radiophone everywhere, Mr. Coats wants to place Demonstrating Outfits in each community, and is making a special reduction of 40% off price on these Demonstrators. Send coupon or postcard today for FREE Radio Book and this special introductory offer. Mr. Coats' proposition for agents is a world-beater—his Demonstrator Agents make from \$60.00 to \$200.00 per week in spare time. Mail coupon today for full particulars.

D. P. COATS, President  
Trans-Continental Radiophone Company  
340 West 47th Street Chicago, Ill.

**Be First—Mail This NOW**

D. P. COATS, President,  
Trans-Continental Radiophone Co.,  
340 West 47th St., Chicago.

Please send me your FREE Book on Trans-Continental Radiophone. Also full particulars about your 10 per cent discount offer.

Name.....  
Street.....  
Town.....State.....

# Herald MODEL B

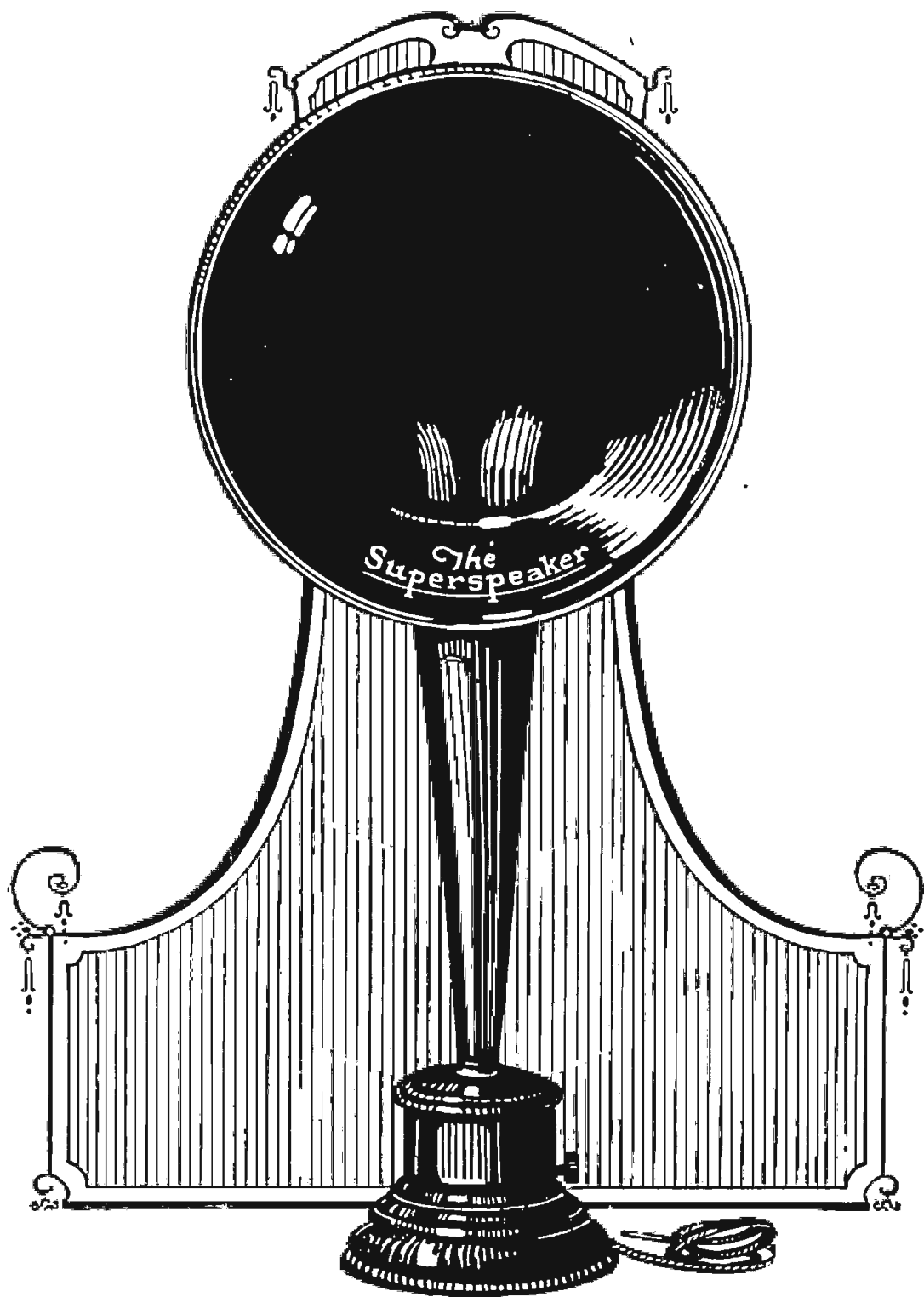


## The Big, Clear Voice of Radio!

# \$18

A NEW Herald—clear—loud—with a tone that is wonderfully mellow and sweet. Height 25 inches. Bell 12 inches. Fibre horn and art metal base. No batteries required. No adjustment necessary. Hear the Herald Model B at your dealer's.

Herald Electric Co., Inc.  
113 Fourth Avenue, New York



## Controlled Volume

With your Superspeaker adjustment you can soften the message from a nearby station, yet keep your set always in perfect tune. The Superspeaker never blares.

Or you can cut through, and increase to the full, round, satisfying limit, the lighter signals that come from stations far away—stations you have never heard before, except on your headset.

If your present loud speaker fails to give you distance—with volume—there's a real delight in store for you.

Install a Superspeaker and reach out!

Straight line air column, correctly proportioned—Materials, immune to harmonic vibration—No extra batteries or coils—Handsomely finished in ebony gloss—Height, 26 inches—Weight over five pounds—A big, substantial musical instrument, built complete by an experienced, musical instrument manufacturer, and not duplicated in design, materials or performance by any other device ever marketed.

**DEALERS**—See our Sales Department at our space in the Chicago's Show, or write us for our money-making merchandising proposition.

**JEWETT RADIO & PHONOGRAPH CO.**  
5670 TWELFTH ST. DETROIT, MICH.

*The*  
**Superspeaker,**

RADIO FOR EVERY PURPOSE AND ANY PURSE—\$5 TO \$32.50

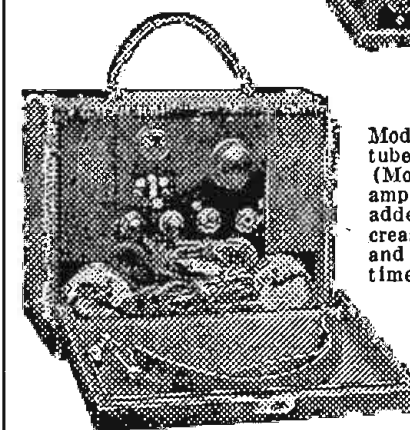
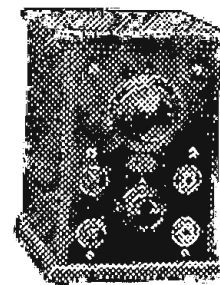


# KODEL

—an astonishing new receiver that will make radio history

Model C-11 One-tube Receiver—The biggest value in a one-tube radio set today.

\$10.00

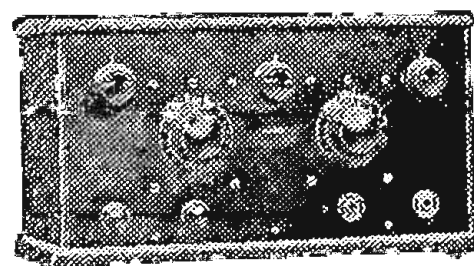
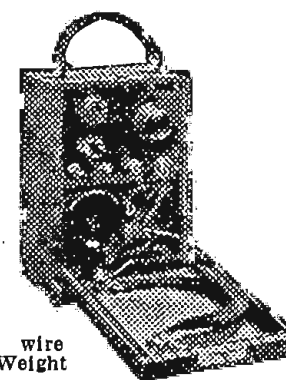


Model P-12 two-tube Portable (Model P-11 with amplifying tube added, which increases distance and volume many times.)

\$22.50

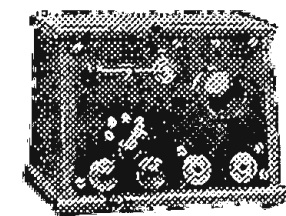
\$16.00

Model P-11 One-tube Portable—the Camera of Radio—price \$16.00 without accessories. Tube, batteries, head-phones, antenna and ground wire all self-contained. Weight 4 3/4 lbs. complete.



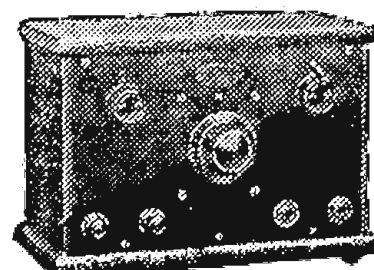
Model C-13 Three-tube Receiver. Gives five-tube volume with only three tubes, due to reflex amplification.

\$28.00



\$5.00

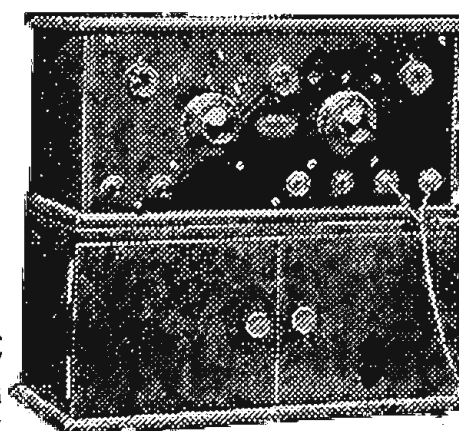
Model S-1, KODEL Crystal set. Sensitive, selective, low priced.



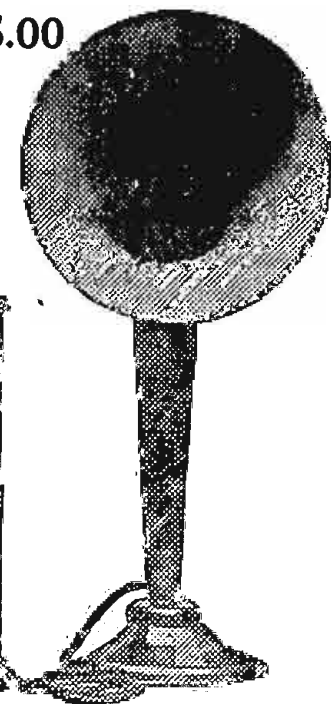
Model C-12 Two-tube Receiver. A great distance getter; puts local stations on the horn; single dial tuning.

\$18.00

KODEL Model C-14 Four-tube Receiver. Price \$32.50 (without battery cabinet, loud speaker or accessories). Battery cabinet can be furnished with any KODEL set at slight additional cost.



\$32.50



RADIO FOR EVERY PURPOSE AND ANY PURSE—\$5 TO \$32.50

# OPERATING AND TROUBLE SHOOTING

## For the Owner of an Ainsworth-Gates Ranger 5

**T**HE best obtainable accessory equipment should be used—no receiver can give good tone or volume on a poor loud speaker or pair of phones.

### Accessories Required

Five good amplifier tubes—6 volt, ¼ ampere type, or four amplifier tubes and one detector tube. Two 45-volt or four 22½-volt special large size dry cell type B batteries, or two 48-volt storage B batteries of 4½ A. H. capacity. One Radio A battery, 6-volt storage type, 80 to 120 A. H. (preferably the latter, owing to greater efficiency in operation.) One pair receivers. One loud speaker.

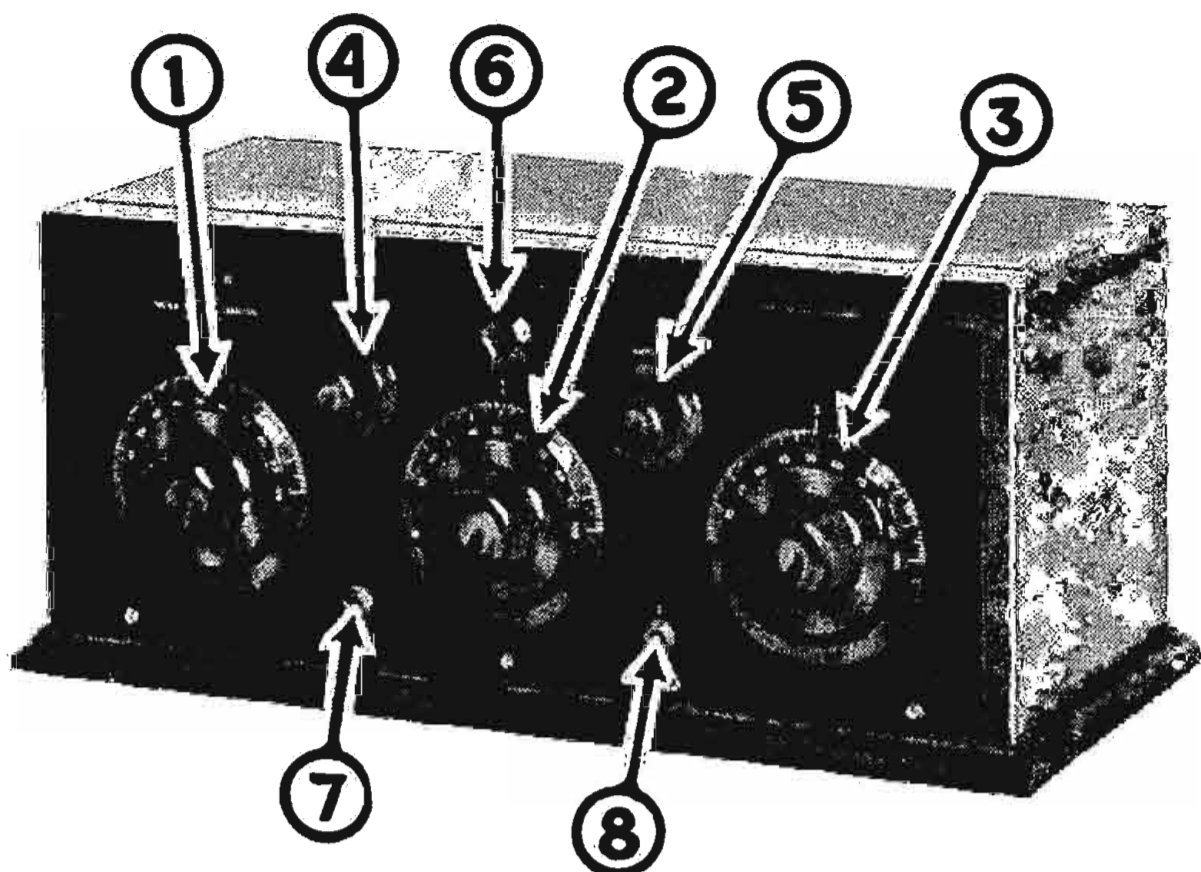
### Antenna

Use an outdoor antenna, the horizontal portion being 40 to 80 feet, with insulated wire lead-in as short as possible.

A large, long antenna or an antenna of proper dimensions with a long lead to the set will tune broadly and in some instances where the location is within a mile or so of a powerful transmitting station, make it almost impossible to tune out the local station. The lead-in from the vertical portion of the antenna should not parallel any water or drain pipes, steel girder or other conducting substances, as any of these conditions tend to broaden the tuning and decrease the volume.

A floortenna is made from number 14 mesh copper, brass or well galvanized ordinary fly screen wire. Should cover 36 square feet or area approximately 6 by 6 feet (preferably on the second or third floor, or in attic and in some room other than that containing the set). Place preferably under carpet or rug. Walking or placing furniture thereon does not affect its efficiency. It is recommended for the portable floortenna, four pieces number 14 mesh wire 18 inches wide, 6 feet long, connected together by short soldered wires.

The indoor antenna should be of large



size stranded, enameled wire installed preferably in the attic; should be put up on insulators and can be mounted on the roof trusses. Start the wire at a point where a lead can be run down to set, run the wire around the attic in a square or rectangular manner, bringing the wire back to the starting point. Join the wires together to make a closed loop, then connect and solder an insulated wire to continue down to set.

Ground wire should be number 10 insulated (or equivalent) wire. The ground lead must be well connected to a water pipe. The use of an approved ground clamp is recommended or the use of a piece of 2-inch galvanized pipe, about 6 feet long. Flatten and close one end, drive (flattened end) in ground until the top is about 1 inch above the ground. Run ground wire from set to this pipe, solder the connection to pipe or use an approved ground clamp.

If an outside antenna over 60 feet long

is used, connect the lead-in wire to the second binding post on right (on back of set) marked "L"; also try "S." If an outside antenna less than 60 feet long, an inside antenna or a floortenna is used, run antenna lead to first binding post on right marked "S"; also try "L." Run the ground wire to third post marked GND.

### Connecting the Batteries

For +A battery (6-volt storage) leads, number 10 or heavier flexible wire is preferable, although number 12 can be used. Run one lead or wire from the pole or binding post marked negative on battery to binding post marked A minus on set. Run a second lead or wire from the pole or binding post on battery marked positive, sometimes marked with red washer, to binding post on set marked positive A.

First connect in series all B batteries; use number 14 or 18 flexible rubber covered wire for all B connections.

Run a lead or wire from the negative of the first battery to the negative B binding post on the set. From the same battery (if dry cell type is used try both 16 and 18 volt taps) run a wire or lead to the binding post on set marked Det. positive. If storage B batteries are used, each cell equals 2 volts. Count 8 or 9 cells from negative end for this lead. From the last (second or fourth) battery run a lead from the positive of the battery to the binding post marked Amp. positive on set.

### Operation of Ranger Five

After all connections have been made to the set, including the connections of the A and B batteries, aerial and ground, and phones or loud speaker, it will be necessary for the operator to recognize a condition of tuning known as "resonance." Resonance may be had by bringing the three dials, 1, 2 and 3 to practically the same number. Some variations may be necessary between the setting of dial number 1 and dials number 2 and 3. This condition is best found, as stated before, by setting the three dials to practically the same number, turning the amplifier rheostat number 5 from "off" position to right until the greatest disturbance is heard, either in the head set or on the loud speaker. If head set is used, number 7 jack will probably be found most satisfactory. If loud speaker is used, use number 8 jack. If detector tube is used, the detector rheostat, number 4, should be turned from "off" position to right to about one-half or three-quarters of its range. If an amplifier tube is used in place of a detector tube, the detector rheostat number 5 from "off" position to right quarter on, and usually just touching the "on" position will give the best results. It is not necessary to have a station in order to find this point of resonance. It will soon be recognized as a point of sensitivity when things are in proper adjustment. By finding the proper adjustment for both rheostats numbers 4 and 5, which depends mostly on the condition of the batteries, then the dials may be turned about five degrees each way from any given number until the point of resonance or greater disturbance is known. If a station is found at this setting then the unmarked adjustment, number 6, may be brought into use. This adjustment is (Continued on page 34)

## Build Your Set with Goodrich Rubber

Here's Why It Will Bring In Those Distant Stations Clearer Than Ever—

**B**y scientific tests, Goodrich Rubber Radio Products show the lowest dielectric losses of any practical radio insulating materials. This quality alone means that they give the greatest efficiency in radio frequency amplification. The set built of Goodrich Products will give maximum range and selectivity for its type.

Fifty-five years of rubber manufacturing experience are a guarantee of their reliability. Build for the greatest efficiency with these—

**GOODRICH RADIO PANELS**—dielectric constant, at radio frequencies, 3.5; low moisture absorption and high softening points make them superior. They may be worked with ordinary tools, and retain their rich glossy finish. Full assortment of sizes in attractive black or mahogany colors.

**GOODRICH BATTERY MATS**—A protection from overflowing liquids.

**GOODRICH VARIOMETERS (UNWOUND)**—Wind them to suit yourself.

**GOODRICH RADIOPHONE EAR CUSHIONS**—Shut out all outside noises.

**GOODRICH V. T. SOCKETS**—Special spring lock—releases at a touch of the finger, no turning or twisting the tube. Contacts may be cleaned without removing the tube. Eliminates danger of tube breakage. Low dielectric losses.

**GOODRICH HARD RUBBER TUBES**—Very low dielectric losses.

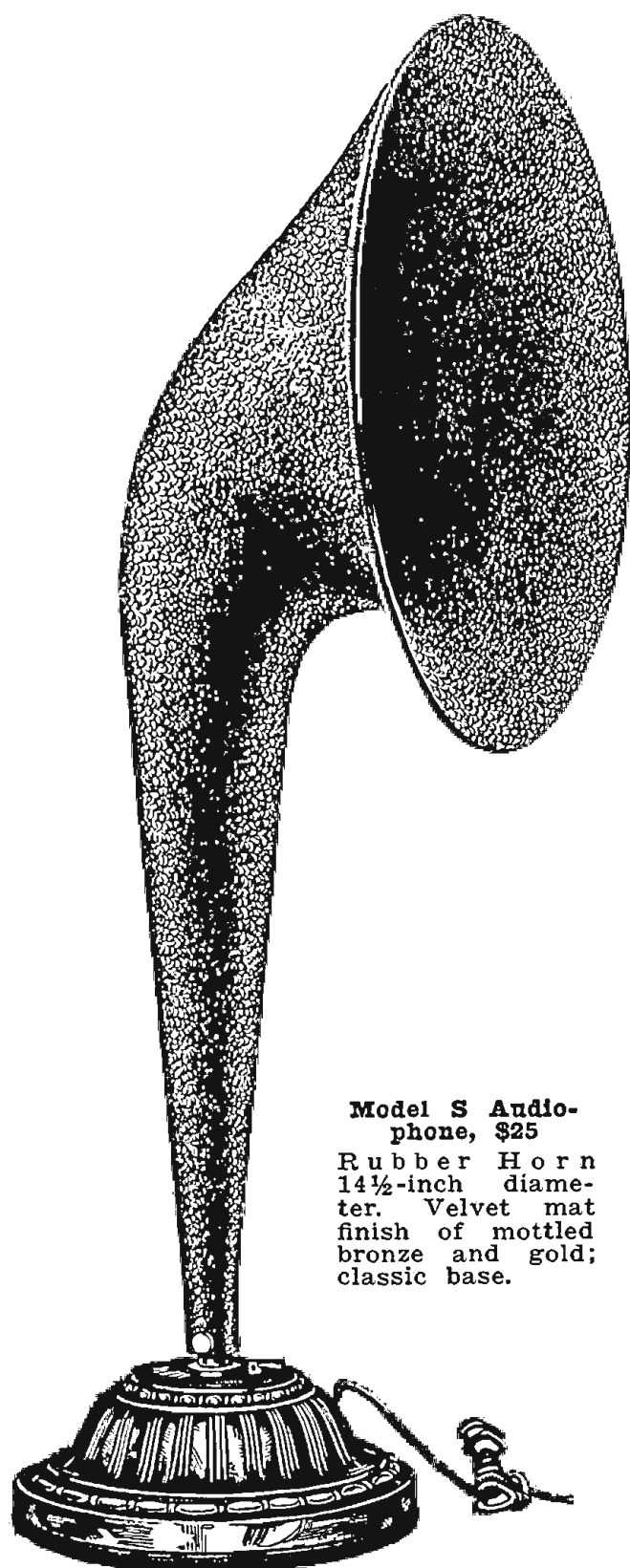
**GOODRICH SPAGHETTI TUBING**—Will not corrode wiring.

Send for our booklet "Rubber for More Perfect Radio Reception."

THE B. F. GOODRICH RUBBER COMPANY ESTABLISHED 1870 Akron, Ohio

# Goodrich

Rubber Products  
for Radio



Model S Audiophone, \$25  
 Rubber Horn  
 14½-inch diameter. Velvet mat finish of mottled bronze and gold; classic base.



Both Must be Musical Instruments

If you are to enjoy the rich resonance of an old Cremona violin, your loud speaker must also be a true musical instrument. So designed and powered as to respond as faithfully to the inspiring crescendos of a Wagner opera as to the whispers of a Moonlight Sonata.

The new Bristol AUDIOPHONE does that. With its joyous, open-throated Rubber horn, and its finely adjusted tone mechanism, it is on a musical plane with the noblest instrument or voice at your favorite station.

In addition to Model S, shown here the Bristol line includes Model J, \$20, Baby Grand, \$15, and the "Baby" at \$12.50. Send for bulletins AY-3017 and 3011, mentioning the name of your dealer.

THE BRISTOL COMPANY  
 Waterbury, Conn.

# BRISTOL AUDIOPHONE

TRADE MARK REG. U. S. PAT. OFFICE

LOUD SPEAKER

## Why it is Better

"MASTER of Every Note in the Orchestral Range" is the proven claim of the Federal No. 65 Audio Frequency Transformer! Volume without distortion is the basis for the beauty of Federal Tone.

From its oversize locking nuts to its heavy brass mounting feet the Federal No. 65 Transformer incorporates the same engineering skill that has made Federal the recognized leader in electrical communication apparatus since 1890.

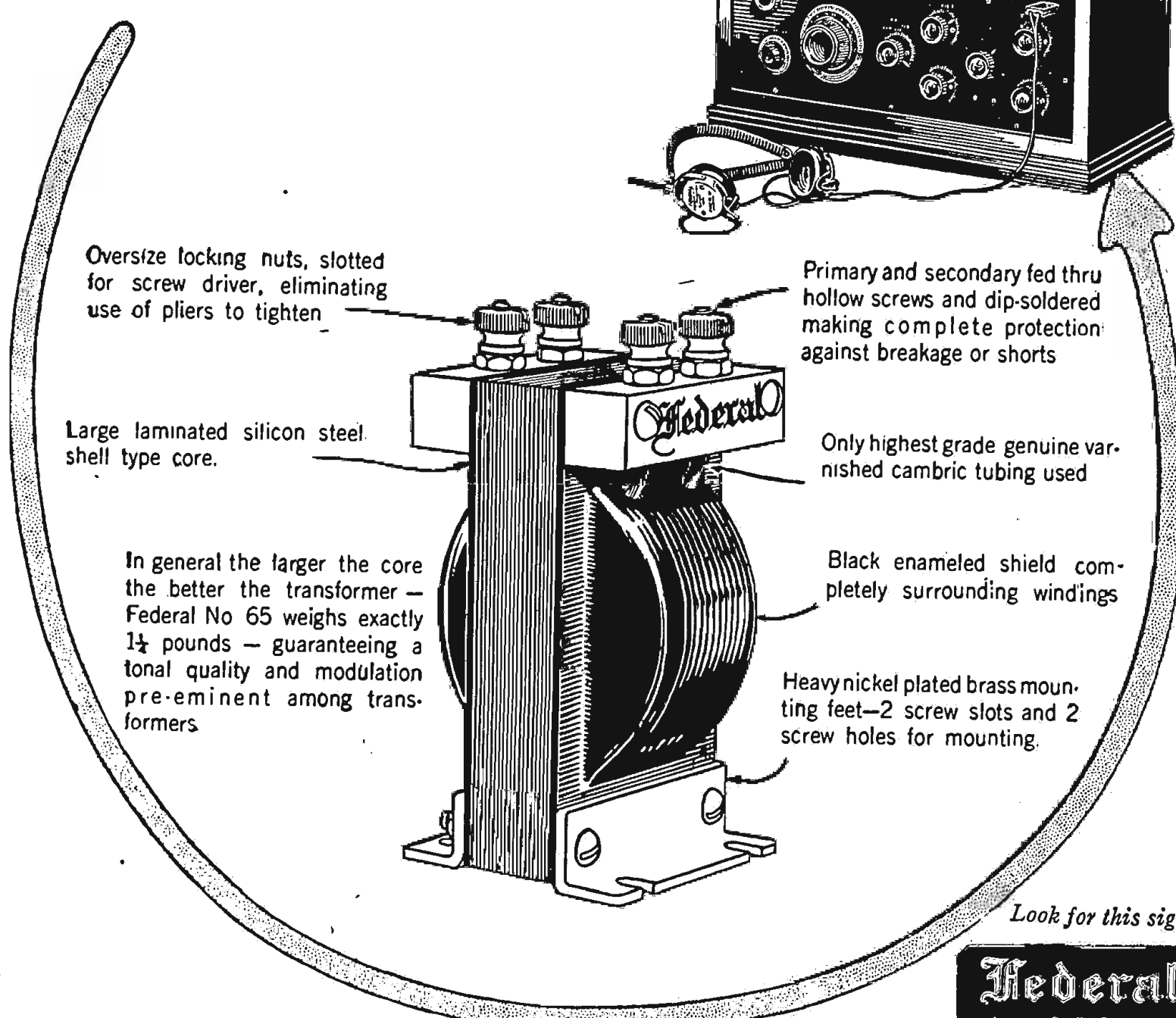
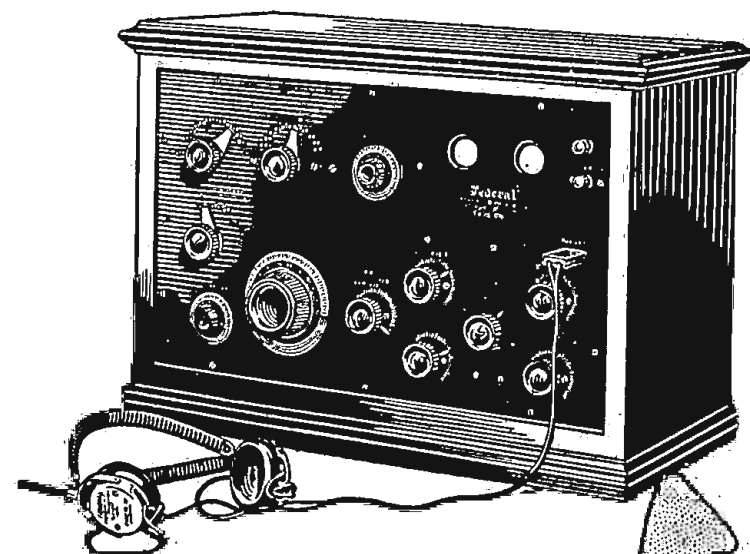
Insist upon Federal parts for your "pet" hook-up. There are over 130 standard parts bearing the Federal iron-clad performance guarantee.

FEDERAL TELEPHONE & TELEGRAPH COMPANY  
 BUFFALO, N. Y.

Boston New York Philadelphia Pittsburgh Chicago  
 San Francisco Bridgeburg, Canada



**Federal**  
 Standard RADIO Products



Oversize locking nuts, slotted for screw driver, eliminating use of pliers to tighten

Large laminated silicon steel shell type core.

In general the larger the core the better the transformer — Federal No 65 weighs exactly 1½ pounds — guaranteeing a tonal quality and modulation pre-eminent among transformers

Primary and secondary fed thru hollow screws and dip-soldered making complete protection against breakage or shorts

Only highest grade genuine varnished cambric tubing used

Black enameled shield completely surrounding windings

Heavily nickel plated brass mounting feet—2 screw slots and 2 screw holes for mounting.

Look for this sign





# GREAT LAKES BOAT BOASTS FINEST SET

## BENSON FORD, CALL KFTC, HAS LATEST IN RADIO

### Direct Interphone Connects Captain with Shore—WWJ Music Guides Vessel Through Storm

DETROIT.—One of the best Radio-equipped ships on the Great lakes or on the ocean as well, is the Benson Ford, a new freighter owned by Henry Ford.

When the steamer's captain, William H. Daniels, desired to talk to the captain of some other ship, or with the captain of the Henry Ford, II, another Ford freighter, he notifies the ship's operator. The latter immediately gets in communication with the ship. Captain Daniels then merely presses a button at his desk, and starts talking into a microphone just as he would into a telephone on shore. This is called the interphone system, and through its use time and effort are saved.

#### KFTC Has Wide Range

Kenneth L. Brown, Radio operator of the Benson Ford, has been able to keep in touch with ships in any part of the Great lakes at all times since the Benson Ford was placed into commission. He also can communicate with ships along the Atlantic coast, with shore stations on the Great lakes and on the Atlantic coast.

The transmitter is a 500-watt set, using two 250-watt modulators, two 250-watt oscillators and a 50-watt speech amplifier. It can transmit an interrupted continuous wave or continuous wave, and an auxiliary spark transmitter is carried for emergencies. KFTC are the call letters, and under the license the station can be operated on 600, 706, 909, or 1,875, meters.

#### Use Music to Steer Ship

Up in the pilot house is Radio's latest contribution to the safety of sailing, a Radio compass. It is said that on the ship's first trip to Duluth the entertainment broadcast by the Detroit News station, WWJ, was used in keeping the ship on its course through Lake Superior. Bearings also were taken from WWJ and the land station at Cape May, N. J., during the most severe storm experienced on the trip to Duluth.

## The kind of Letters Thordarson gets—No. 6

California Fruit Growers Exchange  
Sunkist  
ORANGES—GRAPEFRUIT—LEMONS  
San Francisco, California.

THORDARSON ELECTRIC MFG. CO.,  
Chicago.  
Gentlemen:

Several radio fans, or broadcast hounds, or whatever you may call them, have asked me what kind of equipment I was using. I show them the Thordarsons and let them listen to some undistorted volume. They generally want to know where they can buy them.

If you have any queries about your transformers out in this part of the country, tell them to call me.

I will let them listen to my set and I will show them the new Thordarsons. I would like to have them call some evening about 8:00 o'clock when KPO is putting on Pipe Organ music, violin music, piano music, and singing. I can tune about six different ways with my set and I will let them listen in any way they want to. I will even go as far as to wreck a perfectly good set of \$12.00 receivers if they are hard of hearing. I will make the shingles wiggle on the roof, too, with the loud speaker if they want that much. If they want nice soft reproduction just like they were in the broadcasting room, I will give them that, too. I will surely do all I can to show them Thordarsons are there.

Yours very truly,  
(Signed) Roy E. Headley,  
Room No. 300, 310 Battery St.,  
San Francisco, Calif.

# THORDARSON

Super  
AMPLIFYING TRANSFORMERS  
Standard on the majority of quality sets  
Audio Frequency: 2-1, \$5; 3 1/2-1, \$4; 6-1, \$4.50. Power Amplifying, pair \$13.  
P.S. Write for some real bulletins!

## The Reader's View

### Another Call for Plain Announcing

Some of the announcers cannot be heard very clearly when they make announcement of the call letters, name of station, location and what has been rendered by that station. Some seem to be either too near the microphone or else they do not speak loud enough, as the announcement comes all in a jumble. It should be the same as this: W—O—S, Jeffer—son City, Mis—souri. This would do away with so many inquiries as to letters of stations.

I think that on Sunday nights when church services are broadcast that some announcement of the station rendering it should be made in some part of the service. Several stations do it.

There are lots of good announcers who cannot be missed when heard.

Glad to hear that spark "plugs" are on 750 instead of 450 meters, as is was very annoying. Yet some are still doing it.—Louis O. Dutcher, Rensselaer, N. Y.

### A School for Broadcasters

I get the Digest every week, regular as a W. U. clock, and think it the best all-round Radio paper extant. I try out nearly every new hook-up in it weekly, and they all work, even on impromptu connections.

I have had in mind some time to write you about a very annoying matter to Radio listeners, in this: A good many stations have a careless habit of not announcing as often as they should. Some, in giving Sunday services, will carry on a whole service without telling who they are, although they have ample time between songs, prayers, etc., to say what city they are in, at least. Others will play long tedious band concerts without saying a word for half an hour or more.

Why not have a small space in your paper captioned, "A School for Broadcasters," "Suggestions for Broadcasters," or somewhat like these, which could be a sort of clearing house for fans all over to contribute and thus get it before a great body of broadcasters all at once.

I would be glad to hear from you on this, what you think of it, or if you know a better way to get this to the attention

of all stations.

I trust you will give the above matter very earnest consideration, as half the satisfaction of hearing any program is to know where it is coming from.—R. G. Goodwin, Kansas City, Mo.

### Want More Plays Broadcast

I have for some time been wanting to get this off my chest, so here goes. Why don't we have more Radio plays? There is nothing more interesting or more helpful to us who are marooned in out-of-the-way places away from good theaters. Not long ago KGO put on a play "Turn to the Right," which was one of the best I ever heard. Together with the descriptions by Mrs. Church it was possible to visualize the whole setting. Another comedy from WLS, "Almost Insane," and another involving a test of a man by sitting on a bee hive for seven minutes for the satisfaction of his sweetheart without getting stung by either bees or her gave us a great laugh. As for me, they can't send out too much of that sort of material.

Here's to broadcasting as is and as can be.—J. E. Burch, Powers, Colo.

**Belden**  
Magnet Wire  
is known the world over for its uniformity and high quality.

# Wind Your Own Coils for the New Hook-ups!

The joy of real accomplishment comes to the radio fan who tries the new hook-ups and succeeds in making new records of long distance reception. He leads—others follow!

This fascinating work calls for special coils of new specifications. The enterprising experimenter winds his own coils to save time and to be sure that the new set will operate at the highest efficiency. To him comes the thrill of true scientific discovery and research.

Belden Radio Magnet Wire has been used for many years by famous manufacturers of radio devices. They require wire of uniform gauge, carefully insulated with high grade cotton or silk insulation from one end of the spool to the other. You should insist on Belden Radio Magnet Wire for your own protection. Every spool is full weight, plainly marked, and of full gauge throughout. Be sure to get Belden Wire—it makes a world of difference!

## Other Belden Radio Products

Our instructive booklet, "Helpful Hints for Radio Fans" describes many other Belden Radio Products, such as Enameled Aerial Wire, Loop and Litz Wires, New Terminals, Sockets, and many other important items. Know all about these efficient radio products. Send for the booklet, now!

Send for this Free Booklet!



### Radio Dealers

Belden Magnet Wire is merchandised in handy cartons of 5 spools each. Every spool is marked for weight, insulation and gauge. Send for complete dealer bulletin, by writing us on your business letterhead. Write, today.

# Belden

## Manufacturing Company

4635 West Van Buren Street  
CHICAGO ILLINOIS

Belden Manufacturing Company  
4635 W. Van Buren St., Chicago, Ill.

I would like to know more about Magnet Wire. Send me your latest booklet—Helpful Hints for Radio Fans. Be sure to explain Litz Wire, too.

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# Takes the Hot Potatoes Out of Singers' Mouths

Sure your Set is good, but that embarrassing evening you invited friends to listen to a program and the singers seemed to have hot potatoes in their mouths, and you finally gave up; what was the trouble?



Look at the Condensers! HILCO Condensers absolutely do not change in capacity. They are incased in solid metal and built up of tested mica and metal. No rough handling or MOISTURE will ever spoil them.

HILCO CONDENSERS are guaranteed accurate within 5%. They will never spoil the balance of your set.

HILCO CONDENSERS are preeminent from an engineering standpoint, both from a low phase angle and because they have an extremely low equivalent series resistance.

Take those old inaccurate, changeable capacity condensers out of your set and put in efficient, always-on-the-job HILCOS. They will save you many a wasted, embarrassed evening, and make that good set better.

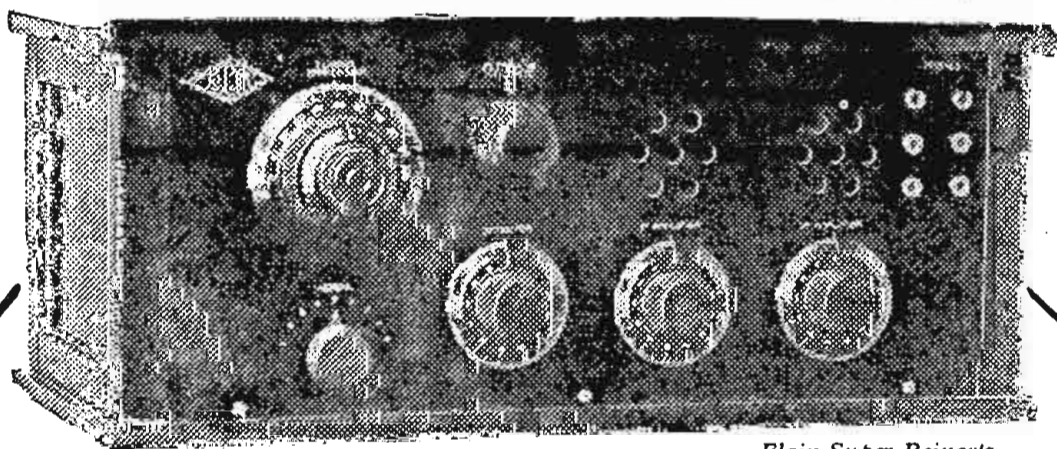
For Sale at all dealers at our usual fair prices

Descriptive literature on Hilco Condensers, Matched Transformers, Oscillator Coupler, Multiforers and the famous SUPER HILCO-DYNE KIT sent free upon request.

A. E. HILL MFG. COMPANY, Atlanta, Ga.

Scientific Radio Apparatus that is Distinctively Different and Superior in Efficiency and Appearance

## HILCO CONDENSERS



Elgin Super Reinartz 2LO Model Tuner

### The Set That Heard London

This astonishing reception was accomplished twice, in two separate cities of the United States during the trans-Atlantic tests last season.

The Elgin Super-Reinartz, 2LO Model Tuner spans the continent nightly at the hands of thousands of Radiophans. Through this highly efficient circuit amazing reception has been obtained. New York is entertained by KGO and Houston, Texas, listens in on WLAG with surprising regularity.

## ELGIN Super-Reinartz "The Ford of Radio"

will give you the DX records it has brought to others.

You must learn more about this wonder circuit at once!

Mail the coupon TODAY with your name and address and we will send—FREE of charge—the complete working diagram of the Elgin Super-Reinartz, 2LO Model. There are no obligations, of course.

Dealers: Write for Proposition

#### Free Coupon

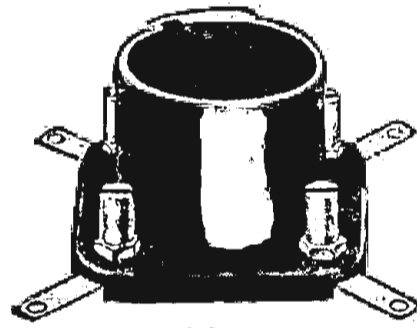
Elgin Radio Supply Co.  
Dept. A, 207 E. Chicago St., ELGIN, ILL.

Send at once the working drawings of the ELGIN SUPER-REINARTZ, 2LO MODEL TUNER—The Set That Heard London. I am enclosing stamp to cover postage.

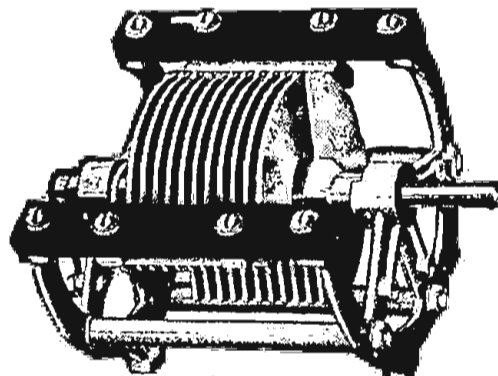
Name .....

Address .....

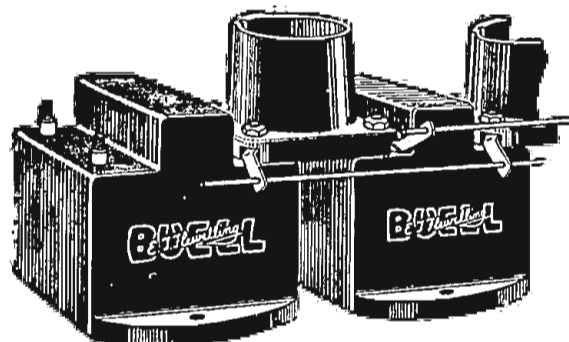
(PLEASE PRINT IN PENCIL)



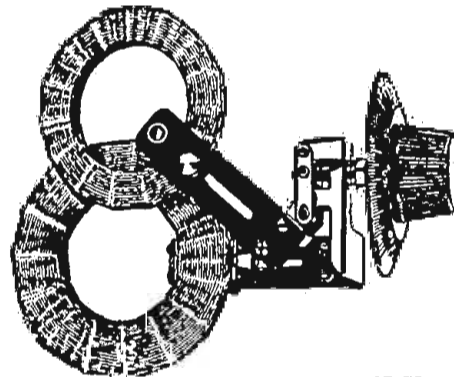
Standard Socket, 75c



.0005 mfd. Condenser, \$7.00  
.00025 mfd. Condenser, 6.00  
(Vernier Included)



Audio or Radio Uniformer, \$5.00



Tuner Complete.....\$7.25  
Coils Less Than 50 Turns..... 1.00  
Coils 50 to 100 Turns..... 1.25  
Single Coil Mounts..... .75

## BUELL Flewelling

RADIO APPARATUS DE LUXE

Flewelling Sockets require no downward pressure on tube. Contact is firm and made on side of tube terminals—not bottom! Extra spacing of contacts make it of the true low-loss design.

Flewelling Condenser is close to perfection in lowness of losses and other electrical characteristics. Most carefully built mechanically. Exceptionally satisfactory in tuning any circuit.

Flewelling Uniformer wins First Prize at Radio World's Fair as representing greatest advance of the year in set construction. Greatly reduces wiring and work of constructing a set. Astatic wound coils make a very selective tuned Radio Frequency set.

Flewelling Type S Tuner is of the approved basket weave design. With 80 and 30 turn coils (as regularly supplied) and in series with a .0005 mfd. Flewelling Condenser extra sharp tuning is secured from 220 to 550 meters. It is a real distance getter.

Flewelling Friction Vernier gives a ratio of 20 to 1 on a 4-inch dial. Friction disc is of special gum rubber. Knob is extra large and has real "feel."

### BUELL MANUFACTURING COMPANY

2975 Cottage Grove Avenue CHICAGO

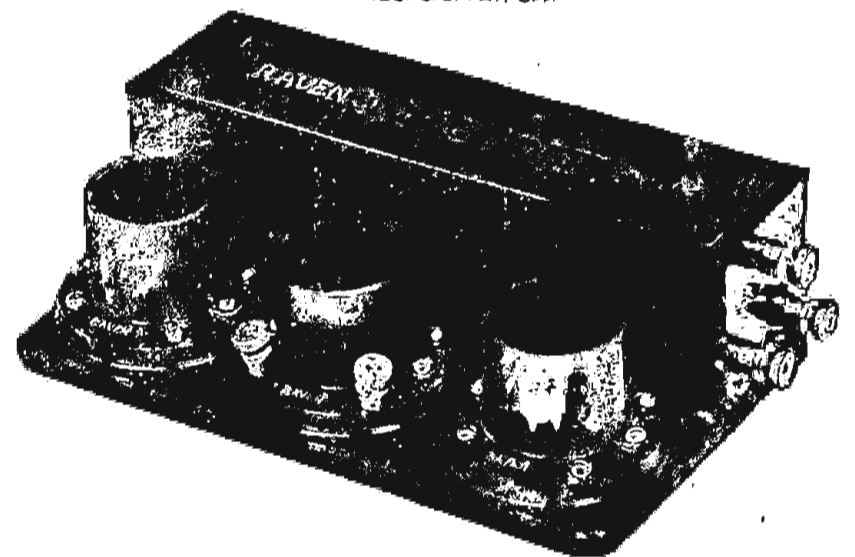


Friction Vernier 50c

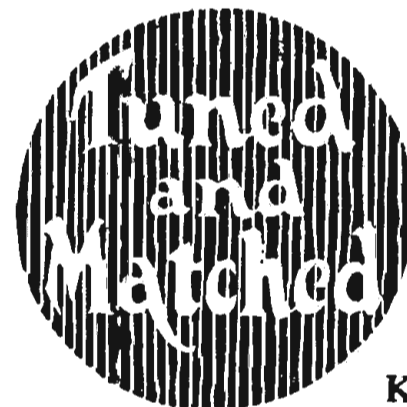
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- 3 Radio Frequency Transformers
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- Completely Wired in Moisture-Proof Wax
- Binding Posts Plainly Marked
- 1 Oscillator included with each "Kit"

Neat—Sturdy—Quiet—Compact

RAVEN RADIO, INC.

8 LEARNED STREET

ALBANY, N. Y.

Moisture Proof—Sealed in—Stays Adjusted

# "Low Loss," What It Is and Why

By Jacques Fournier

THE subject of "low loss" is one that has only recently received much attention from engineers and advanced experimenters, although it should have received this careful attention three years ago. Instead of reducing losses, every one set out to design a circuit that would give selectivity and unusual distance and circuits were brought out at the rate of two or three a week. Some of these were an improvement over previous hook-ups, while others merely added vacuum tubes and more controls. It was only when the limit of tubes and controls was reached in tuned Radio frequency and super-heterodyne that designers of apparatus turned to the lowering of the losses present in apparatus as a means of securing greater selectivity and increased distance.

The first piece of apparatus to be considered from this angle was the variable condenser, and about twenty different models of the "low loss" type have appeared on the market within the last few weeks. This has led the general Radio public to believe that "low loss" applied only to variable condensers, but it is a factor which applies to every piece of apparatus in a receiving set. Although the term was not used in connection with them, the various types of inductance such as honeycomb coils and spider web coils, were the result of an effort to eliminate loss in the inductance. Constructing fixed condensers with mica as the dielectric instead of paper and similar substances, was a step in the direction of reducing losses in fixed condensers. The chief advantage of low losses is, as was mentioned, in increased selectivity, as the increased range obtained is not very marked. When we say that a receiving set tunes very sharply, we mean that it has excellent selectivity and a little study of the matter will show that reducing the losses in a circuit which carries current at Radio frequency gives us sharp tuning.

### Variable Condensers

To reduce the loss in a variable condenser we endeavor to decrease, as much as possible, the ohmic resistance and the high frequency resistance. To reduce the losses in an inductance we try to keep these two factors as low as possible, and a third point, which is known as distrib-

uted capacity. The ohmic resistance can be kept down in a variable condenser by using material which does not have a surface film, by soldering all of the plates together or by constructing the plates of the stator or the plates of the rotor out of one piece. By using any one of these three methods we are certain that every plate is connected to the oscillating circuit with the absolute minimum ohmic resistance possible.

The best method, by far, of making contact with the movable plates is by means of a pigtail soldered to the shaft and to some fixed point which is attached to, but insulated from, the end plate. Where the pigtail is not used and contact with the movable plates is made through the bearing, the best type is the adjustable cone. The type of bearing in which a metal ball is held between two depressions is also good. Bearings made in insulating materials are worthless and should be avoided.

The points mentioned before have all been developed with a view to reducing the ohmic resistance; we will now consider methods of reducing the high frequency resistance. Condensers were, for a long time, made with end plates of hard

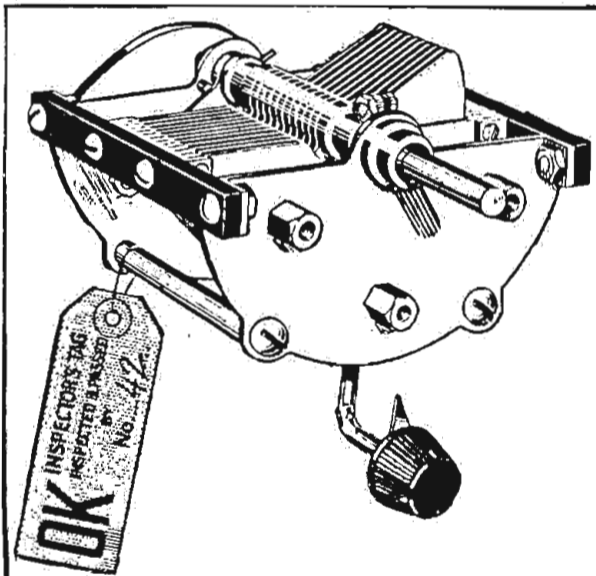
rubber or one of the phenol compounds, but it was found that the introduction of a dielectric such as these into the field of the condenser introduced losses in the form of hysteresis. By constructing condensers with metal end plates it has been found possible to reduce the amount of dielectric entering into the construction down to 2, 3 or 4 narrow and thin strips of insulating material, along the sides of the condenser. The capacity between the fixed and the movable plates is now almost entirely through air and only a very small proportion exists through the insulating material with its comparatively high dielectric constant. There is a certain minimum amount of dielectric possible in the construction of a condenser as the stator must be rigidly supported in place; to do this and yet keep the amount of insulating material small requires ingenuity of the highest order. Note that insulation around the rotor shaft is always bad and in general those condensers which have merely a sleeve of insulation around screws carrying the stator are not very good.

### Inductance

The earliest forms of inductance were naturally a single layer of insulated wire

wound on a wooden, rubber or bakelite form. This type was the only one in use for several years until the development of the honeycomb coil. The honeycomb coil was produced to reduce the distributed capacity between the turns of the coil. A small capacity always exists between two conductors in which there is the slightest difference of potential or voltage and since the voltage in every turn of a coil is slightly higher or lower than that in the turns adjacent to it, a capacity exists between the turns of an inductance. The Radio frequency currents have then, a tendency to enter the coil and go around the first turn and then traverse the coil by jumping from turn to turn through capacity effect instead of going around and around the coil and building up a magnetic field. In the honeycomb coil all turns cross each other at a sharp angle and are not parallel at any point so the distributed capacity has been materially lowered.

The type of insulation used on the wire also materially affects the distributed capacity and since enamel has a high dielectric constant it should not be used in wires that carry currents at Radio frequency. (Continued on page 20)



### A Laboratory Instrument at a Popular Price

The superior features of the CONTINENTAL Lo Loss Condenser are so pronounced that the experienced operator can comprehend them at a glance.

The general design of the instrument insures mechanical strength, rigidity, extreme accuracy and long life. This mechanical perfection was attained only by using quality materials, expert workmanship and many rigid inspections.

Official Test Radiofax of 25 plate Condenser at 1,000,000 cycles yields the resistance of .8 Ohm and a phase angle of 12 min.

Maximum Capacity..... .0000018  
Minimum Capacity..... .0005  
All capacities are exact.

13 plate—Cap. .00025.....	\$5.50
18 plate—Cap. .00035.....	5.75
25 plate—Cap. .0005.....	6.00
45 plate—Cap. .001.....	7.00

Prices without Vernier \$1.00 less.

Write us direct if your dealer does not carry Continental Lo Loss.

**Gardiner & Hepburn, Inc.**  
Philadelphia

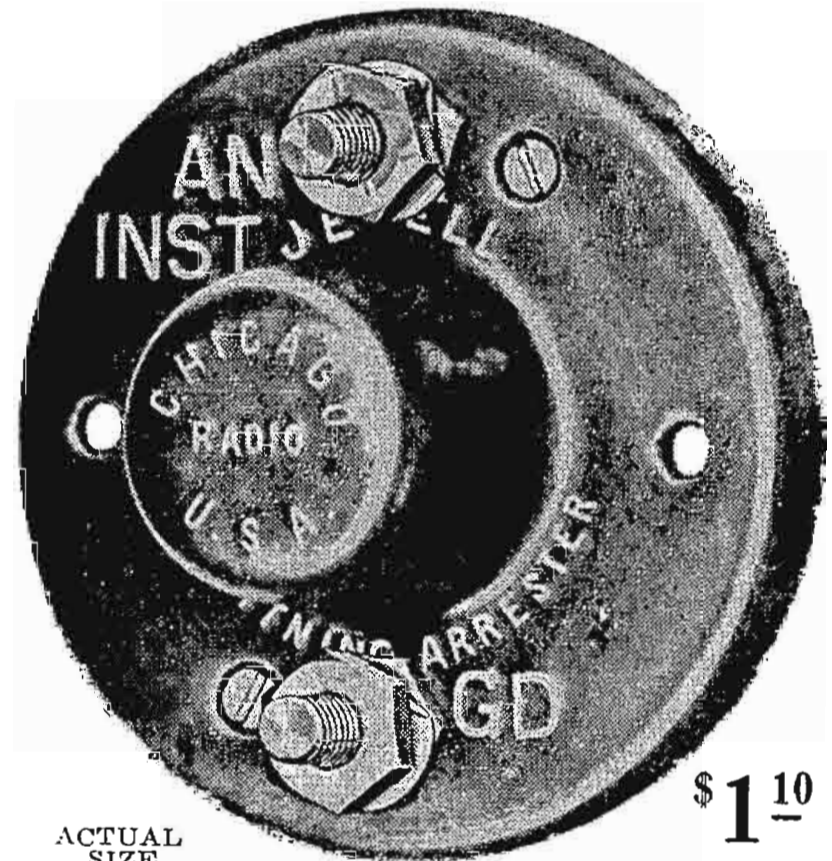
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## The JEWELL LIGHTNING ARRESTER

"Tested and Approved by the National Board of Fire Underwriters." (No. E-5403)

### Why Take Chances?



ACTUAL SIZE

\$1<sup>10</sup>

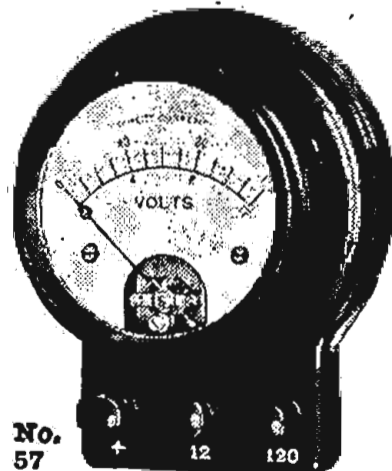
"Each lead-in wire shall be provided with an approved protective device properly connected and located (inside or outside the building) as near as practicable to the point where the wire enters the building. The protector shall not be placed in the immediate vicinity of easily ignitable stuff, or where exposed to inflammable gases or dust or flyings of combustible materials. The protective device shall be an approved lightning arrester which will operate at a potential of five hundred (500) volts or less."

The Jewell lightning arrester, in its brown porcelain case, is of the carbon-block type which has been standardized and used almost exclusively for many years for telephone, telegraph and railway signal work. It was designed to meet the requirements of the National Board of Fire Underwriters as covered in their code covering radio installations, and has successfully passed all their tests. (See Underwriter's files No. E-5403.)

BUY FROM DEALER

## Jewell Electrical Instrument Co.

1650 WALNUT STREET  
CHICAGO



No. 57

(The 7.5 and 150 volt double reading is most popular for "A" and "B" Battery testing.)

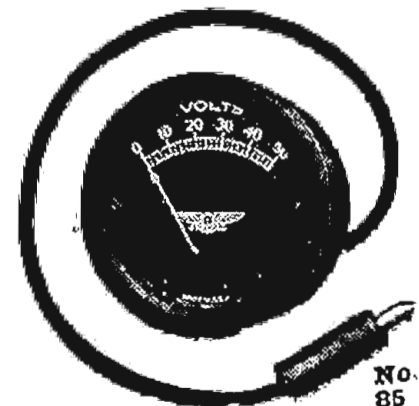
\$10.50

### 60% Of All Radio Trouble

A large manufacturer of receiving sets made a survey recently which showed that over 60% of all radio trouble was due to run-down or poor batteries. This emphasizes the necessity of testing batteries often to know their actual condition.

Write for our 15-A Radio instrument catalog which describes in detail our Nos. 57 and 84 Battery testing instruments.

"25 YEARS MAKING GOOD INSTRUMENTS"



No. 85

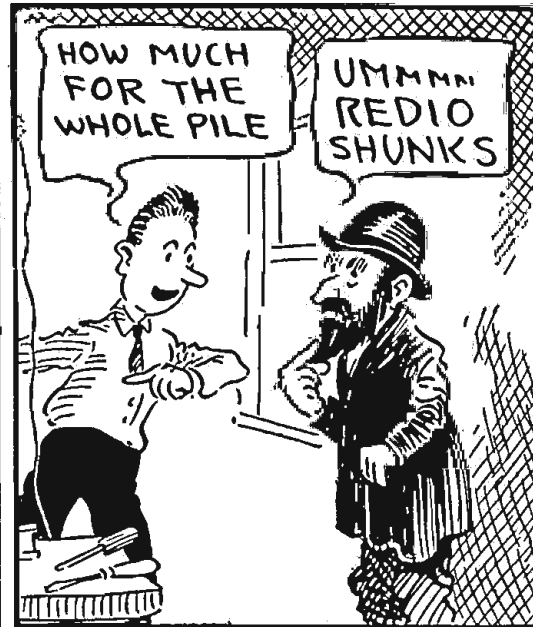
(This handy 0-50 volt "B" Battery testing instrument is sold by leading radio dealers everywhere.)

\$2.75

THE ANTENNA BROTHERS

Spir L. and Lew P.

Market Quotations



LOW LOSS—WHAT IT IS

(Continued from page 19)

quency; it is, however, all right for head telephone receivers and loud speakers. To keep the ohmic resistance of the inductance low, large size wire should be used; number 24 B & S gauge is the smallest size that should be used in winding inductances, while sizes up to number 18 and number 16 are to be preferred.

The third element of loss in an inductance is high frequency resistance and this is governed to a large extent by the method of supporting the wire and the substances placed within the magnetic field of the coil. Around any wire which is carrying currents at Radio frequency there exists a magnetic field in which the lines of force change their direction and intensity from 100,000 to 3,000,000 times per second, therefore as little solid material as possible should be placed in this field so that the lines of force will have a free path for their flow and change. Any solid materials used for supporting inductance offer resistance to the passage of these lines of force and cause hysteresis losses, which increase the high frequency resistance of the inductance.

The latest type of inductance brought out in the endeavor to reduce distributed capacity and hysteresis is the basket

weave coil. Where possible this type of coil should be used with a condenser embodying the points enumerated in the first part of this article. This will give an oscillatory circuit of maximum selectivity and minimum resistance.

Sockets and Loops

At the present time there does not seem to be much effort under way to increase

the efficiency of vacuum tube sockets by reducing the losses within them. Tube sockets must have a certain mechanical ruggedness because of the pressure brought to bear on them when tubes are inserted, and it is this factor which deters engineers from attempting to cut down the amount of moulded material present. Glass is being tried as the dielectric and

may eliminate some of the losses in the lower part of the socket. Various types of contact springs have been used, but no real advance that promises any worth while reduction of the ohmic resistance between prongs and springs or capacity between springs, has yet made its appearance.

(Continued on page 34)

Earn \$50 to \$200 a Week in RADIO

You can! Hundreds of ambitious men are already earning thousands of dollars in this wonderful new industry—you, too, can get your share. Mail coupon below for Free Book which describes fully the amazing money-making opportunities in Radio and tells how YOU can earn from \$5,000 to over \$10,000 a year.

The astounding growth of Radio has created thousands of big money opportunities. Millions of dollars were spent during the past year on Radio and thousands of young men are needed right now to meet the ever-increasing demand of work.

Men are needed to build, sell and install Radio sets—to design, test, repair as radio engineers and executives—as operators at land stations and on ships traveling the world over—as operators at the hundreds of broadcasting stations. And these are just a few of the wonderful opportunities.

Easy to Learn Radio at Home in Spare Time

No matter if you know nothing about Radio now, you can quickly become a radio expert, by our marvelous new method of practical instruction—instruction which includes all the mate-

rial for building the latest up-to-date radio apparatus.

Scores of young men who have taken our course are already earning from \$75 to \$200 a week. Merle Wetzel of Chicago Heights, Ill., advanced from lineman to Radio Engineer, increasing his salary 100% even while taking our course! Emmett Welch, right after finishing his training, started earning \$300 a month and expenses. Another graduate is now an operator of a broadcasting station—PWX of Havana, Cuba, and earns \$250 a month. Still another graduate, only 16 years, is averaging \$70 a week in a radio store.

Wonderful Opportunities

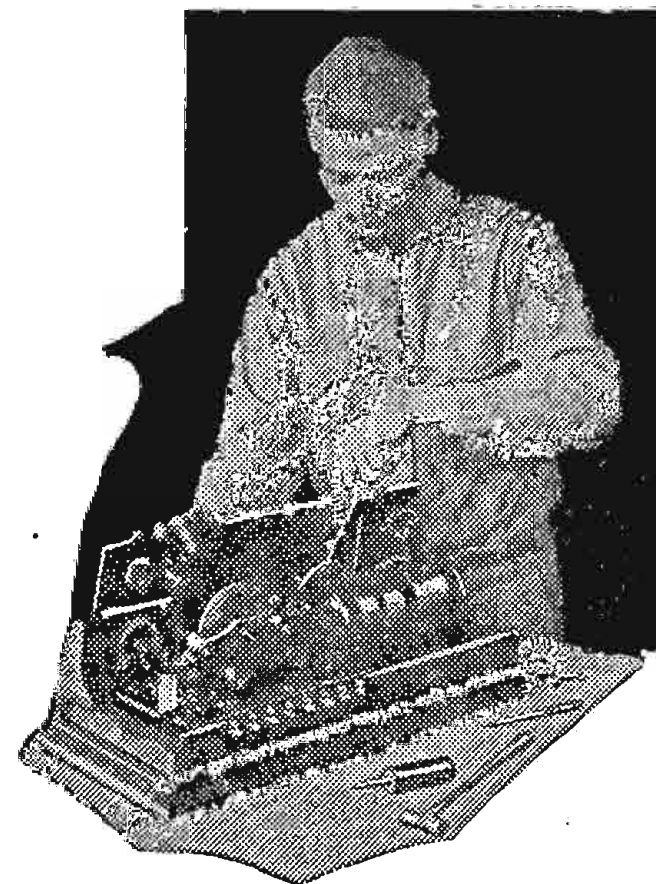
Hardly a week goes by without our receiving urgent calls for our graduates. "We need the services of a competent Radio Engineer." "We want men with executive ability in addition to radio knowledge to become our local managers." "We require the services of several resident demonstrators"—these are just a few small indications of the great variety of opportunities open to our graduates.

Take advantage of our practical training and the unusual condition in Radio to step into a big paying position in this wonderful new field. Radio offers you more money than you probably ever dreamed possible—fascinating easy work—a chance to travel and see the world if you care to or to take any one of the many radio positions all around you at home. And Radio offers you a glorious future!

The National Radio Institute is America's Pioneer Radio School—established in 1914. Our course is the absolutely complete one now being offered which qualifies for a government first-class commercial license. It gets you the bigger paying jobs in Radio.

Send for FREE RADIO BOOK

Learn more about this tremendous new field and its remarkable oppor-



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We have just prepared a new 32-page booklet which gives a thorough outline of the field of Radio—and describes our amazing practical training in detail. This Free Book, "Rich Rewards in Radio," will be sent to you without the slightest obligation. Mail coupon for it now!

For a short time we are offering a reduced rate to those who enroll at once. Act promptly and save money. National Radio Institute, Dept. 55LA., Washington, D. C.



NATIONAL RADIO INSTITUTE, Dept. 55LA, Washington, D. C.

Please send me without the slightest obligation your Free Book, "Rich Rewards in Radio," and full details of your special Free Employment Service. Please write plainly.

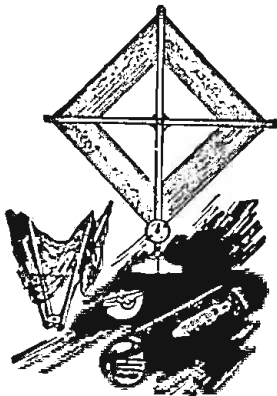
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Address.....

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

Reg. U.S. Pat. Office Lincoln RADIO PRODUCTS

Collapsible Loop Aerials



Built by Radio Engineers Permit Great Selectivity

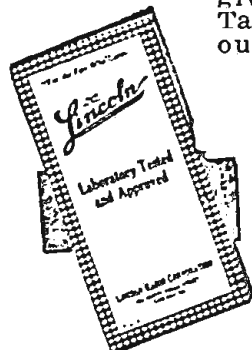
Lincoln Collapsible Loops offer many advantages, appreciated by Radio Engineers and Radio enthusiasts. Quality reception—greater selectivity—no static.

Wave length range with 23 plate condenser is 160 to 600 meters.

H. F. Resistance at 400 meters—only 7 ohms.

Wire is stranded, flexible and of great tensile strength and high conductivity. Inductance .2 millihenry.

If your dealer cannot supply you, order direct giving us his name. Tapped loop \$8.00 Without taps \$6.50.



Write for Catalog All Lincoln products are fully guaranteed. Send your name with your dealer's name for copy of Free Lincoln Catalog. Shows 6 hook-ups and describes Lincoln Laboratory Tested Products.

Lincoln Radio Corporation 224 North Wells St. Chicago, Illinois

Manufacturers of The Lincoln Kit—The Lincoln Oscilloscope—Lincoln "Long 45" Tuner—Lincoln Low-Loss Condenser

Pay Increases Over \$100 a Month

I am averaging anywhere from \$75 to \$150 a month more than I was making before enrolling with you. I would not consider \$10,000 too much for the course. (Signed) A. N. Long, 120 No. Main St., Greensburg, Pa.

Doubles Salary

I can very easily make double the amount of money now than before I enrolled with you. Your course has benefitted me approximately \$3,000 over and above what I would have earned had I not taken it. T. Winder, 731 Bedford Ave., Grand Junction, Colo.

From \$15.00 to \$80.00 a Week

Before I enrolled with you I was making \$15 a week on a farm. Now, I earn from \$2,080 to \$4,420 a year and the work is a hundred times easier than before. Since graduating a little over a year ago, I have earned almost \$4,000 and I believe the course will be worth at least \$100,000 to me. (Signed) George A. Adams, Route 1, Box 10, Tamaqua, Pa.

# How to Build the Simplest Possible Super-Het

## Part I—Parts Essential for Building Set

By John G. Ryan

There have been many articles published in Radio Digest and other Radio magazines, on super-heterodynes—long sets, short ones, high panels, deep baseboards, many controls, two controls, one stage of audio, two stages and push pull, preceded by straight R. F., and even reflexed. Fans have built them, some with success and some with nothing to show except a lot of parts and a feeling of disgust. The general reaction has been a demand for something simpler—for a set that the average man, not an engineer or even an advanced experimenter, could construct and operate successfully. To which, one might well reply, "Well, don't build a super. Construct something with less tubes and less necessity for accuracy." Which is all very well but the fact remains that everyone seemingly wants a super-heterodyne this year and nothing else will do.

With all this in mind, Radio Digest began looking around for a super that would fill the bill, one that would com-

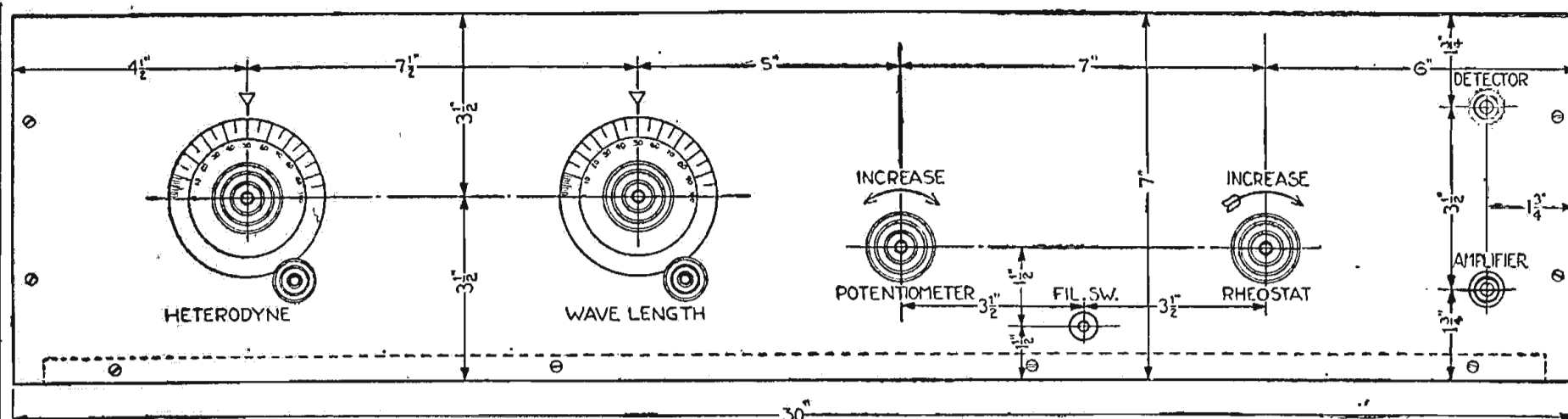


Figure 1

while less than this would be not taking advantage of all the strengthening possible. Some means of coupling tubes together is always necessary and transformer coupling has been found both simple and highly satisfactory. So, we couple the tube in which the waves were mixed, to the first amplifier with a transformer, which is known as a "filter coupler," because, since one winding of this transformer is tuned with a fixed condenser, the transformer has the

property of filtering, the wanted from the unwanted and passing only the former.

### Transformers Used

The transformers used to couple the first amplifier to the second and the second to the third and the third to the detector, are not tuned in either winding and are therefore known just as long wave transformers. One thing is important with regard to them, however; their "peak efficiency" must be fairly closely matched and must exactly coincide with

the single narrow wave band that is passed by the filter circuit. Every untuned transformer amplifies one particular frequency, or narrow band of frequencies, much better than it does the others over the range of wave lengths it will pass. For example, while our long wave transformers will pass frequencies included in the wave length range 5,000 to 9,000 meters, the voltage amplification at 7,000 meters is much greater than that at any other (Continued on page 34)

### List of Parts

2 Variable condensers, .0005 mfd., vernier	\$10.00
1 Potentiometer, 400 ohms	2.00
1 Rheostat, 2 ohms, 2 to 3 amperes	2.00
1 Filament switch	1.00
1 Four-spring double circuit jack	1.00
1 Single-spring, open circuit jack	.75
7 Vacuum tube sockets, standard base	7.00
1 Super-heterodyne kit	35.00
1 Audio frequency transformer	5.00
2 Fixed condensers, bypass, 0.5 mfd.	1.80
2 Fixed condensers, .00025 mfd., with grid leak clips	1.10
2 Grid leaks, 2 megohms	1.00
1 Fixed mica condenser, .0005 mfd.	.35
1 Fixed mica condenser, .005 mfd.	.60
1 Fixed mica condenser, .0001 mfd.	.35
1 Fixed mica condenser, .002 mfd.	.40
1 Panel, 7x30x3/16	5.25
1 Baseboard, 9x29x1/2	1.00
7 Binding posts	.40
Bus bar, spaghetti, screws, solder lugs	2.00
<b>Total cost</b>	<b>\$78.00</b>
<b>Accessories Required</b>	
1 Storage battery, 6 volt, 100 A. H.	\$25.00
2 B batteries, 45 volt, large size	8.00
1 C battery, 4.5 volts	.40
7 Vacuum tubes, "hard" amplifier type	28.00
1 Loop antenna	15.00
	<b>\$76.40</b>
Loud speakers range in price from	\$8.00 to \$50.00



Introducing

# COLONIAL

COLONIAL is a new name in American radio. Behind its products, however, are two of the best radio engineers in the world—Dr. Fulton Cutting and Mr. Bowden Washington. The receiving sets designed by these engineers have an international reputation and their two latest models—the Colonial 16 and 17—are in refinement of design and performance, "abreast" of anything now available to the radio public.

Both types are beautifully housed. Cabinet by Brewster—the first time the design experience of the famous automobile body builder has been available to the radio public.

An enormous amount of thought has been put into the detailed design and it is believed that many small annoying defects which have been learned in ten years of radio manufacturing have been entirely eliminated. This means that the set will arrive in the customer's hands intact, and stay so.

The Colonial 16 is a five tube, dry battery operated receiver. The Colonial 17 is a four tube, dry battery operated receiver. Both employ tuned compensated radio frequency—a special Colonial achievement providing uniform response. They are extraordinarily selective, can be logged accurately, have fine volume of excellent quality and are extremely economical in operation.

## COLONIAL POLICY

The basis of any selling policy can be no more sound than the product which the policy is devised to merchandise.

The two COLONIAL Models, now available to the trade, insofar as the basic design of the circuits is involved, are engineered in a detailed way, we think, more carefully and completely than any receiver on the market today. COLONIAL receivers, we know and are willing to prove, more completely meet the performance desired by the radio audience than any other receiver so far produced. Selectivity, sensitivity, stability, uniform response, faithful reproduction, through perfect mechanical design, are incorporated in COLONIAL receivers and the utmost in reliability is obtained.

COLONIAL'S manufacturing policy is to conduct our factory, from the engineering laboratory down to the shipping room, in such a manner that every piece of COLONIAL apparatus which leaves our hands will be received by the consumer perfectly designed, painstakingly constructed and 100% efficient in the work for which it was designed. To obtain this result means the most scrupulous inspection at every step of assembly. This inspection is continually under the personal supervision of Dr. Fulton Cutting and Mr. Bowden Washington.

### JOBBER POLICY

Exclusive franchise and absolute territorial protection are two of the outstanding features of what COLONIAL will

give its jobbers or distributors. We believe the jobber is entitled to this protection from the manufacturer.

We believe he is entitled to full credit for any "direct to dealer" sales which might be made in his territory. We believe that the jobber who can handle his territory profitably for himself, his dealers and for the factory, should be afforded these protections. Consequently, as territorial limits are defined, there will be but one jobber in that territory enjoying COLONIAL franchise and that jobber will, at all times, have behind him every available resource of the COLONIAL manufacturing organization to assist him in getting the maximum amount of business out of his territory.

### DEALER POLICY

In addition to rendering the jobber the closest possible sales cooperation, COLONIAL has developed a dealer cooperative sales service that is unique and that is sure to be of signal importance to the retail merchant. COLONIAL will offer direct to the dealer, through the jobber, this sales plan, personally supervised and inaugurated by COLONIAL "dealer salesmen" which we know will at once be recognized as being the best, most direct and efficient manner of securing sales that has as yet been devised for radio.

We have prepared our complete merchandising plan in the form of a booklet. You should secure your copy without delay.

### A SPECIAL INVITATION

is extended to jobbers and dealers in attendance at the Chicago Radio Show—November 18th to 23rd—to visit the COLONIAL Booth and see the first public display of COLONIAL 16 and 17.

**Colonial Radio Corporation**  
East Avenue and Tenth Street  
**LONG ISLAND CITY,**  
N. Y.

bine good looks and efficiency with low first cost and ease of assembly, with the emphasis on the last point. With the "simplest possible" thought in mind let us consider what is essential to a super-heterodyne. This type of receiver was developed to get around certain inherent disadvantages of vacuum tubes as they are now generally constructed. Tubes do not efficiently amplify or build up incoming Radio waves at the comparatively low wave lengths used by Radio-casting stations. We therefore, with another tube, create a new stream of energy at a wave length closely approximating that of the incoming program. The two are mixed together and create a new wave length which is much longer and far more efficiently handled by the tubes.

### Essentials of a Super-Heterodyne

This is the principle involved; now for the essentials. First of all, there must be a means of tuning the loop aerial, which is all the antenna necessary with a super. This means of tuning is a variable condenser, the usual size being .0005 mfd., often known as a "twenty-three plate." It was mentioned above that one of the tubes creates a stream of energy. This tube is known as the "oscillator" and some means of varying the frequency of the energy developed must be provided, so that this frequency will always have a certain predetermined relationship to any incoming signals, no matter what their wave length. For this purpose too, we use a variable condenser, also of .0005 mfd. capacity. With this oscillator condenser is also used an oscillator coupler. The circuit must contain inductance, so this coupler provides grid circuit inductance, a plate circuit "feedback" coil and a small coil to be hooked into the grid circuit of the "mixer" tube and so combine the frequencies.

Having mixed the frequencies, we are now ready to amplify them and the question immediately comes up of how many amplifier tubes to use. It has been found good practice to use three; more than this brings the signals up to a volume too great for the average detector to handle.

# Radio Digest

PROGRAMS  
Illustrated

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Vol. XI Chicago, Saturday, November 15, 1924 No. 6

## Super-Radio

### No Obstacle to Larger Developments

WE ARE entering an era of super-everything and now comes the super-broadcasting station. The annual conference recently held in Washington makes it clear that there is going to be startling developments immediately along this line. The conference has gone on record as favoring freedom to increase the power used, and the government is not disposed to interfere except for purposes of preventing abuses and adjusting disputes in the Radio field. Small stations, using low power for local broadcasting, are to be protected, but there is no needless obstacle to the larger development of the art.

The typical station of the future, it appears, will use many times the power now used, and therefore have a broader range. Moreover, in order to make the powerful stations function most efficiently, and keep them from making themselves a nuisance in their vicinity, they will be located not in the cities but outside of the cities. Broadcasting studios will probably be located in business centers, as they are now, but the programs will be carried by wire to the sending stations out in the country.

This should work very well but it is largely experimental. Radio innovators have to feel their way, and it is not sure yet whether super-power will be desirable or not. The coming year will tell, and also will determine the future of national broadcasting by means of inter-linked stations.

## Set Must Be a Thing of Beauty

### Trimings Add Dignity to Your Receiver

IT HAS not been so very long ago when a receiving set, especially those rigged up for distance work, had its equipment laying about on tables and workbenches. Wires and batteries lay about in a maze of disorder and the Radio corner was the pet grievance of the housewife, unless she banished it to the attic or garage.

Thanks to daddy time those days are gone. Sets are now marvels of neatness. In the past few months there has been a decided trend toward the artistic side of set building and mounting.

The same process, the development of the phonograph. Those with long enough memories can recall when the phonograph was a collection of wheels and cylinders, mounted atop a post and equipped with rubber ear pieces that were thrust into the ear openings like a bathing stopper. Then came the big old-fashioned floral horn and later the contained cabinets that are now almost universal.

When hundreds of keen minds are constantly seeking betterments, they come faster than if only a few are hunting them.

## Radio and Advertising

### Will the Radiophans Listen to Publicity Propaganda?

SERIOUS discussion is arising in places regarding the opportunities for misuse of the Radio in advertising or publicity. Part of the business of codifying the use of Radio will be that of fixing responsibility for utterances. Who is it that is broadcasting? What is his interest in the effect of the publicity given?

The public is not much interested in whether someone is paid for the cost of advertising by Radio. It is interested in knowing whose desire, whose impulse is causing the publicity.

Display advertising, whether in papers or magazines or other publications, usually has a form that brands it as interested. The publicity that does not have the form is now considered deceptive. Can interested Radio publicity be given a "form" that will show what it is?

In the course of time, it will be possible to fill the air with statements, implications, pleadings, for the benefit of one cause or another. This may be to the public's advantage providing only that the individual or organization that is back of the pleadings or arguments is known.

## RADIO INDI-GEST

### There's Music in the Air

Dear Indi:  
I'm sending you a little ditty, I trust you will like same. If you care to have it gratis, there's nothing else I'd claim.  
I read your Radio Digest, each line with thought and care,  
It amused me very much, perhaps you're not aware.

Last night my mood got the best of me, as sure as I was born.  
A lonesome feeling crept over me, I felt depressed—  
forlorn.  
So to change my frown into a smile, I turned on my Radio,  
Before I had a chance to think, I heard the grandest show.

When I want music while I dine, I don't go very far,  
I turn my dials to the forties, and get Station WOR.  
If you want your soul to touch cloudland, as if you'd plainly see,  
Just turn your dials to the fifties and listen to WJZ.

When I want to be in dreamland, as if in a cozy den,  
My life is changed into a joyous play, listening in on WHN.  
Then come moments you want to be amused, there's no one to speak or say,  
So I find peace and rest, listening in on KDKA.

How about your baseball fans, don't you get a laugh and thrill,  
Tuning in WOR and listening to our friend, "Jolly Bill"?  
If you want your heart to be filled with constant ecstasy,  
Turn your dials to the seventies and listen to WNYC.

You don't have to long for gay Paree, and keep your cabaret,  
I keep my feet in trim listening to WEBJ.  
You can keep your distant stations, to get Chilly I almost fear,  
Life is sure worth while living, if there's music in your ear.  
JUST A RADIO FAN.

### Mrs. Partington Speaks Out

Dear Indi: Mizz Partington says she has heard a lot of Broadcasting station announcers reporting on their attendance at the recent big Radio conference, and they are unanimous in admitting they had a very interesting conference, especially at the 12 inning tie game, where their old friend, Walter Johnson, saved the series, but they didn't say whether Walter gave them a ride in his new Lincoln. They said if Mr. Hoover, or somebody, had of give Mr. McGraw a few more Kellywatts power he would have faded the Senators ball club.



Mr. Crosley was at the conference but he hurried back home and him and Fred Smith opened up in WLW's new station studios on Monday night and the way they come in that night, she says she thinks Mr. Crosley missed the ball games, while he traded Mr. Hoover out of a lot more watts for his new studio; anyhow they had more stuff than Walter Johnson ever had, on Monday night. She says, to judge by her October reception, the listeners won't have nothing to complain of this winter, unless they holler for Superduplex sets, to let 'em hear several stations to once.  
SIGNING OFF.

### News Bulletins from Milwaukee

Furnished in Co-operation with the Milwaukee Daily Beverage

#### Station WNG Receives a Few Telegrams

SALT LAKE CITY, Utah.—"Program coming in fine. Have band play, 'I Wish I Had a Girl'."—Bringem Young.

TEAPOT DOME, Okla.—"Program coming in fine. Sing 'Star Spangled Banner.'"—Harry Sinclair.

BUTTERNUT, Wis.—"Program coming in fine. Your station most easily tuned out."—A. Groucho.

BUFFALO, N. Y.—"Program coming in fine. Have Erskine Adams sing 'Aniline Blues.'"—Morris Koakley, Irish Scientist.

ZION, Ill.—"Program coming in fine. Have orchestra render 'Klasy Kut Kollege Klothes.' Glad to hear that they are so cheap that even college men can afford them."—U. W. Graduate.

WASHINGTON, D. C. (Or is it AC?—Ed.)—"Program coming in fine. Congratulations. Come again. Very busy. Good Luck."—Cal Coolidge.

CHICAGO, Ill.—"Program coming in fine. Tell soprano singer that her bronchial tubes is not up to expectoration."—Mrs Partington.

NEW YORK CITY.—"Program coming in fine. Reception spoiled by the many single circuit sets I sold the public in 1922. There should be a law against them."—David Sarnoff, Vice President R. C. A.

THE THIRD TROMBONE PLAYER.

### Another Girl Gone Wrong

Dear Indi: Aspirin, our colored cook, has quit, stopped and desisted. No more will her effervescent pancakes permeate their melodious odors through the upper halls whilst we scrub our teeth rid of the dark brown taste. Never again will her broodingnagian form get jammed between the normal-sized kitchen door frame. Why, oh why, did she resign to fry eggs for the Smiths? We know but what our confidential sleuth hath reported: that we have a crystal set and the Smith's use six UV's.  
SPIDER WEB.

## Well Done!



## Condensed

By DIELECTRIC

Following a futile search for something unusual my dials hit the wave of KSD, which brought in the music of bands in the street carnival at St. Louis, Mo. Coupled with the cheering of the crowds, short explanatory remarks from that stations' well known announcer, you felt inclined to join in the fun—and would, except for the two months' old youngster asleep in the room.

Boasting or boosting? Chicago stations were boosting Illinois stock when they described the advantages the state had to offer. They were rightfully boasting when reference was made to the new stadium and grounds surrounding it. Mikes give others a chance to tell, and you the opportunity to hear, of things about which you know little, perhaps.

Let's have the Welsh choir again that entertained through WSAI.

From WEAf's assortment I choose to mention the Gypsy string ensemble, a well drilled group of musicians, and the Penn Harmonic Male quartet, each member of which is possessed of a trained voice.

Nationality plays a part in the degree of interest aroused in a singer or public speaker. That alone would have caused many listeners to tune to WLS when they presented two artists, a Yakima Indian and an Eskimo—vocalist and pianist respectively. But when I listened to these men the impression was one of disappointment; the Indian sang faultless English songs and his accompanist lacked the frigidty of the North land. Their work was applauded both in and out the studio.

Most of us Radiophans know of Beban, the actor and playwright. Possibly not so many have witnessed his unusual characterizations, yet his talk from the studio of WHAS disclosed to some extent the personality of the man. It is always a feature of interest to bring to Radiocast stations people whose work is of a public nature. Mr. Beban's closing remark, "I want to hug everybody," shows the advantage of Radio.

WBZ gave us some very good musical entertainment during a program of French songs and addresses, commemorative of some date in history that I can't recall. Especially pleasing was the singing of Massenet's "Elegie." This is not a selection to be sung in a perfunctory style and be interesting, which the artist fully appreciated.

Then away down in Atlanta, Ga., the First Presbyterian church organ was the medium by which many a listener was held to the dial setting of WSB. A good organ, capably played, and selections ranging over the various stops and combinations thereof made one feel the time spent in "Atla-anta, Georgia" was well spent.

I lost my ticket temporarily that was to take me on the long trip KDKA is conducting. However, it was recovered in time to rejoin the party for the visit to the Taj Mahal in India, one of the most beautiful buildings in all the world. The musical accompaniment to this travelogue was peculiarly fitting on this occasion. Why not arrange to make a trip via Radio to points of interest in the United States?











cast

JZ;

:50,  
HB,  
:45,  
AF;

:10,  
AX;  
PO,

IP;  
IO;  
AL;

m., organ  
ker crystal  
ector; 5:10,  
rgan recital,

7-7:30 a. m.,  
m., Catherine O'Neill,  
atherine O'Neill; 3:30,  
3:30, Halsey Miller or-  
noon stories; 7-7:15,  
-7:30, resume of the

18), 11-12 m., "Bras-  
", Estelle Popp; "A  
M. Olson; 3-4 p. m.,  
oods?" Cora Beeman;  
ida; 7-8, Ralph Will-  
m orchestra; Excelsior  
r; Margaret Garrity,  
nd his Rainbo Skylarks;  
die Boyd Mitchell, so-  
t; Paul Lougher, con-  
Viola Graff, soprano;

tern, 469), 6 p. m.,  
; 7:30, Pan American  
State Charles Evans  
band; 10:15, dance  
adis orchestra.  
309), 7 p. m., Hotel  
isconti, director; 7:30,  
stories, Ethel Behrman;  
and instrumental num-

29), 12 m., entertain-  
; 5-6 p. m., bedtime  
vs. markets; 8-9, the  
mars Bohemians.  
n, 390), 6 p. m. Guy  
orchestra, Claremont

17), 8 a. m., setting-up  
talk, women's editor,  
aw, pianist and song-  
orchestra; 8:30, Detroit  
eger, baritone; Kalman

ember 19

AKAC, KGO, WFAA,  
QAW.

125), 1:45 p. m., Mount

330), 7:30 p. m., State  
eck conductor; "Some  
A. B. Crane.

306), 8 p. m., general

at, 266), 7:30 p. m.,  
serenaders, Ed Miller,

233), 7-7:45 p. m.,  
10-11, Ray Robinson

12), 12:30 p. m., Bill  
s program; fairy story,  
; Pozzi Schoop trio; 10,  
stropolitan orchestra.  
untain, 360), 7:30-8:30  
Crop Rotation," Prof.  
Contest," Prof. Botkin;

ciffe, 423), 1-2 p. m.,  
l orchestra; 4:30-5:30,  
l orchestra; 5:30-6:30,  
Brother; 7-7:30, Rudy  
estra; 8-12, E. Max  
sons in French, Edna

l, 546), 6:45 p. m.,  
rne Arnesen, violinist;

16), 6:30 a. m., 7, 8,  
Y. M. C. A.; 9:30,  
table talk, Anna J.  
ws and market reports;  
y, Uncle Bob; 7-7:30,  
7:30-8, program, Dun-  
musical program, Ann  
orne, baritone; Harold  
t; 8:30-8:45, stage re-  
9:45-2:30 a. m., mid-  
children's hour, Alpha Stalson; 6, sport hour; 6:30,  
weekly summary hour, feed and flax markets, Henry  
Bellows, editor, Northwestern Miller; 7, vesper service;  
7:45, lecture hour; 9, weather report; 9:30-10:30, musi-  
cal program; 11, Warmeln ensemble.

WCCX, Oetroit, Mich. (Eastern, 517), 4:15 p. m., musical  
program; 6, dinner concert broadcast from Hotel  
Tuller; 7, musical program, Malle and Little, Cella  
Djer Kiss, soprano; Daisy Palmer, contralto; Myrtle  
Rist, accompanist; Marlon Miller, soprano; Anastasia  
Prida, violinist; Helen Astrosky, pianist; Bert L.  
Dahlberg, tenor.

astern, 273), 8 p. m.,  
id, Micona Karshoun,  
Twaroschk, tenor; 8:20,  
Golden Age magazine;  
Oriental music.  
entral, 266), 6:30 p. m.,  
and Cecelia Cullen, violinist;  
scotch comedian; Lucille Snyder-

(Continued on page 26)

WJN, 6:30,  
14, WOO;  
F. WEBJ,  
WVJ, 8;  
1:37, WHN;  
A R, 9:30,  
10, WGN;  
30, WHN;  
WIN, WMC;

Philip Spitalny's Music Box orchestra; 8 p. m.,  
music and drama staff, Young Women's Christian  
association, concert; negro songs, readings in dialect;  
WTAM Symphony orchestra.  
WVJ, Oetroit, Mich. (Eastern, 517), 8 a. m., setting-up  
exercises, R. J. Horton; 9:30, talk, women's editor,  
Detroit News; 3 p. m., Detroit News orchestra; 8:30,  
Lucille Lincoln, soprano; Scottie Provan, Scotch en-  
tertainer; Raymond Seeger quartet, E. Eugene Wilson,  
baritone.

Tuesday, November 18

Tuesday, silent night for: KFOX, WHO, WMH, WOC,  
WOO.  
CKAC, Montreal, Can. (Eastern, 425), 7 p. m., kiddies'

WEAO, Columbus, Ohio (Eastern, 424), 11 a. m.,  
Louise Rennich, pianist; Mrs. E. K. Osborne,  
soprano; Francis Boechie, reader, from Marguerite  
Mauley Seldel school of music; 1:15 p. m., music,  
Seldel artists.  
WEAF, New York, N. Y. (Eastern, 492), 6-7 p. m.,  
dinner music, Waldorf-Astoria hotel; 8-8:20, Politics,  
Barnard college; 8:30-9, Gold Dust Twins; 10-11, Na-  
tional Carbon company.

WEBH, Chicago, Ill. (Central, 370), 7 p. m., Edgewater  
Beach Oriole orchestra; Dean Remick, pianist; musical  
hits, Riviera theater; 9, Oriole orchestra; Harry Davis,  
baritone; 11, Edgewater Beach Oriole orchestra; Nick  
Lucas, songster; Edgewater Beach trio.

WEBJ, New York, N. Y. (Eastern, 273), 7-7:15 p. m.,  
Blybrun's review of the new photoplays; 7:15-7:30,  
Rhytho Traub; 7:30-8, Circle quintette dance music;  
8-8:15, Jean Moresio, tenor, accompanied by Norman  
Hennefeld; 8:15-9, Rivoli ensemble, under personal  
direction of Hugo Riesenfeld.

WFAA, Dallas, Tex. (Central, 476), 12:30-1 p. m.,

WMAQ, Chicago, Ill. (Central, 447.5), 12 m., weekly  
program, Illinois Manufacturers' association; 4, Amer-  
ican Red Cross home nursing talk, Estelle Weltman;  
4:30, musical program, pupils, Glenn Dillard Gunn  
school; 6, Chicago theater organ; 6:30, Hotel LaSalle  
orchestra; 8, literary talk, Harry Hansen; 8:20, travel  
talk, Clara E. Laughlin; 8:40, talk, Chicago Asso-  
ciation of Commerce; 8:50, lecture, University of Chi-  
cago; 9:15, program, Wisconsin Rapid Elks Glee club.

WMC, Memphis, Tenn. (Central, 500), 8:30 p. m.,  
classical program, H. P. Benner; 11, midnight frolic,  
"Advice to Lovelorn," Cynthia Grey; 6:25, dinner program,  
May's Mandolin musicians; 9, community program,  
Blair; 10:30, Wow! frolic, Frank Hodek, Jr. and his  
Omaha nightingales.

WOC, Oavenport, Ia. (Central, 484), 12 m., chimes;  
5-15, blues.  
WOL, Ames, Ia. (Central, 360), 12:30 p. m., "Littera-  
ture for Children," Mahel Fleming.

WCCU, Minneapolis-St. Paul, Minn. (Central, 417), 9:30  
a. m., news bulletins; daily program; 10:45, home  
service, "Thanksgiving Dinner Mado Easy," Betty  
Crocker; 2 p. m., woman's hour, "Table Etiquette";  
2:30, musical program, St. Paul studio; 4, magazine  
hour, "The Runnin' Fool," Jonathan Brooks; 5:30,  
children's hour, Alpha Stalson; 6, sport hour; 6:30,  
weekly summary hour, feed and flax markets, Henry  
Bellows, editor, Northwestern Miller; 7, vesper service;  
7:45, lecture hour; 9, weather report; 9:30-10:30, musi-  
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Tuller; 7, musical program, Malle and Little, Cella  
Djer Kiss, soprano; Daisy Palmer, contralto; Myrtle  
Rist, accompanist; Marlon Miller, soprano; Anastasia  
Prida, violinist; Helen Astrosky, pianist; Bert L.  
Dahlberg, tenor.

Wednesday, November 19

(Continued from page 25)

WDAF, Kansas City, Mo. (Central, 411), 3:30-4:30 p. m., the Star's string trio; 6-7, school of the air, piano tuning in number on the Duo-Art; address, auspices, Health Conservation association; address, speaker, Meat Council of Greater Kansas City; the Tell-Me-a-Story lady; music, Hotel Muehlebach Trionon ensemble; 8-9:15, program presented by the Second Missouri District of Federated Music clubs; 11:45-12 u. m., night-hawk frolic, the "Merry Old Chief" and the Plantation players.

NOTE THE BANJO AT WGR NEXT MONDAY



Note the determined expression on the face of Joe Roberts as he lovingly clasps his banjo to him. Joe is awfully fond of banjos. Just how fond he is of it can be understood by tuning in WGR at Buffalo the week of November 17, when the Vincent Lopez Hotel Statler dance orchestra is on the air (see the Digest program for WGR) and listening to him pick this banjo. Harold Gieser, the director, will feature Roberts that week. Colegrove Studio, Buffalo.

children's hour stories, Big Brother; 7-7:30, Rudy Sciger's Fairmont hotel orchestra; 8-9, Theodore J. Irwin, organist; 9-10, program, H. B. Passmore, pianist; 10-11, E. Max Bradford's Versatile band.

dinner concert; 8:30-9, concert, Lyon & Healy; 10-11, dance program, Jack Chapman Drake orchestra, Don Bestor, Blackstone orchestra.

Friday, November 21

Friday, silent night for: CKAC, KFQX, KGO, KPO, WLW, WMH, WRC.

KOB, State College, N. M. (Mountain, 360), 7:30-8:30 p. m., the Ariel quartet of El Paso, Mrs. Alice B. Marshall, director; "Nose and Throat Hygiene, 1," Dr. D. H. Lewis.

Thursday, November 20

Thursday, silent night for: KFQX, KGW, KSD, WHO, WOO.

# Secrets of Selectivity and Regeneration

## Part V—Conclusion; General Principles to Remember

By William W. Harper

**I**N THE articles which have preceded an attempt was made to present the influence of the more important factors such as high frequency resistance and extraneous coupling, upon the regeneration and selectivity. In all cases the data given was based upon one stage of regenerative Radio frequency amplification. The more elaborate arrangements may also be subjected to similar analysis and the same principles can be applied.

The second article disclosed a method of improving both selectivity and response by the use of more than one sharply tuned circuit. A receiving system consisting of one regenerative amplifier with two tuning circuits was described. It is well known that the degree of selectivity can be further increased by the utilization of more tuning circuits. Such an arrangement is shown in Figure 12.

In a system of this order the circuits LC and L1C1 are both adjusted to the condition of critical regeneration by utilizing the optimum number of plate coil turns in La1 and La2 respectively. This adjustment is made as described in the latter part of the third article.

The detector tube is strictly non-regenerative; that is, the circuit L2C2 is not regenerated by energy from the detector plate circuit. It has been found that only a very slight increase in selectivity occurs by using regeneration in the detector and if critical regeneration is used in the precedent amplifiers, nothing is gained in responsiveness.

Assuming the selectivity of a receiver comprising one tuning circuit to be as represented by the resonance curve number one in Figure 13, the increase in selectivity due to the addition of a second and third tuned circuit might be pictured as shown in curves 2 and 3 respectively.

With only one tuning circuit it is noticed that a certain station is heard

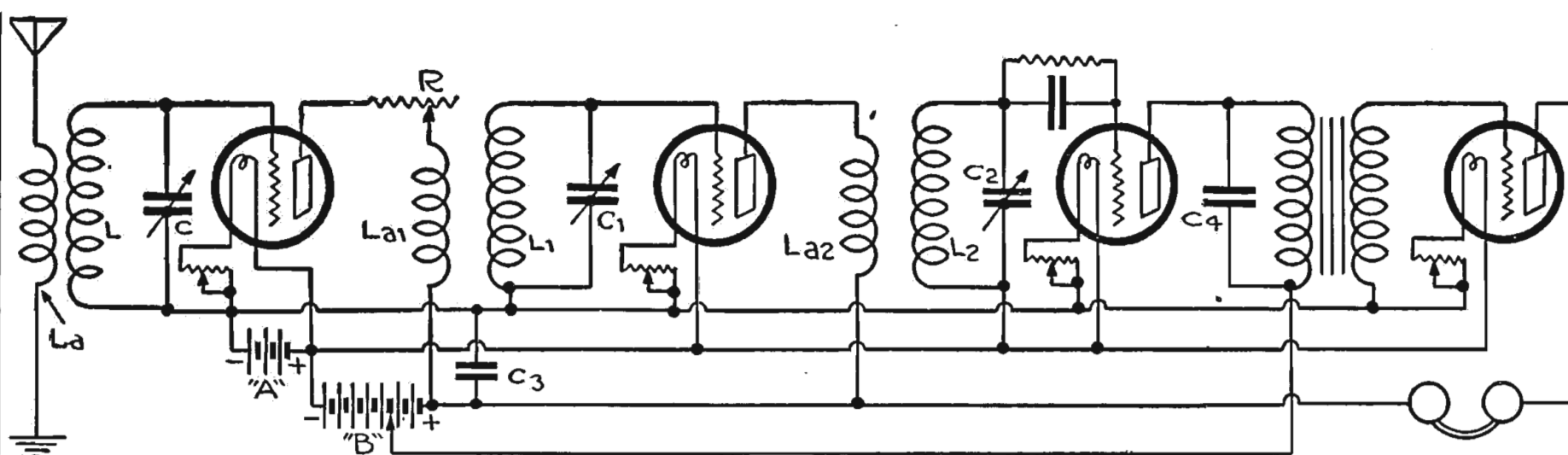


Figure 12

from 250 meters to 550 meters. A local station on a non-regenerative set with one tuning circuit frequently gives response of this character. When one stage of regenerative amplification is used the same station will only be heard within the limits shown by curve 2, namely 325 to 475 meters. The greater amplitude of curve 2 when the set is tuned to exact resonance (in this case 400 meters) results from the regenerative amplification. Curve 3 illustrates the condition when a two stage tuned Radio frequency amplifier is used embracing three sharply tuned circuits. The spectrum of the transmitting station as received by such an arrangement is reduced to a band only 20 meters wide. Unfortunately the increase in selectivity is not proportional to the number of tuned circuits. That is, after the second or possibly the third stage amplifier is added a further increase fails to appreciably improve the selectivity.

For the home builder, it is necessary

to know something of the general features of the construction of amplifying systems of this type. An attempt will be made in this article to bring out these essentials.

As a first step, the builder should select well made low loss condensers for use in the tuning circuits at C, C1 and C2. A capacity of 225—250 micromicrofarads is most desirable for this purpose. A condenser having metal end plates, grounded rotor and pyrex insulation is very satisfactory. Uniform wave length or frequency characteristics are also an asset to a receiving condenser.

The coils L, L1 and L2 should have a value of about 375 microhenries when

used in conjunction with condensers of this capacity. The number of turns necessary to give an inductance of this value depends entirely upon the size of wire and the coil diameter. Seventy turns of number 24 dcc. wire on a 3 inch tube would be approximately correct. After the set is completed a test can be made to determine the wave length range covered. It may be that too many turns are used, as will be apparent from the point at which stations of known wave length are received. In this case turns can be removed. It is necessary to keep the number of turns the same if the condenser dials are to read together.

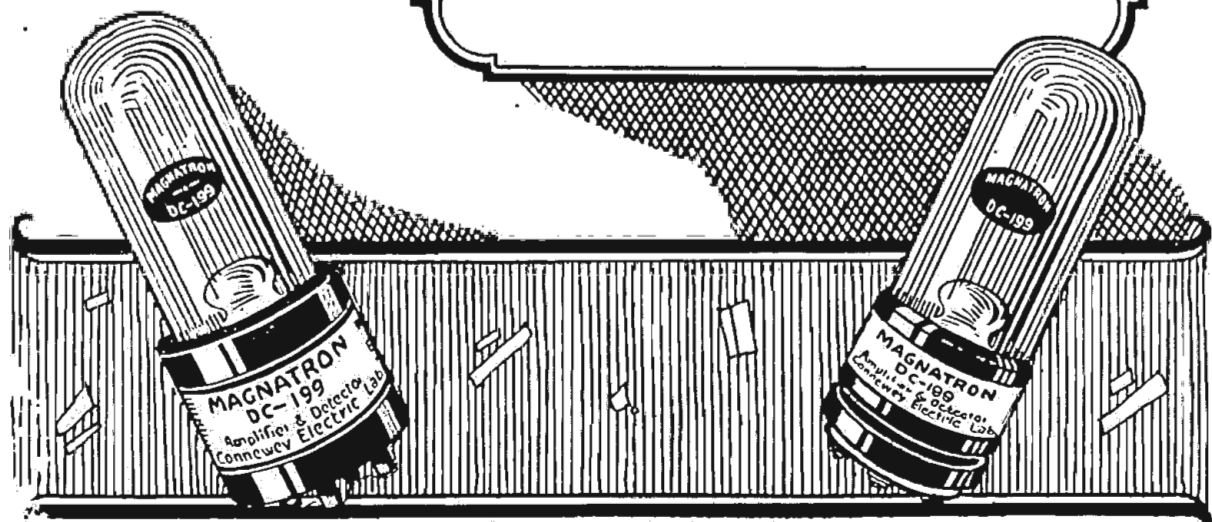
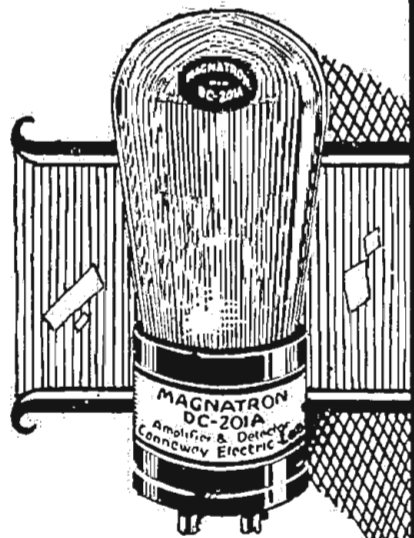
(Continued on page 28)

### MAGNATRONS

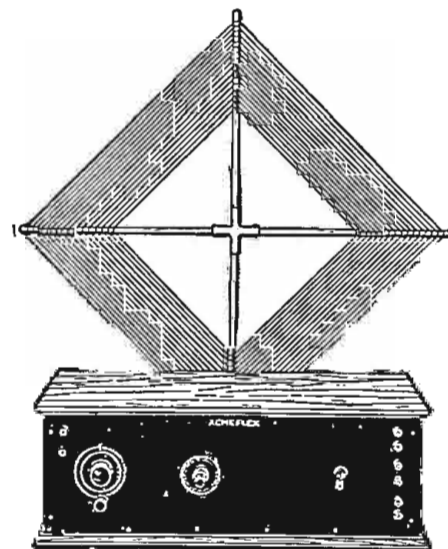
**T**HE improved MAGNATRON available to you today knows no equal in the vacuum tube field. It is the most sensitive detector, the most powerful audio amplifier and the most stable Radio amplifier we have ever developed.

The improved MAGNATRON far surpasses even the original MAGNATRONS upon which we have built our reputation. That, in itself, is saying enough.

The improved MAGNATRONS are tipless. This feature prevents breakage. The price is low. The MAGNATRON DC-201A, the MAGNATRON DC-199, and the MAGNATRON DC-199 with large base all list at only \$4 Your dealer sells them!



**CONNEWAY ELECTRIC LABORATORIES**  
309 Fifth Ave., New York City



A set you can put together

## Only one tuning dial

**A**LL the tuning on an Acmeflex Kitset is done with one dial—the simplest possible way. It is so simple that your wife and the kiddies can use it to their hearts' content, getting "all the year 'round radio," and everything on a loudspeaker.

It is an easy set to make, too. It's the famous ACME 4-TUBE "REFLEX" set. Everything needed for putting the complete set together comes to you nicely packed in one wooden box for \$65.00. Even a screwdriver and a pair of pliers, the only tools needed, are given with the kit. No soldering necessary. That's a good riddance. No workshop or technical knowledge needed. The only accessories to get are the tubes, batteries, loudspeaker and cabinet.

Full directions and print of wiring are furnished with the set. Only 42 simple steps and it is done—in one evening easily. Send for descriptive circular.

ACME APPARATUS COMPANY, Dept. 131, Cambridge, Mass.  
Transformer and Radio Engineers and Manufacturers

# ACMEFLEX KITSET

ACME APPARATUS CO.

Dept. 131, Cambridge, Mass. o

I would like to have the descriptive circular on the Acmeflex Kitset, the set with only one tuning dial.

Name.....

City.....

Street.....State.....

### SELECTIVITY SECRETS

(Continued from page 27)

The use of low loss coils is recommended. A plain solenoid coil wound on a cardboard tube with double cotton covered wire is very satisfactory. A coil of this type is often more efficient than many of the more elaborate and "so-called" low loss inductances. The ambitious experimenter can do better by building basket weave coils or by spaced windings. Cardboard tubing is slightly more efficient than hard rubber and bakelite for use as coil supports. In any instance the use of skeleton forms for the coil supports tends to improve the electrical characteristics of the coil, but experimental work in regenerated circuits operated at frequencies within the broadcasting band indicates that the actual gain hardly warrants such construction. For this reason the experimenter will do well by using a simple and carefully constructed solenoid on a paper or cardboard support.

#### Impregnating Solution

An impregnating solution for coils consisting of celluloid dissolved in amyl acetate can be used with no harmful effects. With this preparation the high frequency resistance increase is practically immeasurable and the distributed capacity is increased by a very unimportant amount.

One of the most imperative things about the construction of any receiver is to keep the coils as far away as possible from both metallic objects and dielectric material. Great effort has recently been put forth to increase coil efficiency and some very good improvements have been made, but the Radio public will not benefit from this work until a complete understanding is reached in regard to the proper utilization of good coils. Many experimenters, and even commercial designers apparently ignore the fact that a condenser or metal tube socket in the concentrated field of a coil is capable of increasing the losses in the coil by as much as one hundred per cent. An edu-

ational campaign should be instituted with the object of instructing the layman on the technic of keeping the losses low in low loss coils.

The effect of wood, hard rubber and other dielectric material in increasing the losses is easily within the range of practical measurements. Unfortunately, it is difficult in such a short review to give any quantitative data as to how far the coil should be from surrounding objects of various kinds. At least metallic objects should be no closer than 2 inches from the coils. Don't cramp a big circuit

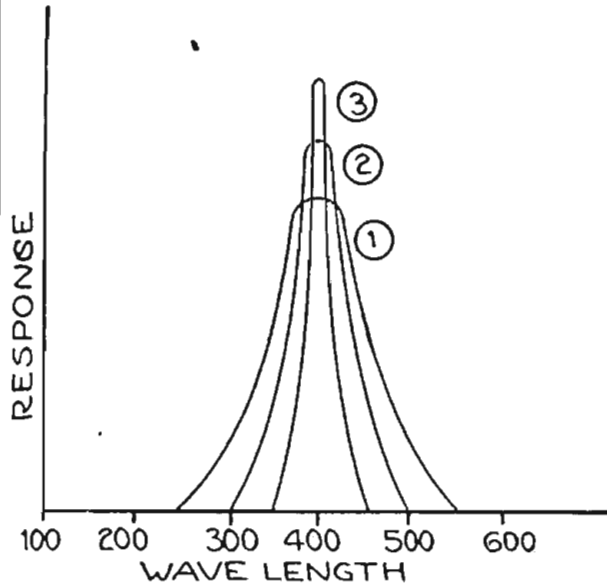


Figure 13 into a small cabinet, is possibly the best single warning to the layman.

#### Winding the Coils

The primaries La, La1, La2, can be wound on the same tube with the secondary coils, and closely adjacent (by a separation of not over 1/16 inch) to one end of these windings. The primary is wound in the same direction as the secondary. The number of primary turns depends upon the circuit conditions, as previously brought out. Beginning with 20 turns the optimum number can be

reached by taking one turn off of each coil at a time until the set no longer oscillates at any point of the tuning scale. This should always be carried out with the antenna and ground connected. The resistance of the antenna circuit affects to some extent the resistance of the first tuning circuit LC and in that way influences the point of critical regeneration. It will be noticed that a variable resistance, R, is shown in the plate circuit of the first Radio amplifier. The maximum value of this resistance should be about 1,500 ohms. If the adjustment for the optimum number of plate coil turns is made with this resistor set at half its maximum value, it will afford a very convenient control of the regeneration. In this way the set is electrically flexible and can be adjusted for maximum efficiency with various aerials.

The regenerative ability of vacuum tubes also varies to a marked degree and an adjustment of this kind will take care of such variations.

A large by-pass condenser is important across the A and B batteries as shown at C3. The actual capacity is not critical, but its value should lie between .1 and .5 microfarad. A second by-pass condenser, C4, is also desirable in the plate circuit of the rectifier of most Radio frequency amplifying systems. Its value may be from .001 to .005 microfarad.

It is very important that the high potential side of the secondary coils and the high potential sides of the tuning condensers be connected to the grids of the tubes. The end of the secondary coil away from the end adjacent to the primary is taken as the high potential side. The end of the secondary coil which is adjacent to the primary is the low potential side and is often termed the "grid return." The grid returns of the amplifiers go to the negative A battery lead always and the grid return preceding the detector tube goes to the positive side of the A battery. Aside from reducing the interstage coupling by

sloping the coils at a 57 degree angle, a further reduction can be obtained by keeping all the high potential ends of the secondary coils either up or down. That is, the coils should all be placed in the same position within the set.

#### Increasing Selectivity

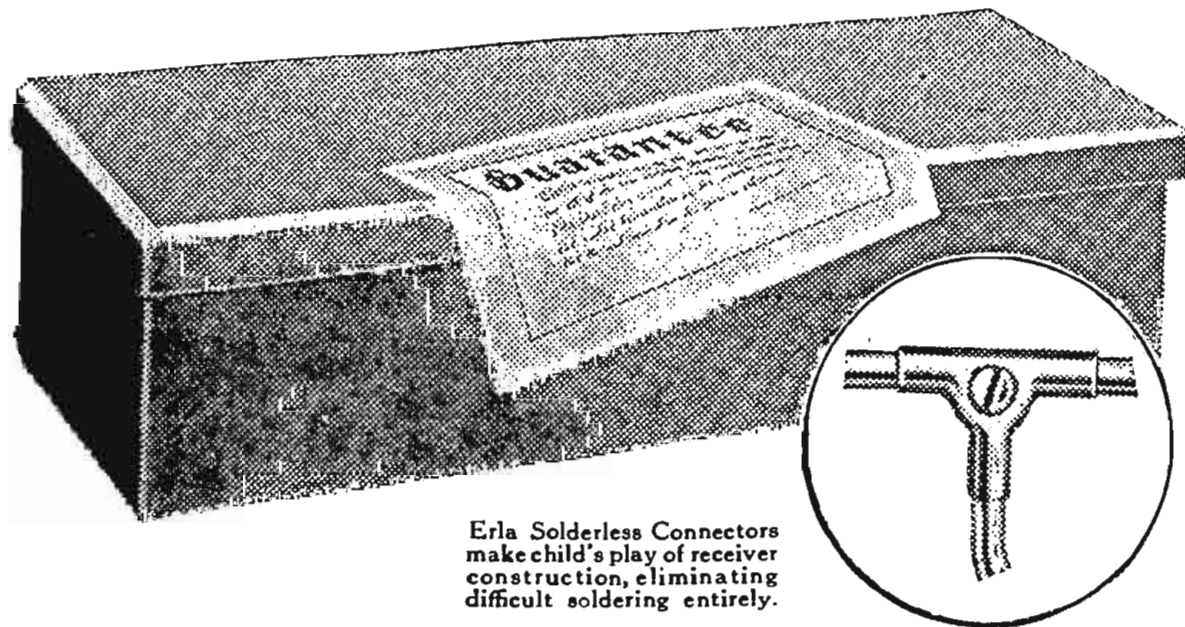
Often times it is possible to increase the selectivity of a receiver by proper shielding. This method is not recommended to the layman, inasmuch as it is difficult to secure proper shielding without decreasing the responsiveness of the entire receiver. For those who wish to attempt this kind of work reference is made to the recent work of R. H. Barfield (see Journal, Institution of Electrical Engineers [London] 62, pp. 249-264, March, 1924).

Where it is desired to operate a receiver using amplification of this kind in congested broadcasting areas, the writer strongly recommends the use of a tapped antenna coil at La. This coil should have a maximum of 20 turns and taps made at 3, 5, 10, 15 and 20 turns. With a well insulated and low resistance antenna it is possible to cut through very intense local interference by using only three turns in the antenna coil La.

In conclusion, the author regrets that he has not been in position to give more exacting constructional data concerning selective amplifying systems, such as panel layouts and the specifications for the constituent parts. It is believed that the Radio fraternity will appreciate the absurdity of all attempts to give a single formula for the construction of any special receiver. This can only be done when the exact value of the elements that make up the set are known as well as their relative positions.

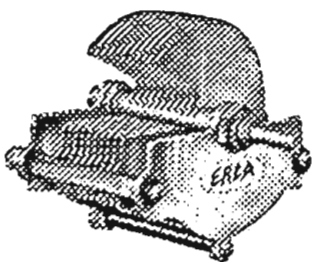
(CONCLUSION.)

One hundred turns is the practicable limit for single layer windings, if any degree of efficiency is desired. For amounts greater than that bank winding should be resorted to.



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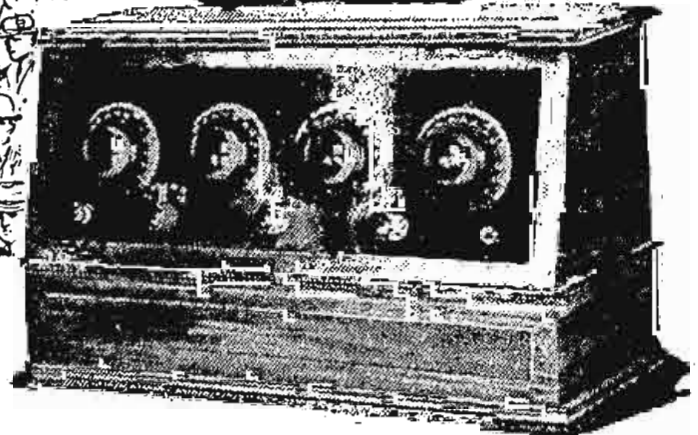


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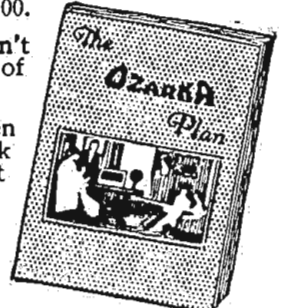
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# Batteries, Their Use, Abuse, Care and Upkeep

## Part III—Construction of a Storage B Battery

By William Fenwick

**T**O OBTAIN maximum economy, the Radio enthusiast should adhere to these few simple rules:

Use the lowest A and B battery voltages which will give the results you want, and also as few tubes as possible, for each extra tube multiplies the current drain on the batteries.

Use a grid, or C battery on the audio-frequency amplifier.

As current is flowing in the circuit as

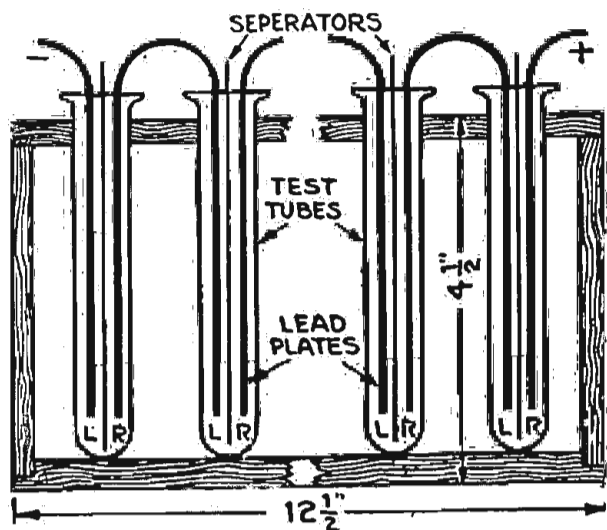


Figure 5

long as the filament is lit, it should be turned off as soon as the operator has stopped listening. By doing this it saves the A and B batteries, and the filament of the vacuum tube as well.

Remember that dry batteries deteriorate when left in a hot or damp place; that they should be kept well ventilated; that laying them on their side will shorten their life considerably; that an individual B battery should be used in the Radio frequency, detector and audio frequency circuits.

To measure the voltage of a B battery, you should purchase a high resistance voltmeter. Because of its low resistance, the ordinary pocket voltmeter drains quite a heavy current from the battery and the readings secured are inaccurate. The voltmeter should have a resistance of at least 50 ohms per volt; e. g., if the instrument is designed to measure up to 30 volts, its resistance should be at least 1,500 ohms.

Even if a B battery has become exhausted, a part of it is still useful. All cells never go dead at once, so it is quite possible to make use of some. To do so, remove the covering that encloses the cells, disconnect them with a pair of wire cutters, and test each separately, throwing away the defective ones and keeping the active. They may be put to a number of uses, such as stepping-up another battery a few volts, or forming a C battery by connecting 4 or more in series, etc. Many more ways in which they can be utilized can be thought of by the thrifty Radiophan.

### Construction of a Storage B Battery

The disadvantages of the dry cell type of B battery are quite numerous. One faulty cell in its makeup will produce a goodly amount of "noises;" it is also impossible to get at the particular cell without first tearing the battery to pieces. Neither does the voltage remain constant; it falls off slowly until nearly exhausted, then decreases very rapidly. Whereas with the storage battery most of the drawbacks experienced with dry cells are overcome. Again a wet B battery is much more economical than a dry one, although it probably is not as convenient. The reason they are not very popular is because they are seldom described and consequently the Radio enthusiast thinks that they are far too complicated for him to construct. In reality a storage

B battery is quite simple in its operation and construction, as well as in caring for it.

Although it is only a few months since the writer has changed from dry to wet

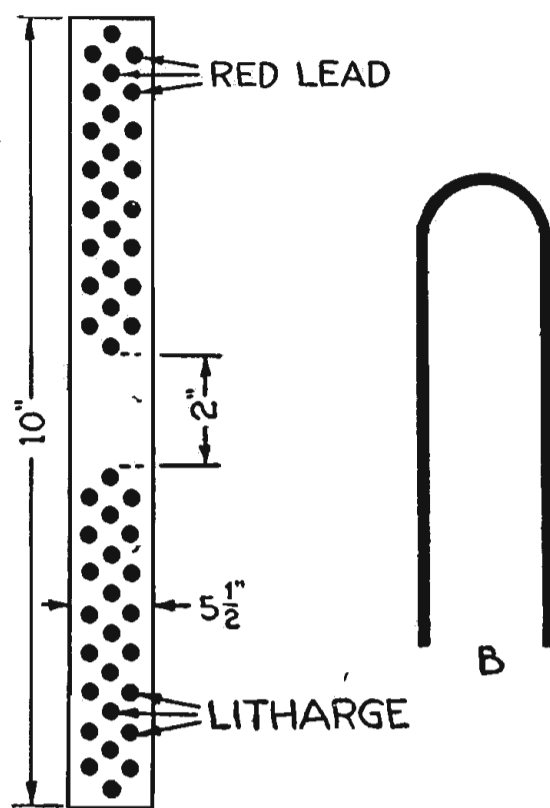


Figure 6

B batteries, the latter have given first rate service right along. The cost will be found extremely low compared with those

at present on the market, for it does not exceed that of the common 45-volt dry battery.

The materials you will need to make a 48-volt storage B battery are: 2 dozen soft glass test tubes, 5 inches long, 3/4 inch in diameter; 2 dozen strips of lead, 10 inches long, 5/8 inch wide, 1/16 inch thick; 1 wooden test tube rack, size to hold 24 test tubes 2 pounds pure red lead; 2 pounds pure litharge (lead monoxide); 2 dozen hard rubber, glass, or celluloid separators, size to fit test tubes and a quantity of sulphuric acid and distilled water.

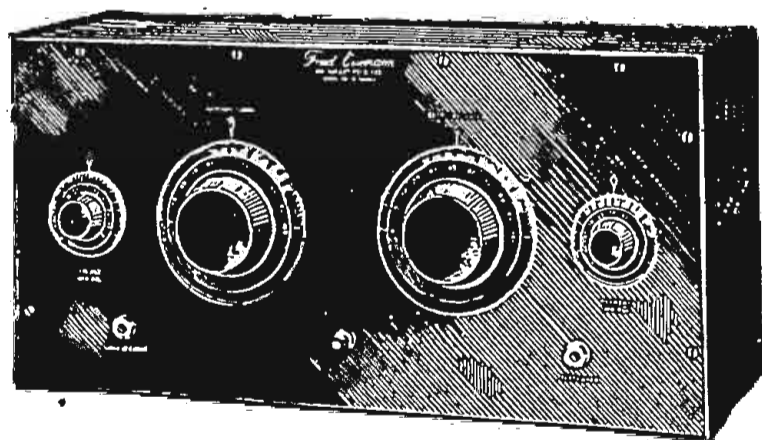
Dimensions of the test tube rack are: Base, 12 3/8 inches by 4 7/8 inches by 1/2 inch; top, same length and width, and 1/4 inch thick; and two end pieces, each 4 inches by 4 7/8 inches by 1/4 inch. Figure 5 illustrates its assembly. The top contains 24 3/8-inch holes. These are arranged in three rows of eight and each holds a test tube. A small portion of the base should be scooped out directly beneath each hole so that the tubes may be held firmly in place.

The battery plates consist of lead cut in strips 10 inches by 3/4 inch by 1/16 inch. Each plate has a number of small holes punched in it; a space of 2 inches should be left untouched at the center, though. See Figure 6. That holes can be punched at a machine shop, by hand with a twist drill, or even with a hammer and a large nail. Of course the first method is the best.

Next, the plates have to be "pasted." This consists of filling the holes at one end of the plates with red lead, and those

(Continued on page 30)

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## AT THE SHOW

The following article taken from the Sept. 23rd issue of the Camden (N. J.) Post-Telegram shows what their Radio Editor thinks of

With many new makes of vacuum tubes appearing on the market, the radio listeners have requested information concerning them, their operation and qualities.

It is proposed here to cover the tube situation from time to time as new developments are made and the article today covers the new Goode Two-O-One A, quarter ampere detector and amplifier.

These tubes are manufactured by the Goode Tube Corporation of Owensboro, Ky., and our tests and experiments with them show them to be extraordinarily fine for amplification.

The filament is rated at five volts to operate on the standard six-volt battery. The current consumption is .25 amperes and the plate voltage recommended is from 20 to 120.

In the tests we loaded these tubes with 230 volts on the plate with no indication of choking.

By rheostat action, the burn-out point of the filament was measured on one tube. Nineteen volts were applied before the filament snapped. This is an indication of long tube life.

The Goode tube is constructed with a standard base to fit the standard sockets.

As a detector the operation is smooth, the tube working best with a grid leak of from two to five megohms. A higher resistance gives better results on weak signals, but makes the operation slightly more critical.

Negative grid biasing with this tube as with all others, gives more satisfactory results.

For a plate voltage of 60, the negative bias from the "C" battery should be from 1.5 to 3 volts. For 120 volts on the plate the negative bias should be from 6 to 9 volts.

It is encouraging from the viewpoint of the fans to realize that several reliable tubes are appearing on the market. It eventually will mean lower prices and a plentiful supply.

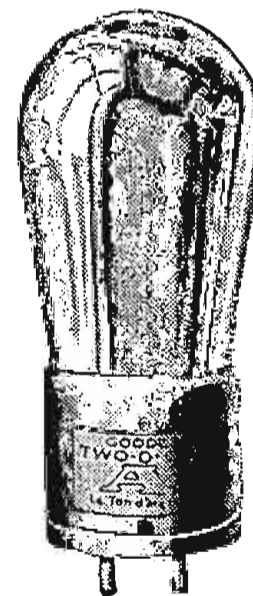
Everyone remembers with some feeling the tube situation of last winter when tubes were difficult to get, due undoubtedly to the absence of competition in the tube market and the efforts of manufacturers to uphold what undoubtedly was an exorbitant price.

With the appearance of other tubes on the market, including the "Goode Two-O-One A," the standard price already has dropped a dollar and the season promises no further shortage of a supply of good tubes for the fans.

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**CARE OF BATTERIES**

(Continued from page 29)

at the opposite end with litharge. Before either of these powders can be used, they have to be made into a paste. This is done by mixing them, separately with slightly diluted sulphuric acid until they are of about the same consistency as putty. When handling sulphuric acid, the builder should always exercise the utmost care, for it is poisonous and corrosive. In diluting the acid, it must be slowly added to the water; never under any condition do it the reverse way.

The paste of red lead is tightly packed

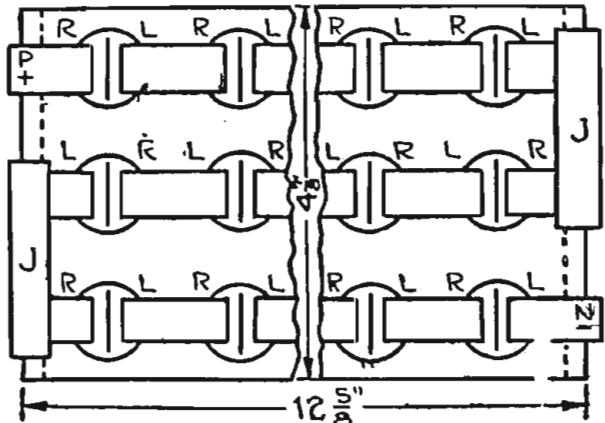


Figure 7

into the holes at one end of all plates, and the litharge paste into the remaining holes at the other end. It is advisable to place the plates on a smooth, level surface, such as glass, when pasting them, and force as much paste as possible into the holes, using a manicurist's orange stick. The plates are then bent into the shape in Figure 6B.

Now is when the main difficulty arises in building this kind of battery. It is almost next to impossible to prevent the paste from falling out of a few holes. To overcome this, many recommend the battery being charged as soon as the plates have been pasted; others prefer letting the plates dry first. The writer let his stand for about four days with good results.

Separators are inserted in each test tube so that the plates can not come together and cause a short circuit. These may be made of hard rubber, glass, celluloid, fruit-basket wood (that has been boiled in paraffin) or any other insulating material that is not affected by the electrolyte. Excellent separators can also be made from moving picture film, that has had

the chemicals removed from its surface by soaking in hot water, and cut into strips around 7 inches long. The details of how the test tubes, plates, and separators are mounted, is clearly shown in Figure 5.

Each test tube is filled to within an inch from the top with an electrolyte of a 20 percent solution of sulphuric acid and pure distilled water. Remember the water only in the solution evaporates, the acid does not; merely add distilled water but never acid as the action of a storage B, battery is identical to that of a storage A battery, both should receive about the same attention.

A top view of the battery is in Figure 7. L indicates the litharge ends, and R the red lead ends of the plates; J are the lead jumpers which make connection between each row and the one preceding. On plates marked P and N, binding posts can be mounted instead of soldering wires to them, as it is more convenient when connecting or disconnecting it. Terminals can also be mounted on the ends of each row of test tubes if a variable voltage is desired. Each cell gives two volts, thus 24 will produce 48 volts.

A sediment will gather at the bottom of each test tube in the course of time and should be removed before it piles up high enough to touch the plates or they will be short circuited.

**The B Battery Charger**

In Figure 8 is the electrical wiring dia-

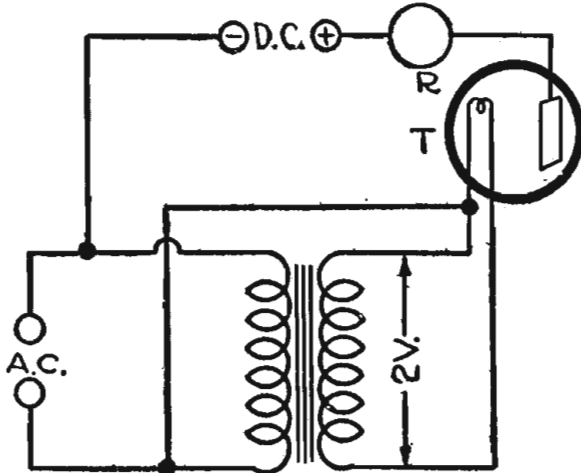


Figure 8

gram of the charger. This is of the gram type and employs a tungar bulb (marked T) for rectifying. R is a 40-watt tungsten lamp. A. C. are the alternating current terminals, and D. C., the direct current terminals. Use the same care when con-

(Continued on page 32)

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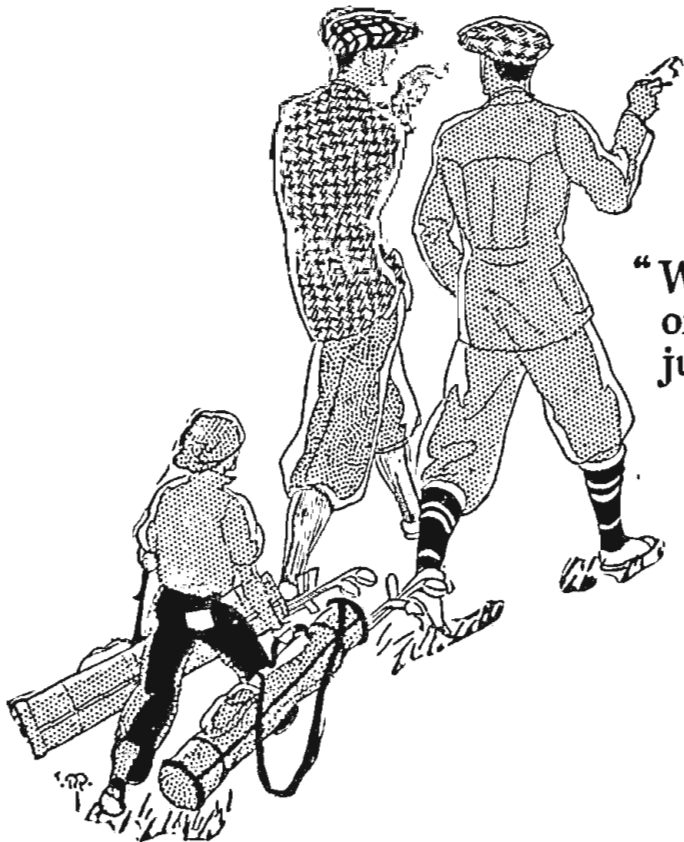
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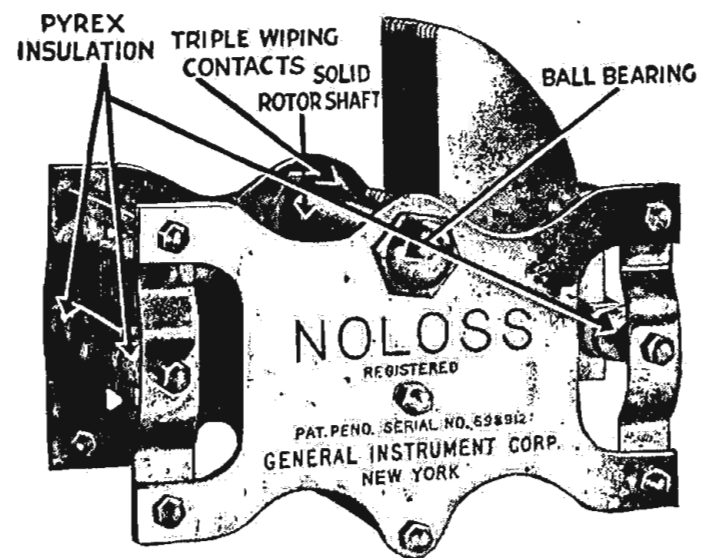
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# Helpful Hints to Get the Most from Radio

## Chapter IX—Use of Jacks and Switches in a Set

By Thomas W. Benson

**I**N THIS series of articles set operation will be told in so simple a manner that the uninitiated can follow instructions and get the most out of reception, whether or not he knows anything about electricity or its application to broadcasting and reception. The series consists of thirteen chapters, of which the four next will be:

- Chapter X—Amplifying the Signals.
- Chapter XI—Care of Radio Batteries.
- Chapter XII—Telephones and Loud Speakers.
- Chapter XIII—Hints on Tuning.

**W**HEN it becomes necessary or desirable to connect exterior apparatus to a set it is customary to employ jacks and plugs for the purpose. These permit of, rapidly shifting from head phones to loud talker or vice versa. Likewise a loop aerial or an outdoor aerial may be plugged in as desired. In practically all cases the jacks and plugs are handling the entire input or output energy as the case may be and any defect in the jacks or plugs will result in decreased efficiency.

Since the installation of jacks adds to the wiring in the set the best practice is to eliminate them wherever possible. The effect of the extra wiring may introduce parasitic feedbacks that produce oscillations or distortion or may lead to capacity losses.

There are three defects often found in jacks, the capacity loss between the springs, poor connections between jack springs and plug or at the jack contacts and leakage through the insulation between the springs. The fact that a capacity of appreciable value exists between the springs of a jack makes their use in Radio frequency stages of transformer coupling practically impossible. This refers of course to the older and still most common form of jack shown in Figure 21.

The newer types known as anti-capacity jacks have a lower capacity but even

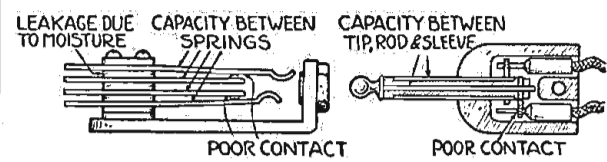


Figure 21—Showing causes of losses in plugs or jacks.

they should not be used to switch in and out Radio frequency amplifiers. The only other application of a jack and plug where the capacity present need enter into consideration is their use for plugging in the loop aerial.

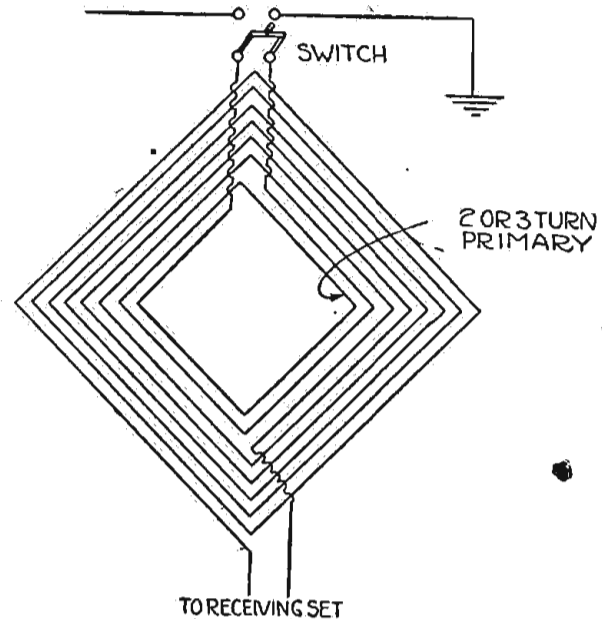


Figure 22—Using loop as secondary of untuned primary coupler to eliminate jacks to change from outdoor to loop aerial.

The effect of using a plug and jack to plug in a loop aerial is to shunt a small capacity across the tuning condenser. The condenser formed in the plug particularly has high losses because of the dielectric present and affects the sharp-

ness of the tuning as well as dissipating some energy. Since the amount of energy picked up by a loop is minute these losses although small in themselves represent the loss of sufficient energy to limit the range of a receiver.

The use of anti-capacity jacks may reduce the capacity but the plug is the most serious offender. The better method is to use binding posts to connect the loop to a receiver. When it is desirable to use both loop and outdoor aerial as conditions warrant, the best arrangement is to connect the loop aerial to the tuning condenser and have two or three turns of wire on the loop form that can be connected to the outdoor aerial. Thus the loop always forms the tuning inductance while the outdoor aerial is connected in as desired by clipping it onto the extra turns on the loop which form an untuned primary or switching it in as shown in Figure 22.

### Use for Plugging in Phones

Since the capacity of the jacks and plugs is small it will have little effect upon the lower frequency currents found in audio frequency amplifiers and their use for plugging in phones or talker is permissible without loss from capacity effects. The question of leakage and poor contacts becomes important. Leakage in a jack may be due to inferior insulation or more often careless soldering of connections to the jack terminals. A jack insulated with fiber strips may work perfectly under certain conditions but the fiber may absorb moisture and thus form a conducting path between the springs. When soldering, the flux may splatter from the hot iron or if too much is used, flow over the strips and partially short the jack. Both these causes of leakage can be eliminated by the use of a jack requiring no soldering and that is insulated with bakelite.

A leaky jack usually causes a scratchy or frying noise in the receivers with a decrease in signal strength. Any losses from leakage would have a greater effect in lowering the efficiency of a set where

the jack is used to plug in the aerial. This is but another reason for their elimination in the aerial circuit.

Poor contact in a jack may result from dirty or corroded contacts or from weak springs. The best of jacks may develop these defects after continued use but they can be readily cleaned up with a little fine sandpaper. Since the cost of the best jacks and plugs on the market is but little more than the inferior types it is poor economy to buy the cheapest. Use as few jacks as possible and use only the best having bakelite insulation, heavy contacts and stiff springs.

### Control Jacks

So far no mention has been made of filament control jacks. They are used but little by the home builder and are

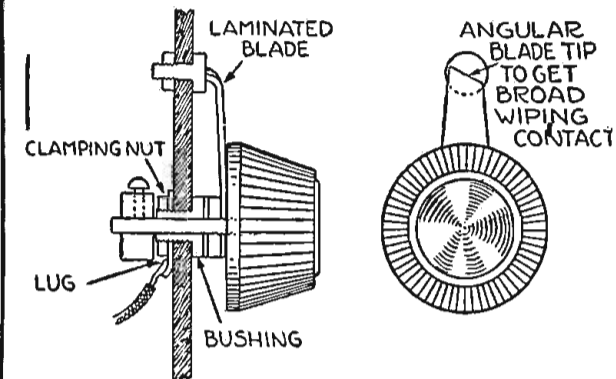


Figure 23—Cross section of an efficient switch.

found mostly on the manufactured sets. They add a touch of refinement and are entirely satisfactory if they meet the requirements of a good jack in all other respects.

It is extremely important that all jacks in the audio stages be connected alike, that is, the spring making contact with the tip of the plug should be connected to the positive of the B battery. The phones are then connected into the plugs with the marked cord going to the tip of the jack. If this method of connect-

(Continued on page 36)



## STRAIGHT-LINE .0003 CONDENSER

\$3.50

If your dealer cannot supply you, send us his name, \$3.50 plus postage for each condenser and we will fill your order direct



**Straight Line:** Specially shaped plates give "straight-line" tuning relations between dial settings and wave lengths.

**Low Loss:** A special patented design and ingeniously contrived provision for insulation assure extremely low loss.

**Brass Plates:** Brass plates, carefully designed and made, give good contacts and high conductivity.

**Grounded Rotor:** Positive ground is absolutely provided by a pigtail.

**Pigtails:** Objectionable tuning noises due to moving frictional contacts between rotor and frame are eliminated by permanent ground through pigtail.

**Ball Bearings:** A non-sticking, easy turning dial-shaft mounted on ball bearings.

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**Capacity Range:** The design gives great capacity range from .000013 MF minimum to .0003 MF maximum.

**Price:** Extraordinary economies due to design make all these features possible at this low price—

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**EXHAUSTIVE** tests prove "Pyrex" lowest loss insulating material for R. F. C. yet presented, excepting quartz. It is strong, heat resisting and free from surface condensation. Pyrex sockets exclusively controlled by Garod Corp.

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ATWATER KENT Radio is the modern "magic wishing ring." By a simple turn of the dials, you can summon to your fireside, concerts, operas, lectures, sermons, educational courses; market, weather and special reports. ATWATER KENT Radio makes you master of the

world's wealth of music, news and knowledge.

ATWATER KENT craftsmen, guided by the experience of skilled engineers, have fashioned the finest materials that money can buy into ATWATER KENT Radio. You will find it combines every feature that means radio satisfaction—unusual selectivity, sensitiveness, distance, volume and tonal quality. Any ATWATER KENT dealer will gladly help in the selection of your receiving set and loud speaker. Instructive literature on request.

ATWATER KENT MANUFACTURING CO., 4749 Wissahickon Ave., Philadelphia, Pa.

THINK OF WHAT IS BACK OF IT



**CARE OF BATTERIES**

(Continued from page 30)  
 necting the B battery for charging as for the A battery; viz., make sure the connections of the battery and charger are positive to positive and negative to negative. The battery should only require about 10 to 15 minutes for charging after the first few times, but these may take quite a few hours. After several charges, the positive plates should turn chocolate brown color and the negative plates, a lead grey.

When this sort of battery is properly constructed and looked after, it will last for years. Moreover it gives equal, or even better service than dry cells.

**The C Battery**

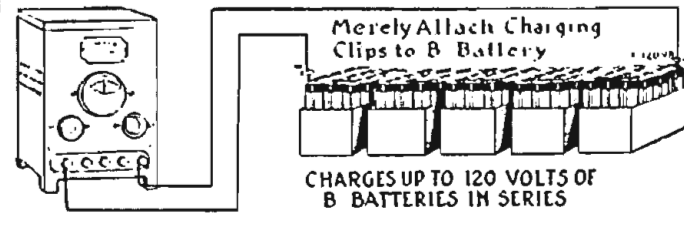
It is fairly well known among beginners that the grid of a vacuum tube in an audio frequency amplifier should never be

allowed to become positive. If it does, it results in distorted signals. This is on account of the grid being the balancing and controlling element in the tube. As a preventive measure, the grid is so connected that it will receive a potential of from 5 to 1.5 volts.

The best way to impress a higher voltage on the grid is by means of a C battery. These are usually sold in 4½-volt units with taps at 1½, 3, and 4½ volts. They are placed in the circuit by connecting the negative side to the secondary of the amplifying transformer, and the positive directly to the negative of the A battery. For plate voltages ranging from 45 to 130 volts, the grid bias can be anywhere between 1½ and 9 volts. The correct voltage can only be found by a test.

(THE END.)

← FRANCE WAY



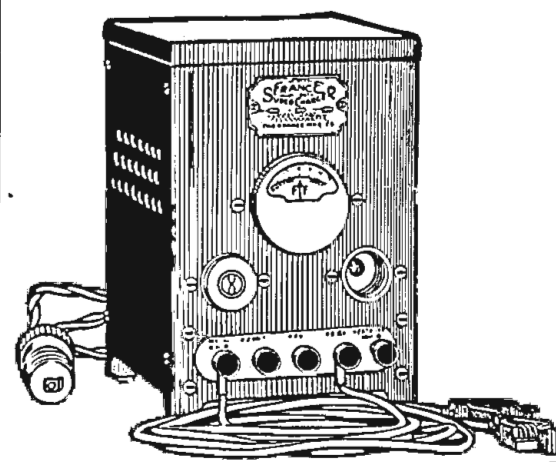
Merely Attach Charging Clips to B Battery

CHARGES UP TO 120 VOLTS OF B BATTERIES IN SERIES

Simple - No Trouble - Quick - Convenient

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Volts of "B"  
Battery  
IN SERIES**

**THE SILENT FRANCE MULTI-DUTY SUPER-CHARGER**



can be easily and quickly charged with the France Multi-Duty Super-Charger. No troublesome wire changing—just leave your batteries wired in series, attach clips, insert ordinary lamp to regulate charging rate and turn on current. Simple—Quick and Convenient.

Two, Four, Six and Eight volt Radio "A" or Auto batteries can also be charged at a 5 to 7 ampere rate.

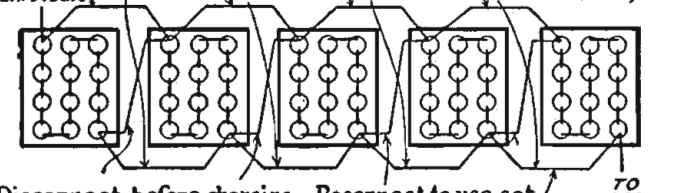
The France Super-Charger is truly the highest attainment in battery chargers. No bulbs or acids, no noise, no sticking or sparking contacts—it embodies every desirable feature.

Price \$22.00; West of Rockies, \$23.00  
 Canada—\$30.80 F. O. B. Toronto

Dealers and Jobbers—Now is the time to tie up with France and increase your profits. Write us today for discounts and details.

This is the Nuisance of Charging 2 to 5  
24 Volt "B" Storage Batteries with ordinary Charger.

TO CHARGER / Add these Jumper Wires before each charge / Take off after



Disconnect before charging - Reconnect to use set / TO CHARGER

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Stocks carried at convenient points throughout the United States and Canada.

THE OLD WAY →

*Hansen "BIRD-CAGE" Radios*



**NIGHTINGALE RADIO**

**4 Tube Radio Set \$32.50**

Without Accessories



**NIGHTINGALE RADIO**

A simplified, loud speaking, long range set at a price within the reach of all. It is a wonderfully good set in spite of its low price.

Hansen BOBOLINK. 2 Tube Reflex..... **\$25.00**

The Very Latest Radio Map, 28"x34", with an Up-to-Date List of Broadcasting Stations Sent Upon Receipt of 10c for Mailing and Packing.



**Hansen BLUE BIRD.**  
 4 Tube Radio Frequency..... **\$57.50**

The Blue Bird with one stage of tuned Radio frequency has great selectivity and wonderful distance. It is easily worth twice its price.



**AMERICAN CREST.** This we believe to be the best high grade 6-tube loop set on the market today..... **\$150.00**

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DURESTO**

**Does Not Warp!**



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Insist on Bakelite, for the best that money can buy. Your dealer can furnish standard sizes from stock, special sizes to order. Individually packed in envelopes under Spaulding label—your guarantee of quality. For a sign of quality apparatus, look for Spaulding Bakelite panels in each set you buy.

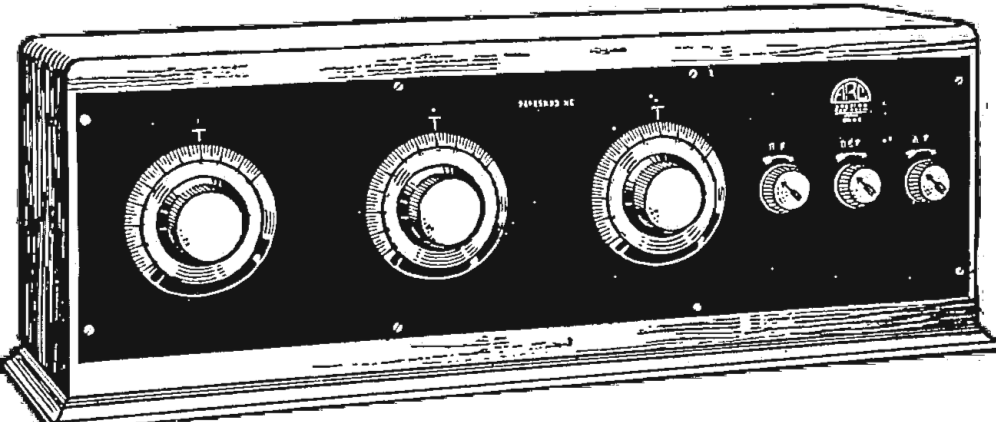
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**Radio Receiving Set**  
 —the first set to combine selectivity and  
 tone quality with distance and volume

Hitherto in buying a radio set you have had to choose between one with high selectivity and fine tone quality and one with great distance and volume. Up to this time both groups of qualities could not be found in one set.

Now the Andrews Deresnadyne 5-tube Radio Receiving Set, using the new and exclusive principle of the Deresonated and Balanced

Plate Circuit, for the first time successfully combines these absolute essentials of fine Broadcast Receiving. Mr. Robert J. Casey, head of the Chicago Daily News Laboratory, says about it: "The circuit combines selectivity, range and quality in a degree that will astonish the old experimenter." Hear the Deresnadyne at your dealer's. Or write to us for a complete description.

Price **\$150** without accessories

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# Simple Homemade Selective Receiver

## Hook-Up That Pulls in Distance and Volume

If there is any reader of the Radio Digest that wants to build a cheap, simple but a very selective set, here's one that is worth your time trying. The parts

### WORKSHOP KINKS EARN A DOLLAR—

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

RADIO KINKS DEPARTMENT  
Radio Digest,  
510 North Dearborn, St., Chicago

used for tuning are two 23-plate variable condensers and at present I am using a 180 degree variocoupler, with a winding of 100 turns and 10 taps. Of course any coupler may be used. The switch arm across the aerial condenser is to cut it out or in as desired.

The loop shown in the diagram is not absolutely necessary but I have found that it works best with it. I have used both WD-11 and 12 tubes and both worked equally well. I have been using from 30 to 40 volts on the plate, 22½ will work very well. After the set is wired up it should start delivering the goods but if it doesn't work go all over the set carefully with the diagram.

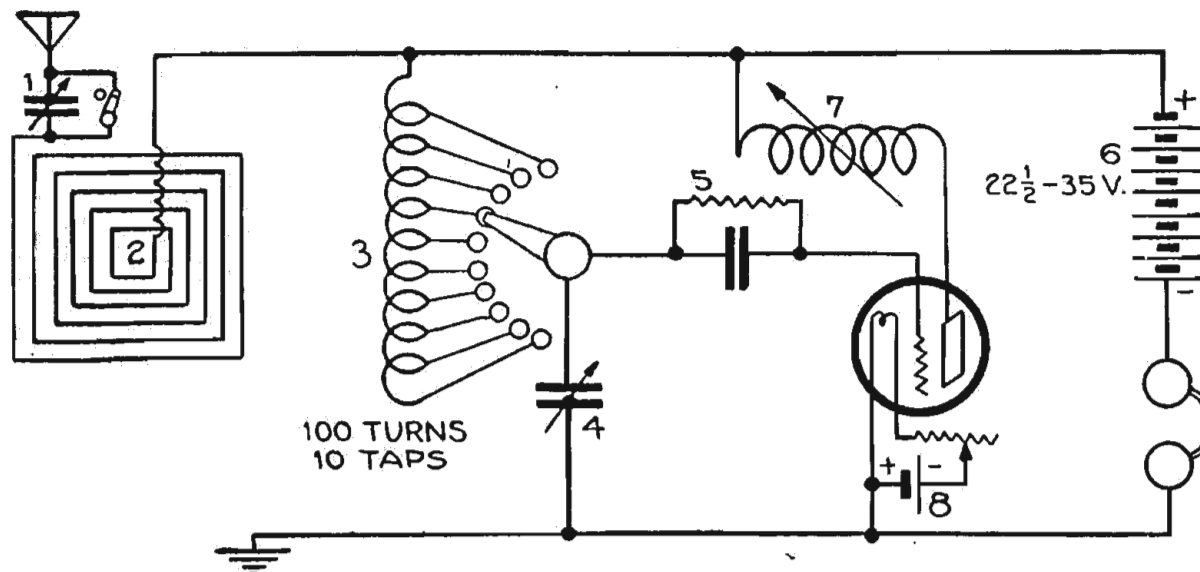
I have been getting very good results, picking up KGO, Oakland and KDKA, East Pittsburgh, and several northern stations come regularly with wonderful volume. I have a small Murdock loud speaker and have gotten KFKX, WFAA, WHB, WBAP and WMC on it with one tube. The local stations are easily tuned out although they come in with a roar.

The diagram is self explanatory and very simple to hook-up. This is a very good little set and it will certainly bring stations in clear and loud if properly built and properly operated.—George Ross, Houston, Texas.

### Wire for Spider Web Coils

Double silk covered wire is preferable for spider web and bank wound coils, as it affords satisfactory insulation, and also a saving in space. Double cotton covered wire is also satisfactory, but it requires slightly more space.

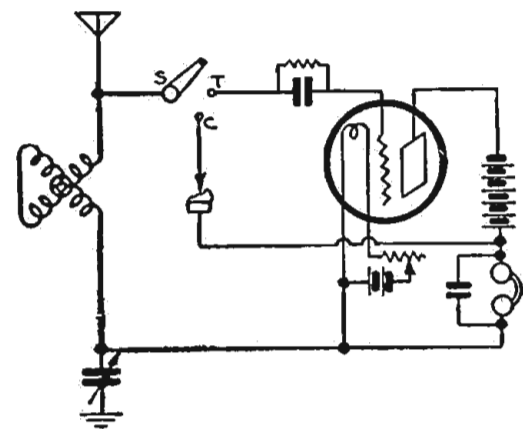
## LOOP USED WITH OUTSIDE AERIAL



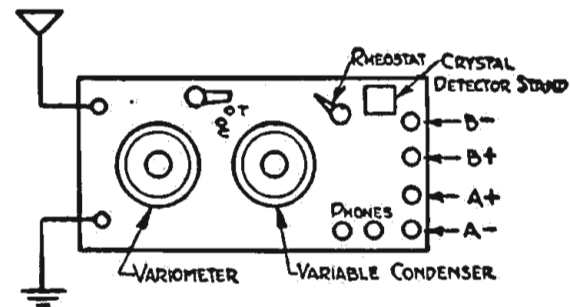
1 is 23-plate variable condenser, 2 is loop aerial, 3 is 100 turn on stator, 4 is 23-plate variable condenser, 5 is grid leak and .005 condenser, 6 is B battery 22½-35 volts, 7 is rotor of variocoupler and 8 is dry cell.

### Crysto-Tube Set

Reception from local broadcasting stations is in most cases obtained with sufficient volume on a crystal set. However,



to receive distant stations with any regularity, a tube set is necessary. A simple set combining the advantages of both a tube and crystal set can be constructed of a few parts, and can be so connected that reception on either one of the two detectors can be accomplished by a single



The hook-up of this "crysto-tube" set

is given herein, showing the position of the switches in the circuit. The letter T shows the contact point for the tube operation and C the contact point for the crystal circuit. The panel layout is shown in the second illustration.—George F. Liuppold, Washington, D. C.

### Lamp Cord Aerial

When you have electric lights in your home twist a length of single cord around the table lamp cord for 5 to 8 feet, or whatever the length may be, leaving one end open, the other end goes to the aerial post of the receiving set.

I have an aerial outside that is 175 feet long including the lead in, but the short length of wire around the electric light wire gives as good results as the outside aerial.—Chas. E. Green, Worcester, Mass.

### Short Aerials Best

Very long aerials will not bring in loud signals from broadcasting stations. Aerials over 150 feet in length make tuning more difficult, give weaker signals and bring in more static. More than one wire will not increase the effectiveness of your aerial, except in the case of exceedingly short ones—say 20 feet in length.

### Use Arresters for Safety

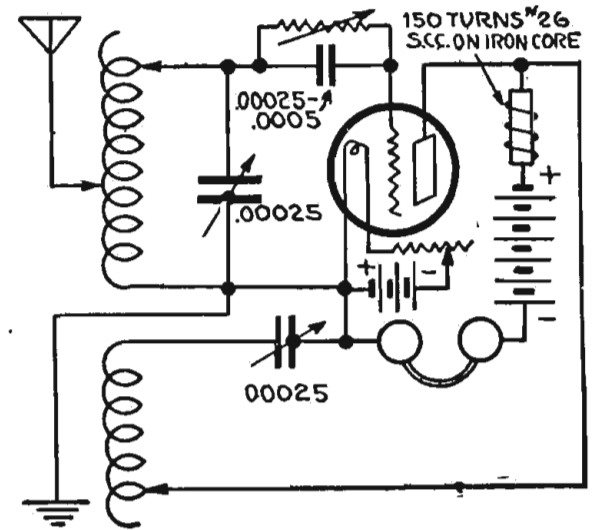
A radio aerial is not so much of a fire hazard as it is sometimes reported to be. This is not meant to indicate that lightning arresters are not worth while for protection of the Radio apparatus, however. If you have a good protector the house and instruments are as safe as if you did not have a Radio at all.

## Reinartz Coil Based on Old Weagant Circuit

Some time ago there appeared in Radio Digest a Reinartz hook-up by C. T. Hanavan and I have tried this circuit with good results, but with the tickler coil placed as shown in the accompanying diagram I obtained much better results. This arrangement is based on the original Weagant circuit.

This hook-up gave louder and greater distance signals than the straight tickler coil arrangement of the Reinartz circuit. The greatest improvement was in the ease with which the set could be controlled once the proper size of tickler coil was found.

The only trouble that was experienced in building the set using this circuit was to find the correct size of the tickler coil. The exact number of turns on this coil must be found by experimentation, as it varies with the design of the set. But in most cases it will be found necessary



to have more turns on the tickler than is generally used on the straight Reinartz set. Do not give up on the first tryout because the set will work and it will be well worth the effort used in experimenting with the tickler coil.—Earl T. Denton, West Chester, Pa.

### Proper Tools Necessary

When building a receiver use tools that are designed for that purpose. Don't buy a pick ax and sledge hammer and think that you are going to build an efficient set. Several sizes of screwdrivers are usually necessary, and purchase a pair of long-nosed pliers to use when working around the corners in your wiring. If you purchase a soldering iron don't buy a big, heavy, cumbersome iron, but purchase one that is thin, which will enable you to reach into the corners to solder your connections. Handle your receiver with care when putting it together, as it is a delicate piece of apparatus.

## Make Your Selection Carefully

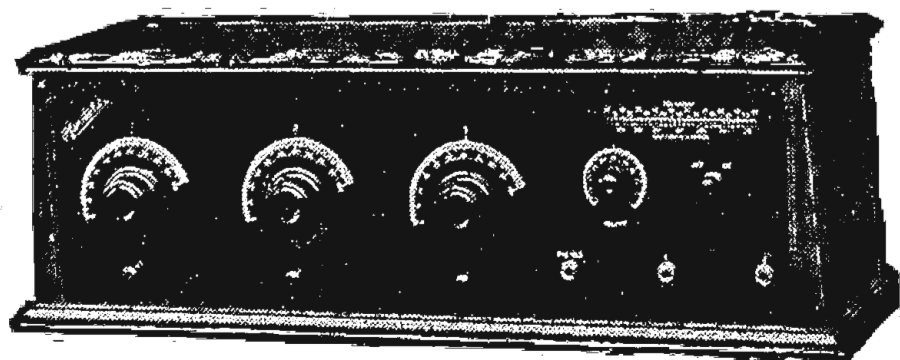
from among only a few of the better receivers. Consider among these the Pfanstiehl Model 7 receiver. You will always appreciate the suggestion.

1. Matchless reproduction
2. Extreme selectivity
3. Unusual simplicity
4. Simplest tuning

made possible by the Pfanstiehl Station Selector.

Your dealer will be pleased to demonstrate these features.

**Pfanstiehl**  
Model 7  
Receiver



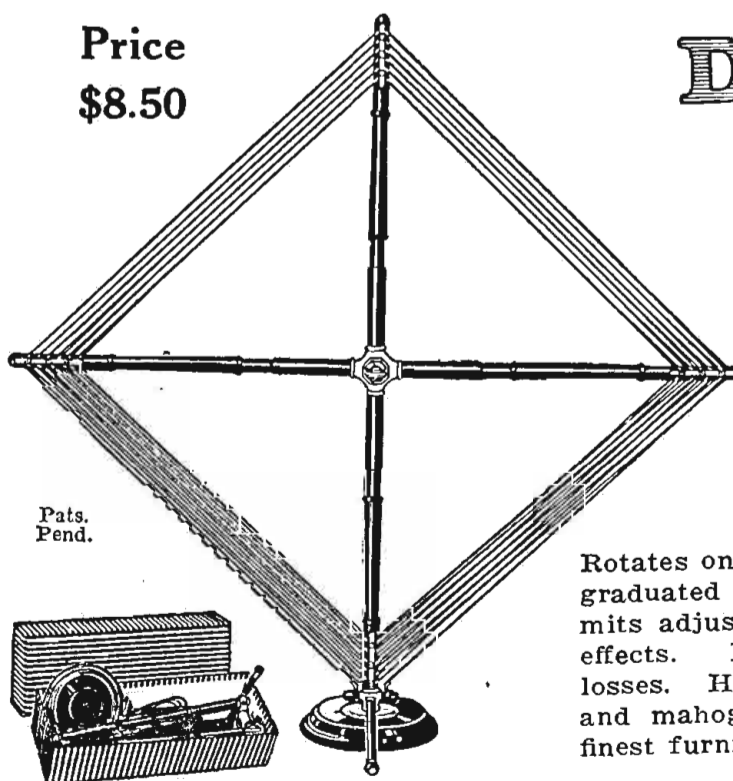
PFANSTIEHL RADIO CO.

Highland Park

Illinois

Price  
\$8.50

## Duo-Spiral Folding Loop



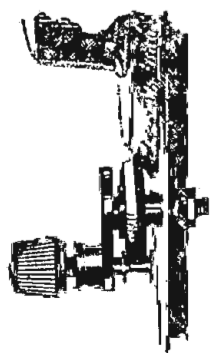
A finer loop for those who want the best in radio equipment. Noted for its handsome appearance and superior performance. Increases selectivity. Reduces static. Easily portable. The most convenient aerial for permanent installations or portable sets.

Rotates on base which has silvered dial graduated for calibration. Handle permits adjustment without body capacity effects. Direct connection prevents losses. Handsomely finished in silver and mahogany to harmonize with the finest furniture. Can be used anywhere.

## Tiny-Turn Vernier Control

Will help you bring in the distant stations. Has a gear ratio of 30 to 1. Rotates in same direction as dials. Can be disengaged, leaving dials free. Easy to install. Fits any standard panel. Handsome nickel and ebony black finish.

It pays to buy proven products. If your dealer cannot supply DUO-SPIRAL and TINY-TURN, write direct.



Price 75 Cts.

Radio Units Inc.

1306 First Avenue

Perkins Electric Ltd., Montreal

Maywood, Illinois

**SUPER-HETERODYNE**

(Continued from page 21)

wave length, and falls off rapidly on each side of this point. This point is known as the "peak efficiency," and since we naturally want all the strengthening possible, our filter coupler is designed to pass this wave length and we mix the incoming with the oscillator frequency to produce it.

In order to separate the audio frequency component of our energy from the Radio frequency currents, a detector is necessary, so the signals are passed from the last Radio frequency amplifier stage through one of the long wave transformers into a vacuum tube equipped with grid leak and grid condenser and operated to rectify and detect instead of amplify. Since the Radiocast energy has been so tremendously increased by our three long wave Radio frequency amplifiers, it enters and leaves the detector so strong that only one stage of amplification at audible frequencies is necessary. This single tube is coupled to the detector by an audio frequency transformer in the usual way now familiar to most fans.

**Two Tuning Controls**

On the panel then, we require only two tuning controls, the variable condensers and two subsidiary controls but seldom touched, the potentiometer and rheostat. Considerably better selectivity will result if variable condensers of the low-loss type are used, with metal end plates and small strips of insulating material supporting the stator. Within the set we need seven tubes, namely, the first detector or "mixer," the oscillator, three amplifying at Radio frequencies, a second detector and one amplifier at audio frequencies. Due to the necessity of matching, certain parts of super-heterodynes are sold as a kit, which usually includes an oscillator coupler, a filter coupler and three long wave transformers. There may be other incidentals included such as large capacity condensers; if so, they need not be purchased separately. These kits may be designed to pass a wave length of 2,300 meters, 3,500 meters, 4,600 meters, 6,100 meters, 8,300 meters and even 10,000 meters. Any of these kits are suitable for this super and may be used. The oscillator coupler may not look like that in the drawing, but this point makes no difference as many very excellent couplers are entirely enclosed and do not have a variable rotor as did this one. Too much stress cannot be laid on the use of highest quality, mica dielectric fixed condensers, as the writer has found that these condensers are second only to the matching of transformers in importance.

**Panel and Baseboard Layout**

Laying out the apparatus on panel and baseboard is the first thing to be done. It is most advisable to lay out everything on paper first and use the paper layouts as templates for center punching and drilling. The panel layout shown in Figure 1 should be made full size with the center holes indicated. Condensers and potentiometers and rheostats are usually provided with templates for the mounting holes, so these smaller templates are pasted on the sheet of paper with shaft center holes carefully placed over the centers indicated in Figure 1. Shielding has not been found necessary in this set, so there are no shield holes to worry the constructor. A similar procedure is followed with the baseboard; only center holes are shown in the baseboard layout. The builder can easily place the parts on the paper layout and determine the exact points for mounting screws. It will be well worth while to

exercise some care in choosing a baseboard; pick one that is absolutely flat to begin with and made of a wood that you know is not so likely to warp. Half-inch veneer, made of thin laminations, can be obtained at any lumber yard, and while harder to put screws into will always look well and stay flat.

Some slight shifting of parts may be necessary due to the difference in sizes of different makes of apparatus. For example, the transformers may be considerably larger than those used in the set built by the writer, and the tube sockets may all have to be moved forward half an inch or so. Similarly, if a large C battery is to be used, it may suit the builder to move the audio frequency transformer and the .00025 mfd. condenser slightly to the right, which may be done without affecting the working of the set in any way. However, the fan will find a full size drawing in the next article with center holes marked, a decided help as a starting point, and will probably be able to follow it exactly.

(Wiring a super-heterodyne, that is John G. Ryan's model, is as easy as hooking up a crystal set. Part II of Mr. Ryan's series will instruct you in the wiring.—Editor's Note.)

**LOW LOSS—WHAT IS IT?**

(Continued from page 20)

The piece of apparatus which should certainly receive attention in the very near future with a view to cutting down distributed capacity is the loop antenna. While one can secure a fair degree of selectivity by the use of a low loss condenser across a loop aerial and also because of the directional effect of the loop, still the selectivity leaves a lot to be desired. There seems no reason why a loop antenna could not be developed along the lines of a honeycomb coil on a large scale, or similar in design to a spider web coil. Other forms of winding will doubtless occur to experimenters in the very near future, and when loop antennas even but 10 per cent higher in efficiency make their appearance it will be a real advance in Radio reception. The present types of loop aerial have been in use for several years and it is to be hoped that the same amount of attention will soon be given them that has been given variable condensers.

(Build your own "low loss" inductances. Mr. Fournier will tell you how in his next article of this series.—Editor's Note.)

**HOW TO OPERATE SET**

(Continued from page 15)

a sensitizer and controls the state of sensitivity of the entire circuit. If the adjustment happens to be out too far the station will be tuned with a whistle. Under this condition it will be necessary to turn it in very slowly to a point where the whistle just disappears. Then by readjusting the dials 1, 2 and 3 slightly the proper quality and volume will be reached. Some times it is necessary after adjusting the dials the second time to turn the sensitizer back out just a trifle to procure the proper amount of volume.

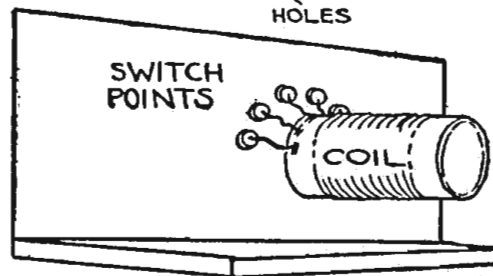
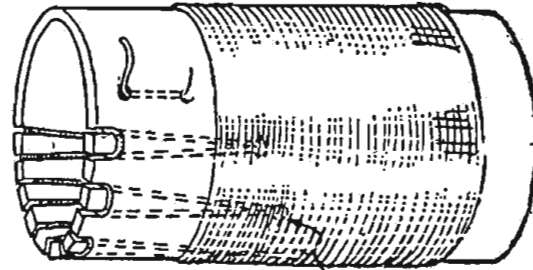
If the operator has tuned Radio frequency sets before, it has probably been noticed that the set is much more efficient over the range of from 0-50 on the dials than it is from 50-100 on the dials. This condition is overcome by the use of the sensitizer, number 6, on the Ranger Five. It will be noted that on the lower dial range the sensitizer must be turned fairly well in and on the upper ranges of the dial best results will be had when the sensitizer is practically all

of the way out. The ideal condition in handling the sensitizer is to just reach the point where the dials can be brought in to exact resonance while tuning a station without getting a whistle.

In leaving the set it is only necessary to withdraw the plug from the jack. This action cuts off both the A and B battery supply and makes it unnecessary to turn off the rheostats and also saves a great deal of time when again using the set in locating the proper rheostat positions. When the set has been unused for some time it is only necessary to plug into the proper jack and allow one or two minutes for the tubes and rheostats to warm up.

**Accessible Taps on Coils**

Notch one end of the tube and run the wire through holes in the tube and out

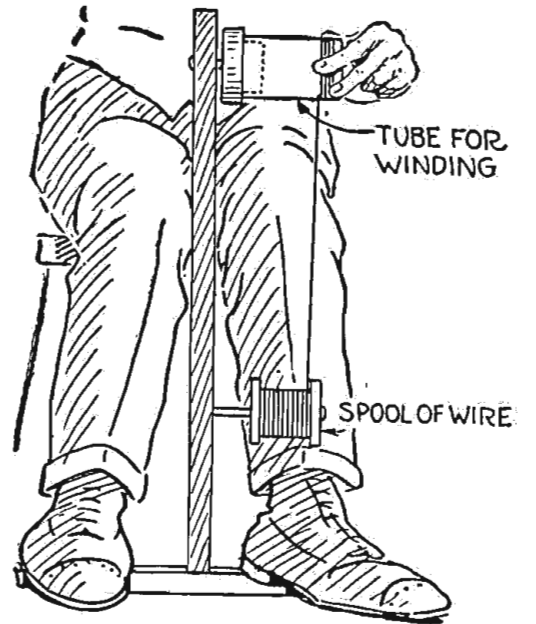


over the tongues formed by the notches then contacts can be easily made and soldered. Connections are especially handy

if the tube is mounted with tapped end against the panel.—D. J. Metzinger, Blair, Nebr.

**Homemade Coil Winder**

In the absence of a lathe, winding of inductances on bakelite or cardboard tubes is greatly facilitated by mounting both

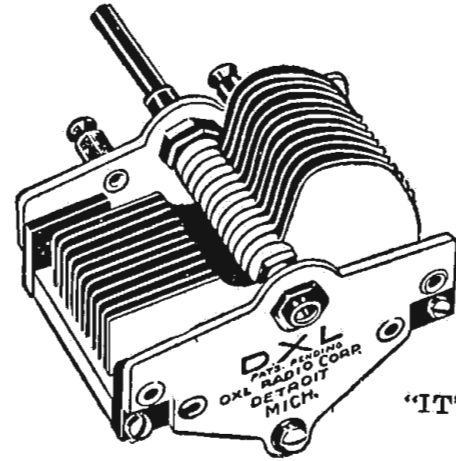


tube and wire spool on a small stick of wood so that the hands are free to guide the windings and to rotate the tube. A head or cap to retain the tube may be obtained from any drug store. It should correspond, in size, to the tube used. Both spool and head are fastened to the board with a small nail. Another larger nail is driven through the bottom and with both feet resting on the projecting ends and the knees fixing the upper end, straight or bank winding is an easy matter.—H. T. Fredeaven, San Mateo, Calif.

**"The Choice of The Critical"**

Opinions do not answer, facts do. . . . That is why you cannot afford to borrow the jaundiced ideas of your neighbor when choosing your condenser.

Buy a D. X. L. and save being disappointed. This condenser is a straight-line-low-loss type designed especially for super-heterodyne and all super sensitive sets. With grounded rotor plates of brass construction and aluminum end plates. Body capacity entirely eliminated. Approved by the University of Michigan and found absolutely accurate with the U. S. Bureau of Standards.



**PRICES:**

11 Plate.....	\$4.00
17 Plate.....	4.25
23 Plate.....	4.50
43 Plate.....	5.00

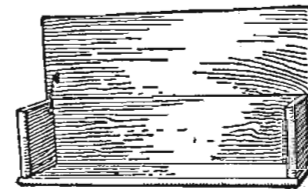
"IT'S A D. X. L."

WRITE FOR FOLDER

If Your Dealer Can't Supply We Will Furnish Direct  
Send Money Order



Manufactured by  
**D. X. L. RADIO CORPORATION**  
5769 STANTON AVENUE  
DETROIT, MICH.



**NEAT FIT K. D. CABINETS**

Made in a variety of sizes, sold knocked down, easily set up. Holes bored for every screw. No other cabinets offer such unusual values.

Panel 7x 9" 7" deep	\$1.80
Panel 7x12" 7" deep	2.00
Panel 7x14" 7" deep	2.25
Panel 7x16" 7" deep	2.30
Panel 7x18" 7" deep	2.40
Panel 7x21" 7" deep	2.50
Panel 7x24" 7" deep	2.60
Panel 7x26" 7" deep	2.70
Panel 7x28" 7" deep	2.80

Other sizes carried in stock. Prices on request.

**M-B-G RADIO CABINETS**



\$3.50

Table No. 31—Substantial table 15"x31"x29". Packed 1 each in carton.

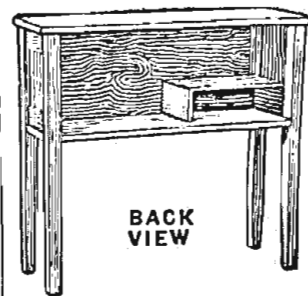
Away with the mussy Radio set! House it neatly in a M-B-G Radio Cabinet. The best value to be found. Large ones—small ones—a variety of styles. All made of Oregon Fir. Selected for its perfect grain. They are protecting thousands of home-made sets the country over. Radio fans are quick to sense their unusual value.

**Order To-day**

Choose your style—from the display at your radio dealer—or if you wish send direct to us. We will send it to you promptly. FREE with every cabinet comes complete and fascinating instruction on how to stain to harmonize with any color scheme or furniture. You finish M-B-G Cabinets to suit your taste—that makes them especially convenient.

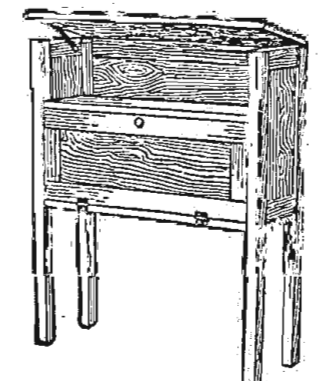
**EVERY M-B-G RADIO CABINET IS GUARANTEED TO GIVE SATISFACTION OR MONEY WILL BE CHEERFULLY REFUNDED.**

**EXPRESS BODY CORPORATION**  
Radio Cabinet Dept.  
43 Lake St., Crystal Lake, Ill.



BACK VIEW

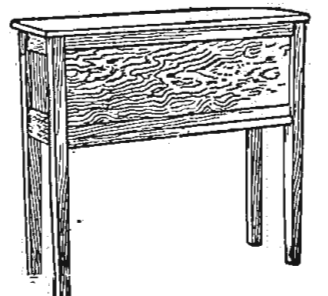
**CABINET No. 29**  
Battery compartment 10"x11"x29". Open back with shelf compartment for B battery. Paneled front to conceal batteries. Overall measurements 11 1/2"x 32"x29". Set up complete in carton, \$7.50. Furnished with panel door same as door on No. 37, extra, \$3.00.



**CABINET No. 37**  
Exceptional design—compartment 10"x11"x29" for batteries, etc., and shelf for instruments 7"x11"x29"—overall measurement 11 1/2"x 32"x37". Set up, complete, packed in carton \$11.50

Additional door makes shelf in front of panel when open, extra, \$3.00.

Sizes to fit Atwater Kent Sets as follows: Five-Tube, Two-door Console, panel size, 8"x30"; depth, 10 1/2"; battery comp. 10"x11"x30"; \$17.50. Six-Tube, panel size, 8"x36"; depth, 10 1/2"; battery comp. 10"x11"x36"; \$20.50



**ROYALTY**  
VARIABLE HIGH RESISTANCES  
VARIABLE GRID LEAKS

WIRE WOUND

**Revolutionary**

ROYALTY Variable High Resistances and the ROYALTY Variable Grid Leaks represent the greatest improvements ever made in this field. They are wirewound!

This wire winding eliminates at one stroke all the common grid leak and resistance troubles. The lever arm cannot scrape away the resistance element. The grid leak and the high resistance are noiseless and positively non-inductive. The resistance value is retained indefinitely.

Your dealer has the ROYALTY Variable High Resistance (type B, 1,500 to 100,000 ohms;—type C, 500 to 50,000 ohms) and ROYALTY Variable Grid Leak (type A, 100,000 to 7,000,000 ohms).

**FREE**—Write for the ROYALTY Hook-Up Booklet.

All Types—\$1.50

**WIRELESS PRODUCTS CORPORATION**  
136 Prince Street, New York City

# Questions and Answers

**Street Car Interference**  
(07078) RAP, Springfield, Ohio.

I would like you to give me a little advice on the subject of interference from street cars. Here is the question, which I would like to have you publish in your paper: I am situated close to a street car line which passes by the front of the house and turns the corner a few doors away and continues on down a side street. My aerial is a single wire, inverted L-type on about a 45 degree angle with both trolley wires on front and side streets, and is located about 70 feet from the front trolley line. When the street car approaches within 2 or 3 blocks of either side of my house, I get a continued roar in the phones or horn until the car has reached about 7 blocks from the house before the station comes back again. At times I can hear the hum of the motors when no cars are in sight, a sound increasing in pitch as the car gains speed.

I have a Reinartz set built from one of your book of specifications. A friend of mine who has a neutrodyne, a few doors south of me has the same trouble with the street cars interfering. We both get excellent results though after 12:00 midnight when the cars stop running, often picking up many DX stations. Can you suggest a method to partially overcome this interference or will one of the wave traps you recently described help in any way?

What types of sets will re-radiate, thus bothering others in the immediate vicinity, or is the single circuit regenerative the only one that will do it?

A.—We are advising in your inquiry that interference of the nature to which you are subjected is very difficult to overcome. The only measure we can suggest

to minimize the disturbances encountered from cars running in your vicinity is a counterpoise in place of the usual ground. The single circuit regenerative set is not the only offender. A great many other circuits may be made to oscillate.

**Push Pull Amplifier**  
(9176) JMH, Salix, Iowa.

When using the "Push-Pull" amplification is a separate B battery necessary or can the same battery that is supplying detector and audio tubes be used?

Will UV-199 tubes function as push-pull amplifiers and what B battery voltage will be necessary?

A.—A common B battery will serve for detector and push-pull amplifier stages. UV-199 tubes may be employed with fair results in consideration of their current consumption and will require probably 90 volts maximum, which is their limit. If volume is a consideration we would recommend that results afforded with the 6-volt tubes will far exceed those of the former.

**\$6.75 for a Radio Table**

The price is low because we ship "knocked down."

No longer do you have to utilize the dining room table, or the sewing machine cabinet as a place to keep your radio set. The radio table illustrated is a real piece of furniture, beautifully finished in hand-rubbed mahogany; legs fitted with "domes of silence." The top measures 16x28 inches; the table is 31 inches high. Comes by parcel post, knocked down; a pair of pillars is the only tool needed to assemble. Send no money; we'll ship the table and you pay the postman. This table is guaranteed to satisfy you—or money will be refunded. Our new booklet shows and describes many other styles of radio tables.

**RADIO FURNITURE COMPANY**  
5400 EMERSON AV. SAINT LOUIS

**AIRIA**  
The Superior

**Radio Crystal**  
For Reflex and Crystal Sets

Your radio set, crystal or reflex, is worthy a high quality crystal to produce proper reception. We offer a very superior radio crystal, loud, clear tone, long range and very sensitive.

**AIRIA CRYSTAL** not an experiment. On the market two years. An established radio product. Individually tested and guaranteed. Purchase price refunded if not satisfactory. For reflex set we offer the

**Reflex Special Airia Crystal**

A perfect crystal for Reflex Sets. Battery currents will not impair the quality. A big asset to any Radio Set. All crystals are mounted in Nickel cups.

**DEALERS AND JOBBERS WANTED**  
SEND FOR PRICE LIST

If not introduced by your dealer send for sample at once.

For Crystal Set 35c, or 4 for \$1.00  
For Reflex Set \$1.00 Each  
Postage Prepaid

**AIRIA CRYSTAL CO.**  
1402 7th Ave. Moline, Ill.

**ROBERTS UNITS**  
(Trade Mark)

The Wonder Circuit of the Year

Combining Neutralization—Regeneration—Reflex Developed by Walter Van B. Roberts, E.E., Ph.D. Editorially Endorsed by Radio Broadcast, as Without Doubt The Best We Have Ever Seen. California Actually Heard at Princeton University On The Loud Speaker, WITH TWO TUBES.

ROBERTS UNITS consist of Five Coils in Two Mountings Ready for Installation. Packed complete with all instructions, Hook-up, Schematic Print, Cut of Complete Set, etc.

**\$8.00**

**Build a Roberts and Reach the Coast**  
Coils Mfg. under Zig-Zag Pat. Aug. 21, 1923

**ROBERTS KIT** (Complete Kit of High-Grade Parts for the Roberts Two Tube Knockout Set)

Genuine Bakelite Panel, completely drilled. General Radio Condensers, F. M. C. Transformer, Sockets, Condensers, Genuine Roberts Units, Baseboard, Dials, Knobs, Busbar, Spagetti!—Everything, except Tubes, Batteries, Cabinet.

**\$60** with Portena Folding (Loop for Local Use)  
**\$53** Without Loop

**J. NAZELEY COMPANY, Dept. C**  
571 Hudson Street (Sole Mfgs.) NEW YORK

**FREE A MILLION RADIOS**

To Quickly and Thoroughly Introduce a New Wonder Crystal Direct to Users and to Dealers

**Aero-Master CRYSTAL**

At last—the perfect detector and rectifier for Crystal and Reflex sets. Superior to "fixed" detectors for every "hot spot" permitting adjustment at will. Puts new "pep" into your set. Guaranteed one year. Send one dollar, money or currency and set together with Aero Master Crystal will be sent postpaid.

**DEALERS**—Send for our special "Free" set proposition. It will attract "radio fans" to your store by the hundred. Serlin & Co., big radio dealers in Detroit, sold over 600 on one Saturday.

**CONTINENTAL SALES AGCY., 507 Hodges Bldg., Detroit**

**\$1.00**

**DIETZEN Adjustable LOUD SPEAKER**

At the Price of an Ordinary Pair of Head Phones

**DEALERS: write for details**

**SEND NO MONEY!**

**ORDER BY MAIL**  
If your dealer cannot supply you we will ship you a complete **DIETZEN JR-65** speaker ready for use. Written money back guarantee with each loud speaker.

**COMPLETE** with specially built **DIETZEN** adjustable loud speaker unit and plug.

**TYPE JR-65 \$6**  
PLUS A FEW CENTS POSTAGE

**NOT a Head Set Unit**

**FREE!** **DIETZEN RADIO LOG BOOK** WRITE FOR YOURS!

**DIETZEN INC.**  
71 Cortlandt St. Dept. D. New York

MAKERS OF PRECISION INSTRUMENTS SINCE 1889

**SPECIAL FEATURES**

- Absolute non-metallic sound. Permanent Crystallized finish.
- No batteries necessary.
- Specially constructed adjustable unit with gold plated diaphragm.
- Unconditionally guaranteed for one year from date of purchase against mechanical defects of any kind.

**SPECIFICATIONS:**  
Diameter of Horn—9 INCHES  
Height—17 INCHES

**GUARANTEE**  
Your money back at any time within 10 days after purchase if not as represented.

**U.S. TOOL CONDENSERS**  
TRADE MARK

**100% GUARANTEED**

Exhibiting Complete Line—Section N  
**CHICAGO RADIO EXPOSITION**

Sold by All Reliable Jobbers and Dealers  
**U. S. TOOL COMPANY, INC.**  
122 Mechanic Street Newark, N. J.

**FROST-RADIO**

Ask Your Neighbor

**FROST-RADIO No. 140 2-FONE PLUG.**  
Holds two pairs fone cord tips. Neat, sturdy, efficient. **60c**

**FROST-RADIO PAN-TAB JACKS.** A type for every circuit. Panel or table mounting. Superb quality. **70c to \$1.00**

A LINE of radio apparatus built with the same precision methods used in fine watch-making awaits your inspection at your neighborhood dealer's. The name **FROST-RADIO** distinguishes this from other apparatus which often costs you more money, yet offers you no greater value.

**FROST-RADIO** Plugs and Jacks are famous for their correct design and satisfactory operation. Other items, including **FROST-FONES**, are of the same high quality.

Thousands of dependable dealers throughout the United States and Canada carry **FROST-RADIO** in stock. See your neighborhood dealer today for what you need with your receiving set.

**HERBERT H. FROST, INC.**  
154 West Lake Street, Chicago, Ill.  
New York Cleveland Kansas City Los Angeles

### GET MOST FROM RADIO

(Continued from page 19)  
ing is not followed the current is reversed through the phones in one of the jacks with the danger of weakening the permanent magnets in the receivers  
The same general rule applies to switches as to jacks. Keep them out of the tuning and amplifying circuits wherever possible. It is usual to include a filament switch but as mentioned previously it is bad practice to suddenly apply full voltage on the cold filament of the tube. Where a switch is used it will pay to turn the tubes off and on with the rheostats and use the switch only to make sure the circuit is open. The filament switch should be connected into the positive leg of the circuit to which the B battery negative is connected so it simultaneously opens both A and B battery circuits.

#### Tap Switches

Tap switches are used very little in the modern tube sets but for those who wish to employ them a few pointers on what makes a good switch will be given. First of all the switch lever should turn in a bushing and have a slotted spring washer to keep it hearing snugly on the bushing. A lug for soldering is a necessity which clamps under the nut holding the bushing in the panel. The blade should be laminated and resilient enough to bear well on the contact points but not so stiff that the blades cut into the contacts. The end of the blade should be bent at an angle as shown in Figure 23 so a good wiping contact is obtained. Such a switch with the leads to the contact points soldered, will introduce very little resistance into the circuit.

Simplicity should be the aim when selecting switches for a Radio set and for that reason the use of complicated switches intended to control audio stages by rotating a knob and similar devices should be avoided.

(Amplifying the signals will be the next topic treated upon by Mr. Benson in his series. You will learn how and why stages of frequency brings up audible sounds and make volume for a set.—Editor's Note.)

### We Want Agents to sell RADIO SETS and Supplies

(Part or Whole Time)  
Standard, well advertised merchandise—the kind everybody knows and wants. Make handsome profits representing us. \$5 a day easy in spare time. \$10 to \$20 a day made by many. Buy parts wholesale, sell them at retail. Assemble sets and sell at big profits—or sell our complete sets. Charon of Waukegan, picked off

**Big Pay!**  
**\$50.00**  
A Week Up!  
Widener of Kansas City has averaged \$50.00 a week selling radio sets and parts to city and farmer trade. You can do as well—or better.  
**OUTFIT FREE!**

Makes \$75 to \$150 a week regularly. Begin by selling in spare time. Others do as well and better. Establish yourself in the radio business. No investment required. Write for agency in your locality.

**OUTFIT FREE**  
Address Mail Order Division, Sect. 24

### WAVELAND Radio Co., Inc., 1027 N. State, Chicago

### Make Your Radio Joy A Sure Thing

The quickest way to spend \$20 is to accidentally make a short circuit in a five-tube set. Zip, and your money is gone as well as your fun—until the radio store opens.  
Either style of KANT-BLO means protection against blowing out tubes.

### Kant-Blo SWITCH SIGNAL BLOWING POST


**Lights on any Short Circuit**  
The KANT-BLO is not an extra accessory to your set. It is designed as a B battery filament Switch Style—are at all the best radio stores. If your dealer is out of stock send us \$2 for a KANT-BLO Binding Post Style, or \$3 for the Switch Style, and we will ship any number of KANT-BLOS direct to you, charges prepaid.

Manufactured by GANIO-KRAMER CO., Inc. New York  
Sole Distributors APEX RADIC CO. 503B Fifth Ave. New York

### Sets for Use on Loops

Sets designed for use on an outdoor antenna do not ordinarily work on a loop antenna. To get good results out of a loop antenna, a set should be used that is designed especially for this purpose. Such a receiver contains from one to three or more stages of Radio frequency amplification. For loud-speaker operation at least four or five tubes should be used, unless the receiver is of the reflex variety in which the tubes do double duty.

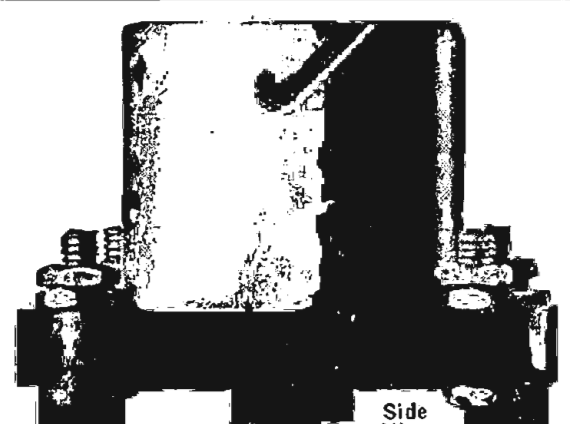
### Radio Dealers HEADQUARTERS



**EIGHT BIG WAREHOUSES TO SERVE YOU**

**DEALERS**  
Write on your letterhead for this big catalog. Ask for A1003

**WAKEM & McLAUGHLIN**  
225 E. ILLINOIS ST. — CHICAGO



**KEYSTONE (Quality) SOCKETS**

Will improve your receiving set, because of the following eight important points of superior construction:

- 1—Low Dielectric losses
- 2—Wiping contacts
- 3—Heavy bronze contact springs
- 4—Contact springs heavily plated and will not corrode
- 5—Genuine bakelite base
- 6—Aluminum shell, improved locking device
- 7—Takes up small space
- 8—Unconditionally guaranteed

**PRICE 90 CENTS**  
If your dealer cannot supply you, send order direct with remittance and dealer's name, we will ship prepaid.

**KEYSTONE RADIO COMPANY**  
Manufacturers of V. T. Sockets, Rheostats, Inductance switches and Keystone Wandertone 5-tube sets  
**GREENVILLE, PENN.**  
JOBBER  
Some territory still open. Your inquiries solicited.

### Dealers Need This



**200% Profit**

**The new FAHNESTOCK Display Case**  
Will stimulate your sales of Fahnestock Radio Products. 14 of the most popular styles and sizes are included. Shows the purchaser instantly the correct piece for his set. A constant invitation to buy Fahnestock Products. Dealers are offered 200% profit on each case, an unusual offer on standard merchandise.

**Price to Dealer.....\$17.50**  
**West of Mississippi..... 18.50**  
**Transportation prepaid when money order or check accompanies order.**  
**Contents Retail for \$51.50**

Refills will be supplied at the regular 100 lot prices, shown in catalogue, which comes with case, less discount shown on enclosed sheet. Send check or money order, today.

**FAHNESTOCK ELEC. CO.**  
LONG ISLAND CITY NEW YORK

### MIDWEST ECONOMIC INSTITUTE

Room 917, Postal Telegraph Bldg.  
332 South La Salle St.  
CHICAGO

### Stock and Grain Markets Forecasts

Weekly Financial Letter Points the Way Toward Successful Investments

**RATES**  
\$60 Per Year — or Three Months' Trial, \$15 in Advance

### STAR-ITE THE STAR-ITE CRYSTAL

Because many people have had good results with the STAR-ITE CRYSTAL used as a detector with non-regenerative tube sets, we have had a great many letters from radio folks who seem to be of the impression that this is the—as yet unperfected—OSCILLATING CRYSTAL, of which so much has been said in the radio press.

We have secured oscillation with crystals in a laboratory fashion, but would not attempt to sell the STAR-ITE to take the place of amplifying tubes.

We do say that the STAR-ITE is the absolute pinnacle of perfection as a crystal to be used in a REFLEX Set, or a CRYSTAL Set, and as a detector in many non-regenerative tube sets, and are glad to support our belief by making it extremely easy to try one for yourself.

As this crystal is a new one put out by an old firm in the crystal business your dealer may not have it, but try to get him to order one for you, on our money back guarantee. If he does not wish to do so send us his name with a \$1.00 bill at our risk, and we will send you one with the understanding that you may return it, and we will refund you the \$1.00 at any time within 30 days. Gold Cat Whisker in Each Package

**Star Crystal Co**  
147N 525 Woodward Avenue  
DETROIT - MICHIGAN

### EXAMINE these two achievements at the Chicago Radio Show in the Coliseum—Booth 22, Section AA.



**APEX VERNIER DIAL**

Do not bother with geared condensers, requiring many holes in the panel and careful lineup of pinion shafts, when this marvelous instrument provides the fine adjustment for tuning in distant stations. Radio 10 to 1—quickly applied to any shaft. For sale by all good radio dealers. If unable to obtain, fill in coupon and enclose \$2.50 for nickel finish or \$3.50 for Gold Plated finish.



**Coast To Coast On An 18-Inch Loop**  
Assemble Your Own 7 Tube Super-Heterodyne —on a 7 x 18 panel in three hours, \$97.50 buys the parts complete, including drilled and engraved panels, condensers, sockets, transformers, dials, connecting plugs, cables, etc., with drawings, diagrams and instructions. Price of cabinets to fit—furnished on application. If your dealer cannot supply these parts for this complete Microdyne Radio Set, fill in coupon, mail check or money order and send dealer's name.

Apex Electric Mfg. Co., Dept 1105-A, 1410 W. 59th Street, Chicago, Illinois.  
Gentlemen: Enclosed find \$..... for which send me  
Name .....  
Street .....  
City ..... State .....



**“Just Be Sure It's a Hammarlund”**

U. S. and Foreign Patents

1. Clock spring pig-tail
2. Ball bearing rotor shaft
3. Cut back plates for easy tuning on low waves.
4. Strongest construction
5. Losses too small to measure
6. Soldered brass plates
7. Micrometer vernier
8. Takes any size dial

### HAMMARLUND CONDENSER

Write for New and Interesting Folder  
**HAMMARLUND MFG. CO.**  
424-438 W. 33rd Street New York  
Chicago Distributors: HUDSON-ROSS  
Canadian Representatives: RADIO LIMITED, Montreal, Que.



**\$3.50 SPECIAL**

### INTRODUCTORY PRICE

For a limited time only, and to introduce this new and superior Storage “B” Radio Battery to the Public, we are selling it for \$3.50. Regular Retail Price is \$5.50. You save \$2.00 by ordering NOW. A finer battery cannot be built than the

### World Storage “B” Battery

(12 CELLS—24 VOLTS)

To ten million homes with Radio Sets—and to countless millions of prospective buyers—this WORLD Storage “B” Battery brings a new conception of battery economy and performance. Here is a battery that pays for itself in a few weeks—will last for years and can be recharged at a negligible cost. And you save \$2.00 by ordering now.

**A Superior Battery Equipped With**  
Has heavy duty 2 1/8 in. x 1 in. x 1-4 in. plates and plenty of acid circulation. Extra heavy glass jars allow ready observation of charge and prevent leakage and seepage of current. It holds its charge, while idler, at constant voltage. You will find this battery a boon to long distance reception. It does away with a great many needless so often blamed on “static.” Mail your order today.

**SEND NO MONEY**

Just state number of batteries wanted and we will ship day order is received. EXTRA OFFER: 4 batteries in series (96 volts), \$13.00. Pay Expressman after examining batteries, 5 per cent discount for cash in full with order. Send your order NOW and save \$2.00.

**WORLD BATTERY COMPANY**  
Makers of the famous World Radio “A” Storage Battery  
1219 S. Wabash Ave., Dept. 76 Chicago, Ill.  
**SAVE \$2.00 BY ORDERING NOW!**

### FREE To Each Purchaser of a World Battery

A 24-Volt “B” Storage Battery positively given FREE with each purchase of a WORLD “A” Storage Battery. The WORLD Battery is famous for its guaranteed quality and service. Backed by years of successful manufacture and thousands of satisfied users, you save 50%.

**Prices That Save and Satisfy**

Auto Batteries	Radio Batteries
6-Volt, 11 Plate \$12.25	6-Volt, 100 Amps. 12.50
6-Volt, 13 Plate 14.25	6-Volt, 120 Amps. 14.50
12-Volt, 7 Plate 17.00	6-Volt, 140 Amps. 16.00

Shipment Express C. O. D. subject to examination. 5 per cent discount for cash in full with order.

**2-Yr. Guarantee Bond in Writing With Each World Storage Battery**

proves satisfactory World performance. Mail this ad with your name and address—we will ship battery day order is received; and give you your choice of “B” Storage Battery or a handsome nickel finish Auto Spotlite, FREE. Write TODAY.

**WORLD BATTERY COMPANY**  
60 E. Roosevelt Road Dept. L, CHICAGO, ILL.

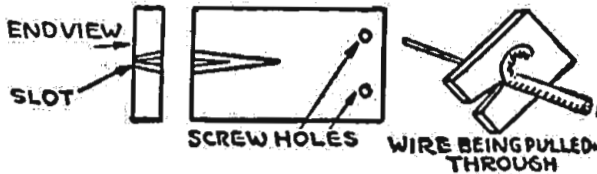
This FREE “B” Storage Battery takes the place of dry cell “B” batteries. Can be recharged and will last indefinitely. To be sold retail for \$6.00. It is the only battery of its kind equipped with solid rubber case—and insurance against acid and leakage. Take advantage of this remarkable introductory offer NOW. To those who prefer it, we will send FREE a handsome nickel finish Auto Spotlite, instead of the “B” Battery. Be sure to specify which is wanted.)

**GIVEN FREE**  
To introduce this new and superior World “B” Storage Battery to the Public

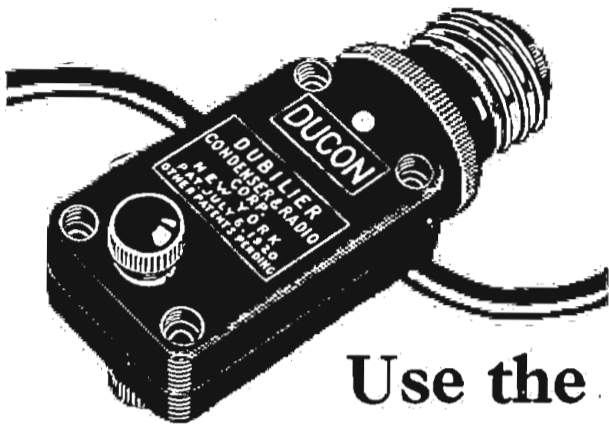


### Special Tool to Remove Insulation on Wires

To remove insulation from a wire cut a V-shaped notch with curved sides in the end of a flat bar as shown in the illustration. For practical purposes a



bar of steel 3 inches long, 1 1/2 inches wide and 1/4 inch thick will be required. Two holes are drilled below the apex of the slot for fastening the cutter to the



Use the **DUCON**

No antenna—just screw the Ducon into your electric light socket and tune in. A great saving in expense and labor—and great results with your set.

PRICE \$1.50

Sold on a 5 day trial basis by all reliable dealers

## Dubilier

CONDENSER AND RADIO CORPORATION

### Two tubes do the work of five

THE Shamrock-Harkness two-tube set that has this amazing pulling power is described in "Shamrock Radio Builder's Guide Book." Before building your set, send 10 cents for this wonderful booklet. It will save you money.

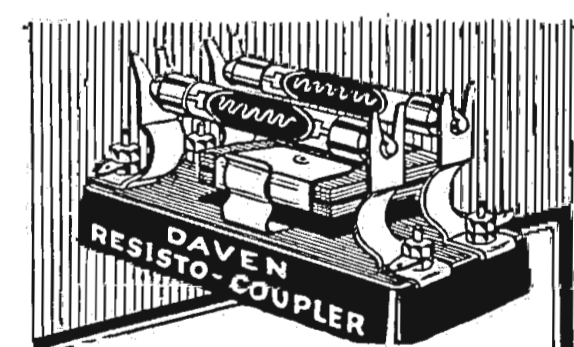
SHAMROCK MANUFACTURING CO. Dept. 27-B, Market St., Newark, N. J.

## SHAMROCK

FOR SELECTIVE TUNING

SHAMROCK MANUFACTURING CO. Dept. 27-B, Market St., Newark, N. J. I enclose 10 cents (U. S. Stamps or coin) for copy of "Shamrock Radio Builder's Guide Book," containing diagrams and complete instructions for building 10 sets at prices ranging from \$15 to \$50.

Name \_\_\_\_\_ Address \_\_\_\_\_ Dealer's Name \_\_\_\_\_



### Resistance Coupled Amplification

The Resisto-Coupler illustrated above is inserted in your set in the place of the ordinary transformer. It is less expensive to install and operate, gives auditive perfect amplification and wonderful volume. We recommend three steps of Resistance Coupling for most satisfactory service. Sold everywhere \$1.50

Read the Daven "RESISTOR MANUAL," by Zeh Bouck. A practical handbook on Resistance Coupled Amplification. At your dealers. PRICE 25 CENTS

**DAVEN RADIO** CORP. "Resistor Specialists" NEWARK NEW JERSEY

work bench. When an insulated wire is pressed in the slot the sharp edges cut to the wire and its covering is readily removed by a quick downward pull.—Allen Bartelt, Milwaukee, Wis.

### Check Trouble with Other Fans

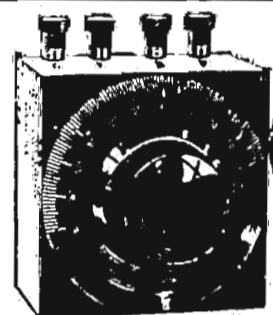
Because of changes in the conditions of the air between the broadcasting station and the receiving set, signals will

## EVEREADY Radio Batteries

—they last longer

Conspicuous for vitality and endurance—the right batteries by test and proof for every radio use.

NATIONAL CARBON CO., INC. Headquarters for Radio Battery Information New York San Francisco CANADIAN NATIONAL CARBON CO., LIMITED Factory and Offices: Toronto, Ontario



This tuning Unit has simplified Set building

It is in the mahogany block, in a genuine Cosmopolitan Phoniformer

The Cosmopolitan Phusiformer, which has won the Universal Praise of Radio Engineers,—enables you to start in with the small expense of a crystal or a one-tube set and to build, by degrees, a multi-tube set with as many stages of tuned R. F. as desired, simply by adding more tubes and Phusiformers. Radio sets that use Phusiformers as tuning units are free from oscillation, squeals and howls. Phusiformers are self-neutralizing, no extra condensers or coils are necessary to balance the capacity of the tubes. Build a Phusiformer tuned radio set and learn with what clarity and volume distant stations can be received.



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Here's what every radio fan has wanted—a convenient, permanent and authentic means of recording all stations heard over your set. The Ekko Album contains spaces for a stamp from each of more than 650 stations. These stamps are verified and prove your reception of the station.

Proof of Reception cards are furnished with the album. Send the card to the station, together with ten cents, to cover cost of verification, give facts which prove you have heard their broadcasting. In return they send you their verified stamp as evidence of actual reception. The stamps are beautifully engraved in different colors, an individual stamp for every station showing the call letters. The album is 9 1/2 x 11 inches, handsomely bound in a two color cover. It contains 96 pages, with spaces for stamps of all recognized stations arranged alphabetically by states and call letters. Also an alphabetical list of the official names and other interesting features of stations, as well as a convenient log.

See your dealer today, get a copy of the Ekko Album and start a collection of these stamps. You will find this a new and fascinating method of verifying the stations you hear. If your dealer cannot supply you, send direct on receipt of price. Money back if not satisfied.

Price \$1.75

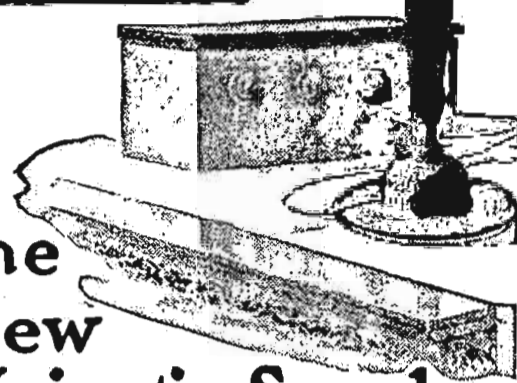
THE EKKO COMPANY 111 West Monroe Street, Chicago

sometimes come in of low audibility. When signals suddenly take a drop, it is a good plan to check the trouble by getting in touch with other Radio listeners before blaming it on the set.

### 10 Days FREE TRIAL

Only \$8.50

UNCONDITIONALLY GUARANTEED 1 YEAR



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The Last word in Radio Re-Creation

Embodies all proved principles of reproduction. Delicate shading, inflection and modulation of voice—this and the musical instrument re-created with remarkable volume and clarity of tone, with astounding purity and faithfulness, even when sending is weak. Floods room with best that's in your set. Horn acoustically perfect. No battery needed—simply plug in like headphones. Handsome crystalline finish horn approx. 22" high; heavy base prevents tipping. Polar indicating connecting cord included.

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Send direct—today—for your Majestic Speaker. Try it for ten days. Hear distant stations plainly. Test its clarity of tone and volume—no distortion, no harshness, no rattle, no blare or screech. Compare it with loud speakers selling for \$15 to \$25 and more. Then if you're not satisfied, simply return it at our expense and back goes your money. You—and you alone, are the judge. So mail your order today.

JAMES M. DAVIS CO. 30-A Euclid Arcade, Cleveland, Ohio Send a Majestic Speaker on your 10-day free trial offer. I enclose \$8.50. I reserve the right to return it at your expense within ten days if not satisfied and receive full refund of my money.

Name \_\_\_\_\_ Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_

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Clarity— Volume— Endurance— and Low Operating Cost! \$2.30



Our Type 501A identical with UV-201A Standard size—Detector and Amplifier (5 volts—18 Amps.)

The New York Testing Laboratories, famous the country over, after exhaustively testing the Claritron Tube and comparing it with a standard High Cost tube which retails for \$1.00, says that it not only "compares well in general," but that the operating cost of the Claritron is "lower on the average."

The Claritron is a safe tube to buy—it is absolutely guaranteed and backed by the exacting tests of experts.

The Claritron average current consumption is only .175 amp.—much lower than the standard quarter ampere tube. This is due to the remarkable new filament wire—the heart of the tube—developed by our engineers.

SATISFACTION GUARANTEED OR MONEY REFUNDED—AND THE PRICE IS ONLY \$2.30

ALL TYPES TUBES—(same price)—Sent by Parcel Post C. O. D., or Prepaid on Receipt of Postal or Express Money Order.

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SUPER-HEPERODYNE  
Hudson-Ross  
123 W. Madison St. Chicago

REFLEX  
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Hudson-Ross  
Largest exclusive Radio  
Jobbers in Middle West  
123 W. Madison St. Chicago

### Campbell RADIO CABINETS

"From the Lumber to You"

PRICES—Cash with order, prepaid east of Missouri River; west, add 15 cents to quoted price. Send Post Office or Express Money Order.

Panel Sizes	Imitation Walnut or Mahogany	Genuine Walnut or Mahogany
7x10x7	\$ 3.00	\$ 4.75
7x14x7	3.30	5.50
7x18x7	3.82	6.75
7x24x7	5.25	9.00
7x26x7	6.05	10.00
7x28x8	7.25	11.50
7x27x9	7.25	12.50
7x40x10	11.25	18.00

Special Sizes to Order

Mounting Boards 50c Each

Will not warp or crack. Made of No. 1 wood finished in either Mahogany or Walnut, bright or rubbed finish to match the finest of furniture. Manufacturers' and Dealers' Liberal Discounts sent upon request.

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### Old Man Ohm Says: "Here is the Ideal Rheostat for all Tubes"

—and he ought to know. He is the fellow who measures resistance. He finds that the Marshall-stat varies resistance not step by step, but smoothly, continuously and uninterruptedly from zero to maximum.

He also finds—and you will too—that the Marshall-stat: Is compact (see exact size cut at left). Requires only one hole in panel. Is vernier all the way but requires only one adjustment. Can be used with any tube or combination of tubes. Has only two terminals and cannot be connected incorrectly.

MARSHALL ELECTRIC COMPANY 3231 Locust Bl. St. Louis, Mo.

Exact size cut of the Marshall-stat \$1.75

Old Man Ohm has an interesting folder on the Marshall-stat. Send for it.

Loose Bearings

Loose or worn variable condenser shafts make it appear that the broadcasting from one particular station is never on the same wave length. Keep the thrust bearings tight enough to prevent variation in the spacing of the plates and the stations will always come in on the same dial settings.

Send me your burned-out or broken Power tubes—50 watts or over. Will pay liberally. W. Baker, 36 West 20th Street, New York City.

IVORY RADIO PANEL. Grained white "IVORYLITE" makes most beautiful set of all. Guaranteed satisfactory. Any size 3/16" thick sent prepaid 3c per square inch. Sample free. E. P. Halton, Dept. D, 614 Main St., Fort Worth, Texas.

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SCIENTIFIC FIXED CRYSTAL DETECTOR BEST BY TEST Price, \$1.50. Manufactured by SCIENTIFIC RESEARCH LABORATORIES 502 N. Howard Street Baltimore, Md. If your dealer cannot supply you order direct.

Give Your Set a Chance Why choke it with an obsolete, unsightly and dangerous outside antenna? Inside your house is the place for your aerial, not on top. Gives you wider range, clearer reception, less interference with less static. Works on any set. Six feet long by 1/2 inch in diameter. Price \$2.50 Postpaid. DAN-DEE AERIAL COMPANY 870 So. Clarkson Denver, Colo.

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NEW WONDER REFLEX Crystals Stand More Battery Current Give Clearer Reception. Equip your Reflex Set with a Shur Hot Reflex wonder. Enjoy the entire evening program without fear of burning out. Should outlast any other. Cost only 75c. NON-SKID CRYSTAL MANUFACTURING CO. 5601 E. 15th St. Kansas City, Mo.

Thirty-one Broadcasting Stations Quit in October. 14 New Ones started. A Radio map that does not have a monthly supplemental service is out of date and useless in a short time. AIR LINE RADIO MAP AND LOG. WITH THE MOVABLE MILE SCALE. Gives this service, and has many other exclusive features. At your dealers or sent prepaid, 50 cents. Money back Guarantee. Dealers and Jobbers write. M. M. CO., 3600 St. John, KANSAS CITY, MO.

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KILL THE NOISE Due to Poor Connections, by Using RAJAH SOLDERLESS SNAP TERMINALS which insures a perfect electrical connection to both base and wire. Patented Sept. 23, 1924 INSTANTANEOUS IN OPERATION Base secured to panel, base board, or battery by No. 8-32 screws. Patented Sept. 23, 1924 Connector secured to wire by screw connection as shown in illustration, and can be used over and over on different wires; attachment being made in a few seconds. FULLY APPROVED BY LEADING LABORATORIES Base studs sold separately for use on B batteries or any place where chances of connection is desired. Retail price, Terminal and Base Stud, as illustrated, 20 cents. Base studs only, each 6 cents. SPECIAL INTRODUCTORY OFFER: 1 dozen terminals and studs, by mail prepaid, \$2.00 Dealers: Get in line at once for the best selling radio device you ever saw. RAJAH AUTO SUPPLY CO. Bloomfield New Jersey, U. S. A.

Takes Place of Solder If the lead-in wire cannot be soldered to the aerial, it is a good policy to wrap tin foil around connection and tape it over with ordinary friction tape. This will help to prevent corrosion. However, all connections should be soldered.

Our applause cards get Broadcasters' attention. Cheaper than telegrams, quicker than letters, only few blanks to fill in. Order today before you forget. Neatly printed on tinted stock, prepaid American continent, 12 for 20c; 25—35c; 50—60c; 100—\$1.00. Special prices on quantities. Cash or equivalent, no stamps.—News-Republican, Radio Dept., Henry, Ill.

BIG money selling new household cleaner. Washes and dries windows. Sweeps, scrubs, mops. Complete outfit less than brooms. Over 100% profit. Harper Brush Works, 200 3rd St., Fairfield, Iowa.

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Men to build radio sets for me in spare time. Leon Lambert, 501-H Kaufman Bldg., Wichita, Kansas.

YOUR CRYSTAL SET will work 400 to 1,000 miles if made by my plans. No tubes or batteries. Copyrighted plans \$1.00. Satisfied customers everywhere. Particulars free. LEON LAMBERT 501 Kaufman Bldg. Wichita, Kansas

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FREE TRI-COIL A COMPLETE instruction booklet telling how to build the TRI-COIL Reflex Set is yours for the asking. The TRI-COIL Reflex, by the way, is one of the most powerful one tube reflex sets ever designed—great for distance and volume. TRI-COIL Transformers \$2 at all good dealers. If your dealer cannot supply you, send money order direct. BROOKLYN METAL STAMPING Corp. 718 Atlantic Ave., Brooklyn N.Y.

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# Radiophone Broadcasting Stations

## Corrected Every Week—Part V

State, City, Call	State, City, Call	State, City, Call	State, City, Call	State, City, Call	State, City, Call
<b>Alabama:</b> Auburn, WMAV Mobile, WEAP Montgomery, WKAN	<b>Illinois (Continued):</b> Elgin, WTAS Eureka, WFBB Galesburg, WRAM Harrisburg, WEBQ Joliet, WVAE Monmouth, WBBU Mosesheart, WJJD Oak Park, WTAJ Peoria, WJAN, WQAX Rockford, KFLV, WIAE Streator, WTAX Tuscola, WJZ Urbana, WRM Zion, WCBZ	<b>Michigan:</b> Ann Arbor, WCBZ Berrien Springs, KFGZ Dearborn, WWI Detroit, KOP, WCX, WWJ East Lansing, WKAR Flint, WEAH Grand Rapids, WEBK Houghton, KEMW, WWAO Mt. Clemens, WABX Petoskey, WBBE Port Huron, WBBH Saginaw, WABM	<b>New Mexico:</b> Albuquerque, KFLL State College, KOB	<b>New York:</b> Buffalo, WEBR, WGR Canton, WCAD Cazenovia, WMAC Ithaca, WVAI Kingston, WDBZ Lockport, WMAK New York, WBAY, WBBR, WDBX, WVEF, WVEJ, WVEB, WVBS, WJAN, WJY, WJZ, WNYC, WQAO, WSAP Richmond Hill, WAHG Rochester, WABO, WHAM Schenectady, WGY, WRL Tarrytown, WRV Troy, WHAZ Utica, WSL	<b>Pennsylvania (Continued):</b> Pittsburgh, KQV, WCAE, WJAS Reading, WBBZ, WRAW Scranton, WQAN State College, WPAB Wilkes-Barre, WBAX
<b>Arizona:</b> Phoenix, KFAD, KFCE Tucson, KFDD	<b>Indiana:</b> Anderson, WEBD Greencastle, WLAX Indianapolis, WBBZ, WFBI Lafayette, WRAF Laporte, WGAZ South Bend, WJZ Valparaiso, WRBC West Lafayette, WBAA	<b>Minnesota:</b> Carver, KFRA Collegeville, WFBZ Hutchinson, WFAN Minneapolis, KFDZ, KFEX, KFMT, KFQF, WCCO Moorhead, WPAU Northfield, KFEX, WCAL St. Cloud, WFAW St. Paul, AVT, KFOY	<b>North Carolina:</b> Charlotte, WBT Fort Bragg, AT9 St. Paul, WFBQ	<b>Rhode Island:</b> East Providence, WKAD Providence, WCBR, WEAN, WJAR, WKBZ, WSAD	<b>Wyoming:</b> Casper, KFEV Laramie, KFBU
<b>Arkansas:</b> Conway, KFQK, KFRJ Fayetteville, KFMI Fort Smith, KFOZ Little Rock, KFLQ, KFMB, WCAV Pine Bluff, KFPX	<b>Iowa:</b> Ames, WOI Atlantic, KFLZ Boone, KFGQ Burlington, WIAS Cedar Falls, KFJX Cedar Rapids, WJAM, WKAA Davenport, WOC Des Moines, WBO Fort Dodge, KFER, KFJY Iowa City, KFQP, WBAA Lamoni, KFFV Marshalltown, KFJB Shenandoah, KFNF Sioux City, KFMR, WEAU Waterloo, WRAN	<b>Mississippi:</b> Coldwater, KFNG Hattiesburg, WDBT Oxford, WCBH Ruleville, WCBG	<b>North Dakota:</b> Fargo, WDAY, WPAK Grand Forks, KFJM, KFJQ	<b>South Carolina:</b> Charleston, WBBY Clemson College, WSAC	<b>Alaska:</b> Anchorage, KFQD Juneau, KFJU Kukak Bay, KNT
<b>California:</b> Bakersfield, KDZB Berkeley, KRE Burlingame, KFZ, KFQK Culver, KDBG, KFQI Fresno, KJL Hanford, KFRN Hillsborough, KFQK Hollywood, KFAR, KFQZ Holy City, KFQU Long Beach, KFON Los Angeles, KFCL, KFI, KFPG, KFPR, KFQK, KFSG, KHJ, KJL, KNX Oakland, KGO, KLS, KLX, KZM Paso Robles, KFNL Richmond, KFBU Sacramento, KFBC San Diego, KDPT, KDYM, KFBC San Francisco, KFPV, KFRC, KPO, KUO San Jose, KQW San Luis Obispo, KFBE Santa Ana, KFAV Santa Rosa, KFNV Stanford Univ., KFGH Stockton, KJQ, KWG Taft, KFQC Whittier, KFQC	<b>Kansas:</b> Anthony, WBL Beloit, WPAR Manhattan, WTG Milford, KFKB Russell, KFQO Topeka, WJAO Wichita, KFOT, WEAH	<b>Montana:</b> Butte, KFQV, KFLA Havre, KFBB Helena, KFNY, KFSY Missoula, KFLW	<b>Ohio:</b> Canton, AQ6 Cambridge, WEBE Cincinnati, WAAD, WHAG, WLW, WMH, WSAI Cleveland, KDPM, WHK, WJAX, WTAM Columbus, WBAV, WCAH, WEO, WMAN Dayton, AW5, WABD, WDBS, WBT Granville, WJD Hamilton, WBO, WRK Lima, WOAC Newark, WBBB Pomeroy, WSAZ Sandusky, WABH, WQAF Springfield, WNAF Toledo, WABR, WTAL Wooster, WABW Yellow Springs, WRAY Youngstown, WDBF	<b>South Dakota:</b> Brookings, KFDY Rapid City, WCAT Vermilion, WEAJ Yankton, WNAK	<b>Porto Rico:</b> San Juan, WKAAQ
<b>Colorado:</b> Boulder, KFAJ Colorado Springs, KFZ, KFQE Denver, AA3, KFAF, KFDL, KFEL, KFLE, KFPO, KFRI, KLZ Greeley, KFKA Gunnison, KFHA Trinidad, KFBS	<b>Kentucky:</b> Louisville, WHAS, WLAP	<b>Nebraska:</b> Belden, KFQY David City, KFOP Fremont, WOAE Hastings, KFEX Lincoln, WFAV, WJAB, WMAH Norfolk, WJAG Oak, KFQZ Omaha, KFQZ, KFOX, WAAW, WIAK, WNAL, WOAW Tecumseh, WTAU University Place, WCAJ	<b>Oklahoma:</b> Bristow, KFJK Chickasha, KFGD Fort Sill, KFRM Muskogee, KFQL Norman, WNAJ Oklahoma City, KFJF, KFQJ, KFOR, WKY Okmulgee, WPAK Tulsa, WGA, WLAL	<b>Tennessee:</b> Columbia, WDBW Lawrenceburg, WOAN Memphis, WCOB, WMC Nashville, WCRQ, WEBX Tullahoma, WCBV	<b>Australia:</b> Sydney, 2FC
<b>Connecticut:</b> New Haven, WPAJ Storrs, WABL	<b>Louisiana:</b> Alexandria, KFFY, KFRF Baton Rouge, KFQC Jennings, WCBZ New Orleans, WAAE, WAAC, WABZ, WBBB, WCAE, WCBZ, WFBZ, WTAJ, WWL Shreveport, KFEX, WGAQ	<b>Nevada:</b> Sparks, KFFR	<b>Oregon:</b> Arlington, KFGL Astoria, KFJL Corvallis, KFJL Hood River, KQP Marshfield, KFOP Pendleton, KFPE Portland, KDYQ, KFEC, KFIF, KFQK, KGW	<b>Texas:</b> Amarillo, WDAE, WQAC Austin, KFQM Beaumont, KFDM Beville, KFBR College Station, WTAJ Dallas, WFAA, WRR Denison, KFQK, KFQT Dublin, KFPL El Paso, WDAH Fort Worth, KFJZ, KFQB, KFRO, WBAJ Galveston, KFLL, WIAC Greenville, KFFM Houston, KFOY, WCAK, WEAY, WEV, WSAV Orange, KFQX San Antonio, WCAE, WQAI San Benito, KFLU Tyler, WQAF Waco, WJAD Wichita Falls, WKAF	<b>British Isles:</b> Aberdeen, 2BD Belfast, 2BE Birmingham, 5IT Bournemouth, 6BM Cardiff, 5WA Chelmsford, 5XX Glasgow, 5SC London, 2LO Manchester, 2ZY Newcastle, 5NO Plymouth, 5PY Sheffield, 6FL
<b>Delaware:</b> Wilmington, WHAV	<b>Maine:</b> Bangor, WABI, WDBN Houlton, WCBZ	<b>New Hampshire:</b> Chesham, WSAU Hanover, WFBK Laconia, WKAJ	<b>Pennsylvania:</b> Allentown, WQBA Altoona, WFBG, WGAJ Arnold, WCBZ Buck Hill Falls, WCBY Butler, WBR East Pittsburgh, KDKA Erie, WQAV Grove City, WSAJ Harrisburg, WABB, WBAK Haverford, WABY Johnstown, WBBY, WTAC Lancaster, WDBC, WGL McKeesport, WIK Parkersburg, WQAA Philadelphia, WABY, WBBT, WCAU, WDAJ, WFI, WGL, WJAD, WIP, WNAT, WOO, WWAD	<b>Utah:</b> Ogden, KFQK Salt Lake City, KDYL, KFPT, KFOO, KFPH	<b>Canada:</b> Bellevue, CFQO Calgary, CFAC, CFCA, CHBC, CHCM, CKCK Edmonton, CFCK, CFCA Halifax, CHAC Hamilton, CHCS, CKOC Innisburg, CFCH Kingston, CFRC London, CFQW, CJGC Mont-Joli, CJCM Montreal, CFQF, CFUC, CHYC, CKAC Nanaimo, CFDC New Westminster, CFXC Oids, CJCX Ottawa, CKCO, CNRO Quebec, CFQJ, CHCD, CKCI Regina, CKCK St. John, CJCI Saskatoon, CFQK Sudbury, CFCA Toronto, CFCA, CHCB, CHNC, CJCD, CJCN, CJSC, CKCE Vancouver, CFQK, CFYC, CHCL, CJCE, CKCD Victoria, CFCL, CHCE Winnipeg, CKY
<b>District of Columbia:</b> Washington, WCAP, WDM, WRC	<b>Maryland:</b> Baltimore, WCAO, WCBM, Sallysburg, WEBI	<b>New Jersey:</b> Atlantic City, WHAR Camden, WABU, WFBI Camden City, WRAX Lambertville, WTAZ Newark, WAAM, WBS, WCBX, WOR New Brunswick, WBEA North Plainfield, WEAM Paterson, WBAJ Salem, WDBQ Trenton, WQAX	<b>Virginia:</b> Fortress Monroe, WNAW Norfolk, WBBW, WTAR Radio, NAA Richmond, WBBJ Roanoke, WDBJ	<b>Alaska:</b> Honolulu, KGU, KYO	
<b>Florida:</b> Deland, WEBU Miami, WQAM Pensacola, WGAN St. Petersburg, WCBK, WDBI Tampa, WDAE West Palm Beach, WBBJ Winter Park, WDBO	<b>Massachusetts:</b> Boston, WCBR, WDBR, WEEL, WNAJ, WTAT Bridgewater, WFBN Fall River, WSAR, WTAB Lowell, WQAS Mattapoisett, WBBG Medford Hillsdale, WGI New Bedford, WDAU Roslindale, WEYB South Dartmouth, WMAF Springfield, WBZ Taunton, WDBB Worcester, WCBT, WDBH	<b>Washington:</b> Bellingham, KDZR Everett, KFBL Lacey, KGY North Bend, KFQW Olympia, KFPP Pullman, KFAE Seattle, KFHR, KFOA, KFPP, KFQK, KHQ, KJR, KTW Spokane, KFIO, KFPY Tacoma, KFQK, KGB, KMO Walla Walla, KFQF Yakima, KFQK	<b>West Virginia:</b> Charleston, WPAZ Martinsburg, WDBD	<b>Porto Rico:</b> San Juan, WKAAQ	
<b>Georgia:</b> Atlanta, WBBF, WSB Macon, WCBW, WMAZ Savannah, WBBZ	<b>Idaho:</b> Boise, KFAU, KFDD, KFFB Kellogg, KFEY Wallace, KFOD	<b>Wisconsin:</b> Beloit, WEBW Fond du Lac, KFIZ La Crosse, WABN Madison, WHA Milwaukee, WCAJ, WHAD, WSOJ Osseo, WTAQ Sisist, WAR St. Croix Falls, WRAL Stevens Point, WLBL Superior, WDBP, WBBZ	<b>Washington:</b> Fortress Monroe, WNAW Norfolk, WBBW, WTAR Radio, NAA Richmond, WBBJ Roanoke, WDBJ	<b>Switzerland:</b> Geneva, HB1 Lausanne, HB2	



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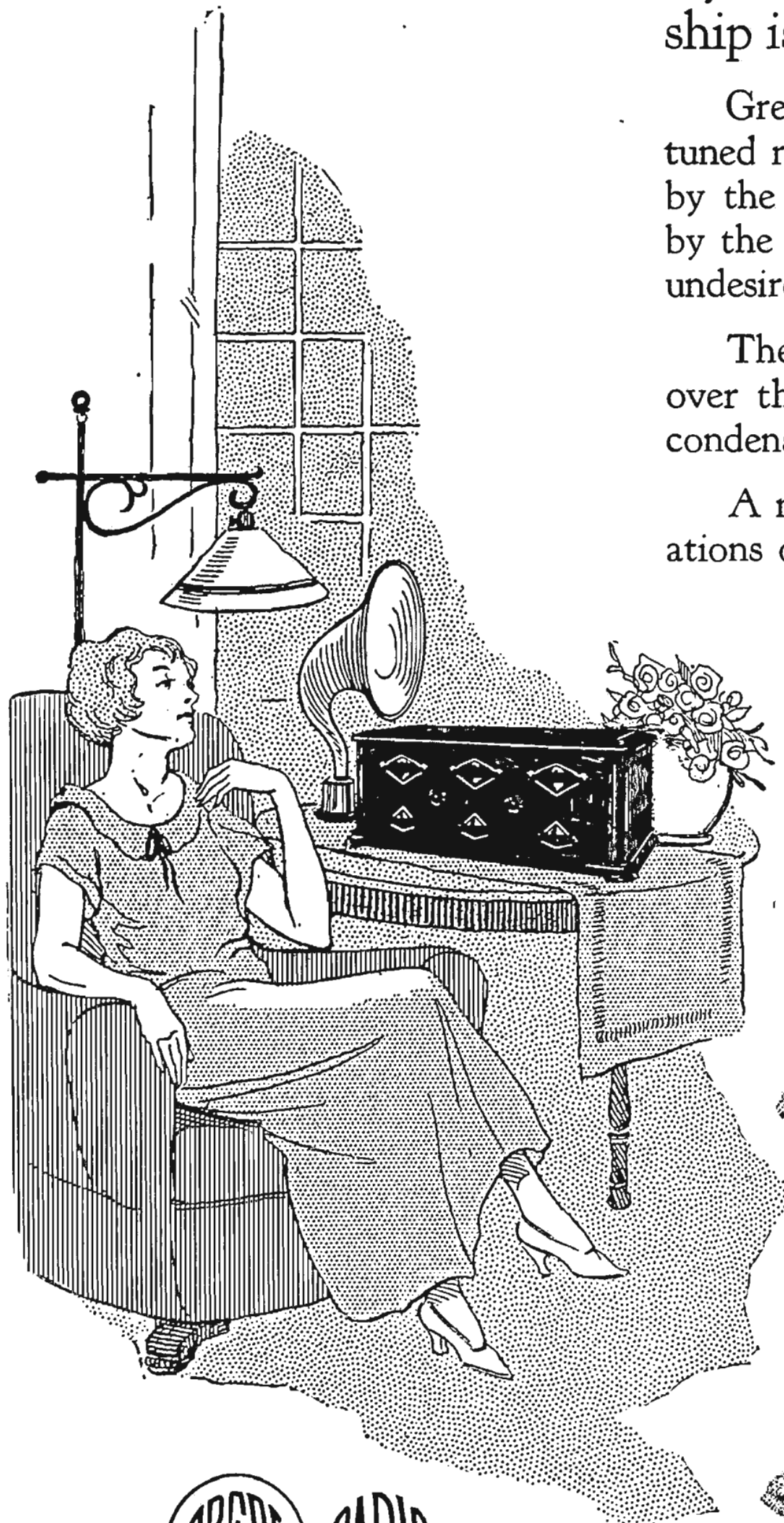
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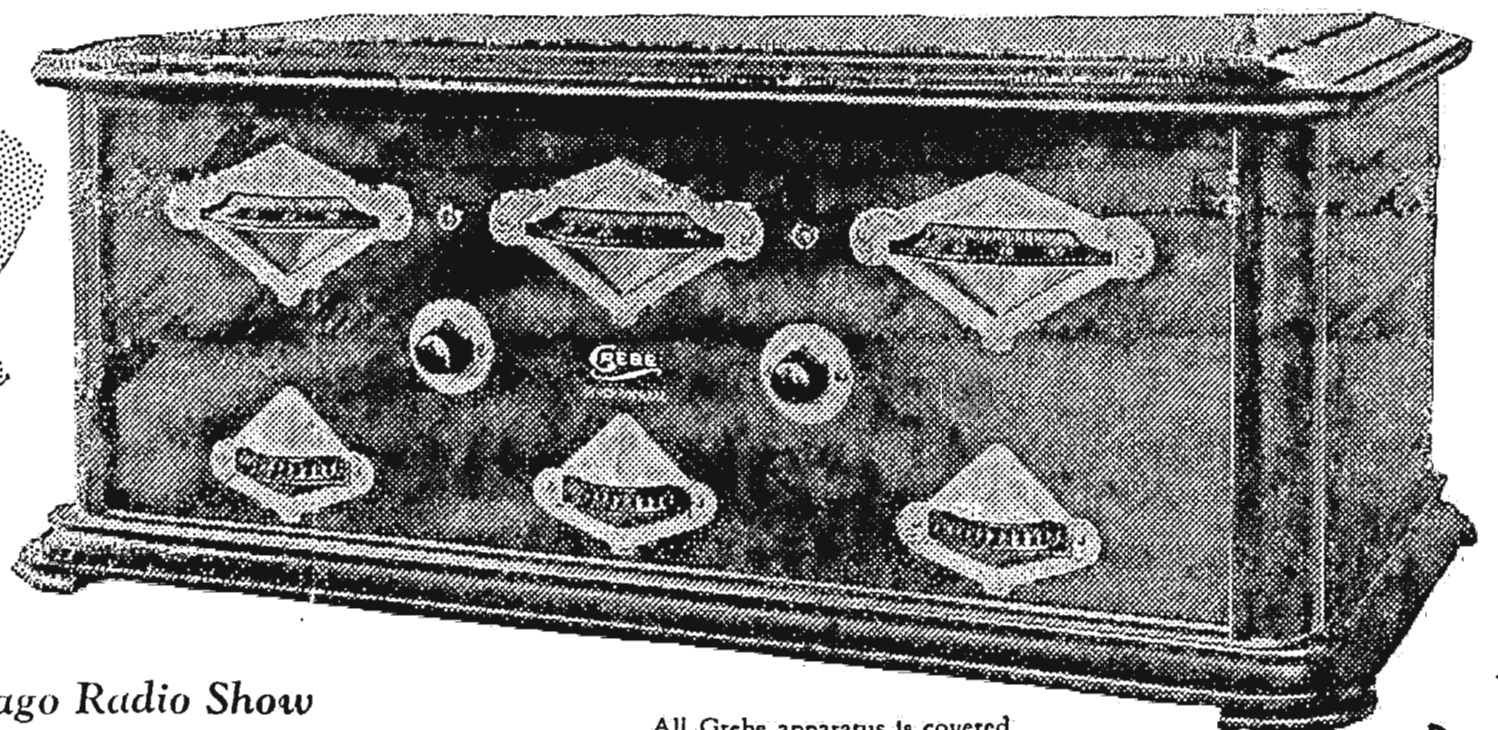
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