Radio Manufacturers of the 1920's

Vol. 2
Freed-Eisemann
to Priess

By Alan Douglas

J. M. Armstrong

RADIO MANUFACTURERS OF THE 1920'S

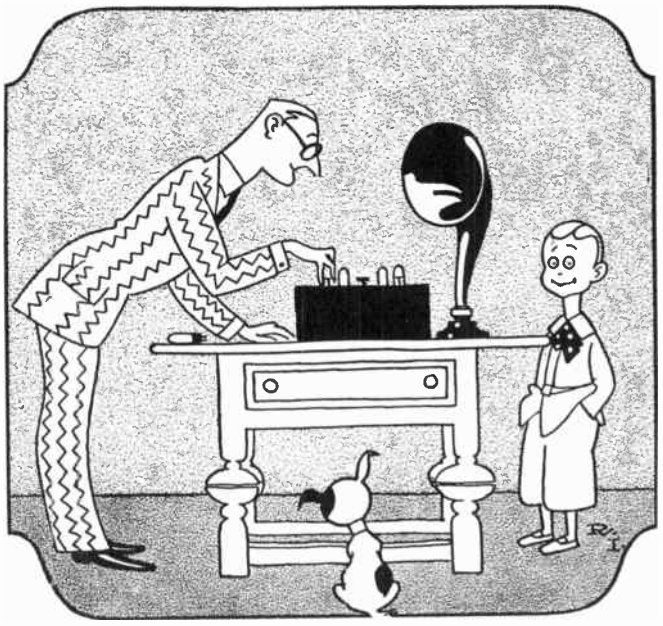
JUST A SONG AT TWILIGHT

Judge (April 22, 1922)

RADIO MANUFACTURERS OF THE 1920'S

BY ALAN DOUGLAS

Vol. 2—Freed-Eisemann to Priess



The Vestal Press, Ltd.
Vestal, New York 13851

A note about the cover:
The MAJESTIC (actually a 1930 model) is from the collection of James Spalik of Kirkwood, New York
The RCA is owned by Harvey N. Roehl of Vestal, New York, and it came from the Murray Clark collection
The ATWATER KENT was loaned by Joyce Demchak of Johnson City, New York

Library of Congress Cataloging-in-Publication Data
(Revised for vol. 2)

Douglas, Alan, 1943-
Radio manufacturers of the 1920's.

Includes indexes.
Contents: v. 1. A-C Dayton to J.B. Ferguson, Inc.—
v. 2. Freed-Eisemann to Priess.
1. Radio supplies industry—United States—History.
I. Title.
HD9696.R363U6345 1988 338.7'62138418'0973 87–31088
ISBN 0–911572–67–8 (v. 1)
ISBN 0–911572–68–6 (pbk. : v. 1)

For additional copies of this book
or for our complete catalog, write to:

The Vestal Press Ltd.
PO Box 97
Vestal New York 13851-0097

Contents

Acknowledgments

In addition to those published in vol. 1, my special thanks go to: Greg Farmer (Midwest), Howard Freed and other family members (Freed-Eisemann), Charles Griffen of the Hartford Public Library, and the Central State University Library (Freshman and Majestic), Serge Krauss (Neutrowound), Lyle Scheid (Neutrowound), John Stokes (Majestic), J. McWilliams Stone, Jr., and Michael Supitilov of Dukane Corp. (Operadio).

Finally to the publisher, Harvey Roehl, who has done all the mechanical layout of these volumes and has shown unbelievable patience with the innumerable bits of information that I wanted included.

ALAN DOUGLAS
MAY 1989

FREED-EISEMANN

Freed-Eisemann Radio Corporation

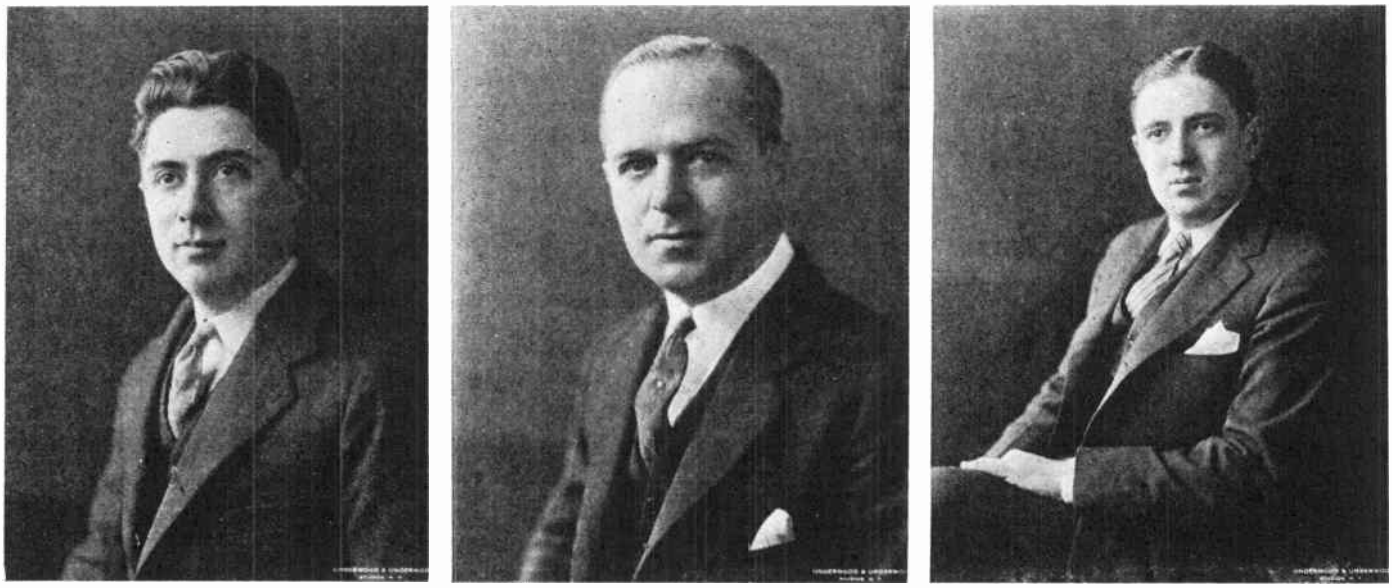
Joseph David Roth Freed was born in New York City on October 18, 1897. Graduating from the College of the City of New York, where he had studied radio under Dr. Alfred Goldsmith, Freed in 1917 became an Expert Radio Aide at the Radio Test Shop, Washington Navy Yard (where Alan Hazeltine was consultant), leaving in 1918 to join Emil Simon. From early 1919 to mid-1921 he was with the Wireless Improvement Company as designing engineer and assistant chief engineer, until he organized the Radio Manufacturing Company.

Freed's first product was a crystal set outfit named the Marvel, which sold like hotcakes, so fast that within a few months he needed capital to expand. In January 1922 he and his brother Arthur's employer, Alexander Eisemann, incorporated the Freed-Eisemann Radio Corporation. Marvel sales continued to boom for several months more.

But when on July 1, 1922, *Radio World* profiled Freed as a "captain of industry" he hardly felt like one. Aside from the bust that followed the boom, when radio stopped selling and scores of small companies went under, makers of crystal sets had a particular problem. The Wireless Specialty Apparatus Company, whose patent position in crystal technology was its only toehold in the "radio group" with RCA, GE, AT&T, and Westinghouse, advertised in June outlining its status and claiming that any other company making or selling crystal detectors was liable for patent infringement suit and an accounting for damages. This had the effect of scaring off Freed-Eisemann's dealers, and incidentally began a series of events that dramatically changed the whole radio industry.

Freed-Eisemann's advertising manager was quoted in August, 1922:

"We have had in our employ here 138 operatives. Conditions are so bad that we have reduced the working crew to 26. There is nothing doing here. I only come around an hour or two a day myself. We are trying only to sell our radio apparatus to the radio departments of dry goods stores, anyway, for we feel that from such customers we have a good chance to collect our money. We cannot collect our bills from radio retailers or jobbers. If we try to dun them, on long-standing accounts, they promptly assure us that they are perfectly willing to return our radio manufactures as sold to them — for the goods didn't sell. I don't know what is going to happen in radio; there is no action around here. We can't even sell our Marvel cheap sets."



Officials of the Freed-Eisemann Radio Corporation. Reading from left to right, they are: Jos. D. R. Freed, President and Radio Engineer; Alexander Eisemann, Treasurer, and Arthur R. Freed, Secretary.

Radio Dealer (April 1926), p. 105

Freed-Eisemann went to court to enjoin Wireless Specialty from publishing these notices, and to sue for damages; to aid in these suits it gathered a group of other New York crystal-set makers together in the Independent Radio Manufacturers, Incorporated, retaining the prominent law firm of Pennie, Davis, Marvin and Edmonds. Through its PDME lawyer, Walter C. Russ, the Independent group learned of an invention of Hazeltine which was then being processed through the Patent Office by another young PDME member, Willis H. Taylor, Jr. If Hazeltine's new circuit, a way of stabilizing a tuned radio-frequency amplifier, could be made to work commercially, then the new IRM members could abandon crystal sets, avoid the regenerative circuit now controlled by Westinghouse, and take up the new "Neutrodyne" (as Taylor called it).

Hazeltine and his assistant John F. Dreyer Jr. occupied a lab at the Stevens Institute of Technology. Freed built a prototype from Hazeltine's notes, took it to the lab, and after some attention from Dreyer, it worked beautifully.

Three IRM members lost no time getting into production. Frank Andrea was first, with a reflexed four tube design shown at the 3rd annual Radio Convention in New York, March 1 to 3, 1923. Freed-Eisemann's model was demonstrated by Hazeltine at the regular Radio Club of America meeting on March 2, where it created quite a stir. Garod was advertising its reflexed model a month later, and was in production in September.

Freed Eisemann did rather well with its NR5: 1923 sales were four times the previous year's, and net earnings (profits) 100 times higher. The company moved into a new factory of 15,000 square feet in December, 1923, in the Sperry Building in Brooklyn, eventually occupying 50,000 square feet and employing as many as 570 workers. It also brought suit against PDME and refused to pay royalties to Hazeltine, claiming that PDME's lawyers were financially interested in the Hazeltine Corporation at the same time they were advising their client Freed-Eisemann to sign the royalty agreement. Hazeltine in turn sued Freed-Eisemann for breach of contract. Freed-Eisemann was hoping to have its royalties reduced, from 6% of the wholesale receiver price, to 6% of the neutralizing condenser alone, and offered Hazeltine $30,000 a year, but eventually lost, and grumpily went back to paying the full amount.

Sales in 1924 were also excellent, again quadruple the year before, and net earnings before taxes, for the first nine months, were a staggering 43% of gross sales. This performance attracted outside capitalists, who bought 100,000 shares, one third of the outstanding stock, in October 1924 for $2½ million. The same group, Hugh Prichitt and his two brothers-in-law named Howard, also controlled Ware and Dubilier. 75,000 shares were offered publicly at $30 each.

But lean times were coming. In late 1924 Charles Freshman introduced his $60 Masterpiece, and Atwater Kent his $100 Model 20, both having the characteristic three dials, just like the Neutrodynes. So why pay $150 for a Freed-Eisemann? Sales plummeted; Eisemann began selling unassembled parts and cabinets at a sacrifice, and in May 1925 dumped 10,000 to 20,000 NR5's to Gimbels at 10% less than its factory cost. In an effort to avoid Hazeltine royalties and to compete more closely with Atwater Kent and Freshman, Freed-Eisemann designed a line of TRF models, not Neutrodynes, to sell for as little as $75. In early September, 1925, the company was reported to be making 2500 to 3000 sets per week, and in one burst, 1000 per day, but by mid-November more than half of its 1200 employees had been discharged.

Pritchitt's money had been used to build a modern 140,000 square-foot factory in East New York, which was occupied by March, 1926. To cover the increased overhead of its new plant, Freed-Eisemann took on manufacture of the Turbax electric washing machine, and was said to be making radio-phonographs. In July orders were placed with outside suppliers for 11,000 sets. But nothing could change the fact that in 1926, fewer sets were sold than in 1925 (1,750,000, down from 2,000,000), and there was simply less pie to be split. With Atwater Kent accounting for one-fourth of radios sold, and Crosley and RCA not far behind, Freed-Eisemann was pretty much left with crumbs. Reports in December 1926 painted a bleak picture: 400 employees let go, radios not selling, suppliers' contracts being repudiated, and imminent receivership (all hotly denied by Eisemann).

1927 might have been even worse; only 1,350,000 sets were sold that year, and Atwater Kent, Crosley, and RCA were as aggressive as ever. The previous season's inexpensive Model 10 was nothing but trouble, not working properly in different climates, forcing a change back to Neutrodynes. An AC model was added by June, 1927, but proved to be premature. However, with the NR60 in November, Freed-Eisemann finally achieved some success, supposedly making them at record rates. Jesse Marsten, an old classmate of Freed's in Goldsmith's group of five, was chief engineer from 1927 to 1930.

May of 1928 brought a good AC model in the NR80; shipments in July were up 50% over the previous year. In October the Freeds (brothers Joe, Arthur, and Leo) and Eisemanns (Alex and his father Emil) decided to sell their company to the owners of the Charles Freshman Company. Clarence Earl was now in charge there — Freshman having been kicked out — and was shortly to change the company's name to Earl Radio Corporation. His plan was to save overhead by moving the two companies to a huge new factory in Clifton, New Jersey and making one chassis for both the Earl line and the more prestigious Freed-Eisemann. The Freeds exchanged their stock for Freshman stock; Alex Eisemann took the oppor-

Radio Adds Joy to Her Home

(C. Kadel & Herbert)
That radio is filling an important and necessary place in the American home is indelibly proved by the photographs Miss Detector has selected to illustrate her page this week. The young lady who posed for the photograph is Miss Dorothy Knapp, who recently won first prize for physical-culture development. The upper photograph shows her radio set in her kitchen—she is an experienced housekeeper.

(C. Kadel & Herbert)
The lower photograph is a cozy corner of her living room. Miss Knapp also uses radio to furnish music by which she takes her physical-culture exercises.

Radio World (Dec. 30, 1922), p. 15

This "Marvel De Luxe" posed for a number of publicity shots with famous people in mid-1922, but apparently never went into production.

tunity to sell his for cash and return to his chosen field of investment banking; Emil Eisemann held no stock. Eventually the Freshman Company held 285,000 out of 300,000 Freed-Eisemann shares.

Freed- Eisemanns and Earls began rolling off the assembly lines in June, 1929, with more than $1 million in sales for this ordinarily-dull month: 13,975 sets in June, 23,564 in July, 32,000 planned for August, 40,000 for September, and so on. Unfortunately the actual sequence of events was somewhat different: consoles stopped selling, the stock market crashed, Earl went into receivership on November 22, followed by Freed-Eisemann on December 10. Assets were auctioned in July, 1930. Clarence Earl, who was originally to have built the new factory with capital from his auto-industry connections, instead had built it with the company's own reserves.

Arthur Freed formed the Freed Television and Radio Corporation in May, 1931. Joe joined Warner Brothers and shortly afterward, in May 1930, Warners bought Brunswick, but later discontinued radio production. Joe Freed was elected president of tube maker Perryman in May 1931 and was later associated with Freed Television and Radio, and Muzak. In 1940 Joe and Arthur formed the Freed Radio Corporation with the financial backing of Messrs. Zalkin and Adelberg. This company was among the first to produce Armstrong-licensed FM radios, and averaged $5 million in orders annually during World War II. A Captain in the Naval Reserves, Joe Freed served on active duty in the early stages of America's involvement in World War II prior to his death from leukemia. Eisemann died in 1953.

SALES (wholesale prices)

Period	Sales	Net earnings (operating profits)
1922	$250,315.64	$1,981.50
1923	979,028.69	202,638.84
Apr.-June	42,000	
July-Sept.	115,000	
Oct.-Dec.	687,000	
1924	4,507,130	
Jan.-Mar.	2,000,000	
Jan.-Sept.	2,880,286.07	1,246,897.06
1925	(no full-year figures available)	
June-Nov.	2,820,757.41	186,454.54
Nov.	799,429.56	97,749.13
Dec.	604,071.22	(22,604.90) loss
1926		
Jan.	248,497.25	6,248.45

Throughout the length and breadth of the land, thousands of families are listening to music, concerts, news of the day, lectures, weather reports, church services, etc., right in their own homes with a $15.00 "Marvel" Radio Telephone Receiving Outfit. No longer is it necessary to have expensive apparatus or any knowledge or experience in wireless telegraphy.

Bring YOUR Home in Touch With The Outside World

Get a "MARVEL" Radio Telephone Receiving Outfit. Music, concerts, lectures, current news, sermons, Government reports, etc., will come to you daily. The cost is small—only $15.00 complete! Nothing else is needed. Receives speech and music, etc., within a 50 mile radius of the large radio telephone broadcasting stations, and wireless telegraph messages within many hundreds of miles.

The "MARVEL" RADIO TELEPHONE RECEIVING OUTFIT, is the only COMPLETE crystal receiving outfit on the market with a wave-length range of 180 to 2,600 meters. The OUTFIT is thoroughly practical, dependable and complete. It can be quickly and easily set up for use. No source of power, no batteries, no license and no special knowledge is necessary for installation.

THE COMPLETE "MARVEL" RADIO TELEPHONE RECEIVING OUTFIT, Model 105, consists of a "MARVEL" Radio Receiver (a completely enclosed, highly efficient, crystal receiver, mounted in a handsomely finished mission oak cabinet), 150 feet of solid copper wire (for the antenna), 5 porcelain insulators, a 1,000 ohm telephone with leather covered headband and telephone cord, antenna switch, ground clamp, code chart, abbreviation chart, and COMPLETE instructions for installation and operation. Nothing else is needed..... **$15.00**

Model 110, same OUTFIT, but with a 2000 ohm double headset **$18.00**

Quality Apparatus **Designed by Engineers** **Popularly Priced**

"MARVEL" RADIO TELEPHONE RECEIVING OUTFITS are for sale at all progressive Radio and Electrical Dealers. If your dealer has not yet received his stock of "MARVEL" OUTFITS, we will send you one prepaid on receipt of Postal or Express Money Order, or via Parcels Post C. O. D. ORDER NOW—DON'T DELAY.

Look for the Registered Trade Mark on every genuine "MARVEL" RADIO TELEPHONE RECEIVING OUTFIT (Patents applied for).

Bulletin R-101 on request.

DEALERS: "MARVEL" RADIO TELEPHONE RECEIVING OUTFITS are nationally advertised; they are the most popular of crystal receiving OUTFITS. Get your share of the growing demand by selling them. Liberal discounts and selling co-operation are part of our sales campaign. ORDER NOW!

RADIO MFG. CO.

TRADE MARK REG.

MARVEL RADIO MANUFACTURING COMPANY, Inc.

OFFICES and SALES DEPARTMENT: **170 Fifth Avenue, New York City**

May 1, 1922

Warning to Patent Infringers

VARIOUS types of crystal detectors, renewals therefor, and crystal detector radiophone receiving sets now being offered for sale employ the inventions of one or several of the following United States patents (commonly referred to as the Pickard patents) the property of the Wireless Specialty Apparatus Company.

836,531	904,222	924,827
886,154	912,613	1,104,073
888,191	912,726	1,137,714
13,798 (reissue of 877,451)	963,173	1,225,852
933,263	1,104,065	1,257,526
1,213,250	1,118,228	1,136,044
1,136,045	1,136,046	1,136,047

The above patents cover, among other things, the most efficient circuit arrangement of apparatus commonly used in crystal detector radiophone sets, various kinds of crystal members, means for mounting the crystals and holding the mounting, special forms of contacting conductors for the crystals, and mechanism permitting the user's selection of contact points of the contacting conductor on the crystals.

Authorized crystal detectors now are available through the distributors of the Wireless Specialty Apparatus Company, also renewals therefor, and complete crystal detector radiophone receiving sets, all in large quantities, which are sold under the various above-mentioned patents.

The Wireless Specialty Apparatus Company purposes to prosecute, vigorously, all infringers of its patents and, therefore, those manufacturers, distributors, jobbers and dealers who have not been authorized as yet are warned to cease the manufacture or the sale or distribution of crystal detectors, renewals therefor, or crystal detector radiophone receiving sets or any other radio devices which infringe these patents.

Unauthorized distributing or selling, wholly independent of manufacturing, is just as much an infringement as the manufacturing itself, and any seller is separately liable to suits for accounting for damages or profits in addition to injunction.

For their own protection, the distributors, jobbers and dealers who yet may be offering for sale unauthorized crystal detectors, renewals therefor, or complete crystal detector radiophone receiving sets, should demand a guarantee from the manufacturer from whom they purchase radio equipment holding them harmless in case of damage suits arising through their distribution and sale of radio apparatus which infringes the above-mentioned patents.

Crystal detectors, renewals therefor, or crystal detector radiophone receiving sets made and sold with the authorization of the Wireless Specialty Apparatus Company can be readily identified by the data of the above patents and restriction notices prominently marked on the apparatus.

WIRELESS SPECIALTY APPARATUS COMPANY

Boston, Mass. *Established 1907* **U. S. A.**

Court Grants Injunction in Radio Suit

Important Decision First Step in Clearing Up Crystal Patent Situation

AN important step in clearing up the somewhat tangled situation regarding radio patents was taken last week by Justice O'Malley of the New York Supreme Court, Special Term, in granting the injunction asked by the Freed-Eisemann Radio Corporation of New York against the Wireless Specialty Apparatus Company.

This decision is the first step of a series in defining patent rights which have arisen in the radio field as a result of the tremendously increased activity in this industry. The decision is of particular interest to all retailers of radio apparatus as well as to users of crystal-receiving sets.

It is stated that the Wireless Specialty Apparatus Company recently published a series of advertisements and circulars which indicated that crystal radio receiving sets are controlled by patents owned by them. These advertisements, which were addressed to radio dealers, advised these dealers to insist upon guarantees from other radio manufacturers, holding them (the dealers) harmless in case suit was filed by the Wireless Specialty Apparatus Company, alleging patent infringements.

The contention of the Freed-Eisemann Radio Corporation, now sustained in the courts, was that these advertisements constituted unfair business competition and an injunction was granted restraining this form of advertising by the Wireless Specialty Apparatus Company. The injunction, just granted, was part of the suit—the balance of the suit, in which $150,000 damages was asked, is still pending.

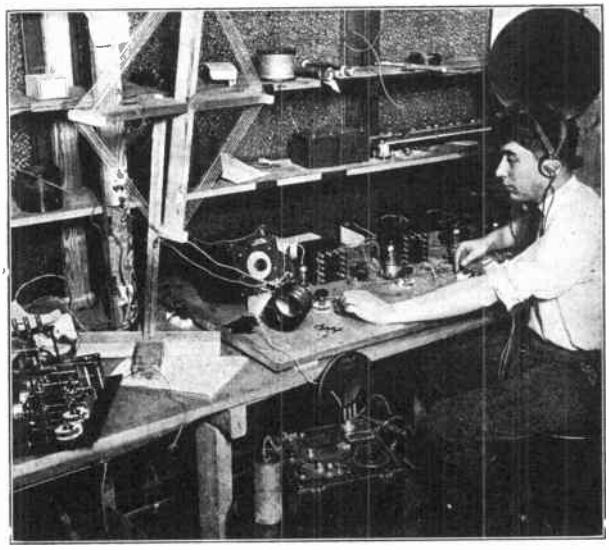
Justice O'Malley's decision is sweeping in the measure of relief afforded the plaintiff. The outcome of the suit will have an important bearing upon the entire crystal radio patent situation. It is stated, also, that a number of radio manufacturers, known as the Independent Radio Manufacturers, Inc., have organized to protect their members against unfair competition and unjust patent litigation.

This organization is represented by Pennie, Davis, Marvin & Edmonds, attorneys, 165 Broadway, New York City. At the offices of the Independent Radio Manufacturers, Inc., it was said by one of the directors that a large number of applications from radio manufacturers are now under consideration.

Radio World (Sept. 16, 1922), p. 19

Emmett Smith

Marvel 101 August 1921 $8 (later $10)



Radio World (Oct. 21, 1922)

"J. D. Freed, radiotrician, designing a radio-frequency receiving set to receive long distances on a loop aerial, and for modest distances without any aerial whatsoever. Mr. Freed claims that he has successfully overcome all the disadvantages of radio frequency circuits."

Freed-Eisemann Radio Corp.
255 Fourth Ave. N. Y. City

TYPE NR 5
NEUTRODYNE RECEIVER

Licensed by Independent Radio Manufacturers, Inc., under Hazeltine patent No. 1,450,080 and other patents pending.

The first NR-5 ad, from the *NY Globe* April 7, 1923.

Hazeltine and Freed at the Radio Club of America presentation, March 2, 1923.

Popular Science Monthly (July 1923), p. 39

Tuned Radio-Frequency Amplification with Neutralization of Capacity Coupling

By L. A. Hazeltine

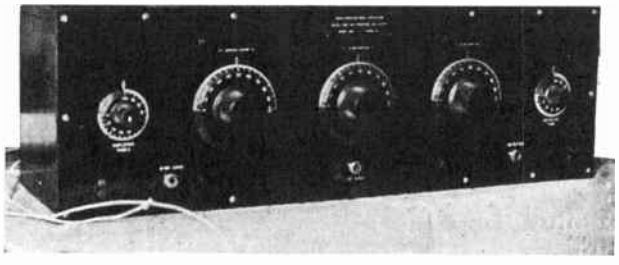
Professor of Electrical Engineering, Stevens Institute of Technology

(A paper presented before the Radio Club of America, March 2, 1923.)

1. **Principle of Neutralization of Capacity Coupling**—The specific subject of this paper, "tuned radio-frequency amplification," is but one of a number of practical applications of a general principle: that electrostatic or capacity coupling between two circuits behaves like electromagnetic coupling in that it may be reversed in sense and in particular may be reduced to zero. This is accomplished by balancing one capacity against another. To attain the balance condition, it is generally necessary to reverse the phase of a voltage; and this involves the use of a transformer in addition to the capacities.

Any system of circuits coupled through capacities may be resolved into elements such as indicated in Fig. 1, where the two circuits A and B are coupled through the direct connection at the bottom and through the capacity C_1. To neutralize this coupling, two closely coupled coils L_1 and L_2 and a neutralizing capacity C_2 are arranged as shown, L_1 being connected between one terminal of C_1 and the common connection, and L_2 being connected in series with C_2 between the other terminal of C_1 and the common connection. The terminals of L_1 and L_2, which are connected together are of unlike polarity.

If we regard the circuit A as having the source of alternating current, the alternating potential of its upper terminal (marked "disturbing potential," Fig. 1a) would send a current through C_1 to circuit B, which current in flowing through the



A HAZELTINE NEUTRODYNE RECEIVER
Front view, showing simplicity of controls. The small left-hand knob is the rheostat controlling all the amplifier filaments, the right-hand the detector filament. The first large dial controls antenna tuning, the center dial tunes the first radio transformer, and the next dial the second radio transformer. (Photo courtesy Freed-Eisemann Corpn.)

Hazeltine's original Neutrodyne paper, from the *Proceedings* of the Radio Club of America, vol. 2 no. 8, March 1923. Also printed in *QST*, April 1923, pp. 7-12.

INDEPENDENT RADIO MANUFACTURERS
Incorporated
announce that the

HAZELTINE NEUTRODYNE CIRCUIT

is covered by U. S. Letters Patent No. 1,450,080 issued March 27, 1923, and patents pending and that the trade mark **NEUTRODYNE** is registered in the U. S. Patent Office.

The exclusive rights under this patent and pending applications and the registered trade mark **NEUTRODYNE** have been granted and are now vested in the Independent Radio Manufacturers, Inc.

The Independent Radio Manufacturers, Inc., hereby give notice of their intention to promptly and vigorously prosecute all direct or contributory infringements of their rights in the exclusive manufacture and sale of Hazeltine **NEUTRODYNE** Receivers, parts therefor, instructions pertaining thereto, and wiring diagrams thereof, or the use of the trade mark **NEUTRODYNE** in connection with the sale of any Radio apparatus.

The Independent Radio Manufacturers, Inc., as soon as possible, will thru its licensees arrange to place before the public properly designed parts and instructions to aid individuals to build sets embodying the **NEUTRODYNE** principle.

Certain inherent characteristics of the NEUTRODYNE circuit will cause considerable difficulty to experimenters unless the parts and instructions emanate from official sources.

NY Globe (April 7, 1923)

The New Hazeltine Neutrodyne

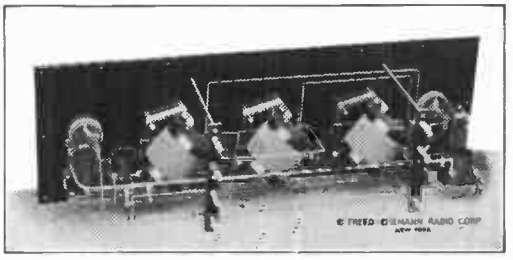
AND DEPENDABLE PARTS FOR OTHER CIRCUITS

A startling advance in radio progress. Non-regenerative. Non-oscillating. No howling or hissing. Remarkable clarity and power and tremendous distance. Simple in operation. Built by the Freed-Eisemann engineering organization of master craftsmen.

Hazeltine Neutrodyne Receiver. Wave length range, 200 to 550 meters. Designed to receive all stations operating on new broadcast wave lengths. 5-Tube Set encased in mahogany cabinet. Price, without tubes or batteries.....

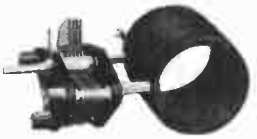
MODEL NR-5

$150.00



REAR PANEL VIEW MODEL NR-5
(No Variometers Nor Variocouplers Used)

ESSENTIAL PARTS
for Hazeltine Neutrodyne Circuit



MODEL 351—Carton, containing 3 Neutroformers (primary and secondary coils) mounted on variable condensers, ready for panel mounting, $6.50 each. Total, $19.50.

The mathematically accurate construction and testing apparatus necessary to satisfactory building of Neutrodyne parts makes it practically impossible for the amateur to build the parts. For this reason, we list two essential parts below. WIRING DIAGRAM INCLUDED WITH ARTICLES LISTED.
(Protected under Hazeltine Patents)

MODEL 352—2 capacity balance adjustment Neutrotons mounted on bakelite, in one unit. Total, $2.80.

Freed-Eisemann apparatus is guaranteed. If your dealer cannot supply you—write us.

Send 5c. for catalogue or 25c. for wiring diagrams and descriptive matter.

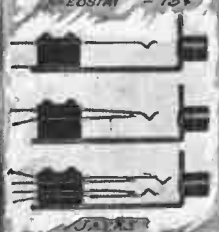
Freed-Eisemann Radio Corporation

"Pioneers in Radio Broadcast Reception"

255 Fourth Avenue — New York, N. Y.


3,000 OHM HEADSET $7.50


RHEOSTAT - 75¢


JACK
OPEN CIRCUIT - 30¢
CLOSED " - 40¢
DOUBLE " - 50¢


ALUMINUM SOCKET - 50¢


BAKELITE SOCKET - 70¢


VARIABLE CONDENSER
43 PLATE - $4.00
21 " - $3.00
11 " - $2.75


CRYSTAL DETECTOR - 70¢


AUDIO FREQUENCY TRANSFORMER $4.00


GALENA CRYSTAL - 20¢


DOUBLE HEADSET-3,000 OHMS-$7.50


RADIO PLUG - 60¢


VARIO COUPLER - $3.00

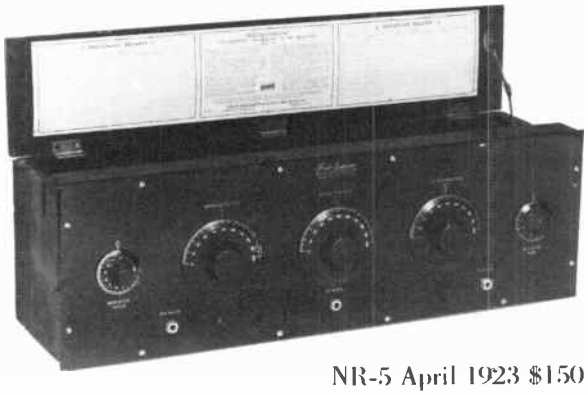

VERNIER VARIABLE CONDENSER
46 PLATE - $7.00
24 " - $6.00
14 " - $5.00

Radio World (April 28, 1923), p. 32

NY Sun & Globe (Sept. 8. 1923)

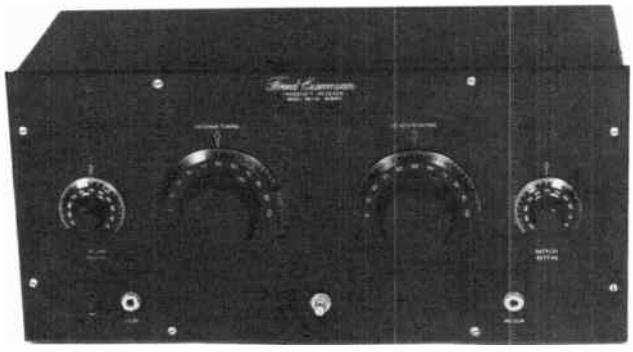
NY Globe (May 20, 1923)

QST (April 1924), p. 71



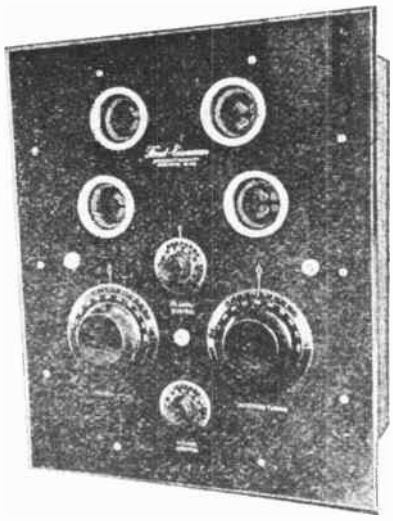
NR-5 April 1923 $150

NR-6 Oct. 1924 $150



NR-12 Nov. 1924 $100 Rich Elskamp

Radio Industry (Nov. 1924)



NR215 Nov. 1924 $95

1925 SALES

Model	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan. 1926
NR6	919	72	30	80	121	11		
NR20	314	12	2	8	8	22		
NR205	7	48	19	5	14	1		
NR405	9	42	2	3		32		
						6425		1537
NR7	4	1522	3539	4312	7592	−92	returned	−194
						6333		1343
Special								157
NR7					150	263		−1
								156
						733		190
NR45			42	1685	932	−23		−40
						710		150
						7320		2295
FE15		1014	2806	3187	5851	−236		−174
						7084		2121
Special								207
FE15					150	428		−1
								206
						1157		919
FE18			132	2516	2507	−29		−641
						1128		278

1925 PRODUCTION

Model	June	July	Aug.	Sept.	Oct.	Nov.	Dec. & Jan.	Total
NR6	50	33	50		99			232
NR20		42						42
NR205		4	2		64			70
NR405		44	3					47
NR7	7	3136	5972	6836	6476	3876	1737	28740
Special NR7					200	500		700
NR45			72	2588	2680	1205	120	6665
FE15	132	898	4227	4258	5134	6196	7515	29060
Special FE15					200	500		700
FE16	6							6
FE18	9		201	3070	3319	746	1765	9110
Total								73972

NR-20 Feb. 1925 $175 Rich Elskamp
Technical article in *Popular Radio*, Sept. 1925, pp. 244-254.

DEALERS who have seen the new Freed-Eisemann dealer territorial franchise contract say it is the last word in dealer protection.

That contract is backed up by a line which we believe to be the last word in *salability*. It is based on a careful analysis of your market. It contains no set with less than five tubes. It has two Latour receivers at $75 and $90—a six-tube licensed Neutrodyne receiver at $110—and more expensive receivers embodying new ideas for the higher priced market.

Every detail of the line has been worked out from the dealer's point of view. Increased discounts make it sure that our dealers will end the season with a profit.

Last year Freed-Eisemann dominated the Neutrodyne field. The official figures in the circle tell their own story.

This year we intend to increase this dominance—by greater values—by an all-inclusive price range—by bigger discounts—and by doubling last year's advertising—all coupled with the strongest dealer protective policy contract ever known in radio.

THE Freed-Eisemann franchise is strictly confined to a limited number of dealers in each territory. Once placed, it will be rigidly adhered to.

You will not be in a position to make the wisest selection of your line for this season until you know the details of the Freed-Eisemann policies and plans.

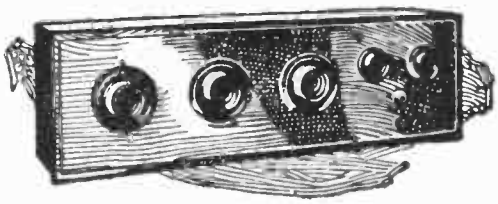
Write to the Freed-Eisemann executive territorial jobber, or write to us and one of our executives will reply personally.

Freed-Eisemann Radio Corporation
Manhattan Bridge Plaza, Brooklyn, N. Y.

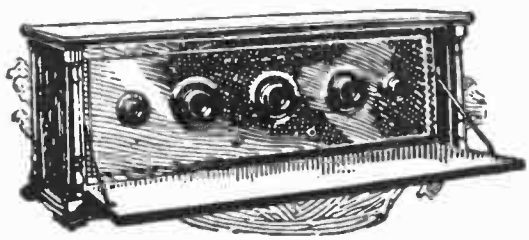
*Licensed for use in Independent Radio Manufacturers, Inc., under Hazeltine patents Nos. [illegible] and [illegible]. Other patents pending.

FREED-EISEMANN

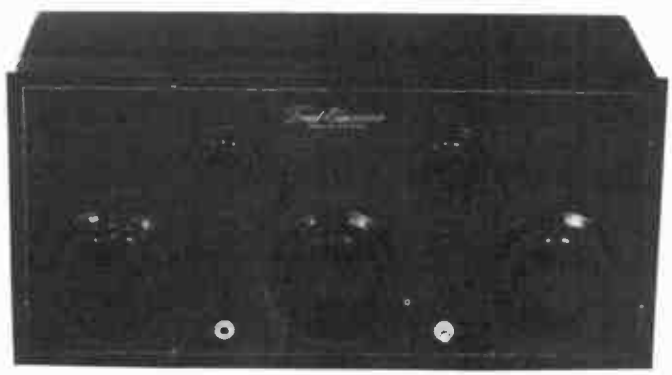
Mastery in Radio



NR7 August 1925 $110



NR-45 Dec. 1925 $160



FE-15 August 1925 $75 John Drew

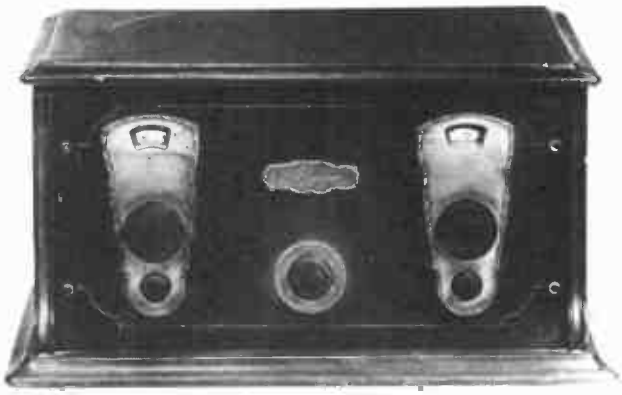
(not shown) NR-35 Aug 1925 $195

Howard Freed

Model	Selling Price	Material	Labor
NR7	$46.87	$20.64	$4.41
Special NR7	44.65	16.37	4.41
NR45	66.86	35.29	4.41
FE15	35.50	16.78	3.53
Special FE15	33.57	13.03	3.53
FE18	40.45	17.13	3.53

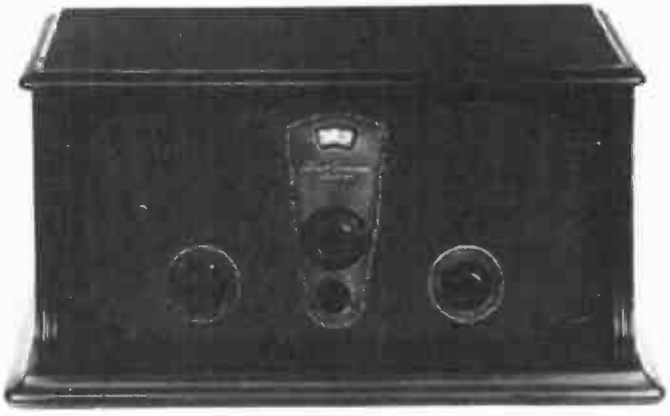
The plant at Junius St. and Liberty Ave., East New York, Brooklyn.

Radio Dealer (April 1926), p. 106



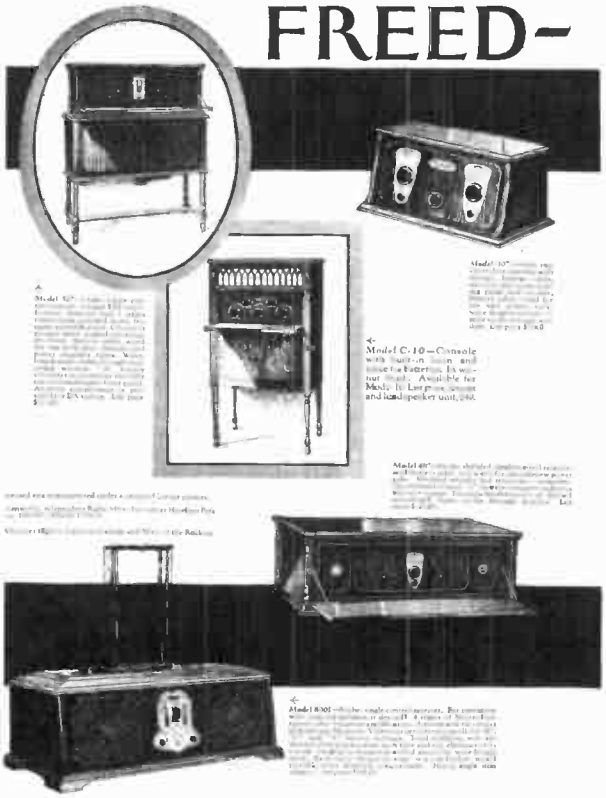
30 Earle Drake

50



40 Henry Harder

FREED-EISEMANN



FREED-EISEMANN

THE RADIO OF AMERICA'S FINEST HOMES

Now—in Radio, too, *Social Prestige* has been established

ONE AUTOMOBILE — *one* piano — *one* organ —stand in the public mind as the summit of excellence and *social recognition*. Now, among radios, *one* has reached the same eminence. That Radio is the FREED-EISEMANN. It was selected by the United States Navy for use on the President's yacht, the Mayflower. Today, the blue book of FREED-EISEMANN users is the "Who's Who" of each community. ¶The amazing advances made in the new FREED-EISEMANN sets have still further intensified FREED-EISEMANN leadership. Think of it! Complete metal shielding from outside interference. Single control. Steel chassis construction. Superb cabinets. All sets can be run from house current with FREED-EISEMANN power units. And, in addition, this year the economies of vast production give you FREED-EISEMANN quality at a new schedule of low prices that set a new standard of radio values.

Table models beginning at $60

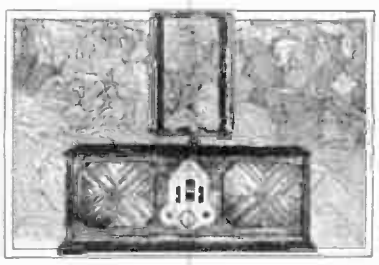
Beautiful console sets: $95 *to* $650

Prices slightly higher in Canada and west of the Rockies

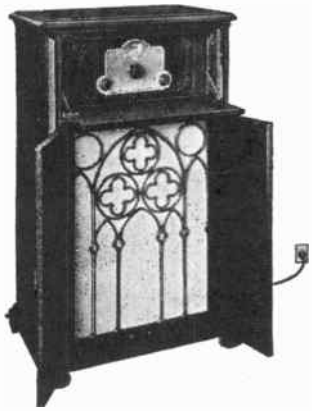
You may have a free demonstration in your own home. Pay on convenient terms if desired.

Model C 40, *Illustrated above.* 6-tube shielded single control receiver. Pressed steel chassis. Beautiful Loud Speaker Console. Price less Loud Speaker Unit $150. Table model of same set $85. Licensed under a group of Latour Patents.

Model 800, *Illustrated below.* Loop set. No antenna, no ground wires. 8 tubes. Four stages tuned radio frequency. Single control. For the first time Hazeltine Neutrodyne and Latour inventions combined in one superlative set. List Price $385. In superb Renaissance cabinet $650.



FREED-EISEMANN RADIO CORPORATION • *Junius Street and Liberty Avenue* • BROOKLYN • NEW YORK



ELECTRIC!

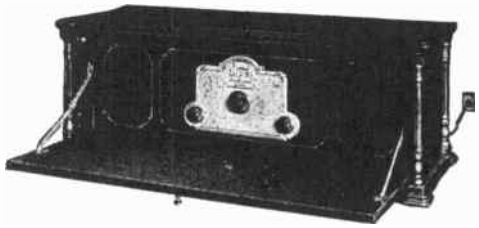
Caswell-Runyan Console C-4—Spanish straight line cabinet. Unusually heavy construction. Stump walnut finish. Contains 84-inch phonic-type horn capable of delivering the finest tonal reproduction and unusual volume on both high and low notes. A cabinet of rare grace. **List Price, cabinet C-4, including loud speaker unit . . . $100.00**

It is pictured with Model Electric 11, making a complete electric console set.

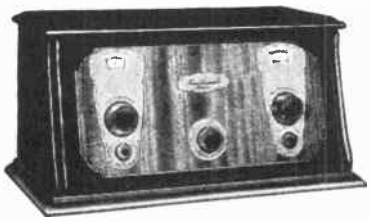
MODEL 800-C-8—This novel 8-tube set can be moved from room to room. Has four stages Neutrodyne TRF. Beautiful Renaissance cabinet. Illuminated rotating drum designates station settings. Complete interstage shielding and individual tube shielding. Embodies the latest advances in radio engineering. List Price $395.00

Caswell-Runyan Console C-1—A full-size graceful Tudor cabinet, finished in figured walnut. Violin-wood tone chamber. Handsome cross-bar affords additional leg support. Metal drop pulls. **List Price, cabinet C-1, including loud speaker horn, less unit . $40.00**

Set pictured in cabinet is model NR-9, a 6-tube Neutrodyne receiver.



ELECTRIC 11—Genuine electric receiver using standard tubes and only one additional tube. (No batteries, chargers, chemicals or dry cell tubes.) This 6-tube receiver has 3 stages of Neutrodyne TRF, one of which is inductively tuned. New Freed-Eisemann "Inductor" is incorporated. Audio frequency stages are supplemented by output transformer. Complete metal shielding. **List Price $225.00**



MODEL NR-8—Six tubes, two controls, two stages Neutrodyne TRF and one stage inductively tuned Neutrodyne radio frequency. Complete metal shielding. Equipped with New Freed-Eisemann "Inductor". Mahogany cabinet. List Price $90.00

MODEL NR-66—Single control, 6-tube Neutrodyne. Three stages Neutrodyne TRF (the first stage inductively tuned). Each radio stage completely shielded in separate metal compartment. Equipped with New Freed-Eisemann "Inductor". List Price . . . $125.00

Caswell-Runyan Console C-3—Jacobean period secretary, figured walnut finish. The very newest in radio cabinet design. Accommodates all necessary equipment. Rigidly constructed. Comes equipped with phonic-type (coiled) sound chamber, noted for exceptional tone quality. **List Price, cabinet C-3, including loud speaker horn, less unit $70.00**

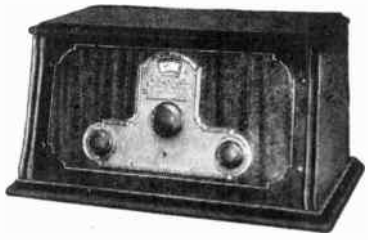
Set pictured is model NR-8, a 6-tube Neutrodyne

MODEL NR-77—An advanced 7-tube, single control Neutrodyne receiver. Four stages Neutrodyne TRF and two stages audio frequency supplemented by output transformer. Equipped with Freed-Eisemann "Inductor". Each radio stage individually shielded. Audio frequency stages in separate metal compartment. New type loop. List Price (including loop) $175.00

Caswell-Runyan Console C-2—Full-size luxurious Early American period cabinet. Heavily constructed. Finished in figured walnut. Violin-wood tone chamber having splendid acoustical properties. Handsome wooden cross-bar affords additional leg support. **List Price, Cabinet C-2, including loud speaker horn, less unit $55.00**

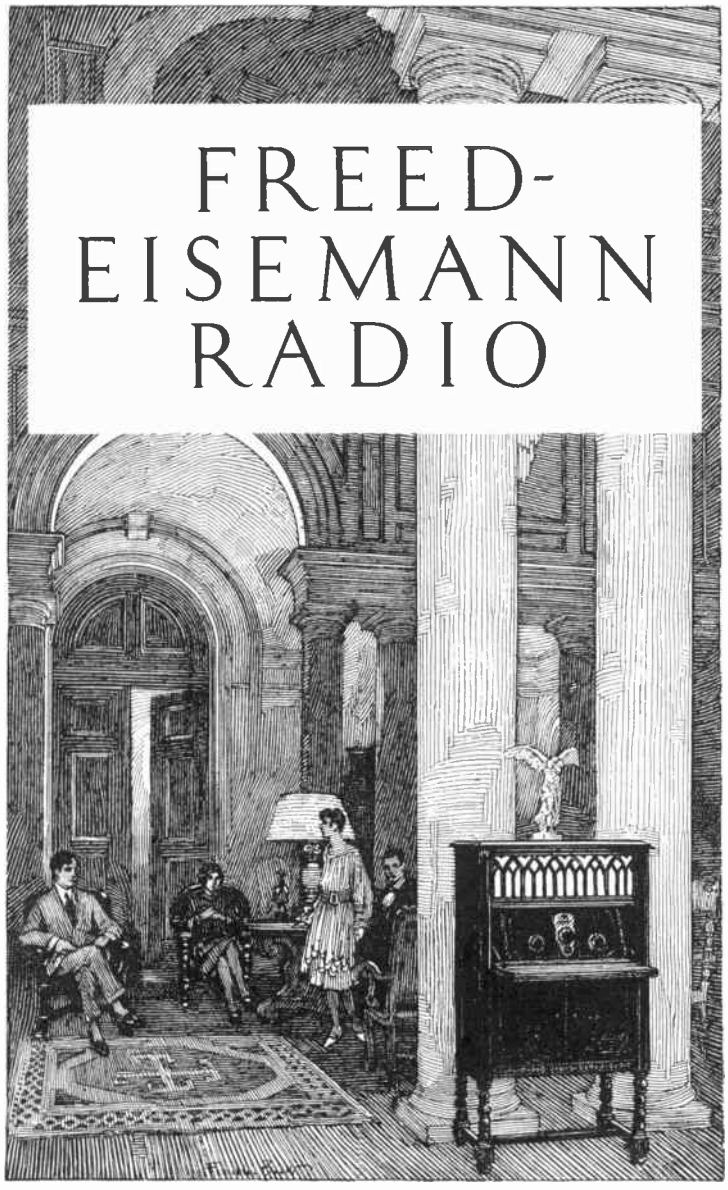
Set pictured in cabinet is model NR-9, a 6-tube Neutrodyne.

MODEL NR-9—Six tubes, single control. Three stages Neutrodyne TRF, one of which is inductively tuned. Complete metal shielding. Equipped with New Freed-Eisemann "Inductor". List Price . $100.00



(not shown) 411 Sept. 1927 $100 NR-11 (11) dropped to $125 in Sept.

Radio Retailing (June 1927), pp. 164-165



FREED-EISEMANN RADIO

THE PREFERRED RADIO—
In homes where leaders meet

$60 *and up for table sets* **$95** *and up for console sets*

Prices slightly higher in Canada and west of the Rockies

IN the splendid residences of Park Avenue, in New York, Lake Shore Drive, in Chicago, and even distinguished streets of foreign capitals, the radio you will find is FREED-EISEMANN.

That FREED-EISEMANN has brought radio to its utmost refinement is witnessed by the fact that it was selected by government experts for installation on the President's yacht, the Mayflower, and that it was the only American radio ever awarded the gold medal at a European International Radio World's Fair.

A vast new plant has effected startling economies in production and has yet been able to maintain that sterling quality for which its makers have won an envied reputation.

Illustrated above is Model 40—C-30—$135. Table model same set, $85. Licensed under Latour patents.

For free demonstration write your name and full address in margin below.

Only in the Freed-Eisemann Radio

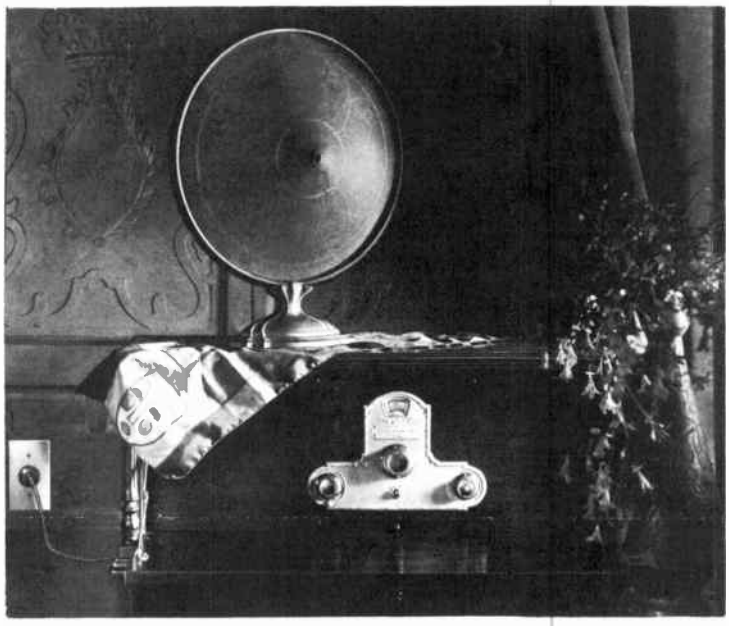
will you find all these features at such remarkably low cost

Complete metal shielding from outside interference. One tuning control instead of three. Steel chassis construction. Superb cabinets. All sets can be run from house current with Freed-Eisemann power units.

FREED-EISEMANN RADIO

Freed-Eisemann Building, Brooklyn, New York

Saturday Evening Post (December 18, 1926), p. 70



NR-57 Nov. 1927 $145 *flyer*

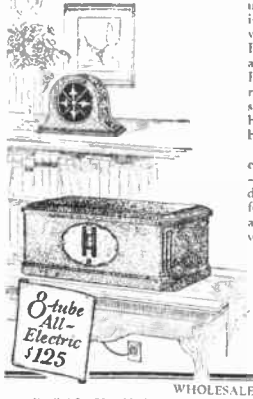
Whether Your Home Has

A.C. or D.C.

ALTERNATING CURRENT — DIRECT CURRENT

FREED-EISEMANN RADIO

The Broadcasting Tone



Ask Your Dealer for FREE HOME DEMONSTRATION

NEW YORKERS should understand that there are two kinds of electric current used in this city, and an electric radio which is designed to work on one kind will not work on the other. For this reason, Freed-Eisemann makes both direct current and alternating current models of the Great Eighty, so all of New York can enjoy the radio of America's finest homes. This foresight for your satisfaction is what you get by buying a radio that has been famous since broadcasting began.

The Great Eighty gives you all-electric and easy operation, low price, beautiful cabinets—hammered silver effect, walnut, or hand-decorated to match any scheme of home-furnishing—and a tone so sweet and natural and truly musical that you can rest and relax when Freed-Eisemann plays. This is the greatest blessing of radio. Without it no set can bring you its real joys. Hear a Freed-Eisemann in your own home—free!

FREED-EISEMANN RADIO CORPORATION
Brooklyn, New York

"Builders of Fine Radio Since Broadcasting Began"

WHOLESALE DISTRIBUTORS

New York City & Long Island — WHOLESALE RADIO EQUIPMENT CO., 902 Broadway, New York City; G. I. SEIDMAN AUTO & RADIO CO., INC., 1160 Bedford Avenue, Brooklyn, 245 West 58th Street, New York City

Westchester & Putnam Counties — COUNTY ELECTRIC SUPPLY & RADIO CORP., 225 So. Broadway, Yonkers, N. Y.

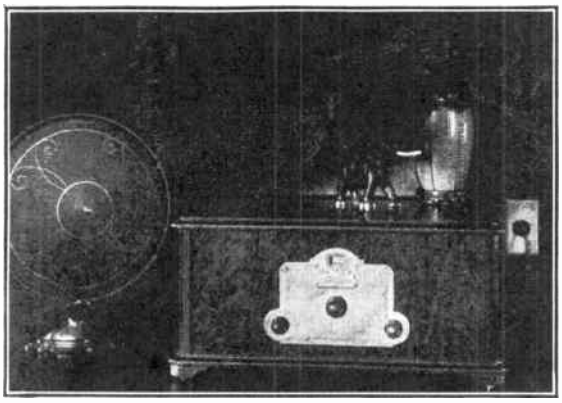
Northern New Jersey — WHOLESALE RADIO EQUIPMENT CO., 90 Washington Street, Newark, N. J.; FEDERAL RADIO & ELECTRIC CO., 90 Hamilton Avenue, Paterson, N. J.

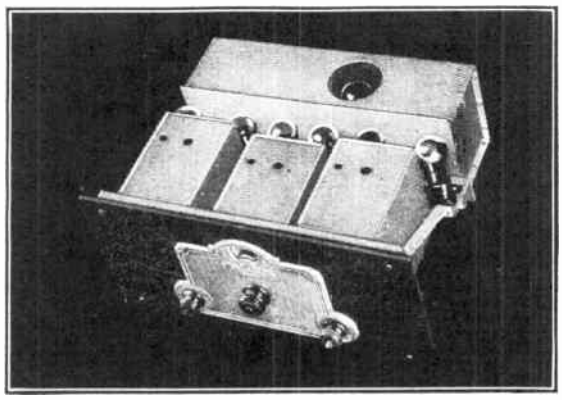
Herald-Tribune (July 29, 1928), p. 5

NR-80 June 1928 $125 or $135

One wood, three metal table cabinets.

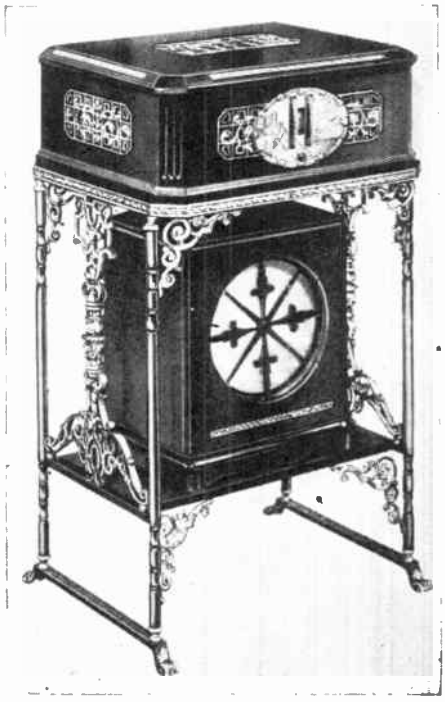
Short technical articles in *Citizens Call Book* vol. 10 no. 4, Nov. 1929, p. 90 and *Radio Broadcast*, Nov. 1928, p. 42.





Radio Retailing (Dec. 1927). p. 20

NR-60 Nov. 1927 $160
Technical article in *Radio Broadcast*, Feb. 1928, pp. 299-301.

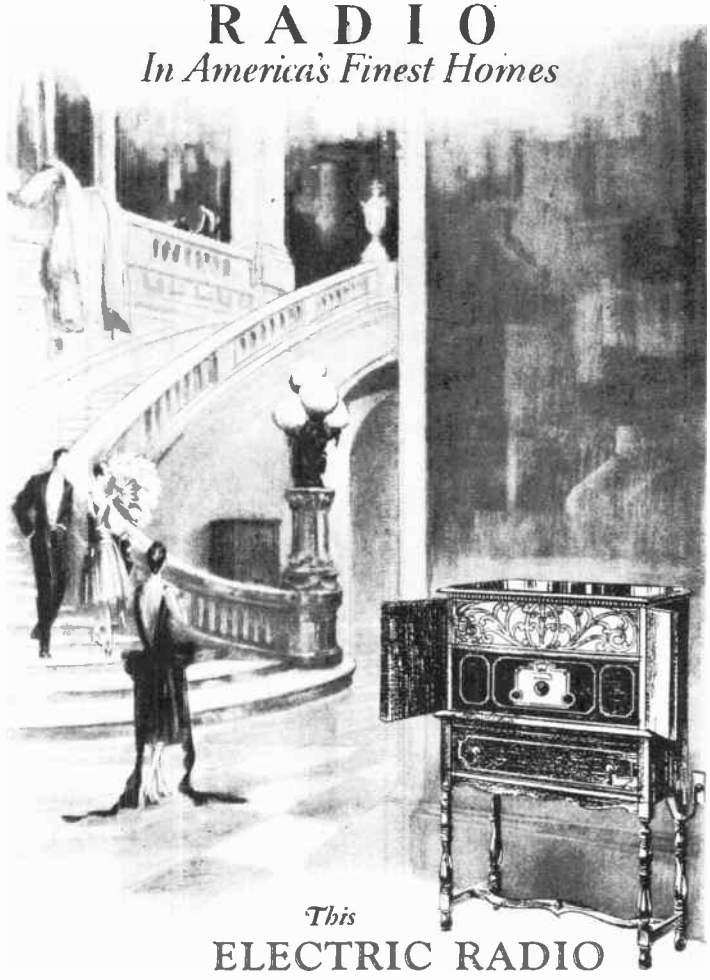


Radio Dealer (Sept. 1928). p. 57

NR85 Aug. 1928 $160
2 metal table cabinets.

FREED-EISEMANN RADIO

In America's Finest Homes



This
ELECTRIC RADIO
is creating a nation-wide SENSATION

Acclaimed by scientists, welcomed by the public, the new Freed-Eisemann Electric Radio is being talked about from coast to coast. Entirely free from batteries and battery cares. Plug in on any A. C. light socket—it plays at the snap of a switch...Just telephone your nearest Freed-Eisemann dealer to arrange for a demonstration in your own home without the slightest obligation.

$60 and upwards

Prices slightly higher in Canada and West of the Rockies

Console Cabinets by Caswell-Runyan

Freed-Eisemann Radio Corporation

BROOKLYN Licensed under patents of Latour, Hazeltine-Neutrodyne, and Radio Corp. of America NEW YORK

In addition to quality radio apparatus, Freed-Eisemann acoustical engineers have developed a new device which will convert your old phonograph into the new phonic type. Simply replace old mica sound box with new Freed-Eisemann reproducer. The results will amaze you. Fits any make. If your dealer cannot supply you, send us your check or money order and his name. Price $7.50

Saturday Evening Post (Nov. 19, 1927). p. 153

$172.50
(less tubes)

MODEL NR-79

8-Tube NEUTRODYNE for house-current operation. Push-Pull amplification. Four tuning condensers. Uses 245 type tubes for richness of overtone reproduction. Electro-Dynamic Speaker. Self-enclosed Highboy Console of Walnut veneer.

THE entire Freed Line is designed with an eye to meet the competition you will have this season.

In demonstrating any Freed Model to a prospect you can truthfully say:

"Here is a set which in those essential parts—chassis and speaker—represents all that Radio has to offer. Notice the absolutely lifelike tone, which gives you the program *just as the microphone gets it*. The beauty of the cabinet speaks for itself. And now that you have heard what Freed Radio can do, I have an agreeable surprise for you. If you are familiar with the prices of other good radios, you will realize that this Freed Model offers you value which has never before been available."

Freed Radio will convincingly substantiate your claims as to Freed performance. Freed prices furnish you with a most effective argument to clinch the sale.

There may be a Freed Dealer Franchise available in your territory. Write or wire us for information and an outline of our national advertising campaign and our comprehensive co-operative retail selling plan.

FREED-EISEMANN RADIO CORPORATION
122 East 42nd STREET, NEW YORK CITY

A Division of Chas. Freshman Co., Inc.
Canada: Freshman, Freed-Eisemann Radio, Ltd., 20 Trinity St., Toronto, Ont.
Prices slightly higher in Canada.

$225
(less tubes)

MODEL NR-95

9-Tube NEUTRODYNE for house-current operation. De luxe model, embodying many exclusive features and using 245 type tubes. Push-Pull amplification. Electro-Dynamic Speaker. Remarkable selectivity is accomplished by a special Antenna Tuning Circuit. Magnificent Highboy Console of Walnut veneer.

Radio Retailing (June 1929), p. 227

FREED RADIO
gives you the program
JUST AS THE MICROPHONE GETS IT

$145
(less tubes)

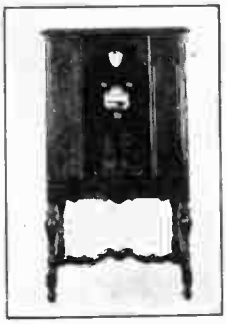
MODEL NR-78

8-Tube NEUTRODYNE for house-current operation. Push-Pull amplification. Four tuning condensers. Inductor Dynamic Speaker. Walnut veneer Console, with two-tone panels. Uses 245 type tubes.

Gertrude and Robert Freed

Freed Model NR-90

Model 90, an eight tube receiver, employing four 224 tubes and two 245's, is the latest product of the Freed-Eisemann Radio Corporation, 122 E. 42nd St., New York City. An automatic tuning device is a feature of this set. A station is tuned by sliding the indicator arm to the tuning point, which is marked on the cellulose scale, and pulling the knob out. Ten station numbers may be written on the illuminated scale. The cabinet is made of walnut veneer. Price, $182.50.—*Radio Retailing*, October, 1929.



$99.50
(less tubes)

MODEL NR-55

8-Tube NEUTRODYNE for house-current operation. Push-Pull amplification. Inductor Dynamic Speaker. Cabinet of Walnut veneer

Howard Freed

Leo Freed, mid-1929

53 Aug. 1929 $55 (not shown)
56 Aug. 1929 $75 (not shown)

Tune in the
FREED ORCHESTRADIANS
Phil Spitalny, conducting
Tuesday Evenings on WJZ and associated N. B. C. stations

The Singer's Living Voice

PERHAPS you think you have heard "good radio." But unless you have heard the new Freed Radio you do not know the full possibilities of modern broadcasting. Tune in the program of some great operatic star. Those glorious, golden tones! That swift uprushing of winged sound! Those tender, fragile notes, so faint that they are sensed rather than heard! You hear them all. You hear this living voice just as though you were sitting in a box at the opera.

What is the secret of Freed Radio's lifelike re-creation of any kind of program just as the microphone gets it? That secret lies in a chassis and speaker which represent all that Radio Science has to offer—in a sensitivity like that of the human ear itself.

And yet, Freed Radio is far from being the most expensive set on the market. Compare it with others and see for yourself.

Give your local Freed dealer an opportunity to demonstrate something unique in tonal fidelity—something unusual in cabinets, designed by master craftsmen—and at most attractive prices for such an exceptional quality product. Drop us a postcard for your dealer's name and complete catalog.

MODEL NR-78 (less tubes) $145

8-Tube NEUTRODYNE for house-current operation. Push-Pull amplification. Four tuning condensers. Inductor-Dynamic Speaker. Walnut veneer Console, with two-tone panels. Uses 245 type tubes.

Inquiries from foreign countries may be addressed to the Export Department, Freed-Eisemann Radio Corporation, 122 East 42nd Street, New York.

MODEL NR 95 (less tubes) $225

9-Tube NEUTRODYNE for house-current operation. De luxe model, embodying many exclusive features and using 245 type tubes. Push-Pull amplification. Electro-Dynamic Speaker. Remarkable selectivity is accomplished by a special Antenna Tuning Circuit. Magnificent Highboy Console of Walnut veneer.

FREED-EISEMANN RADIO CORPORATION
122 East 42nd Street, New York City, (A Division of the Chas. Freshman Co., Inc.)
Canada: Freshman Freed-Eisemann, Ltd., 20 Trinity Place, Toronto
Prices slightly higher in Canada

Famous Since Broadcasting Began

FREED RADIO

Radio Manufacturers in New Plant Soon

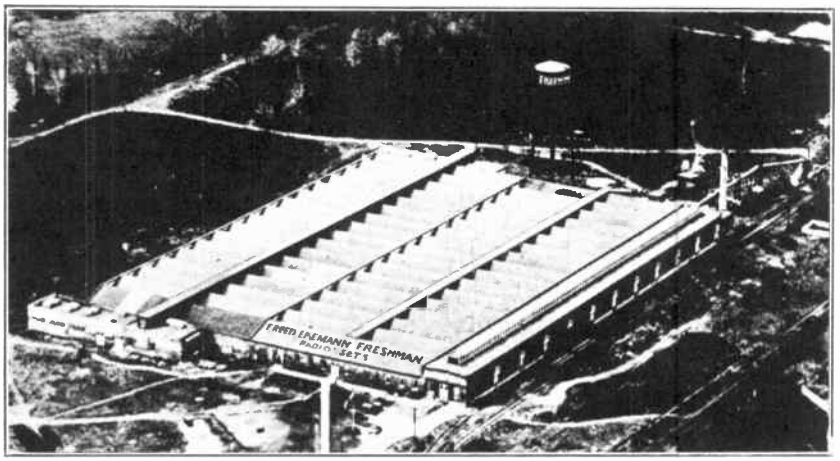
Freshman-Freed-Eisemann Companies to Start Operations in Clifton, N. J., in Near Future—Six Acres of Space

Present plans announced by Clarence A. Earl, president of the Chas. Freshman Co., Inc., and chairman of the board, Freed-Eisemann Radio Corp., indicate that the two companies will be located in their new plant at Clifton, N. J., within the next forty-five days.

The new plant, shown in the airplane view attached, is located twelve miles from New York City and in the center of the labor markets of Newark, Paterson and Passaic, N. J. Six acres of floor space on one floor, saw-tooth roof construction, and fireproof throughout, are features of the building. It is located on the Erie Railroad.

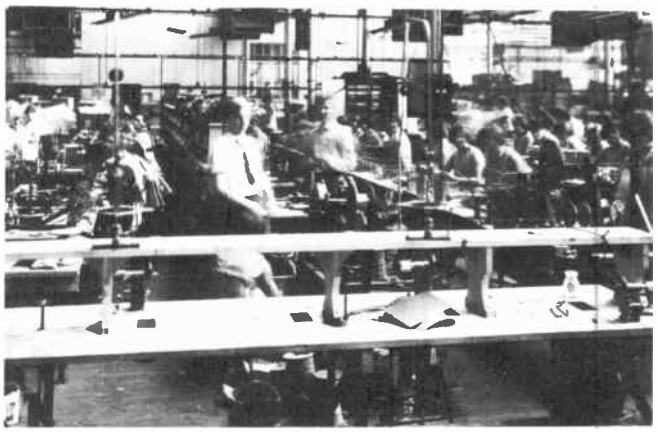
The consolidation of the Bronx, Brooklyn and East New York plants of the pioneer radio manufacturing concerns, according to Mr. Earl, will result in a tremendous saving in rental, overhead and efficiency, amounting to several hundred thousand dollars a year under present operation expenses.

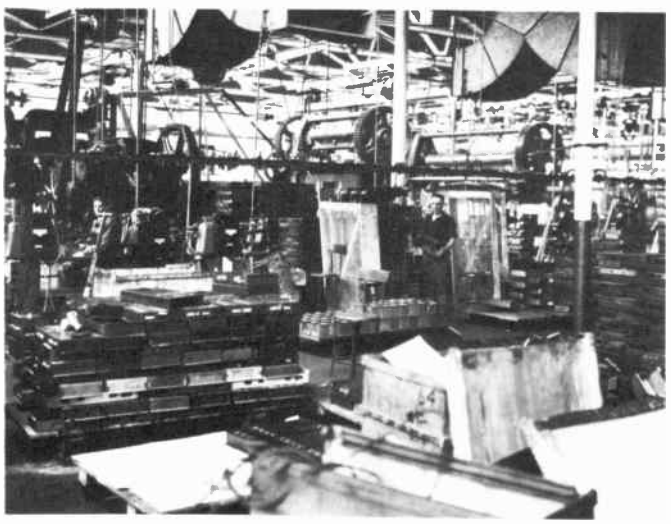
"The economical layout of this new factory will enable us to decrease costs and expenses for operations, and will effect a large increase in our volume of business for the year 1929," added Mr. Earl.

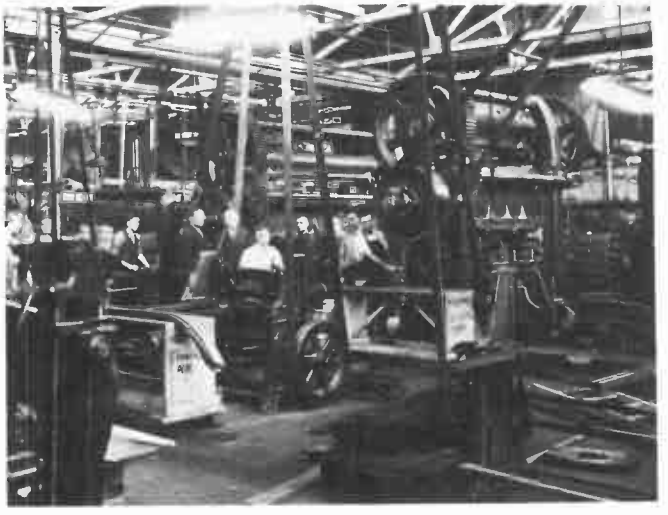


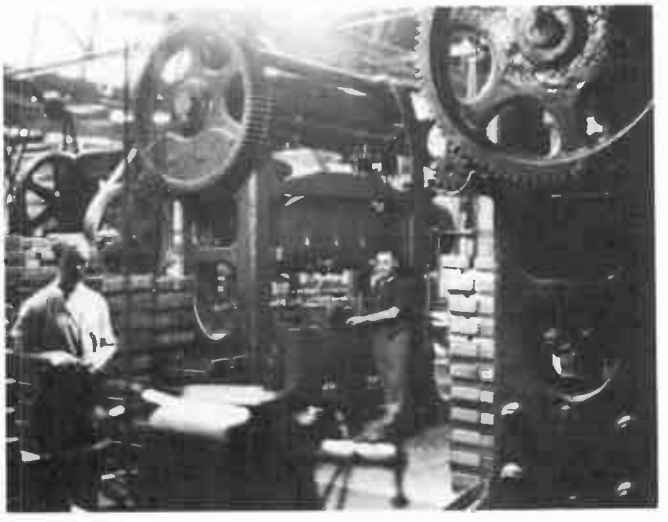
New Freshman-Freed-Eisemann Plant at Clifton, N. J.

Talking Machine World (April 1929), p. 49

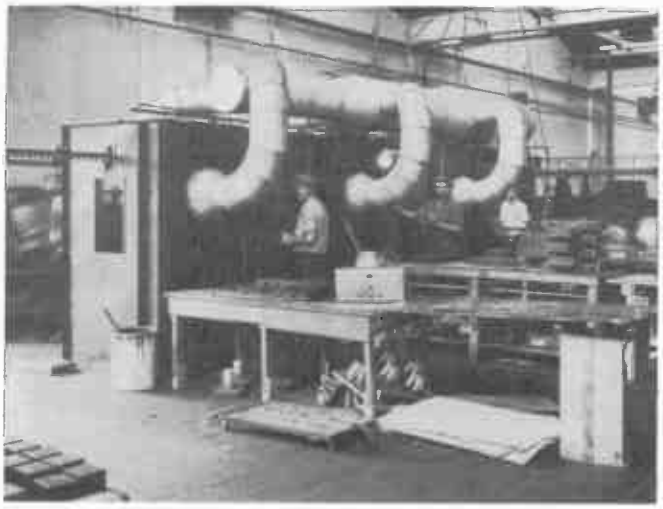


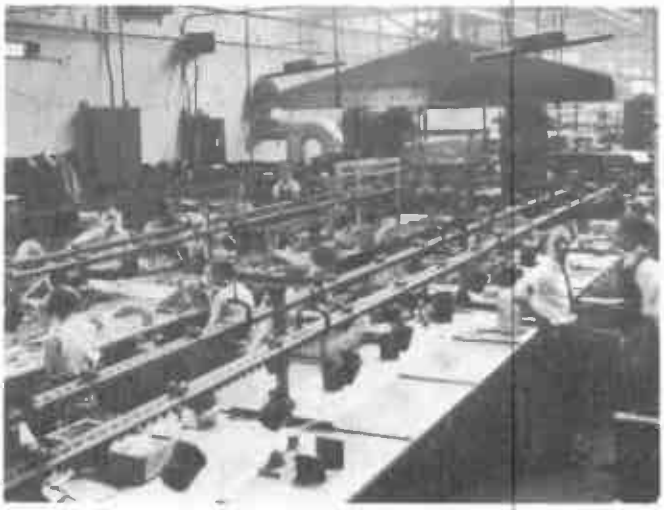






Photos from the Freed-Eisemann factory, Allwood, N.J., showing some of the employees in 1928. (*Howard Freed archives*)





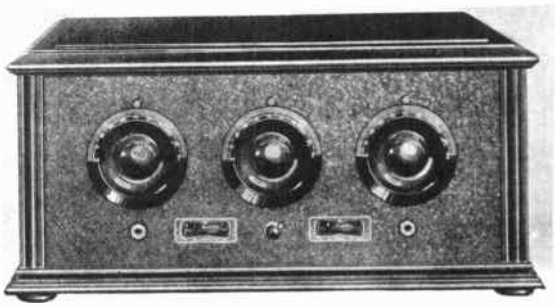
EISEMANN

Eisemann Magneto Corporation

QST (April 1924), p. 77

The Eisemann Magneto Corporation had no connection with Freed-Eisemann. It began in 1903 as a sales agency of Ernst Eisemann & Co. of Stuttgart, Germany, makers of automotive magnetos. Between 1915 and 1930, the company's gross sales of ignition products ranged between $1.5 and $3 million per year.

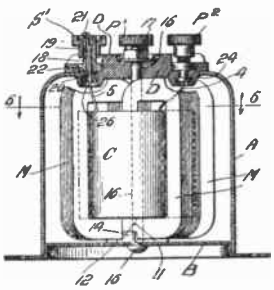
Eisemann entered the radio market in August, 1923, with a comprehensive line of high)quality components, followed by the $110 Model RF-2 in March, 1924, and the 6-D in October before abandoning radio to return to magneto manufacture. The company existed at least until 1940.

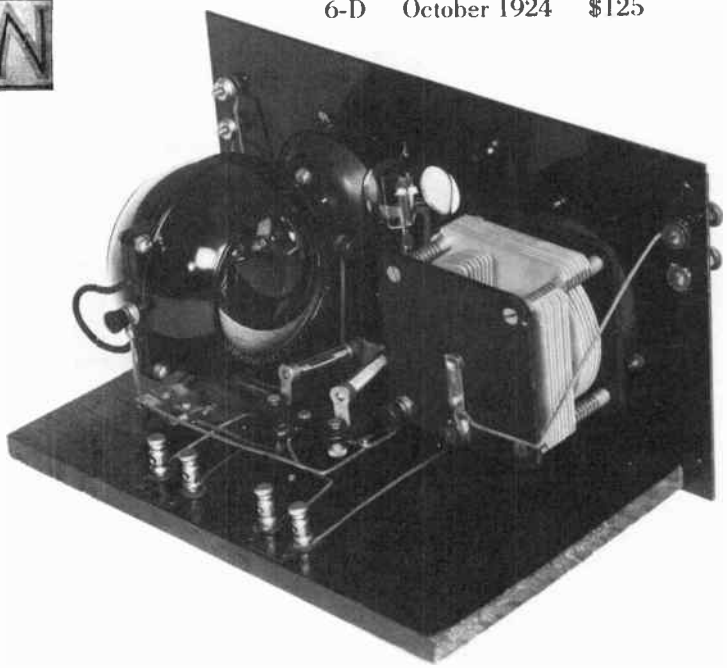


Radio Broadcast (Oct. 1924), p. 31

6-D October 1924 $125

1,585,158. RADIOTRANSFORMER. STANLEY D. LIVINGSTON, New York, N. Y., assignor to Eisemann Magneto Corporation, Brooklyn, N. Y., a Corporation of New York. Filed Dec. 21, 1922. Serial No. 608,215. 2 Claims. (Cl. 175—361.)





A one-tube homebrew built with Eisemann parts.

They said it couldn't be done!

HERE it is at $60

A 5-TUBE SET

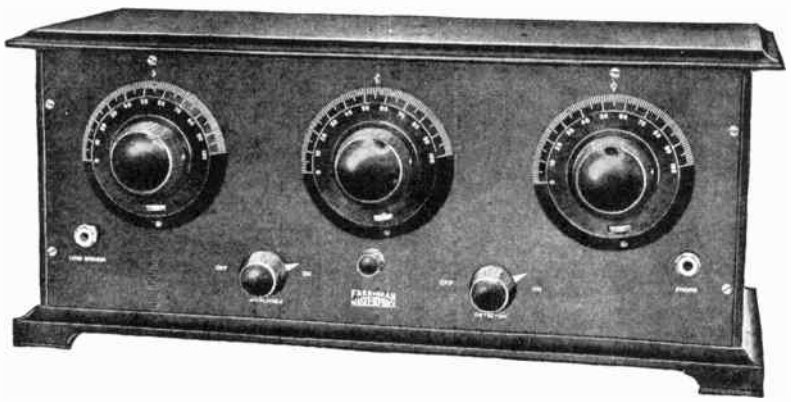
Clarity
Beauty
Volume
Distance
Selectivity

built of the finest low loss material and in a beautiful genuine solid mahogany cabinet at only *sixty dollars.*

Ask your dealer for a free demonstration
Complete literature gladly sent on request

FRESHMAN MASTERPIECE

No neutralizing or balancing condensers to fuss with. Self-balanced—low loss.



A Tuned Radio Frequency Receiver

that will bring even the most distant stations to your home with surprising clarity and volume. So selective that you can pick up any station you want—night after night—at the same dial settings, and, what's more, it is the easiest set in the world to operate.

Chas. Freshman Co., Inc., 106 Seventh Ave., New York

FRESHMAN

Chas. Freshman Co., Inc.

Before Charles Freshman was forty, he had made and lost several millions. Born in Chicago, educated at the College of the City of New York, Freshman was the "rubber king" before determining to retire and enjoy life, but as much as he liked play (he was called "radio's greatest sport," surpassing even Atwater Kent), he found he preferred business to idleness.

Becoming fascinated by radio after hearing the play-by-play of the 1921 World's Series, he began manufacturing radio condensers and antennas by June, 1922, incorporating the Charles Freshman Company in July. During a series of moves to larger and larger quarters over the next two years, he added crystal detectors, variable grid leaks, and other parts to his line, all designed by his engineer, Albert W. Franklin. He also backed Elman Myers in tube manufacturing when Myers was enjoined from making them in the U.S. and set up a plant in Montreal, Canada.

During 1923 and early 1924 as the Neutrodynes and Atwater Kent's three-dial TRFs took over the market, Freshman saw his opportunity. Rather than use the comparatively expensive methods of neutralizing or of potentiometer bias control, his engineers hit on the ingenious scheme of mounting the RF transformers so close to the metal-frame tuning condensers that the eddy-current losses would reduce the amplification and keep the set from oscillating. Of course this wasn't very efficient, but it worked, and, what mattered to Freshman, it was cheap. By cutting corners wherever possible, he was able to market his "Masterpiece" at just $60, while some of his dealers trimmed even that price. Kits were only $17.50.

Designed around May, 1924, and in production by August, the Masterpiece had swept the low-priced market by Christmas, spawning countless imitations over the next two years. From August until the following February, Freshman made 125,000 Masterpieces and kits, grossing $494,322, or more than for the entire year of 1923 ($400,977). In 1924 Freshman took in $2.1 million, of which $754,000 was profit.

As with many radio companies in this period, such performance attracted Wall Street investors. The company reorganized in December, 1924, and offered stock, though not enough to jeopardize Charles Freshman's personal control; a large block was bought by Walter P. Chrysler, acting for the Anthony N. Brady estate (this will figure in the story later).

For the next few months, Freshman, like most radio companies, marked time, though the company had rather more defective sets being repaired than most — 150 to 200 per day. The troubles were in the audio transformers and particularly the rheostats, whose suppliers were changed almost weekly in December in Freshman's quest for the lowest possible price. Freshman quickly won a reputation in the industry for repudiating suppliers' contracts, legally or otherwise, when it was to his financial advantage.

Talking Machine Journal (Sept. 1929), p. 97

Charlie Freshman

"The Masterpiece is made to sell — and sell quick — while it can be sold — for even the public learns, if but slowly." So said the editor of *Radio Retailer & Jobber* which, needless to say, did not get any of Freshman's advertising! Inspectors had to pass 100 sets per day or be fired, but they were also fired if they passed any defective ones.

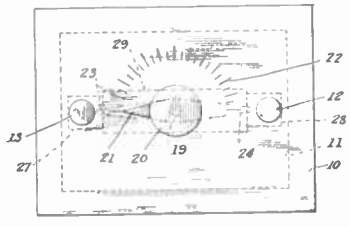
For the 1925-26 season, Freshman had even more ideas to make money. First he cut out his jobbers, selling directly to dealers and shaving a few percentage points off their prices. As he had always concentrated on the city trade, this didn't seem to affect his distribution, though there were many who predicted failure. Next, Freshman introduced, under the name "Polydyne" but

with the same factory address, a set exactly like the previous season's model, to be sold by department stores, undercutting his own dealers, who were understandably furious. Still, Freshman rolled merrily along; by September he was turning out 1000 sets per day, and by November 2500: 2000 of the $60 model with speaker, and 500 Polydynes. Production cost was stated in June to be $18. His planned production for the season was 300,000 and may very well have reached that figure. Sales for September through December steadily climbed: $676,000; $1.3 million, $1.7 million; $1.8 million; and for the entire year of 1925, $7.3 million, with a profit of $1.6 million (much less, as a percentage, than for 1924).

By February 1926, as was the custom, only repair men were at work in the factory, though ads began appearing for the 1926 line; 300,000 sets again were planned. Sonora agreed to deliver console cabinets at its cost of $20.50 throughout the summer, to keep its work crews together, and to insure that his dealers bought them. Freshman discontinued the cheaper models in July. Sales peaked somewhat earlier in 1926 than in 1925: $250,000 in June, $1 million in September, and $1.5 million in October for a total of $7 million for the year with $801,000 profit. Production in November was reported to be 1000 sets per day, and in December only 400 sets, explaining why Freshman did not publicize sales figures for those months. By then, the three-dial models were positively old-fashioned, so he rushed the new single-dial models into production in March, making 1400 to 1600 sets per day in a brief flurry.

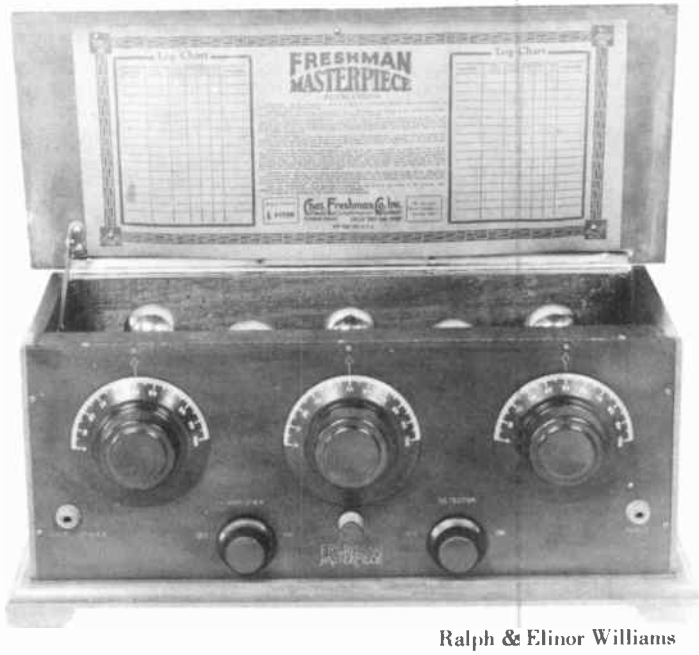
5-F-5 Ralph & Elinor Williams

1,599,225. VARIABLE GRID LEAK. ALBERT FRANKLIN, New York, N. Y., assignor to Chas. Freshman Co. Inc., New York, N. Y., a Corporation of New York. Filed Oct. 5, 1922. Serial No. 592,574. 2 Claims. (Cl. 201—55.)



1. An electrical apparatus comprising a dielectric plate, a conducting coating on one side thereof, terminals for connecting an electric current to the opposite ends of said plate, an elongated strip conductor pivoted centrally on said plate with its entire contiguous surface in constant electrical contact with the coated surface thereof, means for rotating said conductor to present its ends at different distances from the terminals.

After Splitdorf accepted an RCA license in March or April, 1927 and the rest of the industry began falling like tenpins, Freshman held out for a month, but a patent suit on April 23 persuaded him to sign up in June. Now required to use RCA tubes, he cancelled a contract with Arcturus for AC tubes after receiving 20,000 out of the 300,000 to 500,000 total, claiming that only one in a hundred tubes was good. He also began a pilot run of another 1500 AC sets, this time with RCA tubes; but before it could be completed (it took 40 to 60 days each time to procure the parts), he plunged right into a run of 10,000, trying to fill half of his incoming orders for 1200 sets per day. As fast as Freshman shipped them out, two to three hundred came back (the final figure was said to be 60%) with breakdowns in the power pack. The inevitable result: 900 employees were discharged in November.



Ralph & Elinor Williams

Masterpiece August 1924 $60
Described in *Radio Engineering*, Sept. 1924, pp. 236-237; *Radio Review*, May 1925, pp. 19-21; and *NY Telegram*, Oct. 30, 1926, p. 4.

Also in November or December 1927, Walter P. Chrysler arrived. Having invested heavily in the Freshman company, and convinced there was nothing wrong with it but inept management, he made some changes. He bought out vice-president Myron Goldsoll, who owned 37% of the original stock, for just under $1 million, then acquired more stock from chief engineer Franklin (who held 10%) to get majority control. As the stock's market price was dropping like a stone, and the company was in dire need of $500,000 cash, which only Chrysler could provide (having lost $461,000 on sales of $7.3 million in 1927), he had little trouble in acquiring all of Charles Freshman's stock, too, and for much less than Goldsoll had received. In April, 1928, former auto executive Clarence A. Earl was installed as president, while Charles Freshman was given an honorary position

The Tremendous Demand *for* THE FRESHMAN MASTERPIECE

having attained worldwide proportions, has compelled us to move into the brand new twelve story fireproof building at

240-248 W. 40th Street

"FRESHMAN BUILDING"

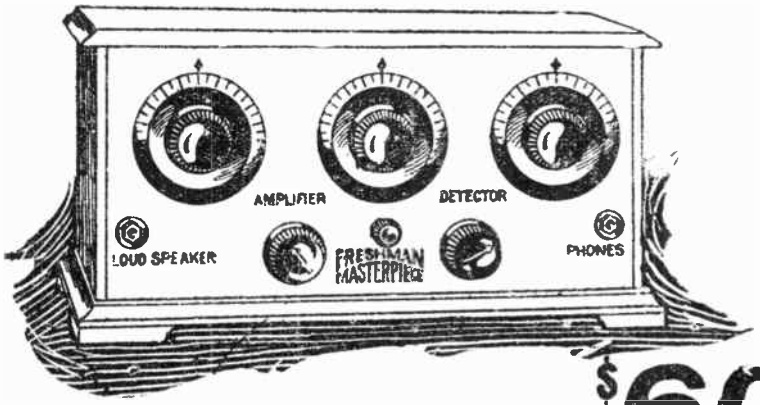
Equipped with every modern convenience for manufacturing efficiency, we shall be able to more than double our production within a very short time.

If your dealer can not supply you with a FRESHMAN MASTERPIECE FIVE TUBE TUNED RADIO FREQUENCY RECEIVER TODAY—

WAIT!

He will have some in a day or two. Don't be misled by unscrupulous dealers or distributors into buying an imitation or counterfeit.

A Five Tube Tuned Radio Frequency Set



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.

$60

Made of the finest low loss materials and in a beautiful genuine solid mahogany cabinet, that is attractive enough for the most pretentious room, and at sixty dollars economical enough for the most modest. It is without a doubt

The Greatest Value Ever Offered In a Radio Receiving Set

Combines all points essential to the perfect receiver. Real distance reception without that squealing and howling. So selective that once a station is picked up it can be brought in again at the same points on the dials, whenever you want it. And, what's more,

It Is Mighty Easy to Operate

CHAS. FRESHMAN CO., INC., FRESHMAN BUILDING, 240-248 W. 40th ST., NEW YORK

Sold BY Authorized Freshman dealers only

Model 5-F-2
Massive cabinet with sloping panel.
$39.50

Model 5-F-4
Genuine solid Mahogany. Sloping panel.
$49.50

Concert Model
Genuine mahogany contains full-throated loud speaker.
$75

Model 5-F-5
Built in loud speaker. A tremendous value.
$60

Model 5-F-6
With table. Solid mahogany, plenty of room for batteries, etc.
$82.50

The 1925-1926 Line of

New and Improved FRESHMAN MASTERPIECE

Five-Tube Tuned Radio Frequency Receiving Sets

For Dry or Storage Battery Tubes

THE WORLD'S GREATEST RADIO VALUES

are made possible by our improved manufacturing facilities and our policy of selling direct to authorized dealers.

A complete line of the world's most beautiful radio receiving sets, ranging from the improved 5 tube tuned radio frequency receiver at $39.50, up to the handsome Franklin Console, of vigorous lines and fine proportions, at $115.00.

Every Set Guaranteed To Be Mechanically Perfect

Every authorized Freshman dealer is equipped to give you the best of service and attention. Convenient terms arranged if you desire.

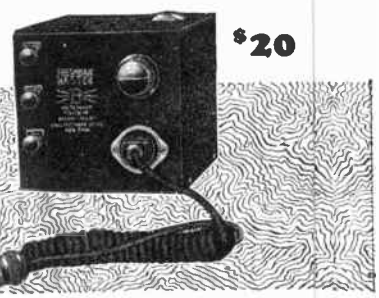
If there isn't an authorized dealer in your town write to either of our offices for information—mentioning the name of your local dealer.

Chas. Freshman Co. Inc.

Radio Receivers and Parts

FRESHMAN BUILDING
240-248 WEST 40TH ST.-NEW YORK.N.Y.
Chicago Office: 327 So. LaSalle Street

Franklin Console
Genuine mahogany, everything self contained. The most beautiful radio on the market.
$115



Master "B" Eliminator
Works from light socket—cuts out "B" batteries.
$20

Most of these models were probably made only with window dials, as in the ad on the facing page, and not the knobs pictured.

as chairman of the board (he was totally out by September). Franklin was shown the door, and his assistant George Eltz took over ("now, for once in its existence, The Charles Freshman Co. has a real chief engineer not a false alarm").

Freshman introduced a few low priced sets in 1928, enough to keep the company going, although it still needed another tranfusion of $1,125,000 in September from bankers. In November, it merged with Freed Eisemann, which also needed money. The idea was to combine Freshman's line with Freed-Eisemann's quality sets, moving both factories into one new facility to share overhead expenses. The Freed-Eisemann name was retained, but Earl replaced Freshman's with his own in July, changing the corporate name to Earl Radio Corporation. At last, the outlook was excellent: 2,000 employees, sales of $1 million in June, 1929; and steadily increasing production of 13,975 sets in June; 23,564 in July; 32,000 planned for August, 40,000 in September . . . .

Of course that's not what happened. After June, expensive sets stopped selling, the stock market crashed (Earl's treasurer, Warren Keyes, actually jumped from his 11th-floor hotel window on October 1), and Earl went into receivership on November 22, 1929. Efforts by Clarence Earl to find new financing failed, and the factory in Clifton, New Jersey, was sold in July, 1930, to a syndicate that intended to go back into production with low-priced sets, but apparently never did.

Radio Dealer (August 1925), p. 4

FRESHMAN Announces Another Sensation!

MODEL 6-F-1

New and Improved
FRESHMAN MASTERPIECE

The World's Greatest Radio Receiving Set

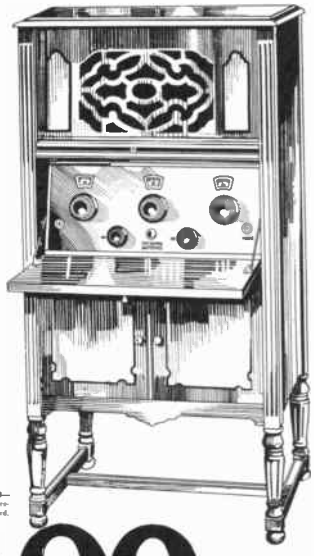
Freshman's latest sensation, illustrated here, has a real appeal to the women of the home. It is built of five-ply genuine mahogany; a handsome piece of furniture that fits in any corner of any sized room. It is compact and comparatively small, giving it preference over clumsy consoles. Contains an especially large tone chamber.

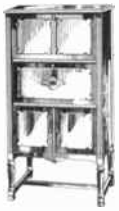
With Built-in Loud Speaker of Great Volume and Superb Tone

When not used as a radio, this console can be entirely closed. The top is stationary and provides an attractive resting place for vases and other ornaments. Spacious compartments afford ample room for all batteries, etc.—not a single wire being visible.

Chas. Freshman Co., Inc.

Freshman Building, New York
2626 W. Washington Blvd., Chicago





The Radio Receiver Women Have Been Waiting For

Here you see Model 6-F-1 entirely closed—real furniture for which no home is too pretentious and none too modest to afford.

Sold on Convenient Terms by Authorized Freshman Dealers, Who Also Install and Service Them.

Write for free illustrated booklet, describing this handsome console in detail.

$99.50

Radio World (Feb. 27, 1926), p. 32

Here Is FRESHMAN'S Greatest Accomplishment—

This BEAUTIFUL CONSOLE

This Wonder Set which is spreading entertainment, education and contentment in hundreds of thousands of homes in all parts of the world now has many additional points of superiority.

New and Improved
FRESHMAN MASTERPIECE
MODEL 6-F-3

A handsome piece of furniture made of carefully selected genuine five-ply mahogany. A radio receiver with the finest of built-in loud speakers, in a console model which provides ample room for all batteries, chargers, eliminators and everything else that could possibly be used in connection with a radio set. Not a single wire visible to mar the appearance of the room.

$69.50

Sold on Convenient Terms—

Now on display by all authorized Freshman dealers who will install and service them

Write for new 8 page folder illustrating and describing all 1926-27 Models

CHAS. FRESHMAN CO. Inc., Freshman Building, New York

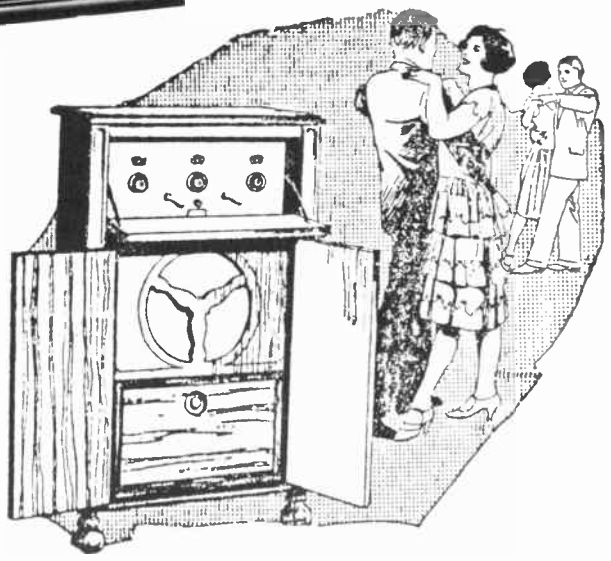
Radio World (March 27, 1926), p. 2

Radio Dealer (April 1926)

6-F-6 April 1926 $38.50

Not Shown:

6-F-5	Apr. 1926	$57.50
6-F-7	Apr. 1926	$38.50
6-F-9	Aug. 1926	$99.50
6-F-10	Aug. 1926	$99.50
6-F-16	Dec. 1926	$79.50



6-F-11, 6-F-12 Oct. 1926 $119.50
Technical article in *Popular Radio*, Nov. 1926, pp. 684-689.

Chicago Evening American (Oct. 12, 1926), p. 7

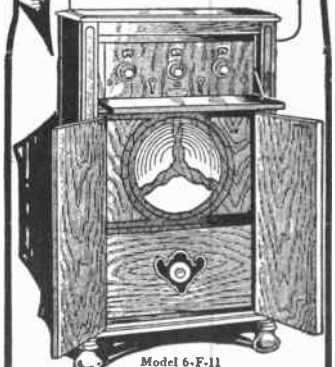
The MASTERPIECE OF MASTERPIECES

New and Improved
FRESHMAN MASTERPIECE

$119.50

The most perfect radio ever designed. Massive—beautiful; just what you want for your home. No matter how exquisite your furnishings are this genuine mahogany upright Console will lend additional beauty.

Sold on easy terms by FRESHMAN Dealers



Model 6-F-11

Our new 48 page book illustrating and describing the entire Freshman Masterpiece Line; Free on request.

Chas. Freshman Co., Inc., Freshman Bldg., New York
2626 W. Washington Blvd., Chicago

Capper's Farmer (Jan. 1927), p. 40

The Man Behind the Machine

In August 1924 a development occurred which revolutionized an industry then in its merest infancy, and pointed the way to a new sphere of progress which has since become the expression of greatest radio development, and the source of enjoyment and educational advantages to millions of people. That development was the introduction of a radio set at a low price—completely manufactured, in a serviceable neat cabinet. This set caught on quickly—its maker had great difficulty in meeting even a fraction of the orders that poured in, and countless imitators entered the field, to profit by the demand he had created.

The set was the Freshman Masterpiece, and the maker Charles F. Freshman. Today both the set and its maker are known throughout radiodom. But while many know the set and its performance, and know of the success it has brought to the man whose name it bears, few know of the man himself, or of the manner in which he built up the producing organization that now ranks as the largest individual producer of radio receivers.

How Freshman Entered Radio

Four years ago a man still on the sunny side of forty boarded a train for Florida, vowing never again to do a stroke of work. He had been highly successful in the rubber business in Akron Ohio, and he had determined to enjoy life while he was still young. He had worked hard from the time of his early youth.

He found that retirement for him was only an Elysian dream. He grew restless for active business again, and came back to the world of business in the North. Having been successful once, he was confident of being successful again, providing he could find a business that would appeal to him. With this in mind he started to investigate "business" and propositions which were submitted to him. He dabbled in real estate.

His entry into the radio industry came about as the result of hearing a play by play description of the 1921 World's Series broadcast by radio. In those days radio was far more of a marvel in the minds of those unfamiliar with its operation than is the case today. Charles Freshman sensed in this new scientific marvel an opportunity, one into which he could enter with roseate visions of achievement, a buisiness having unbounded possibilities.

He began the manufacture of parts for radio set builders in a dingy little loft building in downtown New York. Operations commenced in 1922, with a capital of $500,000.00. In 1923, the first full year of operations, gross sales had amounted to only $400,977.00. Freshman was building a firm foundation, but it remained for him to startle the whole world of radio in August of the following year.

The "Freshman Masterpiece" Appears

The introduction of the Freshman Masterpiece was aptly timed. The best period for broadcasting reception was just being ushered in—the holiday buying period just ahead. Freshman realized that while there were hundreds of thousands who had mechanical ability and the patience to construct their own radio receivers, there were millions who could and would buy a completely constructed set, at a reasonable price, needing only tubes, batteries and aerial for complete installation and operation.

The Freshman Masterpiece did just what its creator hoped and planned for it. It opened up a new avenue of radio sales, and the Freshman, being the pioneer, was the logical leader in this class of radio receivers. Orders poured in from all parts of the country, dealers vied with one another for the privilege of handling the set, and deliveries fell far behind the orders. This left room for competitors and imitators to achieve momentary success, yet there was such a field that this competition served to strengthen the position of the Freshman product.

Forced to Extend Production Facilities

This huge demand, and the inadequate factory facilities then available at the plant on Seventh Avenue, made the acquisition of additional factory space inevitable. The Freshman organization increased its capital, and obtained a location in the mid-town section of New York, at which point it centered its factory, sales, and administrative departments. Still there was insufficient space, and, prior to entering into production for the 1925 season, additional plants were acquired in the Bronx section of New York, and at Chicago.

At its Bronx plant, where more than 1,100 people are employed, between 2,000 and 2,500 receiving sets are turned out each day. Sets are finished at the rate of 5 a minute.

This plant has 56,000 square feet of manufacturing space, the mid-town plant has 40,000 square feet, and the Chicago plant 50,000 square feet—and additional space is being negotiated for, which will permit six units, each with production of 500 sets per day, to be in operation during 1926.

The factories are organized on an efficient production plan, a chart being kept showing the progress of each unit which keeps the employees working at high pace. The set moves evenly down the factory, taking only 45 minutes to get into the hands of the tester. The factory workers are in the position of having to dispose of the sets as they reach them, or be swamped.

An engineering staff is maintained at the Bronx plant, and a well equipped laboratory is provided, in which experimentol work is constantly being conducted for the purpose of working out improvements in the Freshman products.

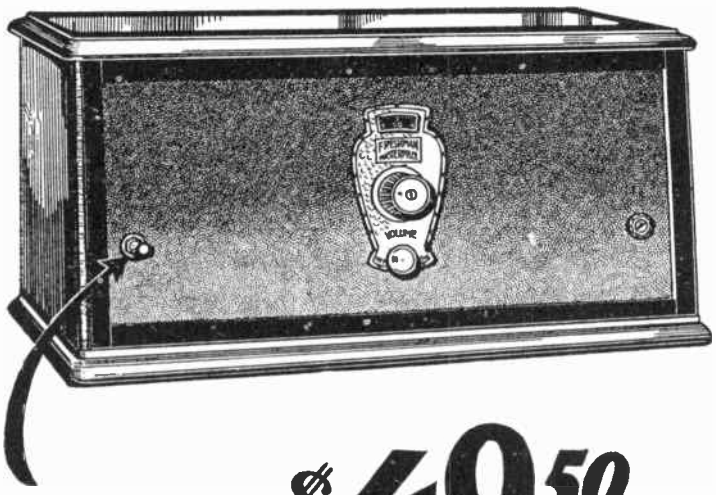
Freshman Tells His Method

Asked how he made such a whirlwind success in this new industry—radio—Charles Freshman said: "I surrounded myself with good men and paid them well. I would not have an associate who could not make money. In the radio business as in every other line it has been the survival of the fittest. We determined to be the Fittest."

Mr. Freshman, who was born in Chicago, and received his education in the public schools of Chicago and New York, and at the City College in New York, believes that most men can be successful if they only use their brains. Many think they are using all their brain power, he contends, when they are really only running on a few cells.

Mr. Freshman does not believe there is any saturation point in the radio industry just as there is none in the automobile, piano, or phonograph industries, as has been clearly demonstrated. The radio today, he says, is as much a commercial and educational factor as it is a pleasure machine. The farmer depends on his receiving set for weather reports and large numbers of people are receiving college educations over their radio.

a NEW radio that "gets" everything!
Six tubes ~ One control



MERELY turn the dial from point to point and station after station comes in separately, clearly and distinctly. The one dial is the only tuning device on this new Freshman Radio. Its amazing power allows stations from a great

Distance

to be tuned in right through the locals. Its superior construction and efficiency separate the different wave-lengths and tune out the undesired stations with startling

Selectivity

allowing you to listen to exactly the station that you desire without bother or interference and with fine

Tone Quality

which is the result of scientifically constructed audio transformers perfectly designed and co-ordinated to match this powerful radio.

$49.50

Distance

Distant stations often broadcast on exactly the same wavelength as locals. This new Freshman set is so powerful that it brings in stations from all over the country. Sometimes it is desirable to cut out the distant station broadcasting on the same wavelength as the local to which you are listening; if so, just pull out the distance switch indicated above.

Six tubes ~ One Control
FRESHMAN MASTERPIECE

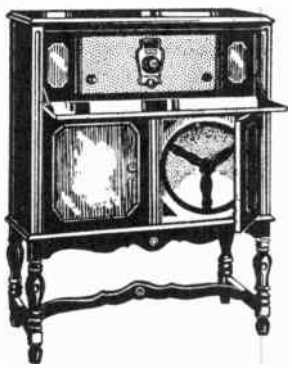
Hear it To-day

At any Authorized FRESHMAN Dealers Store

Operate it Yourself

Panelled in genuine mahogany. Built-in cone speaker. Spacious battery compartment **$79.50**

A distinctively beautiful radio panelled in genuine mahogany. Large built-in cone speaker **$99.50**



This massive console is panelled in genuine mahogany. 12-inch cone speaker..... **$109.50**

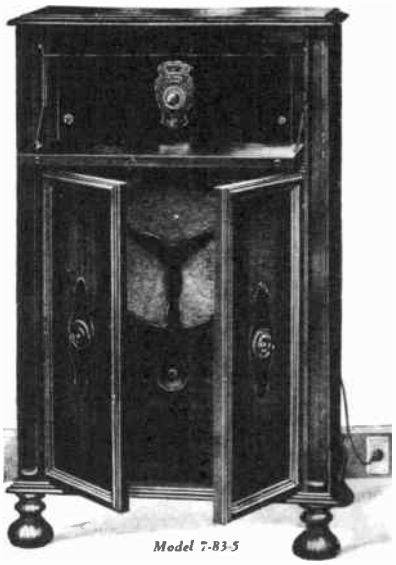
CHAS. FRESHMAN CO., INC., 240-248 W. 40TH ST., NEW YORK CITY

WORLD'S GREATEST RADIO

models 7-F-2, 7-F-3, 7-F-5, ?

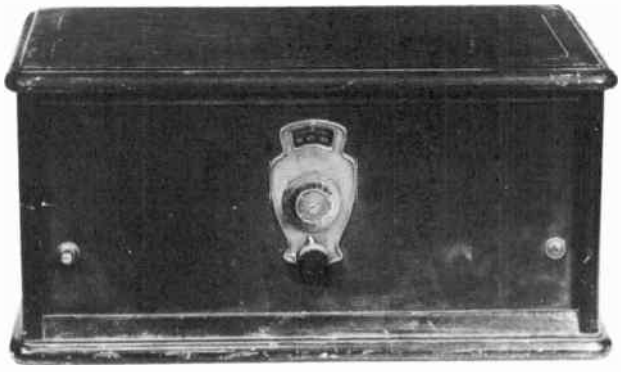
Technical article in *Radio News*, (May 1927), pp. 1324- 1325.

Radio Digest (Feb. 15, 1927), p. 32



Radio Retailing (June 1927), p. 8

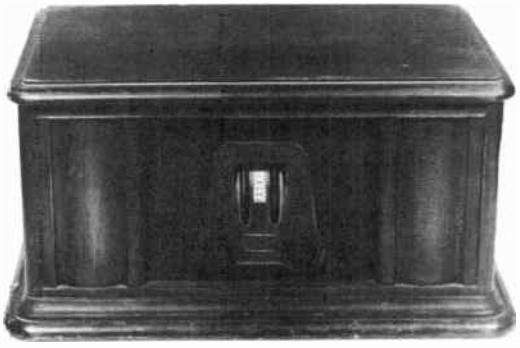
7-83-5	June 1927	
7-AC-5	July 1927	$175.00
7-AC-2	Sept. 1927	$ 54.50
7-AC-3	Sept. 1927	$153.00
7-AC-4	Sept. 1927	$185.00



Earle Drake

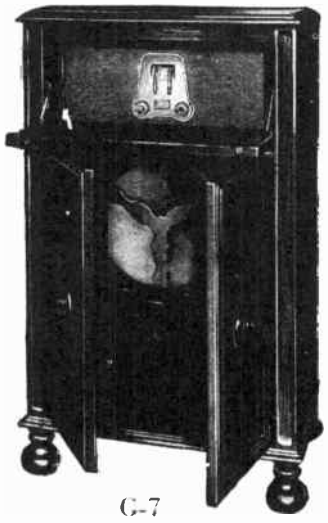
CHAS. FRESHMAN'S HAPPY DAYS

Radio World (March 19, 1927), p. 24



Ralph & Elinor Williams

F-1 Equaphase August 1927 $70
Designed by Franklin, Eltz, and Dunn.
In Sept.: F-2, $110. F-4, $160. F-5, $185.
Technical articles in *Radio Broadcast*, Nov. 1927, pp. 42-43; *NY Telegram*, July 9, 1927, p. 5.



Radio Retailing (May 1928), p. 38

G-1 Sept. 1927 $70 G-2, $175. G-3 $200 G-4, $225 G-5, $250 G-7 Oct. 1927 $185 G-10 Jan. 1928 $195
Technical articles in *Radio News (Dealers Ed.)*, May 1928, pp. 21-22; *Radio Broadcast*, Nov. 1928, p. 41.

The Season's Biggest Selling Arguments—

POWER · CLARITY · SIMPLICITY

MODEL N-12
(Walnut Cabinet)
Model N-14 *(Mahogany Cabinet)*
ALL-ELECTRIC
with Peerless Dynamic Speaker
using UX-250 Power Tube
List Price—Less Tubes . $195.00

MODEL Q-15
"Toe Little Giant of the Air"
ALL-ELECTRIC
Using the new UX-222 Shielded Grid Tube
List Price—Less Tubes . $69.00
All prices slightly higher west of Denver

A BIG national magazine and newspaper campaign is carrying the new and immensely significant message of "Freshman Simplified Radio" to the entire nation.

In the new Freshman idea of Simplified Radio you have the season's greatest sales feature—an argument your customers can understand.

Intelligent simplification of any piece of mechanism adds to its efficiency and reduces first cost, operating cost and upkeep.

Freshman engineers have simplified radio to its essentials.

Freshman Simplified Radio, plus quality construction and workmanship throughout, offers *all* in clarity, power and economy that can truthfully be promised for radio today.

Simplified Radio is an *exclusive* Freshman sales feature. Make the most of it. We will be glad to send you a Freshman Franchise Application Blank. Write or wire for it.

MODEL Q-16
ALL-ELECTRIC
With walnut cabinet, including large built-in cone speaker.
List Price (less tubes) $129.00

CHAS. FRESHMAN CO., INC.
NEW YORK · CHICAGO · LOS ANGELES · KANSAS CITY

FRESHMAN
YOUR ULTIMATE RADIO

Models N and Q first advertised in Sept. Model Q designed by George Eltz. Also sold under "Polydyne" name. Technical articles in *Radio*, Nov. 1928, p. 43; *Radio Broadcast*, Jan. 1929, P. 178; *NY Sun*, Jan. 16, 1929, pp. 2, 8.

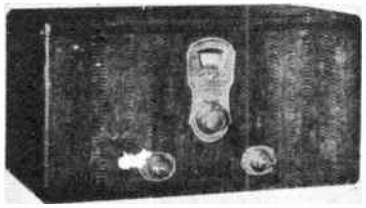
George Eltz

Talking Machine World (August 1928), p. 48

M-11 July 1928 $85
N-11 Sept 1928 $115

Radio Retailing (July 1928), p. 1

Product: President Set. Table model. push pull amplification, shielding, one illuminate control, employs eight tubes, in-



cluding the rectifier. Built in an attractive walnut cabinet.

List price, $60.

Manufacturer: S. Freshman Co., Chicago.

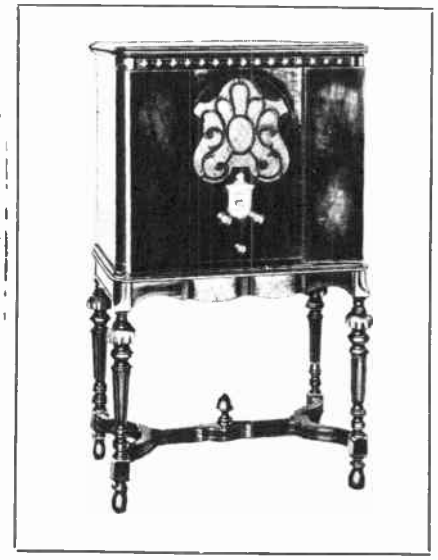
Martwell Sales Co., Paramount Building, New York City, exclusive sales distributors.

"S. Freshman" was said to be Charles' brother, Sigmund.

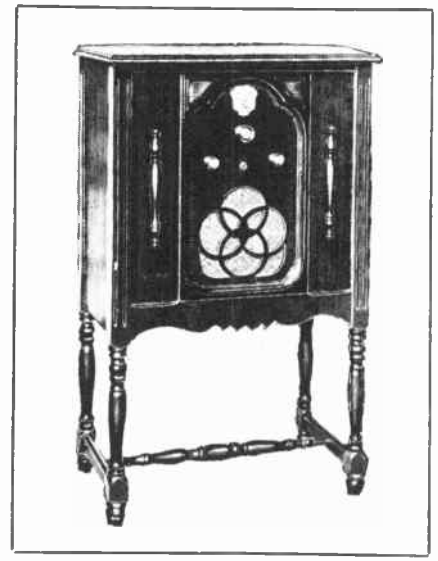
Radio Dealer (Oct. 1928), p. 37

Earl 21 June 1929 $75

Earl 31 June 1929 $139



Earl 41 August 1929 $250



22 April 1929 $99.50

Service manual

32 April 1929 $169

Service manual

Earl Model 33

"Centro-Matic" tuning is being shown in the new Model 33 receiver just brought out by the Earl Radio Corporation, 122 E. 42nd St., New York City. This is an automatic station selector. The names of ten stations can be written on the illuminated cellulose scale. The tubes used in this set are four 224's, one being used as a detector and three in the r.f. stages, a 227 in the first audio, two 245's, and a 280 rectifier. A phonograph pick-up is provided. The cabinet is a semi-lowboy of walnut with narrow paneled doors, and encloses an inductor-dynamic speaker. Price, $179. — *Radio Retailing*, October, 1929.

33 Oct. 1929 $179

Service manual

Freshman Freed-Eisemann Merger Maintains Individuality of Each

A plan to unite two important radio manufacturers was announced late in October. A contract was signed which upon the approval of the stockholders of the Chas. Freshman Co., Inc., a special meeting for which purpose has been called for

C. A. Earl
President Chas. Freshman Co., Inc.
Chairman of the Board of Directors of Freed-Eisemann Radio Corp.

October 31, 1928, will place the Chas. Freshman Co., Inc., in control of the majority stock of the Freed-Eisemann Radio Corporation, and will in effect combine the two businesses.

The Freed-Eisemann Radio Corporation is a pioneer producer of radio apparatus, having been among the first firms to be organized immediately following the first public broadcasting seven years ago. The Chas. Freshman Co., Inc., came into being shortly after that time. Each is one of the leading companies in its respective price-class; the Freed-Eisemann Company specializing in the higher price field; the Freshman Co. in the low-priced field.

In announcing the foregoing, Jos. D. R. Freed, president of the company which bears his name, stated: "After several weeks of negotiations between Mr. Earl, president of the Chas. Freshman Co., Inc., and myself, a contract has been entered into for the unified control of the two businesses, which plan will become operative as soon as the stockholders of the Chas. Freshman Co., Inc., approve it and the Freshman Co. complies with other provisions in said contract.

"This is a logical business step and will prove beneficial to both parties. It will enable both companies to effect valuable economies in purchasing, manufacturing, selling and administration and to greatly expand research and engineering facilities. This will be true even though it is the intention to maintain the individuality of the two companies.

"The administrative and selling policies of the Freed-Eisemann organization will continue as heretofore. Products of both companies will be sold under their present trade marks and they will have the additional benefits of increased strength behind them.

"Inasmuch as both companies have outgrown their present factory quarters, it is the intention in the near future to seek

J. D. R. Freed
President Freed-Eisemann Radio Corp.
Director and Vice-President of Chas. Freshman Co., Inc.

new factory locations, where both concerns will be under one roof.

Arthur Freed
Vice President and Secretary Freed-Eismann Radio Corp.
Director and Vice-President of Chas. Freshman Co., Inc.

"Mr. Earl, in addition to his duties of president of the Chas. Freshman Co., Inc., is to become chairman of the board of directors of the Freed-Eisemann Radio Corp.

Arthur A. Trostler
Vice-President Freed-Eisemann Radio Corp.

"The officers of the Freed-Eisemann Radio Corp., upon the confirmation of the plan, will be as follows: President, Jos. D. R. Freed; vice-president and secretary, Arthur Freed; vice-presidents, Arthur A. Trostler and Leo Freed; treasurer, W. J. Keyes. Jos. D. R. Freed and Arthur Freed are to become directors and vice-presi-

W. J. Keyes
Treasurer Freed-Eisemann Radio Corp.

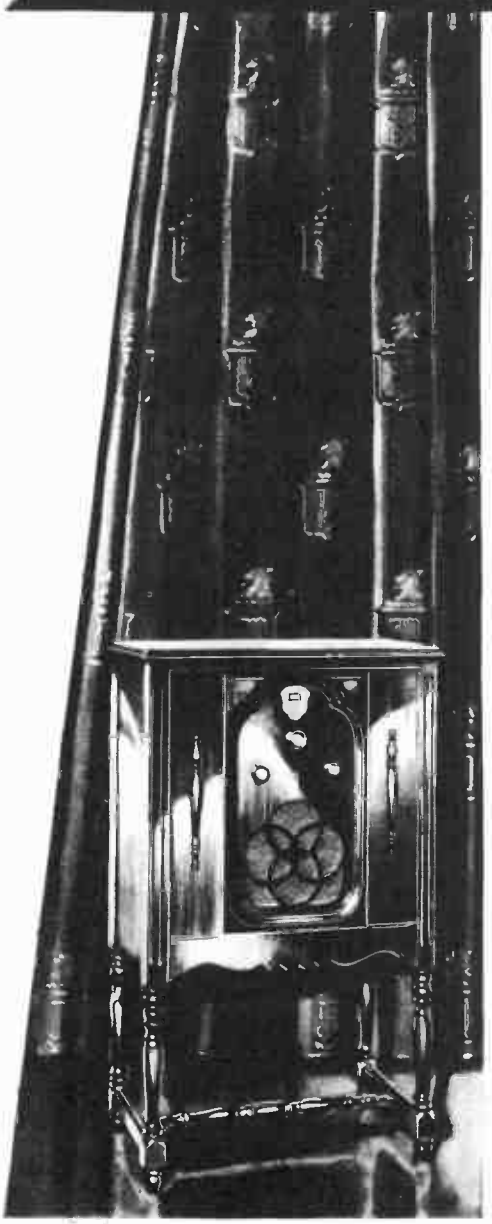
dents of the Chas. Freshman Co., Inc."

Officers of both companies look forward to unusual benefits from this plan. Both companies have enjoyed a remarkably favorable trade season in 1928.

For photos of the Earl plant in mid-1929, see the Freed- Eisemann chapter.

Talking Machine Journal (Nov. 1928), p. 48

C-A Earl Radio



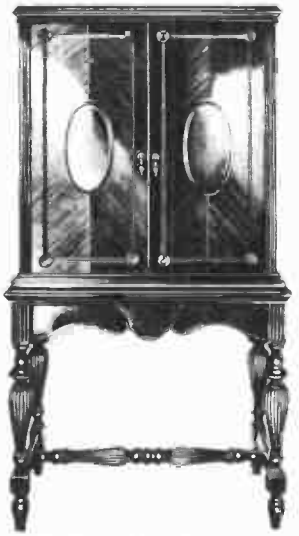
Super-Selective

. . . Tested to Meet Any Broadcasting Condition Anywhere in this Country

"Hair-Line" Super-Selectivity, absolutely unique in radio—that is exclusively C. A. Earl.

The traffic on the air may be at its thickest. Nearer and more powerful stations may volley and thunder. But so far as you are concerned there is only one station on the air—the station you are listening to.

That "Hair-Line" Super-Selectivity has been tested from New England to California—in good reception areas and bad reception areas. On the basis of that Super-Selectivity the C. A. Earl challenges the world. Compare the C. A. Earl with whatever set you please at whatever price. Write for illustrated catalog and name of local C. A. Earl dealer.

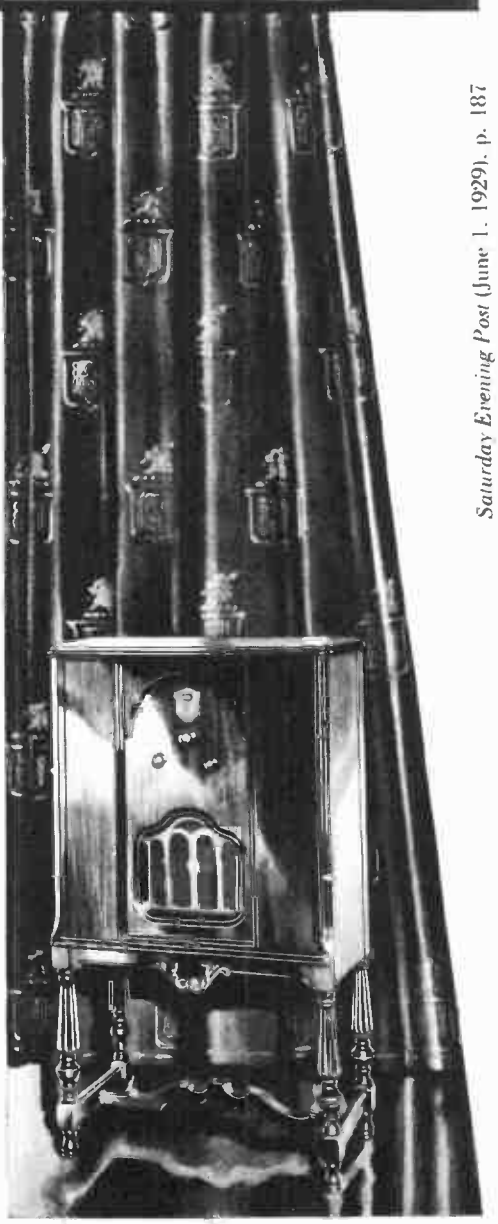


MODEL 32 (*less tubes*) **$169**

All Electric 8-Tube Set

Complete with Arcturus tubes, $194.50

Neutrodyne. Four tuned circuits. Push-Pull amplification. Dynamic Speaker. Phonograph Pick-up. Walnut finish cabinet with contrasting panels.



MODEL 22 All Electric 8-Tube Set (*less tubes*) **$99.50**

Complete with Arcturus tubes, $120

Neutrodyne. Four tuned circuits. Push-Pull amplification. Inductor Dynamic Speaker. Walnut finish cabinet.

The C. A. Earl Orchestradians

—Every Tuesday evening on station WJZ and Associated N. B. C. stations—Phil Spitalny conducting. For time, see your local newspaper.

MODEL 31 All Electric 8-Tube Set (*less tubes*) **$139**

Complete with Arcturus tubes, $164.50

Neutrodyne. Four tuned circuits. Push-Pull amplification. Inductor Dynamic Speaker. Phonograph Pick-up. Open type cabinet, walnut finish.

CHAS. FRESHMAN CO., INC.

122 E. 42nd Street, New York City **BRANCHES** • **Chicago** • **San Francisco** • **Los Angeles** • **Kansas City** • **Atlanta**

Canada: Freshman Freed-Eisemann Radio Ltd., 20 Trinity St., Toronto, Ont. (***Prices slightly higher in Canada***)

Saturday Evening Post (June 1, 1929), p. 187

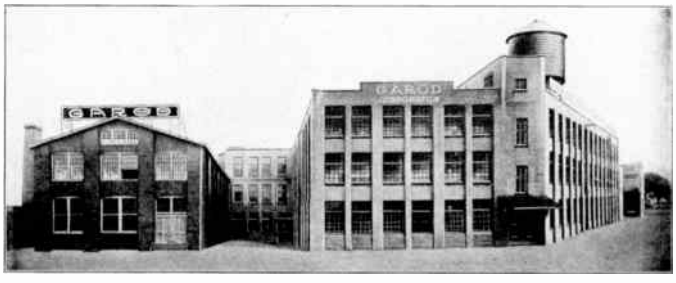
GAROD

Garod Corporation

The Gardner-Rodman Corporation started making crystal sets in 1921; Laurence Gardner had been in the jewelry business and Isaac P. Rodman had worked with Edison as an electrical engineer. Their set was the cleverly designed Heliphone, a brisk seller at $5.

In 1922, they ran into the same problems as every other crystal-set maker: business dried up after the boom ended, and Wireless Specialty Apparatus Company scared off their dealers and customers in June with threats of lawsuits. So Gardner and Rodman joined the group organized by Freed-Eisemann to fight WSA, the Independent Radio Manufacturers, and as noted in the Freed-Eisemann chapter, found themselves promoting Professor Hazeltine's Neutrodyne circuit in early 1923. In 1924 Hazeltine gave Rodman credit for his "inspiration and assistance in both technical and organizational matters."

Gardner-Rodman reorganized as the Garod Corporation in February, 1923, advertising its Neutrodyne in April and beginning production in September. Unlike Fada and Freed-Eisemann, Garod bought most, if not all, components from other makers and assembled them. While not a large-scale maker, the company did sell (according to royalties reported to Hazeltine) $350,564 worth of sets in 1923 and 1924, making a pre-tax profit in 1924 of $85,323. As that was the last year Garod published financial figures, doubtless it never saw black ink again, but the good reports lasted long enough to float a stock issue in December, 1924.



The Garodian (Oct. 1926)

Home Office and Plant of Garod Corporation, Belleville, New Jersey

The plant at Main and Mill Streets, Belleville, NJ., occupied in 1925.

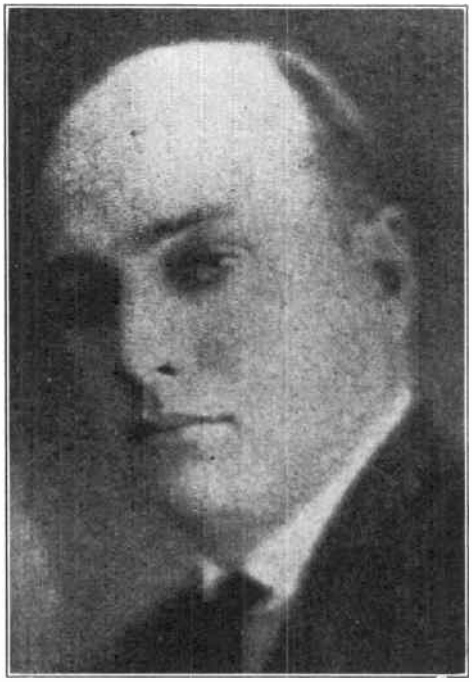
Garod limped along until early 1926, when Benjamin Franklin Miessner appeared with plans for a revolutionary AC set. He had previously tried organizing the Batteryless Radio Company but had not gotten into production. At Garod, which he joined in March, 1926, he developed his ideas into the Model EA in May, began production in June, and advertised in August. Financial backing was from a group of bankers also backing Murad.

Unfortunately, Garod used Dubilier condensers in the power pack, which didn't stand up, and had to replace them later with a Sangamo product. Garod sued for $250,000 damages but could not survive the 100% rejection rate in the short run. The company went into receivership in February, 1927. To compound its troubles, Garod had been sued by RCA and GE for infringement of the Rice and Hartley neutralized-TRF patents. While Hazeltine helped in the defense (since it was an attack on Hazeltine's patents), the suit must have been a great drain on the company's energies for a year-and-a-half before the Circuit Court of Appeals decision in May, 1927, holding that Hazeltine's patents were subsidiary to those of Rice and Hartley.

While the EA was having its problems, Miessner was busy developing the next generation of AC sets, using directly-heated AC tubes, work that parallelled RCA's. In spite of his limited resources, he did succeed in making a workable AC tube — the Armor AC100 — and a radio to use it — the Garod EM. A few were made, but in August, the financial facts of life caught up with Garod and the company was sold for $45,000. The new owners got Garod out of receivership, but when they could not obtain an RCA license, their assets were, in turn, auctioned in February, 1928.

Garod reappeared at the end of 1933, making radios for the next decade-and-a-half before being bought by Majestic (no relation to the original Grigsby-Grunow Company). In August, 1950, Majestic merged with Wilcox-Gay, which continued to run Garod as a subsidiary for a time.

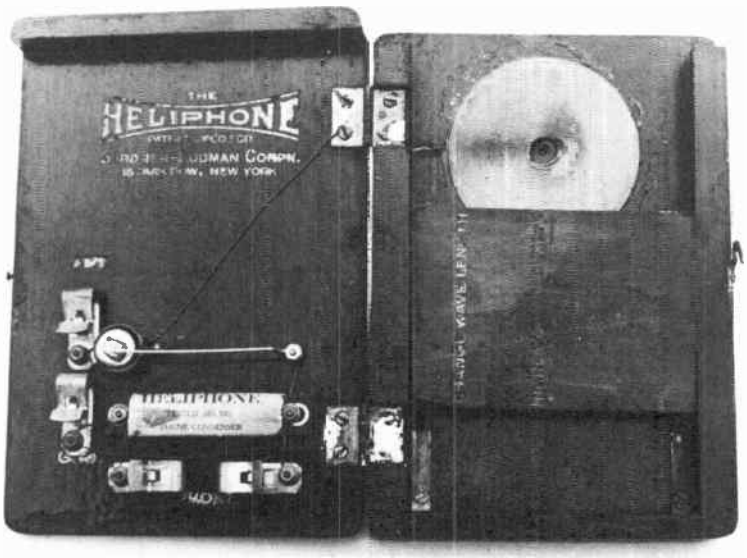
LAURENCE GARDNER
Secretary



I. P. RODMAN
Vice-President and Chief Engineer

ALFRED H. CORWIN
President

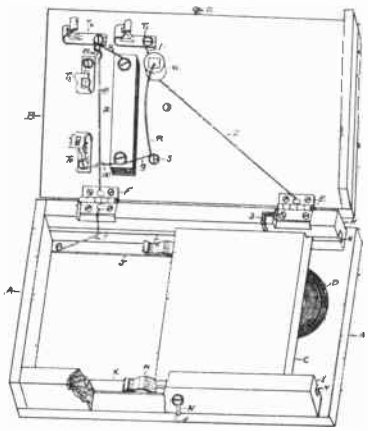
Radio Guide (April 1925)



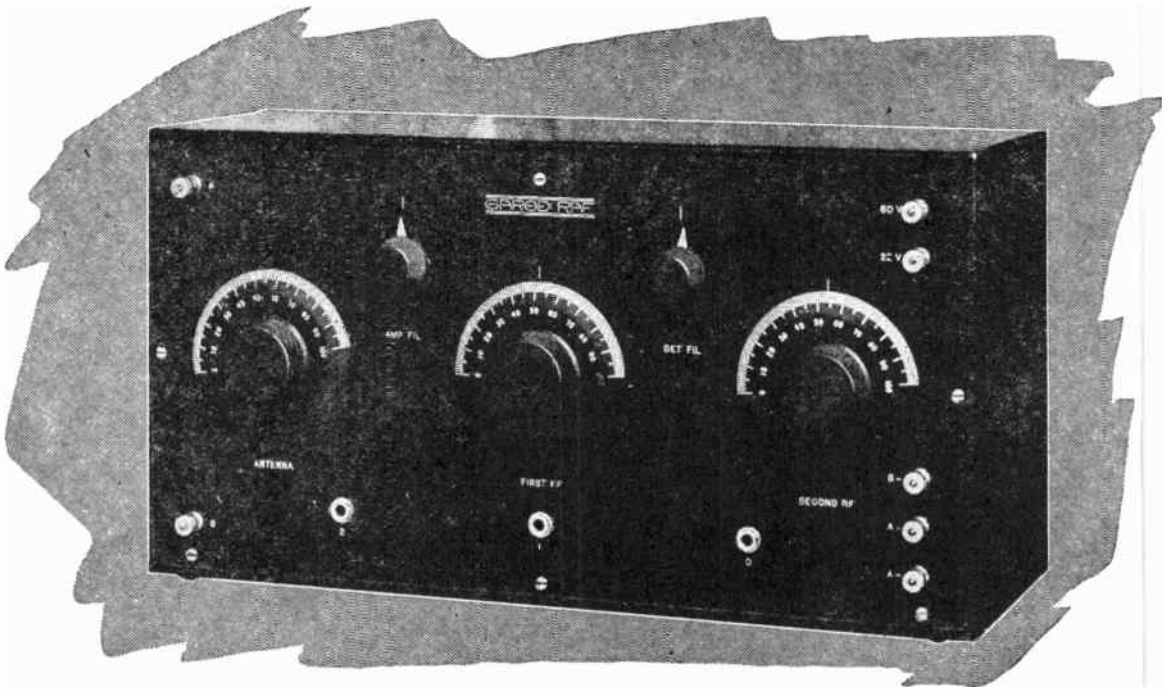
Bruce & Charlotte Mager

Heliphone July 1922 $5
While this was first advertised in July, it probably was sold much earlier.

1,568,470. WIRELESS RECEIVING TUNER. ISAAC P. RODMAN, Newark, N. J., assignor, by mesne assignments, to Gared Corporation, Belleville, N. J., a Corporation of New Jersey. Filed Feb. 1, 1922. Serial No. 533,377. 4 Claims. (Cl. 171—119.)



1. A device of the character described comprising a support having an extended surface, flat coils thereon relatively movable laterally over the faces of each other into and out of overlapping relation and having areas compared to that of said supporting surface such as to maintain said coils in parallelism in each position without projecting beyond the edges of said support, means associated with said coils to maintain an electrical connection between the same in the different relative positions thereof, and a member associated with said support and adapted to enclose said coils; said support and said member constituting an enclosure serving, when in closed relation, to maintain said coils within the confines of said edges and prevent the removal thereof.



GAROD RAF

HAZELTINE "*NEUTRODYNE*"★

The better type of receiver WITH THE 5 *improvements*

WHAT is it that elevates the Hazeltine Neutrodyne Receiver above any similar Radio device on the current market? We are answering this question for the benefit of Radio Dealers and Radio Owners who have expressed gratification with the excellent performance of this popular instrument.

The Hazeltine Neutrodyne Circuit is an inherent part of the Garod Broadcast Receiver illustrated above.

And the five outstanding features of this receiver are:

1—utter simplicity in tuning
2—freedom from all objectionable squeals
3—clarity and full-bodiedness of tone
4—selectivity and
5—long-distance reception

Before we placed this instrument on the market we made certain that it was the nearest to absolute perfection obtainable. The Garod Hazeltine Neutrodyne Receiver was developed by Professor Hazeltine of Stevens Institute, and Garod Engineers. The finest material and workmanship, coupled with rigid, painstaking inspection makes the Garod Broadcast Receiver, in its handsome mahogany cabinet, the supreme receiver of the times.

Recent tests conducted in Newark, N. J., and elsewhere, indicated that the reception of radiophone concerts at a distance averaging 1,000 miles is a regular accomplishment of an inexperienced operator.

$135

DELIVERED AT NEWARK, N. J.

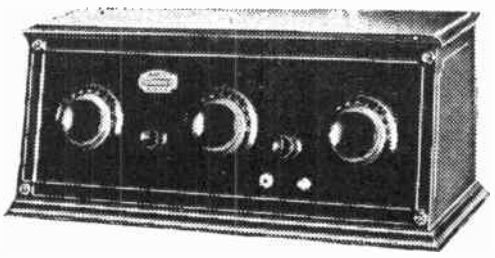
The ★ HAZELTINE *"NEUTRODYNE"* SYSTEM

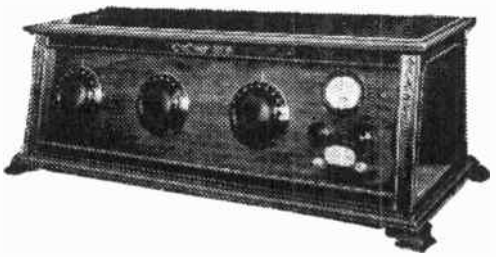
GAROD CORPORATION
8 WEST PARK STREET
NEWARK, N. J.

*Neutrodyne registered U. S. Patent Office all rights reserved. Garod Neutrodyne Receiver licensed by Independent Radio Manufacturers, Inc., under Hazeltine patents No. 1,450,080 and patents pending.

RAF April 1923 $135

M Dec. 1925 $125





flyer

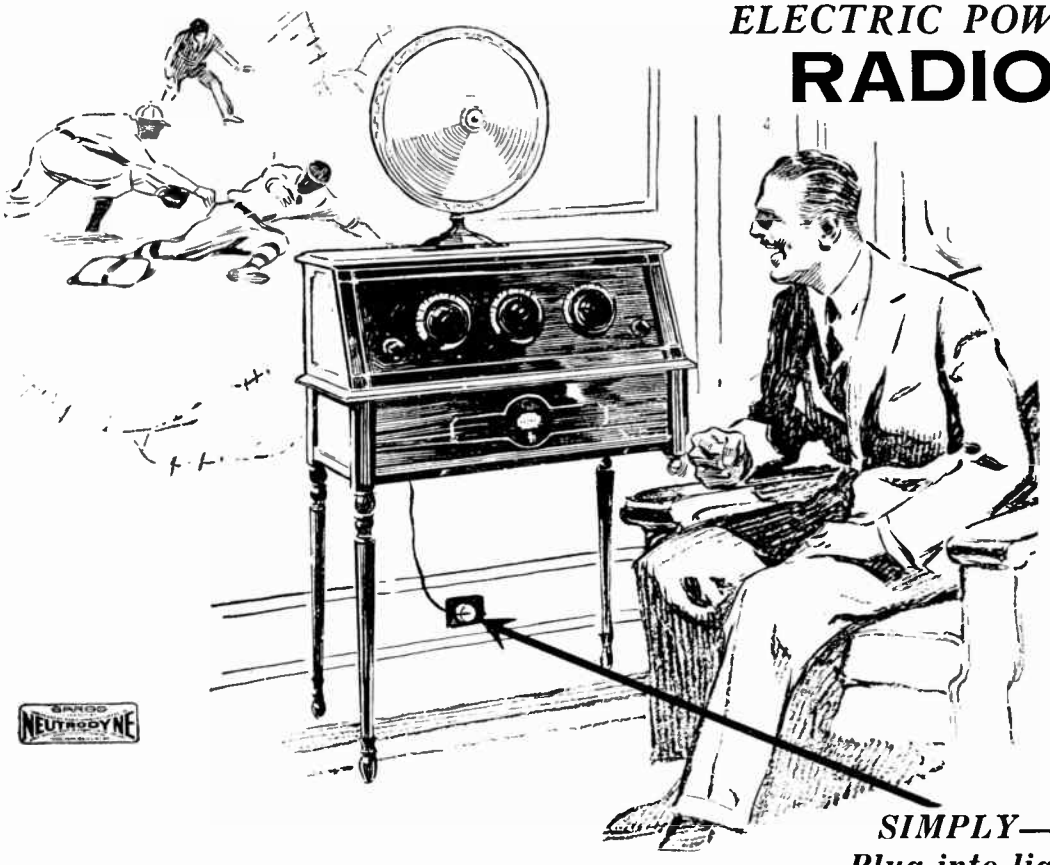
V Sept. 1924 $195

Technical article in *Popular Radio*, Nov. 1925, pp. 427-437.

Georgian Sept. 1924 $400

Radio Broadcast (Nov. 1924), p. 154

GAROD
ELECTRIC POWER
RADIO



SIMPLY—
Plug into light socket at cost of 1-2c per hour

Exhaustless POWER

Brings Amazing Depth and Richness of Tone

GAROD TONE ACHIEVEMENTS—

1. **Electric POWER—equivalent to 10 "B" Batteries!**
2. **POWER TUBES—100 times stronger than standard tubes!**
3. **Powerful Transformer—steps house current to 450 volts!**
4. **Neutrodyne—guarantees world's finest selectivity!**

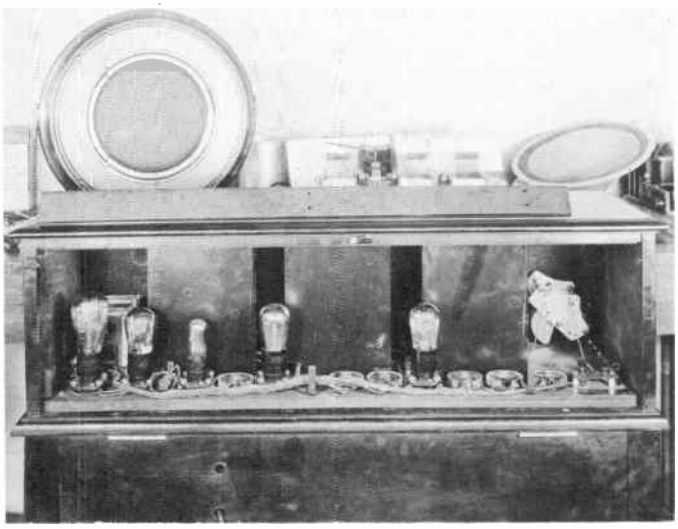
New Garod is brilliant. It is inspiring. What a contrast with the thin, artificial tones of receivers that have sacrificed the elements vital for range, depth, clearness and the finer things of radio.

Before investing in an old-type receiver—hear the amazing tone of the new-era Garod reproducing entirely by ELECTRIC POWER!

Distributed by

CALIFORNIA ELECTRIC SUPPLY COMPANY
643 MISSION STREET, SAN FRANCISCO

EA June 1926 $310
Technical article by B. F. Miessner in *Radio Broadcast*, March 1927, pp. 495-497.



This photo was taken in the RCA Technical & Test Dept. laboratory — keeping an eye on the competition.

GAROD-EB

Custom built by Garod Laboratories
(made to order only)
List Price $775.

This Radio-Phonograph combination contains all the qualifications of a Garod-EA. The change over switch produces phonograph records through a high quality magnetic pick-up. It employs the best phonograph motor made. Radio operated with electric power.

EB June 1926 $775

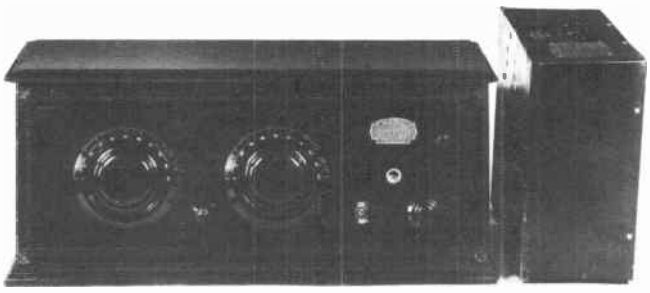
GAROD-EC

Custom built by Garod Laboratories
(Made to order only)
List Price $750.

This completely shielded Receiver has a One-Drum-Dial Tuning Control, Seven Tubes, Electric Power Inductance TRF Transformers (replacing Variable condensers.)

The Garodian (Oct. 1926)

EC June 1926 $750



EM April 1927 $185 Ralph Thorn

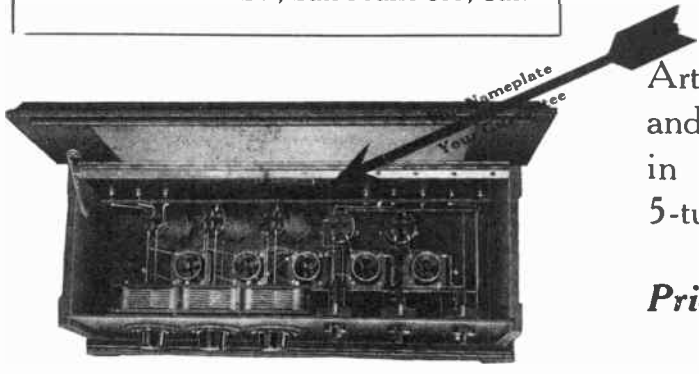
THE BEST BUILT SET IN AMERICA

R-212

MATCHED DIAL

NEUTRODYNE

Distributed in California
by
FREDRICK H. THOMPSON CO.
INCORPORATED
200-210 Drumm St., San Francisco, Cal.



Artistry—Quality—Workmanship and Engineering are exemplified in the R-212—**Matched dial** 5-tube model.

Price—without accessories—$150.

Radio Service Laboratories
INCORPORATED

1007 Eleventh Ave. **Asbury Park, N. J.**

RSL R-212 Nov. 1923 $150

GILFILLAN

Gilfillan Bros. Inc.

The early years of Gilfillan Brothers and Atwater Kent show many parallels. Both began with automotive ignition products: In Kent's case, because he invented the system of a high-tension coil and fast-breaking points; in Gilfillan's, because it was at first a smelting and refining company, selling platinum contacts to ignition makers. By the mid-teens, both companies were leaders in their fields and were among the first to set up Bakelite molding departments. Both companies faced the same slump after the war, and both turned to making radio parts since they had the equipment and expertise, and, just as important, they both had established networks of automotive dealers well-suited to retailing these products.

In 1912, Sennet W. Gilfillan graduated from Stanford University and purchased the assets of his uncle's smelting and refining business in Los Angeles. His younger brother Jay G. Gilfillan, who had been in Cuba selling his uncle's products, joined as a partner and in 1914, the firm became the Gilfillan Brothers Smelting and Refining Company, incorporating under that name in 1917. It originally sold precious metals such as gold and platinum to dentists and jewelers.

By October, 1923, Gilfillan had issued a catalog featuring a line of beautifully-crafted Bakelite radio parts, and in May, 1924, advertised the RA-1 2-tube reflexed kit for $25.50. But the craze for building one's own radio set was beginning to die out in favor of buying a ready-made set. To succeed in radio, Gilfillan needed to produce complete radios. Not wanting to jeopardize its business by infringing on patent rights and inviting lawsuits, Gilfillan chose to follow one very successful group of radio companies: those licensed under the Hazeltine Neutrodyne patents. Entry to the group was restricted by the fixed number of licenses granted, but it was easy enough to purchase one of the smallest licen-

Scott MacWilliam

S. W. Gilfillan

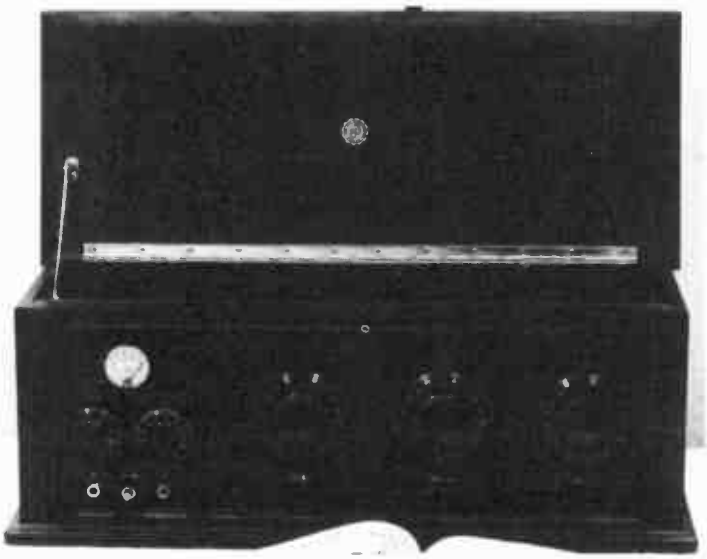
Jay G. Gilfillan

Floyd Paul

sees outright — Radio Service Laboratories in Asbury Park, New Jersey. On June 18, 1924, the Gilfillan board of directors authorized purchase of 51% of RSL. This company had existed since 1921, headed by Harold M. Lewis, a radio engineer formerly at a nearby Army Signal Corps base, Camp Alfred Vail, but the company had produced only one model of radio receiver with limited sales.

RSL advertised its Neutrodyne model for the last time in August, 1924. Gilfillan's GN1 first appeared in September; the GN2 (a lower-priced version), in October. Just who designed the new models is uncertain: either Gilfillan's W. W. Lindsay, or Lewis (who claimed in 1931 to have worked for RSL/Gilfillan until 1925). Later models relied heavily on Hazeltine Corporation's expertise. Lindsay, whose expensively-equipped amateur station was described in *Radio* in November, 1921 (p. 141), was a radio engineer with Gilfillan in 1924-25 and chief engineer 1926-28. Then he worked with Fox Film Studios and at Sound Services in Hollywood before returning to Gilfillan in 1943 in charge of radar work. According to figures reported to Hazeltine, Gilfillan took in $410,394.01 in 1924.

After the 1924-25 Neutrodyne models, Gilfillan plodded along for a few years, but the company didn't come into its own until the early 1930's. In the heyday of the Los Angeles midget-radio makers, when it seemed that every third garage housed one, the Gilfillan company acted as mother hen by providing RCA licensing to any company which built part of its chassis in the Gilfillan plant. Since it had the only RCA license in the West, it controlled a sizeable business and was able to survive the Depression. In 1943, Gilfillan ventured into radar, where it still is, now a division of ITT.



Scott MacWilliam

GN-2 Oct. 1924 $140

GN-3 May 1925 $65

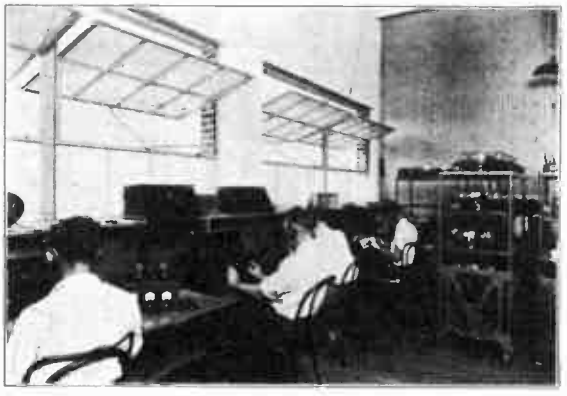
John Wolkonowicz

POSTAGE $69.46!

NY Evening World (August 30, 1924)

If you want it in a hurry, all right, but—the first radio set sent by airplane mail from Los Angeles to New York the other day ran up a postage bill of $69.46. It took only fifty-three hours.

This could hardly have been a publicity stunt (Gilfillan's name is not mentioned in the story), so presumably Gilfillan had to get a sample model to Hazeltine for testing or approval before it could be marketed.



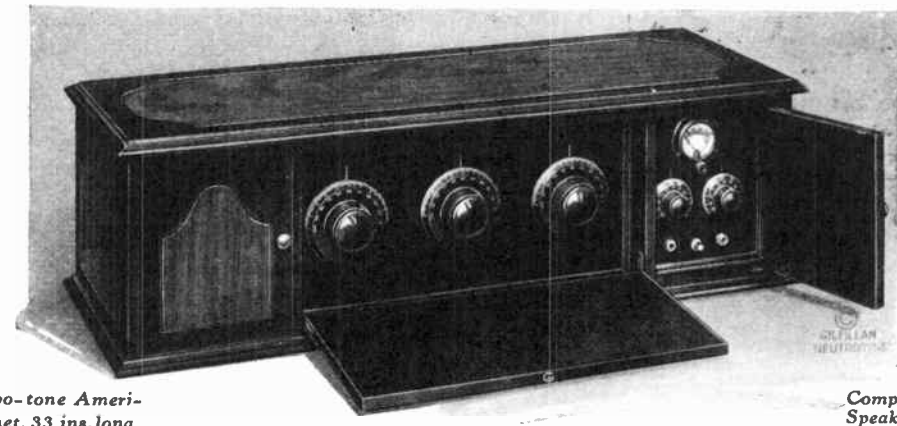
Test Room at Plant of Gilfillan Bros., Los Angeles

Radio Doings (August 29, 1926), p. 22

Popular Radio (Sept. 1923), p. 18

GILFILLAN NEUTRODYNE

A new powerful set of greater Clarity Distance, Simplicity and Beauty



In a handsome two-tone American Walnut Cabinet, 33 ins. long, 12 ins. wide and 10 inches high

Complete, without Loud Speaker, phones, tubes or batteries **$175.00**

The introduction of the GILFILLAN NEUTRODYNE set is the longest forward step in Advanced Radio Engineering

The engineers who designed and built this Set are leaders in Radio Invention and Construction. They reviewed and analyzed every American receiver and have given their best in producing this highly sensitive, accurate, selective NEUTRODYNE set. Extremely simple to operate, convenient to install and of an artistic design that will be a handsome addition to any room.

In the GILFILLAN NEUTRODYNE every detail has been reviewed and corrected to assure highest amplification, finest selective reception and positive neutralization. Its well-balanced, neutralized circuit gives distortionless reproduction of speech and music of ample volume and great clarity.

It is truly a marvel in the radio world and the first "straight line" set with a properly proportioned and beautifully designed and finished cabinet which can be completely closed whether in use or not.

Manufactured at 3 convenient shipping points, addresses below, assures prompt delivery and national distribution.

JOBBERS and DEALERS—looking for a high grade set of assured merit, ample power and real beauty, will write at once for our sales proposition and place their orders early to prepare for sales of unheard-of volume!

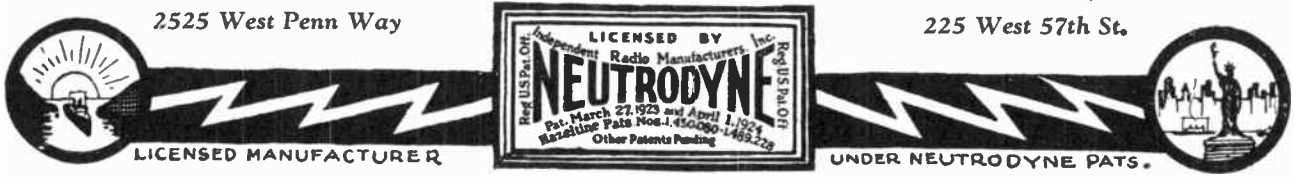
Send for Descriptive Literature showing Special Features and Details

GILFILLAN BROS. Inc.

Kansas City, Mo.
2525 West Penn Way

Los Angeles, Calif., *1816 West 16th St.*

New York City
225 West 57th St.



GN-1 Sept. 1924 $175

GILFILLAN RADIO

"Our Gang"—
Hal Roach's Rascals, are devotees of the Charleston. Farina is demonstrating a difficult step of the dance, while the teasing tones of the Gilfillan Radio furnish the inspiration.

This is a 5-tube model of great power, in a richly finished brown mahogany cabinet. Price $110.

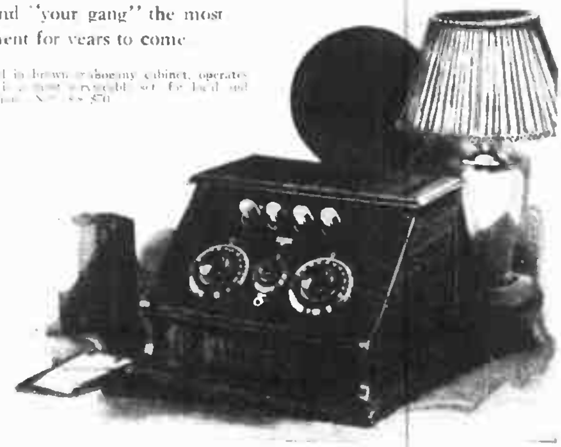
A GILFILLAN Radio for "*Your* Gang"!

THERE is nothing that delights a child (and a grown-up too) more than to understand, easily and distinctly, what they are listening to.

Gilfillan has solved this problem of clear and distinct reproduction of radio programs. The exclusive features and improvements in these new models have produced exceptional clarity and beauty of all voice or instrumental tones, from the highest to the lowest. Tuning-in has been sharpened by providing a wider separation on the dials for the stations. You bring them in quicker, sharper and more accurately.

The Gilfillan design is fundamental in the science of radio. The sets are made complete and tested thoroughly in our factories. The Gilfillan you buy today will be giving you and "your gang" the most delightful radio entertainment for years to come.

This is the 4-tube model in brown mahogany cabinet, operates with dry batteries, and is a most serviceable set for local and reasonable distance reception. Price $70



The Gilfillan dealer will be pleased to demonstrate these handsome models. Write for literature to nearest office.

GILFILLAN BROS. INC.

Offices and Factories

25 Wilbur Ave. LONG ISLAND CITY, N. Y. | 1815 West 16th Street LOS ANGELES, CAL. | 525 West Penn Way KANSAS CITY, MO.

Cable Address, Gilfillan

NEUTRODYNE

Saturday Evening Post (Nov. 14, 1925), p. 211

Saturday Evening Post (Dec. 12, 1925), p. 203

GILFILLAN RADIO

This new 4-tube Dry Battery Model will make an ideal gift for the family. It is a most dependable set with sweet Tone, unusual Distinctness and Power to get reasonable Distance. Brings in locals without aerial. Its satin finish, brown mahogany cabinet is a beauty. Price..... $70

The new 5-tube Model illustrated above will show its superiority for Tone, Distance, ease of Tuning and Selectiveness, in any competitive test. Hear it before you buy! Has the latest exclusive Radio Features. The handsome cabinet is brown mahogany. Price..... $110

The Gilfillan Console has a specially built powerful 5-tube set with all special features and extra battery panel and voltmeter. Reflex type loud speaker and space for all batteries. Beautifully designed in brown mahogany. Price.... $350

He for a Merry Christmas!

The nearest Gilfillan Dealer will be glad to demonstrate these sets to your satisfaction and without obligation. HEAR before you buy! Write to our nearest office for literature.

GILFILLAN BROS. INC.

Offices and Factories

25 Wilbur Avenue
LONG ISLAND CITY, N. Y.

1815 West 166th Street
LOS ANGELES, CAL.

3525 West Penn Way
KANSAS CITY, MO.

Cable Address, Gilfillbros

GN-6 August 1925 $350
Uses GN-5 chassis

GN-5 August 1925 $110

GN-4 August 1925 $70
Uses straight-line tuning condensers and new audio transformers.

The NEW Models of . . .
GILFILLAN RADIO

GILFILLAN Model 10

GILFILLAN Model 20

GILFILLAN Model 30

New Features and Strong Selling Points

Model 10

Compact and powerful—hand-carved Walnut cabinet. Five-tube Neutrodyne including "power" tube.

Two Vernier action controls. Two Radio and two Audio Stages. Registers full scale on a cone speaker.

Operates with Battery Eliminators, if desired.

Size: 21½ in. long; 11 in. high; 10 in. deep.

Plenty of range and marvelous tone with exceptional selectivity. *Price without accessories $90.*

Model 20

In beautiful hand-carved brown mahogany cabinet. Six-tube Neutrodyne including "power" tube.

Single Vernier action control. Three Radio and two Audio Stages. Specially selected Cone Speaker built in cabinet which has space for all Batteries or Battery Eliminators. Size: 42 in. high; 17 in. wide; 16½ in. deep. Wonderful tone, range and selectivity. *Price without accessories $175.*

Model 30

Handsome Mahogany console. Six-tube Neutrodyne with all units shielded in copper (including one "power" tube).

Two Vernier action controls. Three Radio and two Audio Stages. Special Cone Speaker registering full scale. Space for all Batteries or Battery Eliminators.

Size: 51 in. high; 30 in. wide; 20 in. deep.

Great range, with marvelous tone and selectivity—a superior set in every detail. *Price without accessories $350.*

These new Gilfillan models are most attractive in design and will demonstrate their superiority in competitive tests for TONE, CLARITY, RANGE and SELECTIVITY.

Place order through your jobbers for early delivery. Send for beautifully illustrated circular, giving full details, to our nearest office.

GILFILLAN BROS. INC.

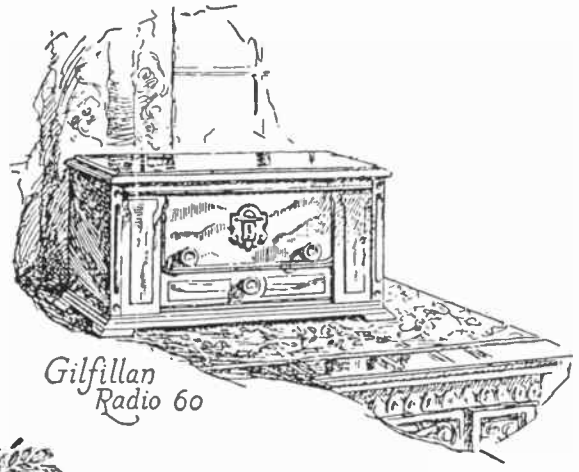
25 Wilbur Ave. Long Island City, N. Y.
1815 Venice Blvd. Los Angeles, Calif.
2525 W. Penn Way Kansas City, Mo.

not shown: 25 (table model 20) $120; 40 (table model 30) $150. RF stages of 30 and 40 described in *Proc. I.R.E.* 1931, pp. 738-805. Manufacture began in Dec. 1926.

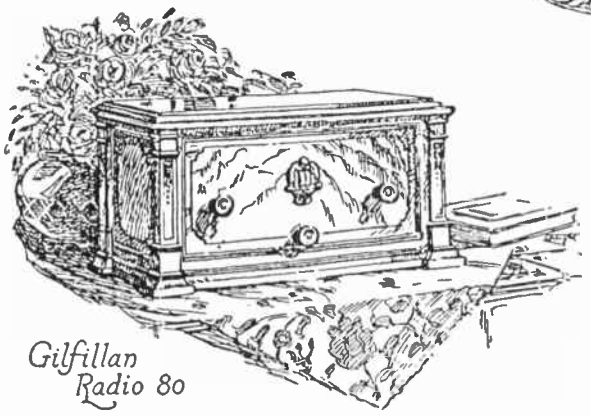
Radio Retailing (Sept. 1926), p. 133

Radio (Sept. 1928), pp. 46–47

33 and 66 technical articles in *Radio*, Sept. 1928, pp. 39-40



Radio Doings (Sept. 24 & Oct. 1, 1928)



60 1927? $217 3 console models
80 1927? $360

Radio (Oct. 1929), p. 15

100 March 1929 $210 (27 detector, parallel 71A audio). Technical article in *Radio*, April 1929, p. 31.

100 (27 detector, 45 audio) technical article in *Citizens Callbook* vol. 11 no. 1, Jan. 1930, p. 76

100 July 1929 $210 (24A detector, 45 audio)

100 Sept. 1929 $156.50, $127.50, $187 (24A detector, 45 audio) Technical article in *Radio*, Oct. 1929, p. 49

GREBE

A. H. Grebe & Co., Inc.

Alfred H. Grebe was born in Richmond Hill, New York, on April 14, 1895. His father, a horticulturist running his business from a greenhouse on the family property, died when Al was about ten years old. Having been interested in radio for some time, by 1909 Grebe had taken over the tool shed next to the greenhouse as a shop and ham shack; the neighborhood boys hung out there, and there he made loose couplers and crystal detectors for sale.

By 1912, Grebe was old enough to be a wireless operator, shipping out on a number of voyages over the next few years. While he was away, his younger friends Ralph Sayres and Arthur Lynch ran the "ham station and crystal detector factory."

In August, 1916, Grebe began advertising his Model AGP-101 regenerative receiver. The letters stood for Armstrong, Grebe, Pacent (Pacent marketed it through his Manhattan Electrical Supply Company). The AGP-102 supplanted it in May, 1917, but by this time the hams were being shut down, and Grebe was working on war contracts, installing radios on French anti-sub boats for Emil Simon. In 1917, he built receivers for U.S. Navy subchasers, then joined the Simon organization in charge of final assembly and testing at the Metropolitan Electric Company in Long Island City (Simon subcontracted all production and assembly, having no factory of his own). There Grebe met Douglas Rigney, who had been hired by Simon as a stenographer and chauffeur, and who soon outgrew this job and became an assistant to the purchasing agent, finally joining the Marines.*

With the disbanding of Simon's group after the war, Grebe formed his own company to manufacture amateur equipment, incorporating around January, 1920. One of the incorporators was Douglas Rigney, Grebe's second-in-command. William Diehl joined Grebe as chief engineer, and as early as March, 1919, Grebe was planning his equipment line, probably including the CR1,2,4,6, and 7, though not all were advertised right away. By early 1920, the CR3 had been added; a group of distributors lined up in various cities; and catalogs, data sheets, and salesmens' photo books made up. Also by 1920, the old ham shack and a two-car garage had been replaced by a large wooden building, probably on the old greenhouse site.

Although originally intending to sell amateur equipment, Grebe was fortunate in having the CR9, well-suited to broadcast reception, ready for the radio boom in late 1921. He sold them as fast as he could turn them out. According to purchasing agent Richard Egolf (who had also joined in 1919), when his normal cabinet supplier couldn't keep up, Powel Crosley contracted to make 2000 of them.

Grebe did so well that his old factory was soon bursting at the seams. Again according to Egolf, an aunt either died and left him $70,000, or gave it to him. He used this money to erect a three-story, poured-concrete factory on the site of his old house. Built between May and September, 1922, this building was reported to have cost $100,000.

Grebe was the first independent maker to be sued by RCA for patent infringement, in its attempts to regain control of the industry. On March 18, 1923, RCA claimed that since only it could legally make vacuum tubes, any equipment intended to be used with these tubes infringed on its patent rights. This ill-advised

tactic, among others, provoked the House of Representatives to order the Federal Trade Commission to investigate monopolistic practices in the radio industry; RCA eventually withdrew this lawsuit in October, 1924. More threatening was a suit filed on May 18, 1923, alleging infringement of one or more patents on grid biasing: Lowenstein's patent on the C battery, Mathes' on cathode-resistor bias, or Langmuir's on the grid leak. This suit dragged on for some years, and was finally decided on November 4, 1927. Grebe had taken out an RCA license a month earlier. Grebe was also harrassed by Westinghouse in a suit filed October 31, 1924, demanding 10% royalty on sales of regenerative receivers rather than the original 5% but nothing came of this suit. Grebe had been licensed by Armstrong on April 30, 1920, a continuation of their pre-war agreement; this license also covered the superheterodyne, although Grebe never used it except as a bargaining chip in the 1927 license negotiations. Interestingly, Grebe is also said to have been licensed by RCA on March 11, 1920, to make vacuum-tube apparatus, paying royalties until expiration of "the patent" (probably referring to Fleming's 1904 valve patent).

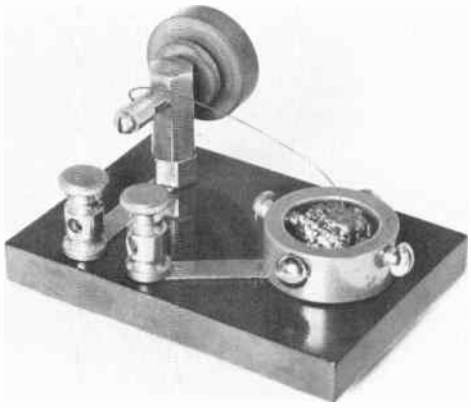
Up to 1923, Grebe's models used a straightforward regenerative circuit, but he made a real departure with the CR12: a regenerative RF amplifier followed by a detector stage, both inductively tuned. The ad's statement that only a 20-foot indoor antenna was needed was no exaggeration; the CR12 was an amazingly sensitive (and selective) receiver.

The set that is universally associated with Grebe is the Synchrophase. Designed by Ralph Batcher with help from other capable engineers (for instance, P. D. Lowell, formerly with the Bureau of Standards, and Bill Diehl, who was still in charge), the Synchrophase was arguably the best TRF design ever made, certainly the best unshielded one. While it could not out-perform the CR12, it was much easier to operate, and of course no longer required Armstrong licensing. It was, however, capacitively neutralized and must have been to Hazeltine what a red cape was to a bull. Suit was filed in February or March 1925, pressed vigorously, and decided in Hazeltine's favor on June 20, 1927, at which time Grebe took out a Neutrodyne license.

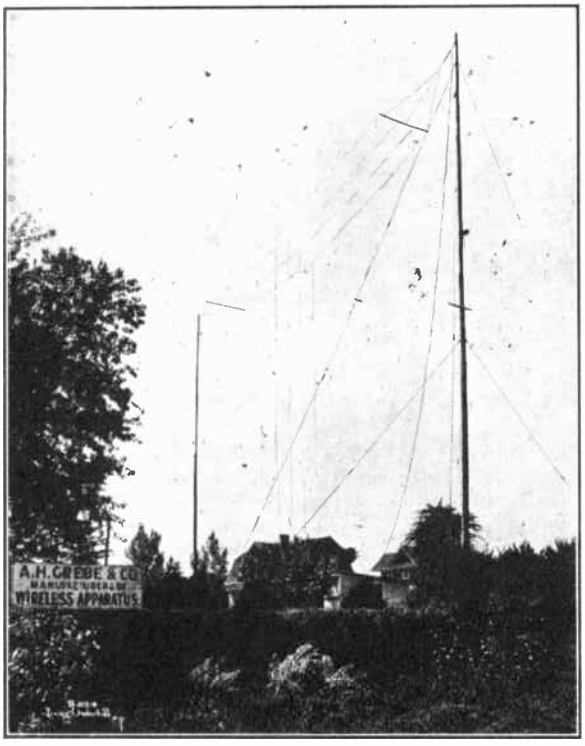
Although the factory was doubled in size in 1925, the Grebe Company had reached its peak. No model after the Synchrophase came even close to equalling its success. WAHG was sold to the Atlantic Broadcasting Company, becoming WABC, and was acquired in December, 1928, by the Columbia Broadcasting System (now WCBS). Diehl and Batcher left for greener pastures in 1928. Grebe was apparently content to sell his high-priced sets to the very few buyers who could afford them. This strategy worked until 1929-30, when sales vanished, and Grebe went bankrupt in late 1932. He intended to return to manufacturing in 1935, contracting with Garod to build his sets until he could set up a West Coast factory, but he died of complications following a colostomy on October 24, 1935.

Many more photographs, from Grebe family scrapbooks, are reprinted in a 15-part series of articles in *Radio Age*, vol. 8 no. 5 (May 1982) to vol. 9 no. 9 (Nov. 1983).

*Simon's manuscript autobiography is among his papers at the Bancroft Library, University of California, Berkeley.



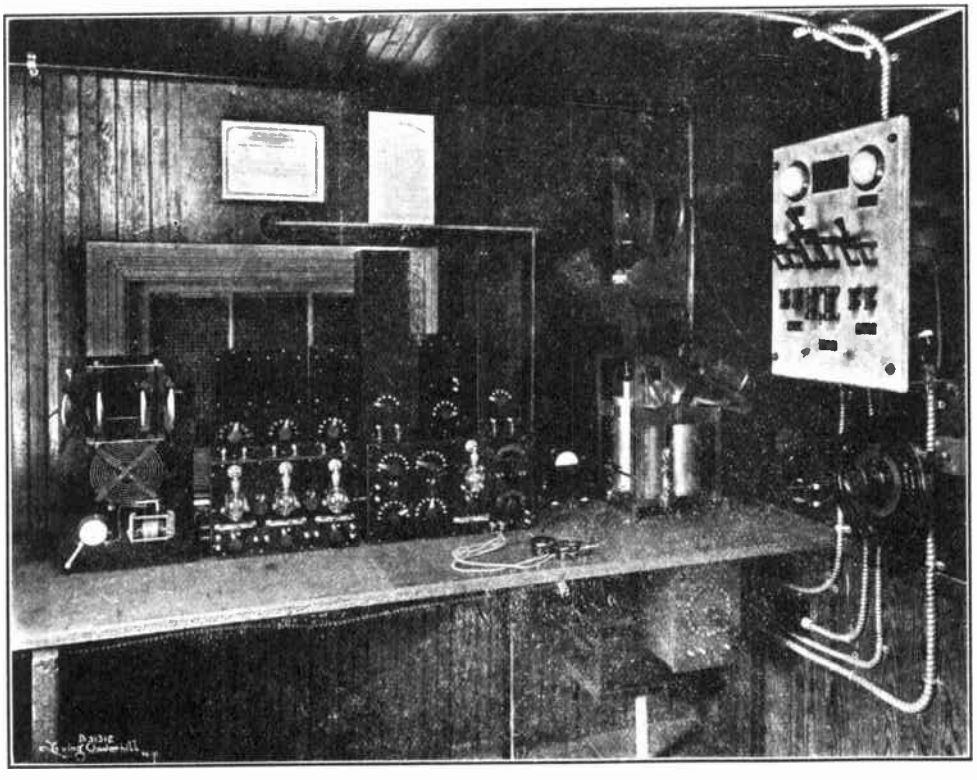
Al Grebe's first product, made in his backyard shack. His name, incidentally, was pronounced "greebie."



QST (Oct. 1916), p. 289

And here, the most familiar of sights—the old aerial going up! The particular amateurs are Barber and Terleph of Richmond Hill, N. Y., but the task engaged in is applicable to any locality in these broad United States

Wireless Age (July 1919), p. 32



QST (Oct. 1916), p. 290

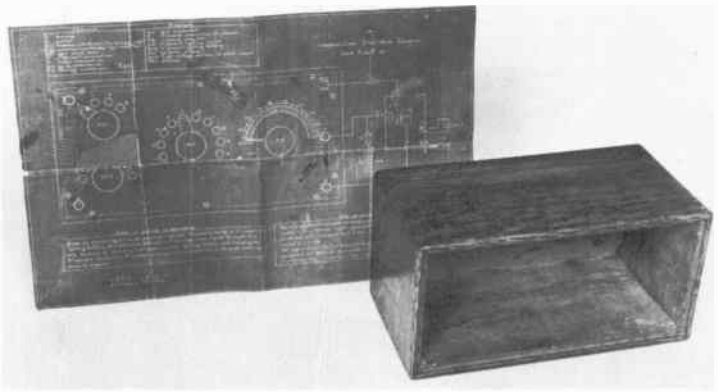
HOISTING THE ANTENNA
Experimental wireless Telegraphy and Telephony (See page 12)

Scientific American Supplement (July 5, 1919) p. 1

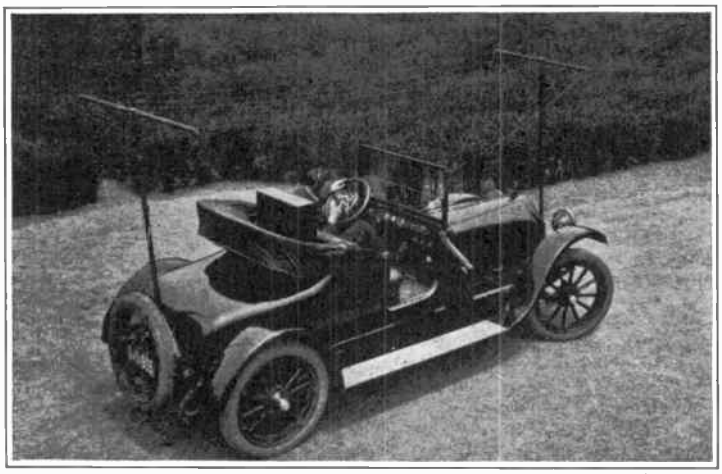
Scenes behind the Grebe factory, when the wartime ban on amateur reception was lifted.

QST (Nov. 1916)

In March 1917, a push-pull coupling knob was added to the left side, and four posts on top for loading coils.



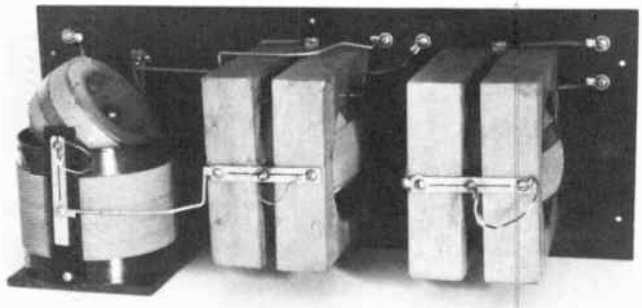
The ham who bought this AGP101 second-hand in 1920 eventually dismantled it, saving only the cabinet and blueprint.

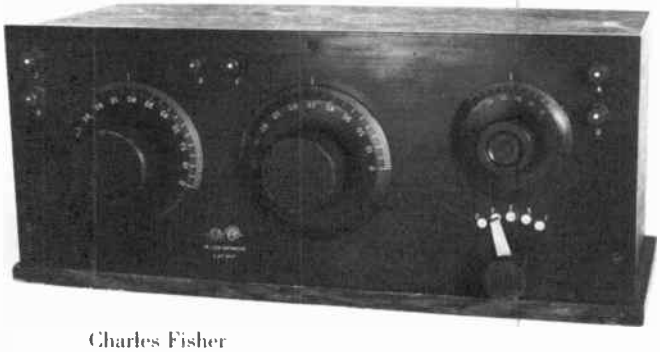


Wireless telephony has progressed to a point where it is applicable to an automobile

The wireless telephone enables the motorist to keep in touch with his home station

Scientific American Supplement (July 5, 1919), p. 12





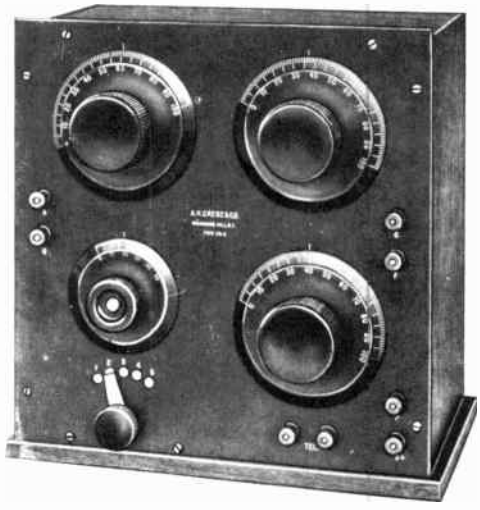
Charles Fisher

CR1 Jan. 1920 $100
(shown in a *Radio News* article in July 1919

CR2 July 1919 $46

Ralph Thorn

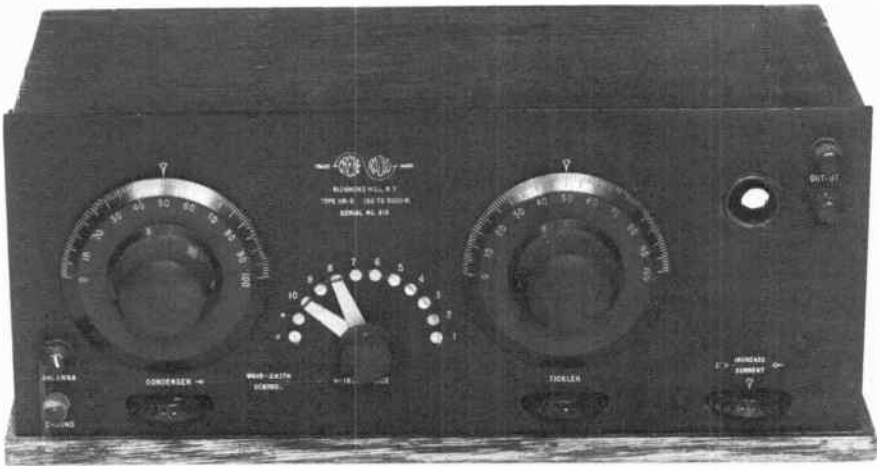
CR3 March 1920 $60 RORD Jan. 1920 $75



CR4 Dec. 1919 $65
Shown in a *Radio News* article in July 1919)

CR3A Dec. 1920 $45.50

Factory photos courtesy of Don Patterson and *Radio Age*

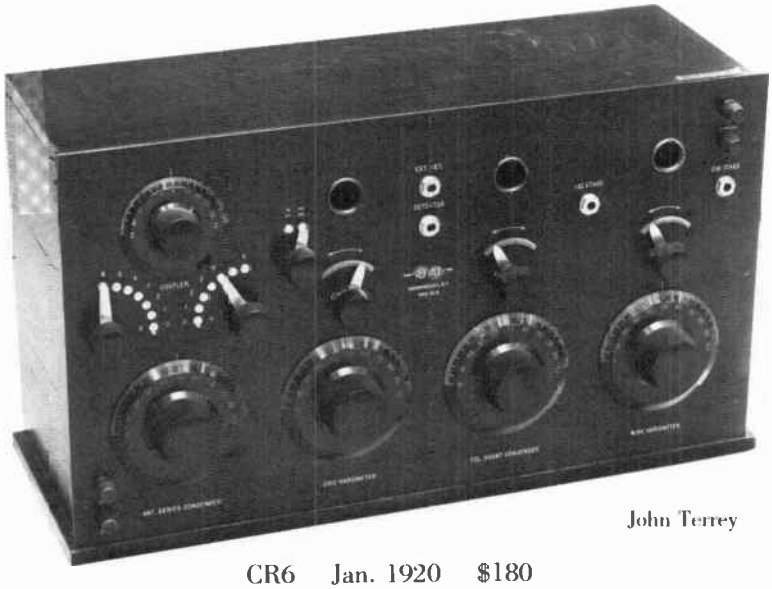


New England Wireless & Steam Museum

CR 5 March 1921 $80

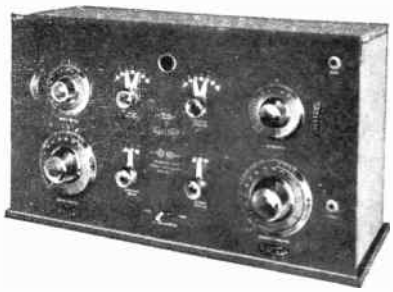
The early model, with wooden variometer, and tube projecting through the panel, was described by William Diehl in *Wireless Age*, April 1921, pp. 23-24.

Literary Digest (Dec. 16, 1922), p. 60



John Terrey

CR6 Jan. 1920 $180



CR7 Jan. 1920 $210

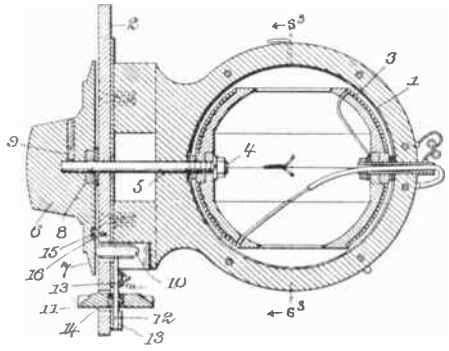
Grebe CR-7 Long Wave Receiver—
$210.00
With one Tapered Grip Plug and Instruction Book showing wavelength calibration.

DETECTORS AND AMPLIFIERS

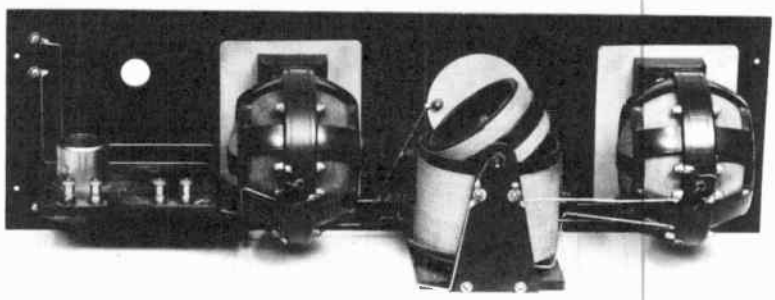
Model	Blueprint date	First ad	Price	Stages
RORA	—	3/20	$11	D
RORB	10/19	10/19	$45	AA
RORD	3/20	1/20	$75	DAA
RORE	10/19	3/20	$23	A
RORF	3/20	2/20	$65	DAA
RORG	3/20	5/20	$43	DA
RORH	2/20	2/20	$17	D
RORJ	—	4/20	$45	AA
RORK	3/20	9/20	$55	AA
RORL	3/21	5/20	$51	DA
RORN	10/22	1/23	$60	R
RORO	—	—	—	AAA
RORQ	—	3/24	$30	R

1,597,034. VARIOMETER. ALFRED H. GREBE, Richmond Hill, N. Y., assignor to A. H. Grebe & Co., Inc., Richmond Hill, N. Y., a Corporation of New York. Filed May 25, 1922. Serial No. 563,722. 4 Claims. (Cl. 74—7.)

1. In combination, a variable electrical device including a shaft, a panel, said device being mounted on said panel with said shaft projecting therethrough, a knob secured to one end portion of said shaft, a spindle revolubly mounted on the back of said panel and disposed substantially at right angles to said shaft, a friction wheel secured to said spindle and projecting through an



aperture in said panel into engagement with said knob, and a band wheel secured to said spindle and projecting through an aperture in said panel.



Radio Digest (June 9, 1923)

CR8 August 1921 $80 RORK Sept. 1920 $55

Gentlemen, Meet Doctor Mu!

—the exalted sage of radio. When he speaks, his words are the veritable epitome of wisdom, acquired through decades of tireless study and research. His advice is well worth heeding. Here's the Doctor:

"'Good words,' said Lao Tzu, "'shall gain you honor in the market-place;—but good deeds shall gain you friends among men!'

"So shall the good deeds of Grebe Radio Apparatus gladden the heart of the Amateur. Words fail to express its excellence."

Doctor Mu.

GREBE RADIO

CR-8 Short Wave Regenerative Receiver

is one in which perfection in even the minor details has been attained. It is indeed a masterpiece. Just look at these new features! Exclusive, every one of them:—

New moulded variometers—that will last a century.

Rubber-tired Verniers—make *real tuning* a pleasure.

Aluminum shields eliminate troublesome change of frequency when receiving C.W.

Direct reading wave-change and rheostat controls.

Battery binding posts in the rear—eliminating unsightly connections.

Constant calibrated wave-length range—150 to 1,000 Meters.

If it were possible to make a finer short-wave regenerative receiver, Grebe would be making it.

Your dealer will gladly order one of these receivers for your inspection. Ask him for bulletins.

Bunnell & Co., J. H., New York City.
Central Radio Company, Kansas City, Mo.
Chicago Radio Apparatus Co., Chicago, Ill.
Continental Radio & Electric Corp., New York.
Detroit Electric Co., Detroit, Mich.
Doubleday-Hill Electric Co., Pittsburgh, Pa.
Electrical Specialty Co., Columbus, Ohio.
Holt Electric Utilities Co., Jacksonville, Fla.
Hurlburt Still Electrical Co., Houston, Texas.
F. S. Katzenbach, Trenton, N. J.
Kelly & Phillips, Brooklyn, N. Y.
Klaus Radio Company, Eureka, Ill.
Manhattan Electrical Supply Co, New York, Chicago, St. Louis.
Leo. J. Meyberg Co., San Francisco, Cal.
Newman-Stern Co., Cleveland, Ohio.
F. D. Pitts Co., Inc., Boston, Mass.
Philadelphia School of Wireless Telegraphy, Philadelphia, Pa.
Western Radio Electric Co., Los Angeles, Cal.
Hickson Electric Co., Inc., Rochester, N. Y.

A. H. GREBE & CO., Inc. 72 Van Wyck Blvd., Richmond Hill, N.Y.

Radio News (Sept. 1921), p. 177

Dr. Mu, apparently inspired by Grebe's voyages to the Orient, was the creation of Doug Rigney, and an inseparable part of Grebe's subsequent advertising.

'A JOURNEY of a thousand miles,' said Lao Tzu, 'begins with a single step!'

"Let a Grebe Receiver be the first step of your radio-journey—lest you be compelled to return and start anew."

Doctor Mu

The CR-9 Receiver is the ideal equipment for C.W. and radiophone reception.

A Regenerative Receiver—150 to 3,000 Metres—moulded variometers, tapered-grip dials, rubber-tired verniers, direct-reading rheostat controls, automatic plug and jack filament control system.

So simple to operate—connect antennæ, ground, batteries—insert tubes—and *listen!*

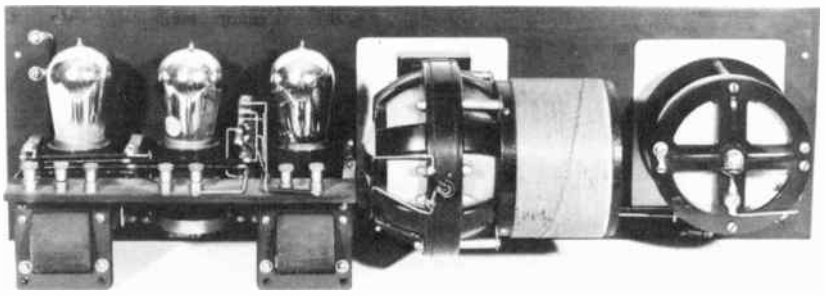
Ask your Dealer to show you this instrument or write us for descriptive bulletin.

A. H. GREBE & CO., Inc., Richmond Hill, N. Y.

The Sine of

GREBE RADIO

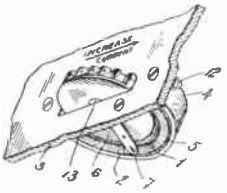
The Right Kind

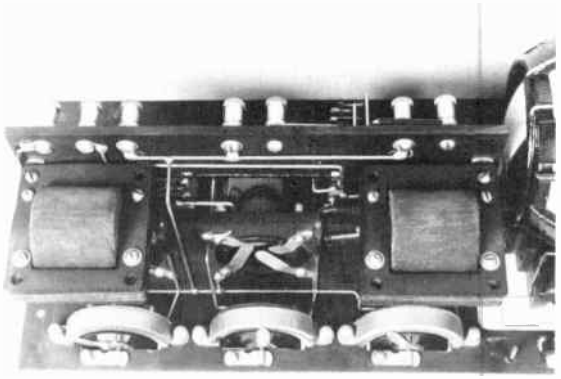


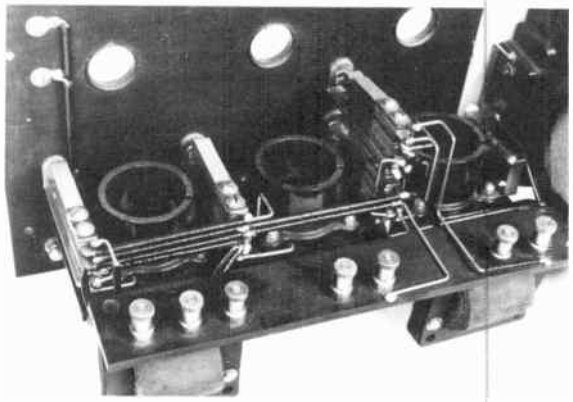
CR9 August 1921 $130

Radio News (Oct. 1921), p. 275

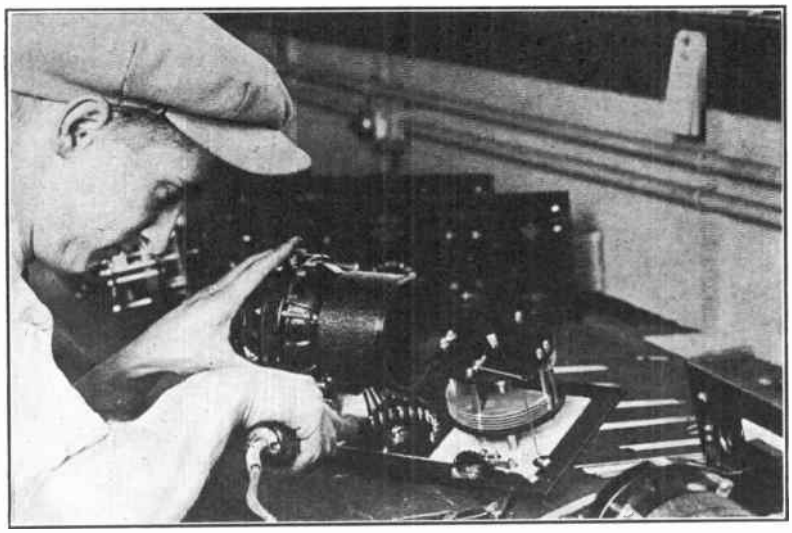
1,560,419. VARIABLE RESISTANCE. ALFRED H. GREBE, Richmond Hill, N. Y., assignor to A. H. Grebe & Co., Inc., Richmond Hill, N. Y., a Corporation of New York. Filed May 25, 1922. Serial No. 563,723. 4 Claims. (Cl. 201—55.)



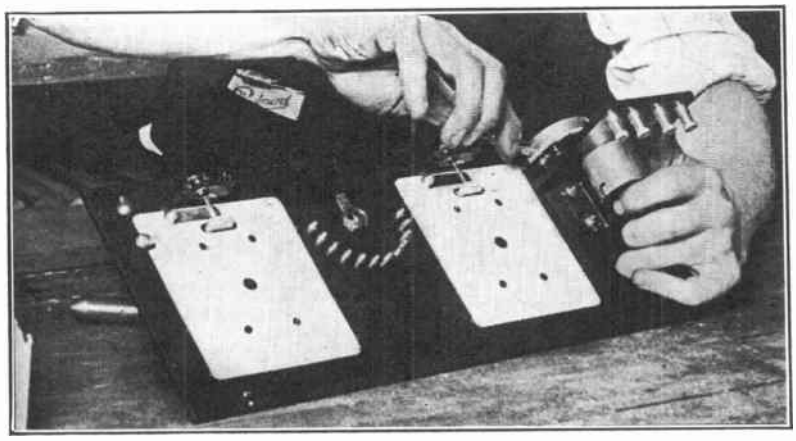




Skill Required to Make Radio Sets



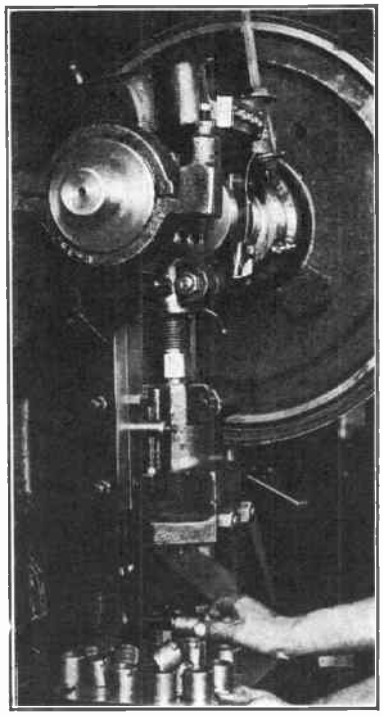
No. 1—Wiring a regenerative receiver.



No. 2—One of the important assembling tasks.

No. 3—Testing the completed receiver.

William Diehl



No. 4—A vacuum-tube slotter.

The Photographs Described

No. 1—Wiring a regenerative receiver. This is one of the final operations before the receiving set is ready for the test. The wireman must complete the circuits from one unit on the panel to the other. Note the short lengths of wire lying on the table. These wires are cut to size and fit into place in the receiving set.

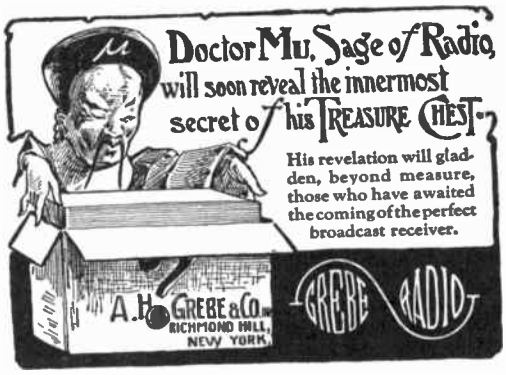
No. 2—One of the assembling tasks. This man is assembling minor parts on the main panel. When the apparatus has reached this stage it is recognized as a radio receiver. It is at this point that all the smaller parts are mounted onto the main panel and made ready for the wireman.

No. 3—Testing the completed regenerative receiver. Each instrument must be tested for mechanical as well as electrical defects. Whether the instrument shall be sent back to the wireman or the assemblyman depends on this man's verdict.

No. 4—Slotting the vacuum-tube sockets which provide a locking device for the tube. This automatic machine is a new type that came into use with the quick growth of radio manufacturing.

THE men and women employees in the various factories now turning out radio equipment are skilled and thorough workers. They must be; for the complete radio set is a complex affair—a machine of many intricate and perfect-working elements, all of which are turned out by the most up-to-date machinery and handled by craftsmen who see a great future

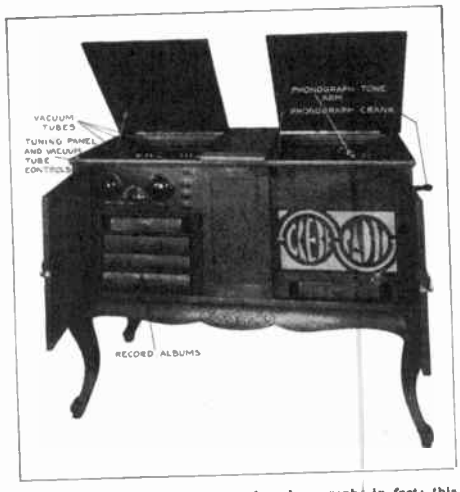
Radio World (June 24, 1922) p. 16



Radio Digest (June 23, 1923)

catalog

CR10 March 1922 $315



Receiving set made in the form of a phonograph; in fact; this cabinet may be used as a phonograph or radio telephone receiving set at will. The radio set makes use of the phonograph horn.

Lescarboura, *Radio For Everybody*, 1922

CR11? March 1922

Radio in the home of Frederick J. Michell, of Ridley Park, Pa.
Photo courtesy Wireless Sales Corporation

Radio in the Home (July 1923), p. 3

Radio Digest (June 16, 1923)

RORN Jan. 1923 $60
Technical article in *QST*, Jan. 1923, pp. 32-33.

GREBE "CLARIFIER"

The interference problem, which is a big one in crowded centers, has led the A. H. Grebe Company to develop a "Clarifier" unit which, when connected in front of the regular receiving set will prevent all radiation.

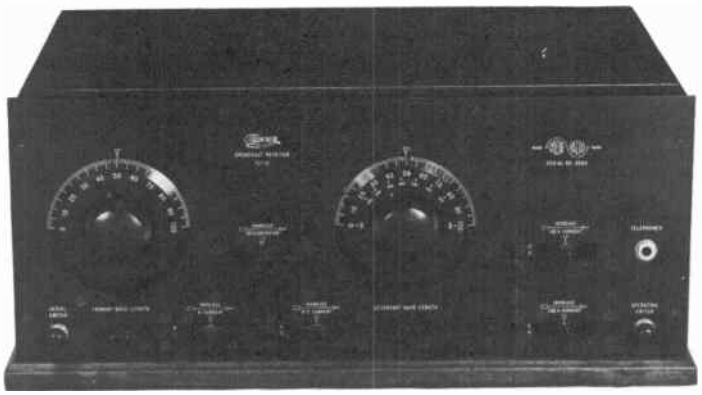
This unit, which is contained in a small cabinet in harmony with the regular Grebe line, consists of a "blocking" tube circuit. It is claimed that it will prevent radiation from any regenerative receiver; give an increased signal strength; add to the selectivity of the set considerably, and extend somewhat the receiving range. It has been so designed that it will work with every available make of tube, and is adaptable to all makes of receivers.

The "Clarifier" has only recently been placed on the market, after extensive tests had been concluded. It is manufactured by the A. H. Grebe Co., Richmond Hill, N. Y.

Amateur Radio (May 1924), p. 210

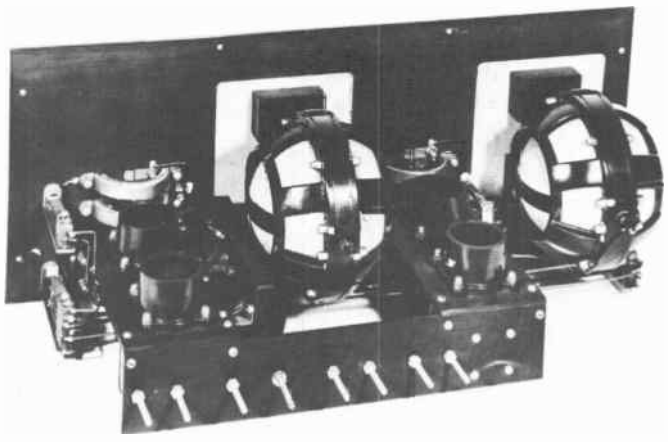
RORQ March 1924 $30
Described by Ralph Batcher in the *NY Sun*, March 22, 1924, p. 3; March 29, pp. 14-15; *NY Herald Tribune*, March 30,1924, p. 2; *Radio Topics*, May 1924, pp. 17-18, June 1924, pp. 17-18, 35; *Radio News*, June 1924, p. 1756,

Radio Digest (June 23, 1923)



CR13 Oct. 1923 $95 Ralph Muchow

An Amateur short-wave version of the CR12. Technical articles by William Diehl in the *NY Radio Sun-Globe*, Oct. 6, 1923, p. 1; Oct. 20, 1923 p. 6; and *Radio Topics*, Jan. 1924, pp. 19-20 and Feb. 1924; and a description in *QST*, Dec. 1923, pp. 28-29.



CR12 June 1923 $175

Said to have been designed by Richard W. Wagner, a broadcast listener from Belle Harbor, NY, working in the Grebe laboratory.

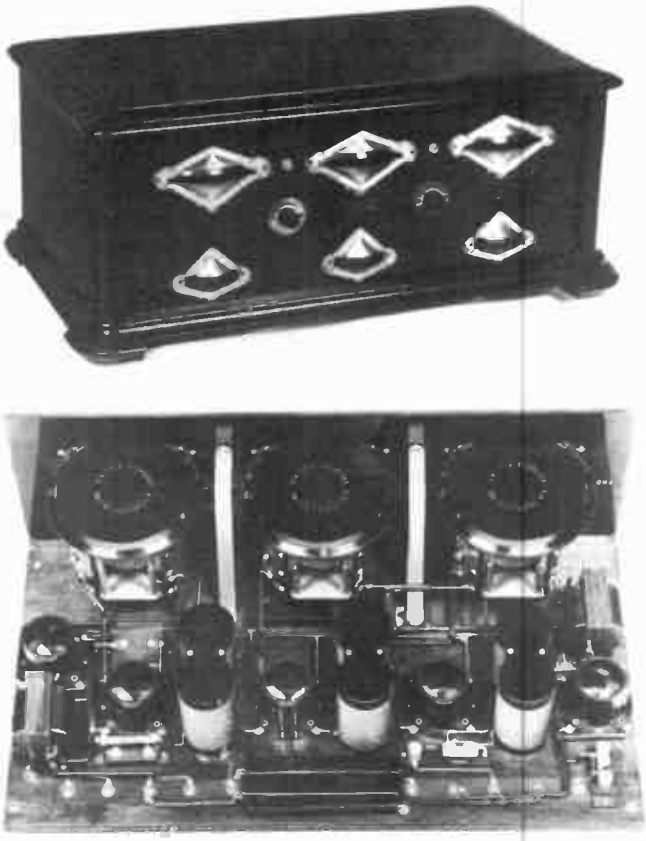
CR14 Nov. 1923 $110

A 3-tube simplified model CR12, using UV199's only.

Merriff Bancroft

Tele-Tech (May 1949), p. 37

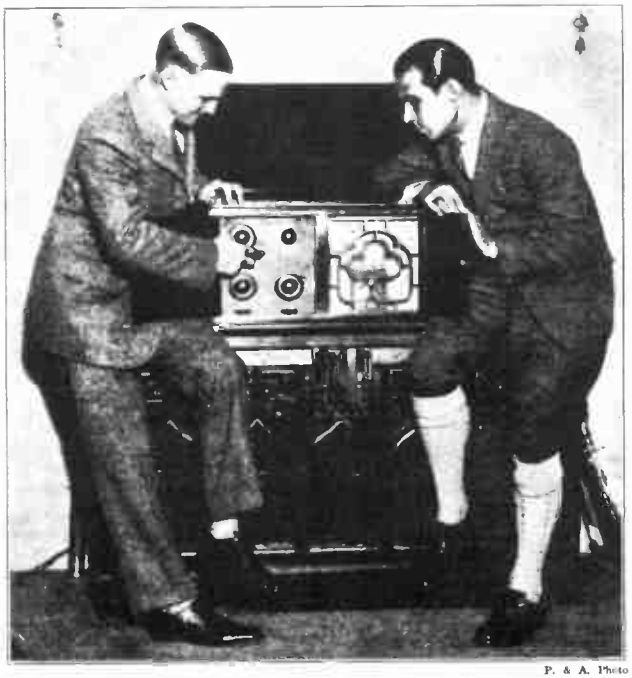
Ralph R. Batcher, (author of the accompanying article) photographed in 1924 with the late Alfred H. Grebe and one of the contemporary Grebe home receivers designed by Mr. Batcher, who as Grebe's chief technical man, also engineered the construction and operation of pioneer broadcast station, WAHG, later WABC, (now WCBS)



MU1 Sept. 1924 $155

The name "Synchrophase" won out over such contenders as Rotophase, Selectrodyne, Uniphase, and Claradon. In August 1925 the tuning dials were coupled by chains, and in September switches were added to tune a higher frequency range by cutting out half of the RF-coil turns. Other changes were made continually to the audio transformers, sockets, volume control, etc. Technical articles are in *QST*, April 1925, pp. 13-16, by Ralph Batcher, in *Popular Radio*, August 1925, pp. 116-127, and Oct. 1926 pp. 529, 577-580, and *Radio News*, April 1926, p. 1416.

MU2 (dry-cell, using UV199s or later UX199s) March 1925 $155



P. & A. Photo

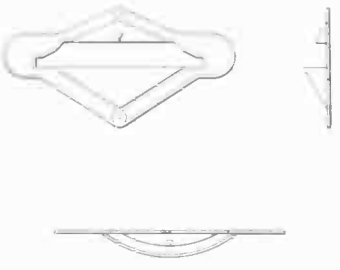
EVEN "THE SHEIK" IS A RADIO FAN

Rudolph Valentino, a favorite with thousands of movie fans he never sees, is himself one of the great invisible audience which listens nightly to radio programs. He started by making a crystal set and has worked his way up to the most complicated hookups. Here he is shown with Alfred Grebe, the radio engineer, testing a new 5-tube set designed by the inventor for Valentino.

CR16 August 1924

Radio Age (August 1924), p. 23

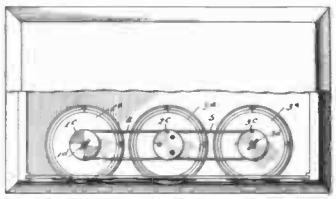
70,412 DIAL ESCUTCHEON FOR RADIO APPARATUS PANELS. ALFRED HENRY GREBE, Hollis, N. Y. Filed Dec. 5, 1924. Serial No. 11,599. Term of patent 7 years



The ornamental design for a dial escutcheon for radio apparatus panels, as shown.

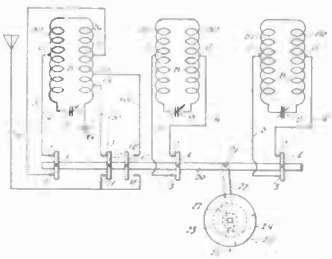
These ads from *Popular Science Monthly* are typical of Grebe: consistent, prominent, (facing the table of contents), technically-oriented.

1,608,734. UNIT CONTROL SYSTEM FOR ELECTRIC CIRCUITS. ALFRED HENRY GREBE, Hollis, N. Y. Filed May 13, 1925. Serial No. 30,033. 4 Claims. (Cl. 74—7.)



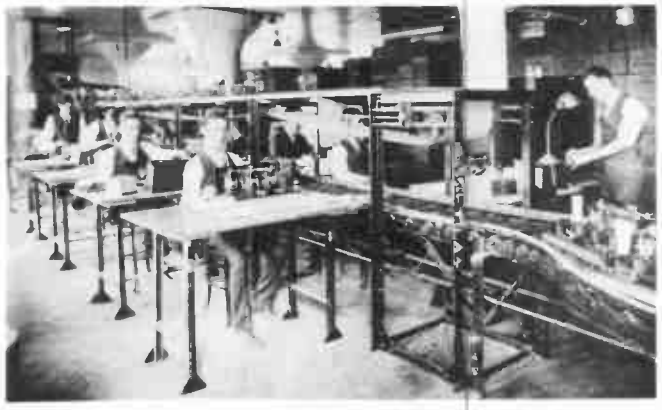
1. In a unit control system for simultaneously adjusting the variable members of a plurality of circuit elements, the combination of a plurality of variable members and means connecting said variable members for imparting simultaneous movement to said variable members, said means being constructed to provide lost motion between the elements for the purpose of permitting individual adjustment of each of said variable elements.

1,727,641. FREQUENCY-RANGE EXTENSION SWITCH ALFRED HENRY GREBE, Hollis, N. Y. Filed Jan. 30, 1926. Serial No. 84,922. 11 Claims. (Cl. 250—40.)



9. Circuit tuning means comprising an inductance variable to two values, a variable capacity normally rotatable through only 180°, and means for automatically varying the inductance when the capacity reaches minimum and maximum values so as to render the variable capacity effective throughout its entire range with each value of the inductance.

"Applause cards" were popular in the mid-1920s, frequently provided by manufacturers and radio stores.



MU-1 console (later, Andalusia) $320. (polychrome finish, $340). Four other consoles available.

Factory photos courtesy of Don Patterson and *Radio Age*

"Doug" Rigney, famous yachtsman and vice-president of the A. H. Grebe Company, Richmond Hill, New York, recently officiated at the launching of his new yacht, the MU-1, which is equipped with a complete broadcasting outfit and will be used to broadcast boat races of all sorts. Its call letters are WRMU. Mr. Rigney is shown giving "mike" its first test.

Radio Retailing (June 1926). p. 599

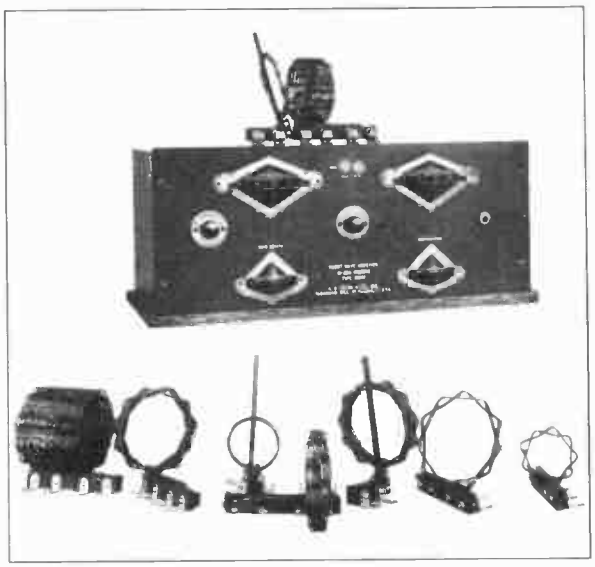
The Grebe CR-19 short-wave receiver uses a screen grid tube as an r.f. amplifier, '01A tubes as detector and first stage audio, and '12 tube as second stage audio. Its regeneration control is continuously variable from zero to

Grebe CR-19 Short Wave Receiver

Radio (July 1928). p. 52

the point of oscillation. It is designed for the reception of short-wave broadcasting, CW and ICW telegraphy, and other special purposes requiring either a wide or a narrow frequency band. Every important unit is heavily shielded.

CR19 July 1928 $150

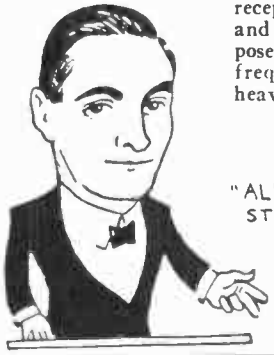


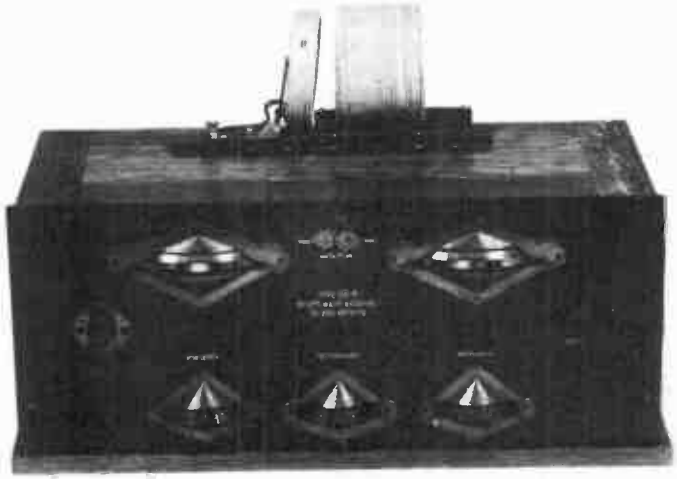
The new CR17 and the coils which make it go.

Amateur Radio (July 1925). p. 246

CR17 July 1925

Technical article on the earlier model in *QST*, Oct. 1925, pp. 33-36





Ron Boucher

CR18 May 1926 $100

Technical articles in *QST*, June 1926, p. 24, and *Radio Engineering*, August 1926, pp. 312-314.

CR18 Special Sept 1928 $110

QST (May 1926). p. 4

When the Gauls transmitted important news, it was shouted from tower to tower through a megaphone. Within fifteen hours the news of the Roman massacre at Orleans was thus sent to Auvergne 120 miles away.

Natural Tone

Perfection in radio reception is naturalness of tone. It must reach you as it left the studio—clear and life-like. It must be rich, deep, resonant—admitting no trace of "radio accent".

Nothing is so fatal to tone quality as an "unsympathetic" loud speaker. Reception suffers unless set and speaker work in perfect harmony.

Grebe has built a *Natural Speaker*. With it your set will reproduce tone more clearly and faithfully, affording you purer tone quality.

But in combination with the Grebe Synchrophase Seven, it attains its highest capabilities.

The Grebe Natural Speaker is priced at $35; the Grebe Synchrophase Seven at $135.

Send for Booklet D; then ask a Grebe dealer to demonstrate both of these Grebe masterpieces in combination.

GREBE SYNCHROPHASE RADIO

TRADE MARK REG. U.S. PAT. OFF.

GREBE RADIO

TRADE MARK REG. U.S. PAT. OFF.

A. H. Grebe & Co., Inc.
109 W. 57th St., N. Y. C.
Factory: Richmond Hill, N. Y.
Western Branch: 443 So. San Pedro St., Los Angeles, Cal.
The oldest exclusive radio manufacturer

Literary Digest (Oct. 8, 1927), p. 54

Synchrophase 7 June 1927 $135
Technical article in *Radio Broadcast*, Jan. 1928, pp. 232-234.

Service Bulletin

Before newspapers were common, news of immediate importance was carried through the streets by a town official called a "Crier."

Get it Better with a Grebe

Born with a heritage of 19 years of outstanding radio leadership, endowed with tonal beauty, selectivity and ease of operation, the Grebe Synchrophase A-C Six is presented—the newest member of a famous family.

This receiver uses A-C (alternating current) tubes and entirely eliminates batteries and socket power units. Just plug into the light socket and listen.

Incomparable range and selectivity—single illuminated dial—freedom from A-C hum—maximum volume without distortion and other new Grebe improvements enable you to get better local and distance reception.

The Grebe Synchrophase A-C Six is truly the battery-less set for which you have been waiting. Hear it today. Then you will have a complete demonstration of what expert, painstaking radio engineering can accomplish.

Grebe Natural Speaker (illustrated), $35; Grebe No. 1750 Speaker, $17.50. Where alternating current is not available, the Synchrophase Seven, $135; or the Synchrophase Five, $95. You will be interested in Booklet N, which fully explains the new Grebe A-C Six. Sent upon request.

GREBE SYNCHROPHASE A-C Six RADIO

TRADE MARK REG. U.S. PAT. OFF.

A. H. Grebe & Co., Inc., 109 W. 57th St., New York City
Factory: Richmond Hill, N. Y. *Western Branch:* 443 So. San Pedro St., Los Angeles, Cal.
Makers of quality radio since 1909

National Geographic Magazine (April 1928)

AC6 March 1928 $227.50
AC6 console Oct. 1928 $510
Short technical articles in *Radio Broadcast*, July 1928, p. 159; *NY Telegram*, March 10, 1928, p. 8.

Three Grebe Sets

Through the use of three screen-grid tubes plus the "equalized band pass filter" and six tuned circuits, unusual selectivity at all points of the dial is obtained with the new SK-4 receiver, according to A. H. Grebe & Co., Inc., Richmond Hill, N. Y. But one stage of transformer coupled amplification is employed, affording improved reception quality. An automatic

Model 285

voltage regulator, provision for a phonograph pick-up, and an illuminated translucent dial scale are some of the features of this set.

Model 21950 is a lowboy of the

Model 21950

open front type. Price, $219.50.

Model 285 combines walnut and mahogany in the cabinet with panelled sliding doors. Price, $285.

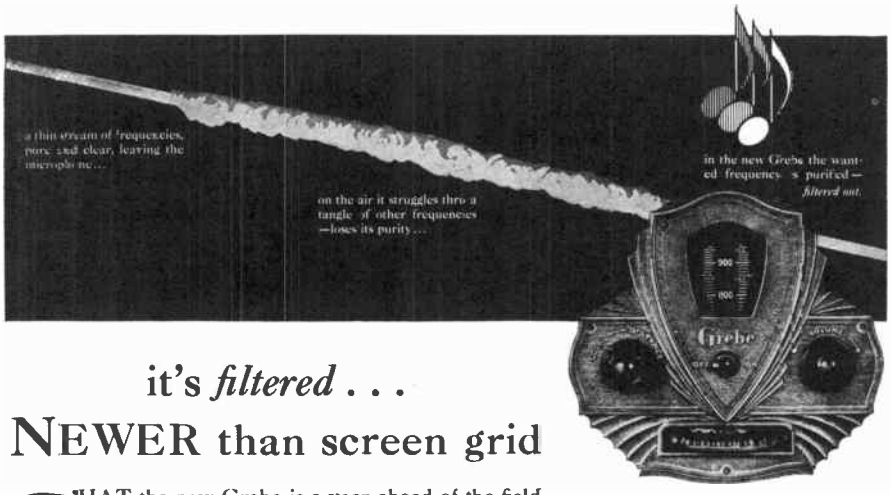
Model 250 is a radio-phonograph combination, in a lowboy cabinet, with decorative side panels. Price, $450. — *Radio Retailing*, October, 1929.

Model 450

SK 4 July 1929 $219.50
Performance graphs in *Citizens Callbook*, vol. 12 no. 2, March 1931, p. 63. Short technical article in *Radio*, April 1930, p. 49.

Radio Retailing (Nov. 1929), p. 5

AC7 July 1928 $195
Synchrophase 7s could be converted to AC7s by the factory for $55.



it's *filtered* . . .
NEWER than screen grid

THAT the new Grebe is a year ahead of the field has been known to the trade since June, when it made its bow at the National Radio Show. Now the public, too, knows that this set is *newer than screen grid*. And while the public reacts to the advertising that is running in important newspapers in every large trading area—while the trade is talking—Grebe franchise-holders are reaping substantial profits.

On the store floor where sales are made, in the home where sales are confirmed, this set is demonstrating to thousands that the *lifelike* tone made possible by the *exclusive* equalized band pass filter is unvarying.

Grebe dealers are making money. That's why it will pay you to take on the Grebe franchise for your district.

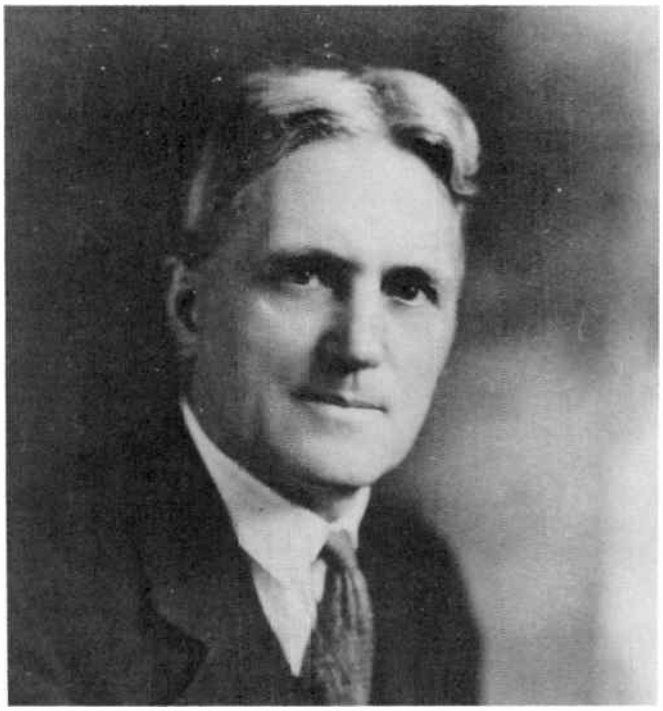
Alfred H. Grebe—"Depend on this: the Super-synchrophase on demonstration proves to the entire satisfaction of the consumer every statement made in our advertising. In perfecting this new set, we relied upon the public to distinguish between tone that is merely pleasant and the life-like Super-synchrophase tone. In our advertising, we have relied upon the facts, told in a simple, straight-forward manner. Franchise-holders know that our faith has in each instance been justified."

Grebe radio
SUPER-SYNCHROPHASE

A. H. GREBE & CO., Inc., Richmond Hill, N. Y.
Western Branch: 443 So. San Pedro Street, Los Angeles, California

HOWARD

Howard Radio Company



Don Patterson/*Radio Age*

Austin A. Howard was born on January 27, 1872. By 1905, he was building radio apparatus. He had an amateur radio station, or at least a receiving station, in Chicago before World War I; it was used in January and February, 1918, by the Navy in transmission tests conducted by Ensign Alfred Crossley (reported by A. Hoyt Taylor in *Proc. I.R.E.* 1919, p. 356). Up until 1922, Howard held special license 9XG. *Radio Topics* in September, 1921, describing the First National Radio Exposition in Chicago where Howard represented the Electric Specialty Company, makers of motor-generators, stated "[he] is the same Mr. Howard that we have heard so often talking to us with his radio-telephone set."

In November, 1922 Howard began advertising radio parts, and by March, 1924, was a Neutrodyne licensee, the last of the original 14 to sign on. Until 1927, his policy was summed up by *Radio Retailer and Jobber:*

"Howard . . . . is in a sound and healthy position. Mr. Howard deliberately makes a limited number of sets, gets his most substantial price for them, fashions each one individually, as a laboratory job, and lets it go at that."

For 1924, he reported sales of about $230,000 to Hazeltine. In the 1926-27 season, he was said to have made 4000 sets.

In mid-1927, Howard obtained an RCA license, to the puzzlement of the radio industry, that wondered how he would make the $100,000 per year minimum royalty. He intended to do it by expanding his output. He advertised a larger number of new models than ever before; a few months later, brought out still more; and moved to a larger plant at 4949 N. Crawford in Chicago in June, 1928. The following February, he tied in with the Everett Piano Company of South Haven, Michigan. In September Alfred Crossley became chief engineer, replacing Leland Hansen, designer of all the Howards up to this point.

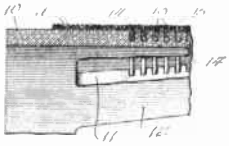
Howard also relied on the Hazeltine Corporation for engineering service; Hazeltine's assistant, John F. Dreyer, Jr., made at least two trips to Chicago to solve problems. Paraphrasing a 1983 interview with Dreyer:

"Austin Howard was a wonderful man . . . drove a Leland . . . was a wild man behind the wheel . . . scared me to death driving from the factory to the office . . . for the trip home, would drive me to the station, wait til the last 'all aboard!,' and stuff a hundred dollar bill in my pocket as he pushed me on to the train.".

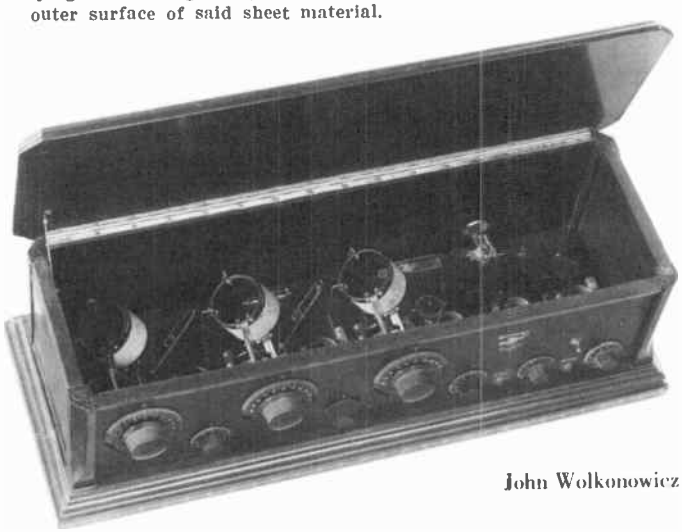
The year 1929 was obviously not the year to expand into fancy console radios. Howard lost control of his company to the other stockholders in January, 1930, but he later returned. In December, 1932, Hansen regained his old position as chief engineer, and in April, 1934, Howard moved back to Chicago, to McMurdo Silver's plant at 1731 Belmont Avenue. Here he provided RCA license coverage to small companies such as Hallicrafters, which at first did not have its own license (Hallicrafters' first models were made by Howard; Bill Halligan then leased space in Howard's basement, eventually expanding to occupy two floors.–1978 interview of Halligan by H. L. Chadbourne).

Silver left Belmont Avenue in June, 1934, but Howard remained there at least through 1948, making communications receivers (reportedly including some of McMurdo Silver's later Masterpieces) and tuners. His company's name had disappeared from the *Electronic Buyers Guide* by June, 1949.

1,575,341. ELECTRICAL TRANSFORMER. AUSTIN A. HOWARD, Chicago, Ill. Filed Mar. 7, 1925. Serial No. 13,773. 3 Claims. (Cl. 175—359.)



1. A device of the character described comprising; a cylindrical support having a spiral groove in its outer surface, said support also being provided with cut away portions, said cut away portions interrupting said spiral groove; a wire laid in the bottom of said groove and spanning said cut away portions, the depth of said groove being greater than the diameter of the wire laid therein; a sheet of material wound on said support and lying over said groove; and another wire wound on the outer surface of said sheet material.

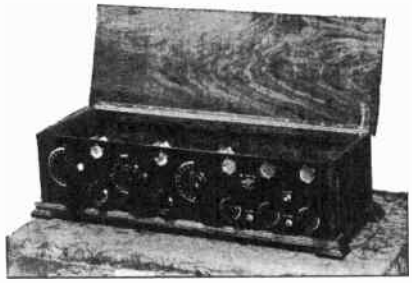


John Wolkonowicz

Model C March 1925 $180

Neutrodyne (model A) Nov. 1924 $200
Model D (4 tubes, not shown) Nov. 1924 $135
Console Mar. 1925 $325

Radio Digest (May 3, 1924), p. 9



The Howard 5-Tube Neutrodyne Coast to Coast Range

Beautiful black Walnut cabinet with special designed Howard Neutroformers, Neutrodones, special sockets and rheostats.

The Howard Neutrodyne brings the wonders of radio into your home and allows you to distinctly receive the famous broadcasting stations of the world.

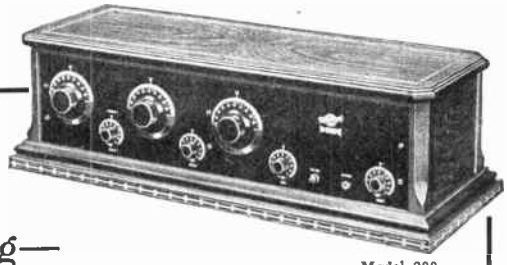
Write Today for Descriptive Folder of This Remarkable Set

Howard Mfg. Co. is one of the few manufacturers licensed under Hazeltine patents to sell Neutrodyne receivers.

HOWARD MANUFACTURING COMPANY
4446 NORTH WESTERN AVENUE
CHICAGO

Licensed by Independent Radio Manufacturers, Inc. Reg. U.S. Pat. Off. NEUTRODYNE Pat. March 27, 1923 and April 1, 1924 Hazeltine Pats. Nos. 1,450,080 and 1,489,228 Other Patents Pending

Neutrodyne May 1924 $200
Console Dec. 1924 $325



Model 200

Announcing—

the new 1926 Howard Six Tube Neutrodyne Radio Receiver with the new special transformer coupled audio amplification.

In performance, the Howard Neutrodyne proved itself dependable last season. It possessed all the requisites for good radio reception—selectivity, distance and tone quality. The new 1926 model No 200 refined in design and workmanship gives still greater volume and reproduction of voice and music as yet unexcelled in radio reception.

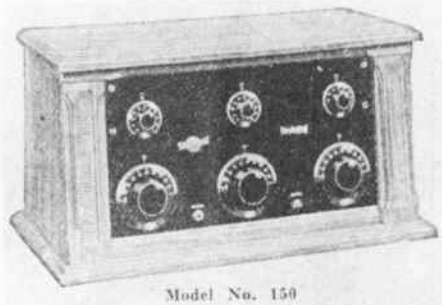
Call at your dealer's for a demonstration of the performance of this latest development in radio apparatus or write us for further information.

Licensed by Independent Radio Manufacturers, Inc. Reg. U.S. Pat. Off. NEUTRODYNE Pat. March 27, 1923 and April 1, 1924 Hazeltine Pats. Nos. 1,450,080 and 1,489,228 Other Patents Pending

HOWARD RADIO COMPANY
451-469 East Ohio Street Chicago

200 Oct. 1925 $200
Console, Nov. 1925 $325

Radio Engineering (Oct. 1925), p. 559



Model No. 150

Trade Name—"Howard"; Type—Neutrodyne; Tubes—6; Battery—"A" storage; "B" 90 volts dry or storage; Controls—Tuning, 3; Tube, 3; Dim.—14 x 24½ x 14¾; Price—$150.00.

Model No. 250

Same as Model No. 150, except as noted. Console type, equipped with built-in loud speaker; Dim.—42 x 40 x 16; Price—$250.00.

Radio Industry (Nov. 1925)

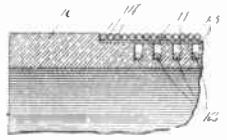
K (150) Nov. 1925 $150
250 console, $250

Technical article in *Radio Engineering*, June 1926, pp. 237-238.

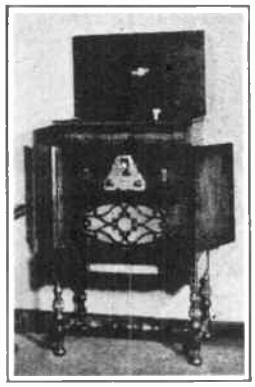
135 (battery) Sept. 1927 $135
consoles, $165 & $325

NY Sun (Feb. 17, 1927), p. 53

1,575,342. ELECTRICAL TRANSFORMER. AUSTIN A. HOWARD, Chicago, Ill. Filed July 9, 1925. Serial No. 42,411. 4 Claims. (Cl. 175—359.)



1. A device of the character described comprising a cylindrical support having a spiral groove in its outer surface, a wire laid in the bottom of said groove, the depth of said groove being greater than the diameter of the wire laid therein, a sheet of material on said support lying over said groove, and another wire wound on the outer surface of said sheet of material.



Radio-Phonograph Combination

The Howard Radio Co., 4949 N. Crawford Ave., Chicago, is making a combination phonograph and A.C. radio console receiver with a '10 power tube in the last audio stage. Both radio reception and phonograph music are controlled by one switch. The intended retail price is approximately $465.

Another model is an eight tube A.C. set, which will retail below the $150 figure.—*Radio Retailing*, July, 1928.

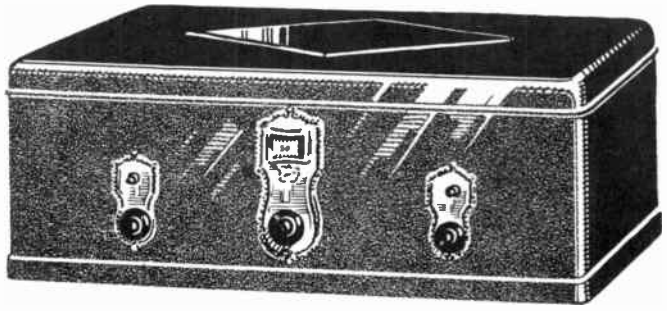
Radio Retailing (July 1928), p. 64

Model Eight

Howard Super Power Console Receiver with reproducer built in and controllable concealed loop. An efficient instrument of indescribable beauty.

Eight Nov. 1926
$655 ($675, Sept. 1927)

Radio Mechanics (Nov. 1926), p. 87



Citizens Radio Call Book (Nov. 1928)

THE 1929 HOWARD

Green Diamond Eight Nov. 1928 $125

Now you, too, can sell the Howard

We have now provided, in one of the finest factories in the world, greatly increased facilities for the manufacture of Howard Radio Receivers and Cabinets, both under one roof. ¶Cabinets embody construction and tone principles to the highest standard of grand piano workmanship. ¶We are ready to talk with distributors and their dealers. Ask us now, please, what we can do for you.

HOWARD RADIO COMPANY
CHICAGO AND SOUTH HAVEN, MICHIGAN

New Howard Plant at South Haven, Mich.

HOWARD

Licensed under Radio Corporation of America and associated companies; Hazeltine and Latour; Hogan; and Miessner.

New Green Diamond a Sensation

Correct design and extreme care in construction are the basis of amazing results which Howard owners everywhere report. Nine tubes arranged as follows—four Radio Frequency Amplifiers, Detector, first Audio, and two Push Pull Amplifiers with one Rectifier Tube. This combination as engineered by Howard produces both distance and marvelous tone quality.

For the first time in our history we are in position to invite inquiries from distributors and dealers because of our greatly enlarged manufacturing facilities. If your trade could appreciate a receiver of Howard quality in a fine walnut cabinet at about $200, use the coupon below and let us give you the details.

HOWARD RADIO COMPANY
CHICAGO and SOUTH HAVEN, MICHIGAN

RADIO

Boston Post (Nov. 17, 1929)

There's None Finer Than—
HOWARD RADIO

The 1930 Consolette
$175
Less Tubes

WITH more than twenty years of actual experience back of every HOWARD, it is only natural that these fine Receivers should be leaders in the world of Radio.

The 1930 HOWARD is no exception to the rule. Tone—that all-important quality in any radio—is the outstanding feature of this year's receiver. Absolute fidelity to the original throughout the tonal scale is yours with the Howard.

And those other qualities which have made HOWARD the desired of the discriminating—selectivity, sensitivity and volume—are accentuated in the 1930 Models. As to outward beauty—HOWARD cabinets are unsurpassed—see them for yourself—ask us to give you a demonstration in your own home.

LICENSED BY R.C.A. AND ASSOCIATED COMPANIES

Exclusive Distributors for New England

BIGELOW & DOWSE CO.

Boston and Springfield, Mass.

Boston Address—169 A St., South Boston. Tel. South Boston 3800

HOWARD RADIO DEALERS

MELCO

TYPE 400

If You are in Radio to Stay — Here are Your Best Products

THE Melco Type 400 Tuner and Detector, with two-stage amplifier, is guaranteed in every particular and has earned certificates of excellence from both the Tribune and Evening Mail Institutes.

Its wide reception range, its selectivity, its loose coupling and Litz wound varicoupler, its simplicity of operation, and stability of adjustment, makes this Radio set, without doubt, the best instrument of its type on the market.

Price, each unit, $35.00

For quality merchandise, price cannot be equalled

MELCO

SUPREME

Write now for Literature, Attractive Discounts and Distributors Proposition

THE "Melco Supreme" Radio Frequency Amplifying Receiver can be used with indoor or outdoor aerial, loop or lighting plug. It is a new departure in radio, non-reflex, non-regenerative, tuned radio-frequency: Amplification of this instrument is extremely high per stage, without loss of tone quality. **It does not distort the wave nor interfere with other members of the radio audience.**

This new system permits of single tuning adjustments that result in a high degree of selectivity and long distance reception.

Price, $125.00

For quality merchandise, price cannot be equalled

Mortimer Radio Corporation

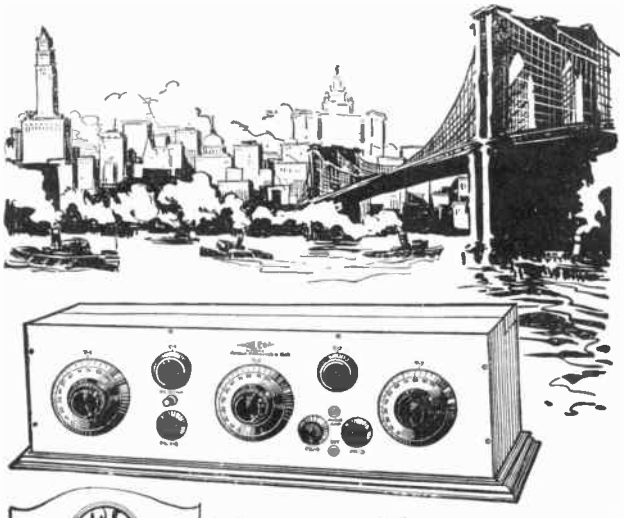
114-116 FULTON ST., NEW YORK, N. Y.

709 Mission Street, SAN FRANCISCO, CAL. — 1828 Fourth Ave., HUNTINGTON, W. VA. — 636 Victory Bldg., PHILADELPHIA, PA. — 704 Granite Bldg., PITTSBURGH, PA. — 13 So. Fourth St., ST. LOUIS, MO. — Flatiron Bldg., ATLANTA, GA.

CANADIAN REPRESENTATIVES: SCOTT BROS., LTD., 332 St. Catherine St., W., Montreal, Que.,

Say you saw it in RADIO MERCHANDISING

The Best in Radio Equipment



MELCO

"Satisfies Every Radio Wish"

Pre-Tuned
Pre-Logged

AMSCO

MELCO-SUPREME

Tuned Radio-Frequency

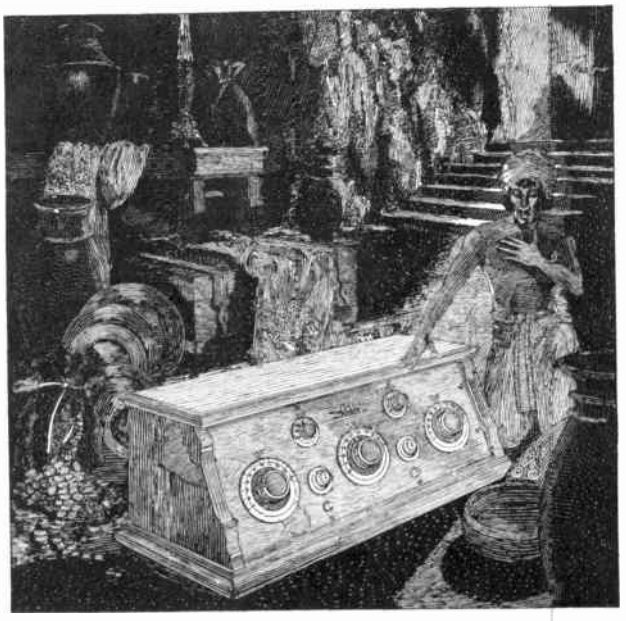
Just as bridges link neighboring cities—so does the Melco Supreme link the happenings of even the most distant towns with your own fireside.

Complete descriptive literature on request

AMSCO PRODUCTS INC

Broome & Lafayette Strs. New York

Please refer to POPULAR RADIO *when answering advertisements.*



MELCO SUPREME—the "Open Sesame" that reveals the priceless treasures of the air! Melco reception is to the ear, like a great masterly-cut gem to the eye. Clear, Flawless, Supreme.

Ready for Distribution January 1st, 1925

MELCO SUPREME RECEIVER

TUNED RADIO FREQUENCY

Write for interesting literature

MELCO AMSCO PRODUCTS INC. BROOME & LAFAYETTE STREETS, N.Y.

All apparatus advertised in this magazine has been tested and approved by POPULAR RADIO LABORATORY

Radio Merchandising (Feb. 1923), pp. 14-15

Popular Radio (Sept. 1924 & Jan. 1925)

JONES

Lester L. Jones / Melco

Jones was described in 1985 by Harold A. Wheeler, who met him in court in the mid-1920's, as "A gentleman, quiet, unassuming, respectful, very well educated." He had studied, according to Dreher in 1926, under A. N. Goldsmith. Over his lifetime, Jones obtained at least 94 US patents.

LESTER JONES
B.S. in E.E. and R.E., consulting radio engineer. Fellow of I.R.E.

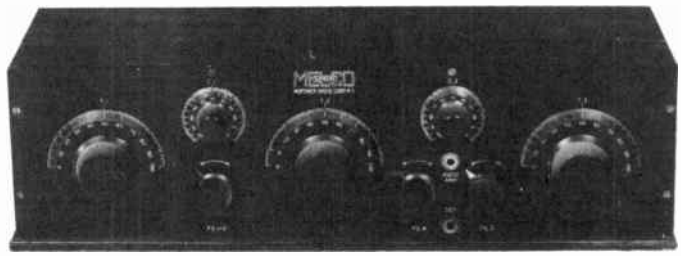
Radio Retailing
(July 1928), p. 48

There were at least three radio men named Jones: Samuel Seaman Jones, Joseph W. Jones, and Lester L. Jones. Samuel, and his Jones Radio Company of Brooklyn, is covered under Kellogg. Joseph W.'s radio activities were relatively straight forward. Lester L., however, was involved in a number of ventures under different names.

Lester L. Jones changed his name from Lester L. Israel around 1922. He worked for Emil Simon from about 1914 to 1920; during the war, he was with Lt. Eaton's group at the Washington Navy Yard (with Priess and Horle, and Hazeltine as consultant), where he developed the SE143 receiver. Forming Danziger-Jones in 1922, he designed the Telos Vario-Transformer (a tunable RF transformer) in January, 1923.

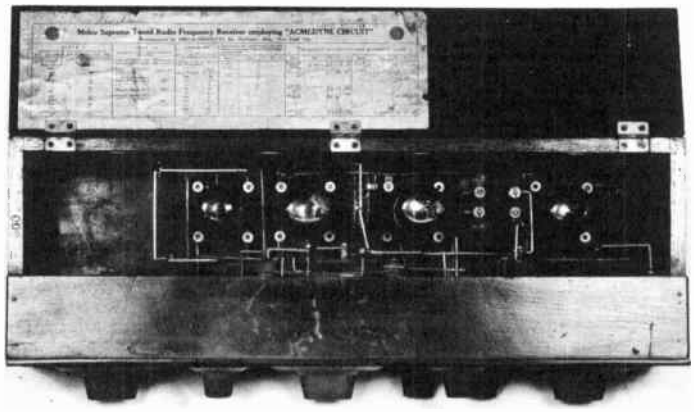
Meanwhile, in July, 1922, the Mortimer Radio Company was incorporated and began advertising under the Melco name. By February, 1923, it introduced the Melco Supreme, using Telos Vario-Transformers. In May, 1923, Mortimer merged with Amsco (Advance Metal Stamping Company) owned by the Price brothers, attorneys who had acted for Mortimer in its incorporation. Westinghouse won a suit against Amsco, for infringement of the Armstrong regeneration patent, in early 1925. In one unconfirmed report, damages were recovered of triple Amsco's past profits on the Supreme (unlikely). The Prices sold out to the De Jur brothers in 1928, soon withdrawing from the De Jur-Amsco Company.

Jones, who had been working on neutralized TRF amplifiers at about the same time as Hazeltine, eventually lost most of his patent claims, but he did produce one successful circuit: the Technidyne. Alexanderson of GE had patented a TRF amplifier with tuned circuits between successive vacuum tube stages. While this was the most practical arrangement, Jones was able to avoid it by placing all his tuned circuits at the input, followed by a multi-stage untuned amplifier. For companies such as Sparks-Withington and AC Dayton, who refused to pay royalties to RCA, a Technidyne license was a valid alternative. Eventually, however, all the companies came to terms with RCA, and little more was heard from Lester Jones.



Ralph Thorn

This particular set was given by Jones to his young neighbor Ralph Thorn in early 1954.



Ralph Thorn

Melco Supreme Feb. 1923 $125

Technical article in *Radio Engineering*, May 1924, pp. 100-101.

5-tube model, with a third jack on the upper left of the panel, described in *Radio Engineering*, Nov. 1924, pp. 340-343; *NY Evening World*, Oct. 18, 1924, p. 3, Oct. 25, 1924, p. 17.

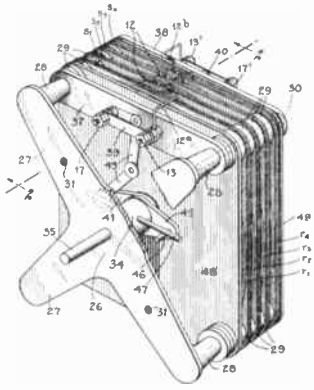
A sloping-panel model was advertised in Jan. 1925, and described in *Popular Radio*, March 1925, pp. 261-269; *NY Evening World*, Feb. 7, 1925, p. 17.

Amsco offered a complete kit in April 1924.

This kit was first advertised in Nov. 1924. Danziger-Jones was formed in 1922 to build and market Telos products; the two partners split in 1926.

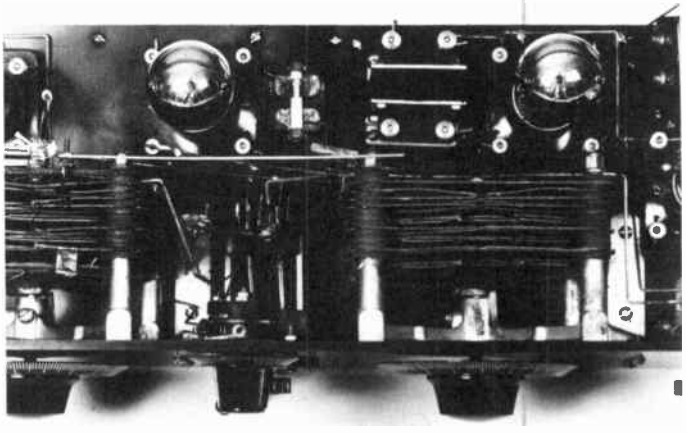
Popular Radio (Dec. 1924, p. 87

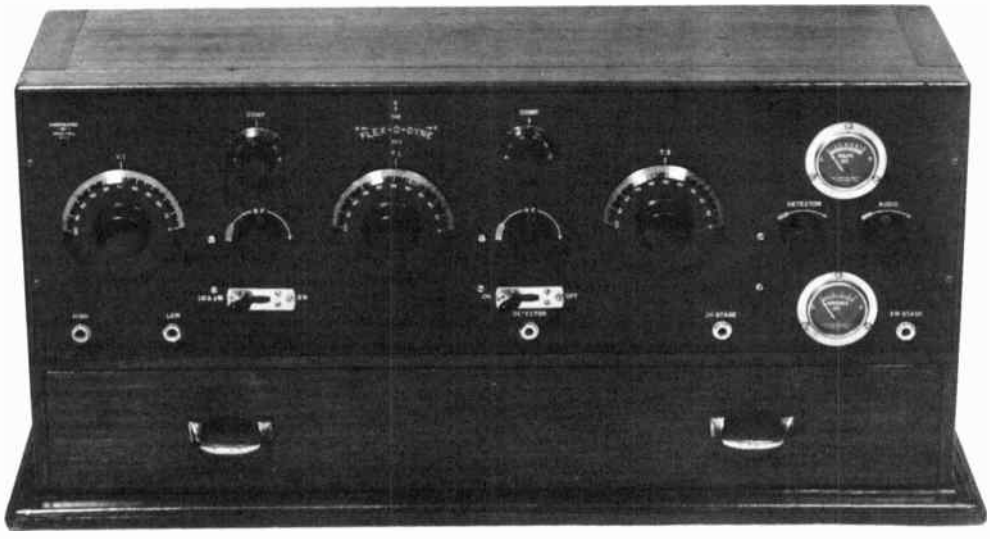
1,664,513. VARIOMETER. LESTER L. JONES, Oradell, N. J. Filed Jan. 23, 1923. Serial No. 614,404. 19 Claims. (Cl. 171—119.)



1. A variable inductance comprising a stator formed of a set of flat coils each coil comprising oppositely wound coil sections wound in a single plane, and a rotor also formed of a set of flat coils each coil comprising oppositely wound coil sections wound in a single plane, the coils of the stator set and the coils of the rotor set being arranged in alternating interleaving relation.

The "Acmedyne" circuit using these Telos Vario-transformers was first presented in a construction article in *Popular Radio*, August 1923, pp. 132-141.





Charles G. Hall of New York City used Telos Vario-Transformers in his Flex-O-Dyne, advertised for a year beginning in Dec. 1923.

JONES

Jos. W. Jones Radio Mfg. Co., Inc.

Radio Guide (Apr. 1925), p. 19

JOSEPH W. JONES
President, Jones Radio Manufacturing Co., Inc.

Joseph W. Jones was a different story. Primarily a mechanical inventor who entered the radio field for only a few years, he remained active with his own successful company until he died around 1960. The Jones Instrument Corporation still exists.

Jones spent a summer vacation in the 1890's working for phonograph inventor Emile Berliner. Combining Berliner's disc record with Bell and Tainter's use of wax (Berliner was using etched zinc), Jones got a patent that he sold for $25,000 to Columbia Graphophone, Berliner and Victor's arch-rival. Now financially able to set himself up as an independent inventor, Jones produced a long series of inventions in the field of taximeters, speedometers, and spring motors, forming the Jones Speedometer Company and Jones Motrola to exploit them. He sold his taximeter patents to the New York Cab Company, and the speedometer patents to Stewart-Warner; but he re-entered the speedometer/tachometer field during World War I with the development of a light-weight aircraft tachometer, an instrument that was in production until 1962. The "Motrola," an electrically-powered spring winder for phonographs, was later applied to NCR cash registers; Jones Motrola also made power tools, such as drills.

Jones' entry into radio production came in October, 1924, with the setting up of a new factory at 370 Gerard Avenue in the Bronx, and the hiring of a bombastic sales manager, "Colonel" S. H. Mapes. However, by January, 1926, Jones had dumped his stock of sets to the Brooklyn department store of Frederick Loeser, going into receivership on March 24, 1926. No doubt the failure of Music Master, with which Jones had a large contract, contributed to his problems. Jones once again began making radios in October, 1926; according to a retired employee, they were still being assembled at Gerard Avenue in 1929, if not 1930, from components produced at a 57th Street plant. After that, Jones returned to the mechanical devices he knew best.

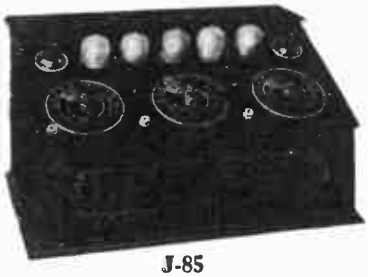
NY Herald-Tribune (Dec. 21, 1924), p. 20

Ralph Muchow

Larry Chestnut

J-75 June 1925 $75

JOS. W. JONES RADIO TRADE MARK



J-85

A

Radio Receiver

for the

Critical

and

Distant reception with the receiver is not a matter of luck—it's an everyday occurrence and the received signal is a reproduction not an imitation.

Write for literature descriptive of Jos. W. Jones receiving sets and precision parts.

J-85 May 1925 $85
Exhibited at the Executive Council Radio Show in Feb. along with other models (probably the J-65 and J-75).

(not shown)

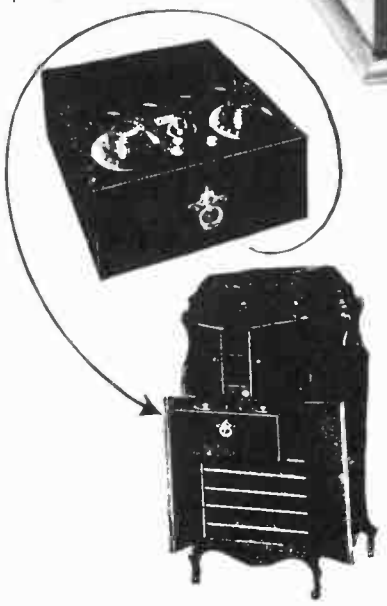
June 1926 models:

J621 $ 65
J700 $125
J675 $ 85
J655 $ 75
J1958 $150

Sept. 1927 models:

J625 $ 45
J600 $ 60

Radio News (May 1925), p. 2118



J80 May 1925 $80
JW-90 May 1925 $90
(phono panel, 5 tubes)

Ted Phillips

J-65 Sept. 1925 $65

Radio News (June 1925), p. 2300

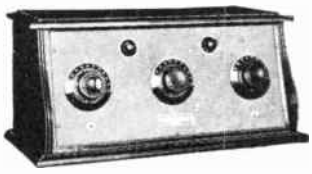
JOS. W. JONES, inventor and manufacturer of world reputation, who has to his credit over 300 patents granted by the U. S. Patent Office.

"They told me it couldn't be done, so I DID it!"

Jos. W. Jones

A Triumph of PRECISION—a Revelation in Performance—an Achievement in VALUE!

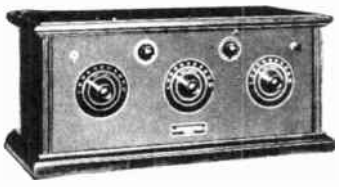
WHEN Jos. W. Jones produced his first standardized, precision-made Radio Receiver, experts proclaimed it to be the greatest achievement in the history of radio reception. And it was! But Jones wasn't satisfied. He said it could be improved. They said it couldn't. So he went to work and *showed* them.



Model J-75 S. P.

To Retail at $75

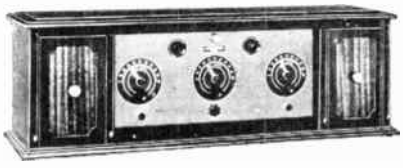
Without accessories 5-tube, tuned radio frequency receiver



Model J-100 B

To Retail at $100

Without accessories 5-tube, tuned radio frequency receiver



Model J-175

To Retail at $175

Without accessories 6-tube, tuned radio frequency receiver

The result of his untiring zeal and energy in the perfection of Radio Reception is shown in the new 1925 line of Standardized, Precision-Made Receivers which bear his name. This line is complete—comprising seven new and beautiful models at $75, $100, $125, $150, $175, $250 and $475.

Each is a masterpiece—each an unbeatable value—each a triumph of PRECISION, producing that perfect harmony in every part which has heretofore been lacking in even the highest-priced radio receivers on the market today.

Write or Wire for Franchise Terms

YOU'LL find the Jos. W. Jones Franchise the fairest, squarest agreement ever offered a merchant to sign. The Jones square-deal Policy protects you against the evils of price-cutting and loss of consumer confidence. It offers you a nationally-advertised line, backed by a strong organization that is able and willing to HELP YOU SELL.

Other models, with handsome radio tables, with and without built-in loud speaker. Also De Luxe Model in richly finished upright cabinet to harmonize with the furnishings of the most sumptuous mansion.

JOS. W. JONES RADIO MFG. CO., Inc., 40-46 West 25th St., New York

JOS. W. JONES RADIO

TRADE MARK

STANDARDIZED PRECISION-MADE RADIO RECEIVERS

Actually from 1895 to 1925 Jones received 39 US patents, not "over 300," largely on phonograph spring motors, auto speedometers, or the like.

Radio Dealer (Sept. 1925), p. 100

KELLOGG

Kellogg Switchboard & Supply Co.

KELLOGG SWITCHBOARD AND SUPPLY CO.

GENERAL OFFICES AND FACTORY AT CHICAGO.

ADAMS & ABERDEEN STS.

CHICAGO

J. B. F. EDWARDS

President and General Manager Kellogg Switchboard & Supply Co.

The Kellogg Switchboard & Supply Company was founded by Milo G. Kellogg in 1897 to manufacture telephone apparatus under his patents. From 1916 to 1923, total sales ran from $5 to $6 million per year, the company employing up to 2400 people. Its fabulously-well-equipped plant included a wire-enameling department and a Bakelite molding facility.

By June, 1922, Kellogg was making tube sockets and radio headsets; by November it was advertising a complete line of radio parts. In October, vice-president Leroy D. Kellogg, one of the family that controlled the company, applied for a circuitry patent; possibly it was his personal interest that got Kellogg into radio.

The Jones Radio Company of Brooklyn, run by one Samuel Seaman Jones, had advertised crystal detectors as far back as March, 1917. Jones' 1920 ads for a long-wave regenerative receiver came to the attention of Armstrong's patent attorneys, whereupon Jones signed up for a license; but he ceased advertising after August. Whether Jones approached Kellogg in 1922 or vice versa is not known, but in February, 1923, he filed for a patent on his "Symphony" circuit and teamed up with Kellogg to produce it, moving his company to Chicago.

For a large, conservative company, Kellogg chose to promote some unorthodox designs; the inductively-tuned Wavemaster, and the Kellogg/McCullough AC tube. The Wavemaster circuit was presumably the product of Lewis M. Hull's Radio Frequency Laboratories, on which Kellogg depended for engineering. Kellogg's strong suit was mechanical design. The shielded Model 507, an excellent performer, sold in especially large numbers. Kellogg had somewhat less success with the tubes. After buying Frederick McCullough's patent rights and assets around May, 1925, and moving the operation to its own plant, Kellogg was said to be having considerable problems making the tubes commercially. Significantly, while Kellogg began advertising the tubes in January, 1926, the company did not use them in its own receivers until June, 1927 — an example not lost on its potential customers.

In 1927, Kellogg's profits disappeared. The company continued to pay stock dividends up to January, 1928, but ran a $600,000 deficit to do so. Only by suspending dividends did it make a modest $90,000 surplus in 1928; but in 1929, it lost $525,000 and continued to lose money for the next four years. Still the Kellogg family remained in control, and by the late 1930's, the company was once again making money. The radio market was abandoned in 1930. Kellogg's business and property were sold to ITT in 1952, which ran it as a division until about 1965.

OUR HUGE SUCCESS

Has Been Due to Our Policy of

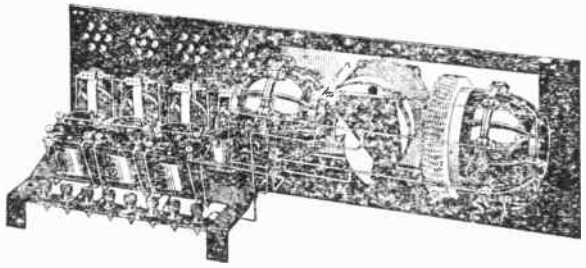
Dealing in Quality—*Not Discounts*

Just Arrived—A Large Shipment Of

JONES RADIO COMPANY SYMPHONY RECEIVERS

Also a complete line of Jones Parts, all made by Kellogg Switchboard & Supply Company, Chicago.

THE ATLAS LOUD SPEAKER is making a tremendous hit. A demonstration means a sure sale for the dealer. No other non-power speaker can equal the ATLAS in tone or volume.



HEAD SETS:

Atlas Head Sets (Navy Type) ..... at $9.00 each list
Atlas Speaking Units for above ..... at 13.50 each list
Atlas Loud Speaker, complete with Fibre Horn & Bakelite Base ..... at 25.00 each list

RECEIVING SETS:	List	Special
General Electric Crystal with phones	$18.00	$8.75
Fifth 250 A—3 Tube	125.00	35.00
Seco Jr. Crystal	5.00	3.95
Western Coil & Elec. 4-tube	100.00	57.50
Honeycombers	18.50	13.50

	List	Special
Batteries Witherbee 6 V-80	$21.00	$13.95
Couplers 180 deg. Cardwell	5.00	1.45
De Forest Condensers Various Types	5.50 to 6.50	3.65
HEADSETS:		
Federal	8.00	4.75
Brandes	8.00	5.75

Also special prices on Rheostats, Potentiometers, Variable Grid Leaks, Variometers, Speakers, etc.

We have a stock of "All America" transformers in all ratios.

We are installing a service for our Dealers, which will keep them in close touch with the Radio Market. A weekly letter service. Send in your name for this mailing list. It will save you money.

INTERNATIONAL ELECTRICAL SUPPLY COMPANY

Ground Floor, 29 Broadway.

NY Globe (March 31, 1923)

The Modulator (April 1923), p. 219

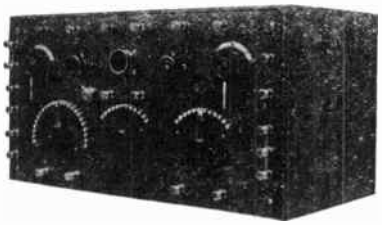
Jones/Kellogg display at the Executive Radio Council amateur-radio convention in New York, March 1-3, 1923.

The Symphony

Detector and Two Stage —No. 512

512 early 1923 $150
502 early 1923 $165
(cabinet with removable top and back panel).
Blueprint dated 12/15/22.

THE JONES CABINET LONG WAVE RECEIVING TRANSFORMER



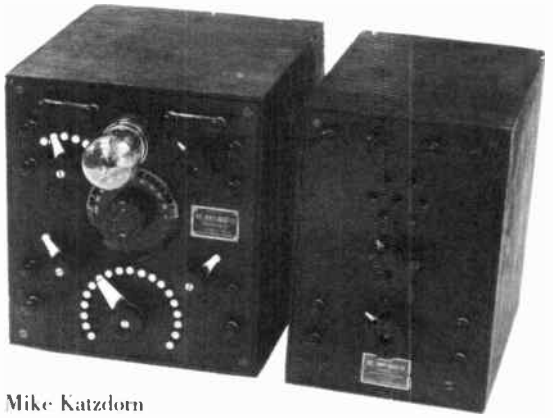
For DAMPED or UNDAMPED Wave Reception

A carefully wound Receiving Transformer with an approximate Wave Length of from 200 to 8000 Meters Equipped with Variable and Fixed Condensers Rheostat and Grid Leak. Fitted to take the latest MARCONI Vacuum Tube. Bakelite Panel, Silver Plated Switches and Contacts, Mission Oak Cabinet. Entire Apparatus built within Metal frame to permit easy removal. Model "D", as illustrated, SIXTY DOLLARS, Net. Model "E" fitted with Modern "DEAD END" Switch and High Grade Hot Wire Ammeter, Eighty-Five Dollars net.

New Bulletin sent on request.

THE JONES RADIO CO., 384 Monroe Street, BROOKLYN, N. Y.

QST (April 1920), p. 76



Mike Katzdorn

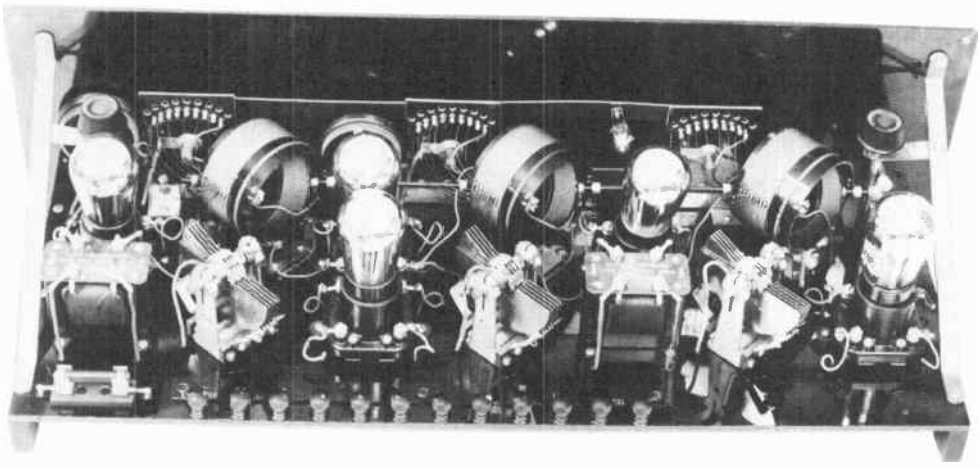
Jones later turned to loudspeaker production, offering the "Seaman Acoustical Fibre Horn" from St. Charles, Illinois in Oct. 1923. The Seaman Jones Fibre Products Co. of Chicago advertised the same horn in 1926. Then, in the Sept. 1927 *Radio Retailing* product directory, the $100 "Harmonic 29" radio is listed, by the Jones Radio Co. of Brooklyn, NY.

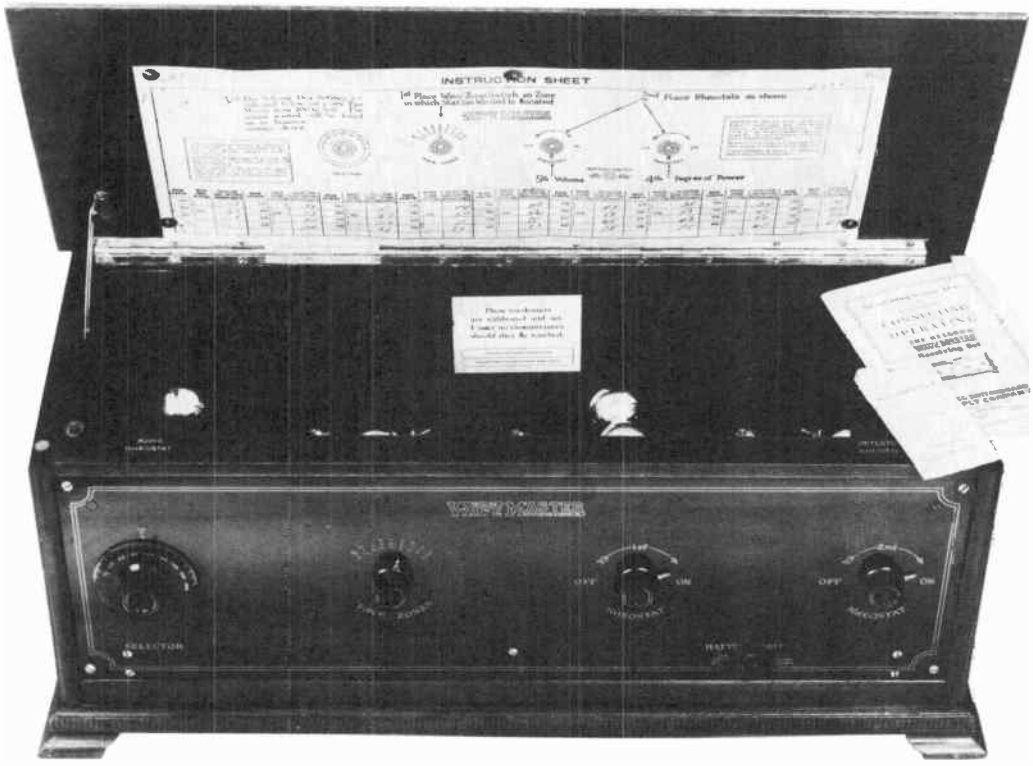
Gary Schneider

Robert Schaumleffel

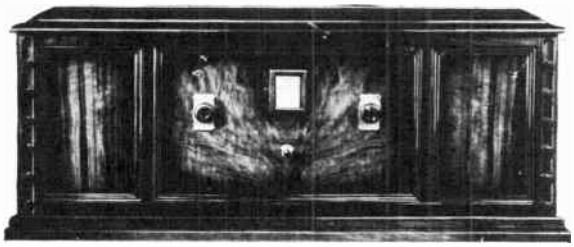
Jones Symphony 503 March 1923 $165

Jones patented the circuit (1,772,607 applied for on Feb. 26, 1923)while Kellogg's president and general manager Joseph B. Edwards patented the knock-down cabinet construction (1,528,473 applied for on Feb. 19, 1923). Circuit blueprint is dated 11/22/22.





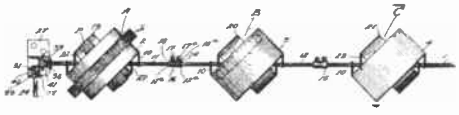
Wavemaster (504) August 1925 $125 Table model with speaker, Sept., $235
Technical article in *Radio Engineering*, August 1925, pp. 394-395.



Radio Broadcast (May 1926), p. 31

RFL August 1925 ($400 as of July 1926)
Technical article in *QST*, Oct. 1925, pp. 8-11.

1,728,596. MULTIPLE CONTROL. Hiram D. Currier, Chicago, Ill., assignor to Kellogg Switchboard and Supply Company, Chicago, Ill., a Corporation of Delaware. Filed Apr. 2, 1925. Serial No. 20,057. 12 Claims. (Cl. 171—119.)



In the 1920s most of Kellogg's telephone engineers were busy patenting radio devices. Ernest Bohlmann had 11 patents, Hiram Currier 9, George Yanochowski 4, Harry Ide 3, and Henry Eisler took out 2.

Experience Plus Quality Kellogg Assets

Widely Known Chicago Manufacturer Enters Radio Fields With Rich Background In Making of Electrical Equipment from Which to Draw

By DONAL COUPER

Kellogg Switchboard & Supply Company, Chicago, offers a good example of how an old established company can add radio to its line and immediately come to the front as one of the leaders in production in the new industry. A company already in business, and in a business having the same background as radio, was saved the necessity of going through much of the experimentation, readjjust-

Section of the assembly room in the Kellogg plant where skilled hands add the finishing touches to the radio products before they are combined in the set.

ment and general building up that all of the companies which started exclusively in radio have been subjected.

The Kellogg Company for many years has been one of the leading manufacturers of electrical equipment in the country and when radio came it was an easy matter, in view of the effectiveness with which the manufacture of radio equipment would work into the general scheme of the plant's other production, to branch out into various manufacturing phases of the new industry.

In consequence the Kellogg Company assigns experts to make an exhaustive survey of the radio field and its possibilities with the view to determining what sort of equipment radio would need most and how best this might be made in connection with the type of manufacturing in which the factory was already engaged.

Typical of the well established and successful business, the Kellogg executives proceeded slowly and conservatively after the reports from the survey had been received. They chose several radio articles of accepted value and essential need and began to make and distribute these. Back of the company's whole excursion into the new business was the decision to give the new goods quality—to give radio the benefit of the experience, the facilities and the workmanship that had already been gained from years in the manufacture of similar goods.

It was found that this quality in the goods was appreciated by the radio fan who, at that time, was harassed from all sides by new radio material, much of which was made by new and uncertain companies who, first of all, knew little of the ramifications of manufacturing and who, in the second place, were not prepared substantially to back up their products.

With this initial success, starting cautiously, the Kellogg Company began to branch out in radio and to add still other articles to the first line. The making of each new part was preceded by a survey that led to some indication of just how this part would be received by the market and what the extent of its sale would be. Today Kellogg puts out a well balanced assortment of radio goods that has an established market and that has met with general approbation and acceptance by the consumer.

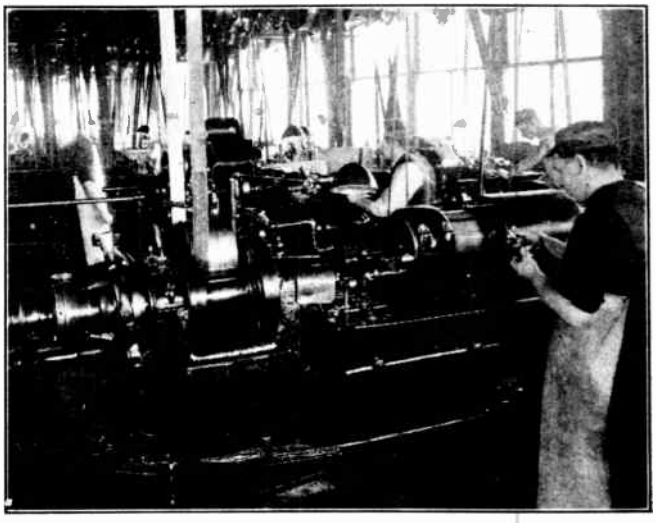
The fitness, efficiency and general atmosphere of stability apparent in the radio section of the Kellogg plant on West Adams Street, Chicago, is a treat to the vistor's eye. Everywhere there is a constant application to business and the picture given is one of orderliness and precision. The size of the plant and the amount of floor space given to radio is one of the first things that impresses. The first department visited is the drafting section. Here may be seen a staff of expert draftsmen to whom come, for further working out, every plan, scheme or new idea in radio that is thought worthy of further developing. In this department the ideas are made into understandable form for the engineers and are eliminated or pushed to the front wherever possible.

From this department the visitor, as well as the work turned out by the drafting staff, goes to the laboratory, considered one of the most if not actually the most important department of the development work. From the draftmen's plans models are made and are thoroughly tested first from a workable standpoint, then from a sales and marketing angle. In other words the laboratory experts attempt to perform the double function of, after determining the working possibilities of the new idea, gauging its sales possibilities as a marketable product.

The laboratory is so complete and well equipped that there is no test in radio that cannot be made there. All ideas found feasible in the laboratory are given an o. k. by the head of the department and are then sent out to take their place in the industry the world over.

The space devoted to the actual manufacture of the products is perhaps the largest department in the plant and some of the processes are of interest even to the layman. The tube sockets are moulded by enormous Bakelite presses and come out of the dies practically a finished product. The attaching of springs completes the important socket unit and this latter operation is done in the assembling department. The springs are so mounted that they are well beneath the mounting surface of the socket, preventing any possibility of short circuiting. They are also of sufficient resiliency to make perfect contact with the tube socket terminals at all times.

To make the Bakelite tube sockets a measure of fine powder is poured into a die and in a few minutes time, after the operation of the big hydraulic press, the powder is transformed into a socket of exact dimensions. The Bakelite itself is a form of two



The lath room shown above gives a vivid idea of the extent of this particular department which is devoted exclusively to the making of radio parts.

substances, carbolic acid and formaldehyde which, under the conditions of manufacture, react chemically upon each other and solidify, giving in the final substance, a solid that has neither odor nor taste. Bakelite, which is one of the best insulating material known today, resists a temperature of 572 degrees Fahrenheit, and is not affected by strong chemicals, oil, hot water or steam.

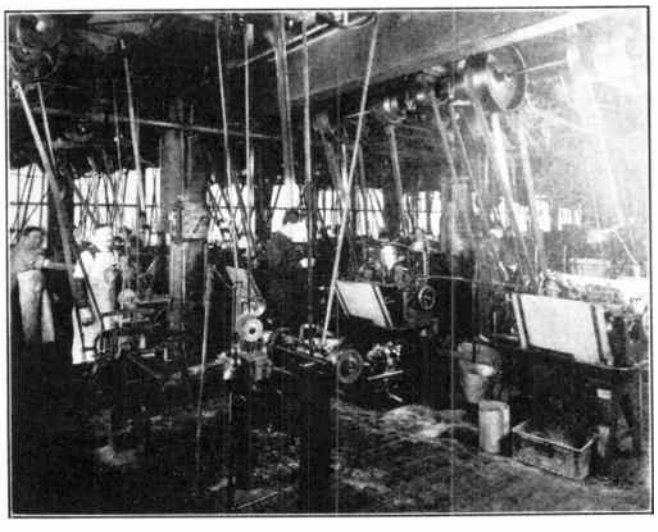
Where the variable condensers are made each plate is tested for size and straightness and special soldering equipment securely fastens the rotor and stator units. Extreme care is used in the assembly of these condensers and when completed, they must undergo a thorough inspection. The inclusion of special cone bearings, small size but sturdy frame, positive contact of rotor plates with frame and other exact features are specially stressed upon. The mounting frame of the condenser can also be used as a bracket for the sub panel which makes it very convenient for the set builder using this latter type of panel.

The next progress of manufacture is the making of enamel magnet wire. This wire is about the thickness of a human hair and though it would seem that great care would be required in handling it, nevertheless, the ease with which it is thoroughly enamelled in the huge enameling machines was astounding. Regular tests are made following this process on every batch of wire so that any imperfection in the process is immediately detected. Breaks in the enameled surface, however, are not frequent.

From the enameling room the next step is into the coil winding room where the coils for Kellogg audio frequency transformers are wound. The speed of the operators in handling this fine wire impresses, as likewise does the accuracy with which the coils are wound. In the assembling department special laminations are mounted on the coils. These special laminations have minimum eddy currents and losses and provide an exceptionally true electro-magnetic core.

In the transformer department after each unit has been completely assembled a rigid test is made for volume and tone quality. Where the rheostats are made it is interesting to note how the wire forms are arranged and how the wire is place on the forms and the frame assembled. The rheostat is one of the simplest on the market. It has only one moving part which is the rotor on which the resistance wire is placed. Two contact arms firmly grasp this resistance wire on each side, making positive contact and an unusually smooth turning rheostat.

It was significant of all departments that only raw material of the highest grade were used and that bolts, washers, nuts and so forth were of such size and temper as to insure rigidity and long life. In the packing department where all goods are carefully prepared for shipping there is again to be seen that attention to detail that is the watchword of the Kellogg plant. Scarcely a com-

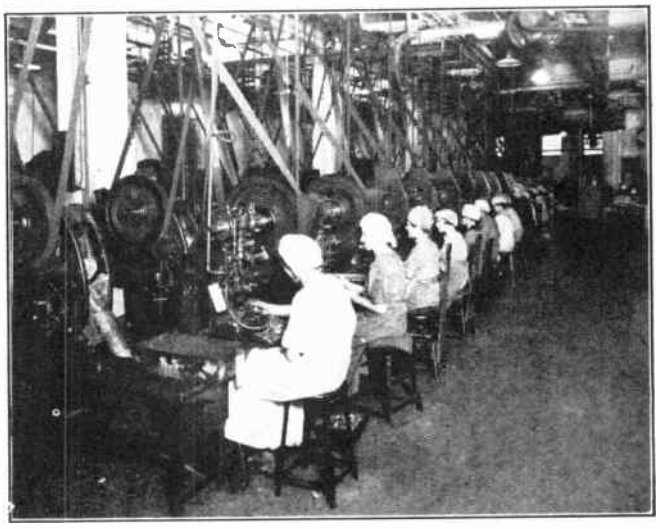


Condensers require the most careful precision work on the part of experienced machinists as can be seen in the above view taken in the commodious Kellogg plant.

plaint is ever received from consignees of breakage through improper packing or of damage to the goods of any description.

The experience of the Kellogg Switchboard & Supply Company in the manufacture of radio equipment has been that the fan cannot be sold on a part that simply looks good. The business is far beyond that stage and the fan insists on the part only that will deliver, regardless of its looks or shape.

In connection with this Kellogg has divided radio apparatus into two classes: first the class of material made by so-called fly-by-night outfits, who have gone into radio manufacturing without manufacturing experience of any kind and whose sole thought is quantity production and not quality. The other class is that type



Powertul punch presses stamp out the various metallic parts used in the making of Kellogg radio parts and also the equipment used in sets made by the concern.

of article turned out by manufacturers who know the business and have earned a reputation for making goods of high quality.

Kellogg aims to turn out radio material that is guaranteed, is correctly designed and mechanically perfect and that will continue always to give as good service as the day when it was installed.

The Kellogg Switchboard & Supply Company was founded in 1897 to make electrical appliances and the first factory was in a school building at Highland Park, Ill. The working staff originally consisted of twenty men. The founder was the late Milo G. Kellogg.

From its small beginning twenty-eight years ago the company has expanded until now its factory premises cover more than fourteen acres of modern plant buildings and large cabinet shops at Cassopolis, Michigan. The payroll in normal production numbers about 2,400 people. The present officers are: J. B. Edwards, president and general manager; Ben Woodbury, vice-president and general sales manager; J. K. Kellogg, vice-president; L. D. Kellogg, vice-president; Seymour Guthrie, treasurer; George E. Nelson, secretary; A. H. Meads, general counsel and C. B. Camp, patent attorney.

The company now has completely organized manufacturing departments for all essentials entering into the manufacture of complete telephone systems and radio receiving sets. The two principal radio sets now in process of production are the semi-portable and console models. The production of a special loud speaker and other radio accessories is also underway. The Kellogg set is of the tuned radio frequency type.

The company is well prepared to do a large export business in radio in view of its export background extending over a period of twenty-three years in the export of telephone equipment.

This is the first of a series of articles describing the manufacturing plants of prominent radio concerns that will appear in THE RADIO DEALER, prepared by prominent writers in the radio trade field. Mr. Couper has several other articles in course of preparation which will appear in subsequent issues.

Kellogg Builds Radio Sets That Way

The purchase of a Kellogg receiver is a *permanent* investment in Radio. The buyer of a Kellogg set gets the radio satisfaction that other people may not know for years, as Kellogg receivers have gone far ahead of others in the use of new and important improvements.

When you purchase a Kellogg set, you are providing for the future as well as the present.

Inductive Tuning is one of the Kellogg innovations. It brings, for the first time, even range and volume at all wave lengths—permits accurate tuning of four circuits with one hand.

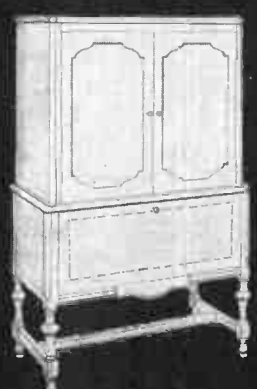
When you buy a set made by a solid, substantial institution like Kellogg, you buy with confidence that promises made *will be fulfilled.* Kellogg has been building telephones and switchboards for 29 years—and will be here for years to come, standing back of the radio sets now sold.

Write for folder describing fully Models 507 and 508

Kellogg Switchboard & Supply Co.
Dept. 24-L, 1066 West Adams Street, Chicago, Ill.

Kellogg receivers are licensed under application for letters patent of Radio Frequency Laboratories, Inc. (R. F. L.)
Dealers and Jobbers inquiries invited

Model 507, 6 tube receiver, Kellogg's development of the sensational new RFL circuit. The acme of Selectivity and Musical Reproduction.



Model 508, the 6 tube Kellogg RFL in a beautiful walnut console, equipped with the Kellogg new, long air column speaker.

KELLOGG Radio

FLAWLESS REPRODUCTION

507 August 1926 $215 508 Console, $345

KELLOGG A. C. TUBE—TYPE 401

DETECTOR AND AMPLIFIER

RATING

Heater Volts	3.00
Heater Amperes	1.00
Plate Volts (Max.)	150

GENERAL

The Kellogg A. C. tube is designed to operate from the A. C. house lighting circuit through the use of a small step-down transformer, thereby eliminating the necessity of the "A" battery as a source of filament supply.

The cathode or electron emitting surface of the A. C. tube corresponds to the filament of the ordinary type tube. This cathode has only one lead for connection instead of the two filament terminals employed with the ordinary type tube. The two filament terminals of the ordinary type tube are necessary in order that a current may be passed through the filament for the purpose of heating it to the electron emitting temperature.

In the case of the A. C. tube the actual cathode heating unit is entirely separate from the cathode or emitting surface. The cathode heating circuit terminates at the small base on the top of the tube and two prongs are provided for connection to the heater supply.

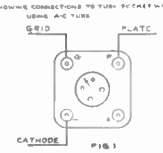


FIG 1

The large 4-prong base on the lower end of the tube fits in the standard tube socket. As shown in figure 1 the plate and grid leads are taken from the usual terminals and the cathode lead is taken from what is ordinarily termed the negative "A" battery terminal.

CATHODE HEATER SUPPLY

A small step-down transformer is used for the cathode heater supply. This transformer should have a secondary or low voltage output of 3 VOLTS at normal line voltage (usually 110 to 115 volts). The A. C. tube is designed to withstand a voltage variation of 10% plus or minus normal heater voltage without greatly affecting the operation of the tube. This takes care of line voltage variations which sometimes occur.

It is much more desirable to run the cathode heaters at a reduced voltage rather than excessive voltage as an increase in heater voltage above 3 VOLTS does not increase the output of the tube but only tends to shorten the life of the tube considerably.

Unless a heater supply transformer of known voltage and rating is used it is advisable to connect a suitable voltmeter across the heater supply terminals to indicate the voltage applied.

Figure 2 shows the heater supply transformer; note the center tap from the secondary which is to be grounded.

Figure 3 shows an alternative method of obtaining this center tap where the transformer is not provided with a center tap lead.

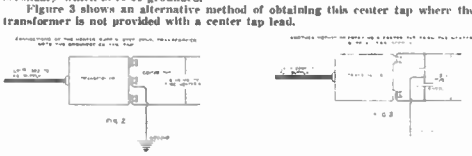


FIG 2 FIG 3

Figure 4 shows the method of making connections from the transformer to the cathode heater terminals. The cathode heaters are all connected in parallel. This may be done by running two flexible leads from the transformer secondary along the tops of the tubes with clips soldered on these leads for making connection to the cathode heater terminals. The cathode heater leads should be the equivalent size of at least a number 14 wire to insure ample carrying capacity. Also the leads are preferably twisted to reduce the possibility of A.-C. induction.

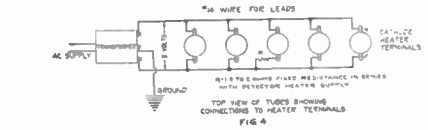


FIG 4

It is advisable to insert a fixed resistance of 1.5 to 2.5 ohms in series with the cathode heater supply lead of the detector tube. Operating the detector tube at reduced heater voltage (approx. 2 volts), will increase the detecting efficiency and also eliminate undesirable line disturbances which sometimes occur. Care should be taken to use a resistance of sufficiently large carrying capacity to prevent it from overheating.

PLATE VOLTAGE AND GRID BIAS

Figure 5 shows several sockets connected for use with the A. C. tubes. This scheme of connections should be followed regardless of the number of tubes used.

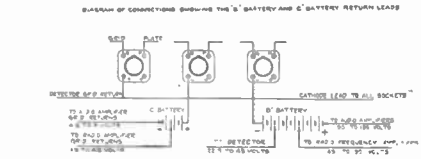


FIG 5

As will be seen from this diagram all the cathode leads are connected together. The positive "C" battery and also the negative "B" battery lead connects to the cathode lead.

The detector grid return is connected direct to the cathode lead as the detector operates most efficiently with a zero grid bias.

The audio frequency amplifiers require a negative grid bias of 4.5 to 9 volts. The radio frequency amplifiers require a negative grid bias of 1.5 to 4.5 volts.

A plate voltage of 22.5 to 45 may be used on the detector, 45 to 90 volts on the radio frequency amplifiers and 90 to 135 volts on the audio frequency amplifiers.

APPLICATION OF THE A. C. TUBES TO STANDARD CIRCUITS

The A. C. tubes will operate in any type of circuit that the ordinary tubes operate in. The changes necessary to adapt the A. C. tubes to a standard set will be apparent from a study of figure 5 as described above, and the diagrams which follow.

Figure 6 shows a standard 3 tube regenerative set equipped with A. C. tubes. The resistance R shunted by the condenser C-3 is used as an oscillation and volume control.

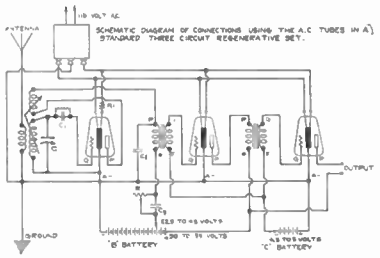


FIG 6

Figure 7 shows the A. C. tubes as used in a standard form of 5 tube set. The resistance R is used as an oscillation and volume control. The rest of the circuit is self-explanatory.

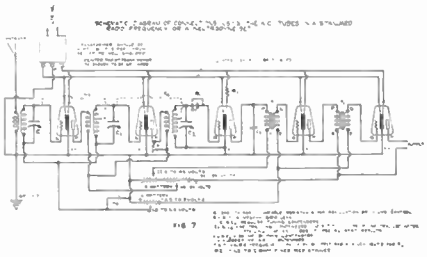


FIG 7

In some types of circuits it may be found necessary to shield the detector tube to eliminate a slight amount of A. C. induction which may occur. This may be done by enclosing the detector tube in a copper shield, this shield then being grounded.

In figures 6 and 7 note that the cathode lead is grounded; this is important for proper operation.

OSCILLATION AND VOLUME CONTROL

When using the ordinary type of tube it is possible to control the oscillation and volume by means of the filament rheostats.

When using the A. C. tubes it is not practical to use a variable resistance in series with the heater supply. This is due to the fact that the cathode temperature does not instantly respond to a change in heater current. It is therefore apparent that some other method must be used for controlling the A. C. tube. This may be done in a number of ways, a few of which will be outlined here as follows:

(1) A variable resistance of approximately 500,000 ohms shunted across the secondary of the radio frequency transformer.

(2) A variable resistance of approximately 200,000 ohms in series with the plate lead of the radio frequency amplifiers.

(3) A variable resistance of approximately 400 to 2000 ohms (max. values) shunted across the primary of the last radio frequency transformer.

(4) Where a volume control only is needed as in the case of a non-oscillating set, a 500,000 ohm potentiometer may be shunted across the secondary of the audio frequency transformer.

The A. C. tubes will operate satisfactorily with any form of good "B" battery eliminator, thereby making an all A. C. operated set.

The A. C. tubes work equally well on 25 or 60 cycle current.

In case the tube does not function properly the connections should be checked over very carefully.

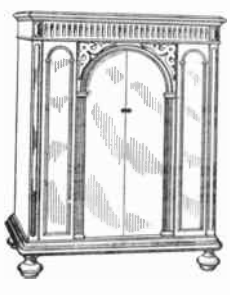
NOTE—About 45 seconds are required from the time the heater voltage is turned on until the cathode reaches its normal operating temperature. This means that about 45 seconds will be required until the signal strength reaches its normal volume.

MANUFACTURED BY

KELLOGG SWITCHBOARD & SUPPLY COMPANY

CHICAGO, ILLINOIS

75,204. RADIOCABINET OR SIMILAR ARTICLE. JOHN M. BEACH, Grand Rapids, Mich. Filed June 29, 1927. Serial No. 22,608. Term of patent 3½ years.



The ornamental design for a radiocabinet or similar article as shown.

Steve Conklin

510 June 1927 $495 other models $365, $495

KELLOGG'S *Supreme Quality*

Built into All Models throughout the Wide Price Range of

$169.50 to $775.00

Model 518—Walnut Consolette, $225
[West of Rockies, $250]

Model 517—Deluxe Console, $725
[West of Rockies, $805]

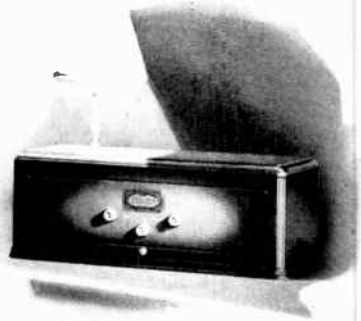


Table Model 515—$169.50
[West of Rockies, $188.56]

Model 519—complete Console, $275
[West of Rockies, $295]

Model 514—complete Console, $595
[West of Rockies, $525]

Model 516—complete Console, $375
[West of Rockies, $500]

IN spite of its wide price range, the Kellogg line offers one uniform, high standard of quality. All models are built with the same circuits, the same precision, and are given the same rigid inspection. The claims you make for Kellogg performance will apply to whatever set may meet the price ideas of your customer.

As fine furniture, Kellogg cabinets leave nothing to be desired. The designs shown here speak for themselves. In selection of woods; in workmanship; in finish, each cabinet, from the Model 518 to the $775 Model 517, the quality is that of the finest furniture—a quality full worthy of the name—KELLOGG.

This announcement is made through the cooperation of the Distributors forming the Kellogg family.

Any dealer desiring details of the Kellogg franchise should write or wire the Distributor serving the territory in which he is located.

If you are interested—and do *not* have a Kellogg distributor already operating in your locality, we invite you to write direct to us. We will gladly serve you direct until such time as a distributor may be appointed.

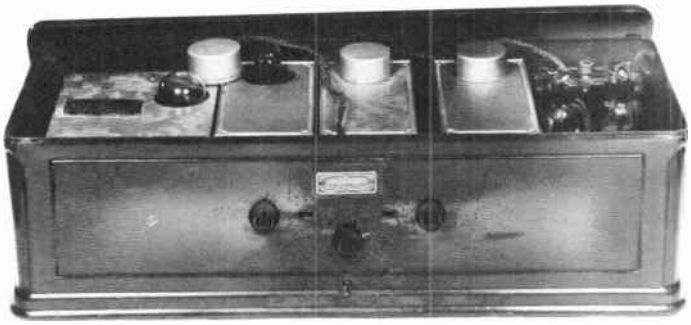
Distribution in Illinois and Indiana

The northern parts of these two states are our own "front yard". To be able to use them as a "proving ground"—to develop new plans for the benefit of our distributors in general, we cover them direct from the factory.

To retail dealers in this section, we urge immediate action if you are interested in a Kellogg franchise. If your territory is open, we will welcome a chance to show you all that we have to offer; not only a splendid line, but an advertising and merchandising plan that will insure the sale of a real volume of Kellogg sets.

KELLOGG SWITCHBOARD & SUPPLY CO., *Chicago*

Models first advertised in June 1928



Steve Conklin

INCOME ACCOUNT

	Net profit before depreciation, interest, taxes	Surplus
1923	$ 727,202	$ 22,848
1924	1,055,754	300,478
1925	915,902	98,069
1926	978,404	70,603
1927	191,223	(600,075)
1928	264,707	89,192
1929	(300,728)	(524,935)
1930	189,099	32,937

79,221. RADIOCABINET. HANS BERG, Grand Rapids, Mich., assignor to Kellogg Switchboard & Supply Co., Chicago, Ill., a Corporation of Illinois. Filed June 17, 1929. Serial No. 31,734. Term of patent 7 years.

Radio Retailing (Nov. 1928), p. 126

Model 521, $199.50
West of Rockies $219.50

Model 520
$115
West of Rockies $124

The ornamental design for a radiocabinet substantially as shown.

Ser. No. 288,100. KELLOGG SWITCHBOARD & SUPPLY CO., Chicago, Ill. Filed Aug. 5, 1929.

Radio Retailing (June 1929), p. 134

MP87

Three Models *of Distinctive Beauty*

Technical article in *Citizens Callbook* vol. 11 no. 4, Nov. 1930, p. 73.

SINCE 1897
KELLOGG

For Subscribers' Telephone Sets, Operators' Telephone Sets, Telephone Switchboards, Power Boards, Telephone Field Sets, Telephone Bell Boxes, Circuit Breakers, Telephone Receivers, Telephone Bases, Telephone Transmitters, Telephone Stands, Telephone Ringers, Telephone Coils, Telephone Switches, Telephone Hand Generators; Switchboard Parts, Consisting of Lamps, Plugs, Cords, Jacks, Relays, Repeating Coils, and Key Switches; Electrical Switches, Automatic Electro-Magnetically-Controlled Switches, Electricians' Tape, Electric Ignition Coils, Electric Ignition Distributers, Electric-Lighting Switches, Thermionic Tubes, Radio Receiving Sets; Radio-Receiving-Set Parts, Consisting of Audio Frequency Transformers, Radio Frequency Transformers, Radio Frequency Choke Coils; Variable Condensers, Fixed Condensers, Electrically Operated Loud-Speakers, Tube Sockets, Power Packs, and Electric Ignition Switches.

Claims use since July 9, 1929.

KENNEDY

The Colin B. Kennedy Company

Colin Bruce Kennedy was born in Teeswater, Ontario, on February 6, 1885. He learned telegraphy while working as an errand boy for a small-town drugstore that was also the telegraph office. Forsaking school, he left home at about age fourteen to spend the next ten years as a telegraph operator in many cities throughout Canada. For the last two of these years he was in charge of two radio stations on the west coast of Vancouver Island in the Canadian government wireless service.

He spent the next seven years with the Federal Telegraph Company. Quoting from a 1981 letter written by Federal's then- chief engineer, Dr. Leonard Fuller:

"Colin (pronounced as in coal) B. Kennedy . . . was a Marine operator in the traffic department. We arranged for his transfer to the Palo Alto laboratory as an assistant to both transmitter and receiver development engineers. Kennedy had a splendid personality and a good business head as well as practical radio competence. He could handle men well, was ambitious, a perfect gentleman, and appropriately aggressive.

"In the summer of 1919 Kennedy told me he believed a large market for broadcast receivers in the home was beginning to develop. He proposed leaving Federal (which was about to be moved to New Jersey — author) *and starting a manufacturing company for that purpose. Would I finance such a venture? In due course I said yes. We discussed possible names: Fuller & Kennedy, Kennedy & Fuller Mfg Co., etc. I preferred Colin B. Kennedy Co. for personal business reasons and we agreed to proceed on that basis."*

Kennedy's obituary in the *IRE Proceedings* states that his first equipment was made for experimenters, and while it might seem unlikely for him to propose making broadcast sets when no one was yet broadcasting, Dr. Fuller reiterated this in a second letter. And Herrold had broadcast from San Jose, California, as far back as 1909, as had de Forest later; in fact, one of Kennedy's first employees, production manager Emil Portal, had worked with Herrold.

One might logically have expected Kennedy to be first on the West Coast with a broadcasting station: he was not, but he did have one going by October, 1921. Station 6XAC, Los Altos, was run by Portal and located on the estate of his wife's parents. Rated at 60 watts, it was noted for its technical excellence, and the following July it became KLP.

Colin B Kennedy, holding the lower magnet pole of a Federal 2 kw arc transmitter, standing next to a 500 kw pole, about 1919. (photo from Leonard F. Fuller)

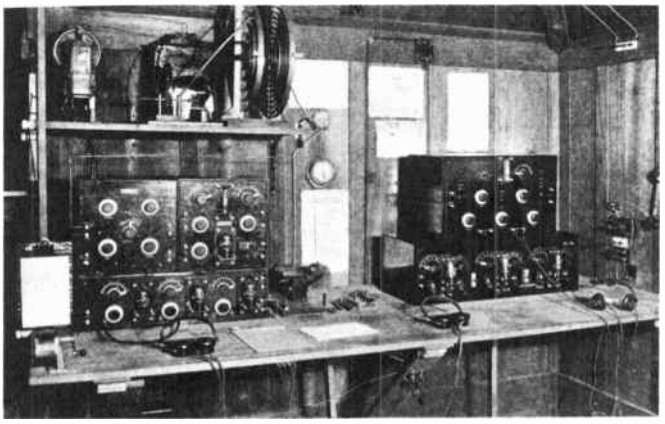
The Kennedy line included receivers, detector panels, and amplifiers. As a result of advertising regenerative models after January, 1920, Kennedy got an Armstrong license in mid-year. A good part of the company's income was from retail sales of components from other makers; by 1922, Kennedy was a regional jobber for RCA and a dozen other manufacturers.

One of Kennedy's officers was quoted in *Radio Broadcast* for June, 1922:

"'When I left the Army,' Mr. Rathbun said; 'I had two or three business propositions made me, but I took the one that paid the least and, to my friends, seemed to have the poorest future — a position with this company. It was organized by Mr. Kennedy in June, 1919, and he had one office boy and a mechanic. I took the work up because I felt pretty certain that within ten years, and perhaps within five, there would be a general and widespread interest in radio telephony.

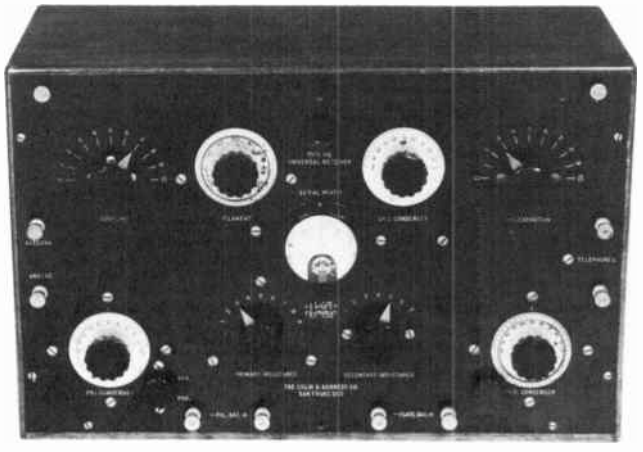
'I was mistaken. When the blaze fired up, it took six months to reach greater proportions than I had ever dreamed it would reach under five years. Now the company employs sixty-five people and is putting on more every day. We are sven months behind our orders, which come from all over the world, but in a few weeks we hope to have our facilities increased to the point where we can catch up to within three months, at least.'"

Kennedy's offices, in the Rialto Building in San Francisco, were within a block of those of Wagner Electric, an old-line St. Louis manufacturer of electric motors. Like almost everyone else at the time, Wagner wanted to get into radio, and when it found that Kennedy had an Armstrong license, became very interested. By June, 1922, Wagner had acquired control, and while Kennedy's ads spoke of "opening another factory in St. Louis to handle the eastern demand," it seems that the whole operation was moved there — lock, stock, and Colin B. himself. Dr. Fuller was nominally on the payroll, but in fact, he left for other ventures. Quoting George Greene, who had worked at Wagner before Kennedy arrived:



Pacific Radio News (April 1920), p. 337

A. E. Bessey's amateur station 6BR (see Radio Shop chapter) equipped with Kennedy SWR-6, LWR-20, and custom-built amplifiers already adapted to Moorhead tubes. After March 1921, the LWR-20 was advertised as the 100; after April, the SWR-6 became the 200 ($70).



Ralph & Elinor Williams

110 July 1921 $250

"Kennedy Co. personnel who joined us included a new chief engineer named Lauritsen, a Mr. McNamee (formerly chief engineer of Moorhead laboratories — author) *and Mr. Rathbun. Officers of the Kennedy Co. were placed under their counterparts at Wagner and the setup seemed to work well. For two years, we played a seller's market, and the money rolled in by the bale.*

"The Kennedy operation was housed in the old plant no. 2, a drafty, obsolete barn of a building that froze the working force in winter and simmered them in summer. . . During the boom we turned out 350 Kennedy sets a day . . . There were more than 200 of us." (ARCA Gazette, July 1973).

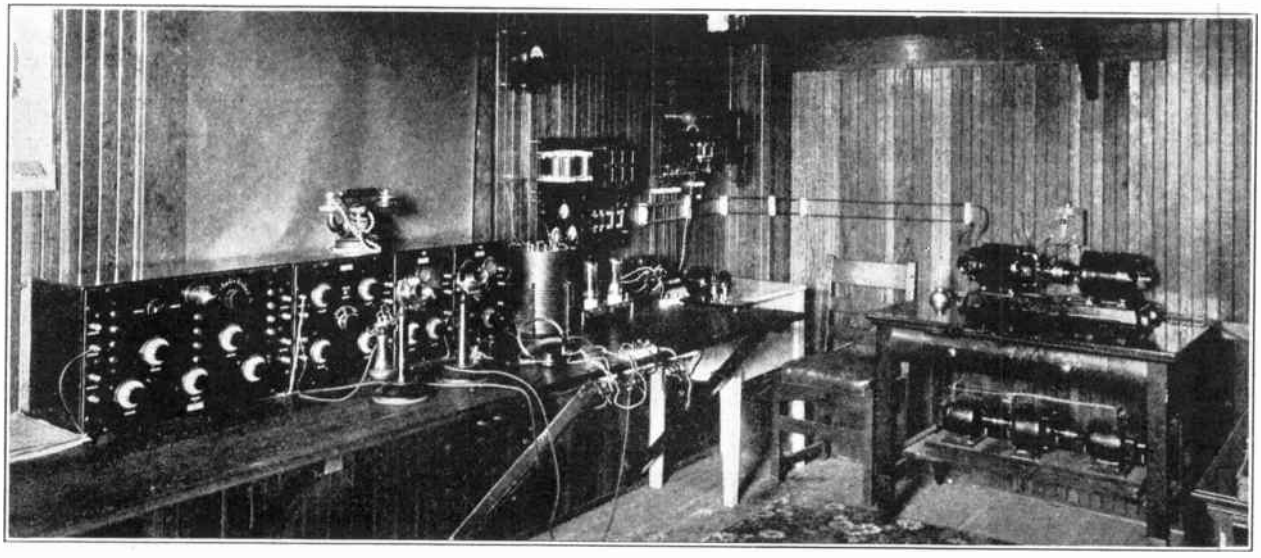
Wireless Age (July 1921), p. 38

Although the company's fancy slogans and gold-plated trimmings sold radios for a few years, its high prices, and other manufacturers' improvements, pushed it into bankruptcy by May 1926. Lauritsen estimated in 1928 that 50,000 sets had been made from 1923 to 1926.

If Colin Kennedy had any plans for a comeback, they were shelved in June 1926 when he broke a hip bone in two places (he was kneeling in front of his car, making an adjustment, when a neighbor backed into it). Not until June 1927 was he ready with a new model, having by that time purchased his old company's assets. However, nothing came of the effort. The following year he tried again, this time in Highland, Illinois, with similar results.

Finally in February 1929 he talked some of the Studebaker family in South Bend, Indiana, into backing him. The Highland factory equipment was moved to a 65,000 sq. ft. plant in South Bend with a capacity of 1000 sets per day. Charles Lauritsen was once again chief engineer (replaced by R.H. Caldwell by 1930), and B.F. McNamee production engineer. Studebaker made a great show, with *four-page color ads* in Radio Retailing (to snare new dealers) and was said to be making 350 sets per day and employing 200 to 300 by July 1930, but was losing money the whole time. The Studebaker Mail Order Co. and its subsidiary South Bend Watch Co. were in no better shape, and combining the latter company with Kennedy did not help. Kennedy was last heard from in mid-1932; in March 1933 all Studebaker real estate and buildings went to its creditors, and in June all materials and machinery were ordered sold.

Colin Kennedy remained in radio merchandising until February 1942 when he joined the Signal Corps inspection depot in Chicago. He died on June 16, 1942.



Pacific Radio News (Oct. 1921), p. 97

Kennedy Telephone Station at Los Altos.

KENNEDY RADIO TELEPHONE TRANSMITTING STATION

Among the radio telephone installations on the Pacific Coast, that of the Colin B. Kennedy Company of San Francisco has been exciting a great amount of interest and comment, due both to its excellent modulation and to the distances over which transmission has been successfully achieved.

The Kennedy experimental station, whose call is 6XAC, is at Los Altos, about 40 miles south of San Francisco on the peninsula and on the inland side of the coast range. The installation is at the home of Emile A. Portal of that company, who is responsible for the operation of the station.

The photograph which is reproduced herewith shows the interior of 6XAC with the exception of the phonograph used for transmitting music, which is at the right. The receiving equipment is shown at the left and consists of the following old-type Kennedy units, a Type 100 long wave receiver, a Type 200 short wave receiver, a Type 300 audion control panel, and a Type 520 two-stage amplifier. Mr. Portal states that he expects to replace all of this in the near future with two of the new receiving units recently developed by his company—a Type .110 universal receiver and a Type 525 two-stage amplifier. A Magnavox and two-stage Magnavox power amplifier complete the receiving equipment with which Mr. Portal has at various times entertained his neighbors within a radius of from three to four miles, as previously recorded in these columns.

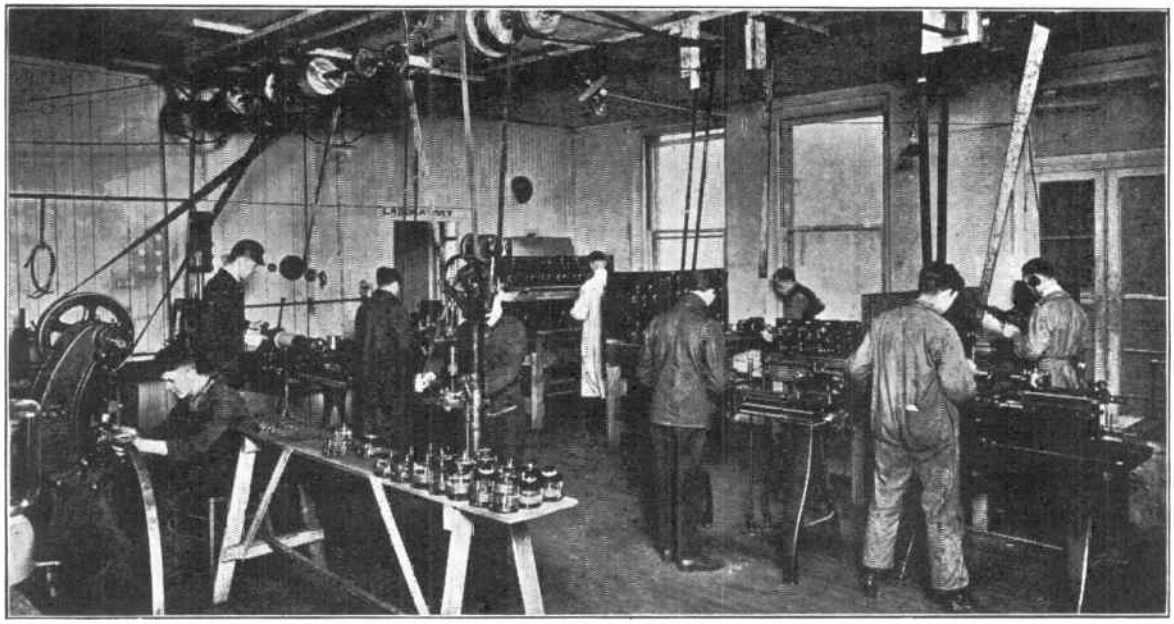
The transmitting equipment, as is indicated by the picture, is extremely simple. Two 50-watt Cunningham tubes are used, one as modulator, the other as oscillator. The filaments are heated by current drawn directly from the 10-volt secondary of a 60-cycle transformer having a neutral point. The plate current is supplied by the 1000-volt generator of the 275-watt motor generator outfit shown on the table at the right. Double choke coils and fixed condensers are used in smoothing out the commutator ripple. A modulation transformer of special design is employed in connection with a high duty telephone transmitter for voice and a Magnavox tone arm transmitter for the music. The necessary meters are mounted conveniently on panels for the observation of the different variable quantities of voltage and current. The normal radiation of the station is three amperes.

The circuits and constants used are developments of the Kennedy laboratory and will be made public at a later date.

The antenna used for transmitting is of the cage type 55 feet long and about 100 feet high. Two other single wire antennas are available for reception when desired.

6XAC transmits music three times a week, on Monday and Thursday evenings between 8 and 9 o'clock, and on Sunday afternoons from 3 to 4. The wave length is 430 meters.

In the short time that this station has been operating some very interesting reports of its reception have been received. Excellent reception on a single tube has been reported from all parts of California, Oregon and Washington, and from various points in British Columbia, Idaho and Nevada. The latest to report is Great Falls, Montana, with a single tube! Some almost unbelieveable reports have been received of reception with very poor antennas. Judging from the splendid work accomplished by this telephone at the time of year it has been operating, we look forward to exceptional results during the coming static-free season.



Journal of Electricity (March 1, 1921), p. 233

RADIO RECEIVING SETS

The Colin B. Kennedy Company specializes in high grade radio receivers, and is helping to supply the demands of South America and the Orient, which have important radio stations under way. Both the local and foreign demand are large.

Polished Bakelite panel. Genuine mahogany cabinet, hand rubbed finish. Rotary air-spaced variable condenser. Two ball type variometers. Specially designed loose-coupler unit with precision adjustments. Connection posts arranged for simplicity of wiring to Vacuum Tube control panel. All metal parts satin nickel plated. Efficient range of from 125 to 700 meters. Shipping weight 24 pounds.

Type SWR-6 Short Wave Regenerative Receiver.....$70.00

The Short Wave Regenerative Receiver shown herewith is one of the several units we are placing on the market for amateur and experimental use.

In designing our apparatus we have endeavored to furnish the field with instruments more nearly approaching the type in Commercial use than, with a few exceptions, are at present obtainable at a price within the limits of the amateur purse.

While our slogan is—BUILT TO A STANDARD—NOT TO A PRICE, we have not ignored price entirely, but have merely placed it secondary to quality, feeling that the great majority of experimenters are willing to pay a fair price for value received.

Practically all of the parts entering into the construction of our apparatus are manufactured by us and by dealing directly with the amateur trade we are able to keep our prices within reasonable limits.

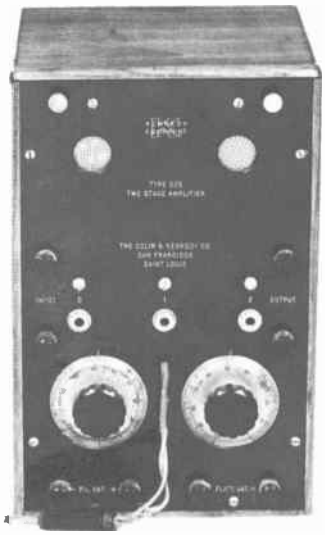
Our apparatus will be found to be honestly represented and up to specification in every detail, and is sold with the distinct understanding that every article found to be not entirely satisfactory may be returned and money refunded without question.

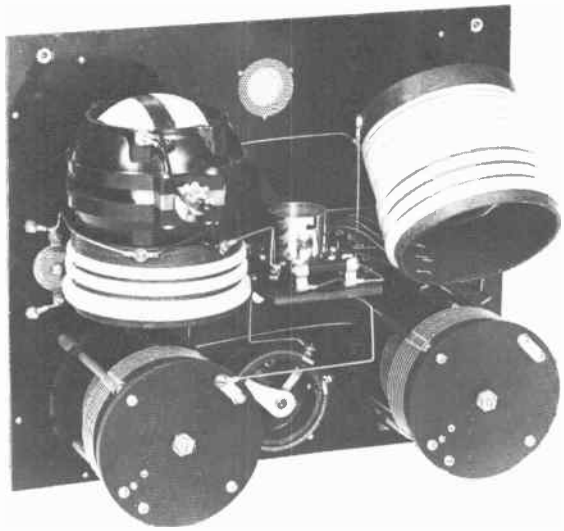
Call or send stamps for copy of Bulletins now on the Press

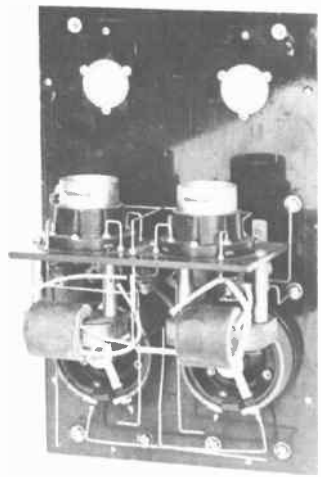
140 Second Street San Francisco, California

When writing to Advertisers please mention this Magazine

Pacific Radio News (Jan. 1920)







220 Oct. 1921 $125

525 Oct. 1921 $85

Licensed under Armstrong U. S. Pat. No. 1,113,149

KENNEDY EQUIPMENT

Our new improved Type 281

SHORT WAVE REGENERATIVE RECEIVER

is designed for high efficiency on wave lengths of 185 to 620 meters.

The ideal set for relay work. It embodies all the features of correct design and superior workmanship that have established the reputation of Kennedy Equipment.

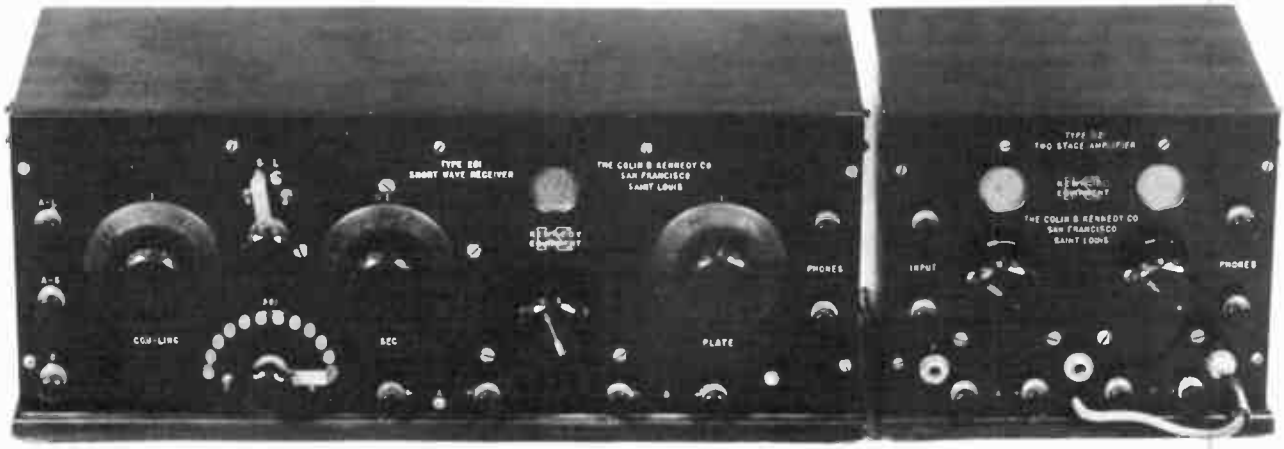
You will be interested in the details of this new short wave set. Ask your dealer about it. If he cannot supply you we will send you Bulletin 201 on request.

The high quality of Kennedy apparatus is being appreciated by those who want the best results.

We again find it necessary to greatly increase our factory capacity to meet the demand

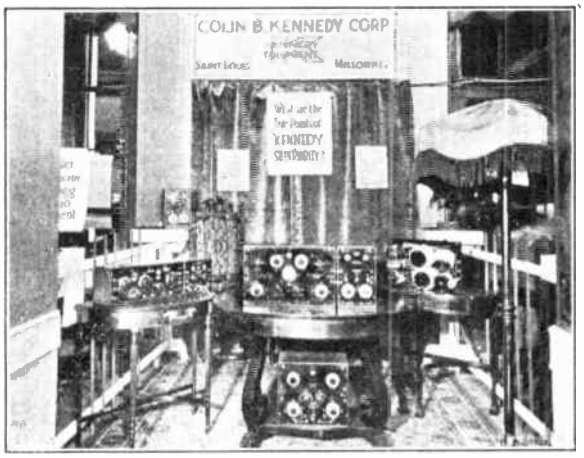
THE COLIN B. KENNEDY COMPANY
INCORPORATED
RIALTO BUILDING SAN FRANCISCO

Radio News (Nov. 1921), p. 455



281 Nov. 1921 $90 521 Sept. 1921 $55

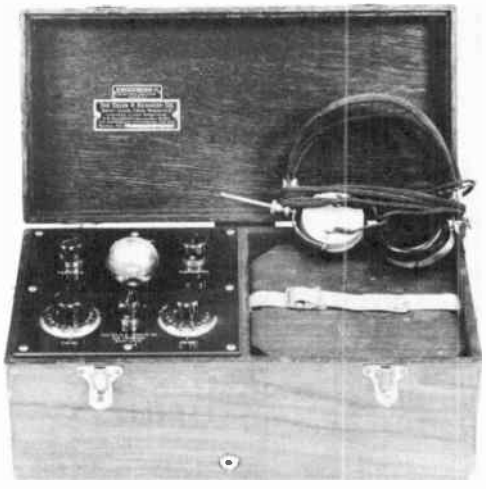
Richard Foster



The Kennedy Booth

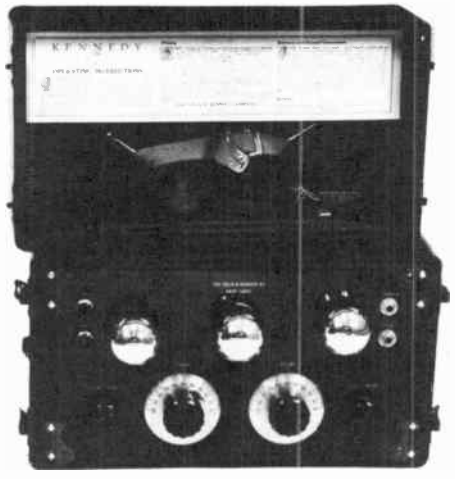
The first booth on the right of the door was the one occupied by the Colin B. Kennedy Co., with Mr. M. R. Rosse in charge. The booth was very attractively arranged making a fitting background for these well known receiving sets. There were several different models on display from the big Universal set on down the scale. The booth was fitted up more as a drawing room than as a booth at a radio show. One of the big sets had the cabinet removed showing the wonderful workmanship and finish of the interior, the bank wound inductances causing much favorable comment among the assembled amateurs.

The Modulator (April 1923), p. 219



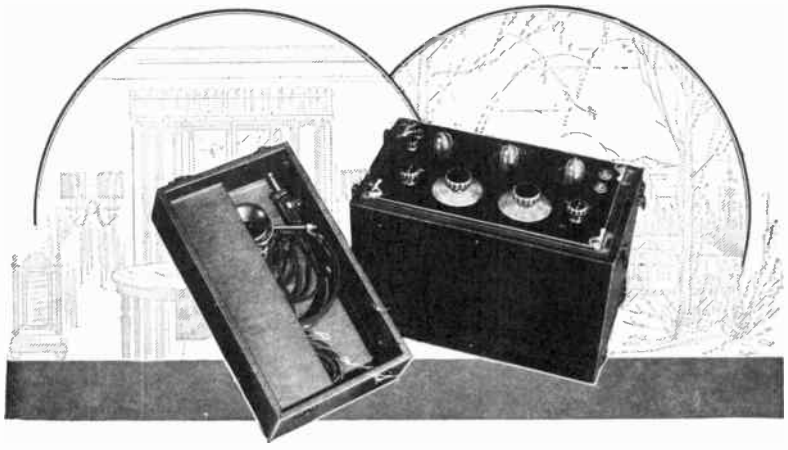
Richard Foster

311 June 1923 $75
311 & 522 Nov. 1923 $137.50 complete

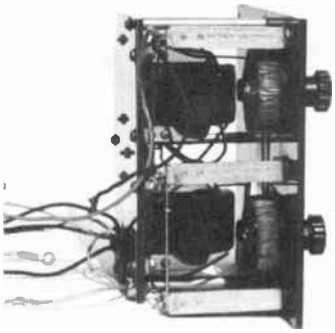


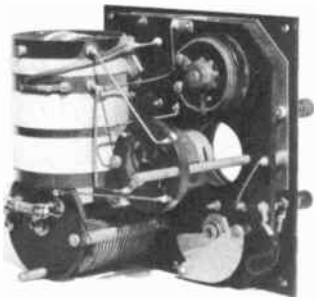
Paul Gagnon

III May 1924 $101.50

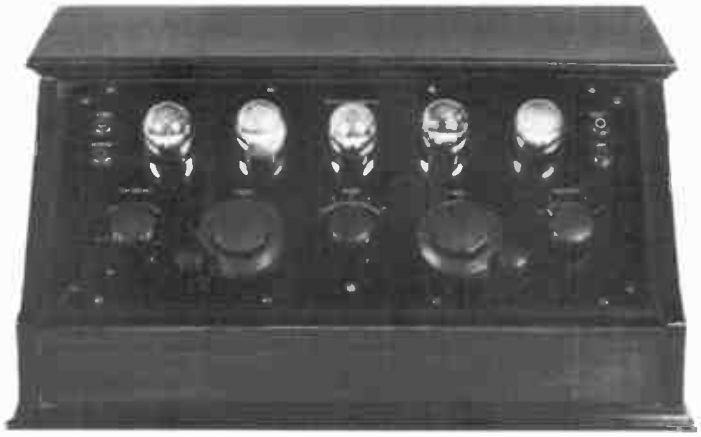


Amateur Radio (May 1924)





Joe Horvath



Rich Elskamp

XV type 430 Sept. 1924 $142.50
XVI console July 1925 $235.00

Ted Phillips

VI type 420 July 1924 $120 ($105 in Oct.)

V Nov. 1923 $86.50

New England Wireless & Steam Museum

X Sept. 1923 $285 complete
Jacobean. $775 Spanish desk, $825

Radio Broadcast (Sept. 1923)

MODEL VI (*Illustrated*)

Splendid for loud speaker reception of distant stations. Selective, but simple to tune. Anyone can use it. Each station is always found at its own setting on No. 1 dial. The other dial regulates volume. Non-radiating—no squeals to annoy others.

Less Accessories . . $105.00
West of the Rockies . 107.50

MODEL XV, five tubes, Super-selective long range radio frequency model. It cuts right through local broadcasting and brings in distant programs. Simple tuning with only two controls. Volume can be controlled. Non-radiating.

Less Accessories **$142.50**
West of the Rockies..... 145.00

A HINT quietly given to the Right Party is likely to bring you this royal gift. It's worth trying!

When you're out together, lead the way so it takes you past the store where KENNEDY Receivers are on display. If you show interest in one, the dealer will demonstrate it. Once a KENNEDY is heard, there is sure to be a strong recommendation to Santa to bring that set on Christmas Eve.

The KENNEDY tone quality is superb and full rounded. It insures musically pure reproduction of any program within a good long range. No hollow tones or distortion. No fussing or fishing for stations. Simply turn one dial to a certain point, and there is the station you want.

N. B. to Santa—Nothing will bring a family more hours of keen delight than a KENNEDY. It keeps young folks home and older folks happy. KENNEDY models are so troubleproof that even a mechanical enthusiast can find nothing to improve.

MODEL XI, Sheraton period mahogany cabinet with satinwood and ebony inlays. Dials and metal fittings finished in gold. Built-in loud speaker. Combines the charm of fine furniture with the most advanced principles of radio construction. Brings in out-of-town stations with loud speaker volume Logged tuning on one dial. Controlled volume. Non-radiating.

Less Accessories..... **$185**
West of the Rockies..... 190

THE COLIN B. KENNEDY COMPANY . *Saint Louis*

XI first advertised Nov. 1924

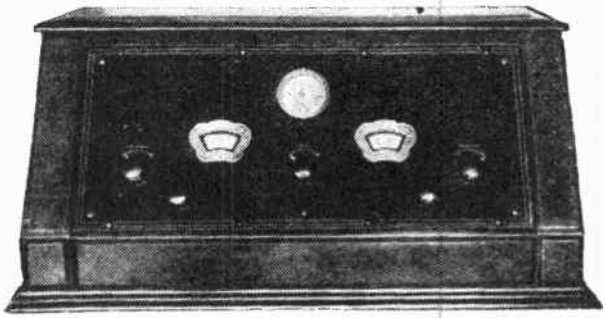
John Wolkonowicz

20 type 440 July 1925 $90 ($80 in Nov.)

The "Spinet," a seven-tube balanced receiver by Colin B. Kennedy, Incorporated. There are four r. f. stages but just one tuning control. The finish is of two-tone antique mahogany, and there is ample storage space for power accessories. Price, $195.00

Royal Seven June 1927

Radio Broadcast (Oct. 1927), p. 360



Radio News (April 1926)

This cabinet is an excellent example of significant artistic form, expressing use in terms of design. The technical appearance is not disguised, but is made instead the basis of the decoration.

XXX type 435 Dec. 1925 $145

Technical article in *Radio News*, April 1926, p. 1417.

Radio Retailing (July 1925), p. 4

BLANK & STOLLER, INC.

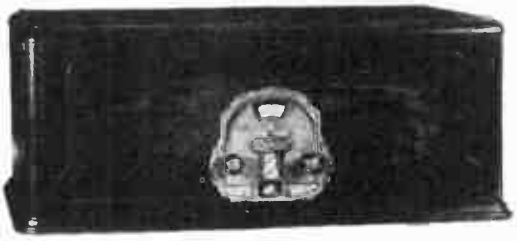
Colin B. Kennedy

Radio Broadcast (Sept. 1929). p. 277

Dr. Charles Lauritsen, chief engineer, Colin B. Kennedy Corp., tries to keep production models equal in every respect to laboratory models. Above is pictured the elaborate factory test bench.

KENNEDY ROYAL SIXTY—6 tube A. C. —Burled walnut—antenna peaking device gives great power on high waves.

Price $95.00
Without Tubes

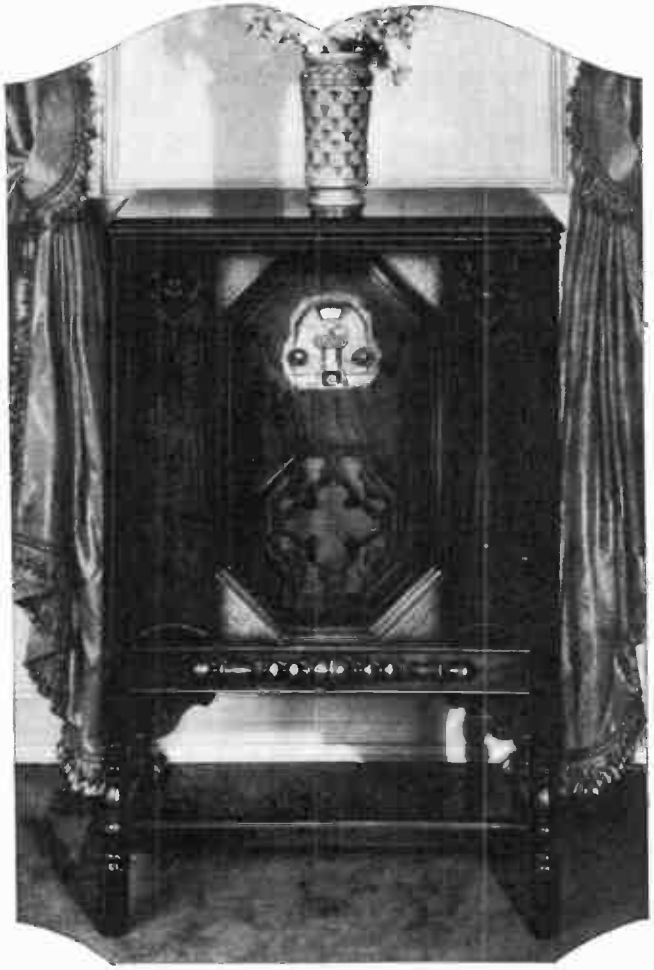


Radio Retailing (June 1929). p. 84

Eighty (console) $290
($330 with dynamic speaker)

Radio Doings (Sept. 1, 1928). p. 67

110 June 1929 $115
Short technical article in *Radio*, July 1929, p. 57.



Radio Retailing (July 1925). p. 4

Radio Retailing (August 1929). pp. 18-19

210, June 1929. 220, August 1929. $159

310, June 1929. 320, August 1929. $197

KING

King Quality Products, Inc.

King Quality Products, incorporated around October, 1924, by W. G. King and two others, was connected with the King Manufacturing Company, formerly King Sewing Machine Company. A maker of cream separators, it was owned by Sears, Roebuck and Company, and had existed since 1904. King Quality acquired the Neutrodyne license of Broadcast Manufacturers, Incorporated, which had held it since late 1923, but BMI had produced only one model, the Transcontinental ZR-1 for Gimbel Brothers in March, 1924.

King's first radio was sold under the Sears "Silvertone" name (registered November 9, 1926; use claimed since March, 1922). It was also advertised by Adler Manufacturing Company of Louisville, Kentucky (also a Sears subsidiary), originally a maker of reed organs and pianos. In 1924, sales, as reported to Hazeltine, were $491,334.70. Later, King marketed the King-Hinners Neutrodyne under its own name in January, 1925. Frank Hinners had started with de Forest as an office boy in 1909 while attending night classes at the Mechanics Institute, then worked for the Wireless Improvement Company from 1912 to 1915, and then joined Emil Simon, where he engineered the ½ and 1 KW transmitters that were Simon's major product. He died in 1960 at the age of 66.

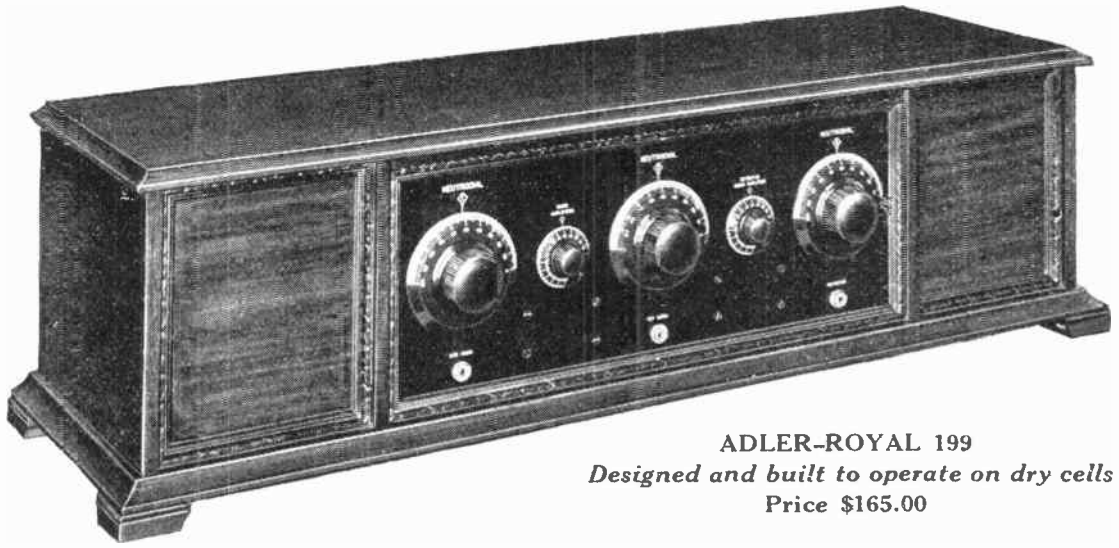
For the 1925-26 season, King made 35,000 sets, plus 15,000 for Sears, Roebuck and Company; components were made up to November 1; then a fixed number of sets were assembled. Hedging its bets when the Neutrodynes seemed to be faltering (and to reduce its royalties), King split into two companies in late 1926: King-Hinners Radio Company, Incorporated, to make Neutrodynes; and King-Buffalo, Incorporated, for TRF models. By March, 1927, the two companies had recombined into the King Manufacturing Corporation. John W. Million was chief engineer from 1926 to 1928.

King seems to have overproduced in 1929 and lost money, prompting Sears to unload the company and simply contract for Silvertone models to whatever company could supply them most cheaply. So Colonial bought the Buffalo plant in October, 1930, and moved there from Rochester and Long Island City, thus becoming Sears, Roebuck and Company's chief supplier of radios in the 1930's. The King Manufacturing Corporation was last listed as a Sears subsidiary in 1933.

Radio Dealer (Sept. 1925), p. 152

Frank A. Hinners, who is chief consulting engineer of the Adler Manufacturing Company, and developer of the Adler-Royal Neutrodyne receivers, back in 1909 entered the radio industry as office boy with Dr. Lee De Forest. Needless to say, Mr. Hinners was not long in this position, and in a very short time was recognized throughout the trade as an authority on radio engineering. His development of the Adler-Royal Neutrodyne which operates on dry cells only, is looked upon as a most creditable achievement.

RADIO *for* APRIL, 1923



ADLER-ROYAL 199
Designed and built to operate on dry cells
Price $165.00

A 5 tube Dry Cell Neutrodyne—
all batteries within the cabinet

YOU may have your choice of two different styles of Adler-Royal Neutrodyne. Set 201 A operates with the usual storage battery. Set 199 operates on dry cells. This is an achievement that has baffled radio engineers since the introduction of Neutrodyne.

Adler-Royal Neutrodyne also has separated the control for radio frequency and audio frequency. In simple language this means that with Adler-Royal, when a station is amplified, the desired tone quality and volume is controlled without detuning or distortion.

Not only their beauty of cabinet design but the workmanship and simplicity of the sets themselves are outstanding features of Adler-Royal.

Adler-Royal is on exhibit only at the higher class stores whose reputation is an additional guarantee of the quality of the Royal line.

★ **ADLER MANUFACTURING COMPANY, Inc.**
General Sales Office: **881 Broadway, New York City**
Factories: **Louisville, Ky.**

ONE *of the three cabinet designs of Adler-Royal Combination Radio and Phonograph Cabriole Model 20*
Price $300.00

Licensed by Independent Radio Manufacturers, Inc.
Reg U.S. Pat Off
NEUTRODYNE
Pat March 27 1923 and April 1, 1924
Hazeltine Pats Nos 1 450,080 and 1 489,228
Other Patents Pending
Reg U.S. Pat Off

The Adler-Royal Neutrodyne is licensed under the Hazeltine Neutrodyne patents and manufactured for us by King-Hinners Radio Co.

ADLER-ROYAL *Elizabethan Floor Type Neutrodyne No. 1 in figured walnut or mahogany finish; storage battery or dry cell equipment*
Price $350.00

Adler-Royal
NEUTRODYNE

Send for an attractive booklet describing the complete Royal line of phonographs, radio sets and combinations.

Saturday Evening Post (Nov. 14, 1925), p. 219

A King Receiver

"KING In Radio" Receivers are built in the two circuits proven best by engineers and popular demand—

King-Hinners Neutrodyne

King Five Broadcast

Both circuits are offered in console, built-in reproducer and plain table type models in two-tone American walnut or dark mahogany.

Prices $75 to $250

Model 25-C

"KING In Radio" Receivers represent 20 years' experience in manufacturing precision parts of high quality, plus specialized work in "Radio."

They are built in a modern, eight-acre plant, fully equipped.

Every "King in Radio" Receiver is tested by actual broadcast reception.

The record is shown by the card which accompanies the receiver.

COMPARE the music which comes from the loud speaker of a "King In Radio" Receiver with any other. Still better, compare it with the original production. All the softness, the natural tone is there, the harshness, the distortions are eliminated.

Judge "King In Radio" beauty, not as a piece of merchandise—imagine it in your home, picture how perfectly it will blend with the other furnishings—a receiver you will be proud of from the first, and grow to like more and more as the years go by.

Try its selectivity under the most congested conditions. Bring in any high powered local station to the maximum, then turn pointers slightly and notice how soon you lose it. You can cut out one station and bring in another within a few points on the dial

And remember this—though you may be an "expert" in tuning, there are others in your home who are not. Choose a receiver from which anyone can get best results.

If you will consider King-made receivers from the standpoint of tone, beauty, selectivity and easy operation, you will be convinced that they are truly "King In Radio."

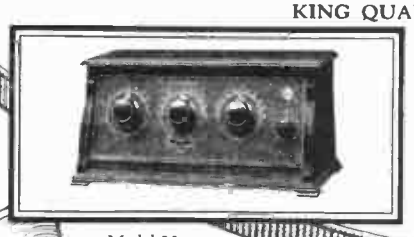
Write for booklet "The Radio Quest"

KING QUALITY PRODUCTS, Inc., BUFFALO, N. Y.

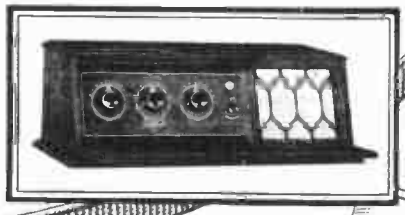
Branches:
CHICAGO KANSAS CITY
BRIDGEBURG, ONT.

KING *NEUTRODYNE HINNERS

*Reg. U. S. Pat. Off.
License under Hazeltine Pats. Nos. 1450080, 1489248 and 1533858



Model 30



Model 30-S

Try This Test

Ask your dealer to demonstrate "King In Radio." Compare it with any other receiver both from a standpoint of tone and beauty—it is the only way to fully appreciate its superiority.

KING IN RADIO

KING QUALITY BUFFALO

Jobbers and Dealers

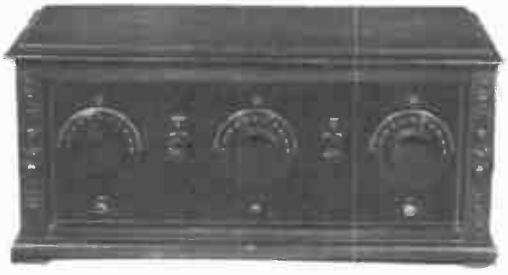
The "King In Radio" sales franchise is a valuable asset. The line is complete—receivers in the two most popular circuits, knock down kits, a full line of parts. Write for full particulars.

Models 30 ($75),	30S ($125),	30C ($180)	Sept. 1925.
25 ($125),	25S ($185),	25C ($250)	Oct. 1925.
35 ($75),	35S ($125),	35C ($180)	Dec. 1925, same as 30 series but for dry-battery operation.

Radio Dealer (April 1927). p. 57

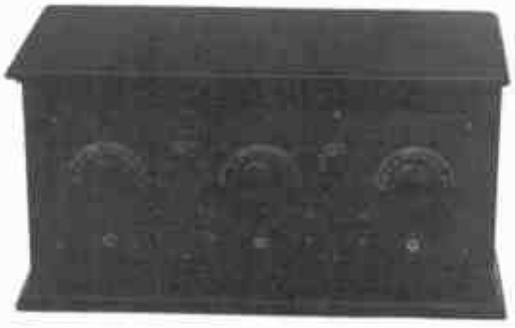
Assembling and testing condensers in the plant of the King Manufacturing Company, Buffalo, N. Y. The work is given careful supervision by the shop manager who can be seen in the background keeping a watchful eye on the work in hand.

Radio-Music Merchant (June 1931). p. 46



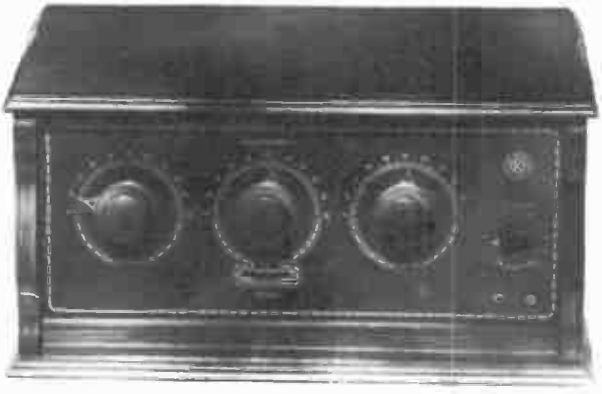
Ralph & Elinor Williams

Silvertone Neutrodyne Sept. 1924
Same model available as the Adler Royal 201A, Nov. 1924, $160.



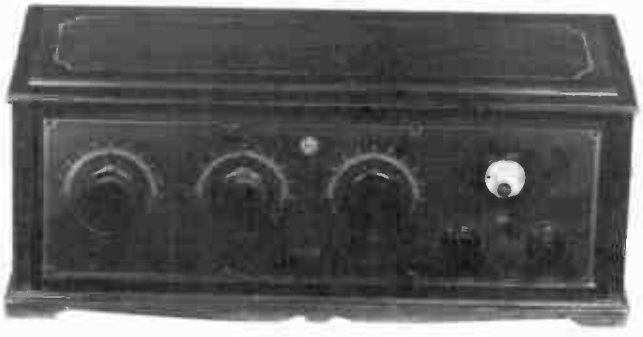
Pat Cutini

10SK Jan. 1925 $160



Flea Market

30



25

Ralph & Elinor Williams

A Trusty Scout at Every Market

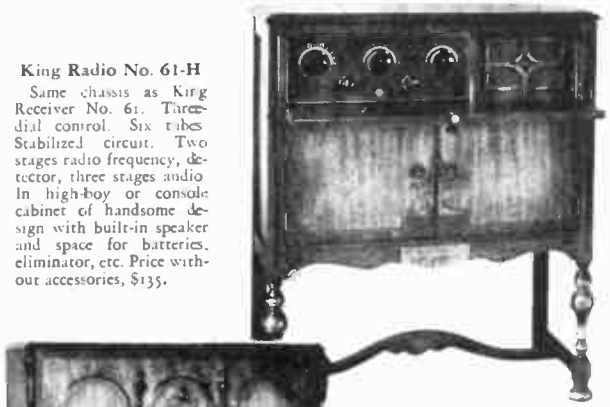
King Radio No. 62
A six tube super-receiver with Single Dial Station Selector. Completely shielded. In handsome cabinet, two-tone finish. Wood panel to match the cabinet. Price without accessories, $150.

KING RADIO

"Most Radio Per Dollar"

King Radio No. 61
Three-dial control. Stabilized circuit. Six tubes. Two-tone cabinet. Price without accessories, $65.

King Radio No. 61-H
Same chassis as King Receiver No. 61. Three-dial control. Six tubes. Stabilized circuit. Two stages radio frequency, detector, three stages audio. In high-boy or console cabinet of handsome design with built-in speaker and space for batteries, eliminator, etc. Price without accessories, $135.



King Radio No. 63
Same chassis as King Radio No. 62. A six tube super-set with genuine Peerless Reproducer built in. Gives amazing results on the "lost frequencies." Fully stabilized, completely shielded. Two stages radio frequency, detector, three stages audio. Built into console cabinet of surpassing beauty of design and finish. Price without accessories, $210.

King Neutrodyne No. 10*
Five tubes, two stages radio frequency, detector, two stages audio. Black panel, three-dial control. Price without accessories, $75.

You can't afford to keep a man at every market to keep you in daily touch with prices. But you can afford a radio. And the radio will give you the prices every day—many of them twice a day—and from 24 to 48 hours sooner than you can get them any other way!

When you want to know "Where shall I ship?" your radio will give the profitable answer. In 43 states, almost half the farmers reporting showed actual cash savings and profits from their radio. If you haven't a reliable radio you are losing money, and shutting your family away from the news and entertainment of half the world.

In this complete King Line there is a set to suit your taste and your pocketbook. Hear them at your dealer's. Or write for booklet of information "Picking Profits from the Air" and name of nearest store. *Can be bought on convenient budget plan.*

KING NEUTRODYNE* WINNERS

Reg. U. S. Pat. Office licensed by Independent Radio Mfrs., Inc. under Hazeltine Patents Nos. 1,450,080; 1,489,228; 1,533,858 and 1,577,421.

King-Buffalo, Inc., Buffalo, New York
For Twenty Years Master Makers of Precision Products

"Picking Profits from the Air"

KING-BUFFALO, INC., BUFFALO, NEW YORK. Send me your free King Radio booklet "Picking Profits from the Air" with name of nearest King Radio dealer. No cost or obligation.

Name .....

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

Post-Office ..... *State* .....

Prices Slightly Higher Denver and West; also in Canada

R-5

Source unknown ca. Sept. 1926

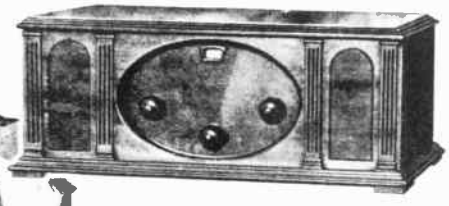
"MOST RADIO PER DOLLAR"

If you haven't a good radio — half the world is passing you by

King-Hinners Neutrodyne No. 72

Six tubes, fully shielded, three stages radio frequency amplification. Price $105. Loop optional ($15 extra)

Prices slightly higher Denver and West and in Canada



King Radio No. 62

A Six tube super receiver with Single Dial Station Selector. Completely shielded. In handsome cabinet, two-tone finish. Wood panel to match the cabinet. Price without accessories, $100

THE development of fine radio receivers around the famous Neutrodyne Circuit, is the sole task of the KING-HINNERS organization. Our talents are focused upon that one objective. Our concentration, we believe, has enabled us to produce a line of superbly fine Neutrodyne Receivers.

We invite you to call on the authorized KING Dealer nearest you and examine the genuine KING-HINNERS creations. Then judge for yourself of their amazing power and volume and quality of tone.

Three thousand stores selling good radio will gladly demonstrate them for you; if you will send your name and address, we will send you interesting radio booklet "*The Radio Quest*," and free Demonstration Card giving the name of the nearest dealer.

KING NEUTRODYNE HINNERS

Reg. U. S. Pat. Office licensed by Independent Radio Mfrs., Inc., under Hazeltine Patents Nos. 1,450,080, 1,489,728, 1,533,-818 and 1,577,611.

THE name "KING" on a radio receiver is all the guarantee you need. Regardless of what you know of the technical details of radio, the name KING means satisfaction in bringing to your own home the great things that are on the air.

For Twenty years, KING has been making precision products. Since the days when Roosevelt was President, we have been responsible manufacturers. And every radio receiver upon which we place the coveted KING trade-mark must make good or we will.

Call upon your nearest Authorized KING Dealer with confidence. Ask him to see the great KING Line. If you do not know his name, send us your name and address and we will mail you free Demonstration Card and interesting radio booklet, "*Voice of the World*."

KING-HINNERS RADIO CO., INC. : BUFFALO, N.Y. : KING-BUFFALO, INCORPORATED

KING RADIO

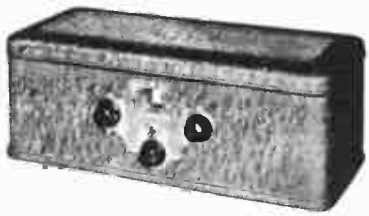
71	Sept. 1926	$205
71H (w/o loop)	Feb. 1927	$325
72H console	Oct. 1926	$375

Saturday Evening Post (Sept. 18, 1926), p. 235

KING

Model FF 6 Tube AC Electric

Genuine Licensed
All Electric
Neutrodyne



Here's a wonderful profit maker

at almost unbelievable low price. A result of a fortunate cash purchase of the manufacturer's entire supply, making it possible for us to offer this quality receiver at a price far below the maker's cost.

Every receiver packed in original factory sealed carton with a booklet of full instructions.

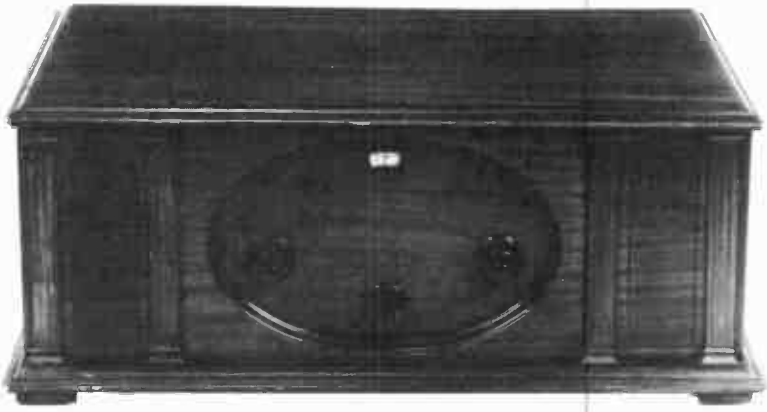
Just a few features of this receiver.

—employs six new type AC tubes.
—single drum control illuminated dial.
—marked in meters and kilocyles.
—beautiful brown bronze two-tone all metal cabinet.
—distance—selectivity greater than many high-priced sets.
—tone—deep, mellow and natural.
—compact—cabinet measures 19 in. long, 8 in. deep and 7 in. high.

List Price, $110.00 less tubes

Special June Price $27.50

Radio Retailing (June 1929), p. 281



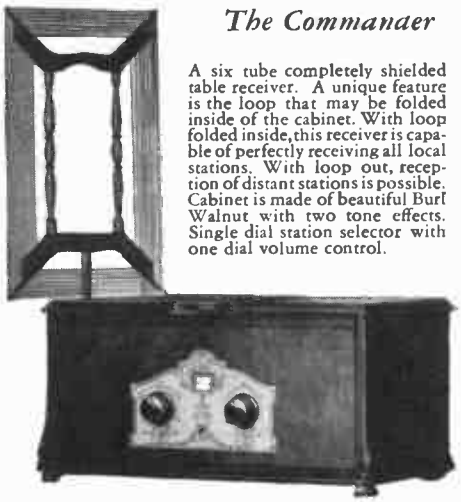
Warren Falls

62

The Viking

A six tube tuned radio frequency console model. Single dial station selector with separate vernier adjustment, stabilized circuit, two stages radio frequency, detector, three stages audio. Attractive blended cabinet with built-in speaker and space for batteries, etc.

The Commanaer



A six tube completely shielded table receiver. A unique feature is the loop that may be folded inside of the cabinet. With loop folded inside, this receiver is capable of perfectly receiving all local stations. With loop out, reception of distant stations is possible. Cabinet is made of beautiful Burl Walnut with two tone effects. Single dial station selector with one dial volume control.

KING RADIO BUFFALO

Trade Mark Registered

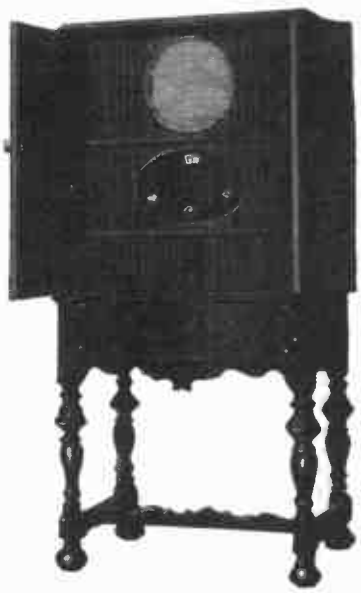
The Baronet

A six tube tuned radio frequency table model. Single dial station selector with separate vernier adjustment. Beautiful Gothic design cabinet. Rugged mechanical construction.

The Crusader

A six tube completely shielded table model with single dial station selector. (Same chassis as "Chevalier".) Handsome cabinet, two tone finish. Unusually attractive panel to match cabinet.

The Chevalier



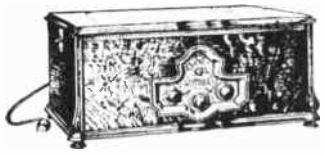
A completely shielded six tube receiver with single dial station selector. Beautiful Burl Walnut High Boy cabinet. Most beautiful design and value on the market at its price. Built-in speaker with space for batteries, etc.

Radio Retailing (June 1927), pp. 208-209

80 Baronet, $170. 80H Viking, $140. 81 Crusader, $115 81H Chevalier, $210 (all June 1927). 81? Chancellor, lowboy similar to Viking, Dec. 1927, $190.

Radio Retailing (June 1928), p. 251

KING ELECTRIC SETS (7 TUBE)



A real 1929 electric set, built in one cabinet—(no additional power packs, no water or solution). Set uses, four 226, one 210, one 199 and one 281 tube. This is the best value you will ever be able to buy—a sample will convince you! King is an R.C.A. license.

OUR PRICE ONLY $57.50

List Price $225

(not shown) Models E, F, G, H, J 1928
No data other than in *Langley/McMahon, Rider, and Gernsback* manuals.

Model J technical article in *Citizen's Callbook*, vol. 11 no. 1, Jan. 1930, p. 75.

KING RADIO

Announces

DIRECT to DEALER SALES PLAN

Compare
KING RADIO
With the BEST you can buy elsewhere at *ANY PRICE*—
PERFORMANCE, TONE, CABINET, SALABILITY

9-TUBE
DYNAMIC SPEAKER
Two 245 Power Tubes Push-Pull
Walnut Cabinet
RCA License
CURRENT MODEL
1929-1930
GUARANTEED

KING IMPERIAL

$169.50	LIST
84.75	Less 50%
84.75	
8.47	Less 10%
76.28	
7.63	Less 10%
68.25	
1.37	Less 2%
$67.28	NET

TO DEALER

KING ROYAL

LIST	$149.50
Less 50%	74.75
	74.75
Less 10%	7.47
	67.28
Less 10%	6.73
	60.55
Less 2%	1.21
NET	$59.34

TO DEALER

8-TUBE
DYNAMIC SPEAKER
Two 171 Power Tubes Push-Pull
Walnut Cabinet
RCA License
CURRENT MODEL
1929-1930
GUARANTEED

King Monarch

Screen grid set. Seven tubes, with 245 Push pull amplification. Dynamic Speaker. In King Royal cabinet.

List price, less tubes $159.50
Net price to Dealers, less tubes $63.31

King Manufacturing Corp'n
Buffalo, N. Y.

Radio Retailing (Nov. 1929), p. 121

Announced (without prices) in June

ORDER BLANK
KING MANUFACTURING CORP'N
Buffalo, N. Y.

Ship To _____

Address _____

Maximum Discount offered to Dealers on this order

50-10-10-2 % Terms C. O. D. or Cash

How Many	King Radio Sets						
	King Imperial, 60 Cycle, Less Tubes	$169	50	$67	28		
	King Royal, 60 Cycle, Less Tubes	149	50	59	34		
	King Monarch, 60 Cycles. Less Tubes	159	50	63	31		
	Total Amount						

Dealer Sign Here. _____

Satisfaction or MONEY BACK

If you are not satisfied for any reason, it is your privilege to return these sets, at once, and we will refund your money.

KODEL

The Kodel Manufacturing Co.

Clarence E. Ogden was born in Cincinnati, Ohio, on August 29, 1890, and educated in the public schools there through eighth grade, returning to his family's small farm outside the city for the next four years. Taking a job as elevator boy in a shoe factory in 1908, Ogden used his $3 weekly salary to enroll in night classes at the Ohio Mechanics Institute. In 1914 he began selling electric trucks. To eliminate need for an attendant to charge their batteries each night, he invented an automatic charger and began making them in his cellar, finally organizing the Automatic Electrical Devices Company in 1917. From a $25-a-month loft at 120 Opera Place, to eight times the space there two years later, to a five-story building at 120 West Third Street, Ogden's commercial and military business in chargers and motor controllers kept expanding. But the post-war slump in 1920 forced him to develop a home model charger using his vibrating-reed mechanical rectifier.

The Homecharger became extremely popular for charging radio batteries, as well as automobile batteries, leading Ogden to enter the radio manufacturing business itself. In June, 1924, he designed a compact portable receiver that he called "the camera of radio." He named it the Kodel, organizing the Kodel Manufacturing Company to produce it. A whole line of inexpensive compact sets appeared in October, and in January, 1925, the two companies merged into the Kodel Radio Corporation. By this time, more than 50,000 radio sets had been made and sold.

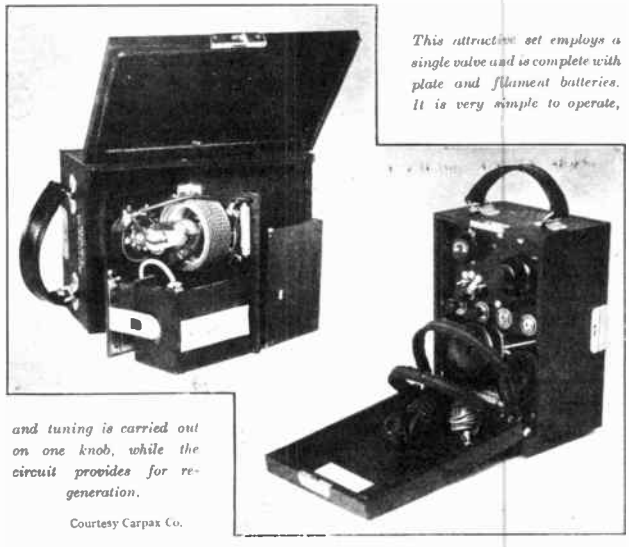
Kodel's new building at 507 E. Pearl Street, replacing five former factory locations, was said to be nearly complete in September, 1925; but just two months later, a five-story addition was contracted for construction. Also in 1925, Kodel's new radio station, WKRC, took to the air, along with another portable transmitter installed on Ogden's yacht that broadcast from small towns up and down the river.

Kodel's mechanical rectifier worked well for charging batteries, but it would not run a radio directly and it also caused a great deal of interference, so Ogden kept experimenting, looking for a better electrolytic rectifier. He came up with an electrode material of a cast silicon alloy he called "Silite," and in November, 1926, he claimed to be turning out 11,000 chargers a day using it. While in August, 1926, Kodel had employed only 85 workers, during the same period in 1927, 1100 employees were at work in three shifts around the clock, and seven-story addition was planned to house 3,000 more.

In February, 1927, Kodel abandoned radio production entirely in favor of battery eliminators. In May, 1928, he changed the company's name to Kodel Electric & Manufacturing Company. To further bolster his position, in August 1928 Ogden bought the rights to Kuprox, which Kodel had already been manufacturing. Kuprox was a copper-oxide rectifier developed by S. J. M. Allen of the Liebel-Flarsheim Company, Cincinnati X-ray equipment makers.

For another year, Kodel's business seemed to prosper, but inevitably the coming of AC radio tubes decimated the battery-eliminator market. Sales in 1929 were down and in 1930 Kodel lost money. The company went into receivership on October 12, 1931, and disappeared in the late 1930's. Ogden's last patent, in 1933, was assigned to the Union Switch and Signal Company, a Westinghouse affiliate, whose employee Lars O. Grondahl had invented the copper-oxide rectifier well before Allen (patent #1,640,335). Presumably Ogden sold out after losing an infringement suit in December, 1931, which had begun on January 12, 1928 (55F 2d 387).

THE REALLY PORTABLE SET.

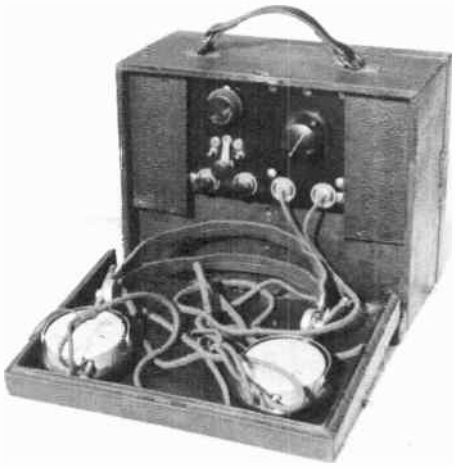


This attractive set employs a single valve and is complete with plate and filament batteries. It is very simple to operate, and tuning is carried out on one knob, while the circuit provides for regeneration.

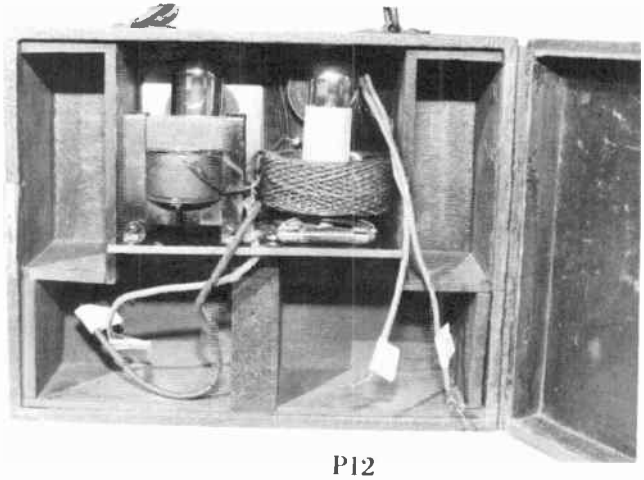
Courtesy Carpax Co.

Wireless World (Oct. 6, 1924), p. 50

Ogden's "Carpax Co." in England offered some of the same models there.



Walt Curry



P12

Insist on the Gold Seal HOMCHARGER $18.50 at your dealer's (in Canada $26.)

GENUINE GOLD SEAL HOMCHARGER UNQUALIFIEDLY GUARANTEED

You needn't have "battery trouble"

TWO things will make your enjoyment of radio free from battery trouble. First, any good storage battery. Second, that excellent, simple, automatic charger—the new silent Gold Seal Homcharger.

★ *Insist* on the GOLD SEAL

Such a combination means minimum care and maximum results, with no trouble at all. Then you can use your set all you want. If the battery becomes weak right in the middle of a program, screw the Homcharger plug in any lamp socket, snap two spring clips over the battery terminals, and go right on listening at full power. Leave the Homcharger connected overnight, and in the morning the battery is charged again.

Everybody says this is the handsomest charger ever seen. The Gold Seal Homcharger is finished in mahogany-red and gold. It has rubber feet and so cannot mar polished floors, tables or cabinets. Safe—approved by the Fire Insurance Underwriters. Can't injure anything.

When buying a set, get storage battery tubes. They give most volume, and in many cases better results in distance too. Make sure the battery you buy is charged, then you can listen in for a week to a month before you buy your GoldSeal Homcharger. Price only $18.50 complete; $26 in Canada. Absolutely guaranteed.

FREE! Ask your dealer or send direct for our interesting free booklet, "The Secret of Distance and Volume in Radio," containing valuable information on this subject and fully describing the GOLD SEAL HOMCHARGER.

Insist on the Gold Seal Homcharger—ask your dealer.

The AUTOMATIC ELECTRICAL DEVICES CO.
Under the same management as the Kodel Mfg. Co.
128 W. Third Street, Cincinnati, Ohio
Largest Manufacturers of Vibrating Rectifiers in the World

14 Gold Seal HOMCHARGER Features

1—Simple; needs no care.

2—Efficient; costs about 5c to charge the average battery, much less than bulb or liquid types of charger.

3—Quick; brings battery up to full charge overnight.

4—Tapers charge; cannot injure the battery.

5—Clean; no bulbs to break, no liquids to spill or produce fumes.

6—Dependable; adjusted and sealed at factory

7—Lasts forever; only one moving part, the Tungsten contact, which can be replaced at $1 after many thousands of hours of use.

8—Fool proof; charges automatically, no matter which clip is attached to which battery terminal.

9—Safe; approved by Fire Insurance Underwriters. No danger of shock or fire.

10—Beautiful; sturdy metal case finished in mahogany-red and gold.

11—Universal; made in types for all voltages of alternating and direct current. Charges all radio "A" and "B" batteries, and automobile batteries.

12—Quiet; its faint hum cannot be heard in next room.

13—Unqualifiedly guaranteed.

14—Popular price—sold everywhere for $18.50; in Canada $25. Complete, no extras to buy.

Radio Broadcast (Nov. 1924), p. 14

"RADIO" anywhere~everywhere!

No longer is Radio confined to home use. Whether touring, on the farm, at camp, mountains or seashore, you can now "listen in" on your favorite station at any time and any place.

Just throw a few feet of wire on the floor or ground and stations from 25 to 50 miles away come in with surprising clearness and volume. Connect a single wire to water pipe or other ground and stations several hundred miles away may be heard with ease. With an outdoor aerial, stations thousands of miles away come in as clear as a bell.

KODEL
The Camera of Radio

—is the first *really* portable, long distance radio receiver on the market. And the ideal set for home use too, since it may be used in any room of the house, on the porch or lawn, and when not in use, folded up and put out of the way.

KODEL is complete—nothing else to carry. Batteries, tube, ground wires and phones—EVERYTHING is fitted inside of a neat Fabrikoid covered case, no larger than a camera and weighing less than 5 lbs. complete.

PRICE, **$18.50** without accessories.

Standard head phones, batteries and tube are obtainable from any dealer at slight additional cost

Interior view showing phones, aerial and ground wire fitted in. Size 5¼" x 4½" x 8".

Dealers—Jobbers

No other radio set possesses such a universal selling appeal as the KODEL. Our national advertising will make KODEL the most popular radio receiver in the world.

Act quickly—Write, wire or telephone TODAY for full details of our liberal sales proposition.

The KODEL MANUFACTURING Co.
CLARENCE E. OGDEN, President
118 THIRD STREET, WEST CINCINNATI, OHIO
NEW YORK OFFICE: 132 NASSAU ST. BEEKMAN 7392

Kodel on the porch

Kodel "lulls" you to sleep

Visit with Kodel

MARKET REPORTS without a ticker

KODEL
The Camera of Radio

—brings market reports to you in your office. Keep KODEL on your desk during business hours—take it with you on your vacation and when you travel.

DEALERS

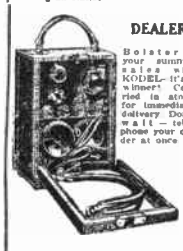
KODEL offers amazing possibilities for summer radio sales. We advise you to place a liberal stock order at once. You'll need them!

Spartan Electric Co.
99 Chambers St.

IT'S IDEAL FOR THE VACATIONIST

KODEL
The Camera of Radio

—is the only practical set to take with you wherever you go this summer. It brings in many stations without an aerial, thus eliminating all static.



DEALERS

Bolster up your summer sales with KODEL—it's a winner! Carried in stock for immediate delivery. Don't wait—telephone your order at once

Times Appliance Co.
33 West 60th.

RADIO ON YOUR LAWN OR PORCH

KODEL
The Camera of Radio

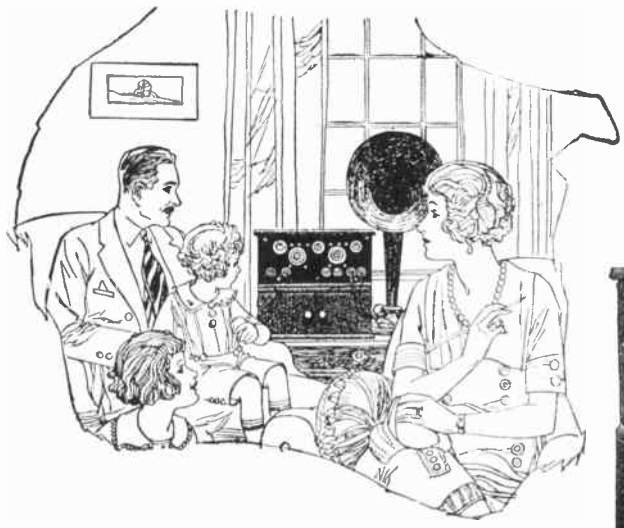
—brings radio concerts right to you out of the cool evening air without static and without an aerial. Use it at home—take it with you on your vacation—let it be your inseparable companion.

DEALERS

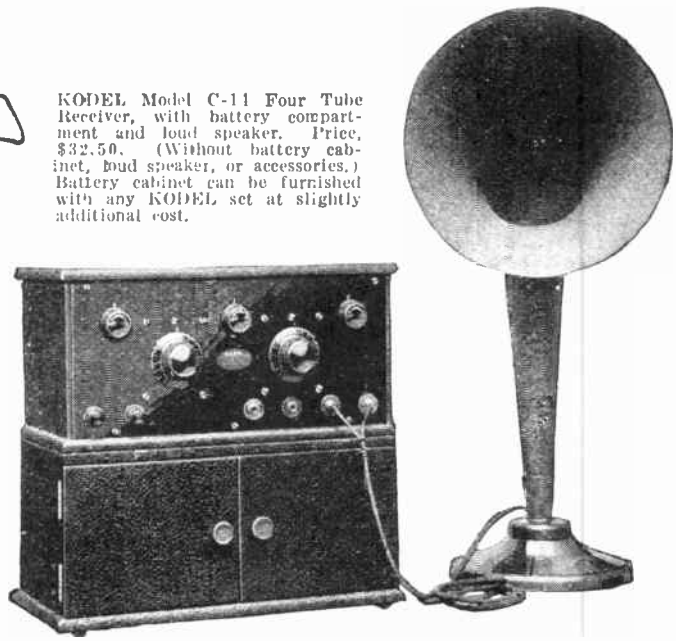
KODEL is a life saver for summer radio sales. You need take no losses if you get behind KODEL and push it. Telephone your order to-day.

North American Radio Corporation
1845 Broadway

NY Sun (June 21, 1924), p. 9



KODEL Model C-11 Four Tube Receiver, with battery compartment and loud speaker. Price, $32.50. (Without battery cabinet, loud speaker, or accessories.) Battery cabinet can be furnished with any KODEL set at slightly additional cost.



KODEL—An astonishing new receiver that will make radio history

KODEL is the name of a circuit discovered by an independent experimenter. So wonderful is the KODEL circuit that it picks up stations 1,000 miles away, using only one tube, and *no antenna,* when conditions are right. Add tubes and you increase distance and volume until you succeed in covering 3,000 miles on the loud speaker. All this with only a single dial to turn!

If you travel—KODEL Portable. If you cannot erect an antenna—KODEL. If you want distance and quality—KODEL. If you want simplicity—KODEL. If your pocketbook is limited—KODEL. Even if you want results regardless of cost—KODEL.

See the KODEL line at your dealer's. If he cannot supply you, send us his name and address with check or money order and we will ship direct to you. Money returned if any KODEL set does not more than satisfy you.

ALL KODEL sets use the unique KODEL circuit and may be operated from either storage or dry batteries at will, and without an outdoor antenna if desired.

FREE. Write for instructive KODEL Catalogue, entitled "Radio for Every Purpose and any Purse." FREE!

DEALERS: the KODEL is a sensation wherever introduced. Write for terms.

Kodel Manufacturing Company

Under same Management that made the Homcharger famous.

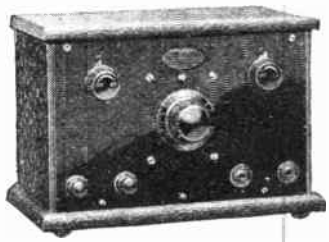
128 West Third Street **Cincinnati, Ohio**

Model S-1 KODEL crystal set. Sensitive, selective low priced. Price, $5.00

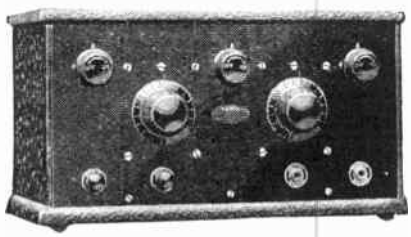
Model P-11 One Tube Portable—the Camera of Radio. Price, $16.00 without accessories. Tube, batteries, head phones, antenna, and ground wire all self-contained. Weight 4¾ lbs. complete.

Model P-12 Two Tube Portable. (Model P-11 with additional tube added, which increases distance and volume many times) $22.50.

Model C-11 One Tube Receiver—The biggest value in a one tube radio set to-day. Price, $10.00.



Model C-12 Two Tube Receiver—$18.00. A great distance getter; puts local stations on the horn; single dial tuning.



Model C-13 Three Tube Receiver—$28.00. Gives five tube volume with only three tubes due to reflex amplification.

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

C. E. OGDEN ADDRESSES HIS OWN MICROPHO

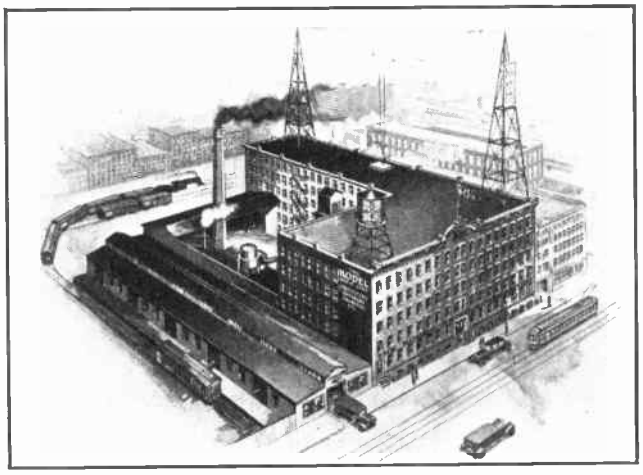
OWNER OF NEW STATION WKRC TAKES THE STAGE

Clarence E. Ogden, President of the Kodel Radio Corporation, of Cincinnati, Ohio, is above depicted delivering his first address to radio fans, when his new station, WKRC, located in the Hotel Alms, was opened April 6th. Mr. Ogden purchased this class B 1000-watt station from the Ainsworth-Gates Radio Company.

Lee Ainsworth, President of the Ainsworth-Gates Radio Company, on the left, is introducing "Chief" Ogden to the fans.

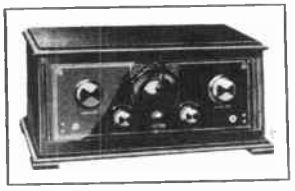
This station operates on wavelengths of 325.9 and 422.3 meters; alternating with stations WLW and WSAI of Cincinnati. Additional Western Electric equipment has been ordered and will be installed during the summer months so that when the station is officially opened, coincident with the completion of the new $2,000,000 Hotel Alms, this fall, it will be one of the finest in the country.

Radio Retailer and Jobber (April 1925)

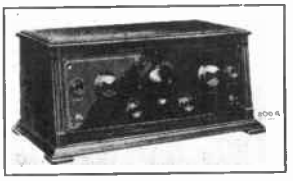


Factory of the Kodel Mfg. Corp., in Cincinnati, O.

Radio Engineering (July 1925), p. 350



KODEL UNITROL "STANDARD FIVE" RECEIVER. Manufactured by the Kodel Radio Corp., 507 East Pearl street, Cincinnati, Ohio. Five tube tuned radio frequency receiving set having three condensers in synchronism with one major tuning control and two verniers. Dark mahogany cabinet, sloping panel engraved in gold with inside panel similarly engraved hiding inside wiring. List price $85.00.

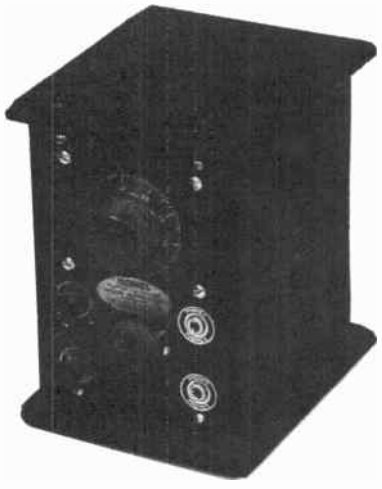


KODEL UNITROL "BIG SIX" RECEIVER. Manufactured by the Kodel Radio Corp., Cincinnati, Ohio. Six tube tuned radio frequency receiving set using special control designed to synchronize three condensers with one control and two verniers. Sloping front panel engraved in gold with inside engraved panel hiding all wiring. Dark brown mahogany cabinet. List price $115.00.

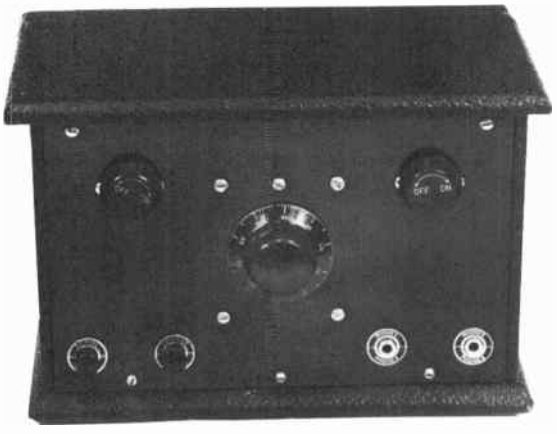
Radio Dealer (July 1926)

CLARENCE E. OGDEN

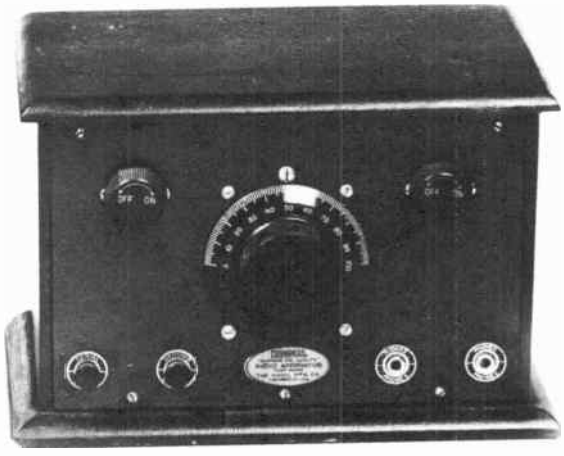
Radio Dealer (Oct. 1925), p. 223



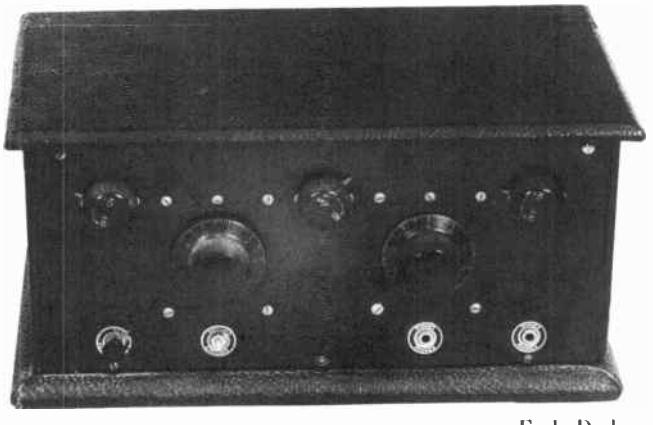
Gold Star John Terrey



C12 John Drew



Gold Star Ralph & Elinor Williams

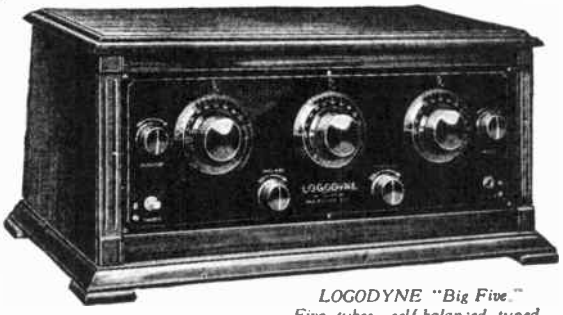


C13 Earle Drake

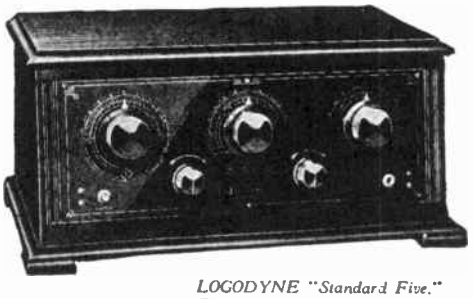
KODEL

The Emblem of

A New Standard



LOGODYNE "Big Five."
Five tubes, self-balanced tuned radio frequency; sloping panel, gold engraved; beautiful massive Adam brown mahogany cabinet; stations already logged. **$90**



LOGODYNE "Standard Five."
Five tubes, tuned radio frequency; lithographed panel and sub-panel; brown mahogany cabinet; stations logged. **$70**

LOGODYNE "Standard Five" Console Model.
Five tubes, tuned radio frequency; beautiful brown mahogany furniture design; built-in loud speaker and compartment for batteries and charger. **$165**

KODEL RADIO has set a new standard in radio manufacture.

To own a KODEL RADIO this year is to have the best that radio offers—or will offer in years to come. KODEL RADIO this year represents the highest development in radio engineering—the most beautiful in cabinet art—the most simplified of circuits consistent with utmost efficiency — KODEL RADIO offers the widest selection and choice of receivers and accessories ever designed by any single manufacturer.

In buying KODEL RADIO one buys with utmost confidence. For each model, regard-

Free *Write for new edition of our instructive booklet on radio operation "The Secret of Distance and Volume in Radio"*

LOGODYNE "Big Five" Console Model.
Five tubes, self-balanced tuned radio frequency; a masterpiece in furniture design; Adam brown mahogany; built-in loud speaker and battery and charger compartment; desk-like front panel can be closed when not in use
$275

models first advertised in August

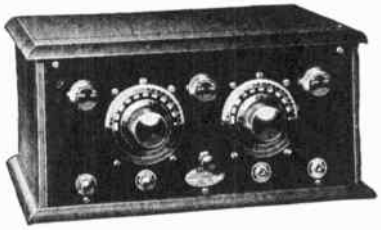
RADIO

Worth in Radio

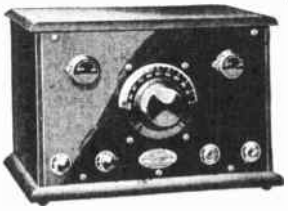
Of Radio Value

less of price is unqualifiedly guaranteed to represent the utmost in quality, in performance, in artistry, and workmanship — conscientiously made and expertly tested.

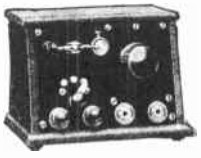
The choice of a radio receiver or accessory, so long as it bears the name KODEL RADIO, is largely a matter of personal opinion and price—all measure up to the same high standards set for KODEL RADIO this year—the best that radio offers.



KODEL "Gold Star."
Three tubes; Kodel new circuit; low-loss plate condensers; brown mahogany cabinet; radio's greatest set value. **$30**



KODEL "Gold Star."
Two tubes; single dial tuning; plate condensers; mahogany cabinet. **$20**

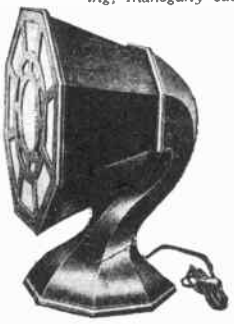


KODEL "Crystal Set."
Sensitive, selective, black leatherette cabinet. **$6**

KODEL "Gold Star."
One tube; single dial tuning; mahogany cabinet. **$12**

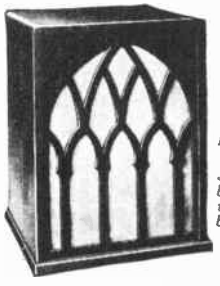
LOGODYNE UNITROLA.
Five tubes; tuned radio frequency; fits any standard upright or console phonograph; all operating parts enclosed; easy to install. **$87.50**

KODEL Microphone Loud Speaker the sensation of the season; exact replica of broadcasting microphones; has unique snail-shell horn construction — amazingly clear and loud. **$20**



KODEL "DeLuxe" Amplifier.
Combines volume and tone of horn type speakers with dignity of cabinet type; artistic grill over golden cloth screen beautiful, practical. **$25**

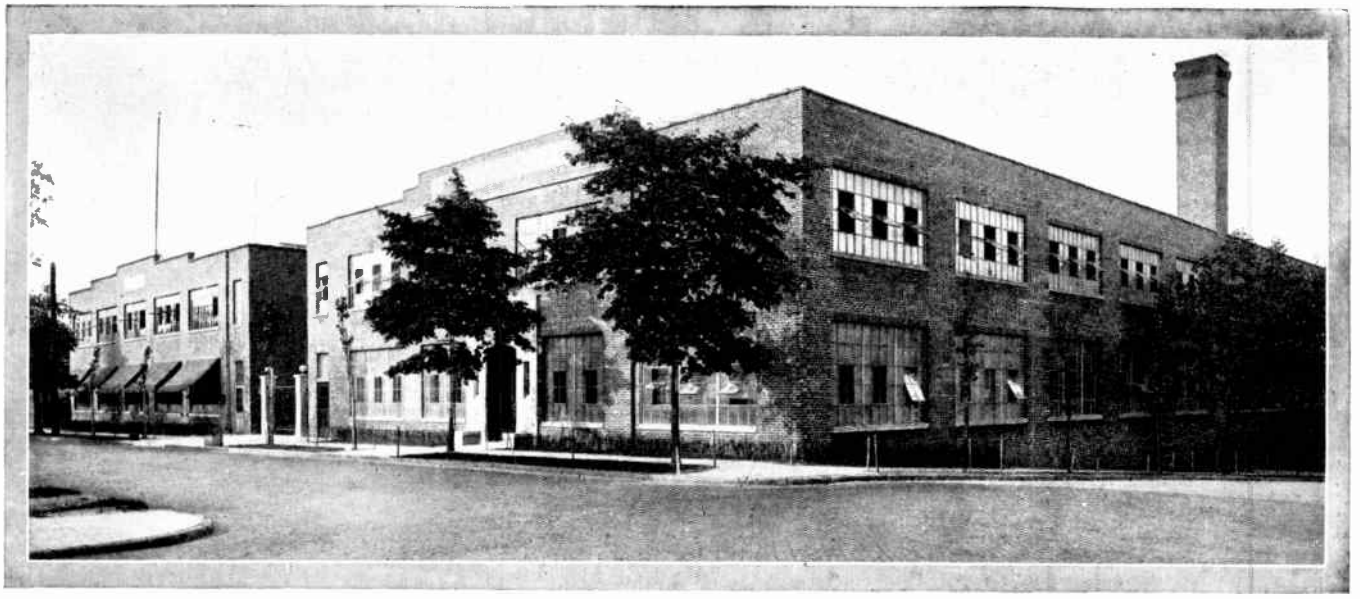
LOGODYNE Panel-Assembled Kits.
Front and sub-panels, beautifully engraved, already assembled; furnished with mounting brackets, wiring, solder, etc., BIG FIVE Model **$65**
STANDARD FIVE **$50**



KODEL Cabinet Type Amplifier.
Solid mahogany cabinet beautiful old gothic lattice work over golden screen; built-in tone chamber. **$27.50**

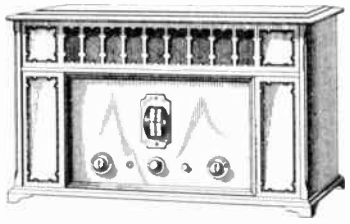
THE KODEL RADIO CORPORATION
503 East Pearl Street Cincinnati, Ohio

WKRC
Owners of Kodel Broadcasting Station WKRC on the Alms Hotel. Send for program.



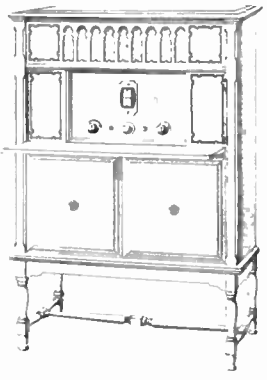
Brandes Factory at Newark, N. J.

69,120. RADIOCABINET. ROBERT C. EDWARDS, New York, N. Y., assignor to Federal Telegraph Company, San Francisco, Calif., a Corporation of California. Filed Aug. 24, 1925. Serial No. 14,574. Term of patent 3½ years.



The ornamental design for a radiocabinet substantially as shown.

69,121. RADIOCABINET. ROBERT C. EDWARDS, New York, N. Y., assignor to Federal Telegraph Company, San Francisco, Calif., a Corporation of California. Filed Aug. 24, 1925. Serial No. 14,575. Term of patent 3½ years.



The ornamental design for a radiocabinet substantially as shown.

Edwards had previously designed the cabinets for RCA's Radio la Super-VIII and X.

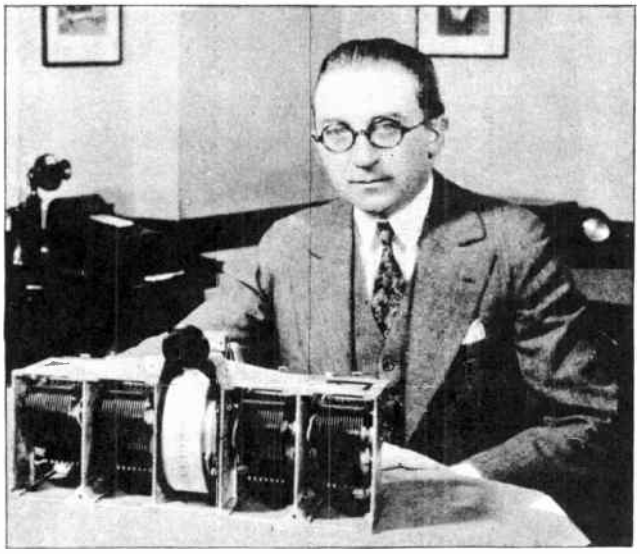
original advertising dates for 7A and 7B not known.

Radio Retailing (June 1926), p. 1

Radio Retailer and Jobber (May 1928), p. 5

KOLSTER

Federal Telegraph Company



NY Herald Tribune (Feb. 20, 1927)

Kolster was another might-have-been — an attempt by a large communications company to make broadcast receivers. The Federal Telegraph Company of California had been doing about $500,000 a year gross business when Rudolph Spreckels became chairman of the board in 1924. Spreckels, who had made millions in sugar refining and banking, along with his family decided to finance Federal's entry into the broadcast market. Since 1921 Federal had had a first-class engineer on its staff: Frederick A. Kolster, former chief of the Bureau of Standards Radio Section, inventor of the Kolster Decrementer (wavemeter) and radio compasses. Born in Geneva, Switzerland on January 13, 1883, and brought to the U.S. when his father was engaged as a violinist by the Boston Symphony Orchestra, Kolster worked with John Stone Stone from 1902 to 1908, Lee de Forest 1909 to 1911, and Fritz Lowenstein 1911 to 1912.

Since there was already a company called Federal making radios (Federal T&T of Buffalo; no relation) and Kolster's name was well-known in commercial circles, Federal adopted Kolster as its brand name.

Kolster started with a bang: double-page tinted ads in the *Saturday Evening Post*, and two elaborate models built by Brandes Products in Newark, New Jersey — 20,000 of them, with 100,000 planned. Federal and Brandes began bickering almost immediately; Brandes wasn't making any money on the contract and was therefore doing slipshod work, resulting in 60% returns by the distributors. The problems were resolved the following July with the formation of Federal-Brandes, Incorporated, and the absorption of Brandes in November, 1926. Still, Federal was stated to have lost $200,000 that first season, a figure later increased to "over $500,000" and finally $800,000 in the trade journals. However, Spreckels was certain that he would more than make up the loss in the future.

Because the seven- and eight-tube models had flopped, Kolster designed a modest, more competitive six-tube model for the 1926-27 season. By January, 1927, production was reportedly about 3,000 sets per day; in June, 300; and in July, 600 per day. By this time Spreckels had to infuse the company with $750,000 more of his family's money. To cut expenses, Kolster moved its sales staff from plush offices in the Woolworth Building in New York (where RCA was also located) to Newark, New Jersey. Even so, the *Radio Retailer & Jobber* couldn't resist carping at the "large litter of grand and petty executives, who draw large salaries and who seem to be stepping over each other's shoes."

Kolster's RCA license, granted in September, 1927, opened the way for an AC model in October. By the end of the year the company was making from 700 to 1200 sets per day, but apparently was not selling them. In February, 1100 employees were let go. In May, a job lot of 10,000 obsolete models was sold to Emerson Radio and Phonograph Corporation (in the 1920's, not yet a manufacturer, but a dealer in surplus), and that was nothing compared to what remained on the factory floors. In August, one estimate was 30,000 sets overproduced; another more detailed one in October was 18,000 of a $176 model, 50,000 7-tube, 30,000 8- tube, and 30,000 AC sets, for a total of 128,000 surplus radios. In April, 1929, a job lot with $3 million retail value was disposed of, leaving half that amount still there. Obviously, Kolster was in trouble.

Spreckels and other stock-holding executives were already bailing out. After some skillful newspaper publicity, Federal-Brandes changed its name to Kolster Radio Corporation on April 9, 1928, and announced a new stock issue. By rigging the market, Spreckels and his associates unloaded a large amount of stock at 2 points under the peak (for which they were sued in 1931 by a group of disgruntled stockholders).

In late 1929, Kolster tried to merge with Earl, but the deal was called off. Receivers were appointed on November 22, 1929, and although several proposals were made to reorganize the company in 1930 and it made 49,000 sets with 15,000 more contracted for, the New Jersey Chancery Court ordered an auction of assets in April, 1931. A new company was formed shortly afterward, Kolster International, controlled by Mackay. It did get into production, but it was last heard from in October, 1932. Federal-Brandes in England, also controlled by Mackay, remained, eventually becoming a part of ITT. Frederick Kolster died in 1950.

Tone Ranks First

F. A. KOLSTER

For eight years he was head of the Radio Section of the United States Bureau of Standards.

He invented the Kolster Radio Compass for Navy and Passenger ships.

The staff which he heads built most of the United States Navy Radio Stations.

This internationally famous organization concentrates all its experience in Kolster Radio.

How a great staff of radio experts—the organization which built most of the United States Navy Stations—solved America's great problem: perfected reproduction

With international fame in radio development, the brilliant staff of the Federal Telegraph Company (of California) now adds another triumph to its long list of achievements.

F. T. C. engineers, experts in commercial radio transmission, offer now the ultimate in radio reception.

F. T. C. engineers built the world's greatest station, the Lafayette in France, one of the many they built for the United States Government.

Kolster and his associates have installed the Kolster radio compass on naval vessels and passenger ships, including the Leviathan.

The Company maintains the foremost land radio service in the Western Hemisphere.

These are but a few of its world-wide operations.

Pioneers in radio, they did not rush into the promotive days of public radio.

They preferred to *perfect* a final-type set, one so wonderful that it would mark a distinct new epoch.

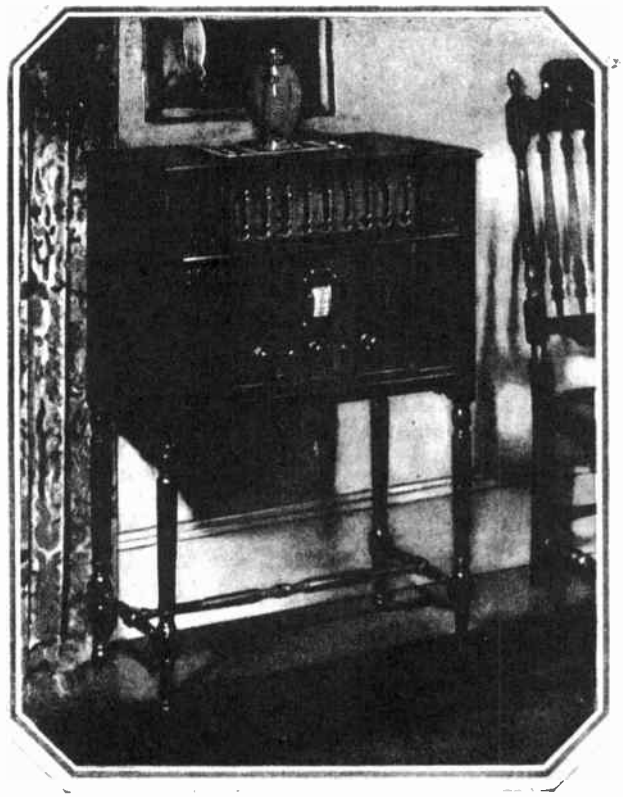
This they have done. Kolster radio, named for their chief research engineer, brings a great and wanted advancement.

Yesterday's problem was reception. Today's is reproduction.

Distance alone no longer has its charm. The real demand is for *perfected* reproduction, reality of tone.

Now you can have it. Now you need not be content with yesterday's limitations.

Now radio offers a *new* thrill.



Kolster Eight. Single control. Internal loop. Provisions for external loop or antenna. Built-in reproducer.

KOLSTER

Kolster Six. Dual control for antenna. Built-in reproducer.

8C technical article in *Popular Radio*, Dec. 1926, pp. 794-796.

Models 8B ($265), 6B ($225) 6A ($175), 8C($375). First advertised August 1925

in Radio Enjoyment

F. A. Kolster and his able associates offer 1925's sensation: rare tonal advancement, the new-day ideal in radio. Reproduction such as you've never heard before

Up to now reception has been the thrill in radio.

That thrill has had its day.

Now people want reality in tone.

If Zimbalist plays, it must be Zimbalist—as if you were in the studio. There must be no interference, no muffling, no exaggerations or repressions.

If the President makes a speech, if McCormack sings, if Lopez jazzes, if Godowsky plays the piano—

—whoever or whatever is broadcast must be reproduced faithfully.

A Kolster neither adds to nor subtracts from broadcasting.

With magical clarity you get perfect reproduction—true and realistic.

A Kolster brings out the hitherto "Lost Chords."

A Kolster gives you the subtle overtones, the pleasing nuances, the delicate shadings.

A Kolster gives you music or speech just as the artist or speaker gives it in the studio.

To hear a Kolster is to revise your entire idea of radio.

No howls. No interference. No mechanical background. Just pure, rich tone, undefiled.

Hear a Kolster. Get a new thrill. But do so at once for the supply is limited.

At his shop or in your home, a Kolster dealer will be delighted to give you a demonstration.

FEDERAL TELEGRAPH COMPANY
(of California)
Woolworth Building, New York City

SINGLE CONTROL

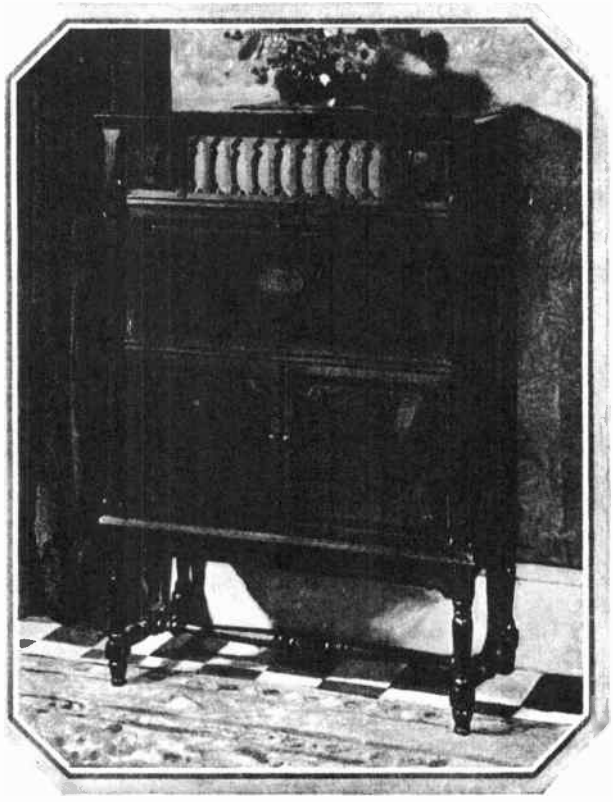
One station after another parades by as you turn the Kolster regulator. No meaningless combination of numbers, but the actual names of the stations.

Whatever is on the air comes in easily, perfectly.

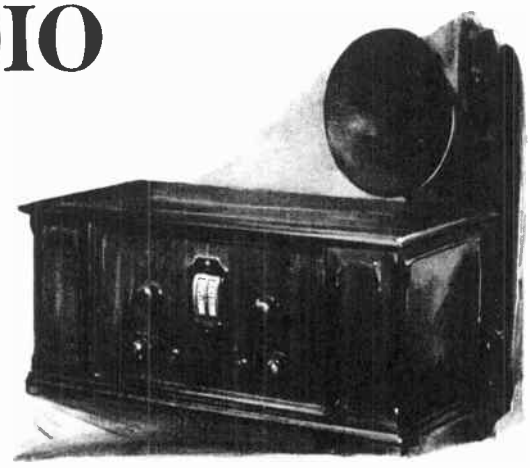
To play a Kolster is easier than playing a phonograph.

Radio programs assume new magic—but it is not that their transmission is bettered. The secret is in Kolster perfected reception and reproduction.

RADIO



Kolster Eight. Single control. Enclosed, rotating loop. Also provision for antenna. Built-in reproducer.



Kolster Six. Dual control for antenna. External reproducer.

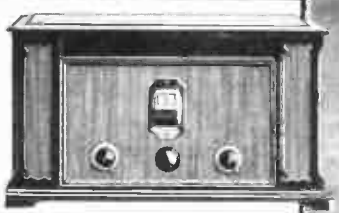
Financial data on page 260

(not shown) 6C Dec. 1925 $250

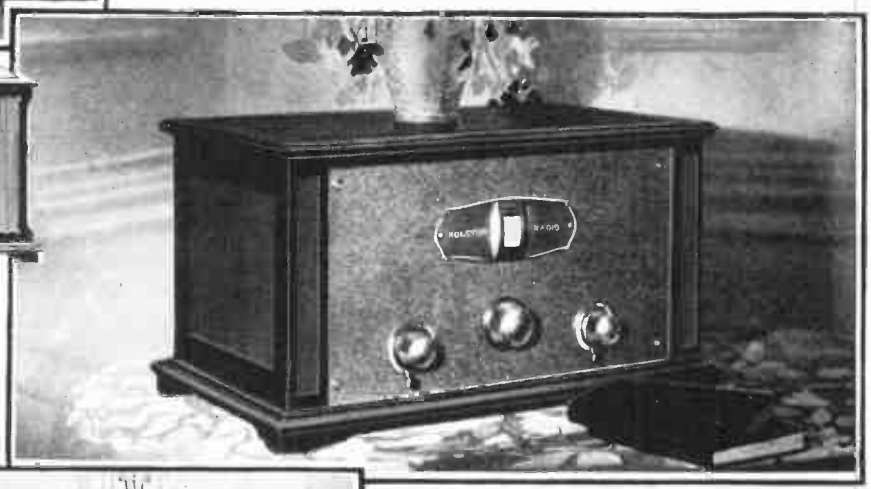
Kolster

The Kolster retail prices range from $85 to $375, each item an outstanding value. Read the individual descriptions. These sets include all the latest Kolster refinements. No dials—just one simple station selector, calibrated in wave lengths. Maximum selectivity and sensitivity through Kolster adjustable coupling control. No howling. Improved tonal qualities. Built-in special Brandes Cone Speakers. Beautiful cabinet work in duo-tone Adam brown satin finish.

The Kolster 6-E set is full console with speaker built-in. Single control—fully adjustable — finished in Adam brown satin mahogany. $135, less tubes.



A table model 8-tube set—Kolster 8-A. Single control — adjustable for volume, selectivity and sensitivity—with station selector dial, illuminated and marked in meters wave length. $185, less tubes and batteries.

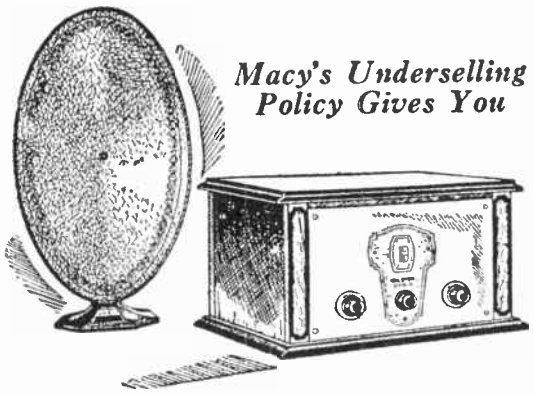


Six tubes, completely adjustable, single control. Kolster 6-D set. $85, less tubes and batteries.

This is the Kolster 8-C. Single control — adjustable for volume, selectivity and sensitivity—full console with built-in loud speaker and loop antenna. $375, less tubes and batteries.

This semi-console is the Kolster 8-B set with loop antenna attached. Single control — built-in loud speaker—adjustable for selectivity, sensitivity and volume. $235, less tubes and batteries.

6D August 1926 $85 (later $98.50) $80 in May 1927
Technical article in *Radio News*, Jan. 1927, p. 792.
6E August 1926 $135 (later $150)
Design patent 71,811 filed 10/25/26



Macy's Underselling Policy Gives You

The New Kolster 6D

With Farrand cone speaker, Exide 100 amp. battery, Burgess B and C batteries, Cunningham tubes—FOR

$121.00

Sharply selective, ideal for local conditions. Sensitive to the point of giving loud-speaker volume on distant stations. Easy to operate—only one dial. Equipped with best quality of accessories to insure full, realistic tone. For small additional cost the set can be equipped to operate from your light socket.

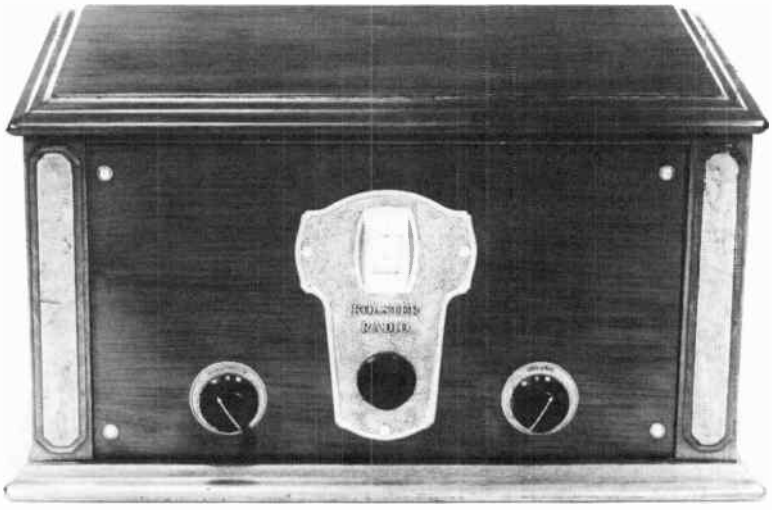
At Macy's—Sets for 6% Less

Fifth Floor, East Building

MACY'S

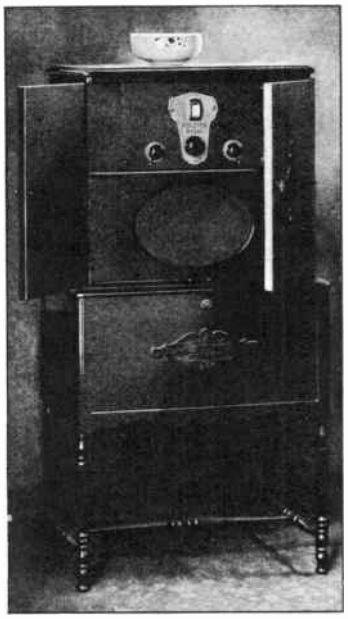
34th St. and Broadway **New York City**

NY Herald-Tribune (Oct. 30, 1927)



6D new style, advertised Sept. 1927

Robert Enemark

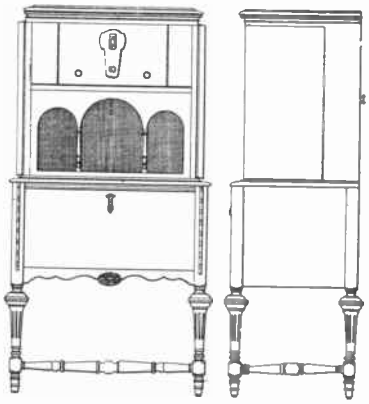


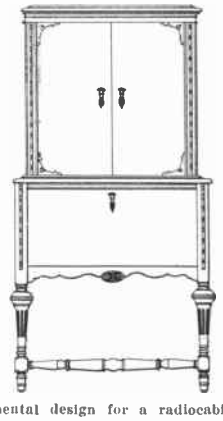
Radio Retailing (March 1927), p. 6

SUCH a beautiful cabinet—simple, aristocratic—fittingly encases such a fine set as the Kolster 6 G. Inbuilt cone. Antenna operation. Ample space for batteries . . . . . List, $185

6G March 1927 $185
($165 in July)

73,879. RADIOCABINET. DAVID S. SPECTOR, New York, N. Y., assignor to Federal Telegraph Company, San Francisco, Calif., a Corporation of California. Filed June 22, 1927. Serial No. 22,529. Term of patent 14 years.

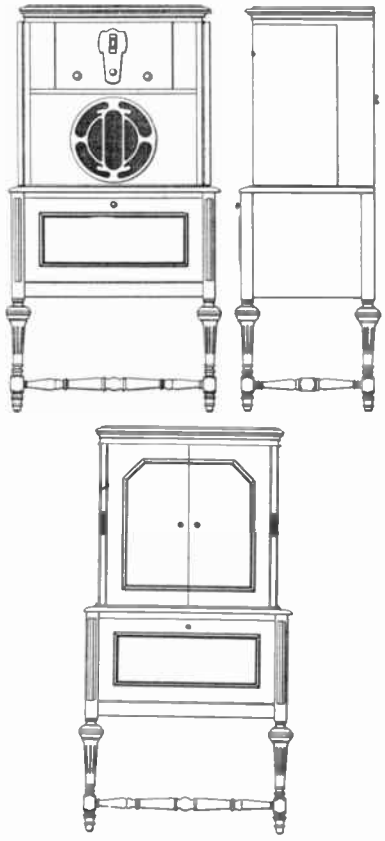




The ornamental design for a radiocabinet as shown.

6H June 1927 $265
6M Feb. 1928 $365

73,878. RADIOCABINET. DAVID S. SPECTOR, New York, N. Y., assignor to Federal Telegraph Company, San Francisco, Calif., a Corporation of California. Filed June 22, 1927. Serial No. 22,528. Term of patent 14 years.



The ornamental design for a radiocabinet as shown.

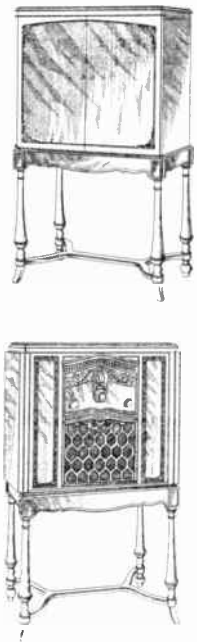
NY Herald Tribune (Feb. 5, 1928)

6F Oct. 1927 $160
6J Apr. 1928 $160
6K Oct. 1927 $250
Short technical article in *Radio Broadcast*, July 1928, p. 160.
(not shown) 6R Apr. 1928 $250

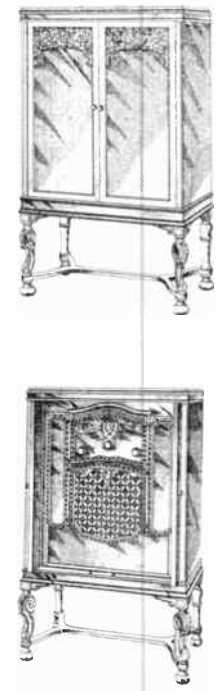
76,512. RADIOCABINET. EVERETT WORTHINGTON, Chicago, Ill., assignor to Brandes Laboratories, Inc., Newark, N. J., a Corporation of New Jersey. Filed June 2, 1928. Serial No. 26,973. Term of patent 14 years.

K-20 Robert Russell

76,514. RADIOCABINET. EVERETT WORTHINGTON, Chicago, Ill., assignor to Brandes Laboratories, Inc., Newark, N. J., a Corporation of New Jersey. Filed June 13, 1928. Serial No. 27,113. Term of patent 14 years.



76,515. RADIOCABINET. EVERETT WORTHINGTON, Chicago, Ill., assignor to Brandes Laboratories, Inc., Newark, N. J., a Corporation of New Jersey. Filed June 16, 1928. Serial No. 27,170. Term of patent 14 years.



July 1928 models: AC, magnetic speaker: K-20, $135. K-22, $200.
AC, dynamic speaker: K-21, $160. K-23, $285. K-24, $350.
Technical article in *Citizens Call Book*,, vol. 11 no. 2, March 1930, p. 82.
DC, K-30, $135. K-32, $200.

ALL you want in a radio plus one thing more!

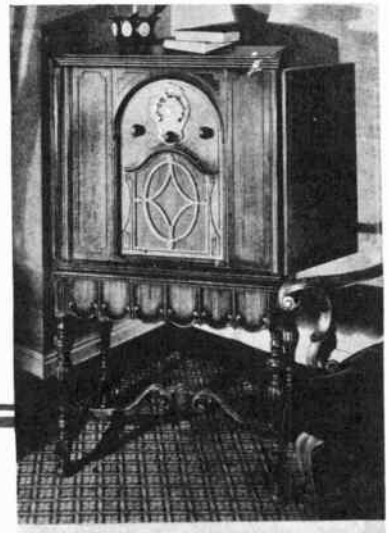
Name what you will that is newest and best in radio. Kolster has it! Remote control—which enables you to operate your Kolster from any remote corner in the home. Electrical tuning—merely pressing a button selects your favorite station electrically. Selector tuner—the new, convenient Kolster method of tuning. Screen grid tubes—for greater distance and quieter reception. Four tuned circuits to choose unfailingly the one station you wish to hear, excluding all else. New dynamic reproducers affording a new realism of tone. Cabinets of extraordinary appeal. And in addition to all these advantages there is the background of fine quality and lasting satisfaction inherent in every Kolster Radio.

Enjoy the Kolster Program every Wednesday Evening at 10 P. M., Eastern Daylight Saving Time, over the nation-wide Columbia Chain.

K-43—Handsome cabinet with doors of figured butt walnut and two tone panels. Seven tubes and rectifier. *Selector tuner.* Dynamic reproducer. Screen grid tubes. Push-pull amplification with 2 type 345 tubes. *Price, less tubes* $235.00

Model K-45 uses remote control, a Kolster development. With this device, you can start the radio—take your choice of 8 different stations—and make the volume louder or softer as you will from a remote point in your home!

K-45—Richly grained walnut cabinet—unique and exquisite in appearance. *Remote control. Electrical tuning.* Nine tubes and two rectifiers. Screen grid R. F. tubes. Extra large dynamic reproducer. Three stages of audio . . . second and third stages push-pull, using type 327 tubes and type 350. *Price, less tubes* $500.00



K-44—Console receiver using 7 tubes and 2 rectifier tubes. Walnut cabinet of tasteful design. *Selector tuner* of embossed bronze. Screen grid tubes. Dynamic reproducer. Push-pull amplification, 2 type 345 tubes. *Price, less tubes* $325.00

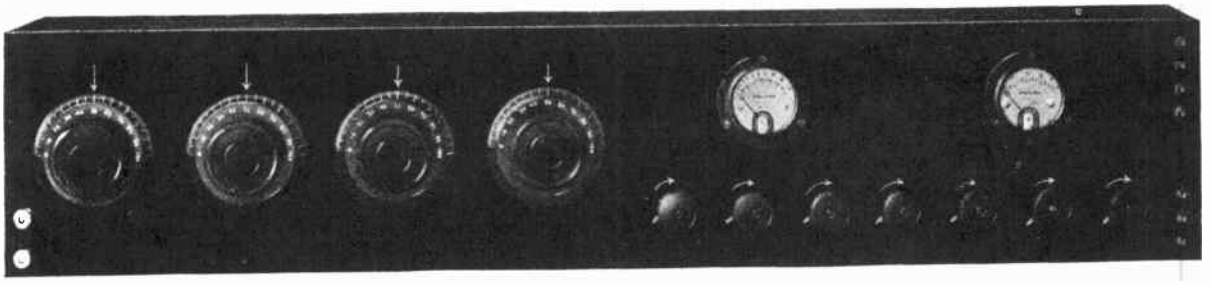
Prices slightly higher west of the Rockies

KOLSTER RADIO

Presumably designed by Lewis Clement and Sylvan Harris. Clement arrived from Fada in Nov. 1928 and left for Westinghouse in March, 1930. Harris came from Stewart-Warner in 1928 and by early 1930 had joined Fada.

Armstrong

Super-Heterodyne Receiver



Wireless Age Sept. 1922, p. 13

"The Rolls-Royce Method of Reception"—"Armstrong"
This Method of Reception

USED BY

Paul F. Godley at Ardrossan, Scotland, in last December's Amateur Trans-Atlantic Tests.

The Commercial Radio Companies for long distance ship-to-shore communications.

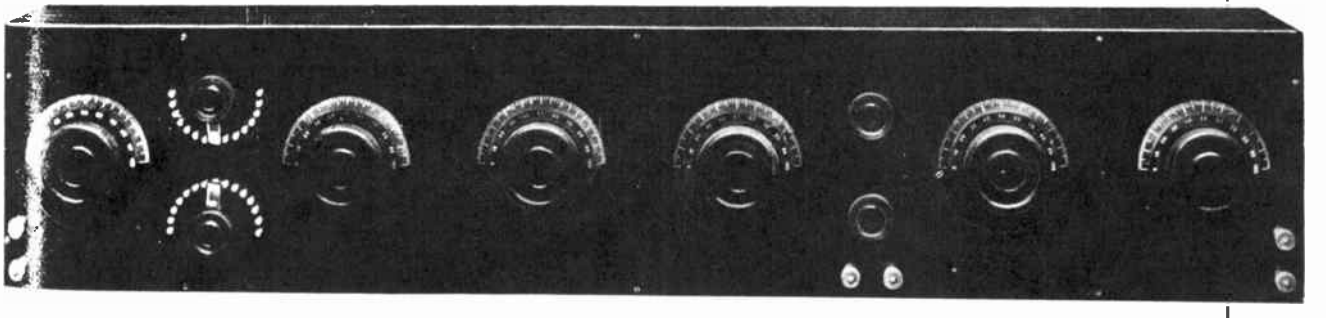
Progressive amateurs for exceptionally long distance reception of radiophone, spark or CW signals.

WAVE LENGTH RANGE

150—850 meters with Heterodyne. 850—25,000 meters without Heterodyne.

Complete constructional details of this receiver are covered in our blue prints Nos. 30035—38A showing assembly views, individual details, wiring diagram, technical data and bill of material, price $4.00.

Armstrong Super-Regenerative Receiver



Full constructional details shown correctly in five blue prints each 22 x 17 inches, price $4.00

Catalog 92 covers our entire line, gratis

EXPERIMENTERS INFORMATION SERVICE

Designing Radio Engineers

220 West 42nd St. (23rd Floor) New York City

When writing to advertisers please mention THE WIRELESS AGE

LEUTZ

Golden-Leutz, Inc. / Norden-Hauck, Inc.

Modern Radio Reception (1928) advertising flyer

Charles Roland Leutz was born in Jamaica Plain, Massachusetts, on December 18, 1898. Becoming interested in radio while in grammar school, Leutz got his amateur license in August, 1913, and shortly went into business:

"*While in high school (Mechanic Arts, Boston) 1912-16 organized the Eastern Scientific Apparatus Company with a couple of other chaps. We intended to sell 'safety at sea' to yacht owners and ran an advertising campaign in the yachting magazines. The response was tremendous. It also resulted in receiving a letter from the Marconi Wireless Telegraph Co. of America. First, they said that we could not sell for yachts larger than 500 tons. The next letter (David Sarnoff) said we could not sell to yachts at all.*" [from an autobiographical sketch, ca. 1960]

Following high school, Leutz worked six months at Clapp- Eastham and another six at the Fore River shipyard. Then in the fall of 1917, he left Boston for American Marconi in Aldene, New Jersey. After three weeks in the test department, he was promoted to assistant engineer and, for the war's duration, worked there under Paul Godley, gaining invaluable experience in receiver design.

In 1921, Leutz and Claude Golden formed the Experimenters Information Service to sell blueprints for superheterodynes that Leutz designed. About April, 1923, when he designed the Model C, Golden-Leutz, Incorporated, was formed to sell parts and kits. RCA tolerated this infringement on its patent rights (though it would not fill Leutz's orders for UV1716 long-wave transformers used in the IF amplifiers) until its own Radiola Superheterodyne was ready in February, 1924, at which time it sued Leutz, Golden, Golden-Leutz, and E.I.S. under the Fessenden heterodyne and Armstrong patents. Testimony was taken in June, and on July 21, 1924, Leutz's companies were enjoined from selling "knock-down" (kit) superhets; all they could sell were plans and parts.

Norden-Hauck in Philadelphia took over where Leutz left off. Alexander Norden, Jr., had sold and installed E.I.S. sets in 1923. Norden-Hauck began advertising in April, 1924, as a mail- order purchasing agent that would sell anything at 10% off list; but in July it began advertising Leutz superhets, continuing until March, 1926, when it, too, switched to TRF models. Why Norden-Hauck seemed immune from suit is not known, although the *Radio Retailer & Jobber* mentioned more than once that Philadelphia judges were known to be poorly disposed toward RCA, and Norden-Hauck had no New York distributors who could be sued in RCA's jurisdiction, as the larger companies, like Atwater Kent, did. Norden-Hauck was far from a large operation. Quoting from two 1980 letters of Jesse Haydock to H. L. Chadbourne:

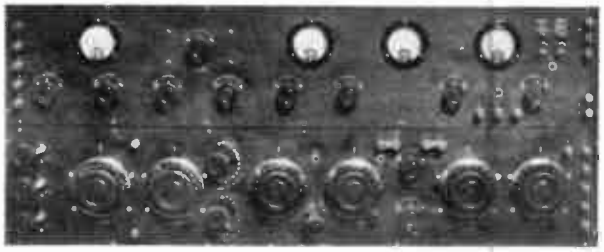
"*I once climbed about four flights of stairs in an old brick building to find that the Norden-Hauck shop consisted of a couple of wood-top work tables, practically no machine tools, in short a very primitive facility. . . . There was only one employee present and he was not a member of the management, simply a guy in overalls. I don't recall that there was any 'work in process' on the work tables.*"

Norden-Hauck was in the Marine Building at Delaware and South Streets from June, 1926, to 1932. Norden had moved to New York City by 1934 and remained in radio manufacturing to about 1948.

While Norden-Hauck was handling the superhets, Golden-Leutz was limited to TRF models. In December, 1923, Leutz, in conjunction with Clair Farrand, had designed the Super-Pliodyne 9, which Golden-Leutz began advertising in March, 1924. This was shortly joined by a six-tube model, then by a progression of larger and larger high-performance models, claimed to be far better than the forbidden superhets. In February, 1927, Golden-

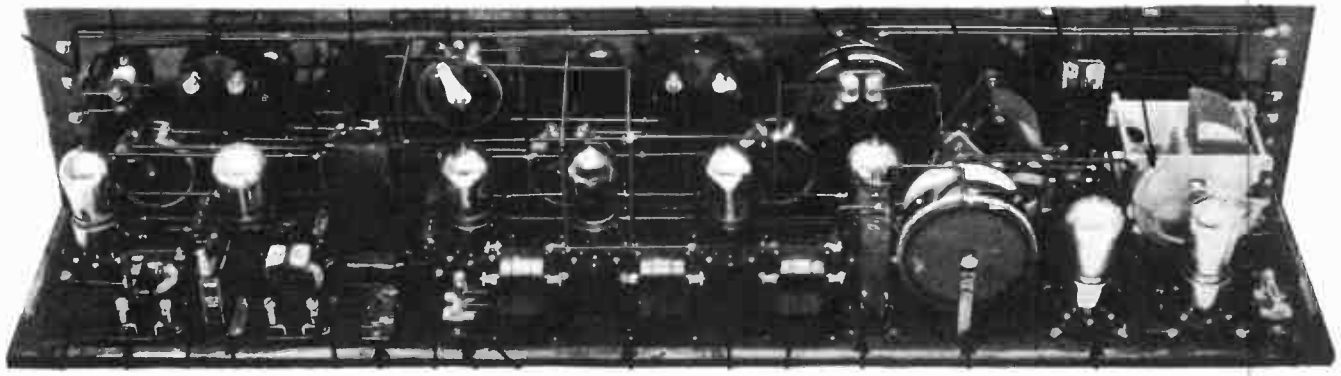
Leutz changed its name to C. R. Leutz, Incorporated; around October, 1929, the company moved to Altoona, Pennsylvania, presumably to be closer to Robert B. Gable, probably Leutz's financial backer. The company was last heard from in late 1930. Charles Leutz reappeared briefly in 1933, making yacht radio installations under the name of Eastern Research Laboratories.

A great deal of technical data on Leutz models can be found in Leutz's four books: *Super-Heterodyne Receivers* (1923, paper), *Modern Radio Reception* (1924 and 1928 editions), and *Short Waves* (1930, with Gable). Leutz went into radar and missile work for the U.S. Navy, retiring from the Johns Hopkins Applied Physics Lab about 1963. He died on April 28, 1964.

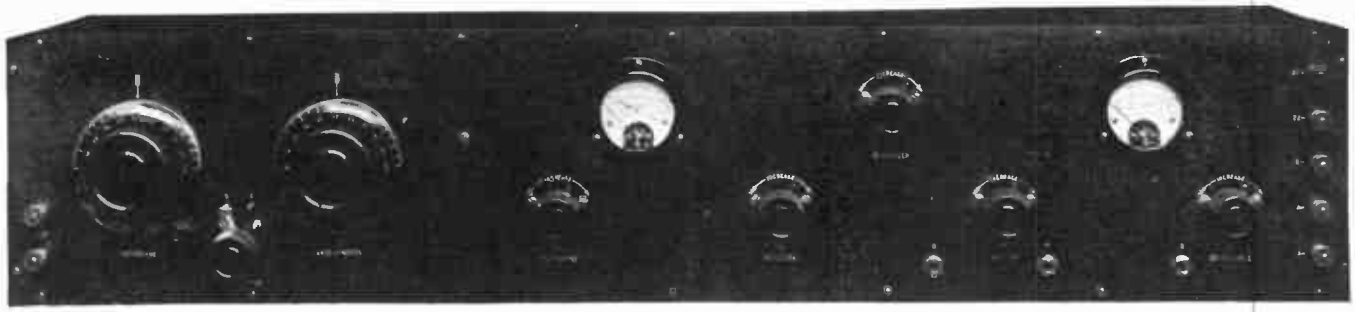


Modern Radio Reception (1924), p. 84

L Nov. 1922 (E.I.S. plans only)
Technical articles in *QST*, Dec. 1922, pp. 11-14 and *Radio Topics*, Dec. 1922, pp. 19-21.

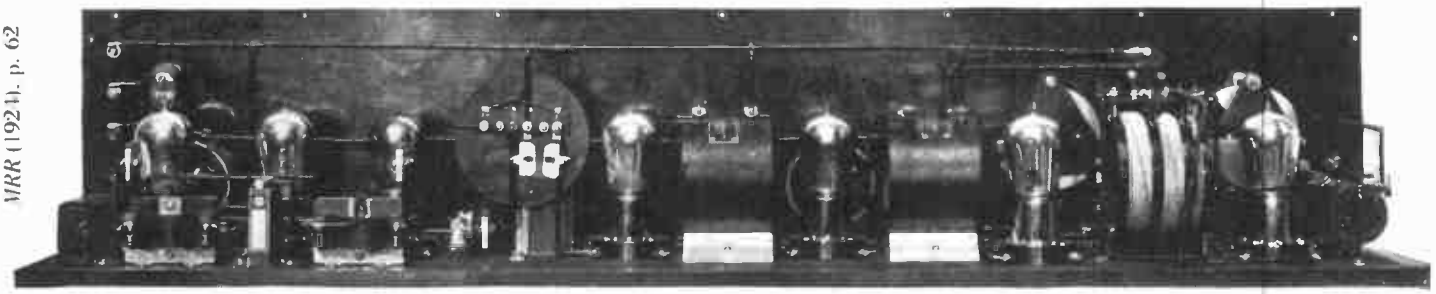


Modern Radio Reception (1924), p. 28

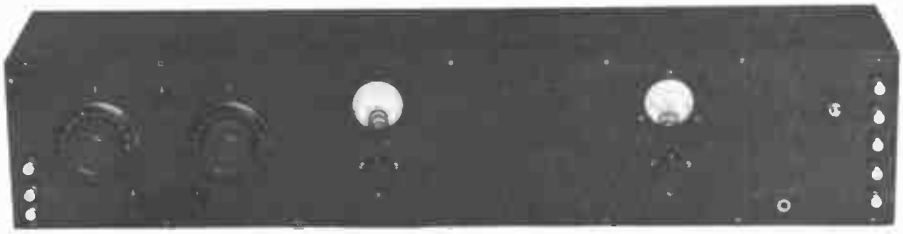


Radio News, (July 1923), p. 65

C July 1923 (E.I.S. plans) Norden-Hauck kit, July 1924, $108.15



MRR (1924), p. 62

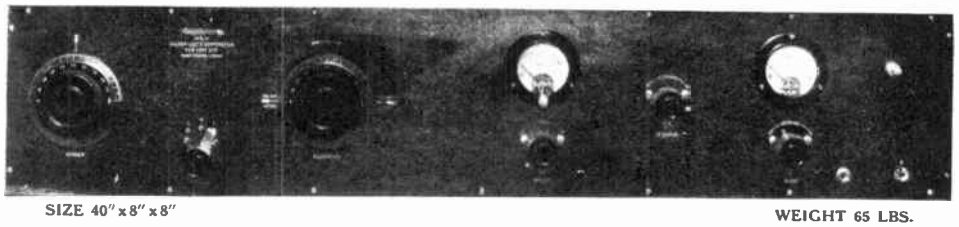


C-7 Sept. 1924 (E.I.S. plans) Norden-Hauck kit, $109.09

John Wolkonowicz

SUPER-PLIODYNE 9 ★

THE PERFECT BROADCAST RECEIVER



SIZE 40" x 8" x 8" WEIGHT 65 LBS.

MANUFACTURED UNDER FARRAND LICENSE

Super-Pliodyne 9

March 1924

$295 (as of Nov. 1925)

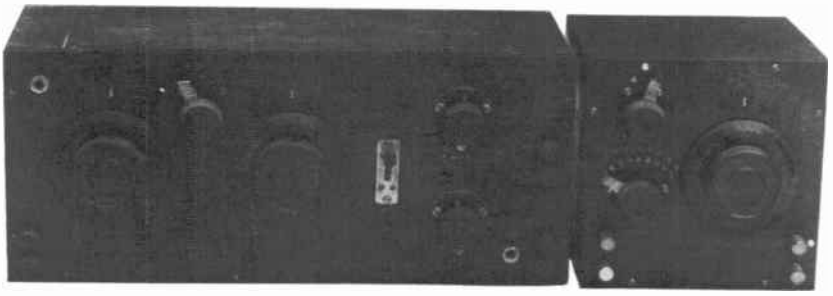
A New Broadcast Receiver having 5 stages of Tuned Neutralized Radio Frequency Amplification, Detector and 3 stages of Audio Frequency Amplification

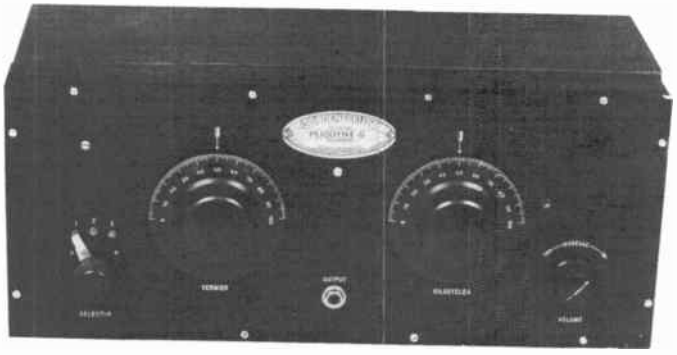
Built for People Who Want the Best

Complete Illustrated Catalogue and Instruction Book Mailed Upon Receipt of 25c

"J" RF amplifier & "K" antenna adapter (1924)

John Wolkonowicz

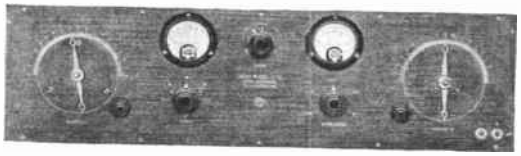




Pliodyne 6 Sept. 1924 $95 (later $60)

John Drake

The Highest Class Receiver in the World



Navy Model C-10 Super-Heterodyne

For any Circuit

Prompt shipment can be made on tested, standard apparatus of the following manufacture.

E. I. S., Inc.
General Radio
Willard
Benjamin Electric
Allen Cardwell
Dubilier *Formica*
Western Magnavox
Jewell Amer Tran
Western Electric
Radio Corporation
Music Master Acme
Cutler Hammer Frost
Federal Kellogg

Wavelength range 50-600 meters with removable Coils. Dimensions 28 in. x 8 in. x 8 in. Only two major tuning adjustments. Total amplification almost 2,000,000 times.

A high powered 10-tube Broadcast Receiver capable of receiving over 3,000 miles under favorable conditions, and having a degree of selectivity far in advance of others.

We believe the Navy Model C-10 represents final superiority over any receiver now being manufactured or even contemplated for broadcast reception.

Illustrated descriptive matter gladly mailed upon request. Write direct to

NORDEN-HAUCK, INC.
Engineers
1617 Chestnut St., Philadelphia, Pennsylvania

Popular Radio (Aug. 1925), p. 22

C-10 May 1925 Norden-Hauck C-10, August 1925

The New

NAVY MODEL
C-10 SUPER-HETERODYNE

Only 2 Main Tuning Adjustments for 10 Tubes

Panel Size Only 28 3/16" x 8"

A POWERFUL 10 TUBE BROADCAST RECEIVER

Total Amplification 1,500,000 Times
Wave Length Range 50 to 600 Meters

We believe this new design by Charles R. Leutz has a range and degree of selectivity far in advance of any receiver, and represents final superiority over any receiver now being manufactured, or even contemplated, for broadcast reception.

Descriptive Literature Mailed on Request

Experimenters Information Service, Inc.
476 Broadway
New York City, N. Y.

Designers of the Highest Class Radio Apparatus in the World

Experimenters Information Service, Inc.
476 Broadway, New York, N. Y.
Please forward literature on the New Navy Model C-10. No charge.

Name .....
Address .....
City State

Popular Radio (May 1925), p. 55

NOTICE

You are authoritatively advised that the manufacture of Super Heterodyne parts will be discontinued very shortly.

The remainder of material of this nature we now have on hand for the Model C-7, etc., is hereby offered for immediate sale at thirty per cent. (30%) discount. All parts are guaranteed to be genuine, new, and in original condition. Immediate shipments will be made.

We feel this is an extraordinary opportunity to obtain genuine E. I. S. parts for building the famous Model C-7 designed by the Experimenters Information Service.

A few parts for the Navy Model C-10, as well as some miscellaneous items, are offered at the following special prices:

	List Price	Special Price
Special C-10 Output Transformers	$6.00	$5.00
Triple Condenser for C-10, without gears or pointer	20.00	14.00
Heterodyne Shielded C-10 Condenser—no gears or pointer	6.00	5.00
Vernier Shielded C-10 Condenser	5.00	4.50
Premier No. 131 Closed Jacks	.95	.50
Special 750 Ohm C-10 Resisters, each	1.50	1.00
Gen. Radio 285 Audio Transformers	7.00	5.00
Premier No. 133 Open Jacks	.65	.45
5-wire Connecting Cable, colored, 5-ft.	1.00	.75
C-10 Panel Drilled and Engraved Black Formica, size 28 3/16 x8x1/4	19.50	17.00
Special Weston Voltmeter 0 7.5 V. 0/150 V. 2-scale, with special 5-point switch C-10 type	14.00	12.00
Weston 0 to 50 Millimeter No. 301	8.00	6.75
Model K Cabinet, Mahogany 8x8x7¾—open end	5.80	2.50
Model C Oscillator Couplers	6.00	1.50
Model C Panels 40x8x1/4, drilled and engraved	20.00	10.00
Model L Panels both halves, 2 panels drilled-engr.	36.40	20.00
Gen. Radio 214A Potentiometer 400 Ohm	3.00	2.00
Complete Set 38 Items Model C with meters	157.60	100.00
Complete Model J Parts, all items	71.90	50.00
Complete Model K Parts, all items	24.70	18.00
C7 Output Transformers	6.00	4.20
C7 Oscillator Couplers	6.00	4.20
C7 R. F. Transformers	8.50	5.95
Western Electric 21K Condensers	2.00	1.65
Gen. Radio ¾ Ohm 214A Rheostats for C-10	2.25	1.95
Complete Sangamo Pressly Kit	22.50	18.00
X Laboratory Condensers, dial, vernier .0005 MF	8.00	5.95
Blandin Triple A Mahogany Cabinet 18x7x7½ polished	12.00	9.00
Prest-O-Lite Storage Battery 6V 80 Amp.Hr. WHR 611	16.00	12.00
Manhattan Jr. Loud Speaker	10.00	6.50

As all orders must be accompanied by cash at these prices, you may further deduct 2 per cent. If you contemplate building a set for yourself or friends we earnestly solicit you to purchase at once, because, positively, no Super Heterodyne parts will be manufactured from now on.

Norden-Hauck, Inc.

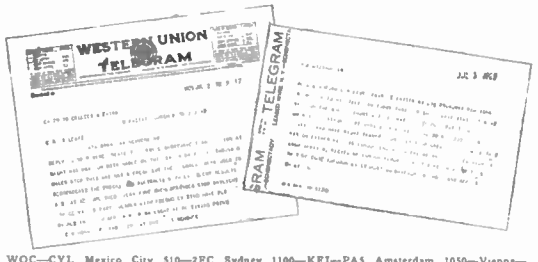
1617 Chestnut Street, Philadelphia

UNIVERSAL PLIO-6

The Only Set That Tunes All Wave Lengths.

35 to 3600 METERS

3AR Melbourne 480—WGY 109—2FL Sydney 770—WKAQ San Juan 360—2BL Sydney 350—PCFF Amsterdam 2000 Karachi—Bombay—KOP—WGY 1660—6KW Tunucu 340—Bankok—NSF Hilversum 1050—WLW—KDKA 64—KYW—3NO New Castle 400



WOC—CYL Mexico City 510—2FC Sydney 1100—KFI—PA5 Amsterdam 1050—Vienna—Colombo—WWJ—WCX Lakehurst 80—ICE Rome 470—5PY Plymouth 330—Voxhaus 430—CNRC Calgary 440—Madras—Stuttgart 437—BAV Brussels 1100—6FL Sheffield 303—WGY 38—PCGG Hague 1050—Otchiski—KGW—CFAC 430—CHXC Ottawa—EBX Cartagena—NAA 2500—PCMM Ymuiden 1050—SBR Brussels 262—KHJ—LOX Palermo 375—OXE Lyngby 2400—KOA—2SB Sydney—OKP Kbely 1150—2BE Belfast 435—KGO—YN Lyons 470—1 Nice 360—FL Eiffel Tower 2600—PTT Paris 450—5XX Chelmsford 1600—LZ Monte Grande 425—2LS Leeds 346—5MA Adelaide 850—2LO London 365—PWX Havana 400—RAS Vladivostok—WMBF—CJCM Mont Joli—LOR Buenos Aires 400—LP Berlin 2370—VTR Rangoon—3LO Melbourne 1720—6BM Bournemouth 385—5WA Cardiff 350—PRG Prague 1800—2ZY Manchester 375—HB2 Lausanne 850—JC Funabashi—JSB Chemulpo—3FL Melbourne 400—6VL Liverpool 318—HB1 Geneva 1100—KDKA 64—POZ Berlin 2800—2EH Edinburgh 325—5IT Birmingham 475—Munich 485—Leipzig 452—2BD Aberdeen 495.

THE NEW UNIVERSAL PLIO-6

Six tube, 2 Stages Non-Regenerative Tuned Radio Frequency Amplification, Detector and 3 Stages Distortionless Radio Amplification. Receiving range from 1,000 to 12,000 miles depending upon location, station transmitting, wave-length received and other variable factors.

FULL DETAILS NOW AVAILABLE FROM MANUFACTURERS

GOLDEN-LEUTZ INC.

476 BROADWAY :: NEW YORK CITY

Manufactured under Hogan Patent 1,814,002—Other Patents Pending CABLES "EXPERINFO" NEW YORK

Radio News (Oct. 1925), p. 490

C-7 PARTS ON HAND FOR IMMEDIATE SHIPMENT

Item	Quantity		Price
1	1	Cabinet, Genuine African Mahogany, Dark Piano Finish, Removable Base, Hinged Top size 40 x 8 x 7 3/4 inches outside, made of 1/2 inch stock	$ 18.00
2	1	Panel, Genuine Grade M Black Formica 40 x 8 x 1/4 inches, cut square and smooth	9.90
3	1	Drilling Panel to specifications	1.50
4	1	Engraving Panel to specifications	6.00
5	8	General Radio Type 138V Binding Posts	1.20
6	1	General Radio Type 247V Special Condenser	4.75
7	1	General Radio Type 247K Special Condenser	4.00
8	1	.000045MF Variable Vernier Condensers	1.50
9	1	Type C-7 Coupler as per specifications	6.00
10	1	Type C-7 Output Transformer as per specifications	6.00
11	2	EIS Model C-7 Rad. Fre. Transformers	17.00
12	2	General Radio 231A Audio Fre. Transformers	10.00
13	3	Everready No. 746 Bias Batteries	1.20
14	1	.005 MF Dubilier Type 601 Condensers	.75
15	2	.001 MF Dubilier Type 601 Condensers	.90
16	1	Open Circuit Jack	.65
17	1	2 Megohm Grid Leak	.50
18	1	.00025 MF Dubilier Type 601 Condenser	.35
19	1	Grid Leak Holder	.50
20	3	Western Electric 21K 1MF Condensers	6.00
21	7	General Radio Type 156 Sockets	7.00
22	60'	No. 12 Soft Drawn Tinned Copper Wire Round	1.20
23	60'	General Electric Insulating Tubing Black	3.60
24	1	C-H Filament Switch	.60
25	2	EIS 4 inch Dials with General Radio Knobs	3.00
26	1	Set Misc. Nuts and Screws	.25
27	1	Antenna Inductance as per Specifications	6.00
28	1	G. R. Rheostat 7 Ohm Type 214A	2.25
29	1	G. R. Rheostat 20 Ohm Type 214A	2.25
30	2	Verniers	3.00
31	1	.01 MF Dubilier Condenser	1.00
			$126.85

EXTRA IF DESIRED

32	1	Set of Jewell Meters, consisting of a two scale Voltmeter with five point switch, reads A Battery Voltage, Detector Filament Voltage, Amplifier filament voltage and B Battery Voltage and a single scale ammeter. Panel drilled for meters at no extra charge. Price per pair $21.50.	

E.I.S., Inc., carry large quantities of the above items in their dealer stock and can give very prompt shipments. We extend the privilege of cancelling orders if they are not shipped within 10 days after receipt of your order.

C.O.D. orders should be accompanied by a deposit of 25% of total amount. Individual items may be ordered if desired.

USE THIS SHEET FOR ORDER BLANK

Check off items wanted.

Ship to _____

_____

_____

Via Express

C-7 Items Marked Above ***Remittance Total***

Signed _____

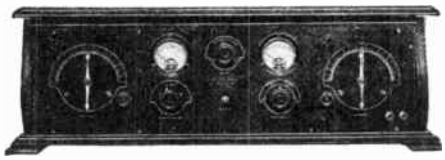
E. I. S., Inc., 476 Broadway, New York City

Plio-6 May 1925 $60 Robert Russell

Universal Plio-6 August 1925 $125 (June 1926)
10 models to $520
"Admiralty" or "Imperial" Plio-6, July 1926.

The Mystery Receiver

CHARLES LEUTZ'S LATEST EPIC



THE UNIVERSAL SUPER-8

LICENSED UNDER HOGAN PAT. 1,014,002

Tunes all Wavelengths from 35 Meters to 3600 Meters

The Universal Super 8, "The Mystery Receiver," is an improved design of the Universal Plio 6, but does not by any means supersede the Universal Plio 6, which is still continued and which is the leading broadcast receiver in its sphere. The Universal Super 8, however, is an advancement in that while it retains all the salient features of the Universal Plio 6, adds some new desirable features, making it the highest grade set possible to produce.

(1) Meters are provided to read the battery voltages.
(2) A special antenna coupling circuit is provided to reduce interference and static.
(3) Geared verniers are provided on the tuning controls
(4) Metallic shieldings provided at points deemed advisable.
(5) Seven tubes are used to give a lot greater volume and fine tone musical reproduction.
(6) All the important component parts are housed in a metal container, and factory sealed to prevent any damage and to prevent competitors from copying the new features.
(7) We believe it is impossible to trace the circuit and design by taking this receiver apart outside of our factory.

The exact function of the seven tubes of the Universal Super 8 is not revealed at this time as the manufacturers desire to keep all details a secret until full patent protection is afforded. Full operating instructions are supplied with each Universal Super 8, however. Patents are applied for covering some of the features of the Universal Super 8.

Either the old or the new type tubes are used in the Universal Super 8, and special provision is made for bias batteries, specified by some tube manufacturers.

Obviously this receiver will not be made on a large production scale, due to the time needed in building each one individually. Orders are now being taken on a custom-made basis as each set is laboratory tested in Long Island by an expert radio engineer to insure its perfection.

It is believed that the new design embodied in the Universal Super 8 gives the finest musical reproduction, tone, selectivity, audibility and maximum range that can be obtained by any receiver using seven tubes. Judging from the interest in our other multiple tube receivers, we believe the demand for this new design is going to tax our capacity the year around, and, as above stated, orders are now being taken in rotation. Prices quoted on application.

This receiver is not regenerative and is not a super-heterodyne.

WRITE OR WIRE

GOLDEN-LEUTZ INC.

VAMOS BUILDING

6th & Washington Sts., Long Island City, N. Y.

Cable *"Experrato"*

Radio News (March 1926), p. 1371

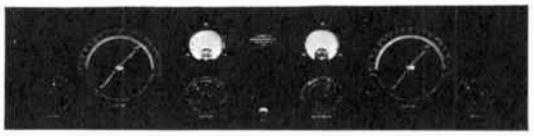
Universal Super-8 March 1926 $460 (June 1926)
4 models $350 to $610
"Admiralty" or "Imperial" Super-8, July 1926.

NORDEN-HAUCK, Inc.

A New and Advanced Model—

Norden-Hauck Super-10

Highest Class Receiver in the World



Panel Size: 36"x9"x11-4" Weight: 55 lbs.

THE NORDEN-HAUCK SUPER-10 is an entirely new and advanced design of Receiver, representing what we believe to be the finest expression of Modern Radio Research Engineering. It is the product of years of experience devoted exclusively to the attainment of an ideal Broadcast Receiver—regardless of cost.

Results obtained in every respect will upset all your previous ideas of good radio reception.

Here are only a few of the host of features that place the NORDEN-HAUCK SUPER-10 far in advance of competition:

—10 tubes employed to give perfect reproduction with unlimited range and volume power.
—Super selectivity on all wave lengths.
—Built to Navy Standards.
—Wide wave length range without change of coils, etc. (Adaptable 35 meters to 3600 meters if desired.)
—Use Loop or Antenna.
—Simple to operate, having only two major tuning controls.
—No Harmonics. Signals are received only at one point.
—Special Power Audio Amplifier, operating any loudspeaker and eliminates necessity of external amplifier.
—Can be operated directly from house current if used with NORDEN-HAUCK POWER UNIT AB-2.

The NORDEN-HAUCK SUPER-10 is available completely constructed and laboratory tested, or we shall be glad to supply the complete engineering data, construction blue prints, etc., for those desiring to build their own receiver.

Upon Request A complete catalog, attractively illustrated, will be gladly mailed without charge, or full size constructional blue prints, showing all electrical and mechanical data, will be promptly mailed postpaid upon receipt of $2.00

Write, Telegraph or Cable Direct to

NORDEN-HAUCK
Incorporated
ENGINEERS
MARINE BUILDING
Philadelphia, U. S. A.

TEAR OFF AND MAIL TODAY

NORDEN-HAUCK, Inc.
Philadelphia, U. S. A.

Gentlemen:—

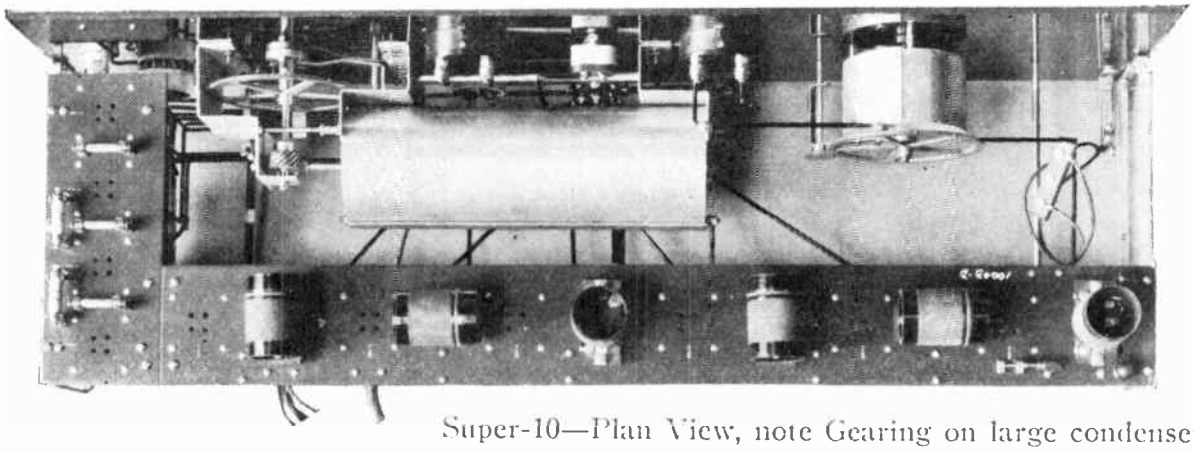
☐ Please send me without cost or obligation on my part, attractive illustrated literature describing the new Norden-Hauck Super-10.

☐ I enclose $2.00 for which please send me, postpaid, complete full size constructional drawings and all data for building the Super-10.

Name _____

Address _____

Radio News (June 1926), p. 1683



Modern Radio Reception (1928), p. 235

Super-10—Plan View, note Gearing on large condenser.

Super-10 (Norden-Hauck) June 1926. Technical articles in *Popular Radio*, Feb. 1927, p. 135; *Radio Engineering*, Oct. 1926, pp. 406-407; *Radio Listeners Guide and Call Book and Radio Review*, vol. 1, no. 11, Dec. 1926, pp. 105-107, 161.

Special Super-10 June 1927

Improved Super-10 Oct. 1927 $350 (later $195). Technical data in *Modern Radio Reception* (1928), pp. 232-236.

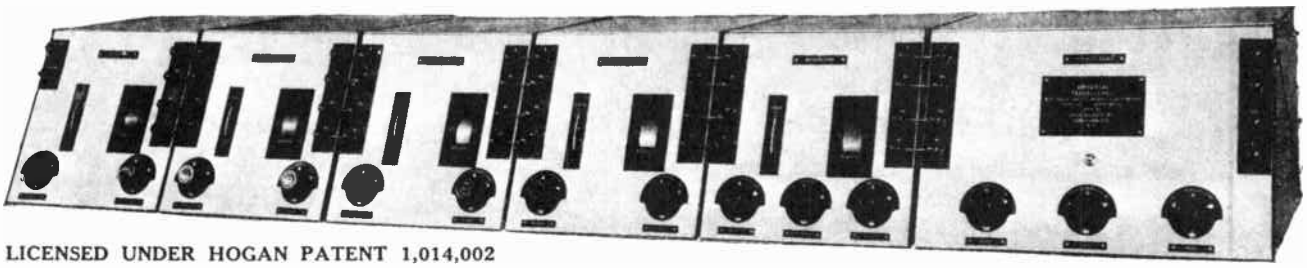
(not shown) Super Plio-9 June 1926 $295

"MOST POWERFUL IN THE WORLD"

Navy Model

UNIVERSAL TRANSOCEANIC

Design by
CHAS. R. LEUTZ



LICENSED UNDER HOGAN PATENT 1,014,002

Wavelength Range 35 Meters to 3600 Meters

Full details are given in our 88 Page Catalog Free.
Wire or write for your copy today.

MANUFACTURED BY

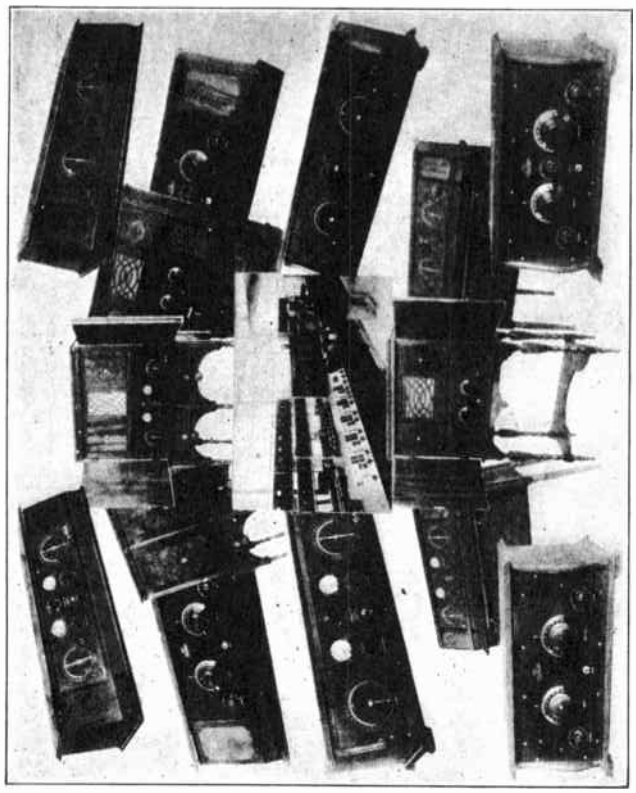
GOLDEN-LEUTZ, Inc., Sixth & Washington Aves., Long Island City, N. Y.

CABLE "EXPERINFO"

Radio News (June 1926), p. 1693

Universal Transoceanic June 1926 $990 (Sept. 1927, $650). Re-named "Silver Ghost" by Jan. 1927.

21 MODELS
100 Cabinet Styles



For 1926-1927 Golden-Leutz Present the Most Complete and Up-to-Date Radio Receiver Line Ever Manufactured

Outstanding Features:

Wavelength Range—35 to 3600 meters.
Designed for new UX200A Super-Sensitive detector tube.
Adaptable to UX112, UX171 or UX210 power tubes in last audio stage.
Power audio amplifier incorporated in every set.
All important parts manufactured in our own factory.
Special filter provided to eliminate "B" current from the loud speaker.
Voltmeter and switch to read "A", "B" and "C" voltages, 8 readings.
Milliammeter supplied to adjust bias voltages.
10 wire cable, separate "B" taps for radio, detector, audio and power audio.
Special antenna coupling circuit for extremely high selectivity.
Chassis type internal construction for rigidity and permanence.
Master workmanship and the finest parts used throughout.
Guaranteed for one year against defective material or workmanship.

88-PAGE CATALOG SENT ON REQUEST.

GOLDEN-LEUTZ, Inc.

Sixth and Washington Aves. Long Island City, N. Y.

Cables "Experinfo" New York

Radio News (Nov. 1926), p. 570

UNIVERSAL TRANSOCEANIC

A NEW COMPANION TO THE "SILVER GHOST"

TRANSOCEANIC "PHANTOM"

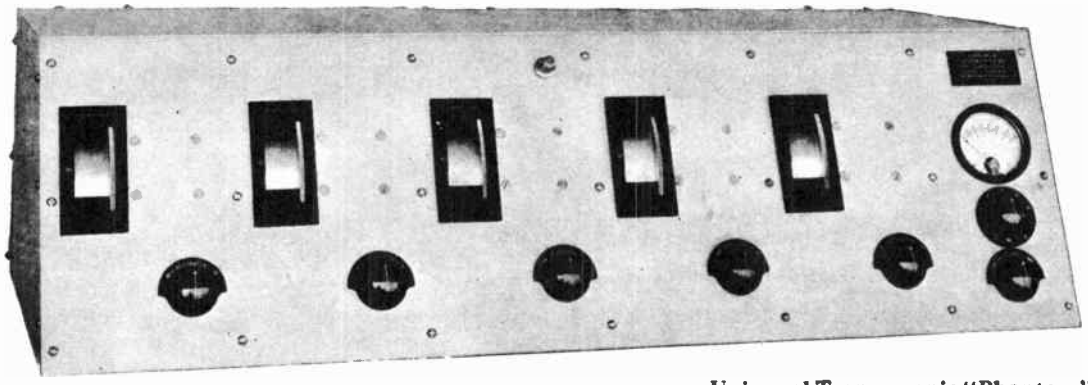
NINE TUBES--100% SHIELDING--TUNES 35 METERS to 3600 METERS

$250 (NO ACCESSORIES)

We are now ready to demonstrate that the Phantom Model has a far greater range, greater degree of selectivity, easiest means of operation, finest electrical design and construction and the best quality of musical reproduction as compared with any radio broadcast receiver in the world.

MOST POWERFUL IN THE WORLD

Phantom models are now in use on the U. S. S. Vaga and U. S. S. Utah



COMPARE THESE FEATURES WITH ANY RADIO

* INDICATES ORIGINAL GOLDEN-LEUTZ FEATURE AS APPLIED TO BROADCAST RECEIVERS, # EXCLUSIVE FEATURE

		Golden Leutz Progressive	Any Other Radio
1.	100% shielding — Interstage shielding — Complete external shielding against extraneous disturbances*-	√	
2.	Totally shielded for loss variable condensers to prevent interaction between condenser and transformer fields* # -	√	
3.	Complete shielding between stators (grid circuit) of multiple condensers*	√	
4.	Use of indicating Meters and special switch to read "A," "B" and "C" battery voltages*	√	
5.	Licensed under Hogan Patent 1,014,982 for single control (first licensee)*	√	
6.	Optional individual control or simultaneous control of all tuning controls*	√	
7.	Use of interchangeable tuned radio frequency transformers to tune all broadcast wavelengths in the world, viz, 35 to 3600 meters* #	√	
8.	A special filter circuit in the output to exclude detrimental plate current from the Loud Speaker	√	
9.	Use of Resistance Coupling in the Audio Amplifier, combined with impedance and transformer coupling for perfect reproduction* #	√	
10.	Adjustable Antennae Coupling to adapt set to all various types and sizes of broadcast antennae* #	√	
11.	Antennae Series Condenser for Extreme Selectivity in congested districts* #	√	
12.	Sealed Chassis to exclude moisture and dust* #	√	
13.	Last stage, power audio, adaptable to 201A, 112,171 or 210 tubes, 560 volts maximum capacity for great volume* #	√	
14.	Separate B Voltage Taps for Detector, Radio Amplifiers, Audio Amplifiers and Power Amplifiers*	√	
15.	Separate Bias Voltage Taps for Radio Amplifier, Audio Amplifiers and Power Amplifiers*	√	
16.	Power Audio Tube Filament arranged for heating by either battery or alternative current*	√	
17.	No rivets to corrode, all connections soldered in accordance with Navy Specifications*	√	
18.	Only piece of steel used is in condenser shafts, detrimental steel supports purposely omitted*	√	
19.	Metallized heavy current carrying, permanent value grid leaks and resistors	√	
20.	Direct Dial Vernier Adjustments	√	
21.	Indicating return upon which calibrations can be recorded for reference	√	
22.	All insulating material Genuine Bakelite include sub-panels and bases, uniform sockets	√	
23.	All Screws, Bolts and Nuts securely fastened by bronze lock washers* #	√	
24.	Most Compact Multiple Tube Sets made, 9 tube less than 2 cubic feet; 7 tube less than 1 cubic foot	√	
25.	Scientifically determined distance between transformers and shield, not detrimentally close* #	√	
26.	Volume Control device to regulate volume to any desired value without affecting quality	√	
27.	Can be used with "B" and "C" Eliminators, special Golden-Leutz Eliminator made to match	√	
28.	Practically all parts, except the meter and a few small parts, are manufactured in our factory	√	
29.	Each receiver tested at night and calibrated to a station at least 2000 miles distant	√	
30.	Designed by Charles R. Leutz*	√	

Universal Transoceanic "Phantom"

Item	Quan.	DESCRIPTION	Price
1	1	Universal Transoceanic "Phantom" Broadcast Receiver, 9 tubes, 4 tuned radio, detector, three audio and power audio amplifier. Including "A" Transformers for 200 to 560 meters tuning range. (No accessories included.)	$250.00
		EXTRAS	
2	1	Set selected tubes including detector and 210 power amplifier	25.50
3	1	Set "B" Transformers for tuning 80 to 210 meters	25.00
4	1	Set "C" Transformers for tuning 35 to 90 meters	25.00
5	1	Set "AA" Transformers for tuning 500 to 1500 meters	25.00
6	1	Set "BB" Transformers for tuning 1200 to 3600 meters	25.00
7	1	6 volt 120 A.H. Storage Battery	24.00
8	1	New Type Farrand Senior Loud Speaker, Cone Type	32.50
9	1	Golden-Leutz Special Current Supply for 110 volts 50/60 cycle A.C.	135.00
10	1	Antennae Equipment	4.00
		Total all accessories	$571.00
11	1	Complete Knocked down Kit of all Transoceanic "Phantom" Parts, ready for assembly including constructional drawings (no accessories). "A" Transformers for 200 to 560 meters included	$220.00
12	1	Complete set of Constructional Drawings and Operating Data for Transoceanic "Phantom" only	2.00

Special Quotation for Dry "B" Battery Operation Will Be Made on Request

GOLDEN-LEUTZ, Inc.

"Manufacturers of the Highest Class Radio Apparatus in the World"

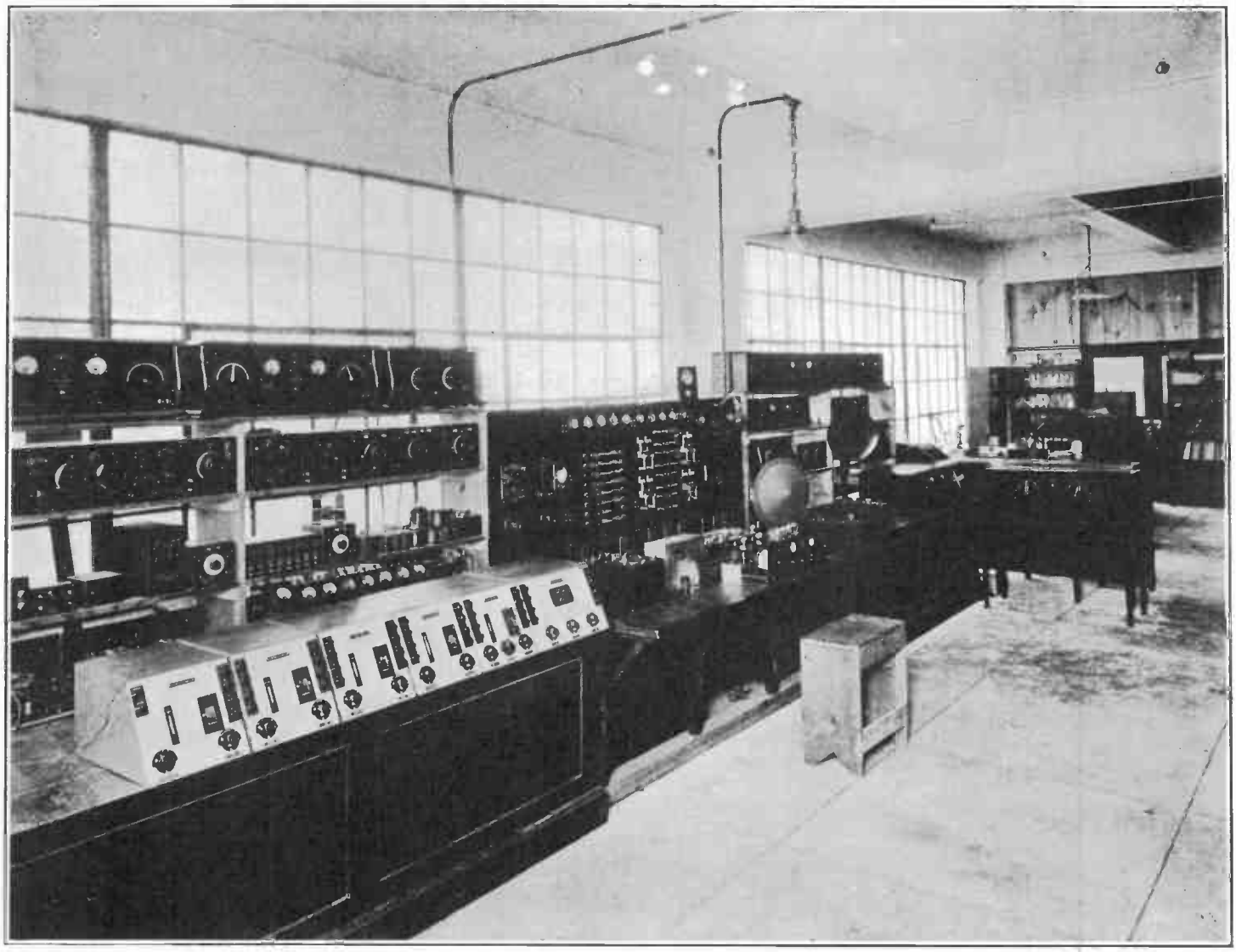
MAIN OFFICE AND WORKS:

SIXTH and WASHINGTON AVENUES, LONG ISLAND CITY, NEW YORK, U. S. A.

Cables: "Experinfo" New York—All Codes

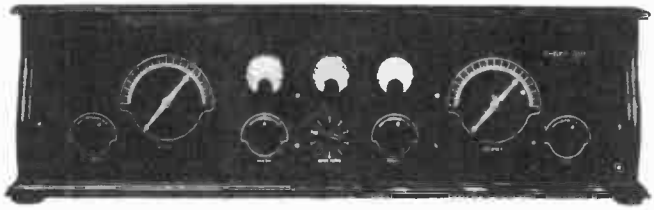
DEALERS OR JOBBERS WIRE ORDER FOR SAMPLE TODAY. CUSTOMERS MAY ORDER DIRECT IF DESIRED.

Universal Transoceanic Phantom Jan. 1927 $250 ($150, July 1927. $200, August 1928)
Technical articles in *Radio Listener's Guide and Call Book and Radio Review*, vol. 1 no. 12, March 1927, pp. 128-129, 156; vol. 2 no. 1, June 1927, pp. 79-84, 138; *Radio News*, July 1927, p. 19.
Also made as a 7-tube model with 2 RF stages, $220 ($150, Sept. 1927).
Universal Transoceanic (222 tubes) July 1928 $250.



FIVE TYPE UX222 SCREEN GRID TUBES ARE USED IN THIS ULTRA-POWERFUL BROADCAST RECEIVER, INCREASING the RADIO FREQUENCY AMPLIFICATION and SENSITIVITY OVER 500 TIMES

Front Panel View
NEW ADMIRALTY MODEL
with complete set of indicating meters. Panel size 9 x 26 x 14 inches. Weight 42 lbs.



Licensed under Hogan Patent No. 1,011,092

The New Norden-Hauck SHIELDED SUPER-10

Highest Class Receiver in the World

The New NORDEN-HAUCK SHIELDED SUPER-10 is fundamentally different, being specially designed for crowded broadcast conditions. It is a long distance concert Receiver which marks radio's final arrival at the goal of the connoisseur of performance.

Far away stations are received like locals, using only a small loop or short piece of wire for the antenna. Distance possibilities seem unlimited with this new model. Usual background noises are conspicuously absent, and an extraordinary quality of reproduction is obtained with the improved audio amplifier in the Shielded Super-10.

Smashing power with complete fidelity makes previous standards of reception pale into insignificance. There is simply nothing like it. This great 10-tube Model is so far in advance of others that its absolute superiority is instantly apparent to anyone.

Standard Shielded Super-10 Front Panel view. This model is identical with the Admiralty model except for the indicating meters. However, it is equipped for the Weston Pin jack Voltmeter.

Some Exclusive Features

1. Ten tubes. A combination of Screen Grid and Power Tubes arranged for maximum efficiency.
2. Totally shielded in accordance with latest research data. Various circuits are completely isolated.
3. Selectivity remarkable—Tones completely through local broadcasters.
4. Either A. C. electric operation or batteries may be used as desired.
5. Simple to operate—only two main tuning controls.
6. An entirely new audio amplifier, with two power tubes handling the output.
7. Provision made for electric phonograph pickup.
8. A precision laboratory instrument. Material and workmanship conform to U. S. Navy Standards.
9. Moderately priced. Deferred terms of payment can be arranged if desired.
10. Beautiful new, and less expensive console cabinets are available.

The design and development of the Shielded Super-10 is a crowning achievement which has been made possible by the revolutionary "screen grid" tubes. It will be several years before any AC tube is developed that will even approach the efficiency of the "screen grid" tube as a radio frequency amplifier. This new tube raises the amplification factor thirty to forty times over that secured with the conventional 201-A tube.

Everyone can have this wonderful Receiving Set, for it is sold as a complete manufactured laboratory tested Receiver and also in a kit of parts for home construction, or for the professional set builder and dealer.

The full size genuine blue prints and instructions are so complete in every detail, that it is exceedingly easy for anyone to build the Shielded Super-10. Almost everything is done for you to simplify this work.

Learn more about this remarkable Receiver. Send for attractively illustrated literature on the new NORDEN-HAUCK SHIELDED SUPER-10, which will be gladly sent to you without cost or obligation on your part.

Fill out and mail this coupon.

NORDEN-HAUCK, Inc.,
Marine Bldg., Phila., Pa.
Gentlemen:

☐ Without cost or obligation on my part kindly send me complete attractively illustrated literature on the new Norden-Hauck Shielded Super-10.

☐ I enclose $5.00 for which kindly send me immediately, Postpaid, complete constructional Blue Prints and operation instructions for the new Norden-Hauck Shielded Super-10.

NAME .....

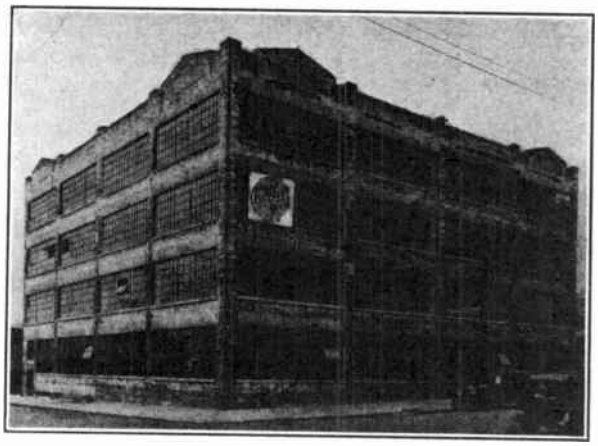
ADDRESS .....

NORDEN-HAUCK, Inc., *Engineers*
Marine Bldg., Delaware Ave. and South Street, Philadelphia, Pa., U. S. A.

Builders of the Highest Class Radio Apparatus in the World
Cables: "NORHAUCK"

Radio News (April 1928), p. 1153

Shielded Super-10
April 1928



1928 catalog

Radio News (Nov. 1928), p. 495

Electrophonic (Norden-Hauck)
Sept 1928 $125
(not shown) P-6 August 1928 $80

THE NEW

Seven Seas Console

FIRST WITH A/C SHIELD GRID TUBES

Features:

A/C Operation
Single Dial
Dynamic Speaker
Push-Pull Audio
2/210 Power Tubes
100% Shielding
Adjustable Selectivity
Shield Grid Tubes
Heater Type Tubes
Unit Construction
9 Tubes
Maximum Range
Tremendous Volume
Perfect Reproduction
Walnut Console

Once again LEUTZ *leads, introducing the first A/C Console to use the superior A/C Shield Grid Tubes. The result, a superior Console which will meet all competition.*
Franchise applications are invited from established dealers.

Literature on Request

C. R. LEUTZ, INC.
Long Island City New York, U. S. A.
Cables: "Experinfo" - - New York

Radio News (April 1929), p. 971

Seven Seas April 1929
Short technical article in *Radio*, July 1929, p. 59

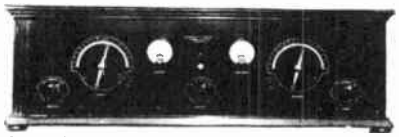
New Admiralty Super-10

A Brand New Receiver for the Radio Connoisseur

THIS new Admiralty Super-10 is the very apex of Modern Radio Research Engineering. We believe it represents final superiority over any Receiver now being manufactured or even contemplated for broadcast reception. Strictly Custom-Built, this great new Model meets fully the requirements of those who want the best. It is in *fact* The Highest Class Receiver in the World.

EXCEPTIONAL FEATURES

10 Radio Tubes—Super Power—Extremely selective—Simplified operation—5 Screen Grid Tubes in R. F. Amplifier—Audio output 250 Tubes in Push Pull—Entirely self contained electric operation—Universal wavelength range for use in any part of the world—A precision scientific instrument—Material and workmanship conform strictly to U. S. Navy Standards—Exquisite cabinet work—Thorough air test by Receiving Engineers—Sold direct from factory and through selected dealers in the principal cities of the United States and foreign countries—Warranted against any defects.



Attractive illustrated descriptive literature on request. Write, telegraph or cable today

NORDEN-HAUCK, INC., Engineers
MARINE BUILDING
DELAWARE AVENUE AND SOUTH STREET
Philadelphia, Pa., U. S. A. Cable: NORHAUCK

National Geographic Magazine (Sept. 1929)

MAGNAVOX

The Magnavox Company

The Magnavox story began in 1910 when Peter L. Jensen was brought over from Denmark by Cyril Elwell to operate his imported Poulsen arcs for what became the Federal Telegraph Company. In the fall of 1910, Jensen and engineer Edwin S. Pridham resigned their positions and, with the financial backing of Richard O'Connor, formed the Commercial Wireless & Development Company at Napa, California, to perfect a more sensitive telephone receiver. Before amplifiers were available, this was the only way to increase communication range, other than raising the transmitted power. Pridham and Jensen succeeded by using powerful electromagnets, but of course this made the unit so heavy that it had to rest on a table with rubber tubes leading to the ears. Wireless companies were not enthusiastic about such a cumbersome device.

By chance, in May, 1915, Pridham and Jensen discovered that if a phonograph horn were attached to their receiver, it made a rather good loudspeaker. Jensen later recalled (*Radio & TV News*, February 1959) that its first use was to amplify the voice of "Fog-Horn" Murphy at the local baseball park. Naming it the Magna Vox (Latin for "great voice"), they gave it a number of public demonstrations over the next few years. They developed a phonograph pickup, and since Sonora was the only such company interested in using it, its western distributorship merged with the Commercial Wireless & Development Company in August, 1917, to form the Magnavox Company. Frank M. Steers of Sonora became president.

As the Napa lab was close to the Mare Island Naval Shipyard, this work attracted the attention of Lt. Commander George C. Sweet, in charge of radio there. He persuaded Pridham and Jensen to apply their loudspeaker to aircraft intercoms, an attempt which led to the development of the SE4005 noise-cancelling microphone. Sweet is said by one account to have introduced Pridham and Jensen to Steers and, thus, to have been directly responsible for the formation of Magnavox.*

Business was good during the war; Pridham and Jensen's noise-cancelling microphone and moving-coil receiver were used in telephone systems on 250 Navy and 1000 merchant-marine vessels. In 1919, Magnavox moved from 526 Mission Street in San Francisco to 14th Street in Oakland and began making vacuum-tube power amplifiers. Herbert E. Metcalf, formerly a lieutenant in the Air Service, joined the company in 1920 as publicity director, and later became western sales manager. In February, 1920, the company introduced a radio speaker, forerunner of the 1921 Model R-3. Its production was 20 per day with 50 employees in early 1922, 750 per day with 700 employees in June, then back down to 100 per day with 120 employees by the end of the year. In spite of this cyclical demand, Magnovox made a great deal of money in 1922 and 1923; even after spending $400,000 for advertising in 1923, and paying out about $255,000 in stock dividends (20 ¢ per share regular; 15 ¢ extra), it had accumulated a $933,801 surplus by December.

The Magnavox people must have felt that the world was their oyster. If loudspeakers, why not also radio sets and tubes? Engineer Metcalf went to work on a tube, developing one with a planar "grid" by August, 1924. Anyone could make diode tubes because the Fleming patent had expired, but when Magnavox tried to market this "A" tube as a two-element design, RCA "chased it back to California" to await the expiration of de Forest's grid patent on February 15, 1925. Metcalf published a design article in *QST* in March, but now there was no need for the peculiar form, especially as it was prone to shorts and misalignment of elements. Later, Magnavox changed to a conventional design which remained in production for several years. By mid-1926, over 200,000 were said to have been made.

Pridham and Jensen tackled the receiver problem, coming up with a TRF design using flat variometers for tuning, linked to one dial. This was perhaps the first single-dial radio made, but it's all a matter of definitions. Thermiodyne had similarly linked its tuning capacitors to one dial some months earlier. Thermiodyne had a formidable array of trimmer controls spread across the panel while Magnavox hid theirs inside the cabinet, but since they had to be constantly adjusted (so we are told in a *Radio Guide* test in April, 1925), it hardly mattered where they were. Mohawk, on the other hand, had no user-adjustable trimmers at all, so it was a true single-dial set.

At any rate, the Magnavox set was a good one. However, according to Pridham's 1947 recollections,

"It was a wonderful set but had one serious defect — it used Magnavox tubes. . . .After losing about one million dollars on a business we knew little about, we dropped out

Financial data on page 260

Richard O'Connor (1855-1925) was the principal backer of the Commercial Wireless and Development Company incorporated March 1, 1911. Mr. O'Connor was a leader in Civic and Political affairs in the San Francisco Bay area. His vocation was that of an investor. His faith in Pridham and Jensen continued with his sponsorship through experiments and innovations, which were unique, but provided no commercial rewards. During the first week of May 1915 in Napa, California, their dynamic principle produced sound amplification. The loudspeaker was born. Mr. O'Connor was president from 1911 until 1917. He remained on the board of directors until 1925. His son, Richard A. O'Connor, became president in 1929.

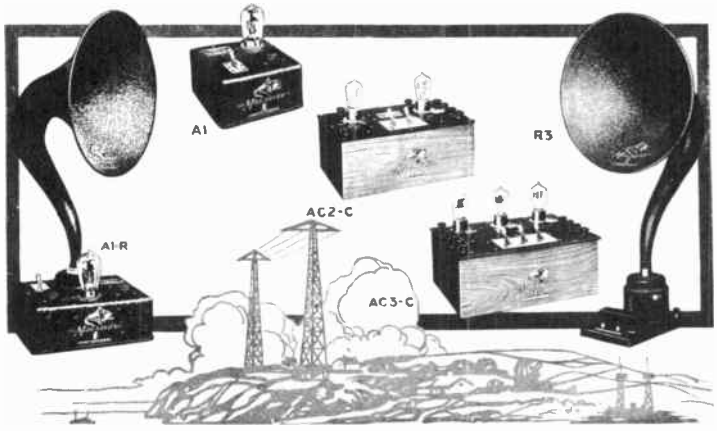
Edwin S. Pridham (1881-1963) was born in Downers Grove, Illinois and had mastered Morse code at nine years of age. He investigated electrical apparatus throughout his youth and graduated from Stanford University in 1909 with a degree in physics. A Stanford professor and Pridham had experimented successfully with a small Poulsen Arc Transmitter. The American Poulsen Company, newly formed in 1910, hired Pridham to assist in the installation of two California stations. It was there he met and worked with Jensen.

. . .I was asked by the Board of Directors to make a personal check on the Magnavox tube. I did this and reported that of all the hundreds of tubes tested, not one lasted over five hours, continuous burning. The Board of Directors ordered an immediate shutdown of the tube division."

Magnavox gave up its New York office and warehouse in June, 1925, finding it too costly to ship sets there for eastern distribution but still the company lost money in 1925 and 1926 — so much that it did not even report the figures in 1926. To replace its 1924-25 model, which proved expensive to make, Magnavox kept the same circuit, but changed the tuning elements to variable capacitors on one shaft aligned fore-and-aft, just as Mohawk had done. But apparently there were troubles getting the set into production, as it was not advertised at all in 1925, nor exhibited at the Chicago Radio Show in November, though it was said to be selling well there in February 1926. Essentially the same model was advertised nationally in late 1926 before Magnavox threw in the towel, abandoning radio sets in mid- 1927 in favor of dynamic speakers. This on-again, off-again sales policy, and the financial troubles, were a reflection of internal management problems.

Eventually Pridham and Jensen's patents on dynamic speakers won a sizable share of the loudspeaker market for Magnavox, but to fully capitalize on it, a location closer then Oakland was necessary: in 1928, $180,000 was wasted in freight charges. Magnavox opened a final-assembly plant in Chiago, but it wasn't enough. In February, 1930, the company was entirely reorganized. O'Connor's son Richard A. O'Connor became president (Jensen had left to found his own speaker-manufacturing company about March, 1928, working under Magnavox license). The Magnavox Company Limited moved to the old Steinite plant in Ft. Wayne, Indiana, about June, 1930, closing the Oakland and Chicago plants. Also moved to Bueter Road was the Mershon electrolytic-capacitor division of Amrad, bought from Crosley. Magnavox became a part of North American Philips in 1981.

* Haraden Pratt, quoted in Lillian C. White, *Pioneer and Patriot, George Cook Sweet* (Southern Publishing Company, 1963) pp. 73-74. Pratt's papers are in the Bancroft Library, University of California, Berkeley.



New Magnavox Combination Set

A2-R insures convenient and perfect Radio reproduction. Consists of Magnavox Reproducer and 2-stage Magnavox Power Amplifier, as illustrated.

Radio takes another step forward with these wonderful new Magnavox devices

THE new Magnavox models here shown extend and supplement the already famous Magnavox line of Reproducers and Power Amplifiers. There is a Magnavox for every receiving set.

Magnavox Reproducers

R2 with 18-inch curvex horn in new acoustic finish . . . $60.00

R3 with 14-inch curvex horn in new acoustic finish . . . 35.00

M1 new Magnavox Reproducer requires no battery for the field, thus meeting requirements of dry battery receiving sets. Equipped with binding posts and a five foot flexible cord. With 14 inch curvex horn in new acoustic finish 35.00

Magnavox Combination Sets

A1-R consisting of Magnavox electro-dynamic Reproducer with 14-inch horn and 1-stage Magnavox Power Amplifier 59.00

A2-R consisting of Magnavox electro-dynamic Reproducer with 18-inch horn and 2-stage Magnavox Power Amplifier 95.00

Special with 14-inch curvex horn, ... $85.00

Magnavox Power Amplifiers

A1 meets the demand for a 1 stage Power Amplifier. Special finish metal case. . 27.50

AC 2-C Magnavox 2 stage Power Amplifier with Bakelite panel in highly finished hardwood case. . 55.00

AC 3 C Magnavox 3-stage Power Amplifier 75.00

Ask your dealer for a demonstration. Interesting booklet will be sent on request

The Magnavox Company
OAKLAND, CALIFORNIA
370 Seventh Avenue, New York

World pioneers in the development and manufacture of sound amplifying apparatus

MAGNAVOX PRODUCTS

Magnavox Reproducers and Amplifiers

Billy Malone/Magnavox

Edwin S. Pridham (left) and
Peter L. Jensen in Napa, California,
with their invention—(May 1915)—the loudspeaker.

F. M. STEERS
President, Magnavox Company

Radio Guide (April 1925)

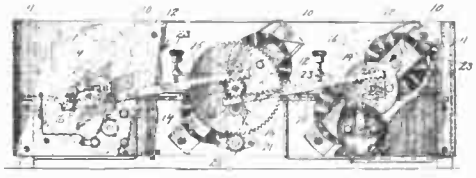
R. A. O'Connor

Talking Machine Journal (March 1929)

Cone speaker assembly

Billy Malone/Magnavox

1,603,494. RADIO RECEIVING APPARATUS. EDWIN S. PRIDHAM and PETER L. JENSEN, Oakland, Calif., assignors to The Magnavox Company, San Francisco, Calif., a Corporation of Arizona. Filed Nov. 8, 1924. Serial No. 748,567. 2 Claims. (Cl. 250—40.)



1. In a radio receiving apparatus employing tuned radio frequency, a variometer for the antenna circuit and a variometer for each of the two radio frequency amplifying circuits, a panel on which said variometers are arranged, a pinion on the shaft of each rotor of said variometers, a pair of toothed racks meshing with the pinion on the rotor of the intermediate variometer, said racks extending in opposite directions and meshing with the pinions of the variometers at either side, in such manner as to cause opposite movement of the rotors at the side with respect to the rotor of the intermediate variometer.

Robert Lozier/Magnavox

Peter L. Jensen (1886-1961) was born on the Island of Falster in the Baltic Sea. Despite the unavailability of technical education, his schoolastic training and natural abilities led to an apprenticeship with the Danish inventor, Valdimar Poulsen in 1902. By the year 1909, Jensen was an engineer and assistant to Poulsen, who subsequently sent him to the U.S. to help install transmitting stations in Sacramento and Stockton California. It was during these projects that he met and become close friends with Edwin Pridham in 1910.

Toroidal coil assembly

Chassis assembly

Bring Customers To *Your* Store With MAGNAVOX Newspaper Advertising

YOU will never know how much Magnavox Radio equipment you can place in your community—or how large your net profit per sale can be—until you have made a thorough use of the local newspaper advertising columns.

We have prepared a complete series of newspaper advertisements in various sizes, mats or electros of which are supplied Registered Dealers free on request.

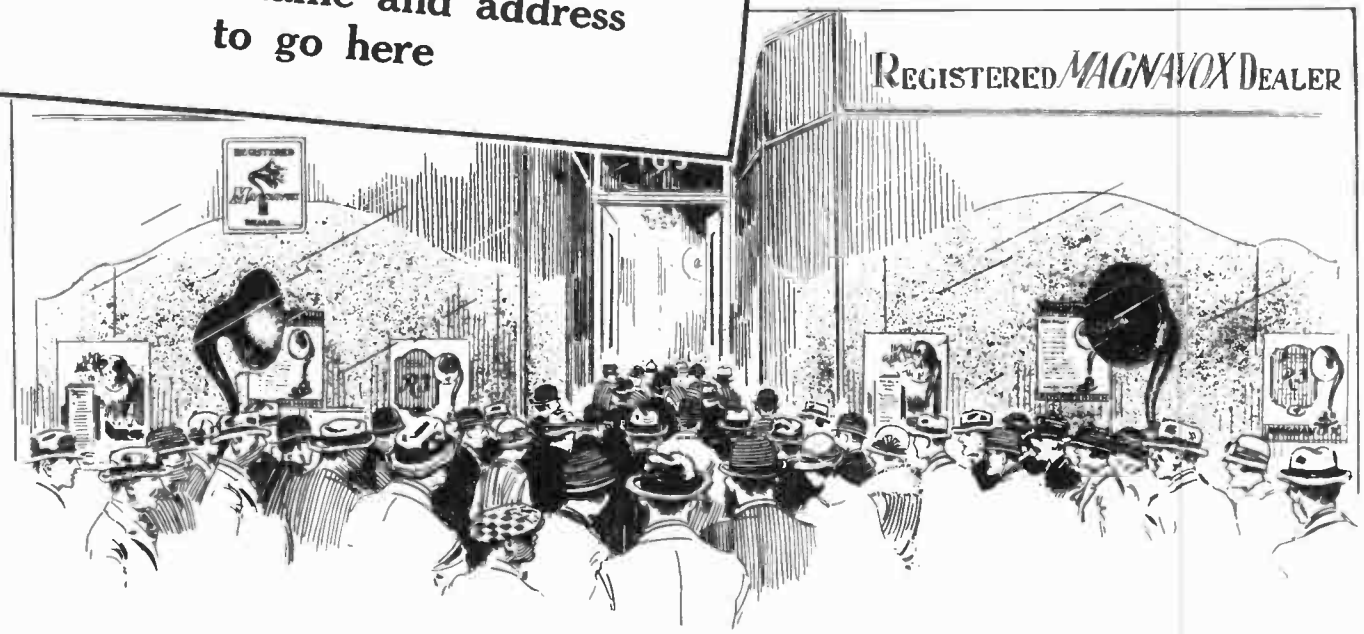
The size we particularly recommend is 100 lines on two columns (total of 200 lines), a sample of which is illustrated at the left.

Write for sheet of Magnavox advertisements and let us know what mats or electros to send.

Sales Promotion Department

The Magnavox Company

***New York*: 350 West 31st Street**



Saturday Evening Post (Nov. 8, 1924), p. 191

TRF 5 Sept. 1924 $125
TRF 50 Sept. 1925 $150
Technical article in *NY Evening World*, Oct. 4, 1924, p. 3.

The New

Simple, Sensitive, Selective
The Magnavox Single Dial

MAGNAVOX 75
Five tube tuned radio frequency set. Built-in Magnavox Loud Speakers encloses all batteries. Artistic mahogany cabinet, hand rubbed finish. Price, without tubes or batteries, **$200**

MAGNAVOX JUNIOR
Same circuit as Magnavox 75, but not removable from cabinet. A compact, portable set. Price **$85**

Last year Magnavox introduced the single dial control to the Radio world.

This year the Magnavox single dial is perfected.

Simple, of course,—a flick of the fingers makes you master of the air—

Sensitive—Factory tuned with the Magnavox tuning meter, 1000 times more sensitive than the human ear. No multiple dial control can equal it for fine tuning—no human fingers can adjust a series of dials to the exact unison of the Magnavox circuits which are *forever* in perfect resonance.

Selective—If you know the wave length of a station, turn your Magnavox dial to that length—and there it is. The New Magnavox tunes through the big, powerful stations when right under them—the New Magnavox circuit and the Torodial R. F. transformers do the trick.

Small Selling Cost—And for demonstrations—the Magnavox single dial tuning will enable your prospects to do their own demonstrating and each one of your salesmen to make three and four times as many house demonstrations as ever he did before—and so treble and quadruple his sales.

The New Magnavox is a set you can *sell* with utmost confidence, knowing that any amateur, a child, a woman, can operate it with complete satisfaction.

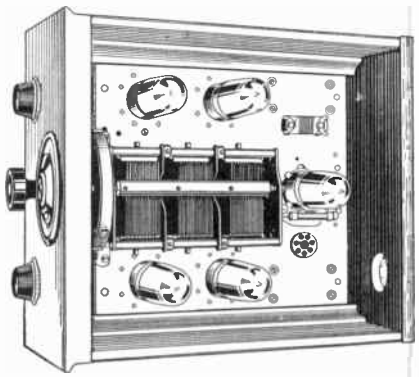
MAGNAVOX 25
Table model, Magnavox Built-in Loud Speaker, enclosing B batteries, engraved dial panel. Price, without tubes or batteries, **$145**

MAGNAVOX 10
Table model, allowing enclosure of B batteries, operating with external loud speaker. Artistic cabinet finish. Price, without tubes, batteries or loud speaker, **$110**

MAGNAVOX

The most advanced feature in Radio

The Magnavox Receiver Units



MAGNAVOX M-20
Cabinet Loud Speaker Especially adapted for use with Magnavox Model 10 Radio Receiving Set. Price of the M-20 Cabinet Model including cord and plug is **$25**

NEW MAGNAVOX
Anti-Noise Tube
The Magnavox Anti-Noise Tube with bakelite base fits every standard base and is used either as a detector tube or an amplifying tube. Price **$2.50**

Here is the greatest advance in Radio development yet achieved—All Magnavox Receiver Units on all Magnavox models except the Junior are interchangeable. Figure out what that means to you in making service easy. Service! Why, service with Magnavox is instant, complete, everything it should be. A new Unit slipped into place—the old Unit fixed up at leisure.

Then think of this—

No Magnavox set can ever become obsolete—If, through constant research we can better the Magnavox circuit next year, a change in Units only is all your customers will need to bring their Magnavox right up to date.

This advertisement has listed but two of the many outstanding features of the New Magnavox—the set which will make radio history this year.

Backed by powerful, consistent, large space advertising and a unique dealer policy, those fortunate enough to secure a Magnavox franchise will undoubtedly make the coming season the most profitable in their history.

Write, or better still, wire at once for particulars.

THE MAGNAVOX COMPANY

1315 So. Michigan Ave., Chicago Oakland, Calif. 130 West 42nd St., New York

MAGNAVOX M-1
Loud Speaker
Magnavox Loud Speakers combine all factors essential to perfect reproduction. The M-1 has a 15 inch bell. Price **$25**

10, 25, 75 first advertised August 1925

New England Wireless & Steam Museum

Junior

Radio World (June 13, 1925), p. 17

WHY warm one's hands over the hot roof on a Summer afternoon? No reason for it, so this pair avoids such foolishness and instead sensibly drops new, good (not no good) radio tubes. Kerplunk! The tubes—a new type—are unbreakable. Herbert H. Metcalfe and Elsie Glassen demonstrating.

For this Christmas • and those that follow—the enduring type of radio

MAGNAVOX
SINGLE DIAL Radio

Saturday Evening Post (Dec. 11, 1926), p. 200

NO other radio gives more positive assurance of enduring style and value than *Magnavox*.

First, the single dial feature. The swing to this type of radio is growing apace but *Magnavox* remains the perfected and proved set.

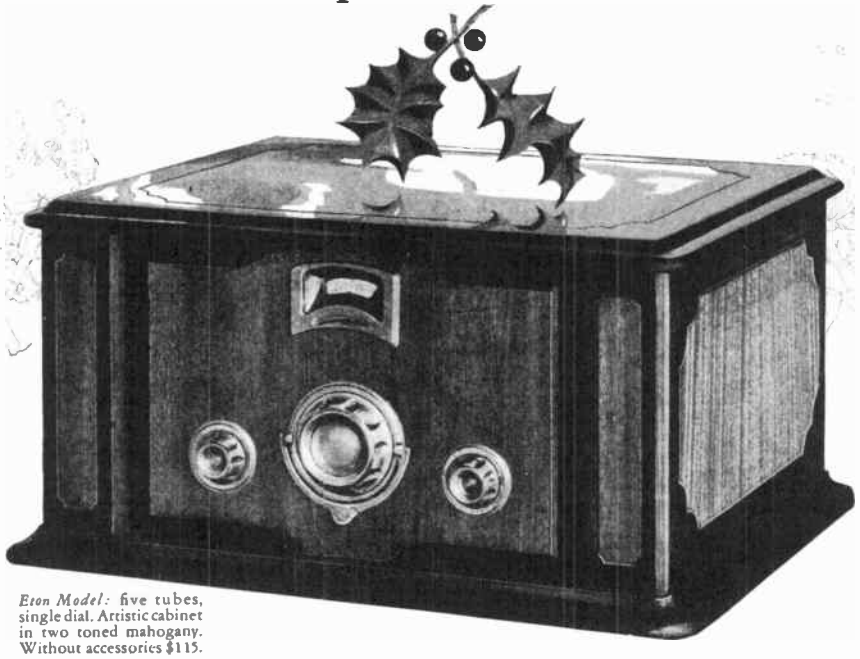
Next, appearance. You know that many of today's sets, with numerous exposed dials, switches and panels, are out of place in a well appointed room. They were endurable when radio was a novelty, but few women will want to harbor them long. Notice the dignified beauty of *Magnavox* sets—the absence of "switchboard" characteristics, made possible by *Magnavox* single dial.

Magnavox assures the safety of your investment and the pleasure of your entertainment. *Magnavox* is a revelation of power, clarity, selectivity—all obtained at the turn of a single dial, with tedious tuning eliminated.

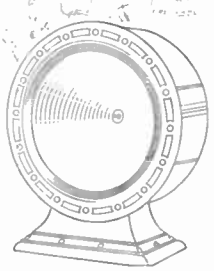
Magnavox—creators of the original loud speaker and with a background of fifteen years in radio development—offers choice of models ranging from $260 to $75, including one that converts your phonograph into a radio-phonograph. Sold on easy terms. Let the *Magnavox* dealer demonstrate. If you don't know him, write us for full information.

THE MAGNAVOX COMPANY • *Oakland, Calif.*
R. S. Williams & Sons, Ltd., Toronto, Distributors for Canada [not including British Columbia] • 54 © 1926

Christmas spirit is in the air!



Eton Model: five tubes, single dial. Artistic cabinet in two toned mahogany. Without accessories $115.

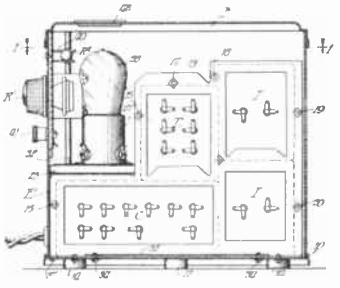


Magnavox Cone Speaker, Cornell model, covers entire tonal scale. Artistic finish, 7" cone. $22.50.

FIFTEENTH ANNIVERSARY OF MAGNAVOX PROGRESS IN RADIO

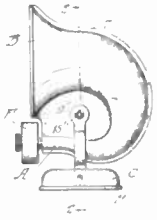
Technical article in *Radio News*, Jan. 1927, p. 793
Not shown: Piedmont with speaker, $175; Berkeley console, $260.
Eton shown as model T in April, 1927.

1,768,471. BATTERY SUBSTITUTE. William C. Grunow, Chicago, Ill., assignor to Grigsby-Grunow Company, Chicago, Ill., a Corporation of Illinois. Filed Oct. 6, 1926. Serial No. 139,789. 3 Claims. (Cl. 250—27.)



1. In a current supply device of the character described, a suitable base, a plurality of condenser and coil elements suitably enclosed as individual units, and a frame work for holding said units upon said base and including means for independently removably securing the units thereby, said frame including two vertically disposed side walls between which said units are clamped, one of said side walls being readily removable to permit ready removal of any of said units.

1,800,709. HORN FOR LOUD SPEAKERS. August J. Wiegand, Chicago, Ill., assignor to Grigsby-Grunow Company, Chicago, Ill., a Corporation of Illinois. Filed Aug. 1, 1925. Serial No. 47,446. 6 Claims. (Cl. 181—27.)



1. A horn for loud speakers and the like having a neck and continuing bell portion comprising two like but oppositely formed halves of suitable moldable plastic sheet material provided with abutting edges on the median plane for fastening the two halves together to form a single unitary structure, the flanges between the neck and bell being extended to provide a web of double thickness.

Radio Dealer (July 1926), p. 120

"YES!" *says*

B. J. GRIGSBY

President, Grigsby Grunow Company, Chicago

Radio Retailing (June 1929), p. 76B

Radio Dealer (Oct. 1925), p. 189

W. C. Grunow

Radio-Music-Merchant (Feb. 1931), p. 80

MAJESTIC

Grigsby-Grunow Company

"Meteoric" is the word to describe Majestic: a sudden appearance from nowhere, a blaze of glory, then . . . .

Bertram J. Grigsby, born in 1884, left the University of Chicago before graduation to become the English representative of the Benjamin Electric company. Returning to Chicago at the end of World War I, he advanced to Vice President and General Manager of Anderson Electric Specialty Company. William G. Grunow, raised on Chicago's West Side and an Army captain in 1918-1919, joined the company as an accountant. They joined forces and incorporated the Grigsby-Grunow-Hinds Company on November 16, 1921. Hinds was presumably a financial backer. Grigsby was the silent partner who seldom visited the factory and had little to say to employees. Grunow, with his bull-horn voice that could be heard all over the plant, was active everywhere, and would fire workers or engineers on the spot for the slightest offense.

GGH's first radio products were loudspeaker horns, developed about August 1924 and advertised in October under the GGH tradename, with Pyralin (celluloid) bells in a variety of colors. Pyralin had previously been used for the company's first product — automobile sun visors. Other speaker models were added in the following year. In September, 1925, an A and B eliminator was marketed under the name "Majestic." But it was the Super-B Model eliminator, introduced in March, 1926, that really propelled the company upward. In 1927, Majestic's gross sales of eliminators were nearly $5 million, more than most receiver manufacturers were making.

Grigsby and Grunow knew, however, that the advent of AC sets would kill their eliminator business; the best they could hope for was to built power packs for other manufacturers. Instead, they chose to expand into radio production themselves. They brought Pfanstiehl Radio Company's RCA license. Orville Q. Hinds and Grigsby's younger brother sold out their interests. On March 15, 1928, the official name became the Grigsby-Grunow Company. Then in April, Majestic went public and sold 20,000 shares of common stock at $40, using the money to add to the 4540 Armitage Avenue plant, to lease the Yellow Truck & Coach plant at 5801 Dickens Avenue, and to purchase 100,000 sets of parts for a new radio receiver with engineering apparently done by Radio Frequency Laboratories. In mid-May, production began, soon reaching 1500 sets per day; in what was normally the slack season, radios were being gobbled up as fast a Majestic could produce them. Why? Their competitors still used puny magnetic speakers, but for the same price, Majestic's dynamic speaker could blow them off the salesroom floor!

In 1929, the Grigsby-Grunow Company went into tube production: 5000 per day in April, 30,000 in newly-completed buildings in August. Grigsby-Grunow bought the La Salle Radio Corporation, an RCA-licensed tube maker, in October. Overall Majestic sales for the year June, 1928, through May, 1929, were $49 million; for the following year, $61 million, making the company no. 1 in the industry.

Majestic's business, based as it was on expensive console models, simply couldn't continue indefinitely in the Depression. Majestic was saddled with large factories (having purchased the Dickens Avenue plant outright in October, 1929) and high fixed costs. Adding refrigeration to the line and purchasing the Columbia Phonograph Company in 1932 may have slowed the slide into bankruptcy, but these changes could not stop it.

Grunow was "relieved of the presidency" in January, 1931 and formed his own company, merging in July, 1933 with the U.S. Radio and Television Corporation in Marion, Indiana. He changed its name to General Houshold Utilities Company; it ceased manufacturing in 1937. Grunow subsequently ran a successful poultry business. He died in 1951 at age 58.

Majestic went into receivership on November 24, 1933; in December, 1934, all assets were advertised for sale. While the name was revived in 1937 by a group of former Zenith executives (of which there were a great many over the years), it had no connection with the original Majestic, and was bought by Wilcox-Gay in August, 1950. Wilcox-Gay discontinued Majestic production in 1955, switching to marketing Grundig products under the name Grundig-Majestic. Grigsby died in 1954.

AMAZING M

MAJESTIC FEATURES

CABINETS

The finest woods and the finest workmanship that brains and unlimited resources can create. All cabinets made in Majestic's own great, modern cabinet plants.

CHASSIS

Rigid and sturdy throughout. Trim and beautiful in design, and at the same time built to give lasting satisfaction. All parts readily accessible.

POWER

Majestic supremacy in the manufacture of electric radio power is acknowledged. All power units for the new receivers designed for performance of the highest quality, under the most exacting conditions.

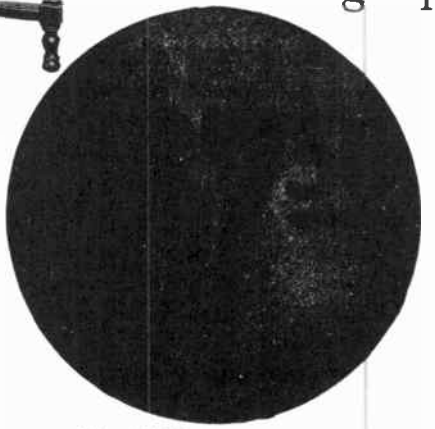
DYNAMIC SPEAKER

Designed and manufactured in the Majestic plants. The most rigid tests have demonstrated conclusively its dependable construction, its ability to withstand the most severe shocks, its consistent high performance in the face of all climatic changes.

*Cabinets, Dynamic Speakers, Chassis, Power—**Everything** made from beginning to end in six great Majestic Plants.*

To see and hear these new wonder radio receivers is an experience that will thrill you, no matter how long you've been "in the game."

Majestic Was First to build high-qual-



Prices Slightly Higher West of Rocky Mts.

The Majestic name and products are already known to millions. Our new high-pressure advertising,

MODEL 62, $99.50 LIST

$99.50

Seven tubes, completely shielded, using R.F.L. balanced circuit, consisting of three tuned radio frequency stages and a tuned antennae input and audio power amplifier. Two 171 power tubes connected in push-pull in the power output stage. Single dial control, supplemented by a secondary control for obtaining additional selectivity when occasion demands. Volume control instantaneous in action. In beautiful walnut cabinet with front panel of matched burl walnut, complete with Majestic electric power unit.

MODEL 72
$167.50 LIST

Seven tubes, completely shielded, using R.F.L. balanced circuit, consisting of three tuned radio frequency stages and a tuned antennae input and audio power amplifier. Two 171 power tubes connected in push-pull in the power output stage. Single dial control, supplemented by a secondary control for obtaining additional selectivity when occasion demands. Volume control instantaneous in action. In beautiful walnut cabinet with front panels and doors of matched burl walnut, complete with Majestic electric power unit and Majestic dynamic power speaker. A value that is absolutely outstanding both as regards furniture appeal and radio quality.

Models 61 and 62 were discontinued on July 31, 1928.

majestic RADIO

That explains the astounding prices—but the quality, performance, and tonal magnificence must be seen and heard.

ity low-priced electric radio power to suit everyone's desire and purse.

Majestic Is First to offer the world's finest radio, at the world's lowest prices.

Prices Slightly Higher West of Rocky Mts.

now about to start on Majestic receivers will penetrate every city, town and hamlet in America.

MODEL 71
$137.50 LIST

Seven tubes, completely shielded, using R.F.L. balanced circuit, consisting of three tuned radio frequency stages and a tuned antennae input and audio power amplifier. Two 171 power tubes connected in push-pull in the power output stage. Single dial control, supplemented by a secondary control for obtaining additional selectivity when occasion demands. Volume control instantaneous in action. In beautiful walnut cabinet with front panels of matched burl walnut, complete with Majestic electric power unit and Majestic dynamic power speaker. A value that is absolutely outstanding, both as regards furniture appeal and radio quality.

MAJESTIC FEATURES

SIMPLICITY

Majestic receivers are true one-dial sets and are so constructed that a child may secure remarkable results over the entire range of stations.

SENSITIVITY

An outstanding feature that has amazed even veteran radio engineers. Under actual tests, in comparison with every leading make of set, no matter what the price or number of tubes, Majestic has "out-picked" and "out-distanced" anything on the market.

TONE

Majestic receivers reveal a fidelity, breadth, and magnificence of tone without distortion, that will thrill you. Both high and low notes of all broadcast auditions faithfully reproduced.

PRICES

Majestic prices speak for themselves. Stated briefly, comparison will show them the highest quality receivers in the world for the least money.

MODEL 61, $85.00 LIST

Seven tubes, completely shielded, using R.F.L. balanced circuit, consisting of three tuned radio frequency stages and a tuned antennae input and audio power amplifier. Two 171 power tubes connected in push-pull in the power output stage. Single dial control, supplemented by a secondary control for obtaining additional selectivity when occasion demands. Volume control instantaneous in action. In beautiful walnut cabinet with front panel of matched burl walnut, complete with Majestic electric power unit.

$85.00

Radio Retailing (May 1928), pp. 18-19

This is perhaps the best informal photograph ever taken of the 3 Majestic Marajahs, the regal potentates who direct the activities of Majestic Radio. From left to right, should there be anybody left in the country who doesn't know them, are: The Right Honorable Wm. C. (Bill) Grunow, Sir Herbert E. (Cy) Young, and Minister of the Exchequer, B. J. (Bert) Grigsby.

Talking Machine Journal
(March 1929) p. 64

71B Jan. 1929 $137.50

71 May 1928 $137.50
Cabinet design patent 77,882 by Frank Burton, filed March 8, 1928.

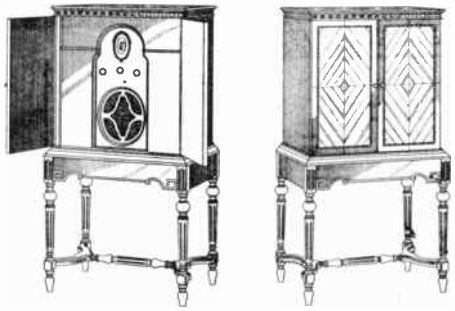
	Gross sales	Net before taxes, etc.	Before dividends	After dividends
1927	$ 4,988,727	$ 652,202	$ 553,358	$ 381,383
year ending 5/31/28	5,861,225	895,667	616,206	444,231
8 mos. ending 1/31/29	32,185,568	4,329,140	3,396,843	2,907,903
year ending 5/31/29	49,318,669	6,531,809	5,117,614	4,191,634
(2nd source)	49,275,990			
year ending 5/31/30	61,330,217	3,022,513	1,745,648	(564,421)
year ending 5/31/31	28,350,881	(352,785)	(2,169,761)	
7 mos. ending 12/31/31	8,417,590	(1,330,052)	(2,901,305)	
6 mos. ending 6/30/32	6,481,414		(1,056,026)	
24 wks. ending 6/17/33	3,817,171		(1,455,190)	
year ending 12/31/32	9,349,741		(2,236,276)	

Date	Production/day	Employees
6-7/28	1500	—
11/28	3250	6,000
12/28	3300	6,800
2/29	4000	—
5/29	—	6,000
7/29	4400	—
8/29	5000	11,000
7/30	3700	15,000 (for 60 days only)
2/31	3000	5,000 ("soon")
3/31	3500	5,795
4/31	3500	5,795

DESIGNS

NOVEMBER 26, 1929

79,951. RADIOCABINET. FRANK C. BURTON, Chicago, Ill., assignor to Grigsby-Grunow Company, Chicago, Ill., a Corporation of Illinois. Filed Feb. 14, 1929. Serial No. 30,051. Term of patent 7 years.



77,529. RADIOCABINET. FRANK C. BURTON, Chicago, Ill., assignor to Grigsby-Grunow Co., Chicago, Ill., a Corporation of Illinois. Filed Oct. 27, 1928. Serial No. 28,674. Term of patent 14 years.

NY Telegram (Sept. 15, 1928)

The ornamental design for a radio cabinet as shown.

72 May 1928 $167.50

Majestic's success in a nutshell: with the nearest comparable (dynamic speaker) model selling for nearly $60 more, which would *you* buy?

WHAT IS BEHIND GRIGSBY-GRUNOW CO.

Manufacturers of Majestic —ELECTRIC-RADIO—

The two Armitage Avenue Chassis plants contain 125,000 square feet of floor space and employ 2500 people. Part of the plants shown have just been completed and will require 3000 more employes.

The four plants at Dickens Avenue are 375,000 square feet in area, and in them 4500 employes make the cabinets, speakers and power packs.

Plant No. 7, nearing completion, adds 50,000 square feet of space and will employ 1000 more men and women.

In this modern tube plant, 1000 employes are making Majestic Tubes of the same high quality as Majestic Radio Receivers.

Every Sunday evening, from 9 to 10 o'clock Eastern Standard Time, Majestic presents headliners of the Stage and Screen over a coast-to-coast hook-up of the Columbia Broadcasting System and the American Broadcasting Company.

Time payments in the purchase of Majestic Receivers are financed through the Majestic Plan at lowest available rates.

THE world knows and acclaims Majestic radio as the most outstanding receiving set ever built—outselling all other makes by so great a margin that wherever *Radio* is talked of, *Majestic* is talked of.

So meteoric has been the career of Majestic, so tremendous has been its sale, so universal its popularity, that only a very few have come to know the real story behind Majestic success—a story that reads like a chapter from Arabian Nights, yet one that is packed with hard business sense and sound merchandising principles.

It is due the public to know something about the organization behind Majestic, which made possible the slogan that has swept America, the slogan that is true, and the slogan that the public believes—*"You can't buy a better radio set than Majestic at any price."*

Unlike Topsy, Majestic didn't "just grow"—Majestic is the realization of a dream, as all great business successes are realizations of the indomitable spirit of wishing to do something better for the world than has ever been done before. Back of Majestic radio is an organization of men who have put their souls and hearts into building a product better and finer, at a price so low that the whole world may enjoy *all* the thrills and *all* the pleasures of modern radio.

Starting with this ideal—the will to accomplish—Grigsby-Grunow Company within a short space of seven years has grown from a small plant employing a few people, to its present size, where eight great plants, making every part of the Majestic radio receiver, give employment to more than 8000 people. Each working day more than 4000 complete Majestic sets are produced in these eight great factories.

More than thirty carloads of steel, fine cabinet woods, wire and other raw materials are received each day, and more than forty carloads of complete Majestic radio sets are shipped out to more than 12,000 Majestic dealers the same day. To insure its receiving the very finest of raw materials, Grigsby-Grunow's own men are stationed at the sources of supply to select the best, and speed its shipment to Chicago. The company operates its own veneer plant, and has even gone so far as to purchase stumpage, to insure a constant supply of the best panel woods for cabinet construction.

Besides more than 8000 employes in Chicago, a small army of Grigsby-Grunow field representatives travel the entire country, assisting dealers to help you get a greater appreciation of what Majestic is doing and more enjoyment from your Majestic set.

The Grigshy-Grunow policy is not to rest on present achievements, but to look into the future. Scores of the finest engineers in the entire field of radio are constantly experimenting, testing, and planning to make Majestic a still greater value, and a still greater source of enjoyment.

The Majestic story cannot be told in an advertisement. But something of the spirit behind the product can be conveyed, that you may understand Majestic leadership is not transitory, but reaches into the future.

GRIGSBY-GRUNOW COMPANY

General Offices: 5801 Dickens Ave.
Chicago, Ill.

Licensed under patents and applications of R. C. A. and R. F. L., also by Lektiphone, Lowell & Dunmore and Hogan License Associates

Majestic Radio-Phonograph Combination gives you—at moderate cost—the greatest instrument for musical entertainment the world has ever seen. *Everything* in Radio—an *electric pick-up*, electric motor phonograph—in a cabinet of beautifully matched butt burl walnut.

181, March 1929. $265
Technical article in *Radio*, August 1929, p. 48
Design patent 79,952 by Frank Burton, filed Feb. 14, 1929.

ANNIVERSARY MODELS

featuring Power Detection and Elimination of All A-C Hum

MIGHTY MONARCH OF THE AIR

MODEL 92 Absolutely no hum and no oscillation at any wave length. Automatic sensitivity control gives uniform sensitivity and amplification in both high and low wave lengths. Improved MajesticSuper-DynamicSpeaker. Extra heavy, sturdy Majestic Power-Pack. Jacobean period cabinet of American Walnut. Doors of matched butt walnut with overlays on doors and interior panel of genuine imported Australian Lacewood. Escutcheon plate, knobs and door pulls finished in genuine silver.

MODEL 91 Power Detection and the *new* –45 tubes plus four tuned stages of radio frequency enables Majestic to produce the most powerful and selective radio set ever built. Absolutely no hum and no oscillation at any wave length. Improved MajesticSuper-DynamicSpeaker. Early English design cabinet of American Walnut. Instrument panel overlaid with genuine imported Australian Lacewood. Escutcheon plate and knobs finished in genuine silver.

Licensed under patents and applications of R. C. A. and R. F. L., also by Ediphone, Lowell & Thurmore and Hogan License Associates.

POWER Detection, developed to its highest form by Majestic engineers, enables Majestic to give you the *most powerful and selective radio set built*—without the slightest trace of A-C hum, and free from squeals and whistles at all wave lengths. "Background" noises are practically eliminated, so that power detection and the *new* type –45 power tubes can give you

Magnificent Reproduction —Speech and Music *Only!*

Another triumph of research is the exclusively Majestic feature, *Automatic Sensitivity Control*, assuring equal sensitivity and range at *all* points on the dial, while adjusting only the tuning knob. Now, for the first time, you can enjoy low wave stations with no "fuzzy," garbled reception—and you secure full range and volume on the higher waves. In the Majestic Anniversary Models, reception is clear and strong, free from hum or distortion, *anywhere on the dial!*

The new Majestic is so amazing that mere words won't tell you the story. Just see it, and try it for yourself. Try it at *any* wave length—give it rough treatment—it will go through every test as the best radio set you have yet seen, at *any price*. Look for a finished job, one that you can bank on to give you *lasting enjoyment* and *lasting service*. That's the new Majestic. It has no experimental tubes nor tricky, untried circuits. It is dependable, solid all the way through. And Majestic's new cabinets are in keeping with the mechanical perfection of the set itself.

Any one of more than 12,000 Majestic Dealers will gladly give you a home demonstration, without cost and without obligation.

GRIGSBY-GRUNOW COMPANY
5801 Dickens Avenue, CHICAGO, ILL.

[*Tune In . . . Majestic Theatre of the Air over Columbia and American Broadcasting Systems every Sunday night, 9 to 10 Eastern Daylight Saving Time. Headliners of the Stage and Screen.*]

Majestic
ELECTRIC RADIO

YOU CANNOT BUY A BETTER RADIO SET AT ANY PRICE

91 July 1929 $137.50 Cabinet design patent 80,931 by Frank Burton, filed August 12, 1929. Technical article in *Radio*, Oct. 1929, pp. 47-48.
92 July 1929 $167.50 Cabinet design patent 79,787.
101 Dec. 1929 $245.00 Radio-phonograph
90B chassis technical articles in *Radio*, May 1930, pp. 45-46; *Citizen's Call Book*, vol. 11 no. 3, Sept. 1930, p. 80. (performance specs in vol. 11 no. 2, p. 84.)

Management vol. 31 no. 6 Dec 1928 pp. 35-40, 77-81.

Assembling Component Parts of Majestic Set Into Chassis

MANAGEMENT'S Sightseeing Trips in Industry—No. 5

Watching Majestic Radio Combine Class with Mass Production

A Trip made by James B. Glazebrook through the Factories of

GRIGSBY-GRUNOW COMPANY, CHICAGO

WHEN does an industry reach its saturation point? Does anybody know of any industry which has reached it? Is it possible for any industry to reach it, provided that that industry is backed by textile brains capable of making markets where apparently no market exists?

→1. When the Grigsby-Grunow Company of Chicago introduced the Majestic Electric Radio in June, 1928, the "experts" were already beginning to point out that radio sales possibilities were showing signs of slackening. The outlook was none too encouraging.

Summer, so the experts said, is not the time to sell radio sets. There were already too many makes, too many dealers.

Lurking around the corner was always the possibility that some new development would make present sets obsolete.

Business was none too good, anyway. Radio was supposedly a luxury, and when factories were laying off workers, it was no time to try to induce them to make the first payment on some new, untried receiver.

→2. All these wet blankets did little to disturb the stout hearts in the management of Grigsby - Grunow. Competition did not worry them much. The danger of an already saturated market was ignored.

They had an idea. Good radio sets up to this time had been selling for around $400. Why not design the best set possible to sell for less than half this price, make it in big quantities, and put it over the same way Ford did the flivver?

Section of Cabinet Assembly Room

So the Majestic Electric Radio was designed, and manufacturing methods on a large scale were carefully worked out. They explain how the idea was put into effect:

→3. "We invited 55 leading radio distributors or jobbers to Chicago, showed them the Majestic Radio, and told them that we planned to make 500,000 sets in six months.

"We showed them plans of our factories, our facilities for the purchase of raw materials. We told them that mass production requires mass sales, and that if they would follow our plans they would make money. We told them that mass sales cannot be expected in radio sets selling from $300 up.

→4. "We told them that it was up to them to line up good dealers, and to help keep sets moving. Of these 55 distributors, 50 signed up before the Majestic Radio went into production.

→5. "In five months, three of them summer months, when radio sales are supposed to be slow, each of these distributors has sold an average of 10,000 receivers.

"Today we have orders on our books which will keep us booked solid until the first of the year, even though we are producing at the rate of 3,500 Majestics a day."

→6. Until a few years ago, automobile owners drove their

cars only in pleasant weather. By various methods, motor car makers educated the public on the idea of driving twelve months a year.

Grigsby-Grunow reasoned that people could also be sold the idea of operating radio sets the year round, and so they went after the business intensively. At the very beginning they created a market which was not known to exist.

→7. The company has no salesmen. Under the direction of Herbert E. Young, general sales manager, 50 men in the field cooperate with the distributors, and maintain contact with Majestic dealers. These men are not order takers, but men with intensive sales training who give dealers practical aid in keeping Majestic Radios moving.

Getting Mass Production

→8. The first Majestic Radio was made in June, 1928. In five months production had been brought up to 3,500 receivers a day. Plant facilities are now being extended to produce 4,000 sets a day early in 1929.

→9. The plant of one of the General Motors subsidiaries was taken over. This consisted of four buildings.

As soon as the first building was vacated, the manufacture of cabinets was started, and general production was well under way before the motor company had entirely moved out. Improvements were put in while production was going on, and this is still in process.

Increasing the value of its stock 2200% in a little over a year; building up a production volume of 3,500 radio receiver sets a day in less than six months; distributing this output through only 50 jobbers—these are some of the things the Grigsby-Grunow Company has accomplished through mass production

It is not uncommon to move an entire department during a night, for production must never be interrupted. If the moving takes more than one night, temporary facilities must be installed meanwhile.

→10. One of the first things done when moving into the old buildings was to cover the concrete with block flooring with a wood floor which has been waxed to a ballroom finish.

This may appear to be an unnecessary expense, but in the cabinet department it is very easy to slide cabinets from one place to another in trains, in the way that a small boy slides a row of chairs across the floor.

→11. This has saved a considerable investment in trucks, and an infinite amount of handling which would otherwise be required in loading and unloading.

Besides, it would take a very good trucker to handle as many cabinets as we saw a rather skillful boy maneuvering through a busy department.

Constant Material Movement

→12. Operators never leave their work. Material is brought to them and taken from them in a steady flow. Each department moves its finished material on to the next.

Almost every known means of material handling is used somewhere within the plant, and improvements are still being made.

→13. An inclined conveyor carries loud speakers from the testing booths to the point where they are assembled into cabinets, saving twelve workers who formerly had to carry them down a flight of stairs.

→14. Another conveyor is being installed to carry boxed receivers from the shipping room to the loading platform. This conveyor will be in the nature of a subway, going under two railroad tracks.

Assembled sets, ready to place in cabinets, are packed into four-deck push trucks which are loaded bodily on motor trucks and carried a mile to the cabinet plant.

→15. Metal boxes containing the power packs are enameled and baked by the truckload on a continuous overhead conveyor. The enameling and baking processes are accomplished almost automatically.

→16. There is still much improvement to be made in material handling, and Grigsby-Grunow will be a paradise to some good equipment manufacturer who can make and sell the highly specialized conveying and trucking equipment they need. But it will have to be good and thoroughly practical.

Only Two Models Made

→17. Mass production is not an easy thing to maintain when there are several models to make. At first the Majestic Radio was made in four models.

To lower costs and increase output this was cut to two models. In each the radio itself is the same. The only difference is in the cabinet.

→18. The few dollars difference in price is sufficient to satisfy the buyer who feels that he cannot afford the higher price; and by using the same mechanical construction in both models there is no danger of loss of prestige to the Majestic name through the possible poorer performance of a cheaper model.

Checking Up on Production

→19. As we went through the plants, we several times noticed that a foreman consulted a

card which he carried in his pocket. When we inquired why, one of them explained that each foreman keeps a record of each hour's output in his department.

He gets this from a counting machine stationed at the point of the last operation; and he watches this count as a railroad engineer watches his steam gauge.

→20. He knows that his department must put through, exclusive of rejects, 3,500 pieces a day, or some multiple of that number. He knows, too, that the next department is never more than two hours ahead of him.

In other words, throughout the plant, there are never more than parts for 388 receivers waiting to be worked upon.

→21. Still, when we realize the amount of capital tied up even in this number, we can understand why the management is not interested in storage space for raw material, parts in process of manufacture, or finished receivers.

Each department has its set quota, figured on an hourly basis, and just as much precaution is taken against overproduction as against underproduction.

Cost of a Photograph

→22. They don't take much time to stand around and talk at the Majestic factory.

Recently the advertising department had eight photographs made in the plant. Three of them illustrate this article.

It required about two minutes to take each photograph and during that time the operators had to remain motionless at their posts.

→23. That afternoon the general superintendent told the advertising manager in no uncertain terms that his such-and-such photographs had cost the company 112 receivers in lost production.

So take another good look at the photographs and appreciate them. It cost 42 very good radio sets to make them.

When a product selling for $167.50 is being turned out at the rate of seven a minute, we get an idea of how valuable a minute is.

Plan for Mass Production

→24. The sale of a half-million receivers in five months was no accident. This production and sale was actually planned—in fact, it was planned to make and sell this number in six months, so the quota has been exceeded by some 20%.

→25. The best machinery and methods were studied, the best mechanical experts consulted, the best radio manufacturing plants visited. It was found necessary to make special machinery, so a good machine, tool, and die shop was created.

→26. For instance, a coil winding machine was made to wind just so many turns of wire, then stop automatically. This worked well until some bright mind in the engineering department designed an improvement which winds several coils at once.

→27. In making this and other special machines, the ever-present possibility that changes in the design of the Majestic would be made were not overlooked. The coil winders are equipped with counters which indicate the number of turns; and should it ever be desirable to change this number, a few adjustments will adapt the machine.

→28. Wood turning lathes were designed with set tools to turn out a cabinet leg every ten seconds.

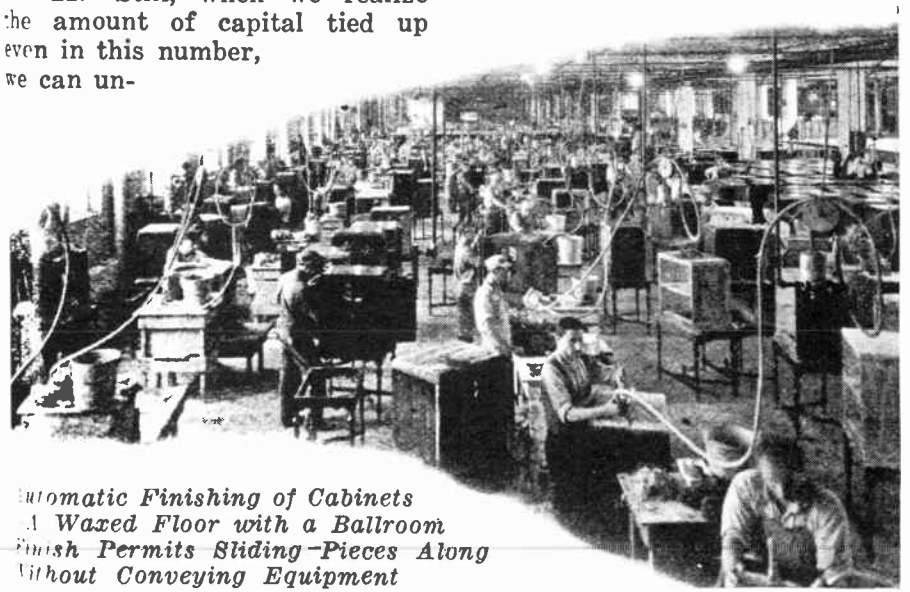
→29. Special dies for punch presses were made to cut out transformer laminations from blank strips with less than 5% scrap. The best dies formerly used left more than 25% scrap.

Employees All Experts

→30. Every one of the 6,300 productive employees knows how to do one job and do it well. Every operation from winding the first coil to tacking the label on the last crate has been standardized.

→31. We might think that with only 1.8 workers for every receiver produced daily, employees would have to work at top speed to keep up production.

Quite the contrary. Perhaps the most vivid impression we got was the feeling of serenity and smoothness. There is no excite-



Automatic Finishing of Cabinets and Waxed Floor with a Ballroom Finish Permits Sliding Pieces Along Without Conveying Equipment

ment, no bustle—just a steady movement.

We see no rows of workers bending over their tasks, no beetle-browed, slave driving foremen, no "rules and regulations" signs.

→32. The place seems human. Employees chat with one another, a foreman occasionally stops and talks to a worker or an inspector, a trucker comes up to set down a load and take away another. Nobody seems to hurry and nobody seems to loaf.

→33. Of the 6,300 employees about 60% are women. Experience has proved that women are more tractable than men, more easily trained to follow prescribed methods, less prone to argue and in many cases more ready with suggestions.

→34. Practically all Grigsby-Grunow engineers and department heads grew up in the original organization. Before the radio plant was opened these men were sent to study methods in other plants, and also sent to the factories in which the material they use is made.

In this way each department head has gained direct from the maker a basic knowledge of the lumber, wire, or metal that he is using.

→35. The management, recognizing ability and loyalty, has encouraged these men to become financially interested in the business and has co-operated with them to this end.

Stock Value Up 2,200%

Employees who in 1927 invested $100 in Grigsby-Grunow stock now own shares valued at $2,240—an increase of 2,200% on their investment.

Model Cabinet Plant

→36. A furniture manufacturer might learn a lot by visiting the Majestic cabinet plant. The two styles of cabinets were designed and fully decided upon before equipment was installed for making them. This was done instead of setting up woodworking machinery, then casting about for a suitable cabinet design.

→37. The result is, that where the average furniture factory has 25% to 50% of its machinery idle because it is used only on certain jobs, every machine in the Grigsby-Grunow cabinet plant is busy from morning to night.

→38. Lumber is purchased cut to exact dimensions. The only operations required are the finishing ones. All rough operations are eliminated—a great advantage in the elimination of waste.

Using rough lumber, there is the constant temptation to use pieces which are not quite up to standard. Such a piece might go through several operations before being condemned by an inspector. The cost of these operations would be lost.

→39. Woodworking operations have been so carefully studied out and simplified that waste of stock is negligible.

The only place where an operator can spoil material is on jigsaw work; and even this danger has been lessened by a special machine which cuts out speaker grills from a pattern, and is semi-automatic in operation.

In such operations as cutting moldings, turning and sanding, it is virtually impossible to spoil material.

→40. Another advantage of working by template and pattern is that every piece is uniform.

→41. Cabinet legs are turned from material about 1¾ inches square.

At one place in the leg it was desired to make it slightly wider in order to give it a better appearance. This is done by gluing blocks about one-half inch thick to the four sides at this point.

→42. The cost of the gluing operation is more than offset by the saving of 57% in material, as compared with the idea of turning legs from 2¾-inch stock. Turning this extra material would also require more time and cause more wear on tools.

→43. Every woodworking machine is connected to a blower system which sucks away the shavings and dust. This keeps fire hazard at a minimum, reduces the cost of keeping the plant clean, and safely conveys wood refuse to a point where it is easily disposed of.

Fumes from spray booths are also whisked away by powerful fans.

Each machine has an individual motor drive.

Shipping by Carloads

→44. Shipping at the Majestic factory sounds very easy. The railroad has a standing order for 30 box cars a day, which are brought in ten at a time, cleaned, loaded, inspected, sealed, and pulled out.

Very seldom is a less-than-carload shipment made, and practically all shipments are made to the 50 distributors who handle the entire factory output. There are only 30 bills of lading to write, only 30 routings to make.

→45. Here we see the wisdom of selling through a limited number of jobbers. Suppose Grigsby-Grunow sold direct to their 10,000 dealers. Think how that would complicate their loading, billing, accounting, and routing operations!

→46. But don't apply for the traffic manager's job. It isn't as soft as it looks.

Grigsby-Grunow have no warehouse, nor any intention of building one. Those 30 cars a day

have to move, fair weather or foul.

If the railroad is a little slow in shoving in the empties, or taking out the loads, shipments begin to pile up. A delay of an hour is very serious; a half-day is paralyzing.

The traffic man's job is like everyone's else—carefully studied out, simple, but it's got to be done.

Tests Control Packaging

→47. Packaging was no small problem. A console radio has a natural tendency to be topheavy, and while it must be packed carefully, cost schedules permit no great expenditure for packaging or labor.

→48. The characteristic Grigsby-Grunow method was followed in adopting package standards. Packages were tested by throwing a boxed receiver down a stairway and improvements in packing were made until the present veneer crate, with simple interior bracing, was developed.

A workman suggested a simpler interior bracing which saves five cents on each box. Multiplied by 3,500, this amounts to $175 a day.

→49. Power packs, which are shipped separately from receivers, are packed in a corrugated fiber container which proved successful after tests consisting of throwing packed boxes out of a second-story window.

→50. It is a matter of record that the damage to Majestic sets in transit is insignificant.

Inspection Is Thorough

→51. Inspection is so vital in radio manufacture that there is one inspector to every nine workers. Every operation is inspected, and from the time it is started until the bracing in the freight car is approved, a Majestic Radio receives 92 inspections.

All inspectors are under the engineering department, which sets standards and tolerances.

→52. Inspection, like production, is progressive, so that there is no complicated final inspection which might require tearing down the entire set to correct defects.

→53. The result of this careful inspection is that less than one in every 1,000 sets shipped from the plant have been found defective, and these defects have been of such a minor nature that dealers or distributors have repaired them without difficulty. No receiver has ever been returned to the factory.

→54. Material rejected by inspectors is not sent back to production workers for repair or correction. Instead it goes to a special department, where it is repaired, the causes of rejection carefully analyzed, and the production department advised.

This sounds complicated and rather smacks of red tape, but here is an actual instance of how it works.

→55. An inspector in the loud speaker department, who tests each speaker in a sound-proof room, rejected several speakers because of a slight metallic rattle. The inspection department found this to be caused by slightly loose rivets in the metal shell, which had escaped first inspection.

The department doing the riveting was immediately notified, a defect was found in the riveting machine and the trouble was corrected in less than twenty minutes.

Parts Inspectors Specialists

→56. Parts inspectors, like production workers, are trained to inspect one thing, but all assemblies are inspected by electrical engineers who have both practical and theoretical knowledge.

Speakers and finished sets are all tested in sound-proof booths and compared with standard equipment of known good quality.

→57. Parts inspectors frequently perform simple production operations while handling parts, or carry parts from one operation to the next; but in the main, production and inspection are kept divorced.

Production's natural aim is to make as many units as possible. Inspection's natural aim is to keep up quality.

→58. No foreman or department head is authorized to override an inspector's rejection without taking the matter up with the chief inspector, or the engineering department. Adherence to engineering standards is considered more important than adherence to production schedules.

→59. Inspection does not cease in the manufacturing department. After a receiver has been packed in a box the cover is not nailed down until an inspector has okayed the packing.

The shipping clerk who seals outgoing cars inspects the bracing in the car and the count of the contents, and is held responsible for the correctness of both.

Purchasing in Quantity

→60. The purchasing agent for Grigsby-Grunow has a man-size job. Of one item—enameled wire for loud speaker coils—25,000 miles a day are used, or enough to stretch around the earth at the equator.

→61. It must also be understood that there is no warehouse for raw materials.

Many items of raw material are shipped out in finished product within two hours after they are received. Practically no item is kept in an unfinished state more than two days.

Simple Advertising Effective

→62. The advertising program is characteristically simple. Of course, we have all heard the

Here you have pictured in practical form just what 7,500 sets a day means. Majestic Radio is now produced at the rate of one every 3½ seconds and a steady stream pours out of Grigsby-Grunow's eight great plants as here shown.

Final Cabinet Assembly Department in Plant No. 5 of Grigsby-Grunow Co., makers of Majestic Radio. The cabinet plant is now the world's largest furniture factory.

"Majestic Theatre of the Air," featuring the "Two Black Crows," Moran and Mack. But no effort is made to produce inquiries from radio advertising.

→63. "We put on the Majestic Hour to show our customers that we appreciate their patronage," says Mr. Duane Wanamaker, advertising manager.

"We put on the best possible talent for pure entertainment; and we try consistently to do this in such a way as to make Majestic dealers say with pride, 'This is my program.'

→64. "We never miss a chance for favorable publicity. A Majestic went back to Europe on the Graf Zeppelin, and got us thousands of dollars worth of valuable propaganda."

→65. A battery of tabulating machines keeps an accurate analysis of sales by territory, state, and county. Territorial quotas are set, based on population, previous radio sales, and sales of the Majestic "B" Eliminator, which was Grigsby-Grunow's first radio product.

Distributors clearly understand that, in order to keep their contract, they must accept their quota of receivers whether they order them or not.

→66. An official was asked how long he thought the present high rate of production would continue, and when the slack-up would come. He showed us that, if radios were produced at the rate of 3,500 a day every day for the next twenty-five years, there would be only one for every family in the country—not individuals, but families.

→67. Slogans in a plant are too often meaningless, or plain bunk. But two signs hanging in the Majestic plants are worth our notice:

OUR SLOGAN

Make them fast, make them well—
It makes a price that makes them sell.

MAJESTIC'S POLICY

Best construction, fast production means low cost and satisfied customers.

In these Grigsby-Grunow give their secret formula for successful mass production. And the best of it is, they make the formula work.

AN increasing number of large industrial plants are introducing bus lines for the exclusive benefit of their employees. This is true in the northern and eastern New Jersey region, where perhaps industrial operatives travel farther than in any other part of the country.

The employee pays a small fare, which in many cases is said to sustain the service. In other instances, the employer takes a small loss on operation.

This service is said to have greatly reduced absenteeism and tardiness, because workers must meet the bus schedules. A five-cent fare is the rule.

A Wonderful Seller

Because It Is

Such a Wonderful Buy

The LITTLE GIANT

Trade Mark

Radio Receiving Outfit

The Ideal Gift!

SELLS at a popular price, attractively put up in Holiday box. A gift for anyone because there isn't a person who can't use the **Little Giant**, it's so simple. It's complete ready to put together and use, nothing extra needed to enjoy the program. Easily demonstrated and fool proof. Its beautiful cabinet, neat workmanship and compactness help its sale immensely. Make the **Little Giant** your leader for holiday trade. Little Giant complete receiving outfit also put up in plain black box.

Write Today for Proposition

COMPLETE

With Metro Headphones, Aerial, insulator, ground clamp and all accessories.

In Holiday Box $ List .. 15

METROPOLITAN RADIO CORPORATION

71-75 Goble St., Newark, N. J.

American Radio Journal (Nov. 1, 1922)

A Wonderful Xmas Gift

Little Gem

Crystal Receiving Set

Cut ¼ size

Simple, Clear, Efficient and Beautiful

The LITTLE GEM presents a unique design combining compactness with efficiency. Voice and musical tones come in with wonderful clearness and volume.

The dealer will at once appreciate the potential sales possibilities of this wonderfully efficient and beautiful little crystal receiving set. Has a large receiving radius. Test it yourself. You can then recommend it with the same confidence that we do.

All metal parts are brass, nickel plated and polished. The instrument is beautiful in appearance, well made and practically indestructible. Nothing to get out of order or give trouble.

Price, $6.50 List

Manufactured by

United Specialties Co., Inc.

57-59 Spring Street, Newark, N. J.

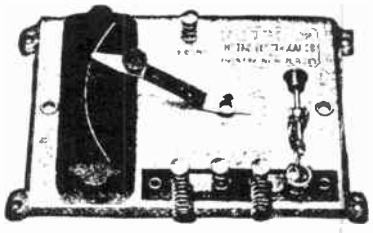
American Radio Journal (Nov. 1, 1922), p. 14

Little Gem

Design patent 67,043 filed Oct. 8, 1923 by Edward Moore, issued April 14, 1925, assigned to Metro Electrical Co. Inc., Newark, NJ.

Metro Electrical Co.

67 Goble St., Newark, N. J.



Model A2

Trade Name—"Metro Junior"; Type—Crystal; Price—$2.50.

Model A3

Trade Name — "Metro Little Gem"; Type — Crystal; Price—$6.50.

Radio Industry (April 1925)

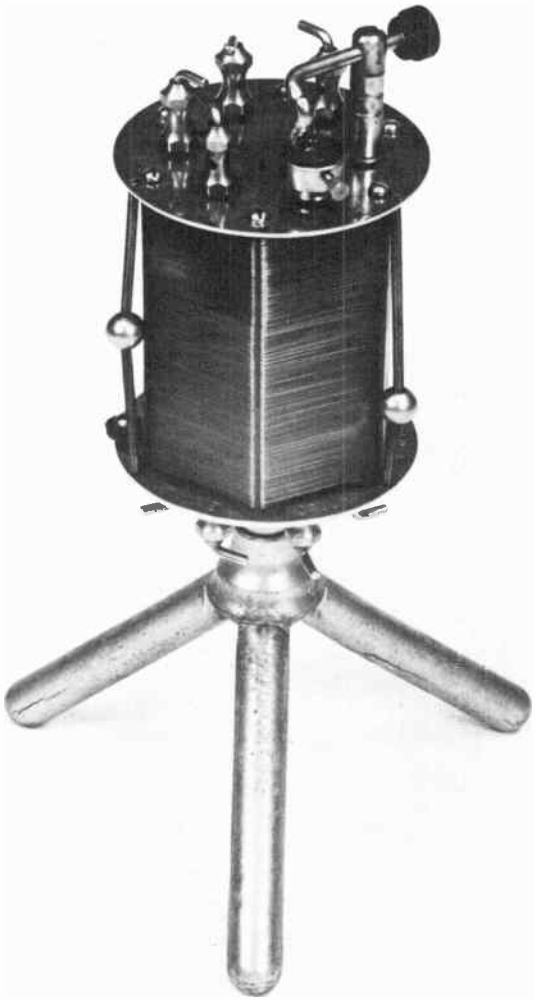
MARTI

Martian Manufacturing Co., Inc.

For all that is known about this company, it might as well have come from Mars. But in fact, Charles Louis Marti was a Swiss citizen. He lived in the vicinity of Newark, New Jersey, and his first patent was issued in 1918.

By March, 1924, Marti had formed the Martian Manufacturing Company, Incorporated, and as of September, 1926, the Martian Electric Laboratories also existed. Both companies became the Marti Electric Radio Company Incorporated in October, 1926. By September, 1929, this had been reorganized after receivership proceedings.

There is no known connection between the Martian Big Four and the Metro Little Gem, although the two do have a striking similarity.



April 29, 1924. C. L. MARTI TUNING COIL Filed Dec. 1, 1922 1,492,080

Fig. 1

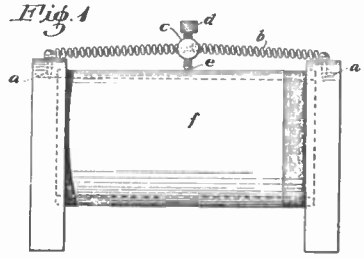
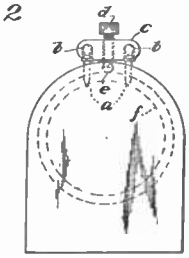


Fig. 2



Inventor.
Charles Louis Marti

Radio World (April 7, 1923), p. 32

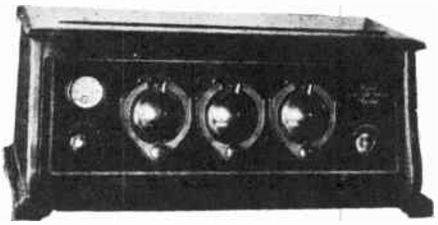
Wally Worth

Martian Big Four first advertised Feb. 1923, $6.50.

QUELQUES ATTRACTIONS SENSATIONNELLES A L'EXPOSITION RADIOÉLECTRIQUE DE NEW-YORK

COMME CELLE DE L'ANNÉE DERNIÈRE, L'EXPOSITION RADIOÉLECTRIQUE QUI VIENT D'AVOIR LIEU A NEW-YORK A PRÉSENTÉ AUX VISITEURS DE SENSATIONNELLES ATTRACTIONS. IL A SEMBLÉ INDISPENSABLE D'ATTIRER LE REGARD PAR LA CONTEMPLATION DE L'INFINIMENT GRAND ET DE L'INFINIMENT PETIT. — 1. Ce haut parleur, monté sur une colonne, emprunte sa forme [illegible] — 3. A l'écoute près du pavillon d'un autre haut parleur non moins gigantesque. — 4. Attitude plastique [illegible] sur le coffre d'un récepteur dont les dimensions et la forme rappellent celles d'un [illegible] bijoux de Paris.

Radioelectricite (Jan. 10, 1925), p. 7



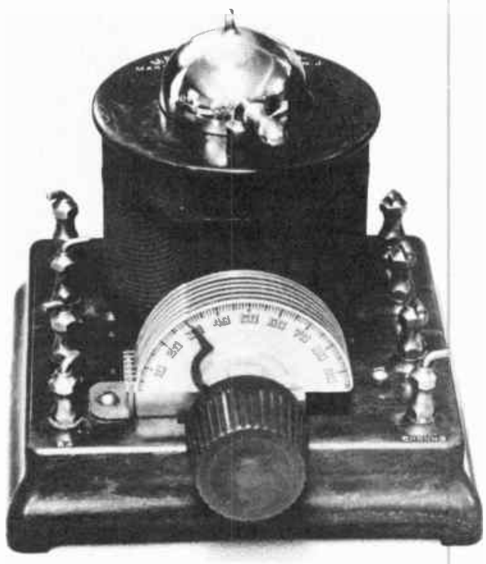
MARTI ELECTRIC POWER SET. Manufactured by the Martian Manufacturing Co., Inc., West Orange, N. J. Operated directly from 110 AC circuit. Solid black walnut cabinet 7 inches wide, 21 inches long. Price $175 with six tubes.

Radio Dealer (Sept. 1926), p. 144

"The infinitely large and the infinitely small." Presumably this is Charles Marti holding his newest creation at the Third Annual Radio Exposition in Nov. 1924.

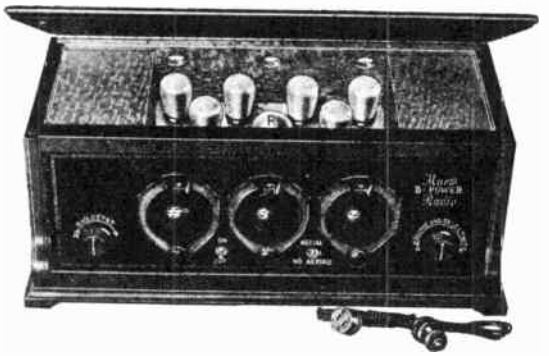
New England Wireless & Steam Museum

Martian Special
The top plate is engine-turned, as in Marti's later models.



John M. Williams

Martian Beauty   Dec. 1924



MARTI B-POWER RADIO. Manufactured by the Marti Electric Radio Co., Inc. Receiving set designed to use electric light socket for "B" current supply while storage "A" battery supplies filament current. 6 standard UX base and 1 rectifier tubes are used. Shielded; resistance - coupled audio circuit. Walnut cabinet measures 24" long, 11" deep, 10" high. List price $125.00.

Radio Dealer (Oct. 1926), p. 148

Popular Radio (April 1928), p. 329

Popular Radio (May 1927), p. 499

What's the Most Important Thing that Goes Into a RADIO SET?

Without it no Receiver Can Give the Service You Expect —The Marti Electric Power Radio Has It.

YOU may be one of those thousands of laymen who know little or nothing about the "insides" or "parts" of a radio receiver. All the wires and things you see inside a radio set mean nothing to you.

It follows then that of all the things that go to make a complete radio set the most important of them all is honesty, manufacturing honesty—the will and determination of the manufacturer to eliminate all skimping both in the selection of the parts and in the construction of the receiver.

The Marti's Success

In its scientific design and honest construction lies the success of the Marti Electric Power Radio. The Marti engineers have established the most thorough and severe series of parts tests.

Not a single part goes into the Marti-Electric Power Radio until it passes these tests and measures up to the Marti standard for that part's particular function. These service-tested, super-quality parts are then assembled on the Marti chassis to function most efficiently, one with the other. The result is an outstanding piece of workmanship, and a quality of broadcast reception as superior to other radio receivers as the tone of a Steinway is to an ordinary piano.

MARTI
ELECTRIC POWER RADIO

Operates Directly From Your House Current Socket

NO [A Batteries, B Batteries, Chargers] NO [Liquids, Acids, Eliminators]

It Mirrors Tone

Judged by the five standards by which any radio set should be judged—tone quality, volume, selectivity, dependability and simplicity of operation—the Marti Electric Power Radio will win your decision. The Marti reproduces the broadcast program naturally and without distortion. It mirrors tone. Illuminated dials permit of hair line tuning and the construction of the Marti assures dependable performance and long service. Electric power from your house current eliminates all "A" and "B" batteries, chargers and other bothersome accessories. Just turn on the switch—that's simplicity of operation.

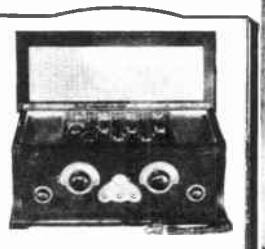
Hear the Marti at Your Dealer's.

Ask your dealer to let you hear the Marti Electric Power Radio. If he hasn't one in stock, write us for circular and address of nearest Marti dealer.

MARTI ELECTRIC RADIO CO., Inc.
WEST ORANGE, NEW JERSEY

Important Note to the Trade

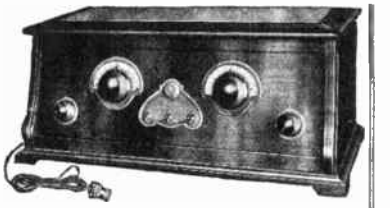
Heretofore the entire production of Marti Electric Power Radios has been taken by the Eastern market. We are now in a position to make an interesting proposition to high-class dealers and distributors in other parts of the country. Write or wire for complete particulars. See our exhibit at Radio Trade Show, Chicago, June 11-15.



The Marti Receiver is light and compact. Entirely self-contained —everything within genuine solid walnut cabinet. The two transparently illuminated dials—one for each hand—permit hair line tuning. And so highly selective is this Radio that you can tune in on any program that suits your fancy and be sure of perfect reception without interference.

Models up to $390.00
including all tubes

Described in *Popular Radio*, April 1928, pp. 316, 344.



Model T-2—with six AC Tubes—$225

Hear the new MARTI *Electric Power* RADIO

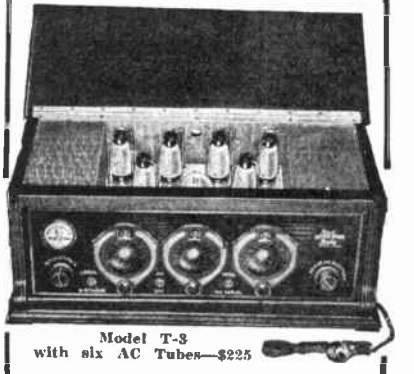
Current Direct from Light Socket to Receiver

Equipped with Six McCullough Tubes

Current direct from your electric-light socket to your Marti receiver! No A or B batteries, no trickle charging, no eliminators; just plug into your house current and the Marti receiver is ready to play.

The Marti is equipped with six long-life McCullough tubes.

Hear the Marti at your earliest opportunity. Ask your dealer for a demonstration.

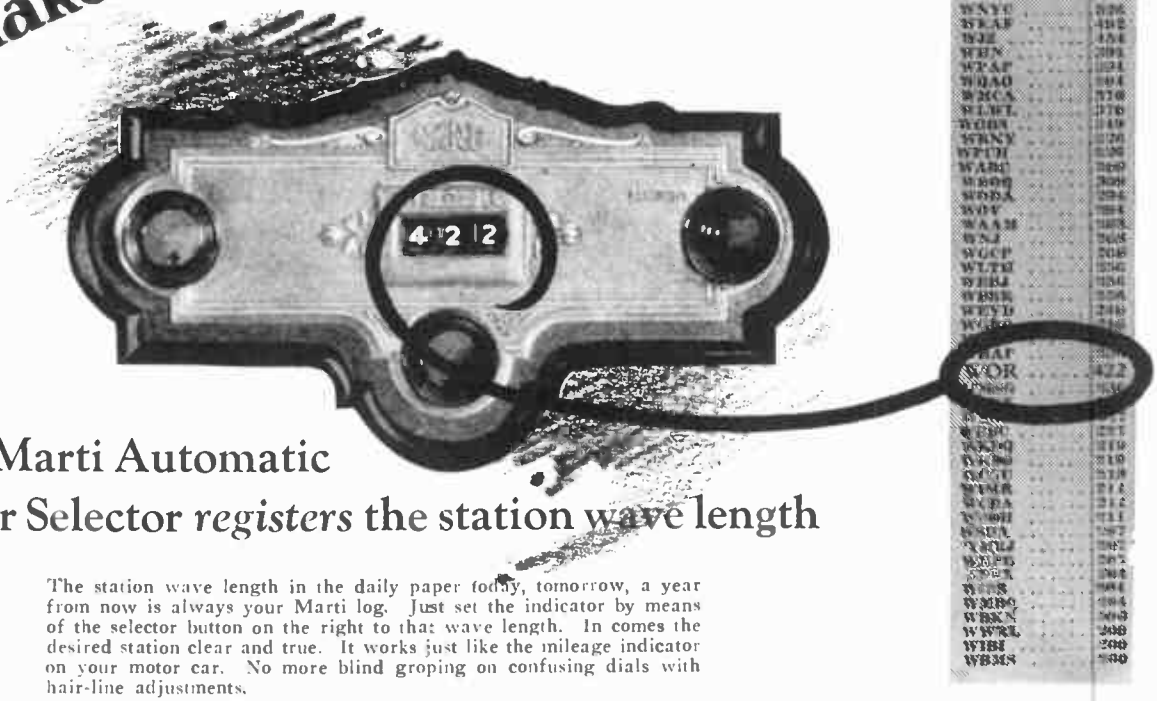


Model T-3
with six AC Tubes—$225

Marti Electric Radio Co., Inc.

After August 1927, model TA-2. $235; TA-10 with 1 UX210 tube inSept. 1927. Also desk models DC-2, $275; DC-10, $290; consoles CS-2, $325; CS-10, $350.

Let this new tuning feature make sales for you!



The Marti Automatic Meter Selector *registers* the station wave length

The station wave length in the daily paper today, tomorrow, a year from now is always your Marti log. Just set the indicator by means of the selector button on the right to that wave length. In comes the desired station clear and true. It works just like the mileage indicator on your motor car. No more blind groping on confusing dials with hair-line adjustments.

It is as fool-proof as it is accurate. It's lots of fun to tune in because it is entirely automatic. What is more, you are not limited to a few stations. The entire range from 200 to 550 meters is at your beck and call, local or long distance. When wave lengths change on November 11th, just consult the daily paper and set the indicator to the new figures. No other adjustments to be made.

In selling Marti sets, just let your prospect tune in on a few stations. That one experience in *registering* wave lengths instead of hunting for them will go a long way toward making the sale.

Everything in the set is of the best, PEERLESS Dynamic Speaker, fine workmanship throughout, and beautiful walnut cabinet. In appearance, tone quality, volume, selectivity and distance, Marti is among the finest.

Send for information regarding franchises in territories still open.

MARTI ELECTRIC RADIO CO., Inc.

East Orange,
New Jersey, U. S. A.

Opposite Ampere Station
Lackawanna, R. R.

New York Show Rooms
225 West 34th St., New York City.

Table Model. 7 tubes, three stages of tuned radio frequency amplification, three stages of resistance coupled audio with 210 power tube. (281 rectifier.) Phonograph "pickup" jack. Built in socket for Dynamic Speaker. Cabinet, two-tone Walnut.

List Price, $195, *Less Tubes*

MARTI
ELECTRIC POWER RADIO

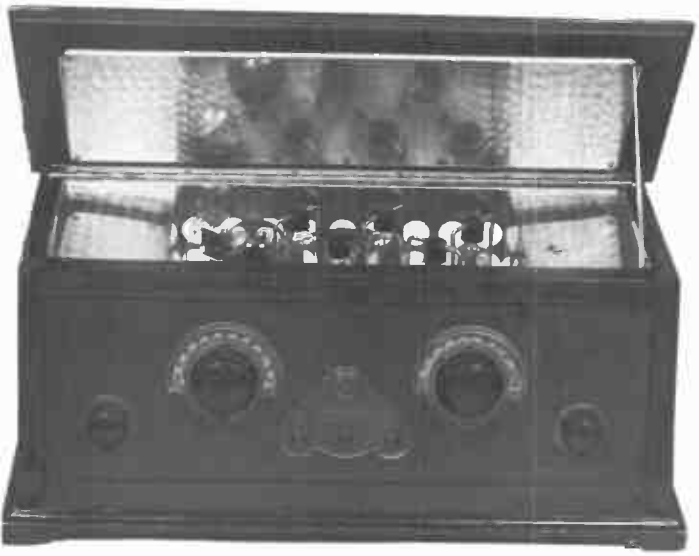
The Marti Console

Console Model. Two-tone Walnut. Phonograph "pickup" jack. 7 tubes, three stages of tuned radio frequency amplification, three stages of resistance coupled audio with 210 power tube.

List price including PEERLESS Dynamic Speaker $350. *Less Tubes*

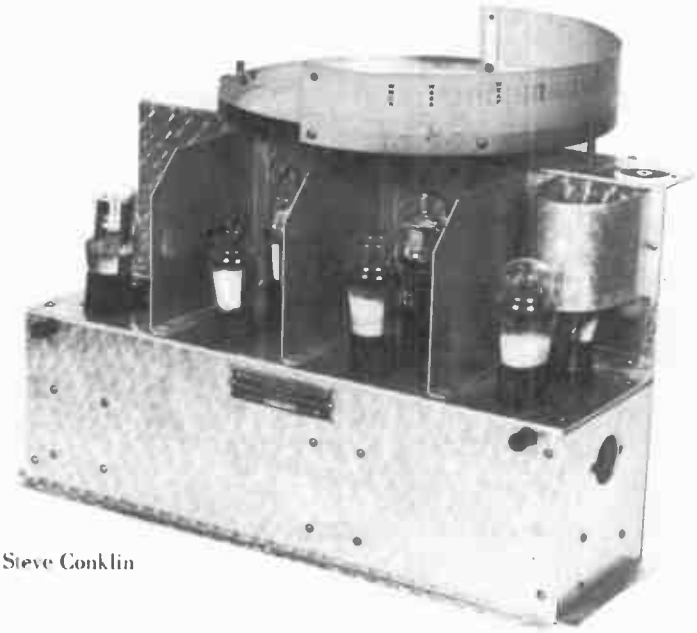
First advertised June 1928, $225 and $395.

Radio Retailing (Nov. 1928), p. 33



2R10 Ralph & Elinor Williams

Steve Conklin

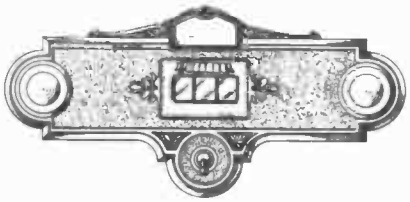


Steve Conklin

Model and precise date unknown, but nameplate reading "Marti Radio Corporation" indicates manufacture after the 1929 reorganization. The dial is visible through the magnifying lens; controls are thumb wheels hidden under the overhanging shelf.

E Steve Conklin

78,959. PANEL FOR RADIO RECEIVING SETS. CHARLES L. MARTI, West Orange, N. J. Filed June 25, 1928. Serial No. 27,263. Term of patent 3½ years.



The ornamental design for panel for radio receiving sets as shown.

Steve Conklin

METRO

Metro Electric Co.

The Metro Electric Company of Chicago is hard to pin down because it sold radios only by mail and through individual agents. In its 1926 application for the trademark "Metrodyne," it claimed to have used the name since April, 1924. Leo Gibbs, W8BHT, supplied the following information in a letter of April, 1984:

Metro Electric was located on (2165) N. California Avenue, near Armitage. It was a rather small outfit employing about 100 workers. Men and women in equal numbers. The upper two floors of the factory building were occupied by Metro. I started working there about May or June, 1929, as a tester. Two models were in production, both being similar 8-tube TRF AC models. One used 227's for the RF, detector and audio stages, plus push-pull 45's and an 80 rectifier. The other used 224's for the RF stages, plus 27's, 45's, and 80. A dynamic 10" speaker entirely made by Metro was used in both models. The power transformer, chokes, and audios were by Thordarson; and all components were of top quality. Furthermore, all mounting screws and nuts were soldered to prevent loosening under vibration. I believe Metro had a large interest in a vacuum tube factory and had ready access to tubes, which at that time, other radio companies were finding in short supply. Brand name stamped on the tubes and the sets was "Commander," possibly named after the chief engineer, Lt. Commander R.H.G. Mathews [founder of Zenith — author]. *"Matty" 9ZN was the designer and consultant of the sets. Jim Baker and Paul Pelletier were the junior engineers. I worked under Jim Baker. Metro went out of business on a cold snowy day just before Thanksgiving in 1929. Almost all of the production of 50 per day was exported to countries south of the border.*

Ser. No. 224,102. (CLASS 21, ELECTRICAL APPARATUS, MACHINES, AND SUPPLIES.) METRO ELECTRIC CO., Chicago, Ill. Filed Dec. 2, 1925.

Metrodyne

Particular description of goods.—Complete Radio Receiving Sets, Radio Receiving Sets Adapted for Combination with Talking Machines or Mechanical Amplifiers, Amplifier Units Containing Electron Tubes, Loud Speakers, and Amplifying Horns.

Claims use since April, 1924.

Ser. No. 287,829. METRO ELECTRIC COMPANY, Chicago, Ill. Filed July 29, 1929.

COMMANDER

For Radio Receiving Sets and Parts, Particularly Radio Inductance Units; Radio Frequency Subpanels and Kits Including Unassembled Elements Forming a Radio Receiving Set, Radio Loud-Speakers, Transformers, Condensers, Rheostats, Sockets, and Assembled Audio-Amplifying Units.

Claims use since about Dec. 29, 1928.

Ser. No. 287,830. METRO ELECTRIC COMPANY, Chicago, Ill. Filed July 29, 1929.

COVERLAND

For Radio Receiving Sets and Parts, Particularly Radio Inductance Units; Radio Frequency Subpanels and Kits Including Unassembled Elements Forming a Radio Receiving Set, Radio Loud-Speakers, Transformers, Condensers, Rheostats, Sockets, and Assembled Audio-Amplifying Units.

Claims use since about Dec. 29, 1928.

Super-Five Feb. 1925 $38.50
Metrodyne July 1926 $88.00
(1-dial, 5 tubes, not shown)

7 Tube Set
Single Dial Radio

30 DAYS FREE TRIAL

The Metrodyne

ONLY ONE DIAL TO TUNE

Retail Price
$75
Completely Assembled
Big Discounts to Agents and Dealers

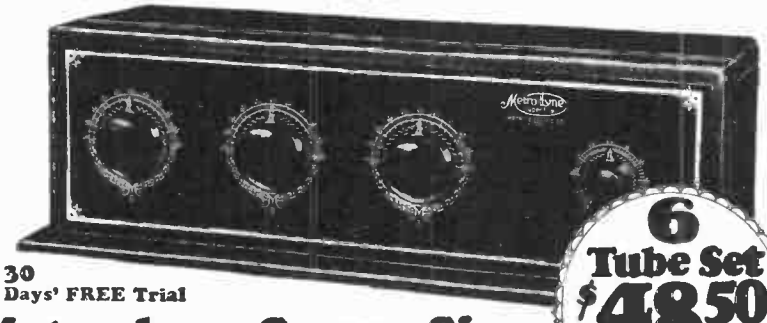
Wonderful offer direct from the factory! The world's greatest radio.
A perfect working, single dial control, 7 tube receiver. And just to prove our claims, we will ship it to your home for **30 days' free trial.** Test it under all conditions. Test it for distance, volume and tonal quality — and if you are not convinced that it is the best single dial set you ever heard, return it to the factory. We don't want your money unless you are completely satisfied.

BIG PROFITS TO AGENTS AND DEALERS
Our Agents and Dealers make big money selling Metrodyne Sets. You can work all or part time. Demonstrate the superiority of Metrodynes right in your home. Metrodyne Radios have no competition. Lowest wholesale prices. Demonstrating set on 30 days' free trial. Greatest money-making opportunity. Send coupon below—or a letter—for our agent's proposition.

Metrodyne Super-Seven Radio

A single dial control, 7 tube, tuned radio frequency set. Approved by America's leading radio engineers. Designed and built by radio experts. Only the highest quality low loss parts are used. Magnificent, two-tone walnut cabinet. Artistically gilded genuine Bakelite panel, nickeled piano hinge and cover support. All exposed metal parts are beautifully finished in 24-k gold.

Easiest set to operate. Only one small knob tunes in all stations. The dial is electrically lighted so that you can log stations in the dark. The volume control regulates the reception from a faint whisper to thunderous volume, 1,000 to 3,000 miles on loud speaker! The Metrodyne Super-Seven is a beautiful and efficient receiver, and we are so sure that you will be delighted with it, that we make this liberal **30 days' free trial offer.** You to be the judge.



30 Days' FREE Trial

6 Tube Set $48.50 RETAIL PRICE *Completely Assembled*

Metrodyne Super-Six

Another triumph in radio. Here's the new 1927 model Metrodyne 6 tube long distance tuned radio frequency receiving set. Approved by leading radio engineers of America. Highest grade low loss parts, completely assembled in a beautiful walnut cabinet. Easy to operate. Dials easily logged. Tune in your favorite station instantly on same dial readings every time. No guessing.

Mr. Howard, of Chicago, said: "While five Chicago broadcasting stations were on the air I tuned in seventeen out-of-town stations, including New York and San Francisco, on my loud speaker horn, very loud and clear, as though they were all in Chicago."

We are one of the pioneers of radio. The success of Metrodyne sets is due to our liberal **30 days' free trial offer,** which gives you the opportunity of trying before buying.

MAIL THIS COUPON or send a postal or letter. Get our proposition before buying a radio. Deal direct with manufacturer—**Save Money.**

Mail COUPON Below!

Let us send you proof of Metrodyne quality

F. L. Warnock, Greentown, Ind., writes: "I received the Metrodyne in good shape and am more than pleased with it. Got stations 2,000 miles away."

C. J. Walker, Mariposa, Calif., writes: "Received my Metrodyne Single Dial set O. K. I believe that these one-dial sets are going to be excellent sellers. I had no trouble in tuning in stations enough to satisfy anyone, so you will please send me another set."

Roy Bloch, San Francisco, Calif., writes: "Very often we travel from New York to the Hawaiian Islands quickly — from station to station — by means of the little tuning-knob which operates the electrically-lighted dial. The Metrodyne Single Dial Set is much easier to operate than any radio set I've ever seen."

We will send you hundreds of similar letters from owners who acclaim the Metrodyne as the greatest radio set in the world. A postal, letter or the coupon brings complete information, testimonials, wholesale prices, and our liberal **30 days' free trial offer.**

METRO ELECTRIC COMPANY
2161-71 N. California Ave., Dept. 107
Chicago, Illinois

Gentlemen:

Send me full particulars about Metrodyne 6 tube and 7 tube sets and your **30 days' free trial offer**

Name _____

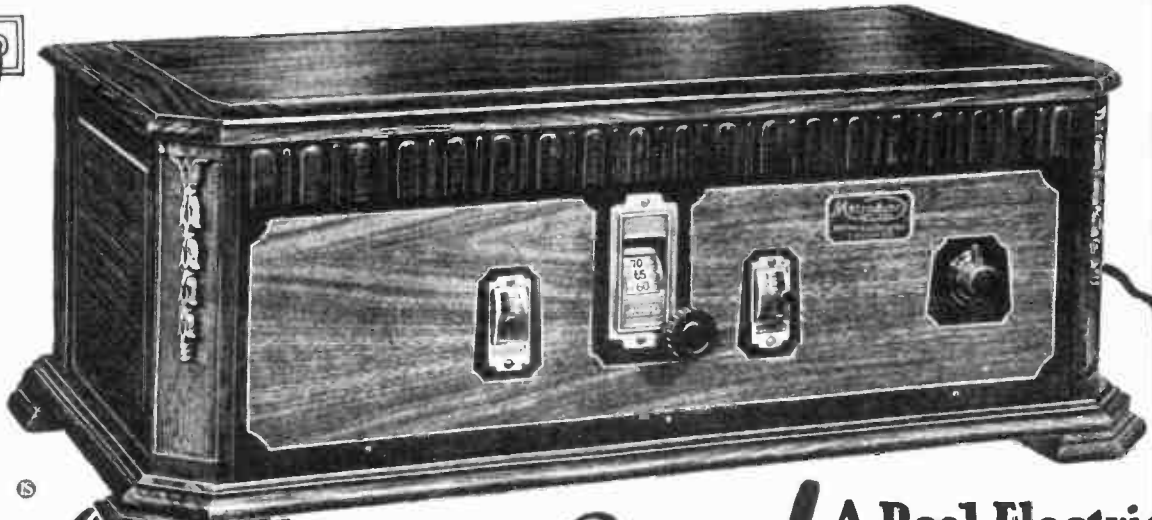
Address _____

If you are interested in AGENT'S proposition, place an "X" in the square ➡ ☐

METRO ELECTRIC COMPANY

2161-71 N. California Ave. • Dept. 107 • Chicago, Illinois

Super-six Oct. 1926 $48.50
Super-eleven Oct. 1926 $75.00



30 Days Free Trial

Now! A Real Electric Radio Set

Three Year Guarantee

Shipped direct from our factory at rock bottom prices—cost less than most battery sets

No Batteries, Chargers or Eliminators

No Acids; No Liquids—Plug In—Press Button—"Tune In'

Metrodyne

ALL ELECTRIC RADIO

Agents! Dealers—Big Profits!

Make big money taking orders for Metrodynes. All or part time. Metrodyne All Electric Radios are in a class by themselves. Unequalled for quality, performance and price. Demonstrate at home and take orders. Lowest wholesale prices. Your demonstrating set on 30 days' free trial. Mail coupon below for details.

Gorgeous Console Electric Radio

Here is the Metrodyne All Electric Console Radio — a gorgeous, genuine walnut cabinet, in a beautiful two tone finish. Has a built-in genuine Metro-Tone large size speaker. Brings in programs with great volume, reproducing the entire range from the lowest to the highest notes with remarkable clearness and distinction. All metal parts are finished in old gold. Wonderful electric radio, in a cabinet that will beautify the appearance of any home.

7 Tubes—Single Dial Set

100% Electric Radio

At last! The radio you've dreamed about! If you have electricity in your home you can now really enjoy coast to coast radio reception without the care, bother and muss of batteries, chargers, eliminators, etc. The Metrodyne All Electric is a real, genuine batteryless radio set. Simply insert the plug in the socket, press the switch button and "tune in." You could not possibly buy a better radio set than the Metrodyne All Electric, no matter what price you paid.

BEAUTY—EFFICIENCY DEPENDABILITY

The Metrodyne All Electric Radio is a 7 tube, single dial set. Only the highest quality low loss parts are used throughout. Solid walnut cabinet, beautiful two-tone effect, with handsome gilt metal trimmings. Size of cabinet, 28 inches long, 13 inches deep, 10 inches high. Has electrically lighted dial so that you can log stations in the dark. Only one dial to tune in all stations. Excellent tone qualities — wonderful volume — very selective.

Costs Less Than Most Battery Sets

Do not confuse the Metrodyne electric radio with ordinary light socket sets, because the Metrodyne is truly an all electric **radio** — consumes less than 2c worth of power a day. Comes to you **direct from the factory.** Its low cost brings it down to the price of an ordinary battery **set.** We are so confident that you will be delighted with this wonderful, easy-to-operate **batteryless radio** that we offer to ship it to your home for **thirty days' free trial** — you to be the judge.

Mail This Coupon

We are one of the pioneers of radio. The success of Metrodyne sets is due to our liberal **30 days' free trial offer,** which gives you the opportunity of trying before buying. Thousands of Metrodynes have been bought on our liberal free trial basis — **WRITE TODAY!**

METRO ELECTRIC COMPANY

2165 N. California Ave. *Dept.* 621 Chicago, Illinois

METRO ELECTRIC COMPANY
2165 N. California Ave., Dept. 621
Chicago, Illinois

Gentlemen:
Send me full particulars about Metrodyne All Electric Radio and your **thirty days' free trial offer.**

Name _____

Address _____

If you are interested in AGENT'S proposition place an "X" in the square ☐ →

MAIL COUPON NOW!

Ⓢ This seal on a radio, tool or oil burner advertisement signifies the approval of the INSTITUTE OF STANDARDS. See page 6.

New!

WONDERFUL!
Super-Eight—100% Electric
8 TUBES—SINGLE DIAL
Coast-to-Coast

30 Days Free Trial

{Battery or Electric}

Now comes Metro's latest achievement—the world's greatest electric radio set—a powerful long distance eight tube receiver—clearness of tone that is astounding—ultra-selective—a set that expert radio engineers have pronounced as the ultimate for all around perfection. And to prove our claims, we will send this marvelous set to you direct from our factory on **30 days' free trial.** Test it to your heart's content. Compare its quality, beauty and price with any other radio on the market, and decide to keep it only after you are satisfied that the new 1929 Metrodyne super-eight is the peer of them all.

Metrodyne
SUPER-EIGHT ELECTRIC

Save One-Half—Low Price a Big Feature!

You will be amazed at the low price of these wonderful sets, in the console or table cabinet. Our low cost of distribution **direct from our factory** enables us to save you about half their regular value. Never before in radio history have you been offered such sets at such low prices. And we are so sure of their quality, beauty and performance pleasing you that we do not hesitate to let you **try one for 30 days** before deciding to keep or return it.

SUPER QUALITY THROUGHOUT!

Eight powerful tubes. Highest quality low loss parts. Illuminated single dial. Positive switch control—simply turn a knob and it's on. Select your stations with accuracy at any desired volume. Beauty of tone that cannot be surpassed. Console and table cabinets are handsomely grained genuine walnut, hand rubbed, in two-tone effect—artistically carved trimmings. All metal parts finished in two-tone gold. Seeing is believing. **You will be the judge.**

Georgeous console with newest type, built-in sonorous loud speaker that reproduces the entire range of vocal and instrumental music. Amazingly clear and distinct. Low, direct-from-factory price on **30 DAYS' FREE TRIAL!**

AGENTS *and* DEALERS

The 1929 Super-Eight line offers great money making opportunities. Nothing like them for high quality—nothing near them in price. Let us prove this by shipping you a

Demonstration set on 30 days' free trial

Test it—compare it—demonstrate it to prospective radio buyers. Get our liberal discounts—exclusive territory—newspaper and billboard advertising offer that will help you sell Metrodyne radios quickly.

METRODYNE RADIO SETS *Are Equipped For* **BATTERY or ELECTRIC OPERATION**

We are one of the pioneers of radio. The success of Metrodyne sets is due to our liberal **30 days' free trial offer,** which gives you the opportunity of trying before buying. Thousands of Metrodynes have been bought on our liberal free trial basis. We will send you hundreds of letters from owners who acclaim the Metrodyne as the greatest radio set in the world. A postal, letter or the coupon brings complete information, testimonials, wholesale prices and our liberal **30 days' free trial offer—WRITE TODAY!**

Send Coupon Today for Our 30 Days' Free Trial Offer →

METRO ELECTRIC COMPANY
2161-71 N. California Ave. · Dept. 10 · Chicago, Illinois

METRO ELETRIC COMPANY
2161-71 N. California Ave., Dept. 10
Chicago, Illinois

Gentlemen:

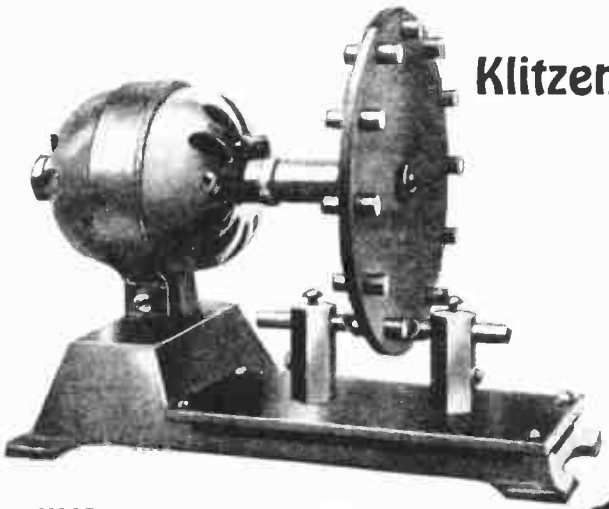
Send me full particulars about Metrodyne Super-Eight sets and your **30 days' free trial offer**

*Name*_____

*Address*_____

If you are interested in AGENT'S proposition, place an "X" in the square → ☐

Radio News (Sept. 1928), p. 195



Klitzen Rotary Spark Gap No. 125

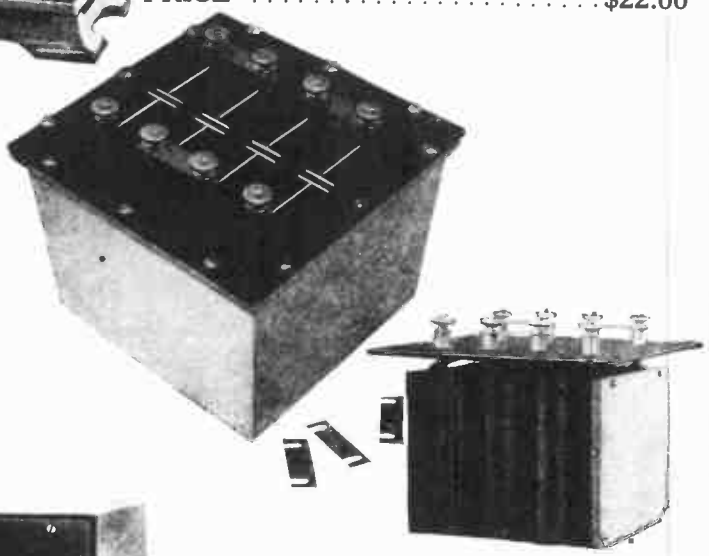
We were the first to manufacture a rotary gap on the spark thru principle and which is now recognized as the most efficient on short wave lengths. The current travel in this rotary is only 3", saving from 10 to 15 meters over other types. Rigid construction and accurate machining make this gap a very quiet running one. Disc of XX grade Bakelite-Dilecto and absolutely true. We balance every disc before assembly. Absolutely no vibration or noise. We apply the pencil test to every gap by placing a pencil upright on the sub-base until the wind alone will upset it. Motor of universal make 25-60 cycles 110-120 volts A.C. or D.C. Best motor made.

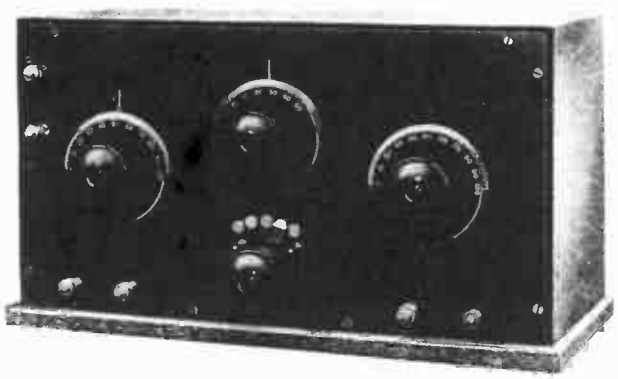
PRICE **$22.00**

KLITZEN OIL TRANSMITTING CONDENSER No. 112

This condenser is made adjustable to suit the varying conditions of various transformers. Its capacity is variable in steps of about .00238 M.F.D. from .00238 M.F.D. minimum to .00953 M.F.D. maximum. The engraved cover makes it easy for the amateur to use any hook up desired. The dilectric which we use will withstand a puncture test of 40,000 volts. Tests in our laboratory show that transformers offered to the radio field at the present time are unable to break down this condenser under the severst tests. The four sections are contained in an aluminum casting filled with Atlas AA special insulating oil.

PRICE **$22.00**





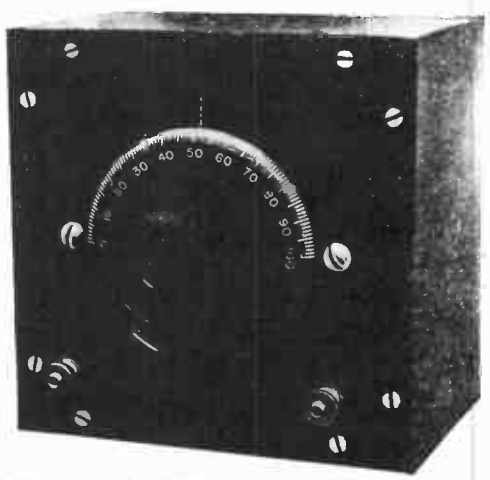
KLITZEN REGENERATIVE RECEIVING SET No. 225

A very efficient unit capable of extremely sharp tuning and wonderful sensitivity. Genuine mahogany cabinet, Formica panel, engraved dials, Bakelite coupler forms. We have tested this set on a one-wire aerial 40 ft. high and 50 ft. long, and have heard amateur stations on either the Atlantic or Gulf coast and as far West as the Rockies without the aid of an amplifier. Every user is a booster. Range of wave length 150 to 800 meters. **PRICE** **$35.00**

KLITZEN VARIOMETER No. 220

This variometer is capable of very sharp tuning, and is a wonderful aid when used as a load coil, in regenerative sets, audion circuits, feed back coil in regenerative circuits—in fact, anywhere that a variable inductance is desired. Cabinet of ebony black finish, panel of Formica, engraved dial, and nickeled metal parts.

INTRODUCTORY PRICE **$9.00**



IF YOU HAVE NOT RECEIVED OUR CATALOGUE "C" WRITE FOR IT.

KLITZEN RADIO MFG. CO.

1510 FLEET AVE.. RACINE. WIS.. U. S. A.

KLITZEN / MICHIGAN

Klitzen Radio Mfg. Co. / Michigan Radio Corporation

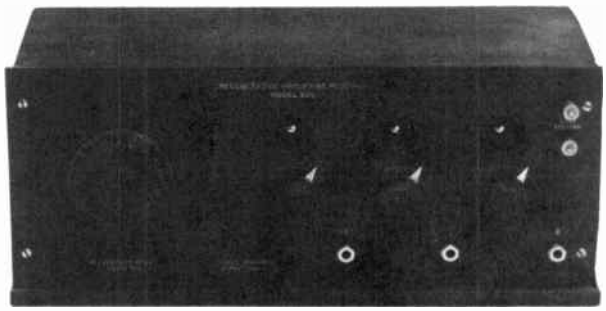
Milhart F. Klicpera 9CM of Racine, Wisconsin, began advertising rotary-spark-gap motors in *QST* as early as September, 1916. Since the Clapp-Eastham "Blitzen" gap was widely known, Klicpera chose "Klitzen" as his trade name. For a short time in early 1917 until the war put a stop to amateur activity, the Klitzen Wireless Apparatus Company was offering loose-couplers and also load coils.

In October, 1919, Klicpera incorporated as the Klitzen Radio Manufacturing Company. After advertising a regenerative tuner in April, 1920 (also in Catalog C in February), Klitzen joined the rapidly-growing roster of Armstrong licensees. In November, 1921, Montgomery Ward and Barawik both featured the Klitzen regenerative tuner and detector-amplifier in their ads while Ward also offered them in its 1922 catalog. By December 1922, Klitzen's own ads showed a similar (perhaps the same) tuner, detector-amplifier, and accessories.

At about the time Klitzen faded from public view, in November, 1922, the Michigan Radio Corporation began advertising and it is known that Michigan operated under a sublicense from Klitzen. For this transgression, Westinghouse sued Klitzen in August, 1923 (although it eventually sued every one of its 18 Armstrong licensees, so Klitzen was not alone), charging breach-of-license-agreement, and asking the court to enjoin Klitzen from selling through channels other than those specifically named in the original license. Running scared, Klitzen immediately cancelled Michigan's sublicense. Then Michigan was operating illegally; this, in turn, prompted the resignations on November 2 of chief engineer Floyd McCall and general manager W. C. Farnsworth, who went off to promote a new McCall circuit. That left President Lyons holding the bag, a particularly uncomfortable position when Westinghouse applied the screws by suing a Michigan dealer in New York City in about January 1924.

Somehow, by March, 1924, the difficulties were patched up; Michigan became a sort of sales agency for Klitzen in return for a $26,000 royalty payment to Westinghouse. It last advertised in January, 1925. Klitzen returned in April with a Grand Rapids address, listing two cheap models: the Kent and the Wolverine. But in 1926, it went into receivership and was dissolved on January 1, 1927.

Radio News (Nov. 1921), p. 457



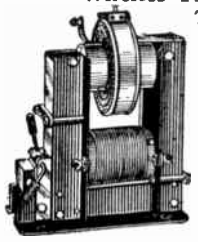
John Wolkonowicz

Buy Reliable Radio Apparatus

ORDER DIRECT FROM THESE PAGES

Wireless Transformers

Thordarson Type R



For use on 108 to 115-volt alternating current, 60 cycles. Generally accepted as the standard transformer for amateur transmitting. Provided with adjustable magnetic leakage gap which controls primary input giving a wide range of amperage and permitting easy adjustment to point of resonance. No impedance or choke coil necessary in primary circuit. Ship. wt., 35 and 55 lbs.

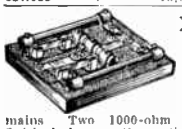
Art. No.	K. V. A.	Amp.	Sec. Volt	Price
63R630	½	1 to 6	10,000	$21.00
63R632	1	2½ to 14	25,000	38.00

Thordarson Type R. S. Transformer

This type differs from the well known model shown above only in that it does not have the adjustable magnetic shunt. All other features of sturdy, compact construction and correct electrical characteristics are the same. For use on 105 to 120 volt 60 cycle alternating current.

Art. No.	K. V. A.	Sec. Volts	Ship. wt.	Price
63R633	¾	3,000	15 lbs.	$10 00
63R634	½	10,000	25 lbs.	19 00
63R635	1	15,000	35 lbs.	28.50

Kick Back Preventer



63R5358—Prevents high frequency surges from discharging back into power line. A necessity when power transformer is supplied from city mains. Two 1000-ohm resistance rods. Mahogany finished base. Connections of strip copper. Ship. wt., 4 lbs. Price..... $4.80

Variable Transmitting Condenser—Oil Immersed

63R620—An oil immersed variable condenser for use with all makes of transformers up to 1 K. W., 25,000 volts. Phenol fibre dielectric, corrugated aluminum separators allow circulation of oil to keep down heating. Flat aluminum sheet electrodes with rounded corners. Variable in ten steps of .0009 M. F. each from .0018 M. F. to .009 M. F. Especially designed to prevent corona losses and brush discharge. Oil included. Ship. wt., 35 lbs. Price..... $25.00

Wireless Spark Coils

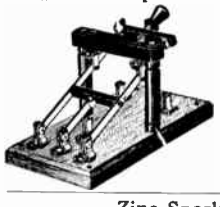
For use on dry cells or storage batteries. Properly adjusted the half-inch coil has a sending range of from 2 to 5 miles, the one-inch coil 5 to 10 miles. Ship. wt., 6 and 8 lbs.

63R5126 — Half inch coil..... $3.65
63R5127—1 inch coil... 5.95

Spark Coil Transmitting Condenser

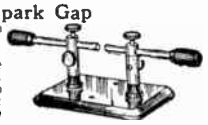
63R5348—Designed for use with spark coil sets, dielectric of 5—size, 5x7 photo plates. Mahogany finished case. Permits working on 200 meter wave. Ship. wt., 3 lbs. Price..... $1.48

Murdock Improved Antenna Switch



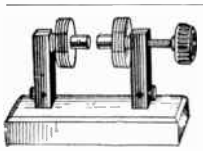
63R5113 — A large, sturdy, well built "change over" switch suitable for use on sets up to 1 K. W. Mahogany finish base. Improved support, copper blades. Fitted with third blade to disconnect receiver when sending. Ship. wt., 2½ pounds. Price..... $4.30

Zinc Spark Gap



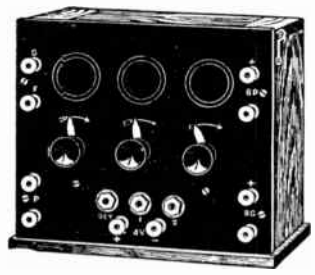
63R5350—For use with spark coil transmitters. Base is moulded composition. Metal parts are plated and polished. Can be used with coils up to 4 inches. Ship. wt., 2 pounds. Price..... $1.10

Radiator Spark Gap



63R5351—Micrometer adjustment. Electrodes of zinc. Cooling vanes aluminum. Metal parts nickel plated. Base glazed porcelain. Will handle over 1 K. W. Weight, 2 lbs..... $2.30

Combined Detector and Two Stage Amplifier



This instrument with the proper accessory instruments has the broadest possible range. So sensitive is it that even with an indoor aerial such as our loop antenna 63R650 messages may be received from stations hundreds of miles distant. Combined with our Regenerative set and two variable condensers and the proper couplers and loaders with a good outdoor aerial, its range is increased to equal the best commercial stations. Has one detector and two amplifier circuits. Standard tube sockets, grid condenser in detector circuit, two amplification transformers, three jacks and one plug so that any desired circuit may be used. Bakelite panel 7½ in. high, 8¾ in. wide. High grade weathered oak finish cabinet with hinged top making interior easily accessible. Binding post connections for batteries and couplers. Binding posts black oxidized finish. No tubes, batteries or phones included. Shipping weight, 18 lbs.
63R615—Price $33.50

Commercial Type Oscillation Transformer

$16.50

63R648—Designed to give wave ranges both above and below 200 meters. Solid copper windings on "Formica" supports 10½ in. diam. primary of six turns No. 3 wire 6½ in. diam.; secondary of twelve turns No. 5 wire. Mahogany finished woodwork. Two helix clips included. Ship. wt., 26 pounds. Price..$16.50

Murdock Oscillation Transformer

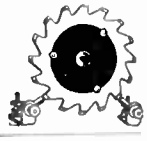
$4.75

63R5155—Permits sharp tuning on 3SO meter wave. Can be used on sets up to 1 K. W. Primary and Secondary windings of edgewise wound copper ribbon. Coupling carried by hinge. Shipping weight, 8 lbs. Price $4.75

Universal Spark Gap Motor

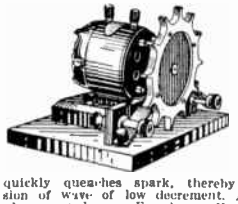
63R5624—A rugged high grade motor for spark gaps, running sewing machines, fans, small lathes, buffers, emery wheels, etc. Running idle will make 8,000 R.P.M. Will make about 4,500 R.P.M. with electrode shown below. Will operate on 100-125-volt A. C. or D. C. current. Black enamel finish. Height, over all, 5½ in. ¼ in. shaft, extends ⅞ in. Will develop about 1/20 H. P. Supplied with 1-in. grooved pulley. Ship. wt., 8 lbs Price.. $9.50

Spark Gap Electrodes



63R5625—Saw tooth rotor, 5¾ in. diam., of machined cast aluminum with bakelite center and brass bushing to fit ¼-inch shaft. Two adjustable stationary electrodes. This set together with universal motor listed above, mounted on a substantial base will make a high grade rotary spark gap. Ship. wt. 1½ lbs. Price, set..... $4.50

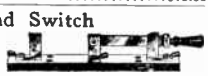
Improved Model Rotary Spark Gap



Flat pure copper electrodes avoid pitting. Width of break adjustable. Strong breeze generated by rotary electrode quickly quenches spark, thereby allowing transmission of wave of low decrement. All conducting metal mounted on Formica. Easily handles 40,000 volts without endangering motor windings. Constant steady speed. Ship. wt., 10 lbs. Shipped from stock at Chicago.

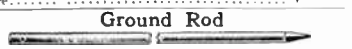
263R5142—½ K. W. size. 1/20 H.P. Universal motor. For 108 to 115-volt current. Speed 4,000 R.P.M. Price..... $14.80
263R5143—1 K. W. size. 1/12 H.P. Universal motor For 108 to 115-volt current. Speed 5 000 R.P.M. Price..... $18.95

Ground Switch



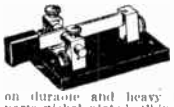
63R5359—600 volt, 100 ampere double throw single-pole switch on insulating base. For grounding aerial when not in use. Ground wire should be 4 gauge. Ship. wt., 5 lbs. Price..... $3.78

Ground Rod



63R1081—Iron Ground Rod; length, 6 ft. Heavily galvanized. A ground rod is necessary with every Radio outfit to insure a perfect ground contact. Shipping weight, 4 lbs. Price each... 43c

Double Action Wireless Key

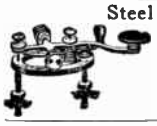


63R5356—Double action which makes for speed. Will improve your sending and lends individuality. Large standards, formica knob, heavy silver contacts suitable for use up to 2 K. W. Mounted on duraole and heavy formica base. Metal parts nickel plated. Ship. wt., 1¾ lbs. Price.. $4.65

Standard Wireless Key

63R5352—A high grade key made of heavy lacquered brass. Large hardened contact points. Ship wt., 1 lb. Price. $3.48

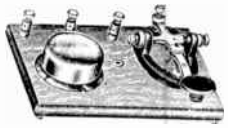
Steel Lever Keys



Shipping wt., 1½ oz.

63R1739—Leg Key with legs to go through table or desk. Price, each.... $1.85
63R1741 Legless Key to screw to top of table or desk. Price each $1.97

Wireless Practice Set



Beginners! Learn the Code!

Anyone learning wireless must know the code. Without it, it is impossible to understand the signals. Send for a wireless practice set and see how easy it is to learn the code. Set consists of a key and buzzer mounted on a polished wood base. Buzzer reproduces accurately the high pitched sounds of wireless stations. Connect a dry battery to the binding posts on the set by means of a short piece of wire, press the handle of the key and buzzing sound will be produced. In a very short time your ear will become accustomed to the various combinations of dots and dashes representing different letters and numerals. Practice until you can understand the signals at the speed sent by average stations and you have completed the most difficult part of wireless telegraphy. A very good way to learn the code quickly is to place two of these sets in separate rooms with an operator at each set and practice sending signals back and forth. Chart included with each set. Base size, 7x4¾ inches. Shipping weight, 3 pounds.
63R1750—Wireless practice set. $2.10

Standard Type Transformer

Operates only when connected onto alternating current line of 100 to 125 volts, 60 to 133 cycles. 100 watt Transformer produces 1½ to 24 volts, 150 watt 1½ to 30 volts in steps of 1½ volts each, and in addition can produce constant voltages, so that a number of different voltages can be drawn at the same time. Fitted with 7 ft. cord and attaching plug.

63R1697—Capacity, 100 watts. Ship. wt., 10 pounds. Price..... $4.35
63R1699—Capacity, 150 watts. Ship. wt., 13 pounds. Price..... $5.95

American Ignitor Dry Cell

We guarantee that these batteries will reach you fresh and will give you all the service you have a right to expect of the best 2½ by 6-inch dry cell made. Designed especially for heavy duty work. For ignition work on gas engines, automobiles, motor boats, etc. Average weight, 2 pounds. Size, 2½ by 6 inches. Average initial amperage, 25 to 30 amperes.

63R2501—Price each..... 37c
63R2502—Price, per dozen..... $4 30

Montgomery Ward & Co.
Satisfaction Guaranteed or Your Money Back

CHICAGO, ILL. ST. PAUL, MINN. KANSAS CITY, MO.

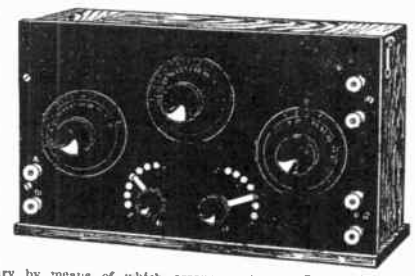
Send Your Order to House Nearest You

Prices are Right at Montgomery Ward & Co.

Satisfaction Guaranteed or Your Money Back

SATISFACTION GUARANTEED OR YOUR MONEY BACK

Short Wave Long Distance Regenerator Receiver $31.50

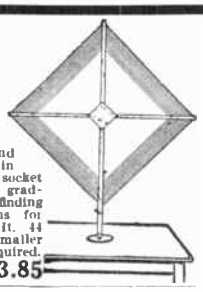


This instrument makes possible the reception of messages to which other types of apparatus will not respond. The range is from 180 to 600 meters and by the addition of external loaders, such as the inductance coils listed on the opposite page, this range may be raised as desired. Properly handled, signals may be read from stations at extreme distances or through heavy static and interference. The antenna and closed circuits are inductively coupled and the coupling is variable. Regeneration is obtained by tuning both the grid and plate circuits to resonance with the incoming signal. Highest efficiency and amplifications are obtained by reducing capacity and resistance in circuits to absolute minimum and best regenerative effects are secured by use of properly designed variometers.

The inductive coupler consists of a primary, the inductance of which is varied by two seven point switches, and a rotating secondary by means of which arrangement very fine tuning is possible. Coupler and both grid and plate circuit variometers are fitted with high grade knobs and indicating dials. A very compact and easily portable instrument. Graduated bakelite panel size 7¼ x 13¼ in. Fine cabinet weathered oak finish, 5 inches deep. Metal parts brass, black oxidized finish. Ship. wt., 26 lbs.

63R610—Regenerative Receiver. Price.....$31.50

Loop Antenna



63R651—Will receive messages from stations 300 miles distant, and much farther under favorable conditions. Wave length, 175 to 300 meters. Comes knocked down complete with brass plates and screws for holding arms in position, brass disc and socket for mounting on table, graduated dial for direction finding and complete instructions for assembling and using. Lft. 44 in. 100 ft. of No. 14 or smaller bare copper wire is required. Ship. wt., 5 lbs. Price without wire $3.85

Indicating Dials and Knobs

Marconi — New Gov. — Reg. — Ideal

Made of moulded black composition. Edges of dials are beveled, radial lines and figures are engraved in and filled with contrasting brilliant white enamel 3/16 in. thick.

63R5655—3-inch Dial only. Price.....39c

63R5657—3-inch dial with bakelite knob. Price 89c

63R5659—3¾-in. dial only. Price.....65c

63R5661—3¾-in. dial with 1⅝ in. government bakelite knob. Price.....$1.31

Black Composition Knobs

Ship. wt., 4 oz. each. Per doz. 1¼ lbs.

63R5665—Marconi style, 1¼ in. diam. Hole for 3/16 in. rod. Each,12c. Per dozen.....$1.10

63R5667—Marconi style 2⅛ in. diam. Hole for 3/16 in. rod. Each, 21c. Per dozen.....$2.40

New government style. Has brass bushing for 10/32 thread and two holes for stay pins.

63R5669—Diam. 1 inch. Each 11c. Dozen.....$1.25

63R5671—Diam. 1-5/16 inch. Each.....14c

Dozen.....$1.55

63R5673—Regulation 1½-inch knob with 8/32 bushing. Each.....11c Dozen.....$1.08

63R5675—Ideal 1¾-inch knob metal bushing for 3/16 rod with set screw. Each.....20c

Dozen.....$2.25

Binding Posts and Switch Points

A B C D E F

Made of brass, nickel-plated. Binding posts have ⅛ in. long 6/32 screws with washers. Switch points have ⅜ in. screws or shanks threaded 6/32. Ship. wt., per doz., 12 oz.

63R5636—Binding Post "A." Length, ⅞ in. Each.....9c Dozen.....95c

63R5640—Binding Post "B." Length 1-3/16 in. Each.....12c Dozen.....$1.28

63R5644—Binding Post "C." With bakelite knob. Each.....12c Dozen.....$1.38

63R5646—Switch Point "D." ¼x¼ head with soldering lug. Per dozen.....38c

63R5648—Switch Point "E." Head ⅜ in. diam. ⅞ in. high with 2 nuts. Dozen.....45c

63R5650—Switch Point "F." Head ¼ x ¼ with two nuts. Dozen.....46c

Grade M Formica Panels

Black sheets. Both sides polished. Waterproof, strong, lasting. Ship. wt., 2 to 8 lbs. Size given is in inches. $0.69

63R5688— 7x 9x1/8		
63R5690—14x18x1/8	Price.....	3.15
63R5692— 7x 9x3/16	Price.....	1.20
63R5694—14x18x3/16	Price.....	4.65
63R5696— 7x 9x¼	Price.....	1.58
53R5698—14x18x¼	Price.....	5.95

High Frequency Ammeter Jewel Pattern No. 25

An exceptionally accurate instrument. High frequency current heats a thermo-couple and the resultant energy is measured by a sensitive D'Arsonval galvanometer. Well damped, insuring a steady pointer. Temperature variations have practically no effect on the readings. Side terminals avoid making inductive loop in connection. Base diameter, 4¼ in. Ship wt., 6 lbs.

63R5360—0 to 3 ampere Range. Price....$14.25

63R5361—0 to 10 ampere Range. Price.....14.25

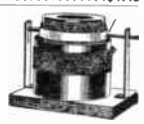
Hot Wire Ammeter

63R5365—Will measure accurately the radiation in the aerial and ground circuit. A necessity for tuning the transmitter to 200 meter wave. Range 5 amperes. Will stand 100 per cent overload. Base is of hard rubber composition. Nickel-plated rim, size 3½ inches diameter. Ship. wt., 1 lb. Price.....$4.25

Variometer

63R5640—This is the same high grade variometer that is used in our Regenerative set. With two variometers, a loose coupler and the proper binding posts, dials, knobs, etc., a regenerative set may be constructed at a very low cost. Can also be used separately for grid and plate tuning. Designed for very low dielectric losses and maximum range of inductance. Rotating element contacts made through ¼ in. shaft so that ball may be continuously rotated without breaking connection. Ship. wt., 2¼ pounds. Price.....$4.45

Loose Coupler



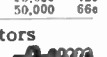
63R5642—The same high grade loose coupler used in our Regenerative set. With a loose coupler, two variometers and the proper binding posts, dials, knobs, etc., a regenerative set may be constructed at a very low cost. Can also be used separately. Primary has seven taps which can be connected up to vary inductance. Secondary rotates. Connections are made through shaft. Ship. wt., 3½ pounds. Price.....$4.20

Electrose Insulators

Electrose insulators are the standard in the wireless field. They stand up under all conditions met with. Eyes are wrought iron galvanized. Ship. wt., ½ to 2½ lbs.

Article No.	Dia. In.	Ov. all Lgth. In.	Strgth Lbs.	Elec. Value Dry Volt	Elec. Value Rain	Price
63R5630	2⅛	3¼	250	40,000	25,000	28c
63R5631	1½	4	1,000	40,000	15,000	42c
63R5632	1¼	10½	1,000	90,000	50,000	66c

Electrose Wall Insulators



63R5634—Special Wall insulator for lead in wires. Has hole through body for wire. Body diam., 2 in. Length over all, 5-9/16 in. Ship wt., 1 lb. Price.....93c

Switch Levers

Smooth in operation, always perfect compact without binding Black composition knobs, diam. 1¼ in. Metal parts of brass nickel-plated. Ship. wt., 4 oz.

63R5651—Complete knob, laminated lever and screw permitting mounting on panels not over ½ inch thick. Each.. 39c

63R5653—Complete knob, spring lever, shaft, two lock nuts and bushing for panels up to ⅝ inch thick. Each.. 49c

Send cash with your order to cover the price of the merchandise you select and transportation charges. Send currency by registered letter only. You take no risk in dealing with Montgomery Ward & Co., as we are one of the largest and most reliable institutions in the world.

Magnet Wire

For repairing motors, other electrical apparatus, experimental work, etc. One piece only on a spool. Wire is standard B and S gauge. Insulation and wire both perfect and uniform. Supplied only in weight spools given.

Double Cotton Covered Magnet Wire Art. No. 63R1350		Belden Enameled Magnet Wire Art. No. 63R1400	
Price 8 oz. Spool	Price 1 lb. Spool	Gauge	Price 8 oz. Spool	Price 1 lb. Spool
$ .65	$ .95	14	$ .45	$ .85
.69	1.03	16	.46	.87
.74	1.12	18	.48	.92
.84	1.34	20	.62	.94
.92	1.54	22	.65	.98
1.02	1.74	24	.70	1.10
1.18	2.06	26	.76	1.20
1.46	2.62	28	.85	1.38
1.64	2.98	30	.88	1.42
1.95	3.58	32	.92	1.52
2.84	5.34	36	1.20	1.96

New Code, Rubber Covered Wire, Single Braid

Solid conductor copper wire, insulated with rubber compound over which is one cotton saturated braid. Ship. wt., 3 and 13 lbs. per 100 ft. Sold only in lengths listed.

63R3015—Size 14. Price for 25 ft.....$0.32

Price for 100 ft....$1.17 Price for 500 ft.....$4.95

63R3032—Size 6. Price for 10 ft.....54

Per 25 ft.....$1.23 Per 100 ft.....$4.50

New Code Twisted Pair Cotton Lamp Cord

Two conductor, twisted New Code Lamp Cord. Conductor consist of fine copper wire strands twisted together. Covering is of fine quality interwoven yellow and green cotton. Ship. wt., 6 lbs. per 100 ft. Sold only in lengths listed.

63R3175—Size 18. Price for 10 ft.....28c

Per 25 ft.....65c Per 100 ft.....$2.37

Porcelain Tubes

Unglazed Porcelain Tubes, 5/16 in. inside; 9/16 in. outside. Length given is from underhead to end. Ship. wt., per dozen, 1 to 2 lbs.

63R3902—Length 3 in. Per dozen.....$0.22

63R3906—Length 6 in. per dozen.....43

63R3908—Length 8 in. Per dozen.....70

Unglazed Porcelain Cleats

Take No. 10 or smaller wires. Have 2½ in. wire centers. Ship. wt. per dozen pair, 3 lbs.

63R3923—2 wire cleats. Price per dozen 42c

Solid Porcelain Knobs

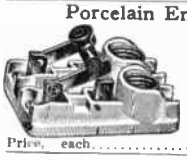
New Code No. 5½ solid porcelain knob. Height, 1-8/16 in. Diam., 1⅛ in. Hole, ⅛ in. Groove, 5/16 in. Ship. wt., per doz., 1½ lbs.

63R3927—Per doz. 32c

No. 4 solid porcelain Knob. Height, 1-11/16 in. Diam., 1½ in. Hole, ⅜ in. Groove, ⅜ in. Ship. wt., per doz., 2 lbs.

63R3929—Per doz.....45c

Porcelain Entrance Switch



National Electric Code Standard Porcelain Base Entrance Switch or main line cut-out switch. Takes plug fuses. Capacity, 125 volt, 30-amperes.

63R4305—Two-pole switch. Ship. wt., 1½ lbs. Base size, 3¼x5⅛ in.

Price, each.....76c

Antenna and Copper Wire

Supplied only in size coils listed.

63R5150—Aerial cable. Composed of seven strands No. 22 B. & S. gauge hard drawn tinned copper wire. Ship. wt., 6 lbs. per 100 feet.

50 feet, 49c 100 feet, 85c 500 feet, $3.95

63R5151—Bare copper wire No. 14 gauge.

50 feet, 22c 100 feet, 42c 500 feet, $1.70

63R5152—Bare copper wire No. 12 gauge.

50 feet, 33c 100 feet, 62c 500 feet, $2.65

A high grade Hardened Steel Plier. Used a great deal on all electrical work. Handy around any work shop. Ship. weight, 6 oz.

63R5802—6-inch Sharp Nose Plier. Price each.....$1.23

Best Hardened Tool Steel Diagonal Jaw Side-cutting Nipper. Length, 5 in. Ship. wt., 4 oz.

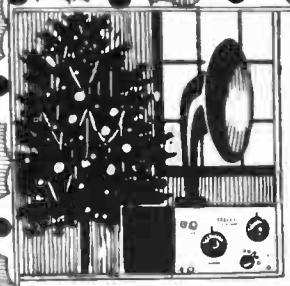
63R5806—Diagonal Jaw Pliers. Price.$1.28

CHICAGO, ILL. ST. PAUL, MINN. KANSAS CITY, MO.

Send Your Order to House Nearest You

Montgomery Ward & Co.

Satisfaction Guaranteed or Your Money Back



At It Since 1913

KLITZEN RADIO

Mfd. Under Armstrong License U.S. Pat. No. 1,113,149

Long-Distance Receiving Sets

No. 225—Tuner Unit, $60

No. 125—Detector and Amplifier, $60

The One Best Christmas Gift!

GET your order into your Radio dealer at once, as the demand threatens to overtax even our large manufacturing facilities.

The Klitzen Set is for **long-distance** as well as local service. Here, in Racine, we easily pick up Schenectady, Newark, Atlanta, Pittsburgh, Detroit, Minneapolis, Kansas City, St. Louis, Denver and stations in between.

Chicago, Milwaukee and Madison come in so strong that we have to "tune them down" for comfort.

CHOICE OF SETS

No. 225 and 125 illustrated above, hooked up together, constitute a highly efficient long-distance Receiving Set, complete, except for tubes, batteries and head phones or loud speaker —two units..... **$120.00**

No. 300, not illustrated—similar to unit No. 225 but with detector added, will receive from several hundred miles, but cannot be used with loud speaker. Price..... **$75.00**

No. 150. Three step amplifier, when added to No. 300 makes a set that reaches from coast to coast and can be used with loud speaker. Price..... **$75.00**

Built Under Armstrong License

The only kind of Radio Receiving Set that can be depended upon is an **Armstrong Regenerative** Set. Regenerative Sets can be built only by firms licensed under Armstrong U. S. patent 1,113,149.

By buying a **Klitzen** set you are not only sure of clear, satisfactory long-distance receiving, but you are protected against "buying a lawsuit." This caution also applies to dealers.

Your dealer will supply the necessary tubes, batteries, head phones and wiring equipment at equally reasonable prices, and will install your outfit —a very simple task— at the per hour cost of labor.

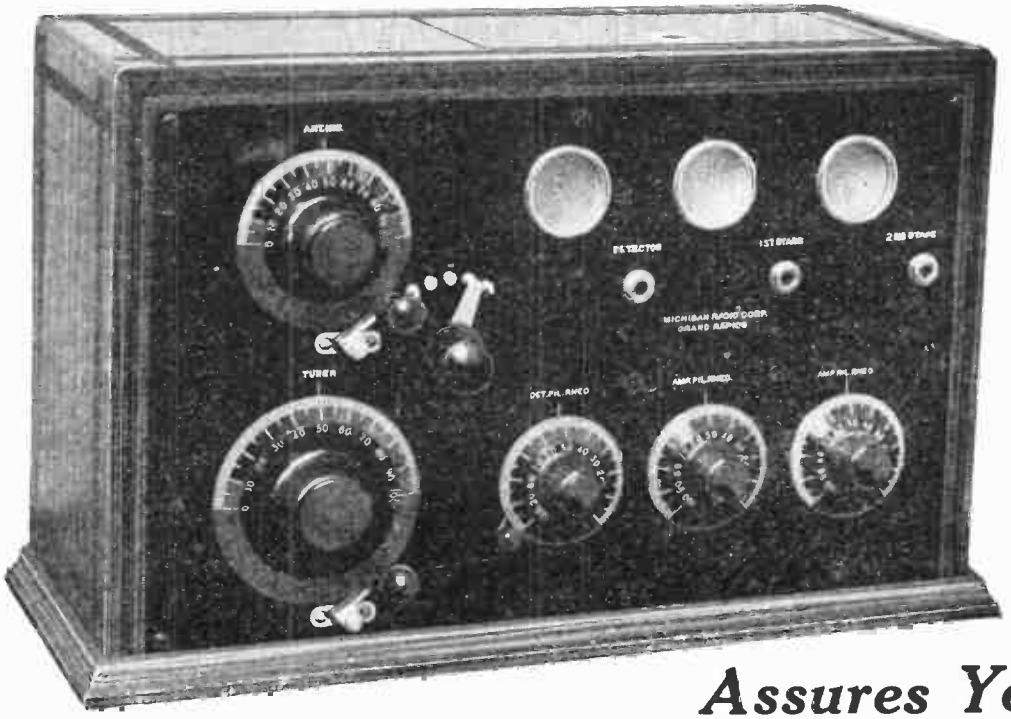
No Christmas Present you can give to your family, your friends, relatives or to **yourself,** will be a source of such endless pleasure and profit—the year 'round; and year after year.

Tell your dealer you must have a "Klitzen"— no substitute will do. Send for descriptive circular

KLITZEN RADIO MFG. CO.

Racine, Wisconsin, U. S. A.

A Michigan "Senior" Receiver



Assures You

MANY HAPPY BROADCASTS OF THE DAY

Equipment of the Michigan "Senior" Receiver

Tuner, detector and two stages of amplification. Wave length 150-650 meters.
Cabinet richly finished in brown mahogany, representing the highest standard of Grand Rapids cabinet work. Size 18¼" wide, 11⅜" high and 7" deep. Weight, approximately 20 pounds.
Vernier dial adjuster.
Filament control jacks.
Molded variometer wound with special green silk magnet wire.
Binding posts located on rear sub-panel, not inside.
Michigan Vernier rheostat for detector tube control.
Michigan filament rheostats for amplifier tube controls.
Radion hard rubber panel (shield over entire panel) on which are mounted all instruments, including rear sub-panel. This arrangement permits immediate accessibility to all instruments and wiring, by removing four front panel screws.

The ease of operation and the wonderful performance of the Michigan "Senior" Receiver makes any amateur sure of obtaining satisfactory broadcasting.
An outstanding feature of the Michigan "Senior" Receiver is the Vernier Dial Adjuster. This means that a very fine adjustment may be made on each dial, which is necessary in tuning in on stations, located at great distances.
Another superior feature is the Vernier Rheostat, which enables the operator to obtain extremely delicate adjustment of filament current on the detector tube.
Quality is the hallmark of all "Michigan" products.

"Senior" Receiver $125.00

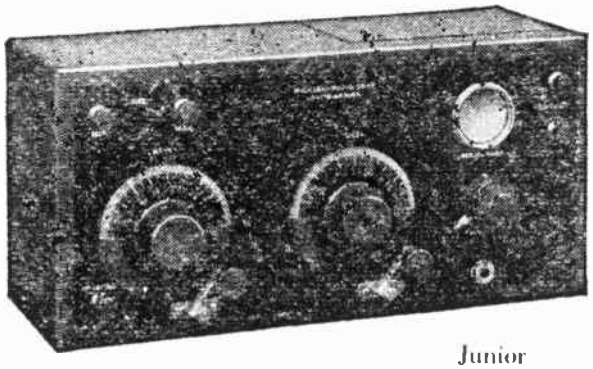
A complete line of radio parts and accessories are manufactured in our own plant. Michigan "Junior" and "Senior" Receivers are not merely assembled sets, but are made complete by us. We are, therefore, enabled to guarantee, absolutely, everything we sell.

Dealers: A connection with this Company will prove pleasant and profitable for you. Send for our catalogue of high grade, first quality merchandise.

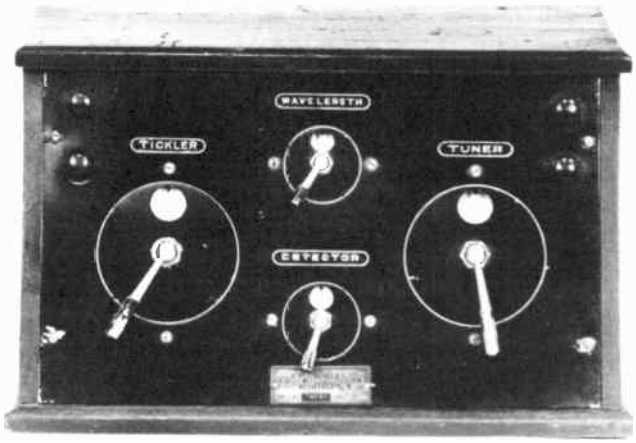
MICHIGAN RADIO CORPORATION GRAND RAPIDS, MICHIGAN

MRC7 Senior Dec. 1922 $125.00 MRC3 Junior Dec. 1922 $ 57.50.

Wireless Age (Dec. 1922), p. 108



Junior



John Terrey

M10 Midget (MRC10 after May 1924)	July 1923	$27
M11 (later MRC11)	Jan 1924	$30

Radio Digest (June 16, 1923), p. 12

MICHIGAN MIDGET

The Sensation of Radio

No. 10 Detector

$27

No. 11 Amplifier

$30

NEVER before have such quality sets been offered at anything like the price of the Radio Midget (both Detector Unit and Amplifier Unit).

Distance
Clearness
Selectivity

These three features stand out in the Michigan Midget and have truly made it "The Sensation of Radio." The quality of the materials and workmanship is the best and the engineering skill of design has made the Michigan Midget the long distance wonder.

Here is a set that tunes out local stations and brings in distant stations—clear and loud.

Go where you may—look over all the sets offered and then you will be more convinced than ever that there is nothing on the market to equal the Michigan Midget.

Send for catalog of other Michigan Quality Radio Products

MICHIGAN RADIO CORPORATION
GRAND RAPIDS, MICHIGAN

Radio News (March 1924), p. 1353

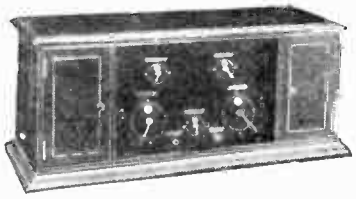
Radio Broadcast (June 1924)

M12 Jan. 1924 $57 MRC12 after May

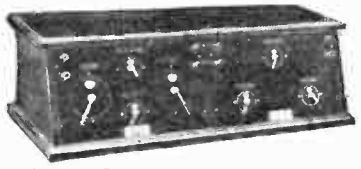
You'll be Proud of This Michigan Four

"America's Most Beautiful Set"

Michigan "de Luxe" 4 tube receiver 1 stage R.F. amplification. Built-in adjustable loud speaker. Solid mahogany case. "America's most beautiful set" M R C 4, $150



3 tube receiver in handsome case with inlaid panel door, and compartments for batteries, head phones, etc. M R C 3, $87.50



1 Tube Regenerative Detector and 2 stages of amplification. The set we never could catch up on orders for last year. M R C 12, $57.00

Michigan two stage amplifier. Will operate any loud speaker. Gives any degree of volume desired without distoration. Can be used with any receiving set. M R C 11, $30.00

2 tube regenerative long distance wonder. M R C 2, $32.50

THE art of Chippendale, the grace of Louis XIV, the sturdiness of the Jacobian period have been combined in this wonderful Michigan four cabinet. And in the radio receiving set itself, all the latest development in good construction and design have been incorporated. One stage of radio frequency, a detector, and two stages of amplification, give you distance—selectivity and unusual volume.

A built-in loud speaker, with adjustable feature of exceptional mellow tone quality is part of the set.

Also compartment with ample room for batteries. The set operates equally as well on Standard Six Volt or Dry cell tubes.

The beautiful mahogany cabinet with inlaid drop panel gives you a set that cannot be surpassed for beauty and service.

Write for Illustrated Folder
Ask Your Dealer for Demonstration

Other models and types to meet all requirements from $32.50 up.

Licensed under U. S. Patent 1,113,149-letter pending 807,388

MICHIGAN RADIO CORPORATION

32 Pearl Street — Grand Rapids, Michigan

MRC4	July 1924	$150.00
MRC3	Sept. 1924	$ 87.50
MRC2	Nov. 1924	$ 32.50

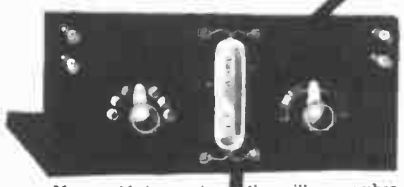
Radio Broadcast (Nov. 1924), p. 124

The Evolution of the Present-Day 1920 MIRACO RADIOS 1928

MIRACO engineers, veterans of the industry, have for eight successful years pioneered new developments and betterments in the performance of radio. The latest Miracos are thus the culmination of eight continuous successful years of achievement in radio. Few other big radio manufacturers of today—even though they may style themselves "pioneers"—can point back to an unbroken chain of accomplishments dating from 1920. Crude as some of these early Miraco radios now appear, in their "day" they were outstanding successes—just as the beautiful new Miracos of today represent the latest in thoroughly modern radio achievement.

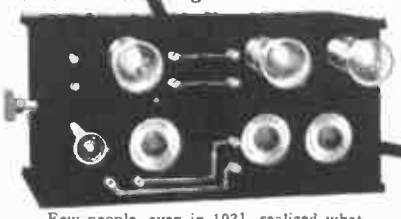
You take no risk in ordering a Miraco—it is the result of 8 years of continuously successful radio experience.

1920—Miraco V-T Control



Many old-timers in radio will remember seeing this Miraco advertised in "QST" and other magazines back in 1920.

1921—Miraco Single Tube



Few people, even in 1921, realized what a slumbering giant the radio industry was to prove to be—but Miraco engineers were preparing for the great day.

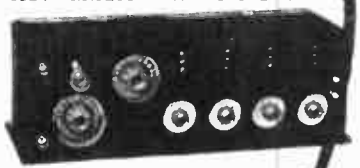
1922—Miraco Broadcast Receiver

Do you recall the thrill you experienced when you heard your first radio? For 1922, Miraco was an amazing performer.

1923—Miraco R-3 Three Tube Set

It seemed as if radio had made tremendous progress when users all over the country hooked up this little 3-tube Miraco and heard programs hundreds and thousands of miles away.

1924—Miraco MW Four Tube Set



Before radio stations started to jam the air, the Miraco MW amazed everybody with its coast to coast reception on a loud speaker.

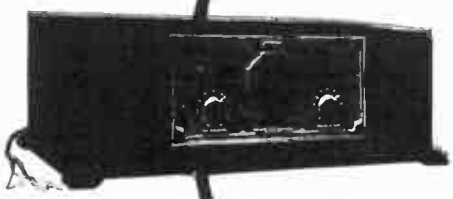
1925—Miraco Five Tube Set

Another sensation was created with the appearance of this selective five tube Miraco. It had seven controls but nobody worried about simplified tuning in those days when radio was still a great novelty.

1926—Miraco Five Tube Set

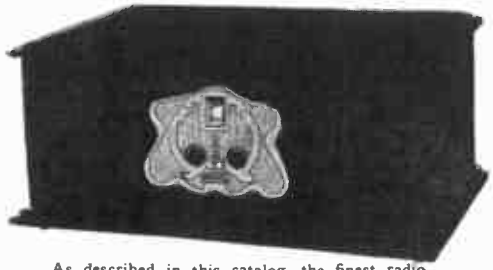
An improvement over the 1925 model. With fewer controls, sharper tuning and finer tone quality, the Miraco of this season proved far ahead of contemporaries.

1927—Miraco Single Dial Set



One of the first successful single dial sets to actually possess the selectivity, volume and power of three dial sets plus remarkably fine tone quality. This Miraco scored a tremendous success. Many thousands in use.

1928—Miraco "Unitune-8"



As described in this catalog, the finest radio set the industry has known—a Miraco value made possible only through the eight years of successful radio accomplishments which preceded it.

If this 1920 model was ever "advertised in *QST*" it was in invisible ink.

MIDWEST

Midwest Radio Co.

A.G. Hoffman began building radios in his basement in 1920 and soon was doing a good mail-order business, advertising primarily to the rural market. In the 1930's he was well-known for fancy console models that superficially resembled Scotts, but sold for a fraction of the price. After the war, Hoffman moved into television. In 1953, Cincinnati businessman Spencer W. Cunningham became president of Midwest, making TV's for a year or two before calling it quits.

Radio News (March 1922), p. 878

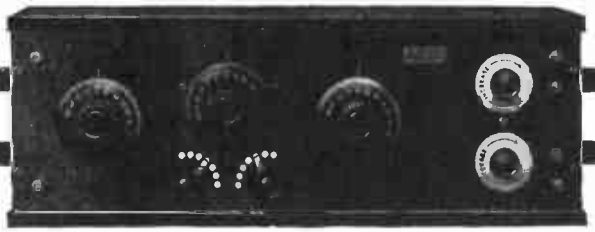
Miraco March 1922 $18
2-step amplifier, Sept. 1922, $25

Radio News (Oct. 1921), p. 316

1927 catalog

This set was advertised for just one month—Midwest had no Armstrong license!

MIRACO Radio Frequency Broadcast Receiver



REPRESENTING THE LATEST DEVELOPMENT IN LONG DISTANCE RADIO RECEIVING SETS

Provides sharper tuning, with less controls, eliminates interference.

AMPLIFIES BEFORE IT DETECTS which makes it capable of bringing in concerts and signals from extremely long distances.

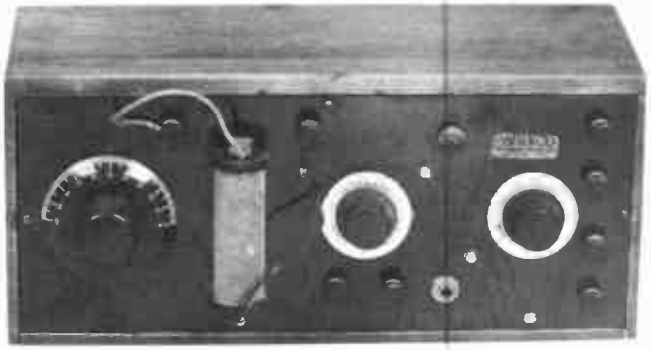
$55.00 PREPAID—Less tubes, phones, and batteries.

DEALERS WRITE NOW

Send for literature descriptive of this and other "MIRACO" Products.

MIDWEST RADIO CO.

804 MAIN STREET, CINCINNATI, OHIO

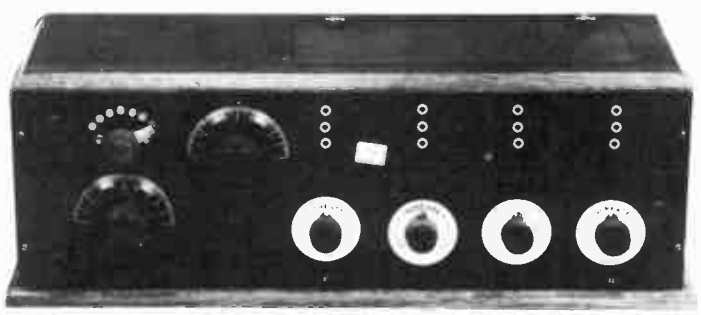


Radio News (Nov. 1922), p. 942

R3 Richard Foster

MA-2 or K March 1923 $29.50

John Terrey



MA4 or MW March 1923 $54.50
one-tube set, Nov. 1923, $18.50.

John Terrey

Radio's finest low-priced receivers

E. D. Elliott of Milford, New York—one of the hundreds of MIRACO fans—writes us that with the MIRACO set pictured below—priced at only $29.50—he heard, among many others, the stations listed below. These results would do credit to a set costing many times as much.

List of Stations

LONDON, ENG.	
WLAY	Fairbanks, Alaska
NNW	La Palma, Panama
PWY	Havana, Cuba
CFAC	Calgary, Can.
CJCY	Calgary, Can.
KSL	San Francisco, Cal.
KHQ	Seattle, Wash.
KFBU	Lorine, Wyo.
WMAT	Duluth, Minn.
CFCA	Toronto, Canada
CJCI	St. John, Can.
WRP	Dallas, Tex.
NGE	Miami, Fla.
WIAZ	Miami, Fla.
WHAB	Galveston, Tex.
WOK	Pine Bluff, Ark.
WJAZ	Chicago, Ill.
WJAB	Lincoln, Neb.
WMAM	Beaumont, Tex.
WCAG	New Orleans
WLW	Cincinnati, Ohio.
WOQ	Kansas City, Mo.
WGY	Schenectady, N. Y.
WEAB	Dodge, La.
KMC	Tacoma, Wash.
KOB	New Mexico
KMN	Butte, Mont.
KMAV	Auburn, Ala.
CFZC	Montreal, Que.

THAT thrill of getting long distances—generally to be had with only the most expensive sets—is part of MIRACO'S year round entertainment.

They're easy to tune in—Cincinnati hears 'Frisco, Denver hears Schenectady, New York hears Havana! Many new refinements account for such long range.

Improved rheostats with multiple resistance windings enable you to use any type of tube—a new aluminum shield prevents annoying body capacity effects—and shock absorbing pads prevent tube noises.

All sets are fully guaranteed against defects of material and workmanship. Price for the 4-tube outfit shown in top illustration is only $54.50.

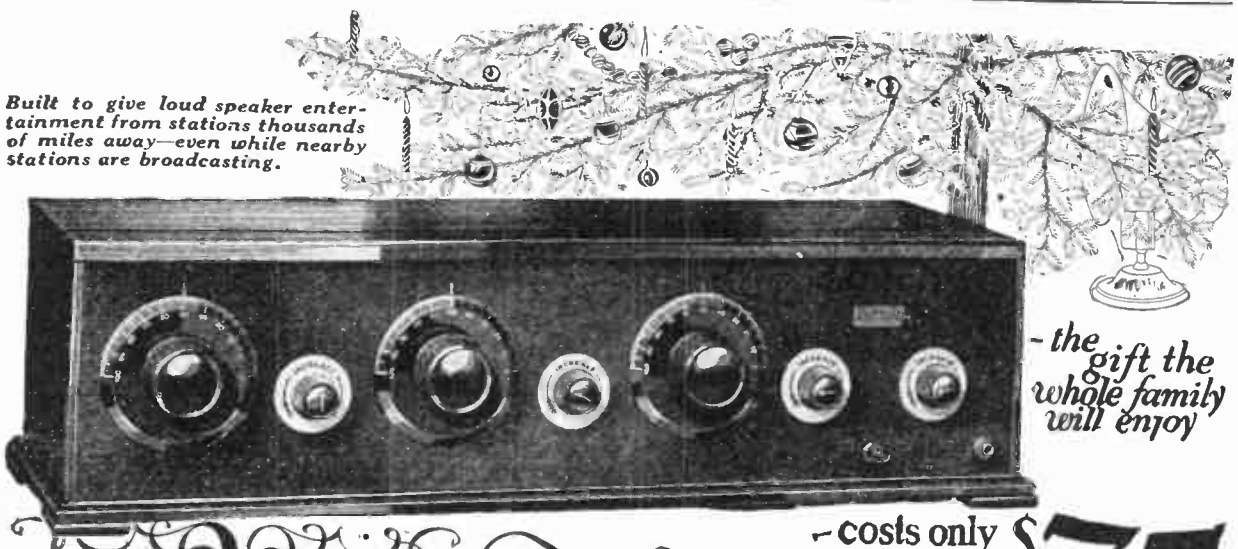
Other details of MIRACO receivers are explained more fully in our new bulletin. Write today for a copy.

THE MIDWEST RADIO COMPANY
808 Main Street Cincinnati, Ohio

The Improved MIRACO

Popular Science Monthly (April 1924), p. 92

Built to give loud speaker entertainment from stations thousands of miles away—even while nearby stations are broadcasting.



—the gift the whole family will enjoy

—costs only $75

The Marvelous MIRACO Ultra 5 ★

[FIVE TUBE OUTFIT IN BEAUTIFUL SOLID MAHOGANY CASE]

Unsurpassed selectivity, sensitivity, range, volume and tone combined

A beautiful sweet toned, five tube, "coast to coast" loud speaker set—factory-built, factory-tested and factory-guaranteed by one of America's oldest and most reliable manufacturers of quality sets. Composed of the finest parts obtainable. Equipped with the latest improvements, refinements and features found on costliest sets. Encased in a handsome hand-rubbed **solid mahogany** cabinet. Looks and performs like $200 set.

Thoroughly tested and approved by radio's highest authorities. **For only $75—a price which has rocked the industry!** Unquestionably the most astounding value offered radio lovers.

Simple to connect and operate. No experience necessary.

Even a beginner can quickly learn to cut through the locals, get far-off programs loud and clear on the speaker, log all stations and bring them back at will. Full directions with each set.

The Miraco **"Ultra 5"** is non-radiating, non-howling, non-distorting. Has cut-out switch—and a first stage phone jack, for tuning—on front of Bakelite panel. Bakelite sub-base under which all wiring is hidden, and other newest features. Operates on storage battery or dry cells.

Other Miraco Long Distance Sets $14.35 up

The Improved Miraco 1925 Model MW—with filament switch, phone jack, etc.—is a four tube outfit that users in every state report outperforms and out-distances sets twice as expensive. Operates loud speaker on distant stations. One stage tuned r.f. amplification, detector, two stages a.f. amplification. Solid mahogany cabinet. Value beyond duplication at **$54.50.**

This wonderful new Miraco Model R-3 is the three-tube, long distance, loud speaker set that has created such a sensation. Easy to tune and log. Covers wave lengths 150 to 625 meters. Detector acts also as a tuned r.f. amplifier. 2 stages a.f. amplification. Has no equal for simplicity, volume, range or clearness at anywhere near its price of **$29.50.**

Miraco Model R justly deserves its title, "Radio's finest low priced quality receiver." One tube acts as a tuned radio frequency amplifier and detector combined. A great distance getter. Easy to operate and log. Covers all wave lengths 150 to 625 meters. Like all Miraco sets, it uses storage battery or dry cells. Never such value before at only **$14.35.**

Send coupon for free bulletins [or order direct from this ad]

MIDWEST RADIO CORPORATION, Pioneer Builders of Sets
406-D East Eight Street, Cincinnati, Ohio.

Send free literature and full particulars about your complete line of Miraco products.

( ) Dealer ( ) Jobber ( ) Agent ( ) User

NAME.....

ADDRESS.....

All Miraco sets are factory-built, COMPLETELY ASSEMBLED, factory-tested and factory-guaranteed. They may be used with any tubes or batteries.

MIRACO RADIO GETS 'EM COAST TO COAST

NOTE: Remember that Miraco Tuned Radio Frequency Sets are built and fully guaranteed by a reliable, long established concern, one of the first to build quality sets. Thousands of users endorse their satisfactory performance. Send for further testimony of coast to coast reception and proof that Miraco Sets are radio's finest low-priced receivers.

COLORADO HEARS N.Y. AND CALIFORNIA

I heard New York and California the first night on my Miraco.—Fred Knappenburg, Jr., Burns, Colo.

NEW YORK HEARS ALASKA

Received 115 stations with my Miraco including WLAY Fairbanks, Alaska, NNW Panama, KSL San Francisco, WLV, Houston, Texas, and CFAC, Calgary, Canada.—E. D. Elliott, Milford, N. Y.

OHIO HEARS 12 CITIES THE FIRST NIGHT

The first night we tried out our Miraco we got Atlanta, Philadelphia, Washington, New York, Detroit, Davenport, Omaha, Hastings, Nebr., Chicago, Schenectady, Pittsburgh and Texas. We think that was real good for beginners.—W. L. Musselman, New Carlisle, Ohio.

NORTH DAKOTA HEARS 43 STATIONS FIRST 3 DAYS

Bought a Miraco, operated it three days and received: WGR, WLW, WDAP, KFI, CHOM, WJAZ, WMAF, CFAC, WTAM, KYW, KFAX, KLZ, WWJ, WOC, WPAA, 9PI, KDAK, WBAP, KFXX, PWX, WOS, WHB, WDAF, WHAS, KFI, KFKB, WLAG, WBAH, WHA, KCAL, WEAF, WOAW, WCAE, KGW, WCK, WGY, KSD, WPAM, CKY, WCBD, WTAY. Who has a better record?—W. L. Johnson, Ashley, N. D.

DEALERS, AGENTS

Write for our new proposition. The nation-wide use and popularity of Miraco Sets, their amazingly low prices and the extensive advertising we are doing, makes them wanted everywhere. Send coupon today—good territory open.

Radio Broadcast (Dec. 1924), p. 408

Ultra 5 Nov. 1924 $75 R Dec. 1924 $14.35 R3 Dec. 1924 $29.50

"Astoundingly Selective!"

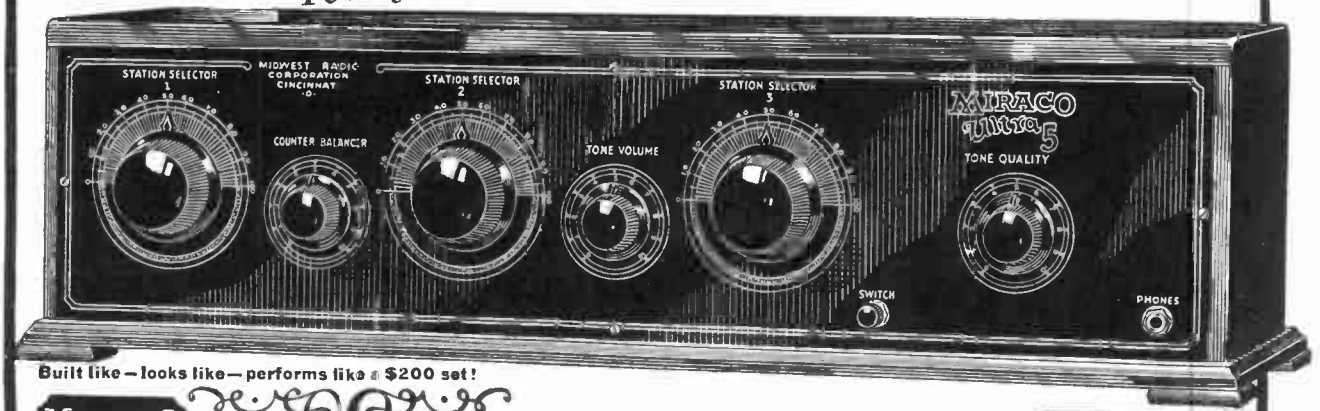
"Delightfully clear tone with Amazing Volume"

"Tremendously Powerful"

"Gets 200 to 600 meter stations coast to coast"

"A great big beautiful set"

"Simple to tune—easy to log"



Built like—looks like—performs like a $200 set!

MIRACO RADIO GETS 'EM COAST to COAST

Notice!

Enormous demand for the celebrated Miraco Ultra 5 (resulting from its many enthusiastic users so highly recommending it to their friends) has enabled us to add hosts of costly new features, latest refinements and up-to-the-minute improvements such as you might expect to find only on the newest sets selling at much higher prices. So the Improved Ultra 5 for 1926 is even a better set—a more beautiful set—a more selective and more powerful set—incredible as this may sound!—for less money than ever before.

Reports from Ultra-5 users everywhere leave little for us to add. These are typical of the many in our files and which we receive daily:

Wins in Distance and Tone

The Miraco five-tube has all the other five-tube radios beat by a mile. All my friends have radios, but they can't get distance or clear tone as I can with mine. I have about 65 stations now and I get them as far as Oakland, Los Angeles, Calgary, Miami, Fort Worth, Omaha, and a lot more. Leon J. . . . . Buffalo, New York.

Utah Hears Coast to Coast

My Miraco Ultra 5 is a marvel. Directly I got it hooked up I got Zion, Ill., loud and clear on loud-speaker, and have had a great number of stations coast to coast since, all coming in on loud-speaker very clear. I consider it one of the best sets I have heard and am greatly pleased with it. John R. . . . . St. George, Utah.

Pennsylvania Hears California Very Loud

I received the Ultra "5" Set, set it up as directions called for, and received Dallas, Texas, first station. Will list a few of the stations received in two hours: KDKA, WHAS, WOR, WDAW, WOS, WTAM, WCAE, WOO, WJY, WJS, KFI, KSI, WWJ, WHN, WHX, NSCX. It is very easy for me to receive Los Angeles, California, loud enough to be heard in any room in the house. W. E. . . . . Uniontown, Pennsylvania.

California Gets New York on Loud-Speaker

I have got stations from coast to coast without any trouble at all on Ultra-5, WTAM, Cleveland, Ohio, comes in on loud speaker nearly as loud as the near-by stations do. I have brought in on loud speaker with ample volume to hear all over the room stations WEAF, N. Y., KDKA, Pittsburg, Pa., WGY, New York, CHCX, Ottawa, WSAI, Cincinnati, WCCO, St. Paul, Minnesota, WLS, Chicago, S. S. . . . . Dorris, Calif.

"Greenhorn" Hears Stations Everywhere

To date have had about fifty stations on the Ultra-5 including Los Angeles, Havana, Winnipeg, Boston, etc. Which is going some for a greenhorn I think. Lynn C. . . . . Bowling Green, Ohio.

New Jersey Hears California on Loud-Speaker

MIRACO Ultra "5" working fine. Have received Western coast. Had two stations in California on same night. Have had many other stations. Receive all stations with loud-speaker. Nivison Van . . . . . Freehold, New Jersey.

Radio Expert Speaks from Experience

As I sell almost all kinds of sets, I have operated all of them and will state that the Miraco Ultra-5 is as good if not better than any other set in the market today. Felix J. . . . , Pawtucket, R. I.

Prefers it to $150 Sets

I received your Miraco Ultra 5 Radio Set, and it surely is a peach. I have tried and heard radios up to the value of $150.00 but I like yours the best. William I. . . . . , Syracuse, New York.

Illinois Hears Alaska

The night I received the Ultra "5" I tuned in New York City. The second day I tuned in KFJ Los Angeles, Calif., and KFJ Junes, Alaska. Can get anything in the United States. I will put it against any set I have ever heard. H. H. . . . Ashkum, Illinois.

Got California Better Than $269 Set

Received the Miraco Ultra-5 the other day and it is a big surprise. Compared it with my friends' $269.00 . . . . and could bring them in just as loud and clear on my Ultra 5. Really I brought in Los Angeles, California on speaker louder than he did. Kyle . . . New Albany, Miss.

The Powerful New MIRACO Ultra 5

Now only $59.50 Retail

Send for Special Offer!

[FIVE TUBE SET IN BEAUTIFUL MAHOGANY CABINET]

Let the testimony of its many users everywhere—as voluntarily reported to us in writing—convince you that a Miraco Ultra-5 actually is unsurpassed for selectivity, long distance range, clear tone, loud speaker volume and beauty—combined with economy and simplicity of operation—at several times the price. Send coupon for plenty of this proof and reports of users which leave no doubt that the Miraco Ultra-5 gets programs coast to coast as well as from foreign countries.

The improved new Miraco Ultra-5 is a beauty! Handsomely gold-etched genuine Formica panel and large Bakelite knobs with "arrow-point" indicators for fine tuning, add to the stylish appearance. Mahogany cabinet is hand rubbed. A radio you will be proud to have your friends see.

Completely built, carefully tested and factory guaranteed by one of America's oldest and most successful makers of quality sets, the Miraco Ultra-5 illustrated above (latest improved model for 1926) in the opinion of radio experts is an astonishing bargain. Selectivity, long distance reception, clarity and volume have been amazingly increased—"B" battery consumption is minimized—oscillations are easily controlled on all wavelengths, through use of latest radio inventions. Among these are: "Duoformers" (ultra low-loss inductance coils); the "Counter-Balancer" (patented); flexible wiring which prevents broken or noisy connections; an adjustment for different length aerials; use of only two rheostats; a cut-out switch; concealed wiring under genuine Formica sub-panel and other features of costliest sets. Literature describes them fully. Send for it—and Special Offer!

Other Miraco Long Distance Sets $13.75 up retail

Wonderfully improved new models in one-tube and three-tube Miraco Long Distance Sets also ready at lower prices! Powerful new Miraco R-3 at only $27.35 (retail) operates loud speaker on distant stations. New one-tube Model R is also a record-breaker for distance at $13.75.

All Miraco sets work on storage or dry batteries, are easily connected and operated. Unmatched values! Let testimony of users convince you. Write for literature and Special Offer—use coupon.

All the Proof you want is waiting for You!

Reports from their hosts of users in every state prove Miraco sets—at their rock-bottom factory prices—out perform sets costing up to three times as much. Send for latest literature, SPECIAL OFFER and plenty of additional testimony from users leaving no doubt that "Miraco Radio Gets 'em Coast to Coast."

AGENTS! DEALERS!

Write for the new Miraco proposition. Nation-wide use and popularity of Miraco sets, coupled with their amazingly low prices, make them wanted everywhere. Easy to sell due to their wonderful tone, volume and distance-getting. Send coupon today!

MIRACO RADIO GETS 'EM COAST to COAST

Send coupon for free bulletins

AND SPECIAL OFFER

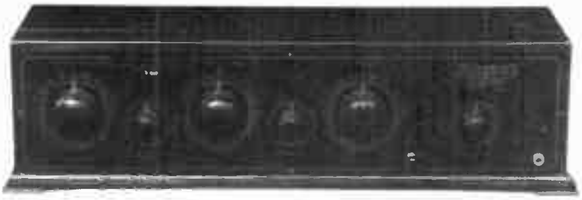
MIDWEST RADIO CORPORATION
Pioneer Builders of Sets
Cincinnati, Ohio

404-H East Eighth Street

Send free literature, SPECIAL OFFER and all particulars regarding Miraco Sets.
( ) Agent ( ) User ( ) Dealer.

NAME .....

ADDRESS .....



Ultra 5 Oct. 1925 $59.50

Herb Parsons

7th Anniversary Special!

Only $19.95 net—an unheard-of price for a high-grade, fully guaranteed 5-tube radio! It's the new $30 (retail list) Miraco **Compact**—14' wide, finished in brown mahogany. Can't be equaled anywhere near the price in quality of construction, selectivity, distance-getting power, tone, ease and economy of operation—**let 30 days' trial prove this!** Complete with high-grade accessories—nothing else to buy—only $49.85 net. Act quick—supply limited. Get Special Offer!

FREE! 30 DAY TRIAL

Another bargain, direct from factory, Coast to Coast range. Powerful, selective; clear, sweet tone.

Compact Feb. 1927 $19.95

Radio News (Nov. 1926)

Popular Radio (Feb. 1927)

30 DAYS FREE IN YOUR HOME

Tested and approved by all of Radio's Highest Authorities

Send Coupon for Amazing Special Offer!

NOTE: This offer is made to prospective buyers by famous big Radio Corporation, one of America's oldest reliable manufacturers of fine sets—seventh successful year. Many satisfied users in every state. Postal or coupon brings testimony of nearby users and proof Miraco's outperform sets costing up to 4 times as much. Very easy to install and operate.

AMAZING SPECIAL OFFER to User-Agents who will allow friends to listen to their Miracos.

BEAUTIFUL-BIG-POWERFUL Ultra Selective MIRACO Ultra 5

Retail LIST Price ~~$49.75~~ now only — GET SPECIAL OFFER — one year GUARANTEE

Built like—to look like—and perform like $200 sets

Real Single Dial Control!

Magnificent Big Powerful Miraco "Unitune-5" Retail List price only $87.50—get special offer

The celebrated Miraco Ultra-5—U.S. Navy type circuit, has also been adapted to Single Dial Tuning—**without sacrifice of selectivity, volume, clearness, power, tone, or distance getting qualities!** In the magnificent big Miraco Unitune-5, above shown, you turn one vernier knob for stations everywhere. Beautiful hand-rubbed, piano hinged, solid walnut cabinet, 28 in. long, 15 in. deep, 10 in. high. Sloping Bakelite panel is walnut finished to match. **Also offered on 30 days free trial!**

Coast to Coast and Foreign Reception Certified by Miraco users

MIRACO RADIO GETS EM COAST to COAST

Send for Proof!

Notice! Enormous sales of the celebrated Miraco 5-tube Receivers (resulting from delighted users so highly endorsing them to friends) again enable us to add hosts of costly new features, latest refinements and up-to-the-minute improvements such as you might expect to find only on much higher priced sets. Miraco's this year are still better—more beautiful—more selective—more powerful for less money than ever before.

USER-AGENTS WANTED . . WRITE!

Reports from users everywhere leave little for us to add. These are only a few of the many in our files and which we receive daily. Send coupon for plenty of additional proof and testimony of nearby users.

CUTS OUT LOCAL, GETS PROGRAMS EVERYWHERE. Meridan, Miss. Everyone says my Miraco 5 is the best set they have heard. It gets stations all over the states, also Mexico, Cuba. Have a broadcasting station next door but it doesn't matter with the Miraco 5. I get them just the same. H. B. Hendrick.

COAST TO COAST THRU LOCALS

Omaha, Nebraska. Miraco is a wonder for distance, volume, tone. We have 4 local broadcasting stations here and she goes right thru and brings them from coast to coast. No trouble at all. H. N. Filer.

BEATS OTHERS FOR SELECTIVITY. Cleveland, O. Have been up against some pretty good radio men with other sets and this receiver has them guessing. In selectivity, volume and range it has outdone several. We were able to cut out WTAM (powerful local station) in 3 points, to bring in other stations. W. C. Pike.

"UNITUNE" SEPARATES CHICAGO LOCALS. Chicago, Ill. With 4 local stations broadcasting less than a mile away, one after another I can tune and keep separated as high as 16 Chicago stations on your "Unitune-5". Even during the summer I frequently got stations clear and loud on speaker as far away as Colorado, New Jersey, New Orleans and many others. With the single dial I switch from one to another station in an instant. The selectivity is amazing, the set is a beauty and the tone is perfect. W. H. Schaeffer.

FLORIDA GETS CAL. FIRST NIGHT. Daytona Beach, Fla. Tuned in 45 stations the first night ranging throughout Florida, Cuba and as far as California with Miraco 5. Monte Rankin.

OHIO HEARS THEM COAST TO COAST. Westerville, O. We have to our credit about 85 stations from CFCF Montreal, Canada to British Columbia, Canada, WIOD Miami Beach, Fla., two stations in California; a station at Seattle, Wash. We are more than pleased with the Miraco 5. Dan Groce.

HONOLULU TO LONDON FROM IOWA. Anthon, Iowa. Here are some of the stations we picked up on the Miraco 5 Sunday Jan. 24 between 10 and 11 P. M.: 2LO London, KYO Honolulu Hawaii; WKAQ San Juan, P. R. and one station in Ireland; could not get call letter. John Kuhn.

NEW YORK LOGS 163 STATIONS. Buffalo, N. Y. I received 2LO London, 11:56 on Monday night but there was so much interference it was not very plain. I also have logged 163 stations in U. S. and Canada. A satisfied user of Miraco. Norman W. Ives.

NEBRASKA HEARS PORTO RICO ON SPEAKER. Spencer, Nebr. Using the Miraco 5 we have often heard Mexico City, Porto Rico, Miami, Florida, Ottawa, Canada and Vancouver, B. C., Canada and all along the Pacific Coast. All the above stations on the speaker. Have also heard Lima, Peru, South America. H. J. Schmidt.

TEXAS GETS 'EM N. Y. TO CAL. Waco, Texas. In less than a week after I installed the Miraco-5 I tuned in on the loud speaker New York City; Oakland, Calif; Minneapolis, Minn. Mexico City, several stations in Florida and many others. E. E. Sits.

TONE, VOLUME, DISTANCE. Elbing, Kans. We like our Miraco fine especially because of its volume, tone and its freedom from howling. Although I do not try much for distance we received programs from Oakland, Cal.; Los Angeles, New York, Miami and Havana. Mrs. E. A. Regier.

MIRACO EQUALS $240 SET. Onaka, S. D. Miraco works fine. Selective and plenty of volume. Stations logged include Winnipeg, Canada; PWX, Havana, Cuba; and CYL, Mexico City, Mexico. Have heard quite a few sets, one costing as much as $240, but can't see where it is any better. Clarence Rusch.

NO HOWLS—SUPERIOR TO COSTLY SETS. Modoc, Ind. We certainly enjoy our Miraco-5. Results equal to any radio I ever heard and far superior to most radios costing a great deal more. All stations come in loud and clear on the loudspeaker. James Tullis.

OUTPERFORMS 6 AND 8 TUBE SETS. Duncansville, Pa. I don't think there is a better receiving set made than a Miraco-5. Stations received—all on the loudspeaker—include KFI, Los Angeles, Calif.—distance, 2,250 miles. I got this on loudspeaker plain, when others couldn't get it with 6 and 8 tube sets. Also have heard Can., Colo., Fla., Cuba, Neb. and many other states. S. D. Fowkes.

OREGON HEARS 'EM FAR AND CLEAR. Chiloquin, Ore. A few stations I have heard very clear on Miraco include California, Denver, Colorado; Hastings, Lincoln, Nebraska, Chicago, Louisville, Kentucky; also Catalina Island. Cyril W. Benson.

CALIFORNIA HEARS PENNA. ON SPEAKER. San Rafael, Calif. I have purchased three of your sets and will give you an idea of what the Miraco-5 does out here. I have logged 86 stations, which I can get nearly any time I try. Mexico City on the South to CFCN, Calgary, Canada, on the North, with Honolulu to the West and E. Pitts., Pa., to the East. All on loud speaker, clear and plain. Roy L. Sharer.

CUTS THRU POWERFUL LOCAL. Pontiac, Mich. The Ultra-5 is sure a wonder. I live 1/4 of a mile from WJR a 5000 Watt Station and can cut through with ease and receive distant stations. During the International Test Week I received 2LO London, England; also CZE Mexico City, Mex. I have received stations from WMBF Miami Beach, Florida to KFI Los Angeles, Calif. In conclusion I'll say it's everything you claim it to be. Very truly yours, Edward J. Elkins.

Send coupon for Amazing Special Offer

Big Powerful New MIRACO

Solid Walnut Cabinet — Unitune 5 — 28 in. long

Solid Walnut Cabinet — Ultra 5 — 27 in. long

TRADE MARK REGISTERED

ULTRA-SELECTIVE LONG DISTANCE 5 TUBE SETS EASY ON BATTERIES

SAVE or **make** a lot of money on sets and accessories by writing immediately for our **Amazing Special Offer!** It will astonish you. Unless 30 days' trial proves a Miraco the most selective, clearest toned and most powerful distance-getter among beautiful big 5-tube sets, don't buy it.

Send for Testimony of Users Everywhere

First, reports of delighted users will assure you that the beautiful, big Miraco's actually are unsurpassed (even at much higher prices) for razor-edge selectivity combined with extreme long distance reception, clear natural tone and powerful loudspeaker volume, plus economy in use of battery current.

Second, it is our honest conviction—based on seven years' successful experience in building fine sets—that these latest Miraco's are the most marvelous values offered in high-grade receivers.

Third, convince yourself by using a Miraco **thirty** days in your home before you decide to keep it.

You'll Be Proud of Your Miraco!

Each Miraco comes completely assembled, rigidly tested, splendidly packed and factory guaranteed for one year. Easy to install and operate—full instructions supplied. A big, handsome, expensive-looking radio—one you'll be proud to have friends see and hear. Stylish, sloping front cabinet of solid walnut, handsomely gold illustrated genuine Bakelite front panel and genuine Bakelite knobs—finished in walnut. In construction, too, like high-priced sets. Finest parts obtainable—and many exclusive features. Literature describes them fully—send for it, testimony of nearby users and Special Offer!

Deal Direct with a Big, Reliable Firm!

Thousands of satisfied customers can testify to the money they've made and saved by dealing direct with the great Midwest Radio Corporation. You are absolutely guaranteed and assured the same satisfaction. Clip coupon now and be convinced!

Our Factory Prices Save You Up to 1/2! Facts About Makers of Miraco's:

To our many thousands of satisfied users throughout the world, we require no introduction. But those who have never enjoyed the pleasure and satisfaction of operating a Miraco Set, will undoubtedly wish to be assured that the makers of the Miraco are thoroughly reliable. We therefore present these facts about the Midwest Radio Corporation of Cincinnati, Ohio:

7th Successful Year!

Every inch of this big 4-story factory is devoted to building Miraco Sets

1. One of America's oldest, largest and most experienced builders of fine sets—seventh successful year.
2. Builds all sets complete in its own big factory and thoroughly tests them under actual broadcasting conditions before shipping.
3. Sells all sets on a Guarantee of Unconditional Satisfaction, allowing liberal trial privilege.
4. Deals direct by mail with its users, agents and dealers, thereby effecting great savings which are reflected in amazingly low prices.
5. Keeps all promises to the letter. Highest references from users, bank officials and all concerns with whom we have dealings. We have been customers of a big $3,000,000 Cincinnati bank for many years. In our literature read what they say about our responsibility and reputation for square dealings.

AGENTS! DEALERS! Write for our latest Miraco proposition. Nation-wide popularity, superior performance of Miraco 5-tube sets, at amazingly lower prices, make them easy to sell. Send coupon today for proof

All the Proof you want is waiting for You!

Coupon or postal brings reports from hosts of users in your vicinity and elsewhere proving that Miraco sets **at rock-bottom money-saving factory prices**, outperform sets costing up to four times as much. **You can also buy speakers, tubes, batteries, etc. at big savings from us!** Get our proposition before spending money elsewhere.

MIDWEST RADIO CORPORATION
Pioneer Builders of Sets
404-M Miraco Building — Cincinnati, O.

Without obligation, send free literature, testimony of users, AMAZING SPECIAL OFFER and full particulars of your **big money-saving factory-price proposition** on Guaranteed Miraco sets and all radio supplies. ( ) Agent ( ) User ( ) Dealer

NAME

ADDRESS

Ultra 5 Oct. 1926 $49.75 — Unitune 5 Oct. 1926 $87.50

FACTORY PRICES~SAVE 50%
Choice of beautiful cabinets offered

3 Year Guarantee

8 tube one dial MIRACO

TRADE MARK REGISTERED

TRY IT 30 DAYS FREE
BEFORE YOU BUY

ALL METAL SHIELDED CHASSIS

Only $69.75
Retail List
Completely Assembled

MAGNIFICENT TONE~SUPER SELECTIVE~POWERFUL DISTANCE GETTER

All Electric or Battery Set!

America's big, old, reliable Radio Corporation* (8th successful year) **guarantees** in its big, powerful, latest 6, 7 and 8 tube Miraco sets "the finest, most enjoyable performance obtainable in **high grade** radios." Unless 30 days' use in your home fully satisfies you a Miraco is unbeatable at any price for beautiful, clear cathedral tone, razor-edge selectivity, powerful distance reception, easy operation, etc.—**don't buy it! Your verdict final.** Save or make lots of money on sets and equipment—write for testimony of nearby users and **Amazing Special Factory Offer.**

Miraco's work equally fine on "AC" electric house current or with batteries. Take your choice. Many thousands of Miraco users—who bought after thorough comparisons—enjoy programs Coast to Coast, Canada to Mexico, loud and clear—with the magnificent cathedral tone quality of costliest sets. Don't confuse Miraco's with cheap, "squawky" radios. Miraco's have finest parts, latest approved shielding, metal chassis, etc.—as used in many $200 sets.

Deal Direct with Big Factory

Your Miraco reaches you completely assembled, rigidly tested, fully guaranteed. Easy to connect and operate. **30 days' trial free.** 3 year guarantee if you buy. You take no risk, you insure satisfaction, you enjoy **rock-bottom money-saving prices** by dealing direct with one of radio's oldest, most successful builders of fine sets. 8th successful year in the radio manufacturing business.

Big Discounts to User-Agents

MIRACO Users Say:

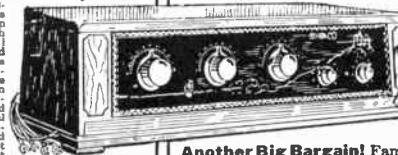
Reports from users everywhere leave little for us to add. These are only a few of the many in our files and which we receive daily. Send coupon for plenty of additional proof and testimony of nearby users.

CLEARER THAN A $450.00 SET
Before I bought your set I tried out and heard quite a number of different makes sets and I believe I can truthfully say that I never yet have heard a set with such wonderful tone and clearness as the Miraco. I never thought that a set could be as clear and reproduce tones and voices as the Miraco. Saturday I listened to a $450.00 set and it can't even come near your set for clearness and volume. I have logged some very distant stations on the Unitune and although people won't hardly believe me, the first week I had KFI Los Angeles on two nights in succession on a 30-ft. temporary inside aerial.—FRANK A. OLDENBURG, Milwaukee, Wis.

SHARPLY SEPARATES STATIONS
The Unitune brings in stations very clearly and with a selectivity that is amazing when you take in consideration the mass of stations on the air at the same time. I have heard three and four stations that were on almost same wavelengths at the same time and was able to tune out one after the other without the least interference.—W. L. BROBACK, San Francisco, Calif.

EXPERIENCED FAN PRAISES SET
Miraco is the most wonderful radio I have ever seen. I have had experience with many popular makes of radios, also have built a number of them myself but in tone quality it is far superior to all. For sensitiveness I can say it is more like a superheterodyne.—R. D. WHITE, Proctor, W. Va.

HAS POWER TO SPARE
"Well Pleased" with Miraco would be putting it mildly. Haven't heard anything to equal it regardless of price. With temporary aerial tuned in WEAF then WJZ Florida felt sure this must be WJZ the pet station of this locality. Stations all coming in clear with wonderful tone and tremendous volume. Seldom have more than half of volume turned on. A local agent insisted he could prove his set superior but to his surprise and astonishment my family and neighbors and the agent himself admitted his $165 set had to step out of the way for Miraco.—H. W. HOEPFL, Perkiomenville, Pa.



Another Big Bargain! Famous powerful big Miraco Super 6, 1928 model—ultra selective! Thousands find it outperforms sets of much higher price. **30 Days' Trial Free. Fully Guaranteed.**

MIRACO "Powerplus" sets—both in 8 and 7 tube models—have magnificently beautiful, clear cathedral tone quality. Turn one dial for stations everywhere. Ultra-selective. Miraco multi-stage distance amplification gives "power-plus" on far-off stations. Latest all-metal shielded chassis. Illuminated dial. Fully guaranteed. *Try one free for 30 days!* Choice of beautiful cabinets.

7 tube one dial
METAL SHIELDED CHASSIS
$49.75
RETAIL LIST

Dealers Write!

USER-AGENTS! Make big profits showing Miraco to friends. Get Our Special Wholesale Prices!
•MIDWEST RADIO CORPORATION, Cincinnati, O.

BEAUTIFULLY ILLUSTRATED CATALOG AND AMAZING SPECIAL OFFER

Free!

SEND NO MONEY—30 DAYS' TRIAL. Special Wholesale Price Offer to User-Agents, Bank References, testimony of nearby Miraco users—*all the proof you want*—sent with catalog.

mail coupon right now!

Electrify Any Radio with MIDWEST NO-BATTERY "AC" Light Socket Power Units

BIG DISCOUNT TO User-Agent

"A", "B" and "C" power, direct from light socket, without batteries! Write for Midwest prices and discounts. Midwest Units are highest grade—lastingly dependable, quiet in operation, fully guaranteed.

MIDWEST RADIO CORPORATION
Pioneer Builders of Sets
479 E Miraco Building, Cincinnati, Ohio.

THIS COUPON IS NOT AN ORDER

Without obligation, send free catalog, AMAZING SPECIAL OFFER, testimony of nearby Miraco users. ☐ User ☐ Agent ☐ Dealer

NAME

ADDRESS

October 1927 models: 6-tube $36.75 7-tube $49.75 8-tube $69.75

Enjoy Any Miraco 30 Days

—then decide. Return EVERYTHING, our expense, unless thoroughly delighted.

Wonderful Selection of Beautiful New Cabinets

For AC-9, AC-8 and Battery 7's and 6's

30 Days' Trial—Take Your Pick

Richly designed, genuine walnut console of finest type. Electro - dynamic cone, magnetic cone or long air column speaker. Wonderful value!

Beautifully graceful Spinet model, handsomely designed. Genuine walnut electro-dynamic or magnetic cone. (This model for "AC-9" and "AC-8" only.)

The same charming Spinet model, for battery or AC sets. Electro-dynamic or magnetic cone or air column speaker.

A most popular walnut Hi-Boy Console, with drop-leaf desk. For all Miraco Sets. Choice of speakers. Astonishingly priced.

A Lo-Boy Console that's a gem and very low-priced. Walnut finish. For all Miraco sets. Choice of speakers.

A new type arm-chair console (for AC sets only) that is very much admired. Genuine walnut. Electro-dynamic or magnetic cone. A splendid value.

A popular, inexpensive combination. Table model Miraco set on handsome table speaker. Table speaker also is sold separately.

Miraco table model sets may be had in metal or wood cabinets. Wood cabinets in walnut or new shaded silver-chrome finishes. Cathedral electro-dynamic or magnetic speakers to match.

Latest All-Electric "AC-9"

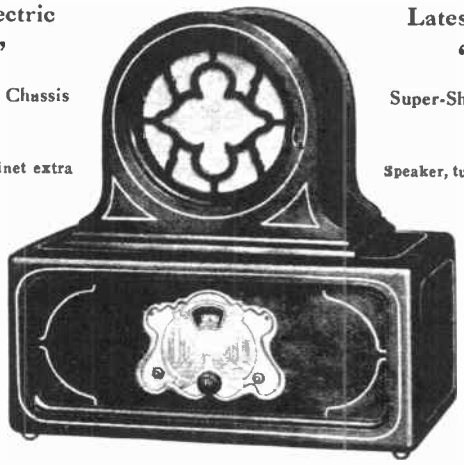
Super-Shielded AC Chassis

$83.75

Speaker, tubes and cabinet extra

Newest Type 6-Tube Battery-Operated Super-Shielded Chassis

Equipment extra



Latest All-Electric "AC-8"

Super-Shielded AC Chassis

$71.50

Speaker, tubes and cabinet extra

Newest Type 7-Tube Battery-Operated Super-Shielded Chassis

$49.88

Equipment extra

MIRACO

TRADE MARK REGISTERED

Cathedral Tone—Super-Selective—Powerful Distance Getters

Celebrating its ninth successful year, America's big, old reliable Radio Corporation springs a genuine sensation in high-grade sets. With its latest, super-powered, 1-dial Miraco's—the wholly self-contained, hum-free, AC-8 and AC-9, using AC tubes, or the new 6- and 7-tube models for batteries or eliminators—you are guaranteed values and savings unsurpassed in the fine set field.

Compare a Miraco with highest - priced radios, for 30 days in your home. Surprise and entertain your friends — get *their* opinions. Unless 100% delighted, return everything—*the complete outfit*—at our expense. Your decision is final —absolutely!

Only exceptionally fine radios, of the very latest approved type, at rock-bottom prices, could possibly back up so liberally unconditional a guarantee. Send coupon now for *Amazing Special Factory Offer!*

Big Discounts to User-Agents

A Miraco will so delight you and those who hear it that people will ask you to get Miraco's for them. In this way our sales grow by leaps and bounds each year. No selling necessary—no radio experience needed. You can easily pay for your set and make as much extra money as you wish, spare or full time, by getting our Amazing Special Offer.

Many thousands of Miraco's — bought after 30-day home comparisons—are cutting through locals and getting distance with the tone and power of costly sets—their delighted users report. Miraco's are laboratory - built with finest parts, and embody nine years' actual experience in constructing fine sets. Approved by radio's highest authorities.

Deal Direct with Big Factory

Everything reaches you splendidly packed and rigidly tested to insure your instant enthusiasm. Enjoy the outfit 30 days—then decide. Liberal 3-year guarantee on each set. Play safe, save lots of money, and insure satisfaction by dealing direct with radio's old reliable builders of fine sets —ninth successful year.

Don't Confuse with Cheap Radios

With its rich, clear cathedral tone, hum-free operation, tremendous "kick" on distant stations and razor-edge selectivity—with its costly, sturdy construction, latest features, beauty, ease of tuning and economy—a Miraco will make you the envy of many whose radios cost 2 to 3 times as much.

IMPORTANT NOTICE!

"30-Day Free Trial" offers usually are money-back guarantees, frequently only on the "set." Please understand that unless you are thoroughly pleased we pay return charges and refund the FULL purchase price on both the "set" and ALL equipment —tubes, cabinet, speaker, antenna (also on batteries or eliminators with 6- and 7-tube sets). Could any offer be fairer?

MIDWEST RADIO CORP'N, 404-AO Miraco Bldg., Cincinnati, Ohio

Free! BEAUTIFULLY ILLUSTRATED CATALOG, AMAZING SPECIAL FACTORY OFFER, TESTIMONY OF NEARBY USERS—All the proof you want—of our honesty, fairness, size, financial integrity, radio experience and the performance of our sets—including Amazing Factory Offer—sent with catalog.

MIDWEST RADIO CORPORATION,
Pioneer Builders of Sets—Ninth Successful Year,
404-AO Miraco Building, Cincinnati, Ohio.

THIS COUPON IS NOT AN ORDER

WITHOUT OBLIGATION, send free catalog, Amazing Special Factory Offer, testimony of nearby users, etc.

.... User .... Agent .... Dealer

Name..... Address.....

October 1928 models:
7-tube battery $49.88
8-tube battery $49.88

AC-8 $71.50
AC-9 $83.75

Sept. 1929 model (not shown):
9-tube screen-grid $49.88

Radio News (Oct. 1928), p. 355

Play Safe! Know! that your Radio is Actually built by a big, old successful manufacturer thoroughly experienced in the business, with a world-wide reputation for Fair, Square Dealings and Willing and Financially Able to Carry Out all Promises to the Letter.

The Big 4-Story Miraco Factory on Eighth St.—one of Downtown Cincinnati's Prominent Thoroughfares.

VISITORS WELCOME!

We occupy every inch of this factory, the largest in the world, we understand, selling high grade radio sets by mail. Satisfied users built our business to its present huge proportions. We welcome visitors and are glad to show them the care and precaution taken to make Miraco's "America's Finest Moderately Priced Radio Sets."

WARNING!

"Fly-by-night" concerns making astounding claims and worthless promises about radio sets which are cheaply put together "just to sell," have infested the radio industry.

We believe, however, that the public has been taught its lesson, and that most people are now turning to the old, reliable, successful manufacturers—veteran concerns like ourselves who have been bulwarks in the industry since its start.

To our many thousands of satisfied users throughout the world, we require no introduction. But those who have never enjoyed the pleasure and satisfaction of operating a Miraco Set, will undoubtedly wish first to be assured that the company back of the Miraco is thoroughly reliable. For that reason we have dedicated this page to—

Miraco Sets are Completely Built and Rigidly Tested in our Big 4-story Factory Before Shipping

Expert assemblers putting the sets together

Wiring and soldering connections with utmost care~

Sets are tested on low, intermediate & high wave lengths

We carefully pack all shipments to insure safe arrival. We ship to customers all over the world.

Facts About the Midwest Radio Corporation

1. One of America's oldest, largest and most experienced builders of fine sets—eighth successful year.

2. Builds all sets complete in its own big factory and thoroughly tests them under actual broadcasting conditions before shipping.

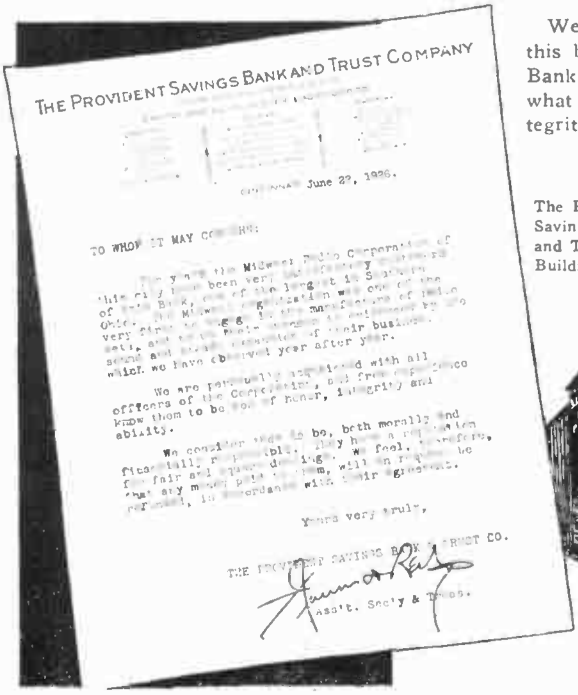
3. Sells all sets on a Guarantee of Unconditional Satisfaction, allowing 30 days' free Trial privilege. (See guarantee bond.)

4. Deals direct by mail with its users, agents and dealers, thereby effecting savings which are reflected in amazingly low prices.

5. Keeps all promises to the letter. Highest references from users, bank officials and all concerns with whom we have dealings.

6. A firm you can absolutely rely upon to ship you the finest sets and accessories your money will buy.

We have been customers of this big $3,000,000 Cincinnati Bank for many years. Read what they say about our integrity and responsibility.


THE PROVIDENT SAVINGS BANK AND TRUST COMPANY

June 2?, 1926.

TO WHOM IT MAY CONCERN:

[illegible]

Yours very truly,

THE PROVIDENT SAVINGS BANK & TRUST CO.

Ass't. Sec'y & Treas.

The Provident Savings Bank and Trust Co.'s Building.

1927 catalog

SINCE the pioneer days of the radio industry, Miraco advertising has been eagerly sought by and accepted by leading magazines—publications that bar their columns to all but the worthy and reliable advertisers. As many publishers guarantee their readers against loss through advertisements naturally the publishers continue to seek and run Miraco advertisements only because they have found from years of experience that Miraco sets satisfy and that the Midwest Radio Corporation always treats everybody fair and square and lives up to all its agreements.

On this page you will notice some of the publications which regularly carry Miraco advertising. Space prevents showing all of the hundreds of leading magazines, weeklies, farm papers, newspapers, etc., in which Miraco ads appear. If you harbor any doubts, write to any or all of these publishers and ask them to tell you the experiences of their readers in dealing with us. We welcome the most searching investigation, knowing that it will convince you 100 per cent of the merit of Miraco Radio and our straight forward business dealings. You are entitled to know that you are doing business with a thoroughly reliable big concern and that every promise will be carried out to the letter whether you live 100, 1,000 or 10,000 miles away from Cincinnati.

Advertising Makes Miraco's Known Everywhere.

Millions of people have, for years, seen this Miraco advertising, which makes it very easy for our user-agents to interest friends, neighbors and townspeople in buying Miraco Radios. The Miraco is nationally advertised.

MU-RAD

Mu-Rad Laboratories, Inc.

Radio Dealer (July 1926), p. 59

Albert Shelby Blatterman was born in St. Louis, Missouri, on June 24, 1892. He became interested in wireless in 1907, and had a description of his station printed in *Modern Electrics* in July, 1909. After obtaining his BSEE from Washington University in 1914, he remained there teaching the subject for three years before joining the Army Signal Corps for radio engineering and research. From 1914 to 1922, he had twelve articles published in a variety of American and British journals. His later work for the Signal Corps at Camp Alfred Vail (now Ft. Monmouth) centered on direction-finding and, finally, on the design of RF amplifiers using iron-core coupling transformers.

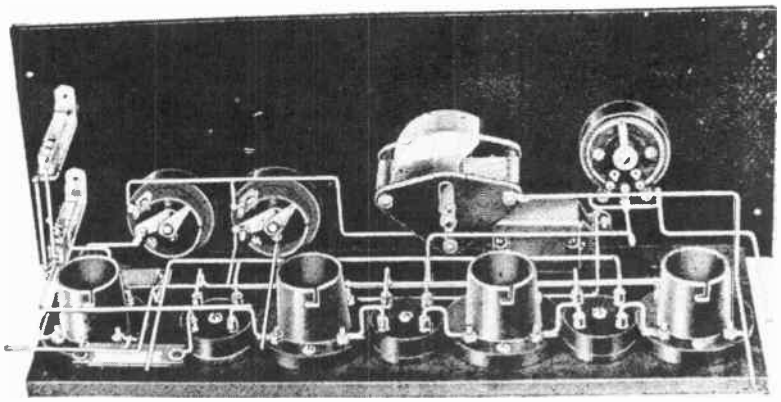
In April, 1922, probably following the example of his friend and co-worker Harold M. Lewis, who had founded Radio Service Laboratories in 1921, Blatterman incorporated Mu-Rad Laboratories in Asbury Park, New Jersey. His first radio models, naturally, used RF amplifiers with iron-core transformers. In the next few years, Mu-Rad introduced a number of innovations: a three-stage RF amplifier that ran on AC power in February, 1922; a single-dial receiver in May, 1924; and a complete AC set in October, 1924. However, none of these models sold very well.

On May 2, 1925, a new company was incorporated: Mu-Rad Radio Corporation, which supposedly was the manufacturing and marketing organization for inventions of the Mu-Rad Laboratories, which Blatterman still owned. Philip Boyer of investment bankers Hayden, Stone, & Company put in $86,000, and Mu-Rad introduced one or two new models each year through 1927 before calling it quits. Boyer is said to have recovered his investment plus $20,000 in a complex stock-jobbing deal involving Sleeper Radio in early 1928, in which Mu-Rad acquired control of Sleeper. Finally the New York Curb Market stopped the trading, and Mu-Rad went into receivership on April 28, 1928. In its voluntary petition during bankruptcy proceedings, Mu-Rad listed assets of $123,000 and liabilities of $190,000.

Blatterman's last patent was in 1936; he had a total of ten.

Radio News (Feb. 1922), p. 781

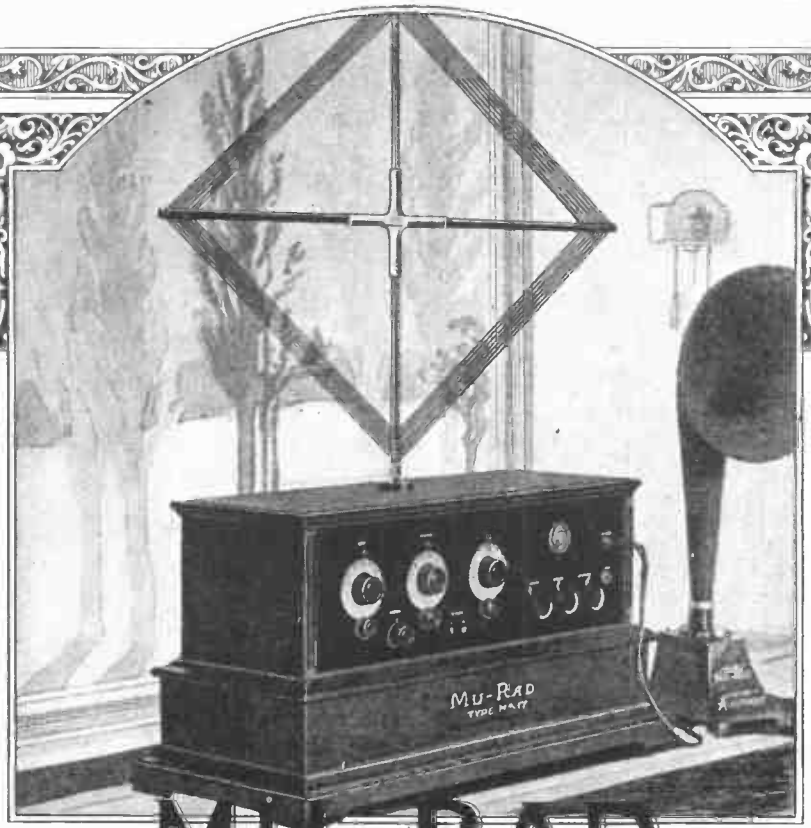
$128 in September



INTERIOR DETAILS MU-RAD TYPE M-A 12

Scott MacWilliam

MA-13 Sept. 1922 $160



MU-RAD RECEIVERS

NEW MU-RAD RECEIVER MA-17

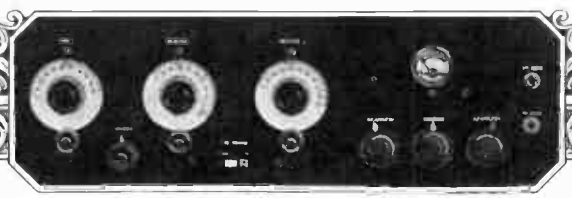
MU-RAD, in the vanguard of the radio art, once again blazing a new trail of progress. Years of scientific achievement anticipated in this *super set*, the MU-RAD MA-17. A new sensitivity, greater distance, fuller volume, with the absolute simplicity and substantial construction of the famous MU-RAD MA-13. Most recently discovered principles are embodied and developments of the future thoughtfully considered in the designing of the MU-RAD MA-17.

Three stages of radio and two of audio frequency amplification and detector. *One* tuning dial and two selecting dials, each independent of the other. Plug-in type r. f. transformers to care for changes of tube type or wave lengths. Panel-mounted volt-meter for quick reading of A and B batteries. Solid mahogany, Adam Brown hand-rubbed finish cabinet with loop fitted into top and compartment in base for "B" batteries. Guaranteed for 1000 miles reception using only a 2-foot loop.

WRITE FOR BOOKLET AND THE NAME OF THE NEAREST DEALER

MU-RAD LABORATORIES, INC.

806 FIFTH AVE ASBURY PARK, NEW JERSEY



Tell them that you saw it in RADIO

Popular Radio (Oct. 1924), p. 59

The First Set to Operate Without Batteries

Radio as Convenient as Your Telephone

THE first receiver to operate at maximum efficiency without "A" and "B" batteries—**THE MU-RAD MA-20.**

Just plug into your electric light socket. Avoids the heavy expense, unsightliness and inconvenience of "A" and "B" batteries and battery chargers. The **MA-20 RECEIVER** with the **MU-RAD RECTO-FILTER** does away with these former handicaps.

The ultimate in simplicity. Especially designed for *high selectivity* so that powerful local stations can be tuned out while receiving distant programs. Tuning on all three dials *always* the same. Where alternating current is not available batteries can be used as with any other set.

A new circuit—new in all its principles. Five tubes, non-oscillating, non-radiating. $185

See our advertisement in this issue of the **MU-RAD RECTO-FILTER**—*a power unit.*

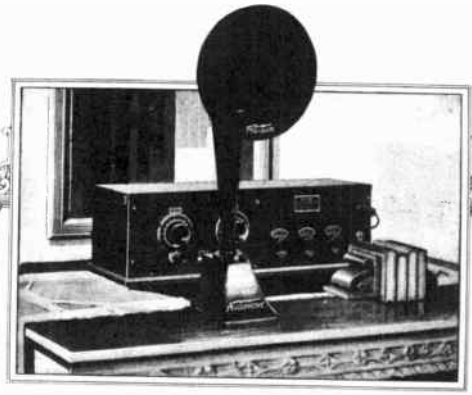
Write for Literature!

MU-RAD LABORATORIES, INC.
809 FIFTH AVE., ASBURY PARK, N. J.

The New MU-RAD RECEIVER MA-20

Actually, the *first* AC set was not this MA20, but was the Dynergy, advertised by the Dynamotive Radio Corporation of New York City from June to December 1924. And the first to be sold in significant numbers was the Radiola 30, from September 1925.

Radio News (Nov. 1923), p. 661



A New MU-RAD Accomplishment — The MU-RAD AUDIPHONE

The super-sensitive mica diaphragm produces sound by the contraction and expansion of an actuating contact, just as the vocal cords produce the voice.

No Extra Battery Connections

Price $25

THE revolution, wrought in radio reception by the *Mu-Rad Receiver*, is equalled by this radical improvement of sound amplification. The *Mu-Rad Audiphone* aimed for a higher perfection than ever attempted—duplication in electro-mechanical form of the greatest sound producing organ, the human voice. The result of five years' continuous research is a radio reproducer worthy of a finer classification than "loud speaker"; it is *a new radio instrument!*

Write for Literature and the Name of the Nearest Mu-Rad Dealer Demonstroting the Mu-Rad Audiphone.

MU-RAD LABORATORIES, INC.
801 FIFTH AVE. ASBURY PARK. NEW JERSEY

Good Bye BATTERIES

A New Day in Radio Art

"B" BATTERIES banished, outclassed, along with the tin-type and the wax cylinder phonograph record. New power—every required voltage—steady, smooth, dependable, right from the nearest lamp socket through the **MU-RAD RECTO-FILTER.** The final achievement of a long awaited ideal.

Not an experiment—a demonstrated, practical power unit.

Actually smaller than the batteries it displaces. Only six inches wide, ten inches long and four and a half inches high.

Used with the new Mu-Rad Receiver MA-20 also eliminates the "A" battery—a dual power unit.

A Mu-Rad product—that underwrites your satisfaction with the **RECTO-FILTER**—a full surety that it will live up to every claim.

See our advertisement of the **MU-RAD RECEIVER-MA20** *in this issue*

Write for Literature

MU-RAD LABORATORIES, INC.
809 FIFTH AVE., ASBURY PARK, N. J.

The MU-RAD RECTO-FILTER

Popular Radio (Oct. 1924)

Daily Broadcasting Programs

Mu-rad Triplex $75

3 Tube-Dry Cell Receiver

4-TUBE EFFICIENCY
Although only 3 tubes are used, all the efficiency of 4 tubes is attained by reflexing one tube. The circuit is one stage of radio frequency, two stages of audio frequency, and detector.

DISTANCE and SELECTIVITY
Real distance right through the strongest local interference with very simple tuning.

CAN BE LOGGED
Only two dials, the readings of which are always the same for each station, so that tuning is practically automatic.

NON RADIATING
Your set cannot interfere with your neighbors'.

CONVENIENT
All power from dry cell batteries, contained in the handsome mahogany cabinet. Easily portable.

NEW—not just in price, because there are plenty of low priced radio sets—but NEW in the value represented by the radio treasures it unfolds, and the sterling character of instruments and workmanship. A MU-RAD Receiver in every detail that has made the name MU-RAD trusted and respected everywhere.

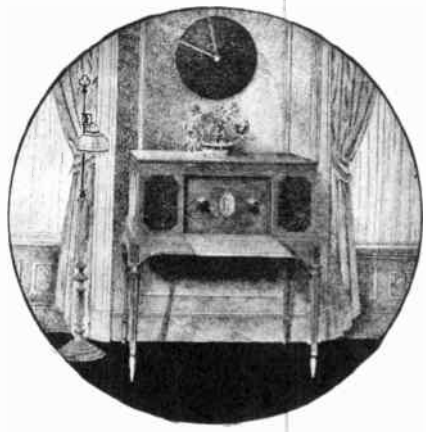
Write for Literature

★

MU-RAD LABORATORIES, INC.
803 FIFTH AVE ASBURY PARK, NEW JERSEY

Radio Broadcast (March 1925), p. 848-i

Bulletin 13 (1922)



dealers!

MU-RAD, *the ultimate in Radio*

Goes One Step Further!

An All Electric Set!

Mr. Dealer—you want profits, you want turnover, you want a steadily increasing business! You know from experience that the way to attain these assets is by keeping your eyes opened to the wants of the public, by anticipating the public's next demands.

Mu-Rad has done this for you in their new Super Six all electric receiver. Mu-Rad has foreseen the trend of public wants and has built a set that may be operated with or without batteries, with only one tuning control, only *one* volume control, without electrolyte and one that may be operated with an indoos antenna if desired. Here is the target for radio users' greatest demand. Here is the criterion about which you can build a powerful sales campaign. Write at once for price list and complete information. We will be glad to discuss territorial arrangement for this new and improved Super-Six.

Additional models available
offering you a complete price range from $91 to $315.

MU-RAD
RADIO CORPORATION
Dept. R
ASBURY PARK NEW JERSEY

Radio Retailing (May 1927), p. 103

Super-Six	May 1927	
Super-Six T	Oct. 1927	$98
Super-Six SC		$172
Super-Six SE		$265

Mu-Rad Laboratories, Inc., Asbury Park, N. J. $158.50, A.C. tubes

Nov. 1927 $158.50

Popular Radio (May 1924), p. 75

MA-18 May 1924 $110

SPECIFICATIONS

Circuit 2 stages of R. F. Amplification, detector and 2 stages A. F. Amplification—an entirely new circuit.

Antenna—single wire—20 feet to 150 feet long.

Cabinet Hand rubbed solid mahogany with rubber feet. 12¾ inches by 7½ inches by 15 inches deep. Engraved Formica Panel.

Wave Length Range—230 to 550 meters — practically the entire broadcasting spectrum.

PRICE (without accessories) **$110**

Popular Radio (Jan. 1924), p. 29

MA-15 Jan. 1924 $180

AROUND THE DIAL
with the Mu-Rad Super-Six Receiver

Shining Eyes, Happy Hearts, a Resonant Xmas with the New Mu-Rad Receiver

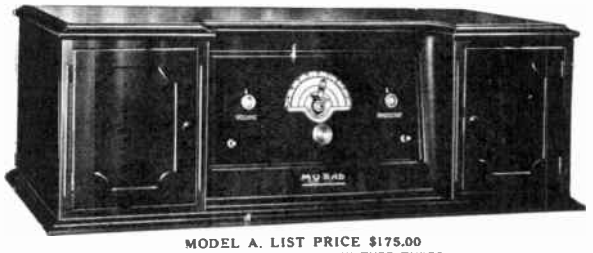
WHEN the gifts are untied, the candles extinguished and the kiddies gather 'round at the close of a happy Christmas Day, the soft sweet tones of MU-RAD will waft their way into your heart. Faithful reproduction, exquisite tonal qualities, simplicity of operation—all this is yours with the new MU-RAD receiver. Ask your nearest dealer for a demonstration. You may exchange your old MU-RAD set for new yearly models.

MU-RAD
Radio Corporation
Dept. B Asbury Park ★
New Jersey

ACROSS THE CONTINENT

Radio Broadcast (Dec., 1926), p. 222

MODEL B, LIST PRICE $125.00
SOCKETS FIT ALL NEW TYPE TUBES



MODEL A, LIST PRICE $175.00
SOCKETS FIT ALL NEW TYPE TUBES

Radio Dealer (Sept. 1925), pp. 62-63

MU-RAD
Transcontinental Receiver

Super-Six July 1926 $195
Technical article in *Popular Radio*, Nov. 1926, pp. 657, 681-682.

Just like being there yourself

JUST like being in the same room—when your favorite violinist plays. You miss none of the wizardry of his art, if you listen-in with Murdock Radio Phones. You get it all—the rich resonance of the high and low notes and the subtle shading of the softer tones. Everything is reproduced clearly and with wonderful volume.

Perfect construction and diaphragm adjustment the reasons

The powerful magnets in the Murdock build up volume signals—and the sensitive, perfectly adjusted diaphragms turn these into clear, natural tones.

The seating and clamping of the diaphragms is an outstanding feature of the Murdock. This adjustment prevents distortion due to vibration.

May be worn for hours without discomfort

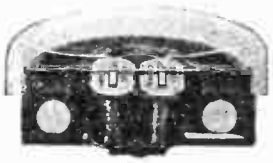
The Murdock may be worn through a whole evening without fatigue. Ear caps are moulded to fit the ears and exclude outside noises. The improved flat headband is feather-weight and does not bind the head; and there are no screws to entangle the hair.

For 20 years Murdock has been making radio phones of high efficiency. Over 1,000,000 users have accepted the Murdock standard of quality and price as the best measure of radio phone value. Buy a Murdock today and test it out—if you want to get the best results from your receiving set. They are fully guaranteed.

SEND FOR FREE BOOKLET. Mail coupon to us and we will send you our helpful booklet, "The Ears Of Radio." It explains in detail the importance of radio phones to efficient radio reception.

MURDOCK MULTIPLE PLUG JACK. This effective plug jack permits the use of one to four 'phones at the same time. Get one.

Announcing the Murdock five tube Neutrodyne Set. (Illustrated above). See this new type at your dealer's. Wm. J. Murdock Company, 371 Washington Ave., Chelsea Mass., Branch Offices: Chicago and San Francisco.



Built, not assembled

Murdocks are made in a single unit, of superior moulded insulation. Each part is fitted by one process into its proper place. They are moulded together—assuring firmness, strength and durability. And they can't get out of adjustment.

MURDOCK RADIO PHONES

Standard since 1904

WM. J. MURDOCK CO.
371 Washington Avenue,
Chelsea, Mass.

Gentlemen: Please send me, without obligation, your free booklet, "The Ears Of Radio."

Name.....

City.....

State.....

MURDOCK

Wm. J. Murdock Co.

The Wm. J. Murdock Company was founded in 1896 by William J. Murdock, joined shortly by his younger brother, Dan. They made an extensive line of radio headphones, parts, and equipment during the teens and in the early twenties. When the Neutrodyne circuit became so successful in 1923, they were quick to jump on the bandwagon, and their model with built-in horn was one of the most unusual Neutrodynes made. Sales in 1924 (wholesale) were $145,773.35.

After treading water for a couple of years, they geared up for a new line of sets in late 1927, after having obtained an RCA license in July (and, theoretically, guaranteeing RCA $100,000 a year in 7 1/2% royalties!) However, they decided to sell out both their RCA and Neutrodyne licenses to Philco in March, 1928, and to go back primarily to making headphones. William was connected with two banks and was president of a hospital by this time while Dan was experimenting in television with Hollis Baird. The company was eventually taken over by William's son George and then, in turn, by his grandsons George Jr., and James in 1963. Until 1985, it still existed in the original factory on Carter Street, Chelsea, Massachusetts, making electrical specialties.

Popular Science Monthly (Dec. 1924), p. 151

Richard Foster

CS32 March 1924 $130
CS33 Nov. 1924 $140

100 Dec. 1924 $100
101, without horn, March 1925, $92.50
110, with adjustable horn, April 1925, $110

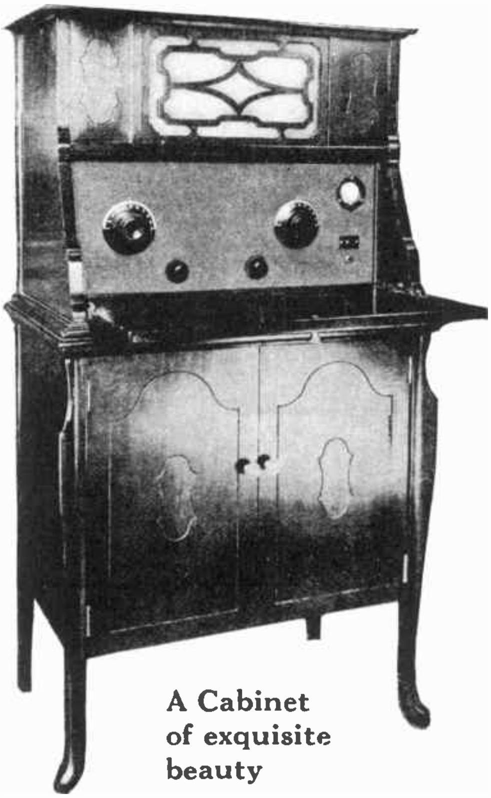
Ser. No. 220,353. (CLASS 21. ELECTRICAL APPARATUS. MACHINES, AND SUPPLIES.) WM. J. MURDOCK CO., Chelsea, Mass. Filed Sept. 17, 1925.

RADIO MURDOCK

Particular description of goods.—Radio Receiving Sets. *Claims use* since on or about Feb. 1, 1924.

The New MURDOCK

Murdock 204



A Cabinet of exquisite beauty

NEUTRODYNE RECEIVER

NOW—*Shielded*

More power—greater sensitivity.

These are the outstanding features of this marvelous receiver.

It embodies the newest achievement in neutrodyne construction—the shield.

You'll be amazed at the way it singles out stations—sifts and separates those you don't want to hear.

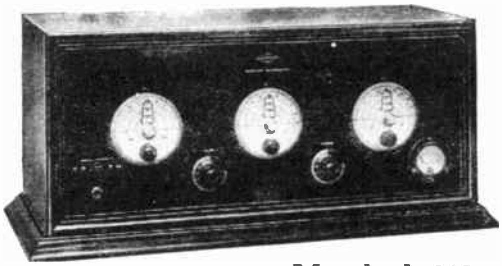
LICENSED BY INDEPENDENT RADIO MANUFACTURERS, INC.
NEUTRODYNE

Murdock 200

Five-tube neutrodyne with loud speaker and vernier dials. Embodies now improvements that will be extolled by others in 1926. We also offer Murdock 201—the same instrument without loud speaker.

There are opportunities for eager, energetic, enthusiastic merchandisers to become Murdock dealers. Write for information. Every day counts just now. Mail your letter tonight.

Wm. J. Murdock Co.
DEPT. 92
Chelsea, Mass.



Murdock 203

Six-tube neutrodyne. Remarkable selectivity and simplicity in tuning make this a truly fine receiver.

MURDOCK RADIO

Standard since 1904

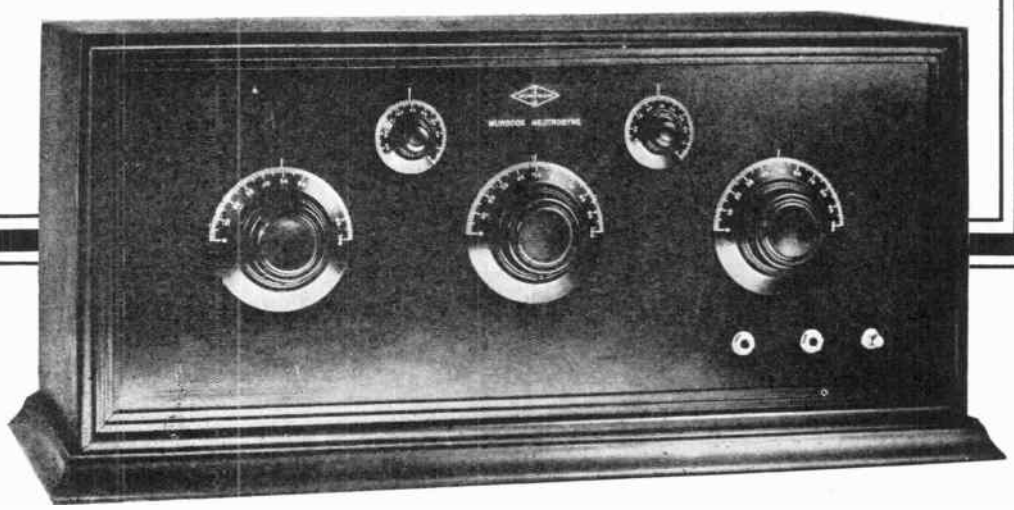
Models first advertised Sept 1925: 200, $100. 201, $92.50. 203, $140. 204, $350.

Radio News (Nov. 1925), p. 691

MURDOCK

Five Tube

NEUTRODYNE



Radio Dealer (Oct. 1926), p. 12

Value Plus

OUR MERCHANDISING PLAN for the 1926-27 selling season gives you a proposition that should enable you to get and to beat your competition on the basis of price as well as performance.

In general, we are offering a 5-tube neutrodyne receiver built under one of the original licenses by a concern with a background of — years of manufacturing experience

A superselective receiver of exceptional range, simplicity of tuning and clarity of tone.

Specifically, we present:

5-Tube Neutrodyne Murdock - C-26 Mahogany Console Cabinet with built-in cone speaker to list at

$125.00

5-Tube Neutrodyne Murdock - M-26 Table Cabinet Mahogany Finish Without Equipment to list at

$60.00

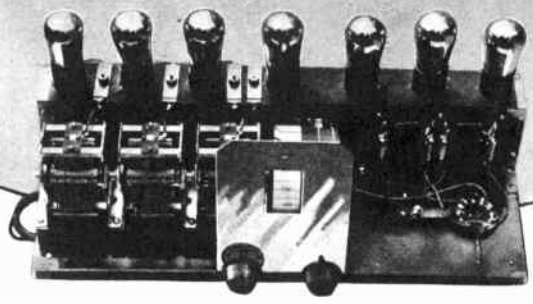
Write for details now—before our capacity is pledged—to

WM. J. MURDOCK COMPANY, Chelsea, Mass.

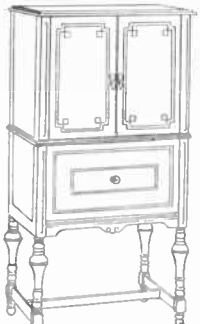
M-26 Oct. 1926 $60 C-26 Oct. 1926 $125

Murdock Radio
Model 163

This Year—it's MURDOCK



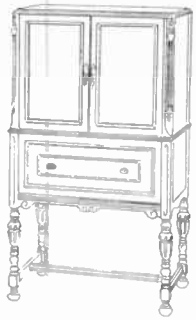
Murdock Radio
Model 164



Console Model 130

And here's why—

The Murdock Model 65 Receiver
Seven Tube
Single Control
Complete Shielding
Illuminated Dial
In Duco Finish Metal Housing
is priced to sell for
$65.00

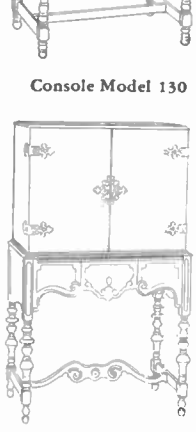


Console Model 145

Once you've heard the quality of its tone, and seen it select stations in congested areas, or pick up those at great distances, you'll not only know that it *is* the outstanding value in radio this year, but the set you'll want to sell.

There is nothing like it anywhere near its price.

Order a demonstrator, or write for particulars — today. It's the best set yet developed by one of the oldest manufacturers in radio.

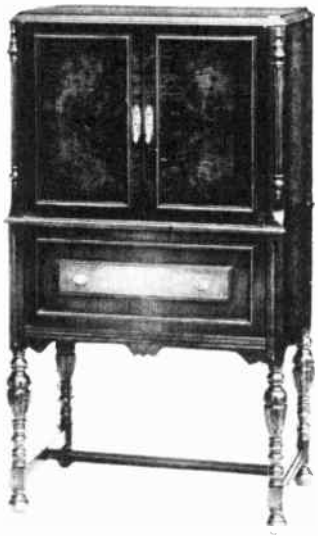


Console Model 160

Consoles for MURDOCK RADIO

A special arrangement with one of the country's foremost cabinet makers enables you to meet the demand for consoles from a wide range of models approved by us as both adaptable and desirable for the Murdock Model 65.

Console Model 180



Murdock Radio
Model 162

Murdock Model 65
In Duco finish metal housing ready for installation in approved cabinet.
$65.00

$65.00

Licensed by patents, owned and or controlled by Radio Corp. of America, Hazeltine Corp., and Latour Corp.

WM. J. MURDOCK CO., CHELSEA, MASS.

Murdock Model 75
A complete set in a handsome mahogany finish table type cabinet
$75.00

CABINETS BY
ADLER-ROYAL

65 Sept. 1927 $65 later made as an AC model 1A, $125.
75 Sept. 1927 $75 later made as an AC model 2A, $150.
(not shown) model 350, Sept. 1927, $52.50, dropped by October.

Radio Retailing (June 1927), p. 229

Music Master
Resonant Wood Insures Natural Tone Quality

Connect Music Master in place of headphones. No batteries. No adjustments.

(Prices of all models slightly higher in Canada)

Model VI, $30
14" Wood Bell

Model VII, $35
21" Wood Bell

Model VIII, Mahogany Cabinet with "full-floating" Wood Bell $35

Model V, Metal Cabinet, Mahogany Finish, Wood Bell $18

Yes you can almost see the artist

MUSIC MASTER'S outstanding eminence of true, natural, vivid Radio Re-creation is achieved by perfect balance of three essential elements

—precision reproducing instrument of unequaled delicacy, accuracy and refinement.

—heavy cast aluminum tone chamber eliminating over-vibration and developing sound waves without distortion.

—wood bell—for only wood gives vibrant resonance, imparts tonal brilliance and assures re-creation of natural quality and life-like characteristics of music, song and speech.

MUSIC MASTER is tested for musical quality, by musicians, through every stage of amplification, and is the supreme re-creating

Musical Instrument of Radio

There IS No Substitute

Mere assertion? No! Statement of fact! We leave it to you—*after* the demonstration any radio dealer will gladly give you.

Music Master Corporation

Makers and Distributors of High-Grade Radio Apparatus

Tenth and Cherry Streets

Chicago PHILADELPHIA Pittsburgh

Canadian Factory—Kitchener, Ontario

Saturday Evening Post (May 9, 1925), p. 135

Music Master RADIO REPRODUCER

MUSIC MASTER

Music Master Corporation

The Music Master story started in 1908 when the Philadelphia firm of Sheip & Vandegrift acquired patent rights to a form of wooden horn and registered the trademark "Music Master." For many years afterward, they supplied these horns to phonograph manufacturers — at least until outside-horn machines went out of style.

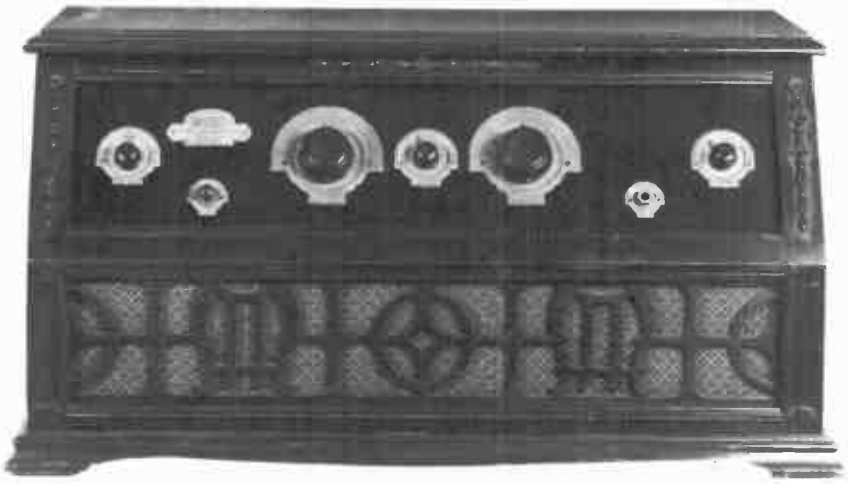
Then came Walter L. Eckhardt, a very successful sales executive, first with Columbia Phonograph, and after 1917, with Pathé in Philadelphia. Looking for new fields to conquer, he couldn't help noticing that as horns were disappearing from phonographs, they were miraculously reappearing with radios. Sensing a great opportunity, he formed the General Radio Corporation in April, 1922, to deal in radios and accessories, but his main product was the Music Master horn (bells, by S&V; drivers by Timmons). He re-registered the trademark for radio horns in October, 1923, changing the company name to Music Master Corporation in February, 1924. By this time, Eckhardt was selling 2500 horns per day; and the profits, together with what he made by judiciously playing the stock market, netted him a reported personal fortune of $1.5 million.

In January, 1925, Eckhardt recapitalized Music Master on an even grander scale, bringing in Wall Street interests and selling $3 million of stock. He was quoted as saying privately "I am after fame. I'd like to create the biggest manufacturing concern in the radio business." And publicly, "We propose to supply the trade with a complete line covering every single item required in establishing one's self in the radio business." He set aside $1 million for advertising, predicting $15 million in sales for 1925. In February, he purchased the 30-acre Lubin motion-picture plant in Betzwood, Pennsylvania, near Valley Forge, where he could make horns and experiment in vacuum-tube development (Elman Myers was on his payroll), and have plenty of room for expansion. Time was too short to build any radio sets there, but he planned a comprehensive line of ten models from $50 to $460, contracting with several manufacturers to build them: Ware, Algonquin, Jones, Sleeper and Thermiodyne. By mid-1925, everything seemed to be perking; factories were busy, distributors and dealers were being signed up, and a lavish advertising campaign was in full swing.

Phonograph Journal of Canada (May 1925), p. 39

WALTER L. ECKHARDT,
President, Music Master Corporation.

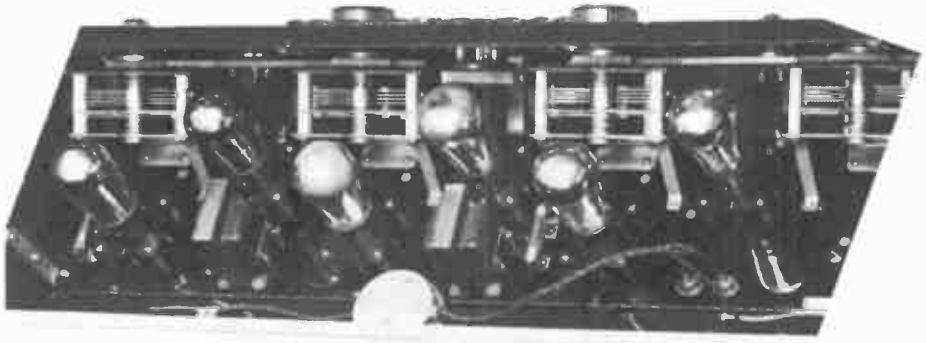
But cracks began to appear in Walter Eckhardt's organization. Ware was headed straight for bankruptcy and required large cash infusions to keep going. No sets were being delivered by any of Music Master's suppliers, and when they finally did begin to arrive, many were defective. Sales for October, 1925 amounted to just $800,000. Having received only 4900 Ware radios up to November 10, Music Master cancelled its contract and set Ware adrift, at which point Ware sold its stock of 15,000 Model 50's to Gimbels at a cut price, demoralizing the few Music Master dealers who had not already deserted. By January, 1926, even Eckhardt was forced to sell his inventory as job-lots to bring in cash: 5000 model 175's and 250's; and 3000 or 4000 model 50's. Algonquin dumped 2000 of its model for $25 each, and Ware was in receivership with only a 35-man skeleton force assembling its sets after mid-December. With no money coming in, it was only a matter of time before Music Master was petitioned into bankruptcy; temporary receivers were named on April 10, and the company was formally declared bankrupt on May 3, 1926. A trustee continued the business for a few years to recover what assets he could, but Music Master essentially was through. Mr. Sheip was last seen in Eckhardt's office, trying to recover a portion of his overdue accounts. Walter Eckhardt tried to go back into radio under his own name, but had little success. He handled the disposition of bankrupt Earl radios in 1930 and joined William Grunow in 1931.



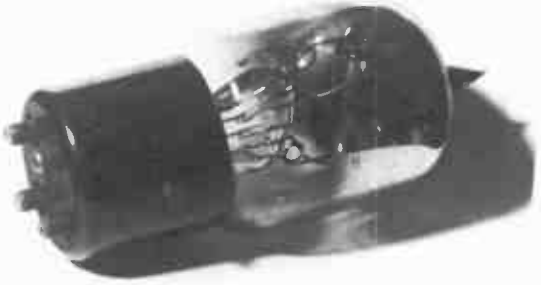
175 made by Thermiodyne

Radio Retailing (July 1925), p. 69

Walter L. Eckhardt, president of the Music Master Corporation, Philadelphia.



Similar to the Thermiodyne TF6, but the tuning condensers are coupled in two pairs, rather than all four together.



Music Master 99
"Made in Germany" stamped into the base, lyre logo molded into the glass stem.

Rich Elskamp

50 made by Ware

flea market

100 probably made by Algonquin

Robert Lozier

140 made by Sleeper.

What Music Master Reproduction

Music Master
REPRODUCER

TYPE 100
Five tubes. Resonant reproduction, exceptional range. Massive mahogany console cabinet. "B" Battery compartments in cabinet. Without equipment . . . $100

MUSIC MASTER REPRODUCER demonstrated the fact that no existing commercial radio set gave full scope to its unequaled delicacy, volume, lifelike fidelity and splendid tone quality.

Inclusion of the MUSIC MASTER combination of reproducing unit, cast aluminum tone chamber and solid mahogany wood bell as the vital element of every MUSIC MASTER ensemble, either built-in or as an essential accessory, makes MUSIC MASTER RECEIVER, of whatever type, the supreme *Musical Instrument of Radio*—there IS no substitute.

TYPE 215
Remarkable for range, clarity, mellowness. Six tubes. Built-in Music Master Reproducer. Beautiful mahogany cabinet and table. Storage battery compartment concealing both batteries and charger. Without equipment $215

Sold everywhere by Registered Music Master Dealers only. See Music Master—hear—compare—before you buy ANY radio set.

Ten Models
$50 to $460
Guaranteed Unconditionally

MUSIC RADIO

Means to Radio Reception

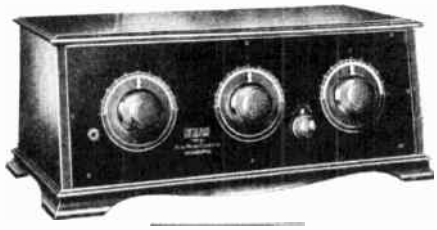
TYPE 460

Music Master-Ware Neutrodyne. Seven tubes. No antenna or ground. Wonderful range and unequalled tone. Beautiful mahogany cabinet with ample battery compartments. Model XL-I Reproducer included. Without other equipment $460

Music Master RECEIVER

MUSIC MASTER RECEIVER, each type correlated in powers and efficiency of reception to the capacities and quality of MUSIC MASTER REPRODUCER, enables you to hear song, music, speech or sound precisely as it was heard in the studio, concert room, auditorium or assembly.

No "stunt" circuits, no "novelty" parts, no "freak" accessories—but the most comprehensive, practical assembly of demonstrated radio principles ever brought together in one standardized radio ensemble.



TYPE 60

Five tubes. Special MUSIC MASTER design. Full, round, natural tone. Three selectors for precise tuning. Without equipment $60

Type for type, the Music Master Receiver you select is the best radio value you can buy at the price you pay.

(Canadian Prices Slightly Higher)

Music Master Corporation, 128-130 N. Tenth St., PHILADELPHIA, PENNA.

Makers and Distributors of High-Grade Radio Apparatus

CHICAGO NEW YORK (Canadian Factory: Kitchener, Ontario) PITTSBURGH MONTREAL

Master PRODUCTS

Financial data on page 260

EDITORIAL

"DELIVERIES start June 15th." In spite of the warm weather, arrangements for a foursome, or a double-header at the baseball park, this news from the factory always brings enthusiasm to the radio manufacturer's local representative, and reminds him of the new handle that must be put on his sample case.

A definite date for shipments means to him a renewal of activity, and an up-grade in his chart of monthly commissions. He is ready to call off old grudges against the factory, forgive all broken promises and, this season, do the job as he would have done it last year if they had only given him the goods to sell.

But what will that delivery date mean to him on August 15th? And what will it mean to the factory next April?

The factory is such a long way from the jobbers and dealers and consumers. Great distances separate the engineering department, the shop, advertising and sales departments, and the sources of supply for materials—distances which measure the accuracy of the delivery date promise.

How will those representatives, pepped up with enthusiasm over the first samples, all set to put across the new line, to show results that will win an occasional letter of commendation from the sales manager, hoping this year that they can meet the jobbers with a smile and a hearty hand shake, feel after the 15th of August?

Which is another way of asking about the financial situation at the factory next April.

What radio manufacturer would advertise this way —"This is the factory that means well, but what we mean doesn't amount to much. We mean to meet our delivery promises, but our engineers have trouble about making up their minds, our shop doesn't know enough to do things right the first time, and our purchasing department hasn't had enough experience to find out what sources of supply are dependable. However, if we get the finished job in production before the season is over, you will be able to make real money by selling it."

You may say that's absurd, yet hundreds of factory representatives advertised dozens of companies that way last year. Not in those words, but jobbers and dealers aren't stupid. The representatives might just as well have told the bald truth instead of lying awake nights to think up excuses for irate customers who saw the season and the season's profits slip away with no goods to sell when, in many instances, they had dropped old lines to take up new ones which promised greater profits.

If an example is necessary, it is best demonstrated by the failure of the Music Master combination. Walter Eckhardt's own organization could have sold twice the anticipated output of the associated companies. He even financed some of them, for they were all wobbling financially, but he couldn't think and act for them. They had all the weaknesses disclosed by broken promises of delivery dates.

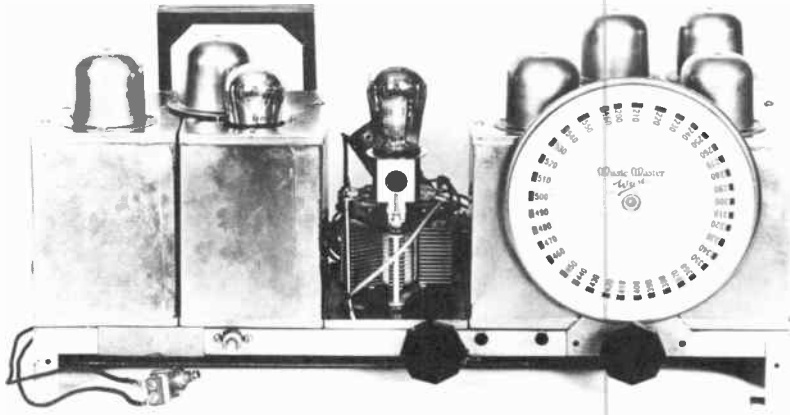
How will your organization be advertised—by representatives out hustling to put the line across, working closely with jobbers who are getting goods to sell, or by representatives who stay in their offices, fearing to meet their customers?

M. B. SLEEPER,
Editor.

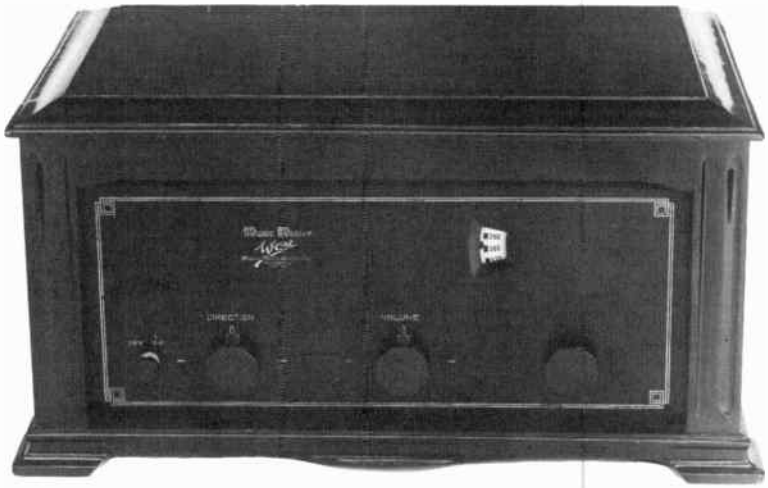
Radio Engineering (August 1926), p. 298

Saturday Evening Post (Dec. 12, 1925), p. 80

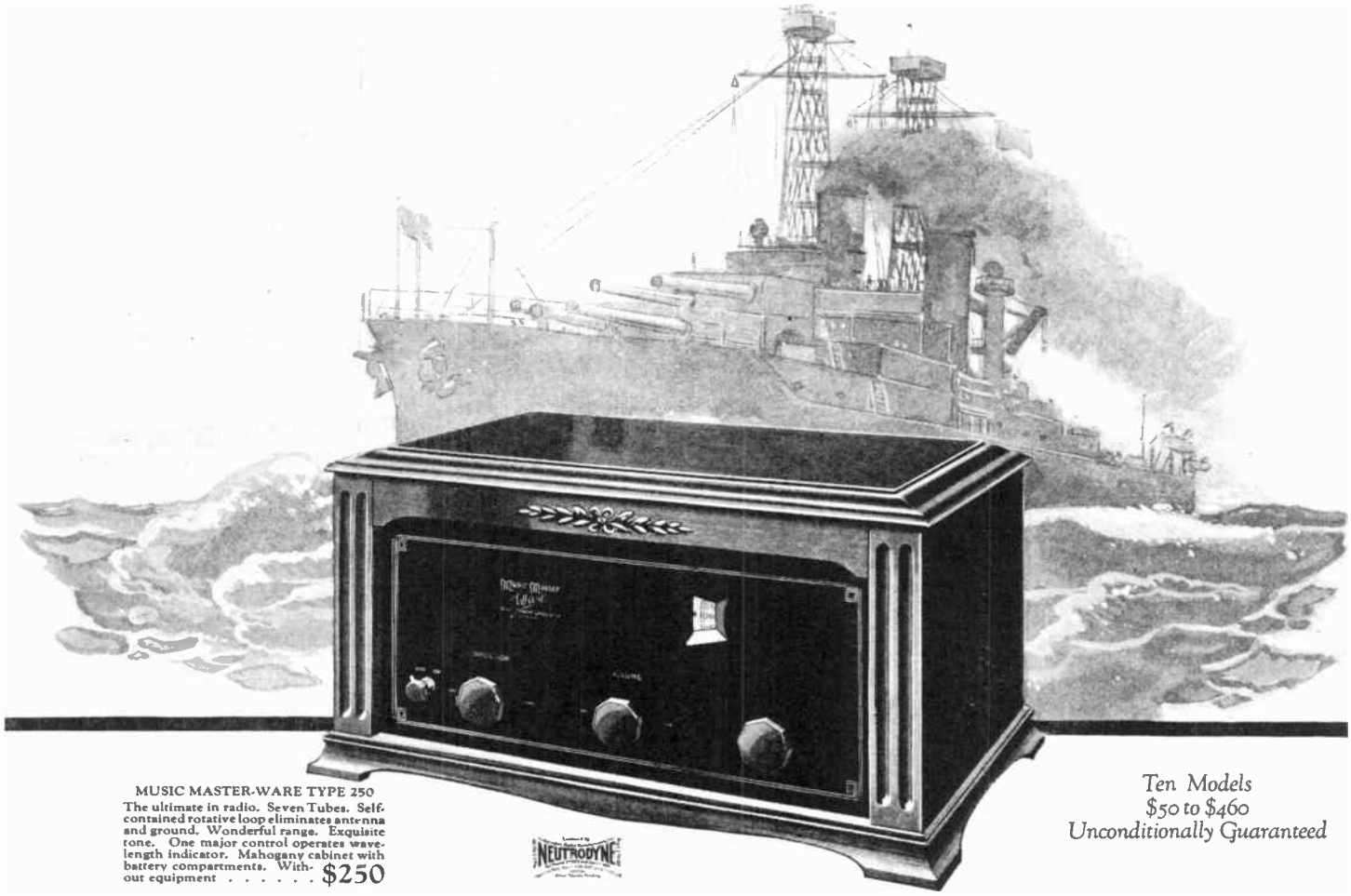
300 (battery) or 400 (AC), both 5-tube sets whose maker is unknown, if they were made at all.



250 chassis, with one shield can removed. The internal loop antenna (rotated by the left-hand panel knob) is visible to the left.



250 made by Ware
Technical article in *Radio News*, Feb. 1926, p. 1116.



MUSIC MASTER-WARE TYPE 250
The ultimate in radio. Seven Tubes. Self-contained rotative loop eliminates antenna and ground. Wonderful range. Exquisite tone. One major control operates wave-length indicator. Mahogany cabinet with battery compartments. Without equipment $250

Ten Models
$50 to $460
Unconditionally Guaranteed

Symbols of Supremacy

The battleship rules the sea. Type 250 Music Master-Ware rules the air. Built with the precision of a battleship, it has the power, range and staunchness that a dreadnought of the air should have

Type 250 Music Master-Ware is an advanced radio receiver which does away with both antenna and ground connection, without sacrificing an iota of range, power or selectivity.

Type 250 enables you to listen to any broadcasted program with the same thrill—the same breathless interest, felt by those who listen to the original.

Music, speech and song come from Type 250, faithful to the original—natural in tone—true to every inflection of voice or cadence of sound—the nearest to perfect reproduction yet attained.

It is the wide range—the sensitive selectivity—the clear, resonant tone—the *pleasure* of operating Type 250 that lift it above any radio you have yet heard or operated.

Type 250 Music Master-Ware does more than receive. It re-creates—retains the life and beauty of whatever it reproduces. It changes mere radio reception to real radio enjoyment.

There is an authorized Music Master dealer near you. Ask him to demonstrate the supremacy of Type 250 Music Master-Ware. Its surpassing performance will fascinate and delight you, as it daily delights thousands of others. And its continued excellence is unconditionally guaranteed.

Music Master Corporation

Makers and Distributors of High-Class Radio Apparatus

128-130 North Tenth Street, Philadelphia, Penna.
CHICAGO NEW YORK PITTSBURGH

Music Master
RADIO PRODUCTS

Saturday Evening Post (Nov. 7, 1925), p. 101

NEUTROWOUND

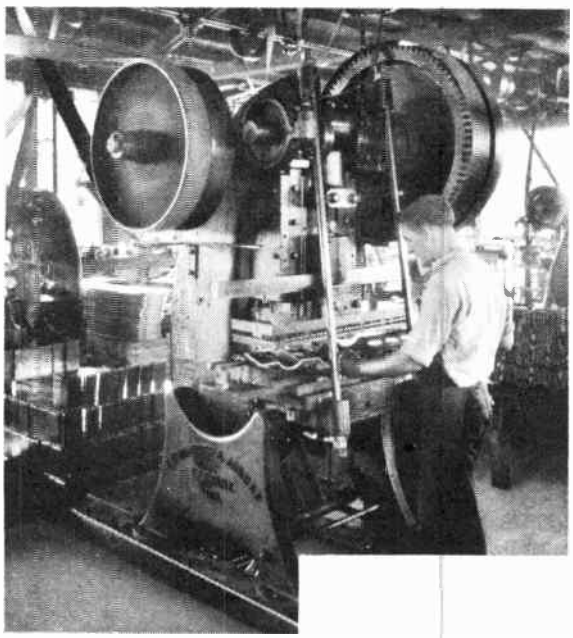
Neutrowound Radio Mfg. Co.

The Advance Automobile Accessories Company had been in business since 1916 making brake and transmission linings before radio came along. It was large enough to publish a monthly house organ in 1920.

In mid-1924, Advance apparently decided to test the radio market with a sort of "shielded breadboard" design, although no advertising of it has surfaced. Because Advance claimed in its trademark application to have used "Neutrowound" since August, 1924, probably that is when this model was first sold.

A year later, Advance put broadcast station WOK on the air at the relatively high frequency of 1380 KC, and advertised its "1926" model. With its wide-open mechanical layout and straight-line-frequency tuning condensers, the Neutrowound probably performed very well at these high frequencies, better than most of its competition.

The next year's "1927" model continued to sell, even though the industry had pretty much switched to single-dial tuning. But the "1928" model introduced in June, 1927, was a positive anachronism. And was, incidentally, made of leftover parts. At this time, Norman Wunderlich was on the technical staff; possibly he had also been responsible for the earlier designs. Neutrowound just faded away; both Advance and its 1925 offshoot, Neutrowound Radio Manufacturing Company were sold to the Potter Company, condenser makers, in early 1929. Potter still exists, in Mississippi.



Press forming the metal cabinet tops for Neutrowound Radio Receiving Sets.

View showing a part of Neutrowound assembly department.

Another view of Neutrowound assembly and inspection.

Final test and inspection. Every Neutrowound Set is tuned on at least three stations before being shipped.

First inspection and electrical test.

Packing Neutrowounds for shipment.

pamphlet *Souvenir of Radio Station WOK*, courtesy of Serge Krauss

Here it is!

"Another Winner"

Unequalled for Range and Power

Here is Power to bring in the distant stations—power to build up the weak signals from smaller stations and make them into "radio"—super-power perfectly controlled, from a whisper to a roar.

It Tunes all Stations

Here's radio at its best—a Super-Power Radio Set that tunes the entire wave band—from the lowest to the highest—from 200 meters to 550 meters [the official wave band]. The stations are accurately separated on the dials—there is no crowding of stations on one dial setting—you get them all—but just one at a time.

A Big Powerful 6-Tube Set

The 1927 Model NEUTROWOUND is a real six-tube super-power set. Six powerful tubes—every one effective, produce wonderful volume, pure and clear. All six tubes are used to produce radio, and not a one is put there for effect, or to neutralize a shortcoming elsewhere. When you buy a NEUTROWOUND you are not paying for six tubes and getting five tube results—you get six tube performance—distance, volume, tone quality and selectivity. You get the entire range of the wave band—all the radio there is—noiselessly, and free from howls, distortion and interference.

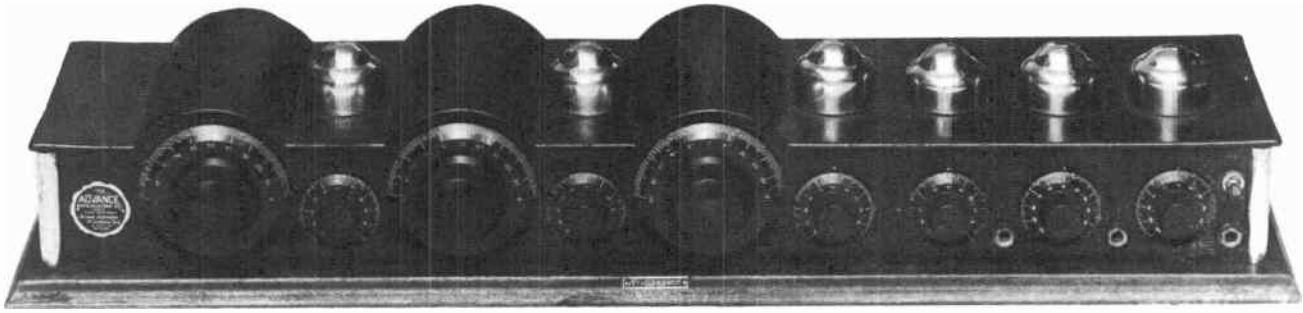
3 Stages of Audio-Amplification

NEUTROWOUND has three tubes [three stages] of audio-frequency amplification. That tells the story—radio without a compromise—power with pure tone quality. You get that perfect balance between selectivity and volume which is necessary to meet the varying radio conditions.

All Metal "Shielding" Case

The Neutrowound is the first radio set ever made with an all-metal case. Radio engineers have endeavored to apply the shielding principle—without obtaining successful results. Our engineers have developed and perfected this principle, and have designed an all-metal case that not only serves as a sturdy protection for the vital parts of the receiving set—but also acts as an electro-magnetic shielding against outside interference.

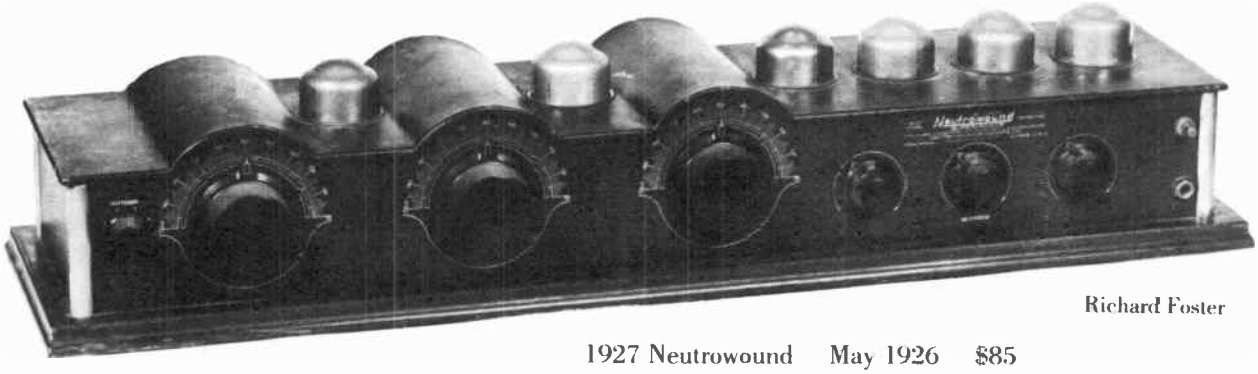
NEUTROWOUND RADIO MFG CO., Dept. 612, Homewood, Ill.
***Radio Division,* ADVANCE AUTOMOBILE ACCESSORIES CORP'N**



Arthur Aseltine

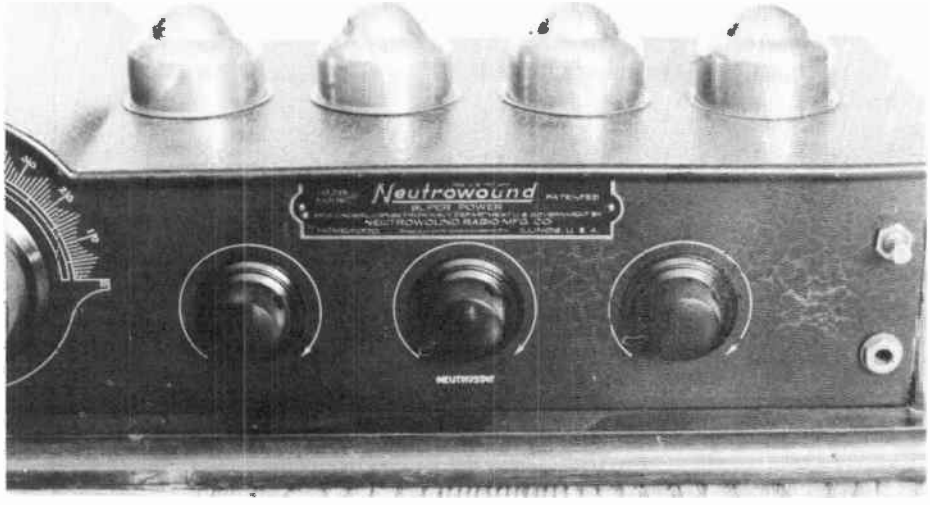
1925 Neutrowound Model C6

John M. Williams 1926 Neutrowound June 1925 $85



Richard Foster

1927 Neutrowound May 1926 $85



1928 Neutrowound June 1927 Walt Sanders

Steve Conklin

Super Allectric May 1927 $150 Uses series '99 tubes.

NEUTROWOUND "TONE KING"

Walt Sanders

"Homewood Purelectric" made by the Homewood Radio Mfg. Co. Aside from its escutcheon, it is identical to the Neutrowound Super Allectric.

TONE KING

A five-tube tuned radio frequency set employs all the exclusive Neutrowound Super Power radio as the world's greatest distance-getter.

This set is made up in genuine American Walnut Cabinet, compact in size. The best quality of parts including the Thordarsen Transformers and other parts of equal high quality are used in its construction.

It is a highly efficient Radio set, built for a man with moderate means—at the same time without sacrificing quality.

It employs: 1 stage Radio
1 stage Detector
3 stages of Audio Frequency

All of these tubes can be regular UX201A Tubes or UX112, or UX171 Power Tubes may be used in the last stage of Audio, if greater volume is desired and if sufficient B Battery Power is employed.

It will out-perform and out-distance sets selling at many times its price and employing a greater number of tubes.

It is very simple in operation, being tuned by one finger and yet obtaining the maximum of resonance or tone quality.

Price (without accessories but with battery cable)..$55.00

Dakota Iron Store Catalog

Dakota Iron Store Catalog

Master Allectric Oct. 1927 $360

Uses series '01A tubes.

OPERADIO

The Operadio Corporation

"I don't aim to have the largest company in the country, just the oldest!" was the typical reply of J. McWilliams Stone when chided by his peers for not expanding his company more rapidly. But "Mac" had been through at least two bankruptcies and a lot of hard times, so he was inclined to be fiscally conservative. Operadio, now Dukane, may never be the oldest nor the largest electronics company, but Stone's is still a remarkable success story.

Mac Stone founded his company in September, 1922, but he had plenty of radio experience under his belt by then. Mac was born on September 11, 1896. His father, an executive with Marshall Field, often travelled to his home town of Syracuse, New York, on business. Interested in wireless from the age of nine, Mac dreamed of building a portable transmitter-receiver he could take with him on one of these summer trips. He and fellow enthusiast Walter Evans, later with KYW and a top Westinghouse executive, sent up kites and exchanged wireless messages as early as 1908, and in 1909 Stone did build his portable set.

During summer vacations in 1910 and later, Mac worked on Great Lakes steamers as a wireless operator. In March, 1913, he travelled to New York, got his commercial radio license by telling the inspector he was 18 years old rather than 16, and signed on the S.S. Pan American, the world's largest sea-going tug. In the fall, he returned home, but he worked as a Marconi operator during the next three summers. On one occasion, he jumped ship in Mexico and joined Pancho Villa's army; as the only man who could read or write, he handled the exchange of silver into "bread tickets" and told of having his hat shot off in an ambush.

Stone joined the Navy and worked at Fore River Shipbuilding in Quincy, Massachusetts, from 1917 to 1919, balancing destroyer turbines, among other jobs. He returned to the Armour Institute and completed his work for a BSME in May, 1920, then joined the Van Dorn Company where he developed a railroad-car coupler (still in use in the 1960's, he noted while on a trip to Spain), becoming a vice president before leaving in 1922 to found his own company.

Stone claimed to have built his first Operadio in the fall of 1922, and actually exhibited it (along with his 1909 portable) at a 1926 radio show, but it has not survived and apparently was the only one made. His first commercial model, then, was the "Operadio 2" which, according to a letter to his father, in August 1923, was being produced at the rate of fifteen units per week with a three-weeks' backlog. Stone must have worked fast to develop it, since the UV199 tubes had only been available in any quantity since May. At the time the Operadio 2 came out there was nothing like it on the market, so Operadio soon had a national network of distributors. Stone believed in advertising, and was an active publicist, selling his sets at wholesale prices to prominent people in return for testimonials.

KYW began operation in November, 1921, by broadcasting the entire season of the Chicago Grand Opera Association, and since his friend Walter Evans was chief operator (shortly chief engineer and general manager), Stone chose the name "Operadio" for its connotations of quality music and fine tone. Upon discovering that the Chicago music firm of Lyon and Healy had registered the trademark "Radiopera" the month before, he bought it from them to avoid conflict. Lyon and Healy became a distributor.

In October, 1923, when Stone applied for a patent on his loop antenna contained inside the removable cabinet cover, Operadio moved to the Emerson Building at 816 W. Erie in Chicago. After a fire in May, 1924, which resulted in a $10,000 insurance settlement, Operadio rented space at the C.A. Taylor Trunk Works (presumably its cabinet supplier), then moved to 700 East 40th, remaining there for several years. Sales and service offices were in the Hartford Building, 8 South Dearborn Street.

Officers were J. MacWilliams Stone, president; Harold H. Shotwell, secretary; and William R. Ricketts, treasurer. Shotwell, who was credited with developing the Model 2 (and later patented the vernier condenser used

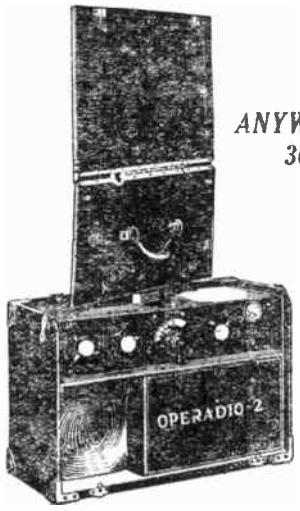
EIGHTY-ONE YEARS OF FAITHFUL SERVICE

GIMBEL BROTHERS

32D ST.—BROADWAY—33D ST.—New York City

The Cover is the Aerial

Can Be Operated ANYWHERE in 30 Seconds



New Radio Masterpiece!

OPERADIO

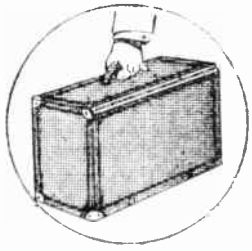
A Six Tube Long Range, Portable Receiving Set, Using No Aerial or Connecting Wires

LOUD SPEAKER: BATTERIES: SIX TUBES: WAVE BRIDGE

$190

EVERYTHING COMPLETE IN READY TO OPERATE, COMPACT CARRYING CASE

Here is the Radio that answers ALL purposes! A radio set built in a sturdy suitcase that can be carried wherever you go! A set using no aerial or ground connections—so simple that a CHILD can operate it! Efficient for long distance reception as well as local. Wonderful tone quality! The Loud Speaker is contained in the case. The set uses 6 U. V. 199 dry cell operated tubes, 6 dry cell batteries and four 22½ volt B batteries.



ENTERTAINMENT

Wherever You Go

You can enjoy Operadio anywhere, nightly at home, or out-of-doors and on vacation trips all summer. It is a remarkable piece of radio engineering. Come in and hear it at Gimbels.

Seven Points of Superiority

1. No outside connections.
2. Great selectivity
3. Portable.
4. Six Tubes.
5. Self contained Loud Speaker
6. Simplified control.
7. Marvelous tone

GUARANTEE

This set is guaranteed for one year against defective workmanship and materials.

GIMBEL BROTHERS RADIO SHOP
33rd St. and Broadway.

GENTLEMEN: -Kindly send me information regarding the OPERADIO

Name . . . . . .

Address S.2.23

If You Cannot Call, Mail This Coupon

Easy Monthly Payments

GIMBELS RADIO—Eighth Floor

NY Sun (Feb. 23, 1924)

in the 1925 model), was a few years older than Stone and had done radio work in the Army.

For the next three years, Operadio's models changed remarkably little. Each model showed mechanical improvements and adaptations to the newest tubes, but the circuit was always similar: a tuned loop, followed by a tuned RF stage that could regenerate, then untuned RF stages. While capable of excellent performance, the circuit was a bit tricky to handle and difficult to make work at the higher frequencies as the broadcast band kept edging upward. By 1927, in spite of its marvelous mechanical design, the Operadio really was obsolete. Other complications had also arisen: Westinghouse was now ready to pounce on any circuit that could be made to regenerate, even by misadjusting controls, on the grounds of infringement of its Armstrong patent. And it was no use switching to a TRF circuit because RCA was now signing up everyone for licenses under these patents, demanding $100,000 per year minimum royalty payment.

Stone was already developing loudspeakers, and, with the large number of radio manufacturers in the Chicago area who would need speakers for their sets, he probably saw a lucrative market opening up, one that would not require an RCA license. At any rate, he had no choice: Operadios were not selling, and even a cost-cutting direct-to-the-customer sales program couldn't stop the company from going into receivership in February, 1927. Stone reorganized as the Operadio Manufacturing Company, gave up the Hartford Building offices and, in December, moved back to Erie & Green Streets, this time to the third floor at 647 North Green. With business apparently improving, he opened a new plant forty miles away in St. Charles in an old piano factory on May 20, 1928. Just ten days later, an explosion and fire in Operadio's part of the Erie & Green Streets building totally gutted it.

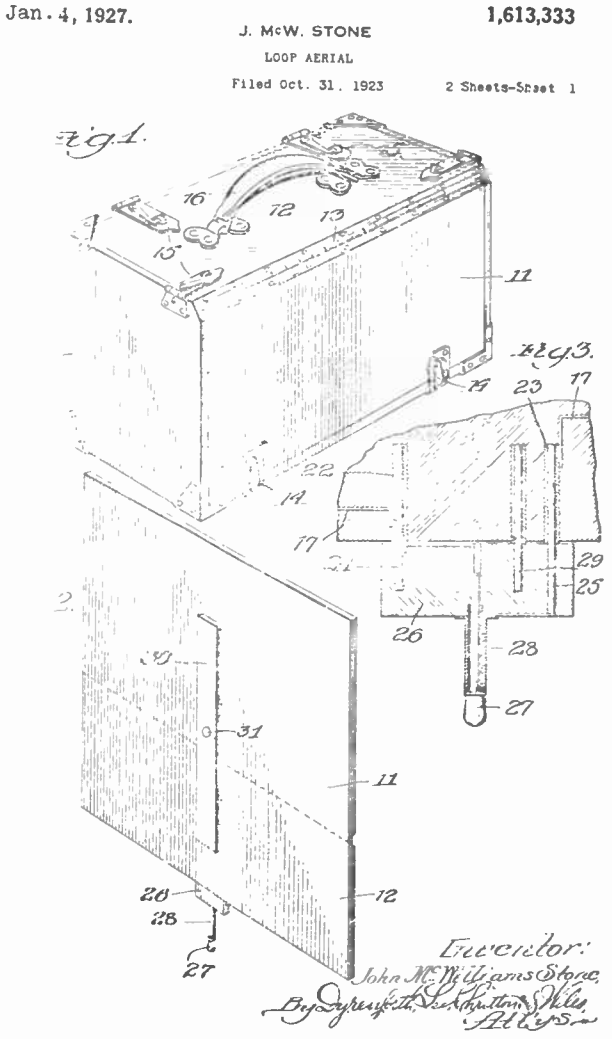
Now the die was cast. By August, Stone sold his loop patent to Trav-ler, since 1926 a competing maker of portables (selling for only $57.50), and in September he announced formally that Operadio had dropped set manufacturing.

Records of the 1930's are scarce, and the company is said to have gone bankrupt again in 1929, but Stone's company survived through the 1930's as a maker of speakers and amplifiers, growing enormously during World War II. In 1946, it operated three plants, and later six plants in four different towns, making military equipment and employing about 1100 people at peak.

One intriguing sideline during the mid-to-late 1930's was the Magic-Glo line of hollow bar glassware: ashtrays, swizzle sticks, and stemware blown with neon and other gases inside. The glasses glowed in various colors when placed near a high- frequency transmitter and tuned loop hidden under a bar or table. This line was quite popular until the Armed Forces complained of radio interference and the FCC declared the units illegal, at which point Stone disposed of his remaining stock in Mexico, at no loss.

After World War II Operadio expanded into the audio-visual and ultrasonic fields, changing its name to the

Dukane Corporation in 1951 to better reflect its diverse product lines. J. McWilliams Stone Jr. took over upon his father's death in 1970, having been with the company since 1951. In recent years the company has grown steadily, sales reaching $50 million in 1985.


Jan. 4, 1927. 1,613,333

J. McW. STONE

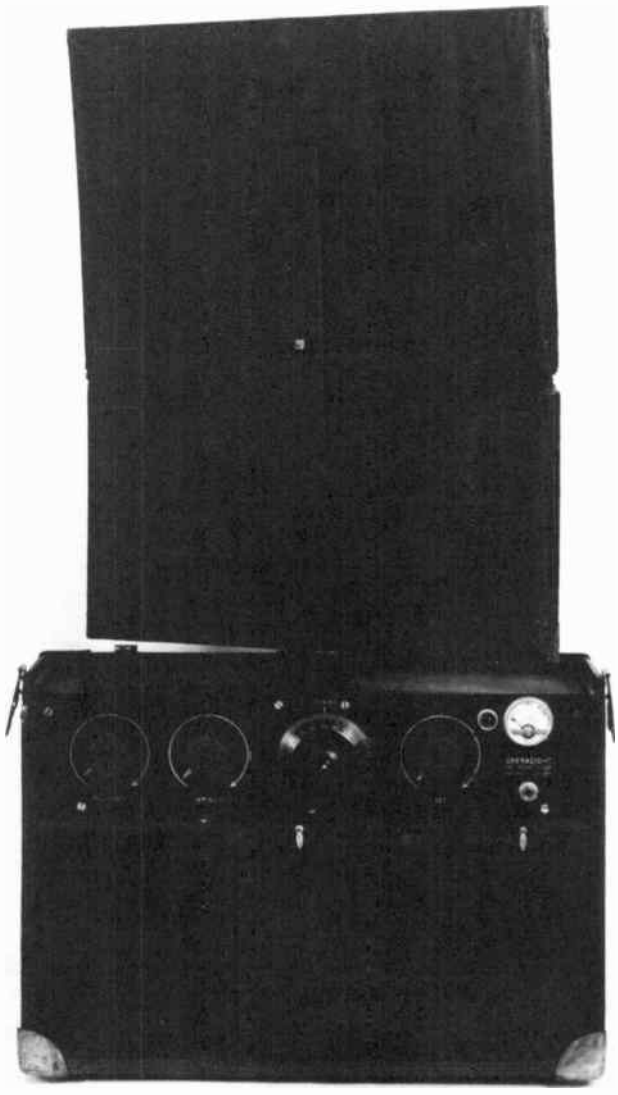
LOOP AERIAL

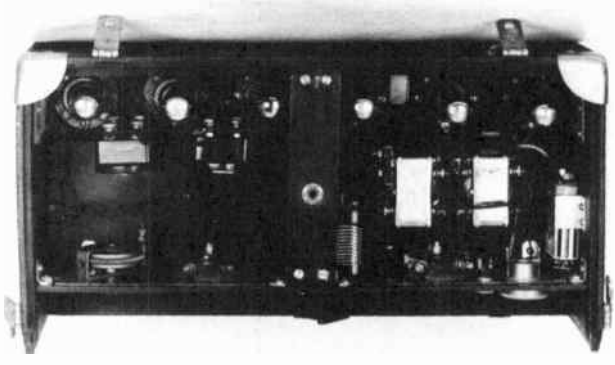
Filed Oct. 31, 1923 2 Sheets-Sheet 1

Fig. 1.

Fig. 3.

Inventor:
John McWilliams Stone,
By Dyrenforth, Lee, Chritton & Wiles
Attys.





Model 2 August 1923 $150 stripped, $195 complete. A radio complete with batteries, loop antenna and horn was unheard-of in 1923. Zenith tried to copy it and failed miserably.

Financial data on page 260

Left, Walter Evans; center, "Mac" Stone, with Stone's 1908 outfit. An aluminum wire held up by a kite was the antenna.

You Know A Dozen Men Waiting for THIS Set

Long Range OPERADIO Six Tube

Go Through Your Files! You will find the wealthy Mr. Jones, that enthusiastic customer of yours who bought a big "permanent installation" set from you last winter. He will soon be moving out to his summer home and he will want a radio. You recall Mr. Brown who would not buy a set because they all took up too much room. And Mr. Smith, who talked so much about his camping tour this summer. They all want radio—Operadio—the one and only set which will entirely meet their requirements. You know a dozen men or women who have been waiting for just this type of a receiver.

Built by the Pioneers of the Self-contained Set — Sold Under a Policy that is Right for You!

The Operadio Corporation has emerged from the so-called "intensive radio selling season" with a unique and wonderful record. Thousands upon thousands have been delivered and sold. No over-stocked jobber or dealer has had to "dump" his excess supply of Operadios because there has been no excess. In the month of March, when Radio selling was supposed to be on the wane, Operadio did a big business, and was constantly behind in deliveries. But still more remarkable is the fact that April was a bigger Operadio month than March.

A Practical Portable that is also an Ideal Home Set

The Operadio is a practical portable—the only entirely satisfactory set of this type on the market at the present time. It is entirely self-contained with loudspeaker built in, and space for sufficient battery supply to guarantee efficient performance. It is as light as it is possible to build a satisfactory radio set. Moreover, it has proved that it is an ideal set for use at home. It compares favorably in performance with any radio set on the market regardless of size or price. Now with the convertible cabinet which may be purchased separately, it affords the beauty of a handsome and dignified piece of furniture plus all of the advantages of a portable set. ORDER OPERADIO NOW. DON'T LOSE EVEN A WEEK'S PROFITS.

THE OPERADIO CORPORATION
8 So. Dearborn Street, Chicago, Illinois

You Don't Have to Apologize for the Appearance or Battery Life of Operadio

Operadio engineers have not gained portability by sacrificing battery supply. There is space in the case for six "A" batteries and four of the largest "B's"—insuring high efficiency, long battery life, and low cost of operating the set.

The Operadio is extremely attractive in appearance—resembling a smart traveling case when closed, and harmonizing with any interior when opened for use. With the new Convertible Cabinet now available you may have the most beautiful furniture model ever designed.

Remember, the Operadio is a COMPLETE unit with built-in loudspeaker, wave-bridge (loop antenna), six tubes, batteries and all parts.

LIST PRICES
(East of Rockies)

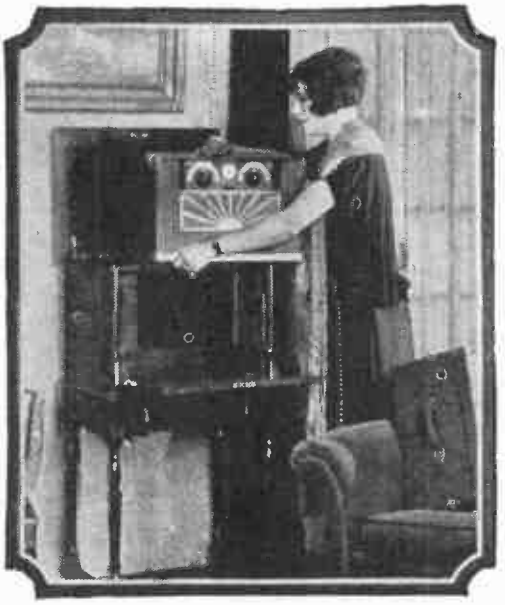
$160.00
without tubes and batteries.

$189.00
complete with tubes and batteries.

Operadio Convertible a walnut cabinet for housing the Portable Operadio (as described on another page of this folder.)
$84.50

1925 Model Oct. 1924 $160, or $189 complete. "Convertible" walnut cabinet to house the portable for home use, $84.50. The "works" were potted in two plug-in metal cans.
Technical article in *NY Evening World*, May 16, 1925, p. 19.

BETSY ROSS. WINTER GARDEN STAR



Removing the set from the cabinet. A separate cover (containing loop aerial or wave-bridge) is applied to the case—and the set becomes a smart-looking piece of hand-luggage.

The Operadio—in portable form—closed and ready for carrying. A complete set, with loud speaker, six tubes, batteries—everything contained.

ESTELLE TAYLOR. DEMPSEY

This advertisement appearing in Liberty, September 19th, is the first of a series running every other week during the intensive selling season

Different

This cabinet contains a complete radio . . . . which may be removed . . . . . and carried like a suitcase . . . . .

. . . wherever you go . . . . . set up anywhere in one minute . . . . . or used in any part of your home.

Everything any radio can offer plus advantages no other set affords

Radio as you have hoped it would be! Radio of the finest quality. Simple, powerful, reliable and so convenient that it may be enjoyed anywhere—indoors or out, upstairs or down.

That is the Operadio—a complete, compact, self-contained receiver with loudspeaker, six tubes, batteries, loop and all parts fitted into a case of unbelievably compact proportions. No aerial or outside connections of any kind are required.

A single hearing will convince you that its performance is far ahead of any radio set you have ever heard. Performance of such superb quality and reliability that the Drake, Roosevelt, Ben Franklin and many other leading hotels chose this set for the entertainment of their guests.

The portable Operadio in its extremely smart carrying case is complete in itself and harmonizes with the most beautiful surroundings. In this form it is now being used in thousands of homes.

And for those who desire it, the distinguished walnut cabinet shown above is available for housing the set in the home—thus combining the beauty of a furniture model with the convenience of absolute portability.

Before you decide on a radio set, see and hear the Operadio which offers every advantage of any set on the market, and so much besides. Leading dealers handle the Operadio and will gladly demonstrate it in your home.

The illustration shows the portable Operadio in the cabinet from which it may be removed in one minute's time and used in any part of the house or wherever you go. For those who want a compact set for home use only, the Operadio also is available in a distinctive semi-portable mahogany case.

The Operadio idea was conceived sixteen years ago when J. M. Stone built the first successful self-contained radio receiving set, using a kite to carry the aerial wire aloft. The accompanying sketch was made from a photograph taken in 1909

THE OPERADIO CORPORATION
8 South Dearborn Street
Chicago, Illinois

OPERADIO

The Original Self-Contained Radio

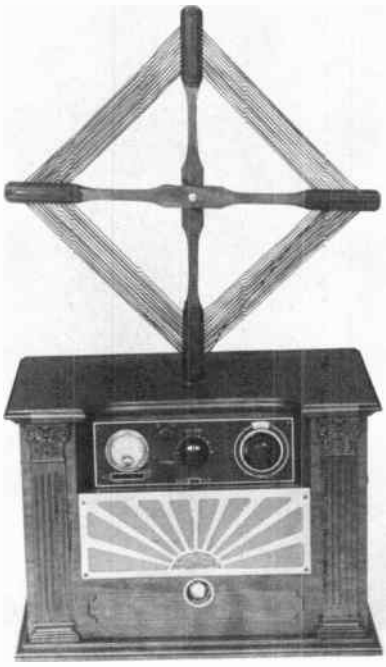
Mail this coupon for full particulars

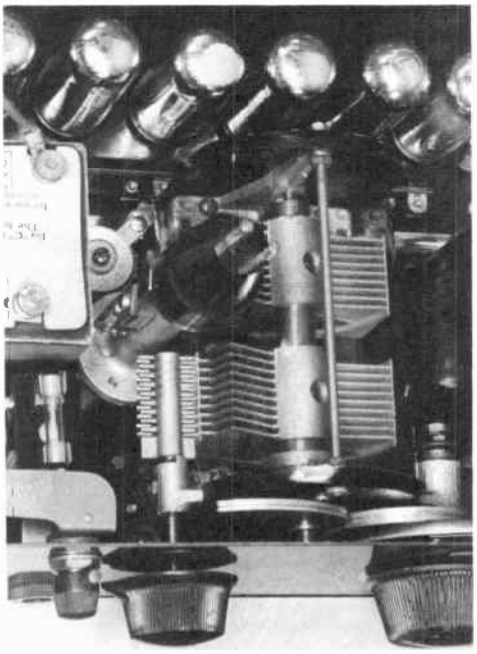
THE OPERADIO CORPORATION, Dept. A
8 So. Dearborn St., Chicago, Ill.
Please mail me illustrated booklet giving full particulars of Operadios and their distinctive features.

Name .....

Addr .....

City .....





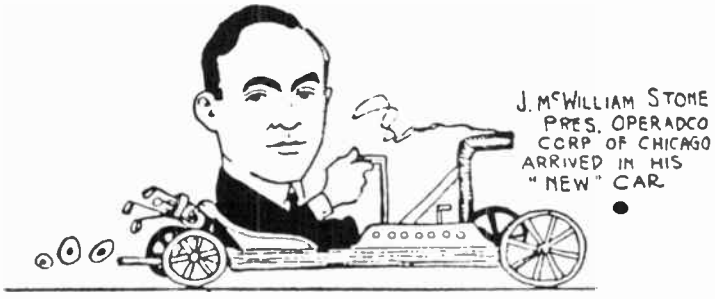
1926 model Sept. 1925 $160 (portable case)
$180 (consolette)
$ 68 (separate Tudor cabinet for portable)

The cabinet of the consolette shown above has been extensively rebuilt. Note the tuning and regeneration condensers, machined from solid aluminum. Two eccentric cams, connected at their rims by metal dial cord, form a variable-ratio drive, providing a perfect 10kc-per-division scale.

6-A Feb. 1927 $68
This was the only non-portable Operadio made, apparently in very limited numbers, in a last-ditch effort to stave off receivership. It used 01A tubes.

model 7 Sept 1926 prices same as 1926 model, but reduced to $112 in Feb. 1927. A model 7 with A & B power pack was offered for $190.75 in Sept. 1927. Technical article in *Radio Engineering*, Oct. 1926, pp. 395-396.

8	Oct. 1926	$26	chassis only
9	Oct. 1926	$40	chassis only



At the Radio World's Fair, New York, Sept. 14-19, 1925
(New York Evening World Radio Magazine)

Your Choice

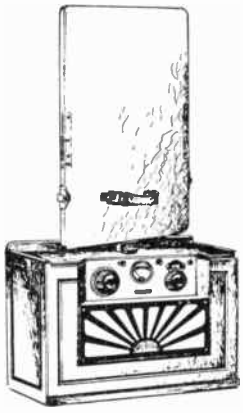
of Portable or Cabinet Sets Operating Either with Loop or Outside Aerial

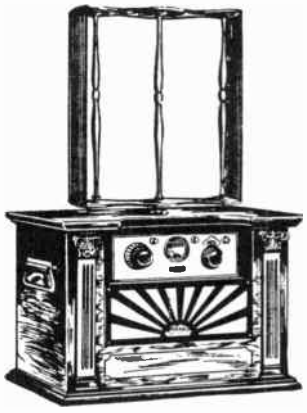
1927 MODELS

7-Tube Portable

A powerful, rich-toned seven-tube receiver. The loud speaker, large battery supply and all parts are fitted into a beautiful carrying case. Loop aerial built into the demountable cover. Including built-in loud speaker, was $160. *Now* **$112**

This is the famous Portable in use in thousands of Chicago homes. The set may be closed for carrying—and in less than a minute's time, it can be opened and put in operation. When a furniture model is desired for the home Model 7 may be housed in a handsome cabinet at small additional cost.





Loop Cabinet

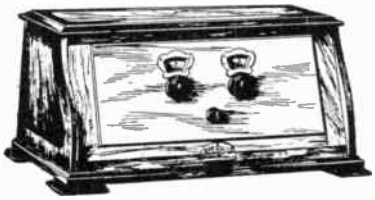
Same as portable described above, except installed in a beautiful walnut cabinet. A piece of furniture you will be proud of. Operates on loop no outside aerial or outside connection of any kind required..... **$98**

With built-in loud speaker, $112

Model 6-A

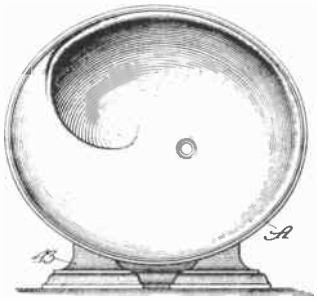
Using Outside Aerial

A wonderful 6-tube set using large (storage battery) tubes and operating on outside aerial. Remarkable performance, selectivity, tone and volume. In handsome table-type cabinet **$68**



1,735,476. ACOUSTIC HORN AND METHOD OF AND APPARATUS FOR MAKING THE SAME. JOHN McWILLIAMS STONE, Chicago, Ill., assignor to Operadio Manufacturing Co., Chicago, Ill., a Corporation of Illinois. Filed Sept. 22, 1927. Serial No. 221,292. 1 Claim. (Cl. 18—59.)

The method of making a loud speaker horn including; forming an open ended drum of sheet metal; deforming said drum out of its cylindrical shape by suitable shaping means and temporarily holding said drum in said deformed shape by said shaping means; casting a loud speaker horn in said drum, allowing the same to harden while so tem-



porarily holding the drum in its deformed shape; and removing the shaping means, permitting the drum to remain on the casting as a part of the loud speaker horn and permanently held in its deformed shape by said casting.

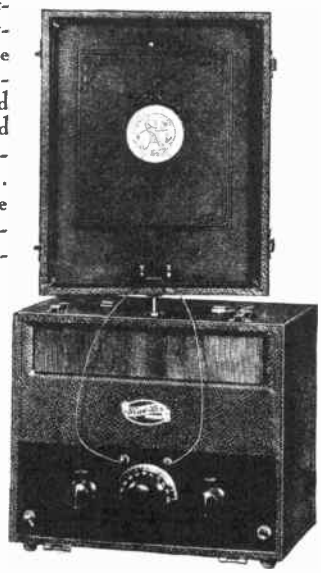
Improved 1928 Model of Trav-ler

The Original "ONE MAN" Portable Radio

Everybody loved the little Trav-ler as it was. Jobbers and dealers because it was a ready seller. Owners because of its easy portability and remarkable performance. *And now it's better than ever.*

Old Features in New Model. Weighs only 23½ pounds . . All in one small case—loop aerial, 5 tubes, batteries, loud speaker . . Standard parts . . Sweet tone . . Strong volume.

New Features. Improved appearance—beautiful black and gold color scheme . . Jones plug—permitting use of Trav-ler with larger batteries or eliminator . . Special attachment—permitting use of either the Trav-ler's loop aerial or antenna and ground . . Rearranged construction eliminates service . . . . Lower price. Write for complete information. Trav-ler Manufacturing Corporation, Dept. K, 3401 N. Halsted St., Chicago.



NOW only $77.15 complete

$57.50 stripped (East of Rockies)

$60.00 stripped (West of Rockies)

Weighs only 23½ pounds complete

Citizens Call Book (March 1928), p. 155

A Speaker to *better* any Set!

The Line Complete ~ $15.00 to $275.00

OPERADIO offers a complete line of Speakers to meet every requirement—*at every price level.* Air column speakers of the successful Bloc Type in three beautiful Table Models and one Dynamic Table Model and three Handsome Cabinet Models equipped with air columns of various lengths or with Operadio Dynamic units, either type with or without amplifier. Dealers find Operadio the greatest profit builder....with unusual turnover.

The Barcelona
A very attractive speaker table of Spanish design equipped with a 54 inch air column. A beautiful cabinet that is also designed to accommodate any standard radio Set. Price, $12.50

Dynamic Unit
Decided improvements in power reproduction due to special Operadio designs. Will handle output of largest sets without trace of distortion, blasting or rattling regardless of stages of power amplification.

The BelCanto
Can be had with 54 in. air column or Dynamic Unit. 6 volt D. C. or A. C. with or without tube radio 4 or 5 tube amplifier. Amplifier may be used in combination with air col. or Dynamic Unit. Prices, $80 to $275

The Westminster
The newest and finest of Operadio Air Column Speakers. May be connected to any set and will handle the output of any standard amplifier up to and including the 171 tube. Has 64 inch air column. Price, $35.00

The Geneva
A table model Dynamic Speaker, scientifically constructed with a sounding board giving maximum baffle effect. Beautiful in design and finished in rich walnut. Furnished with Operadio Dynamic Unit. 6 volt D. C. $55
110 volt D. C. $60
110 volt A. C. $70

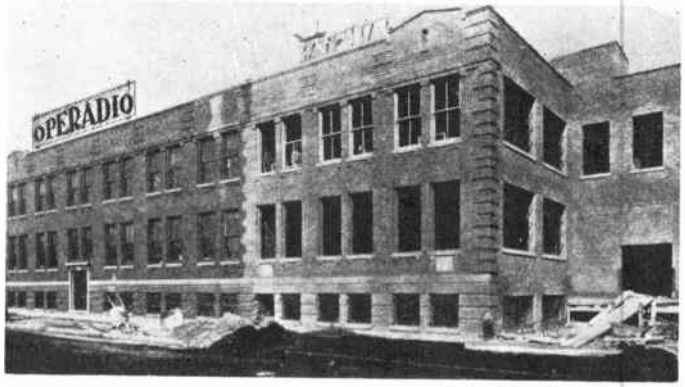
The St. Charles
A cabinet model Dynamic Speaker, will handle and give tremendous volume with undistorted tone fidelity. For sets employing power tubes or equipped with separate amplifiers using power tubes.
6 volt D. C. $70
110 volt D. C. $80
110 volt A. C. $90

Manufactured by Operadio Mfg. Co. St. Charles, Illinois Greater Chicago District

Sales Department The Zinke Company 1328-25 S. Michigan Ave. CHICAGO, ILLINOIS

OPERADIO
Bloc Type and Dynamic
SPEAKERS

Radio Retailing (Nov. 1928), p. 103



New addition at Erie & Green Streets

Radio Dealer (Dec. 1927), p. 66

Modern Plant of the Operadio Mfg. Co.

St. Charles Plant

Talking Machine World (June 1928

OZARKA

Ozarka, Inc.

J. Matheson Bell, after arriving in the United States from Scotland around 1900, worked his way up the ladder from cowpunching in Texas to setting up stoves in a hardware store to selling stoves to heading Montgomery Ward's stove department. Finally he became Ward's merchandising manager. Then in May, 1922, he abandoned it all to go into business for himself. He and engineer John Huff worked from the back of a bicycle shop at 5342 North Clark in Chicago.

A photo of the "first Ozarka . . . introduced May 1, 1922" in an April 1930 sales brochure shows a Sectional Universal Tresco — no surprise since Bell was Tresco sales manager from June, 1922, to at least January, 1923. The Ozarka name was not used until October, 1922 (according to the 1924 trademark application) so if Bell's company existed, it was under a different name. The first Ozarka ads appeared from January to March, 1924 — not for a radio, but for a 10¢ station wall map.

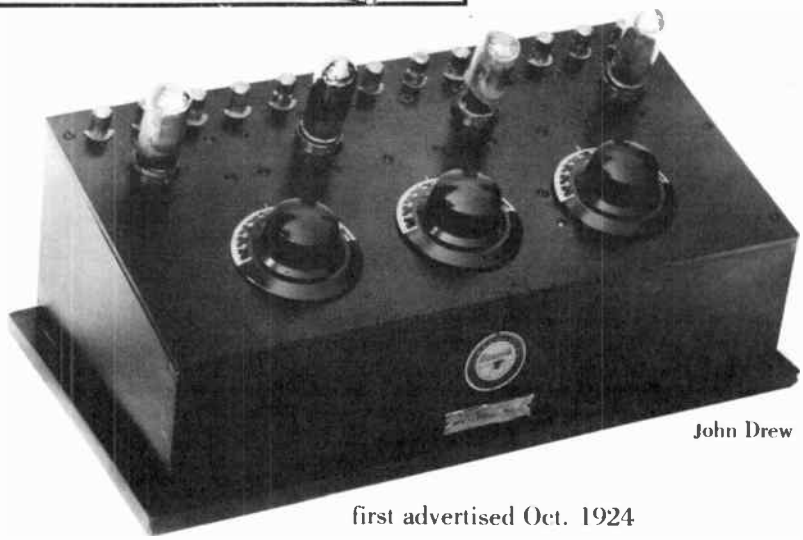
Ozarka sets were sold to individual representatives who handled sales in their local territories. Bell kept in touch with a constant stream of newsletters and flyers. There were 4800 such salesmen in January, 1927; 7100 during 1929-30, and 6800 in August 1931, of whom 1143 had been selling for more than seven years.

Except for a dip in 1927-1928 when Ozarka was caught with large battery-model inventories as the AC models came out, profits increased more or less steadily each year: For the year ending in September, 1925, $33,666; 1926, $30,226; 1927, $41,311; 1928, $28,419; March 1929 (six months) $54,291. In July, 1929, Bell hired L. E. Parker away from Stewart-Warner, and in November, $250,000 worth of stock was issued to finance further expansion. While it seems an unlikely period to have increased sales, July, 1930 showed an 88% increase over July,1929, which had, in turn, been 97% (number sold) ahead of 1928 (other months in 1930 were not quoted). Perhaps Ozarka finally got large enough for RCA to notice because it filed a patent-infringement suit on January 15, 1931. On May 1, 1931, Ozarka signed a lease for a six-story factory, about the same time settling the RCA suit by transferring Kellogg's RCA license. Having outlasted many of his contemporaries, Bell now had big plans. His 1932 models, however, were the last ones made. Ozarka vanished after mid-year, 1932.

Popular Mechanics (May 1924), p. 158

portable May 1924 $65 complete

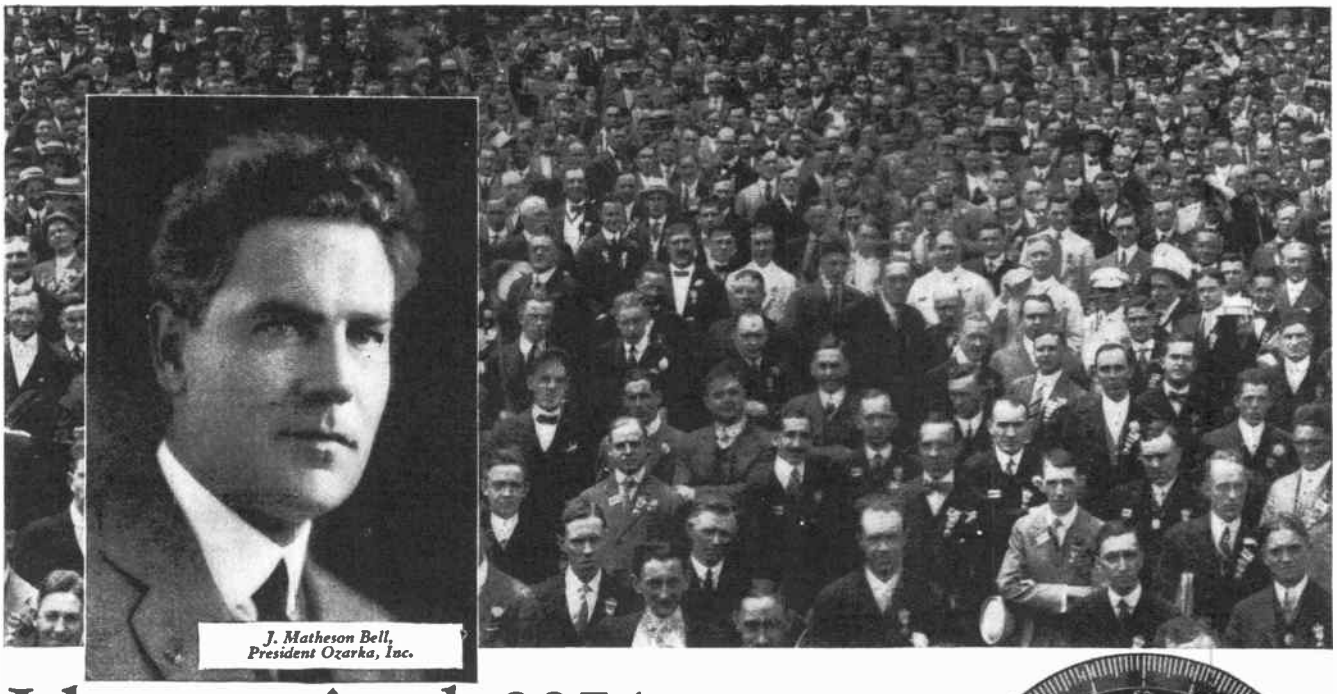
Radio Age (Oct. 1924)



John Drew

first advertised Oct. 1924

Radio News (Feb. 1925), p. 1380



J. Matheson Bell, President Ozarka, Inc.

I have trained 2274 men to make big money in Radio

I can do the same for you

WHO were these men? They came from all walks of life. I have just looked up the record of ten of them. One school teacher, one railroad man, one drug clerk, one die-maker, one electrician, one insurance man, one farmer's son, one travelling salesman.

How much are they making? $50 to $500 a week. The $50 men are mostly those who give me their spare time. A great many of my representatives start that way.

How much did they know about radio at the start? Very little, in many cases nothing. Lack of radio knowledge is not a handicap. In fact, I rather prefer the man who hasn't delved too deeply into radio theory. We have our own methods—they are successful—and the man with nothing to unlearn makes the biggest success of our plan.

Many of the men who have made the biggest money selling Ozarka instruments never sold anything before in their lives. Sales experience naturally would be of some value, but it is not absolutely necessary. Unlike other articles, a radio instrument does its own talking. Your demonstrations are given during the evenings, which is possibly your spare time. In the hands of the man who knows the instrument it will deliver its best, and you can safely put it in competition with any instrument on the market today, regardless of its price.

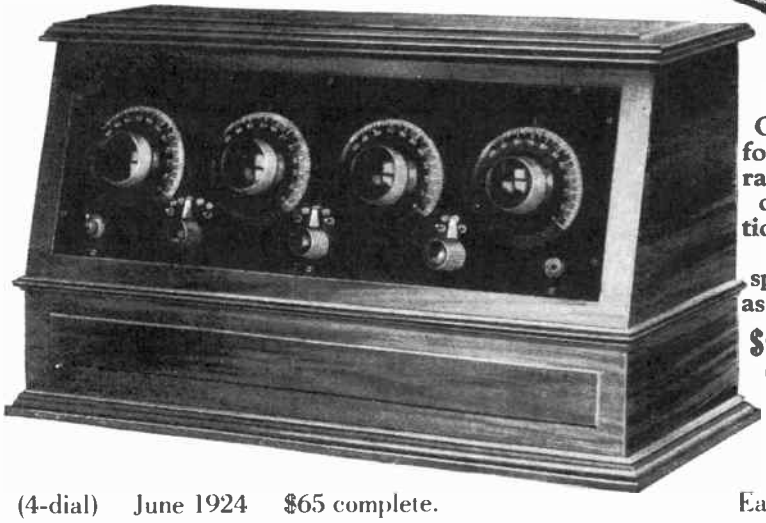
The man I want is known in his community as upright and reliable—a man whose word is as good as his bond—a man who has lived in his community long enough so that his fellow men know him and know the real type that he is. He may not have any considerable amount of money, but he has a little; in fact, in many cases the man who is particularly interested in my plan is the one who is having rather a hard time making ends meet. He is, however, the type of man who would not handle any thing unless he was thoroughly convinced of its merit. If you are this kind of a man and are really sincere in wanting to improve your financial conditions, I will be very glad to tell you of the Ozarka Plan. I can train you to make considerable more money than you are now making. I have done this with 2274 men in the past two years, and I will do it for you if you will do your part.

This Button identifies Ozarka Representative in your city—your assurance of complete radio satisfaction

This large Book tells how to make $100 per week under Ozarka Plan

The Ozarka Plan is fully described in a large illustrated book. I will send a copy to men who are willing to tell me fully about themselves. The Ozarka book is a true story of life, of men, of why they fail, and how they succeed. It tells how men are carving out futures for themselves in this fascinating business of radio.

In territory not now covered, I want the right man. If you feel qualified and are willing to put forth the necessary effort to obtain a splendid, profitable business of your own, write me and say "Send your Ozarka Plan Book No. 100." It may be the turning point in your life. Don't fail to mention the name of your county.



Ozarka four tube radio for operation with loud speaker as low as **$39.50**

(4-dial) June 1924 $65 complete. Early models used crystal detectors, 3 tubes.

OZARKA, INC.

804 Washington Blvd., Chicago

New OZARKA Junior Model Fully Equipped—$100

Radio News (May 1925), p. 2042

COMPLETE WITH

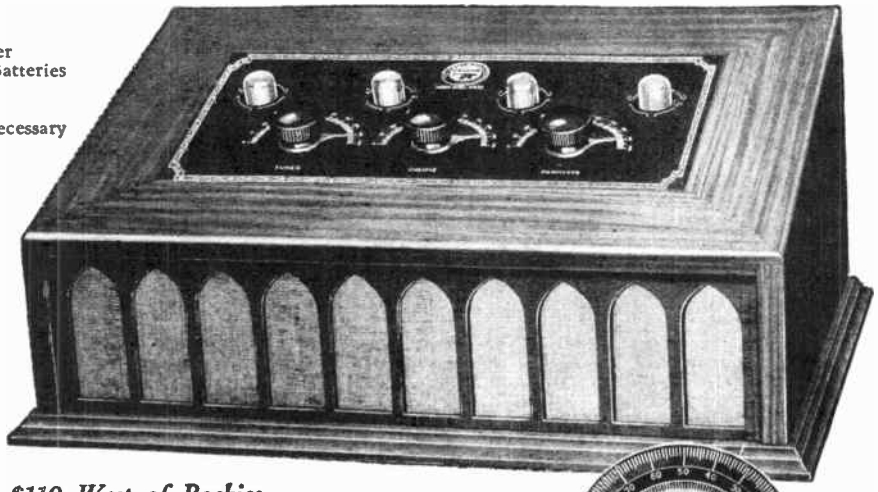
Four No. 199 Tubes
Built-in Hy-Power Loud Speaker
Four Eveready 22½-volt "B" Batteries
Three Eveready Dry Cells
One Eveready "C" Battery
Aerial Equipment, everything necessary

NOTHING MORE TO BUY.

THERE IS A REASON

This instrument is sold direct from the factory to you thru our own factory representative; therefore, our selling expense is less. No middlemen's profit to pay.

Compare Ozarka quality with every other instrument on the market—compare prices and you'll quickly realize how you can secure the highest radio quality possible at prices which are as low as the lowest. More than this, all Ozarka instruments are backed by the Ozarka service.



$110 West of Rockies
$135 in Canada

This button identifies Ozarka representative in your city—is your assurance of complete radio satisfaction.

Let our factory representative bring the No. 299 to your home

FIND OUT in your own home, by tuning this instrument yourself, just what distance, volume and tone it will deliver. All the Ozarka factory representative asks is an opportunity to let you prove to your own satisfaction that the Ozarka Junior No. 299 is the greatest radio value for $100.00.

THE Ozarka Junior No. 299 meets an insistent demand for a radio instrument, operating on dry cells which will deliver plenty of volume from long distances — with loud speaker and batteries all enclosed—an instrument of quality which is a handsome article of furniture and yet all complete for $100.00.

Cabinet is 23 inches long, 15 inches deep, 6¼ inches high at the front and 10 inches high at the back; waxed walnut finish, same as used on high priced furniture. Panel is of etched bronze with dull gold markings. Most convenient shape and size possible to make tuning easy.

Entire front has open grill in attractive design, lined with gold cloth — built-in large goose neck loud speaker of wood veener equipped with powerful loud speaker unit, not a head phone unit, but a power unit weighing 3½ pounds, giving a volume and tone unexcelled in any loud speaker.

Door in back enables dry cells, "B" and "C" batteries to be put in place inside—not a wire in sight — even aerial and ground come in thru the back. Tuned radio frequency circuit especially designed to produce full efficiency from dry cell tubes No. 199. Operates on any outside aerial or on an inside aerial run around the room behind the picture moulding.

The Ozarka representative will gladly bring the instrument to your home—he won't tell you what it will do—he won't tune it himself, but he will let YOU do all the tuning. If, by your own operating, you are not thoroughly convinced that the Ozarka Junior No. 299 is just what you want, then you are under no obligations whatsoever.

If the instrument itself will not prove its value to you, then no salesman can do it — Ozarkas will sell themselves if given the opportunity.

Ozarka factory representatives are trained directly under Ozarka engineers so that they know every detail of Ozarka instruments and can correct any trouble which may ever come up. If you put an Ozarka in your home, it will work perfectly; more than this, a trained Ozarka representative will keep it working perfectly.

Ozarka instruments and Ozarka service mean perfect radio satisfaction to you.

Why not ask us for the name of the nearest Ozarka representative—give us the name of your county, we'll gladly do it.

Attractive Openings for a Few More Representatives

THE Ozarka Junior No. 299 is a typical Ozarka value—made possible by the Ozarka plan of selling thru direct factory representatives. This is only one example—the Ozarka line offers other types of four tube instruments as low as $39.50 (without accessories); an exceptional opportunity for men of the right caliber to establish themselves firmly in a profitable radio business of their own.

The Ozarka organization today consists of 3100 men who are making from $50 to $300 per week. More men are needed in open territory; men who are willing to learn what we are willing to teach them; men who recognize that they must learn how to correct troubles if they expect to make a success of selling radio instruments.

This work can be started in your spare time—evenings are the best time to sell radio. As you learn you will grow, and it will only be a question of time until it will pay you to give Ozarka all your time and own a business of your own—be independent.

Exclusive territory is given to men who have proven that they can handle it successfully. Your profit is immediate, because Ozarka instruments will sell themselves if a demonstration is arranged for. The amount of capital required is small, but some is absolutely necessary. No knowledge of radio is necessary—all we ask is willingness and patience to learn, and that you are somewhat mechanically inclined.

There are many men who work hard but don't seem to get ahead—radio offers just what such men have been looking for—a business of their own which can be started small but one that will grow slowly but surely if established on a firm service basis such as taught by Ozarka, Inc.

Isn't such an opportunity well worth enough of your time to write and tell us about yourself? You'll find that we will gladly discuss this matter with you—it may be the turning point in your life. If interested write today and ask for our Ozarka Plan No. 100.

Don't fail to mention the name of your county.

OZARKA, Inc., Chicago, Ill.

804 Washington Boulevard

Junior no. 299 May 1925 $100 complete

OZARKA PORTABLE

Radio Everywhere You Go

Take It with You On Vacations

HERE'S a real Portable Radio with no apologies. This year you can camp, tour, fish or hunt, and make your vacation more complete with Radio. Bring in sport returns, concerts, music for dancing—radio entertainment in your favorite variety, to liven up dull or rainy evenings, and add immeasurably to your happiness.

The Ozarka Portable is built for long distance. The Hy-power built-in Loud Speaker makes it possible for a large gathering to enjoy the program exempt from troublesome and awkward earphones.

It is simple to operate and convenient to carry and, best of all, you can have it for home use when you return.

The Ozarka factory representative will gladly bring this Portable to your home and let you find out by tuning it yourself, just what distance, volume and tone it will deliver. Prove to your own satisfaction that the Ozarka Portable is the greatest radio value for $75. Why not ask us for the name of the nearest Ozarka Representative, giving us the name of your county, and we'll gladly arrange for a demonstration.

$75 Complete with

Four No. 199 Tubes, Built-in Hy-power Loud Speaker, Four Eveready 22½ "B" Batteries, Three Eveready "A" Dry Cells, One Eveready "C" Battery, Aerial Equipment, ready to unreel—all installed in neat fabrikoid covered case — complete weight 25 lbs.

Men Wanted for Real, Money-Making Opportunity

THE country is full of radio fans who take greatest delight in "listening in." They have been waiting for a really worth while portable radio outfit to take with them on their vacation trips—and here it is—the Ozarka Portable, newest member of the famous Ozarka Radio family.

If you can qualify, there is an opening for you in the Ozarka organization where you can make more money than you have ever made before. We are over 3100 strong, and most of our men are making $50 to $300 a week. Right now is a fine time to get started selling radio. There is a strong demand for Ozarka Portable, a little later on comes the powerful demand for the other Ozarka models. We allot exclusive territories. Profits start immediately. Knowledge of radio is not necessary. We supply that and the training. Our methods of demonstration insure the orders. You must be able to convince us that you are the right man for us—have good reputation and character—are industrious and ambitious. A small amount of capital is necessary. If interested, "action" is the word. Business is starting on Ozarka Portable right now. Write us today and ask for Ozarka Plan No. 100. Be sure to mention the county you live in.

OZARKA, INC.

Portable June 1925 $58 list. later called model 299, $40.70 list.

Radio News (June 1925), p. 2204

"Even if I had Your Fur I Wouldn't Be a Rabbit —"

AN attractive cabinet can never make an Ozarka out of any other radio. Far too many radio buyers pay more attention to the outer appearance and not enough to the inside. The service behind the radio you buy is even more important than the inside or outside, your satisfaction depends on it. Let us see just what radio service is.

When your automobile runs as the manufacturer intended it should it is a real pleasure to drive it. But what do you do when something goes wrong? Do you immediately condemn the car?—no. Do you call in some handy man who can fix anything?—no.

You send for a service man who is trained in repairing your make of car. To correct the fault is easy for him because he knows. Some other mechanic might have to tear the car apart to locate the trouble.

The same is true of radio, no matter what price you pay—you will sometimes need the service of a service man. If he is factory trained and experienced he can and will deliver the kind of service you know you ought to have.

Ozarka instruments are only sold by direct factory representatives who are required to take a complete course of instructions in Ozarka service directly under Ozarka engineers. By so doing we are assured that every purchaser of an Ozarka will have an experienced service man within reach at all times. 3100 such men today comprise the Ozarka service organization—more are being added daily. Ozarka service does not add a single cent to the price you pay for your radio—then why not benefit by it.

Ozarka instruments are sold only in competition side by side with others—do your own tuning and therefore decide for yourself just what Ozarka will do for selectivity, distance, volume and above all, tone.

Send for the book Ozarka Instruments No. 200; please give name of your county and we'll gladly have our Ozarka representative arrange a demonstration in your own home.

We Need a Few More OZARKA Representatives

RADIO offers a wonderful opportunity to men who wish to get into business for themselves. It is work that can be done, at the start, in the evenings and your spare time. You can hold your present position and learn radio under our plan. Ozarka instruments have been on the market for four years—they have successfully met all competition. Ozarka representatives have made good, not only because Ozarka Instruments are right but because our training in both selling and service is the most complete possible.

All we ask is that you are willing to purchase your demonstrating instrument and willing to learn what we are willing to teach you.

We have proven with 3100 men that with this training *you* can make good in radio. The Ozarka sales course consists of twelve lessons—a real course in salesmanship that costs you nothing—our training in service is so complete that you will know Ozarka Instruments in every detail.

Send Coupon for Free Book

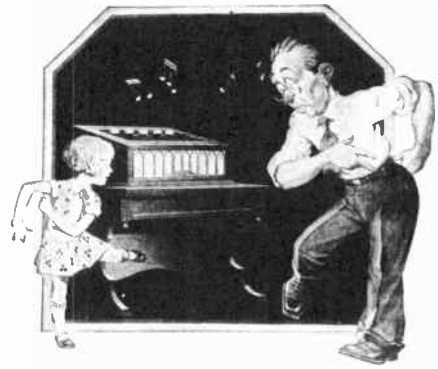
To such a man, who will freely tell us something about himself we will gladly send a copy of the Ozarka Plan No. 100, a rather unusual book. You'll find it interesting because it proves why some men are millionaires and how others made them so—why some men get to the top while others don't—best of all it will show you how you can make more money and become really independent. Send for it today, but please mention the name of your county.

OZARKA INCORPORATED
122 Austin Avenue B
Chicago, Illinois

OZARKA INCORPORATED
122 Austin Avenue, B
Chicago, Illinois

Junior J-1 Sept. 1925 $63.50 list

Radio Broadcast (Sept. 1925), p. 665



Some People Will Never Learn —*The Truth About Radio*

MANY a new radio will perform perfectly. Whether it continues to do so or not will depend entirely on one thing—the very truth that is seldom discussed.

Do you drive a car?

Don't little troubles happen occasionally?

Do you depend on a handy man for service or do you prefer a mechanic who has been factory trained on *your* make of car?

Experience has, no doubt, proven to you that men who know *all* about *all* makes of cars generally don't make the best mechanics to work on *your* car.

You wouldn't think of buying any car, no matter how low its price, unless you knew you could receive service by men who know how.

Treat the purchase of a radio instrument in exactly the same manner if you wish lasting satisfaction.

Service is just as necessary, just as important on a radio instrument as it is on an automobile.

Occasionally little things will go wrong. They will be serious to you and almost as serious to the handy man who can fix all radios but—

Such troubles will mean just a few seconds' time to a factory trained service man who knows that make of radio as he should.

While radio is rather a new industry, even now there are 4364 factory trained Ozarka service men—let us give you the name and address of the one nearest you.

Allow him to set up an Ozarka in your home.

He will let you do all the tuning so that you can satisfy yourself as to exactly what it will do for distance, volume, tone and ease of tuning.

His factory training enables him to keep every Ozarka which he sells, working just as it did when new.

Any radio, no matter what its price may be, will only be as satisfactory as the trained service behind it.

OZARKA INCORPORATED
120 W. Austin Avenue C CHICAGO, ILL.

Popular Mechanics (Oct. 1926), p. 177

$132.50 Plus installation and transportation: Ozarka Senior 5 Tube Model complete with Loud Speaker and all accessories.

$100 Plus installation and transportation Ozarka Junior 5 Tube Model complete with built-in speaker and all accessories.

$215 Plus installation and transportation Ozarka Console 5 Tube Model, solid walnut cabinet, complete with all accessories.

We have a few Openings for the Right Men

WHILE there are today 4364 Ozarka representatives, some territory is still open. We want men who believe in the future of radio—men who are tired of working for some one else—men who would like to add to their present income by devoting their evenings to Ozarka.

At the start, you can keep your present position. Later on, after you have proven what you can do, then you will give us all your time because it will pay far more than your present position.

The man we want may not have much money but he is not broke. He has lived in his community for some time—he has a reputation that his word is good. He may not have made any startling success but he has never "put over something" just to make money. He may know nothing about radio or salesmanship but he will be successful if he is willing to study what we are willing to teach him, without cost.

The field in radio is wide open for the trained man. The success of the 4364 Ozarka representatives proves what men can do. If you are interested, ask for a copy of the Ozarka Plan, a 108 page book which tells a true story of how big money and a permanent business can be built in radio.

Unlike Some Music OZARKA *Service Satisfies Every Owner—*

IN radio, when one selection does not **please**, you simply tune it out and pick up another broadcasting station. If it is a question of unsatisfactory volume or tone in your instrument then it becomes an entirely different matter.

You have certain very definite ideas in mind as to what you want your radio to do. Will you allow us to make a few suggestions regarding a plan whereby you can settle the radio question?

Select the instruments which you think might answer. Have a demonstrating instrument brought to your home. Let each salesman, in turn, make the necessary battery connections. Let him tell you how to operate it but do all the tuning yourself.

You'll buy the instrument then, based on your own operation. You'll size up each one for

—ease of tuning
—distance received
—volume
—tone
—selectivity
—price.

OZARKA
124 Austin Avenue C
Chicago, Illinois

YOU'LL KNOW THE MAN BY THIS BUTTON

OZARKA Senior S-I
Complete With All Accessories Including Hi-Power Speaker
$125.00
West of Rockies, $137.50
Canada, $180.00

There still remains one very important question to settle—the matter of service. No matter what anyone tells you sometimes little things may go wrong. The best radio salesman often knows nothing of correcting radio troubles—satisfy yourself.

Our Ozarka representative in your community will gladly put an Ozarka in your home for such a test. More than this, you will find that he is a thoroughly trained mechanic on our instrument. He has gone through a complete course of study under Ozarka Engineers, the men who designed and perfected the Ozarka.

3187 such men today can correct any trouble which may occur on any Ozarka instrument—more men are being factory trained daily. You wouldn't buy an instrument blindly—then don't buy service the same way. Any radio instrument is only as satisfactory as the quality of service behind it.

Our Book No. 200 shows the full Ozarka line from $75.00 to $197.50, complete with all accessories.

A Few More Men Are Needed

In a great many counties we have the men we want. He is rapidly building up a permanent and profitable business of his own because he has an instrument that will more than meet all competition. More than this, he is trained to back up his sales with the kind of service that counts.

Many well established Ozarka representatives started by giving so only their spare time—their evenings. If your county is open you can do the same.

The investment in cash is very small. The investment in time necessary for study is considerable. It requires patience, but the results have enabled many men to get out of the salary and time clock class.

Any previous sales experience is helpful but not necessary. We can and will teach you how to sell.

Send Coupon for FREE Book!

The 84-page "Ozarka Plan" is entirely too expensive to be sent out on postal card requests. It will be sent FREE to any man who mails the coupon below and who is really anxious to improve his condition. Tell us about yourself, ask for Ozarka Plan No. 100 and don't fail to give the name of your county.

Ozarka Incorporated
124 Austin Ave. C.
Chicago, Illinois

☐ Without obligation, send book "Ozarka Instruments No. 200" and name of Ozarka Representative

☐ I am greatly interested in the FREE book "The Ozarka Plan" whereby I can sell your radio instruments.

Name .....
Address ..... City .....
County ..... State .....

OZARKA INCORPORATED
124 Austin Avenue C,
Chicago, Illinois

Popular Radio (Nov. 1925), pp. 12-13

Senior S-1 Nov. 1925 $125 complete (set only, $73 list, Oct. 1926) later called S-5. Console, $197.50. (same appearance): Senior S-7 Oct. 1926 $89 list. Console, $191.50. Highboys, $122, $138.

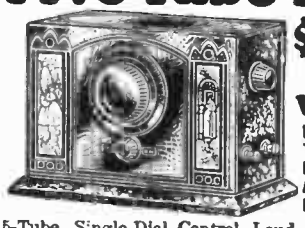
Walt Curry

H. A. Fischer was Ozarka's Secretary and Treasurer.

599 Viking Oct. 1926 $25 list.

Popular Mechanics (August 1926)

Five Tube Radio



$25.00

AGENTS WANTED

EXCLUSIVE TERRITORY DEMONSTRATING AGENT IN EVERY COUNTY

5-Tube, Single-Dial Control, Loud Speaker Radio. "Gets everything." What the public wants. New low price—$25 retail, liberal agent's discount. Take orders in spare time—no radio experience necessary. 100-page Radio Book FREE. Territory going fast—Write TODAY.

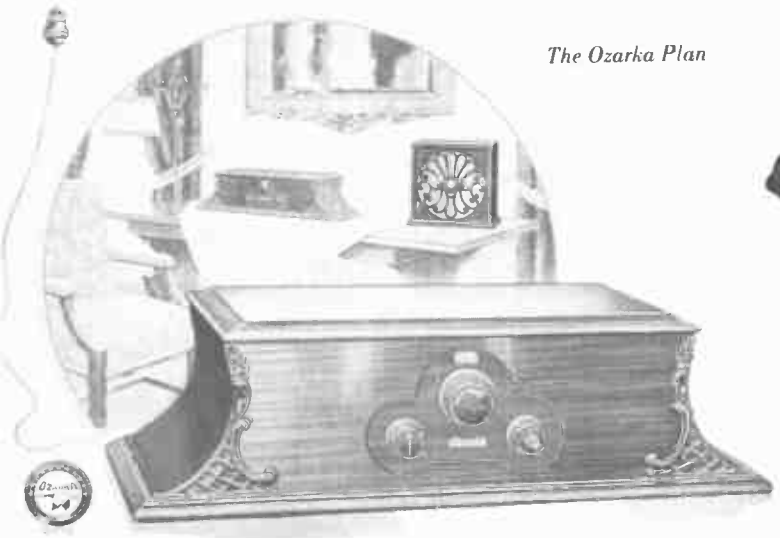
K. B. FISCHER, 122 W. Austin Ave., Chicago

The Ozarka Plan (courtesy of Don Patterson)

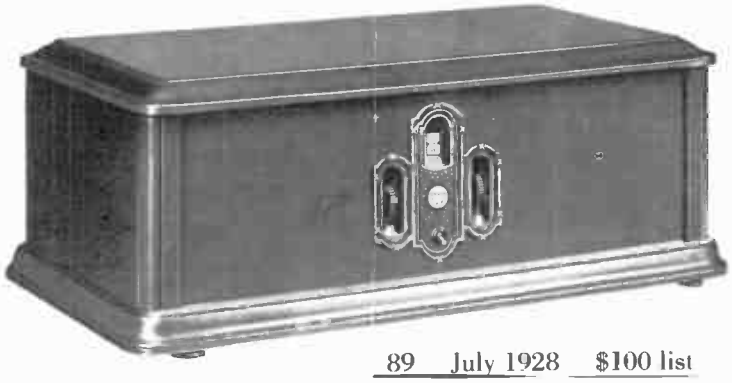
5A Viking Oct. 1926 $33 list. Console $79 list.

Armada 78 $100 list.

The Ozarka Plan



Corona $60 list. AC Corona $150 list



89 July 1928 $100 list
(not shown): 91 chassis only, June 1929, $130 approx.
90 July 1929 $100 list

Home of
Ozarka Incorporated
La Salle and Austin
CHICAGO, ILLINOIS

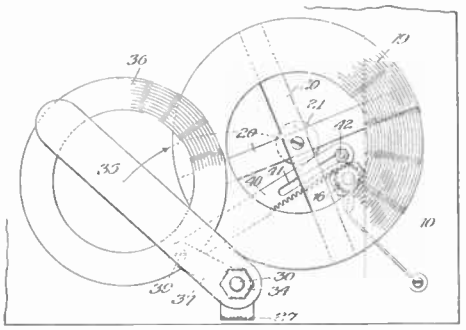
PFANSTIEHL

Pfanstiehl Radio Co. / Fansteel Products Co.

Pfanstiehl and Fansteel, Balkite and Balkeit: all related, but not identical.

Carl A. Pfanstiehl was born September 17, 1888, in Columbia, Missouri, son of a Presbyterian minister. He attended grade and high schools in Highland Park, Illinois, and Armour Institute of Technology. Having built and operated X-ray machines during high school, he and a friend, James Troxel, organized the Pfanstiehl Electrical Laboratory in 1907 to manufacture induction coils. In a few years, automotive spark coils and magnetos were added to the line. All of these products required expensive platinum contact points until Carl Pfanstiehl found a way to fabricate tungsten points. In 1914, the company began producing its own tungsten, the first in a series of refractory metals that would become the company's chief products in the future. Dr. Clarence Balke entered Pfanstiehl's employ in 1916, and after conquering tungsten, he turned his attention to making tantalum sheets and bars as an acid-proof material for chemical apparatus. Balke attempted to use tantalum as an electrode in chlorine cells, but failed; current would pass in only one direction. Dr. Edgar W. Engle of his staff realized that he had invented a rectifier. Sales of "Balkite" rectifiers, chargers, and battery eliminators zoomed from $73,263 in 1923 to $4,068,503 in 1926. The company name had been changed in 1917 to the less-German-sounding "Fansteel," though, ironically, the family had come from Holland.

1,608,993. MOUNTING FOR VARIABLE INDUCTANCE. CARL PFANSTIEHL and WILLIAM OSCAR BELL, Highland Park, Ill., assignors to Pfanstiehl Radio Service Company, a Corporation of Illinois. Filed July 23, 1923. Serial No. 653,176. 4 Claims. (Cl. 171—119.)



In 1919 Carl Pfanstiehl left to form the Special Chemicals Company (according to *$2500 And a Dream*, the 1982 history of Fansteel, this was "to prevent experimental interference with production"). By 1923, he had also formed the Pfanstiehl Radio Service Company; his trademark application claimed use since January 31. His pivoted coil mounting, advertised for the first eight months of 1924, and a dial adjuster were used on Tri-City models made for Montgomery Ward. The Pfanstiehl company itself made a matching P-2 amplifier for Ward before changing its name to Pfanstiehl Radio Company and introducing its own radio model in September 1924.

By the end of 1927, neither Fansteel nor Pfanstiehl was doing well. Pfanstiehl had decided to sell its RCA license to Majestic and to quit radio (besides metallurgy, Carl Pfanstiehl had other interests as diverse as toothpaste and fountain pens). Fansteel was no better off; the AC tube had killed its eliminator business. For the year ending April 1928, it lost $322,828 before dividends. Yet Fansteel came back with a radio chassis in June, 1928. It was reported to have bought Gilfillan's RCA license, a story which Gilfillan denied, but they may have shared one. Fansteel was said to have made 12,000 of this "Balkite" model, but only half of them were sold by February 1929. Its report for the year ending April 1929 claimed "the loss reflected in the statement of the Fansteel Company for the past year has been entirely chargeable to the radio business." So on February 1, 1929, Fansteel set up a subsidiary: "Balkeit Radio Company" (note the spelling change), which continued the old models and introduced the Model C in June. However, the high-priced console-radio market soon vanished, and the Balkeit plant and equipment were sold by April, 1930.

Carl Pfanstiehl died in March, 1942; Balke, in 1948. Fansteel is more vigorous than ever in a wide range of fields, still supplying electrical contacts to the automotive industry as it did in 1914, as well as fabricating components for the Space Shuttle.

Saturday Evening Post (March 21, 1925), p. 176

Does Your Radio Make Music Sound like—

NOISE
(Non-periodic vibrations; unpleasant sounds)

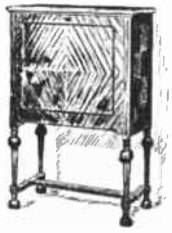
PITCH
(Periodic vibrations, without overtones; sounds which have mere musical pitch)

TONE plus desirable OVERTONES
(Tone color—REAL music)

In Radio, People want Distance—but they want TONE even More

Without desirable Overtones you get no Rich, Resonant Voice nor Tonal Beauty—You Miss the Supreme Pleasure in Radio

Console model, black walnut, equipped with loud speaker Open. $300



Console model, black walnut, equipped with loud speaker. Closed. $300

How Pfanstiehl Reproduces the Most Delicate Overtones

ANY good radio set can get distance, simply by amplification. There is no distinction about that. To get tone quality is quite another matter. And tone quality is the real measure of radio reception. Radios differ in this respect just as pianos differ. You judge a piano by its ability to produce a beautiful tone. You judge a radio by its ability to *reproduce* a beautiful tone, from a distance.

In a piano, quality of tone depends upon the manner in which the overtones are produced and controlled. Without them you could have no richness or beauty of tone. You would have a colorless, uninteresting sound. You can get beautiful piano music only from a fine piano in the hands of a good performer. Paderewski himself could not get tonal beauty out of a poor piano.

Overtones Perfectly Reproduced

In radio you have a similar situation. It cannot receive a lovely voice or beautiful music unless it reproduces the overtones which make it beautiful, exactly as they are sent out in delicate vibrations from the transmitting station.

That has been an extremely difficult thing to do in radio reception, simply because radio engineers have not known how to control the forward stream of radio energy as it passes from circuit to circuit in the set. Some of the energy strays off and feeds back. That is what causes the uncanny noises you hear, noises which have to be choked down by a lot of complicated devices, and these distort the delicate supervibrations which make overtones in your reception. Your tonal beauty is gone, in exactly the degree that your overtones are distorted or suppressed.

The matchless beauty of Pfanstiehl tone lies in the utter absence of feedback to disturb the delicate supervibrations which make the overtones. These come through INTACT. There is no distortion whatever. The tone is full, rich and clear. You can enjoy exactly as transmitted the vocal charm of a beautiful singer or the tone color of a great violinist. What an immeasurable advantage that is!

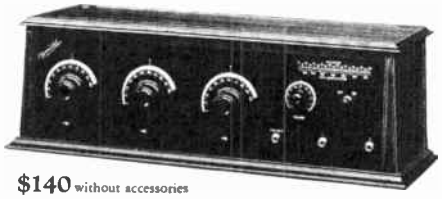
Distance, selectivity, volume, portability, are all values in radio which people want and can have to the extent that the maker chooses to afford them. There is no special problem about thar. Radio science knows *how.*

Tone Beauty— The Big Problem in Radio

The big problem in radio is tone beauty, a full and true reproduction of voice or music EXACTLY AS TRANSMITTED. This problem has been fundamentally solved in the Pfanstiehl. It gets the same distance, selectivity and volume as other high-grade 5-tube receivers; but in tone it is matchless, for the reasons above given.

To any radio technician who is interested, will be sent a scientific explanation of the means used by Pfanstiehl to accomplish this result. The ordinary radio user is not so much interested in that. He wants the result. The way to get it is to have your dealer demonstrate the Pfanstiehl to you. That will bring quick conviction. You will never be satisfied thereafter with any radio set which cannot reproduce the delicate overtones.

Hear the new Pfanstiehl Overtone Receiver at your radio or music dealer's. If he does not have one we can quickly get it to him.



$140 without accessories

A 5-tube Receiver using the new Pfanstiehl system of tuned radio frequency

How It Was Accomplished—A Scientific Explanation

Pfanstiehl found that stray oscillations could not be removed by any mere circuit design. An entirely new structural relationship had to be devised, and that could be approached only after a searching analysis of the specific causes of oscillation. He found them to be twofold and dealt with each separately. One of these is the feedback due to electro-static coupling. This has two sources. The one between the elements inside the tube is of little consequence, although hitherto regarded as the most important. The other occurs between the wiring layout and the condensers. This Pfanstiehl eliminated by removing from the effective electro-static field, scattered throughout the set, all dielectric material which used to cause distortion. The other cause of disturbing oscillations is the feedback due to residual electro-magnetic coupling between the coils. This could not be wholly prevented before, but has now been completely eliminated by using a new type of inductance and by a different placing of the coils. In thus differentiating between these two separate sources of internal oscillation, Pfanstiehl has solved the trouble *fundamentally* by a process of discrimination—the only way it could possibly be done.

Unique "Station Finder" Takes the Guesswork Out of Tuning

A unique feature of the Pfanstiehl Overtone Receiver is a "Station Finder," which takes the guesswork out of tuning and enables even the inexperienced to tune this receiving set quickly and without difficulty. From the radio program in the daily newspaper or radio magazine, ascertain the "wave-length" of the station you want to hear and also the time at which it is scheduled to broadcast. 1. Find this "wave-length" or number on the lower scale. 2. Read the number directly above it on the upper scale, and set each of the three large dials to this reading. 3. Tuning may now be sharpened by adjusting the large dials slightly, one at a time, with the small vernier knobs below. Adjustment of the large dials to a fraction of a degree, enables you to secure the sharper tuning for best results from distant stations.

An Appeal to Radio Users:

Owners of fine radio receivers should agitate for the suppression of regenerative interference in the air and undesirable radio transmission. They spoil the enjoyable possibilities of pure tone reception. Do not be a radio nuisance yourself by using a set which radiates or transmits noises to your neighbor.

USERS: Enjoy a personal Pfanstiehl demonstration. Send this coupon for name of nearest dealer.

PFANSTIEHL RADIO CO.
11 S. La Salle St., Chicago, Ill.
Where in this neighborhood can I see and hear the new Pfanstiehl Receiver?

*Your Name*_____
*Street Address*_____
*City*_____ *State*_____
A

Pfanstiehl

OVERTONE RECEIVER

DEALERS: Pin this coupon to your business letterhead. Get the Pfanstiehl authorized dealer proposition.

PFANSTIEHL RADIO CO.
11 S. La Salle St., Chicago, Ill.
Send us your dealer proposition for the Pfanstiehl Overtone Receiver.

*Your Name*_____
*Street Address*_____
*City*_____ *State*_____
A

7 Sept. 1924 $150 Console, March 1925, $300.
Technical article in *Radio Age*, Oct. 1924, pp. 50-52.

Pfanstiehl Introduces

6-Tube OVERTONE Receiver

With Translucent Station Finder

LAST year Pfanstiehl perfected the Overtone Receiver—an accomplishment of the first importance, which radio engineers had vainly attempted hitherto. He did so by eliminating all clashing of radio energy inside the set, thereby insuring a smooth, forward flow of the radio stream from circuit to circuit. The super vibrations of radio energy are thus kept intact, exactly as received, and there is no blurring or marring of the resulting overtones which bring out the beauty of voice and music.

This year he went a step further. He still further protected the overtones by an overtone loudspeaker inbuilt and sympathetically adjusted to the receiver itself. Modulation is made perfect. Even through a detached speaker the tone was far superior to any other obtainable in long distance reception. Now it is supreme.

Single Dial More Efficient Than Any Multiple Control

His single dial control immeasurably simplifies radio. It will give it a new popularity with the great mass of home users who are inexpert and dislike complicated tuning. It has been made possible by the very same mastery of radio energy in and between circuits which perfected overtone reception. With no leakage of energy to disturb the electrical characteristic of the radio stream on its way through each circuit, THERE ARE NO INEQUALITIES. Each circuit is electrically like every other—ALL tuned by one turn of the Pfanstiehl triple unit condenser.

Without the simple, equalized circuit of the Pfanstiehl system, no efficient one dial control is possible in a radio frequency set. Stray energy and the devices employed to neutralize it create inequalities in the circuits which THEN REQUIRE SEPARATE TUNING.

It thus becomes apparent how important an advance Pfanstiehl made in simplifying the radio frequency circuit and eliminating all compensating or neutralizing devices. It made possible perfect overtone reception, simple and dependable operation and now—single dial control.

Actual Wave Length GLOWS from Illuminated Dial—No Scale Necessary

An unique feature of the overtone panel in all models is the illuminated station finder disc which revolves with the tuning knob and registers in actual wavelengths rather than in arbitrary numbers. The disc is concealed except for a small opening in the panel where the wavelength appears, the disc being translucent and illuminated from behind. Extremely convenient; enables tuning to be done in the dark; shows whether power is on or off; adds a brilliant touch to the panel assembly. Panel is of wood, five ply construction, finished like rest of cabinet. Much handsomer than bakelite or rubber. Control and volume dials of inlaid wood. All exposed metal parts gold plated.

An Exclusive Franchise

The Pfanstiehl line is sold through exclusive dealers and jobbers who are thus protected against unfair competition and price cutting. Whatever good-will the dealer or jobber builds up for Pfanstiehl is his own. He enjoys a liberal profit and is expected in return to push the line aggressively with the co-operation of the maker.

For further details, address

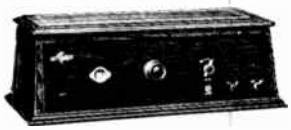
PFANSTIEHL RADIO COMPANY

11 South La Salle Street, Chicago, Illinois

Prices West of the Rockies Slightly Higher

MODEL 10C—A complete 6-Tube Single-dial Console Receiver with Overtone Speaker, Control Board, Battery Charger and Compartments for Battery built in. Price $450.00 (less tubes and batteries).

MODEL 10S—Overtone Single-dial 6-Tube Receiving Set with demountable Console Stand. Overtone Speaker built in. Price $200.00 (less tubes and batteries).



MODEL 10—An Overtone Single-dial 6-Tube Receiving Set. Price $155.00 (less accessories).

MODEL 8—A low priced 2-Dial 5-Tube Receiving Set. Pfanstiehl quality throughout. Price $85.00 (less accessories).

ALSO

MODEL 8C—Two-dial 5 Tube Receiving Set, demountable from console stand, permitting use on floor or table. Overtone Speaker built in. Price $135.00 (less tubes and batteries).

Radio Retailing (Sept. 1925), p. 385

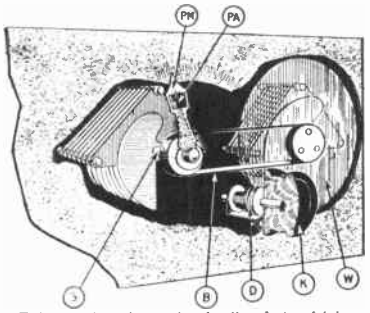
Models first advertised in August 1925. Technical article in *Radio News*, April 1926, p. 1415.

CARL PFANSTIEHL – INVENTOR AND PHYSICIST

NY Evening World (Sept. 1925)

NOVEL FIVE-TUBE RECEIVER

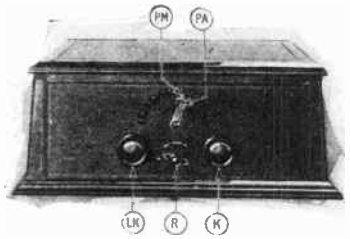
A novel combination of two indicating hands traveling over a single semi-circular scale on the front panel is the outstanding feature of this five-tube set. The three variable condensers which tune the two-stage radio-frequency amplifier circuit are mounted on a common frame, the two left-hand ones being linked together so that their shafts turn together. Their positions are indicated on the panel by the main pointer marked PM in all the accompanying illustrations.



This drawing shows the details of the driving mechanism of the right-hand variable condenser of the five-tube receiver. The large knob K by means of the driving discs D, turns the wheel W, which is attached to the shaft of the right-hand variable condenser. The belt B moves the inside pointer PA, while the pointer PM moves independently on its own shaft S.

Illustrations courtesy The Pfanstiehl Radio Co.

The shaft to which PM is attached revolves inside and independently of a combination shaft and pulley. To the latter is attached a small pointer, marked PA, moving inside a little square window cut in the main pointer. The pulley is belted to the free right-hand condenser on the large frame.



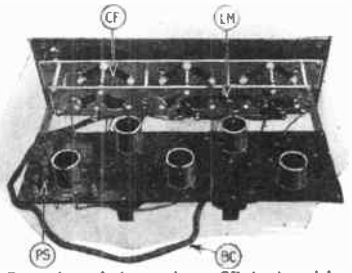
Front view of the complete receiver: PM is the main pointer, PA the auxiliary one, LK controls the two left-hand tuning condensers and PM; K controls the right-hand condensers and PA; R is a rheostat knob.

The operation of the system is obvious from the drawings. There are two tuning knobs: LK, below and to the left of the scale on the panel, and K, below and to its right. Knob LK, by means of a pair of friction discs LD (see drawing of top view of condenser and dial assembly), drives a large disc, LW. This disc is fastened to the extreme left-hand condenser on the frame, and through the link motion, L, also turns the second condenser. The shaft of the latter, S, is fixed to the pointer, PM.

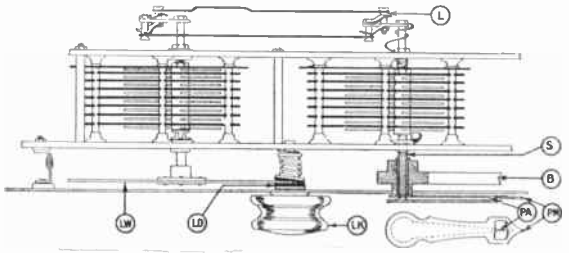
A similar driving scheme is used for the single right-hand condenser, which tunes the aerial coupler of the receiver. The knob K, by means of its friction wheels, D, drives the wheel, W, which is attached to the condenser shaft. The wheel also carries a small pulley, which is coupled by means of a brass belt, S, to the center pulley bearing the auxiliary pointer, PA.

In tuning the set, a person grasps LK in his left hand and K in his right, and turns them so that the small pointer always keeps within the large one. The aerial coupler condenser is rarely more than a few degrees different in setting from the inter-stage condensers, so it is a simple matter to tune the set to perfect resonance with this arrangement.

Electrically the receiver is of more or less orthodox design. The two stages of tuned R.F. feed into a detector tube and a two-stage transformer coupled audio amplifier. Provision is made for the use of a power tube in the last stage.



Rear view of the receiver. CF is the triple-condenser unit; LM the link motion connecting the two left-hand condensers (right-hand in this illustration); BC the battery cable; and PS a switch allowing the use of the proper batteries with a power tube.

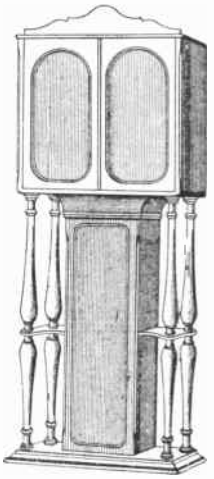


At Left:
This shows the details of the left-hand condenser unit. L is the link motion connecting the two condenser shafts; LW is a large wheel, driven by the discs LD and the knob LK; S is the condenser shaft, B the belt to the right-hand condenser, PM the main pointer, and PA the auxiliary.

18 July 1926 $95 Consoles: 181, $135. 182, $135.

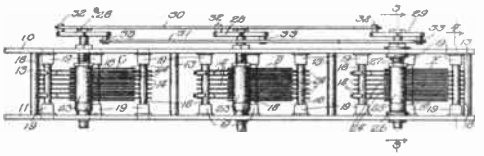
Radio News (Jan. 1927), p. 794

71,622. LOUD SPEAKER. ALEXANDER C. RINDSKOPF, Chicago, Ill., assignor to Pfanstiehl Radio Company, a Corporation of Illinois. Filed July 6, 1926. Serial No. 18,256. Term of patent 7 years.



The ornamental design for a loud speaker as shown.

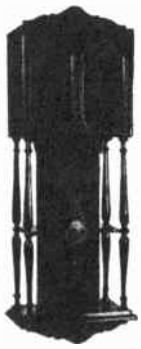
1,712,165. MULTIPLE CONDENSER. CARL PFANSTIEHL, Highland Park, Ill., assignor, by mesne assignments, to National Electrical Products Company, Waukegan, Ill., a Corporation of Illinois. Filed July 20, 1925. Serial No. 44,804. 3 Claims. (Cl. 175—41.5.)



1. In a multiple condenser, spaced side plates, a plurality of sets of spaced parallel stator plates carried between said side plates and insulated therefrom, a set of rotor plates carried by said side plates in capacitative relation to each set of stator plates, one of said sets of rotor plates being insulated from the side plates and the remaining rotor plates being in electrical contact with said side plates, and means for simultaneously and substantially equally varying the capacities of said condensers.

20 July 1926 $125

Saturday Evening Post (Nov. 27, 1926), p. 108



The Wall Speaker

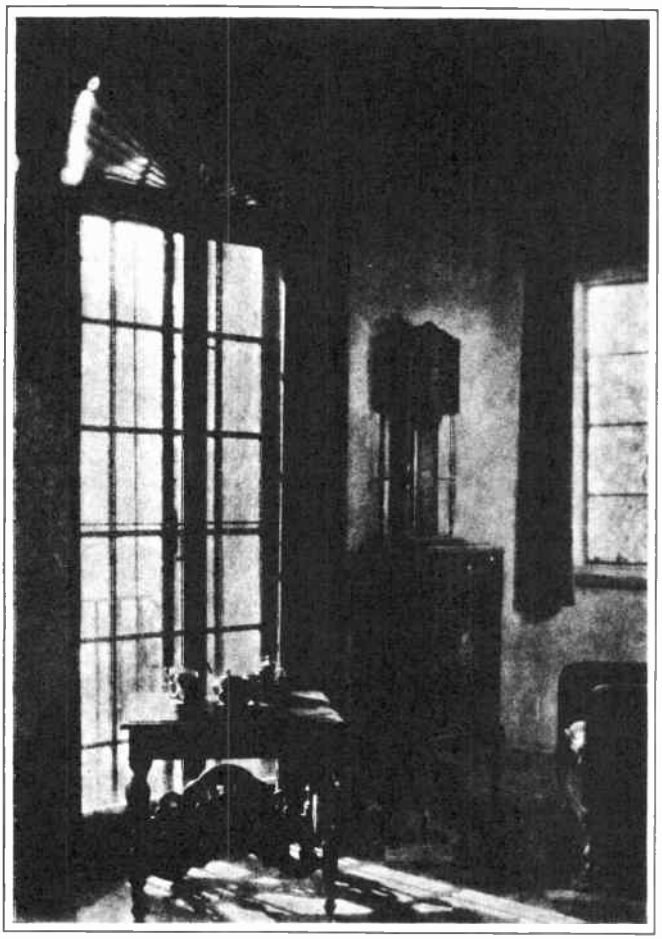
Designed for use on top of the console or to be hung on the wall. Looks like an old fashioned wall clock, flanked by four graceful spindles and supported by a narrow shelf at the bottom. From the standpoint of acoustics there is a certain advantage in having the mouth of the speaker six or more feet from the floor. The tone vibrations are better distributed.

$65

The "Highboy"

A more elaborate console model, eighteen inches wide and seventy-four inches high. Speaker is contained in a tall, graceful superstructure extending six feet from the floor. There is nothing like it in radio design. It is like a grandfather's clock or perhaps more nearly like a tall, slender cupboard of old English design.

$235



Model 201

"Single-tuned Six" Console without speaker, but space for A and B batteries and charger or socket-power equipment. Six tubes.

$170

Listening to Pfanstiehl "Overtone" Radio is like being there yourself—The Tone is so Lifelike

Model 202

Something Really *New* in Cabinet Design

There is so little machinery in a Pfanstiehl, inside and out, that an extremely compact console cabinet is possible—only eighteen inches wide and forty-one inches high. And still it has room for every accessory needed to operate a radio—built-in speaker, "A" and "B" batteries and charger, or socket-power equipment. Everything is contained in a petite piece of furniture making a well balanced radio unit. The console is a space saver; fits anywhere—in a corner, between windows, or between doors—however contracted the space.

$210

PERHAPS you recall, not so long ago, when the projection of movie films on the screen was somewhat blurred and unsteady. Compare that with the lifelike movies of today, and you have an apt parallel of the difference between reception with ordinary sets and the pure, rich tone of the Pfanstiehl "Overtone" receiver.

The difference lies in mastery of the overtones—how exactly they are reproduced. It is they which give tone color to voice or music, are its very "soul." Pfanstiehl has solved this problem by protecting the delicate vibrations which make overtones. There are no complicated parts in the set to absorb or distract them.

Such parts are commonly employed in radio to correct errors which arise in the radio stream while being highly amplified. In the Pfanstiehl there are no errors to correct. The stream flows unhampered through the set. Hence the tone is lifelike and natural—as if you were listening to the singing or playing at its source.

In Radio, as in all mechanical and technical progress, simplicity is the goal and most difficult to attain. In Pfanstiehl design it is an outstanding merit.

Precision Tuning with a Single Knob

Simplicity also governs tuning. Single control that tunes *exactly* is possible only with a set that is extremely simple inside. It cannot be appended to the inner workings of a complicated receiver. If the set is designed for simple, direct flow of radio energy it does not need multiple control.

Thousands of radio owners know the advantage of Pfanstiehl single control. They enjoy the convenience of turning a single knob to immediately reach any wave length desired. A child can tune as *accurately* as an expert. It can be done in the dark, blindfolded, by ear if you like.

PFANSTIEHL RADIO COMPANY · 11 *South La Salle Street* · CHICAGO, ILLINOIS

Model 20

"Single-tuned Six" Table Set.

$125

Seek a demonstration and learn what true radio enjoyment is

Pfanstiehl Radio Sets are sold only by authorized, exclusive dealers. There is likely one near you. He will be glad to demonstrate the simple tuning and lifelike tone. The beauty and workmanship of the cabinets you can see for yourself. If your dealer cannot show you the Pfanstiehl models, write us for catalog illustrated in color.

Prices West of the Rockies Slightly Higher

Pfanstiehl Overtone Radio

Immediate Delivery!

of the New Perfected

Electric AC

Pfanstiehl

Overtone Radio

Yes, we're making *immediate deliveries,* in any quantity, of the perfected and genuine Electric A C Pfanstiehl. Give your customers what they want this Christmas. Send coupon below at once [or wire] for our proposition to jobbers and dealers.

100% *Electric*

The Pfanstiehl Electric AC Receiver operates directly from the electric light circuit without batteries or eliminators of any kind.

A *genuine* Electric AC set—not a compromise or makeshift. Uses R. C. A. or Cunningham AC tubes. Perfected volume control prevents fading signals when line current varies. Tuned with one knob. Entire set and power unit are self-contained in a mahogany finished cabinet.

What the Public Wants

Tone, selectivity, distance and *genuine* light socket operation—that's what the public demands today. That's where the profit lies. And that's what you can supply in the new Pfanstiehl Electric AC set. A thoroughly dependable and durable set. One dealer last year sold 3,000 sets with not a single service call! Pfanstiehl won't eat up your profits in service.

Model 34-322 Complete, ready to operate, $300

Full License Protection

The Pfanstiehl is fully licensed under the patents of the Radio Corporation of America and associated companies. That's important to the radio dealer who is posted on conditions in the radio industry.

Big Profits for Jobbers and Dealers

Pfanstiehl now offers everything the radio public wants, from a $65.00 battery operated set to the perfected Electric AC Console at $300.00. A complete line and a *real money making opportunity,* as you'll see when you investigate. We still have good territory for progressive jobbers and responsible dealers.

Local Advertising

We back Pfanstiehl jobbers and dealers with advertisements in their own local newspapers. Business getting ads that bring customers to the Pfanstiehl store and move the goods. *And we pay the bill.* That is advertising cooperation that *counts!*

Model 50, $135
With 7 tubes, $162.50

Send Coupon

Act at once. Cash in on Christmas profits. Remember, we're making immediate deliveries of the Electric A C Set which the public is clamoring for now. We'll gladly send full details of our proposition without obligation. So, get posted.

Just send coupon below (or wire) now!

Pfanstiehl Radio Company
Waukegan, Ill.

Please send me, without cost or obligation, full details of your proposition to ☐ Jobbers on ☐ Dealers the Pfanstiehl Overtone Radio including the new Electric A C Set on which you are making immediate deliveries.

Name.....

Address.....

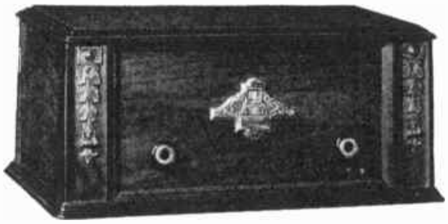
City..... State.....

PFANSTIEHL RADIO COMPANY, WAUKEGAN, ILL.

Radio Retailing (Dec. 1927), p. 24

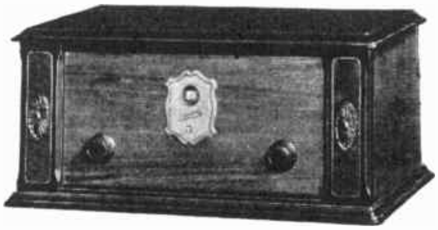
Ads like this in November and December 1927, and an even more frantic one in October, were either intended to bring in cash so that Pfanstiehl could pay its $100,000 royalty assessment to RCA, or were aimed at unloading stock before selling out.

Short technical article in *Radio Broadcast*, June 1928, p. 92.

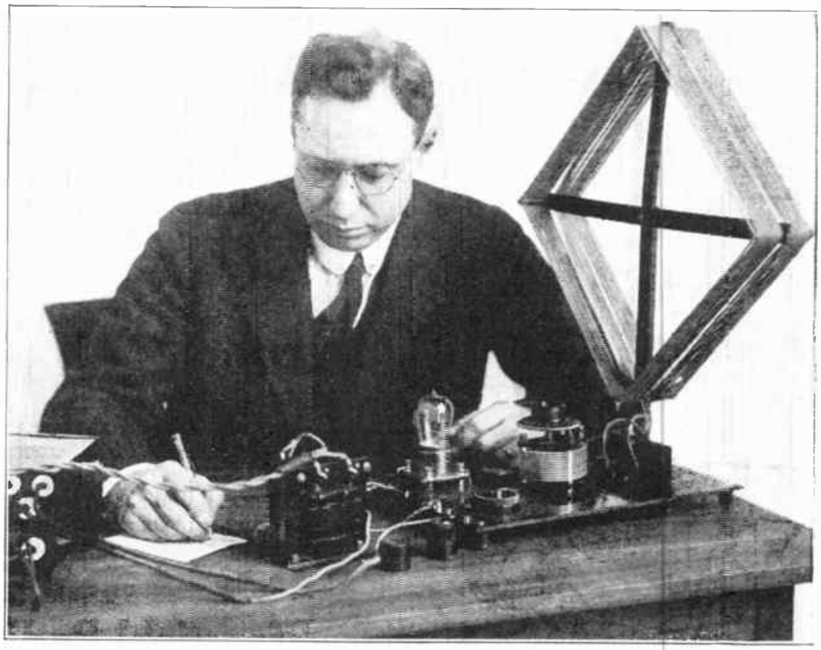


Licensed for amateur, experimental and broadcasting reception under patents of Radio Corporation of America, General Electric Company, Westinghouse Electric and Manufacturing Company and American Telephone & Telegraph Company.

The wise radio dealer of today knows that he must have this important license protection. Pfanstiehl gives it to you.



Radio Retailing (Oct. 1927), p. 10



ASTOUNDS RADIO EXPERTS

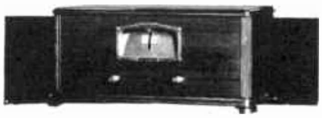
Carl Pfanstiehl, noted radio expert, thrilled an audience of technical men at the Electric Club, Chicago, last month, when he delivered an authoritative discourse on radio progress and technicalities. It is recorded in this issue of RADIO AGE by Frank D. Pearne.

Radio Age (July 1924), p. 42

Sept. 1927 models: Jr. 28 $65

Overtone 30	$105	Console 302,	$185
Overtone 32	$150	Console 322,	$250

The BALKITE HIGHBOY A-7



BALKITE A-5 TABLE MODEL

Cabinet by Berkey and Gay. Complete except for tubes and speaker—$235

The BALKITE HIGHBOY A-7

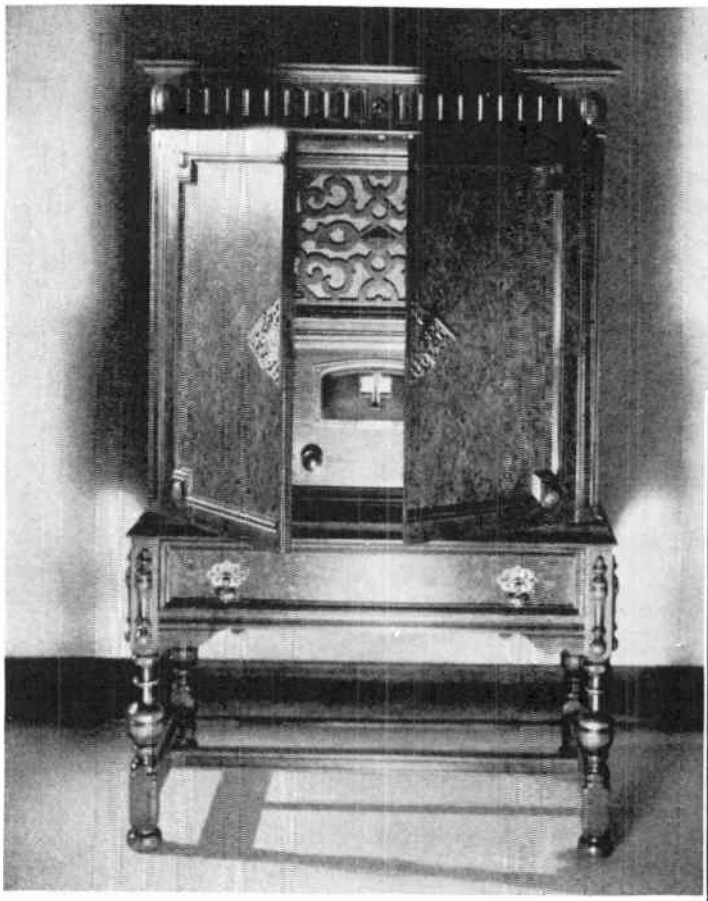
Cabinet by Berkey and Gay. Includes dynamic speaker. Complete but for tubes—$187.50

BALKITE A-3 TABLE MODEL

For those who want all radio. Housed in a simple but sightly all-metal case. Complete but for tubes and speaker $197.50

Balkite Radio

Radio Retailing (June 1928), pp. 170–171



RADIO *or recorded music at the turn of a switch . . .* SYMPHION *through an entirely new principle converts the ordinary 60-cycle AC house current to 3,000,000 cycles . . . This makes possible the use of the* 201A *tube with its far wider range of frequencies and excludes heterodyning and hum . . . Result: every tone is reproduced — as it is played.*

MUSIC
for Music Connoisseurs

A NEW *music instrument, the* BALKITE SYMPHION, *plays both broadcast and recorded music tonally complete, with the long-sought overtones and subnotes . . .*

Both the phonograph and the radio have captured the general public. But there has always been a special public — musicians and music connoisseurs — who have not been satisfied.

Their attitude has been that reproduced music leaves out certain notes in the upper and lower register, and esthetically important overtones.

This is the attitude of extreme fastidiousness. Yet this attitude has constituted a challenge to radio and its marvelous achievement.

The Balkite Symphion meets this challenge. It is radio for the musician and the music connoisseur. It is tonally complete, and with the long-sought subnotes and overtones. The same thing is true of the Symphion playing recorded music or music over the air; absolute fidelity.

Ask your dealer to play Schubert's Unfinished Symphony for you — its purity of melodic form requires perfect fidelity in reproduction; you will find that the Symphion gives this perfect fidelity. Then ask for music over the air. It will be played in the same tonally complete manner.

The cabinets are by Berkey & Gay. Let your dealer demonstrate their beauty in your home, as well as the marvellous quality of Symphion music. Fansteel Products Company, Inc., North Chicago, Ill.

FANSTEEL
Balkite
Symphion

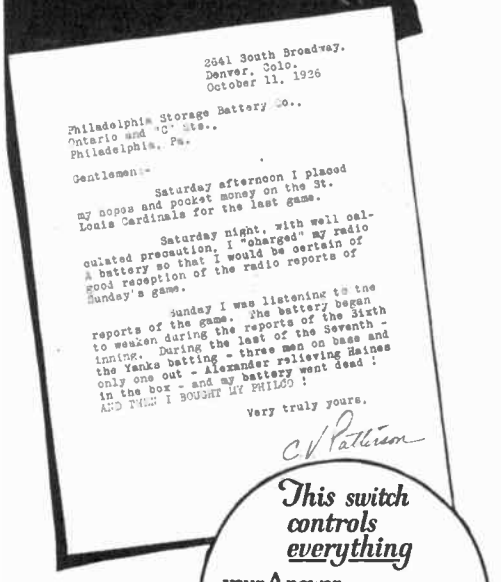
CABINETS BY BERKEY & GAY

B7 Nov. 1928 $475 B9 Nov. 1928 $950 C June 1929 $175 (not shown)

Saturday Evening Post (Dec. 4, 1926), p. 120

And then he got his Philco *Socket Power!*

Run *your* Radio from your Electric Current



2541 South Broadway,
Denver, Colo.
October 11, 1926

Philadelphia Storage Battery Co.,
Ontario and "C" Sts.,
Philadelphia, Pa.

Gentlemen:-

Saturday afternoon I placed my nopes and pocket money on the St. Louis Cardinals for the last game.

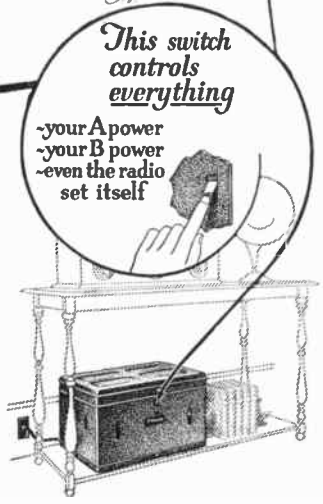
Saturday night, with well calculated precaution, I "charged" my radio A battery so that I would be certain of good reception of the radio reports of Sunday's game.

Sunday I was listening to the reports of the game. The battery began to weaken during the reports of the Sixth inning. During the last of the Seventh - the Yanks batting - three men on base and only one out - Alexander relieving Haines in the box - and my battery went dead! AND THEN I BOUGHT MY PHILCO!

Very truly yours,

C V Patterson

Alexander pitching! Three men on base! —then this happened to Mr. Patterson



And remember, it makes no difference what kind or what make radio set you have, PHILCO Socket Powers will give you *both* A and B radio power from your electric light current—*dependably and constantly.* Here is your opportunity to do away with the ordinary "A" storage battery, dry cell batteries, and "B" batteries.

One switch controls everything. Snap it "ON," and from your house current you get a strong, steady flow of A and B power. Snap it "OFF," and your radio is silent.

Yours On Very Easy Payments

You can buy PHILCO AB Socket Powers on *Easy Payment Terms* from any Philco dealer in your town. You merely make a small first payment—balance monthly.

Go to your Electrical Dealer, Department Store, Electric Light Company, Music Dealer or Battery Service Station; tell them you read this advertisement and you want the PHILCO RADIO SOCKET POWER.

No Hum–No Distortion

Philco Socket Powers will give you radio reception without the least hum; without the least distortion. Your electric lighting current will now operate your radio set smoothly and perfectly—*any kind or any make of set.*

No more recharging to do; no more dry batteries to replace; no more fuss; no more bother, and better still, improved reception.

Trade In Your Old Storage Battery

Yes, any one of the many thousands of Philco dealers will make you a very liberal trade-in allowance for your old "A" storage battery on the purchase of a brand-new Philco AB Socket Power.

It makes no difference what make of "A" storage battery you now have or how old or worn out it may be, the Philco dealer will give you a surprisingly liberal allowance.

Installation FREE

No matter where you live there is almost sure to be an authorized PHILCO dealer near you who will deliver a brand-new Philco Socket Power to your home on the day and hour you desire. He will connect it to your radio set *at no additional cost to you.*

The Philco dealer in your community guarantees you complete satisfaction.

Mail This Coupon To Us Now

Visit the Philco dealer, or if you prefer, mail this coupon to us and we will give you the full details direct from the factory. We will send you complete information on our Easy Payment Plan and Trade-In Allowance offer for your old storage battery.

Sign your name and address to this coupon, and mail it to us today. The coupon is not an order. It does not place you under the slightest obligation. It is merely a request for the full details and free illustrated literature describing these famous Philco Socket Powers.

Philadelphia Storage Battery Co., DEPT. 1229 Philadelphia, Pa.

PHILCO Radio "A" and "B" Socket Powers

We also make the wonderful Trickle Charger Battery in the handsome glass case with Built-In Charge Indicators that tell you when and how much to recharge.

These batteries are made by the makers of the famous *super-powered* Diamond Grid Battery for your automobile.

© H. B. B.

SPECIAL COUPON

Philadelphia Storage Battery Co.,
Ontario and C Streets,
Philadelphia, Pa. **Dept. 1229**

Gentlemen:

Please send me, without cost, illustrated literature describing the famous Philco A and B Socket Powers. I also desire full details of your Easy Payment Plan and Trade-In Allowance offer. It is understood that this request places me under no obligation.

Name_____

Address_____

_____

Name of your radio set_____

Philco's Chief Engineer Walter E. Holland discusses battery eliminators in *Proc. I.R.E.*, June 1926, vol. 14, pp. 345-372.

PHILCO

Philadelphia Storage Battery Co.

Philco's success story belongs largely to the 1930's when it was consistently number one in the radio industry, but even while it was laying the foundation for this success in the 1920's, it was already an old company.

The Philadelphia Storage Battery Company was organized in 1906 to make batteries for electric cars and trucks, and could even claim to date from 1892 after absorbing the defunct Helios Electric Company which had made arc lamps. Beginning with two sheet-iron buildings and eighteen employees at Emerald and Tioga Streets in Philadelphia, by 1909 Philco had been forced by increased business to move to Ontario and C Streets, where it remained for many years. By 1913, sales reached $576,000 and broke the million-dollar barrier in 1917 with the furnishing of auxiliary electric systems for U.S. Navy battleships. Never able to crack the original-equipment auto market (its Philadelphia competitor Exide had that), Philco went after the replacement business with a strong advertising campaign in 1919 and succeeded in increasing its sales until the post-war recession in 1921. But by amazing luck, a new market for storage batteries opened just then: radio. By 1924 Philco's sales reached $4.7 million.

From radio storage batteries, it was only a small step to A & B eliminators, or Socket-Powers using electrolytic rectifiers and small built-in storage batteries. Philco sold 400,000 of these in 1926, and 500,000 in 1927, posting sales of $12.8 million and $15.4 million. Then came the AC tube, making Socket-Powers obsolete overnight. Philco was ruined — or so it seemed.

For general manager James M. Skinner, the man responsible for Philco's performance in the radio market, there was only one path open: to build complete radio sets. Although Philco had never built a radio, it did have two major assets: an established network of dealers and a well-advertised name.

Skinner summed up his strategy: "In 1928 our job was to walk before we ran; to make a good set and to establish a reputation for quality." In other words, he did *not* do what Majestic did; while Majestic in the same situation had immediately leased a 500,000-square-foot-plant, Philco added no new capacity until 1929, and then only 100,000 square feet to double existing space. For its first model, Philco merely bought all components outside and assembled them. It purchased RCA and Neutrodyne (Hazeltine) licenses from Murdock on February 10 for $100,000 and relied on Hazeltine Labs for its engineering. For 1928, Philco wound up 26th in industry sales — selling 96,000 receivers out of a market total of 3,281,000. "In 1929 our job was to go out after volume and get it quickly before competition gained control." The first thing Philco did was to put electrodynamic speakers on its models to counter the one feature that Majestic had that Philco did not, the feature largely responsible for Majestic's amazing success. Then Philco redesigned its plant for mass production, borrowing heavily to enlarge the plant and install conveyor lines. The company almost went under in doing so, for the whole system had to be rebuilt in mid-year, shutting the factory down for three months at a critical time and extending its credit well past the bank's limit. But strong sales at the end of 1929 pulled Philco through; the final tally was 408,000 sets out of an industry total of 4,428,000 — third place behind Majestic and Atwater Kent.

In 1930 Philco took the lead in sales, dominating the industry for the next ten years (selling almost one-third of the industry total in 1934). Skinner's strategy is this decade is described by John Wolkonowicz:*

"In order to build a competitive price barrier, Philco kept production costs low by utilizing the latest production technology and by adding to plant capacity only when necessary. In order to retain the best dealers in the industry, Philco kept a close watch on sales and scheduled production to avoid overstocking. Product engineering and styling were superb and prices were set just below the competition. An aggressive advertising campaign was maintained and designed (along with the Philco product line) to facilitate the clever 'selling-up' marketing strategy that Philco had developed."

In 1939, Skinner left, and Philco began to diversify into refrigerators and, later, electric ranges, tripling its capacity in the next ten years. As a result of wartime contracts, Philco also greatly expanded its basic research efforts and went after government business. It changed its corporate structure; and its stock, which before had been held only by management, was now sold publicly. The effects of these changes were masked during the 1940's by abnormal business conditions; but in the 50's, although sales were high, profits were not, and Philco was forced to sell to Ford in 1961. Ford operated Philco (with considerably improved results) until 1974 when Japanese competition made it prudent to sell the Consumer Products Division to GTE-Sylvania (Ford retained the Aerospace Division). GTE, in turn, sold the Sylvania Consumer Electronics Division to North American Philips in 1981.

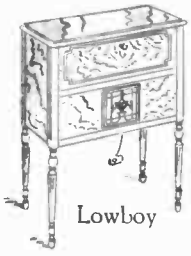
*John Wolkonowicz, *The Philco Corporation, Historial Review & Strategic Analysis, 1892-1961*, Master's thesis, MIT 1981.

Vivid Beauty *to match a new*

Highboy

A Louis XVI period conception by Albert Carl Mowitz, an international authority. Handsomely matched walnut panels. Constructed with infinite care.

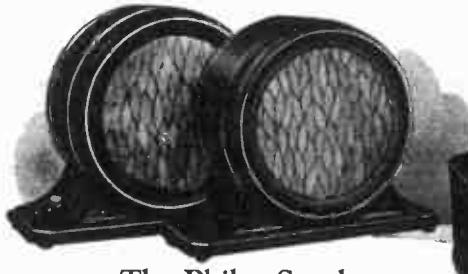
The LOWBOY, at the right, is a lower cabinet in the same style.



Lowboy

THE illustration above shows the Philco Radio in the Mandarin Red Table Cabinet placed upon the Philco Console Grand Speaker. This combination is admirably suited to the home in which a touch of color is desired. It offers, as well, the very utmost in Philco "Neutrodyne-Plus" performance.

The CONSOLE GRAND SPEAKER contains the Philco Speaker unit in a specially designed tone chamber which gives amazing emphasis to its life-like quality of tone. Designed, as it is, to meet the demands of "Neutrodyne-Plus," it will positively improve reception on any set. And besides, it serves as a handsome support for any table model radio.



The Philco Speaker

Reproduces the full musical range from soprano to bass. This is especially important with a set which also reproduces the full musical range, because otherwise high notes or low notes or both faithfully delivered to the speaker by the set would be choked off in the speaker and reception would be thin. This is impossible with the Philco Set and Speaker. The Philco combination produces a range, depth and naturalness of tone which is new to radio! In five colors.

COLOR

AS a timely response to the color trend of today, the Philco "Neutrodyne-Plus" Radio has been placed in cabinets of exquisite color. These are offered in a variety of hand-decorated, softly modulated, two tone effects.

Hollingsworth Pearce, leading authority on interior decoration, created the dignified design of classic outline which is enhanced with color effects by Mlle. Messaros, one of the foremost colorists in the decorative arts. The colors are applied *by hand* under her personal direction. Each cabinet stands forth as a highly artistic ornament, captivating in beauty and charm.

A complete range of colors to suit the conservative as well as the colorful interior.

PHILCO Electric

REG U.S.PAT.OFF.

511 June 1928 $115 Consoles: 531, $200. 551, $275. 512, 513, 514, 515 $125 25 cycle models, $10 extra.
Short technical article in *Radio Broadcast*, Feb. 1929, p. 165.

radio discovery: Neutrodyne-Plus

IT is acknowledged that Neutrodyne produces the purest tone quality known to radio science—*no howls or squeals; no disturbing oscillations.* Now, for the first time, Philco engineers have succeeded in combining Neutrodyne with *super-power.* The result: perfect tone quality PLUS vast distance range and extraordinary selectivity —a combination *new to radio*—"Neutrodyne-Plus."

Free Trial *in your* Home

Any Philco dealer will be glad to send this marvelous Philco Electric Radio to your home on an absolute Free Trial. He will deliver the set, plug it into the light socket and leave it for you to operate. Judge it under your own local air conditions. "Free Trial in the Home" is Philco's national merchandising policy.

This trial in your home does not put you under the slightest obligation to buy. We want you to test the Philco in every way. See for yourself its remarkable ease of operation, its amazing selectivity, its uncanny power in getting far-distant stations. Judge its rare purity of tone—its flawless reproduction.

Easy Payments

After you have experienced at home the vast enjoyment of Philco "Neutrodyne-Plus" performance, if you decide to buy, the Philco dealer offers very easy payment terms.

And At a Price

The super-quality Philco is available in exquisite console cabinets at surprisingly moderate prices. And, in addition, *this same instrument* has been installed in hand-decorated table cabinets to sell *at popular prices!* Thus, no matter what model you choose, you may be sure of the utmost in Philco "Neutrodyne-Plus" performance.

Trade In Your Old Radio

Your Philco dealer is in a position to offer you a *liberal trade-in allowance for your old radio set* on the purchase of a new Philco Electric Radio.

Sooner or later you will be satisfied with nothing less than an electric set, one you merely plug into your light socket—no batteries or separate power units to bother with! Why put it off any longer? Trade-in your old radio as part payment on the Philco "Neutrodyne-Plus" Electric Radio. Own and enjoy the newest, the finest thing in radio!

Call-Look-Hear

this remarkable Radio at any Philco Dealer

No matter where you live there is undoubtedly a registered Philco dealer near you. Visit his store and see the beautiful Philco furniture models. See the table models, exquisitely hand-decorated in most attractive colors.

Then, tune it in—and you will understand what "Neutrodyne-Plus" means in tone, selectivity and distance. Let the Philco dealer explain to you our national policy of "Free Trial in the Home, Easy Payments and Trade-In Allowance."

No Aerial Needed

Due to its *plus power,* the Philco will give you perfect reception of local stations—and many distant stations —*without an aerial!* Portable ground connection is provided. Philco is therefore easily *movable.*

With an aerial, indoor or outdoor, the Philco will bring in stations covering a remarkable distance range.

Daytime Reception

Women folks at home during the day will appreciate the ease with which Philco brings in distant stations in the daytime. Its operation is simple and positive. Stations come in sharply and clearly. *Super-power* is the secret.

Amazing Selectivity

Marvelously sharp tuning! Only a hair's-breadth turn many times tunes out one station completely and brings another booming in. One-dial control; no blind "groping" for stations. So simple to tune, a child can do it! Philco will give you a new experience in selectivity and distance.

Distance and Volume

Philco's super-power means the ability not only to get, but *fully to enjoy* out-of-town stations. You will tune in low-power stations *you never knew existed.*

Superb Tone

"Neutrodyne-Plus" has achieved a life-like fidelity of tone that is truly marvelous. Close your eyes as you listen and you will realize that you are hearing *not* a radio performance but an actual RE-production. The finer shadings and inflections of the high notes—the sonorous depth and character of the deep notes—are flawlessly reproduced.

All-Electric

The Philco is *all-electric.* No batteries, no water, acids or liquids. *Entirely dry.* Merely plug into the light socket. Needs no special attention whatever.

Phonograph Connection

A socket is provided on the Philco dial plate into which an electric pick-up may be inserted, thus making the amplifying power tubes and speaker available for reproducing phonograph records. Through this device Philco will give your favorite records a new depth and fullness of tone, a new volume and life-like resonance.

Send Coupon Below for *free* Philco Book. It describes *all* Philco features of which the above are but a few. Send *now!*

and Send Coupon

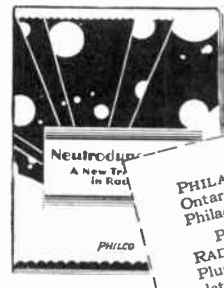
for FREE *Radio Book*

In the meantime, merely fill out the coupon and mail it to us today. It is just a request for full details—no obligation. The coupon also brings you, Free, the beautiful Philco book showing all the exquisite Philco Radio Sets and Speakers in natural colors. It tells the full story of "Neutrodyne-Plus." Yours for asking.

PHILADELPHIA STORAGE BATTERY COMPANY

General Offices: Ontario and C Streets—Dept. 2527—Philadelphia, Pa.

In Canada: Philco Products, Ltd., Queen's Quay, Toronto, Ontario



PHILADELPHIA STORAGE BATTERY COMPANY
Ontario and C Streets, Dept. 2527
Philadelphia, Pa.

Please send me, Free, the beautiful full-color RADIO BOOK telling about the Philco "Neutrodyne-Plus" Electric Radio and Philco Speakers; also full details of your national Free Trial, Easy Payment, Trade-In offer. This request places me under no obligation.

Name _____

Street _____ State _____

City _____

RADIO

[*Tune In on the Philco Hour* covering the whole country every Saturday night.]

Talking Machine World (Jan. 1929), p. 40a

86

Al Monroe

86 Jan. 1929 In same consoles as 1928 models, $215 and $275, plus new $157 model. Model 82 (25 cycles) $10 extra. Technical article in *Citizen's Callbook*, vol 10. no. 4, Nov. 1929, p. 96.

Ralph & Elinor Williams

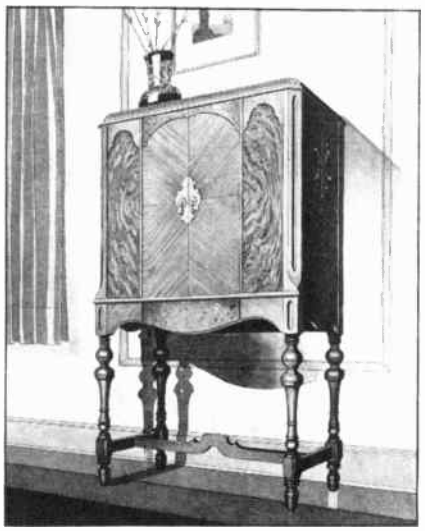
Large New Philco Factory Unit Just Taken Over

Talking Machine World (Jan. 1929), p. 74

PHILCO

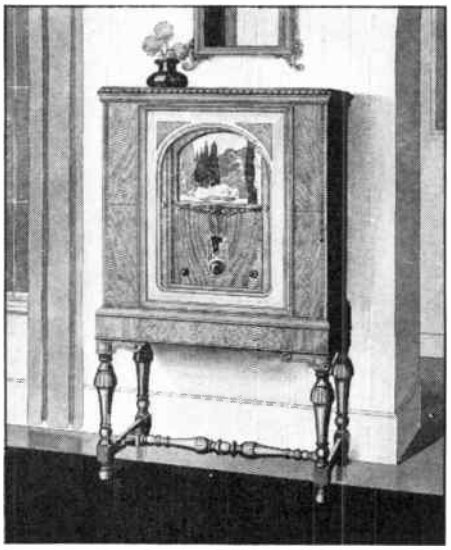
THE LOWBOY. This model is an unusually attractive open-face cabinet with Oriental Walnut raised side panels and set back Bird's-eye Maple center panel. Beautiful new and smaller bezel plate. Philco matched *Electro*-Dynamic Speaker and Acoustic Equalizers built in.

Price, Philco Neutrodyne Plus **$129.50** Price, Philco Screen Grid **$119.50**



THE HIGHBOY. This distinguished cabinet has a balanced Philco *Electro*-Dynamic Speaker and Acoustic Equalizers built in. Half doors which are out of the way when the set is in use; matched Oriental Walnut on doors. Butt Walnut side panels. Bird's-eye Maple panel inside. Beautiful tapestry over the speaker.

Price, Philco Neutrodyne Plus **$149.50** Price, Philco Screen Grid **$139.50**



THE HIGHBOY DE LUXE. A more expensive cabinet. Sliding doors on metal runners which disappear into recesses at the sides. Philco matched *Electro*-Dynamic Speaker and Acoustic Equalizers. Cabinet is exquisitely finished in Burled Walnut. Framed and overlaid with costly, imported woods. Genuine tapestry over speaker.

Price, Philco Neutrodyne Plus **$205.00** Price, Philco Screen Grid **$195.00**

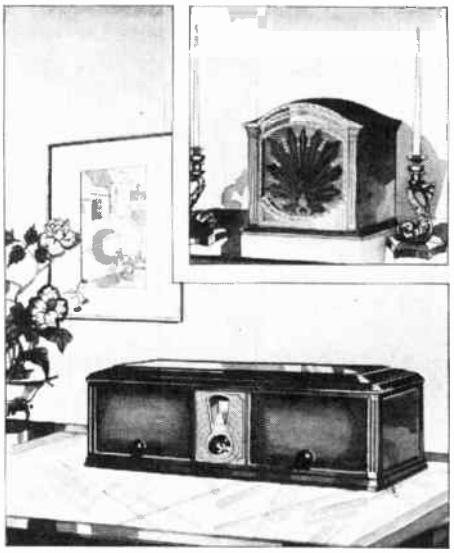


TABLE MODEL. The Philco Screen Grid is also available in an attractive Table Model, complete with matched Philco *Electro*-Dynamic Speaker, extra large to ensure full, round tone.

Price, *Electro*-Dynamic Speaker **$32.50** Price, Screen Grid Receiver **$67.00**

(Tubes extra. Prices slightly higher in Canada, Rocky Mountains and West)

Models 65 and 62 (25 cycle) Screen Grid, 87 Neutrodyne Plus.
Short technical article on 65 in *Radio*, July 1929, p. 80f.

Radio Retailing (June 1929), p. 180


Collier's for October 19, 1929

BALANCED RADIO

BALANCED PHILCO

SCREEN GRID PLUS!

A super-radio for people who want super-performance

PHILCO SCREEN GRID PLUS gives you these entirely new features:

1. Automatic volume control, automatically reducing fading.
2. Entirely new circuit which automatically reduces background noises including static. (And of course no hum.)
3. New and literally enormous power, making it easy to get distant stations even in the daytime.
4. New super-sharp selectivity over the entire dial, bringing in distant stations even in the midst of strong locals.
5. Almost auditorium volume without tone distortion, the result of the entirely new multiplex detector circuit.

The Philco Screen Grid Plus is a nine tube set built specifically for people whose radio requirements are unusual.

Enormous power. We are frank to say that many of its advantages are not needed for normal use. But to the radio owner who lives in a big city where local stations are bunched so closely that they tend to crowd out distant stations, the Philco Screen Grid Plus offers a new thrill by bringing in distant stations in spite of these adverse conditions.

Daylight reception. And to radio owners who live in smaller towns at a distance from good broadcasting, Philco Screen Grid Plus makes daylight reception available, often for the first time, and offers in the evenings a far wider selection of programs than ever before possible.

Fading automatically reduced. To both city and smaller town owners who want distant station reception the automatic volume control of the new Philco is indispensable, because through this automatic volume control the tendency of distant stations to fade and swell is largely eliminated.

Absolutely linear detection. To families who want almost auditorium volume for entertaining or dancing, the Philco multiplex detector circuit (the first absolutely linear detector circuit ever produced in any radio) makes possible very great volume without the slightest distortion. For the first time in any radio, it is impossible to overload the detector.

Background noises reduced. To critical music lovers seeking the utmost clarity of tone, the new circuit of the Philco Screen Grid Plus presents a considerable lessening of static and other interference noises. And, of course, no hum.

No blare. For people who dislike having strong local stations blare into the room as the radio dial is turned, the automatic volume control to a large extent equalizes the volume of strong and weak stations to whatever level you desire.

Best of all, these super features are automatic. No new controls have been added. Just plain, simple, single dial control.

Like the Neutrodyne-Plus, the Philco Screen Grid Plus contains a built in aerial for use wherever an external aerial is inconvenient.

Philco Screen Grid Plus is a truly super set, creating a new pride of ownership. And, in addition to its own special features, Screen Grid Plus retains all the advantages which make other Philco models so desirable.

The same wonderfully true, clear tone which Philco achieves by exact balancing of electrical units is found in this new Philco, as well as in the famous Philco Screen Grid and Philco Neutrodyne Plus.

The same handsome cabinets, designed by America's leading furniture designers and executed in handsome butt and Oriental walnut, bird's-eye maple, arbor vitae burl.

The same extraordinary value giving at every price, and in every model from the compact table set to the luxurious highboy de luxe.

Any Philco dealer will be glad to have you test this new Philco against any other radio you desire so that you can prove for yourself that Philco Screen Grid Plus is beyond comparison the finest radio the world has ever heard. Easy payments if you decide to buy.

PHILCO PHILADELPHIA, PA

On Sunday, November 3rd, and Sunday, December 8th, Philco again sponsors the broadcasting of Leopold Stokowski and the Philadelphia Orchestra programs worth looking forward to, worth listening to, and worth remembering! The regular Philco Hour continues every Friday at 9:30 P. M.

A CHALLENGE

Philco challenges any radio at any price to match these super features of the Philco Screen Grid Plus.

1. SUPER POWER. To bring in hosts of far-away stations.
2. Extra sharp selectivity to suit the most congested districts.
3. The standard Philco tone, marvelously rich, clear, and true.
4. VOLUME! Almost auditorium volume without tone distortion.

AND IN ADDITION

5. Automatic control of volume and fading.
6. Actual reduction of background noises including static and hum.
7. Simplicity of operation, as in all Philco models.

PHILCO

BALANCED UNIT RADIO

PHILCO *adds to its famous line . . .*

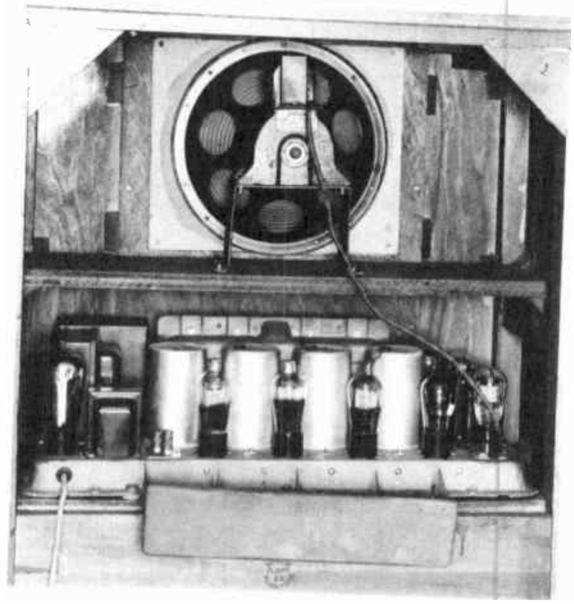
THE PHILCO LOWBOY	
With Screen Grid Chassis	$119.50
With Neutrodyne Plus Chassis	$129.50
With Screen Grid Plus Chassis	$119.50

THE PHILCO HIGHBOY	
With Screen Grid Chassis	$139.
With Neutrodyne Plus Chassis	$149.50
With Screen Grid Plus Chassis	$169.50

THE PHILCO HIGHBOY DE LUXE	
With Screen Grid Chassis	$195.00
With Neutrodyne Plus Chassis	$205.00
With Screen Grid Plus Chassis	$225.00

Rocky Mountains and West. Each furniture model, regardless of price, includes a built in genuine Electro-Dynamic Speaker and TWO 245 power tubes, push pull.

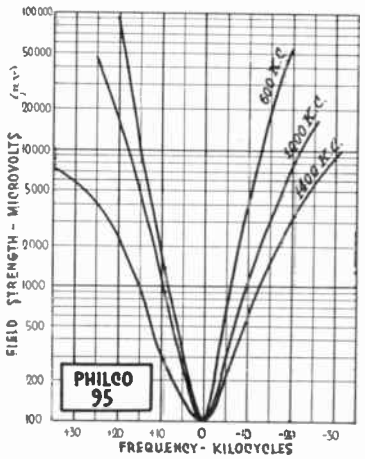
Models 76 Screen Grid, 87 Neutrodyne Plus, 95 Screen Grid Plus



95

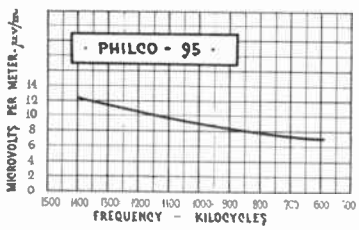
The model 95 was the first radio to use diode automatic volume control, invented by Harold A. Wheeler of Hazeltine Corporation and described in *Proceedings of the I.R.E.*, Jan. 1928, pp. 30-39. Technical articles on the 95 are also in *Radio Broadcast*, Dec. 1929, pp. 111-112, *Radio*, March 1930, pp. 39-40, and *Citizens Call Book*, vol. 11 no 3, Sept. 1930, p. 78.

Performance Curves of Philco 95



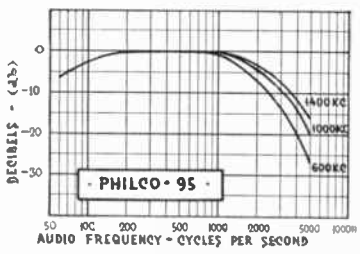
Selectivity Curves of the Philco Receiver

The most interesting fact to be noticed in the Philco selectivity curves is the uniformity of the three. This uniformity is the result of a slight sacrifice of selectivity at the low frequencies with better than average selectivity at the high frequencies. At 1400 kc a station two channels away would have to have from twenty-three to thirty times the field strength to cause 100 per cent interference. The breadth of the 600 kc curve has its effect upon the fidelity curve, showing that at least 11 db loss can be blamed upon side-band cutting. That is, the 11 db difference between the 600 kc fidelity curve and that taken at 1400 kc. There is also some cutting of the side-bands at 1400 kc, of course, which was not taken into consideration in the above statement.



Sensitivity Curve of the Philco

The sensitivity curve of the Philco receiver is very flat and is low enough to allow the reception of all practicable signals. By way of review, this curve indicates the required local field strength per meter height of the antenna, in order to allow a 50 milliwatt output from the receiver. The antenna system used in making the tests was equivalent to one four meters high (approx. 13 ft.). Hence each microvolt per meter is indicative of a field strength from the station of 4 microvolts. At 1000 kc the receiver is capable of amplifying a field strength of 4 x 9 or 28 microvolts enough so that the output of the receiver is 50 milliwatts, the standard chosen to signify room volume.



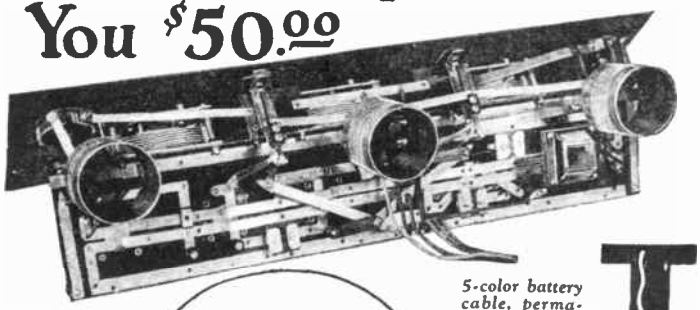
Philco Fidelity Curves

The Philco 95 fidelity curve holds up beautifully at the low frequencies, dropping only 6 db at 60 cycles. The high frequencies drop to from 17 to 28 db at 5000 cycles, which is enough to be almost noticeable by a very critical ear but hardly perceptible to the ordinary listener. Theoretically this attenuation of high frequencies affects the naturalness of the tones by weakening the harmonics or partials which make up the musical tone.

Radio (March 1930), p. 40

Treble losses of 17 to 28 db at 5kHz, "almost noticeable by a very critical ear," were normal in this era.

The Chassis that Saves You $50.00



View Underneath TRINITY SIX *Chassis*

showing how Beacon eliminates the main cause of set trouble—soldered connections—usually the work of inexperienced hands. At one operation 130 separate holes are punched in TRINITY SIX sub-panel. Nickeled phosphor-bronze "power house" bus strips, ⅜-inch wide, are then riveted fast, forming connections and tube-prong contacts. This exclusive Beacon construction cuts assembling costs in half, and minimizes set troubles.

(See November "Radio News," page 608.)

10 U. S. Patents Pending

5-color battery cable, permanently connected at factory, obviates installation errors.

TRINITY SIX

ADVANTAGES

The *Only* SIX-tube Broadcast Receiver at $50.

The *Only* Production-Engineered Set!

Routed through a scientifically-planned plant. Built by team-work and accurate machine methods—not subject to the inequalities of individual piece-workers.

The *Only* One-Profit Receiver.

Beacon molds its bakelite, makes its cabinets, panels, condensers, jacks, rheostats, etc., etc., from raw materials, and sells direct through Trinity dealers.

Soldered Connections Reduced To a Minimum

– which makes TRINITY SIX practically trouble-proof.

TRUE Straight-Line Frequency Condensers

Simplify tuning, spread the stations evenly over the dial, making it easy to eliminate interference.

B-Conomizer (Patent Applied For)

An exclusive TRINITY-SIX feature that saves "B" battery current, reducing replacement costs.

Filament Control Jacks

Allowing plug to open and close all circuits automatically, saving rheostat adjustments.

Simultaneous Use of Loud Speaker and Head-Phones

A TRINITY SIX advantage which permits peak tuning.

Damp-Proof Unvarying Resistances—

Bakelite-enclosed Isoleak (for the Grid), Resisto-Grads (patented) for resistance coupling.

Station-Selecting Dialing Chart

Shows how to set dials for different stations.

TRINITY SIX

1 The "power-house" bus-strip construction eliminating most soldered and bolted joints, reduces resistance and greatly increases efficiency of the circuit.

2 Two stages of tuned radio frequency amplification—affording super-DX and selectivity.

$50

WEST OF THE ROCKIES $57.50

3 Three stages of audio amplification, including two stages of resistance coupling in addition to one stage of transformer coupling, assuring facsimile reproduction of every type of broadcasting—talking, singing, playing—and affording auditorium volume when desired.

BUILT by a revolutionary method of construction in the set-building division of America's greatest radio parts plant, practically everything in TRINITY SIX is made from raw materials into the finished product under one roof. The TRINITY SIX Broadcast Receiver gives you the most that has yet been offered in Radio—more tubes, more power, more volume, more selective tuning, greater clarity, stronger construction—a bigger and better Radio in a handsome cabinet—at $50.

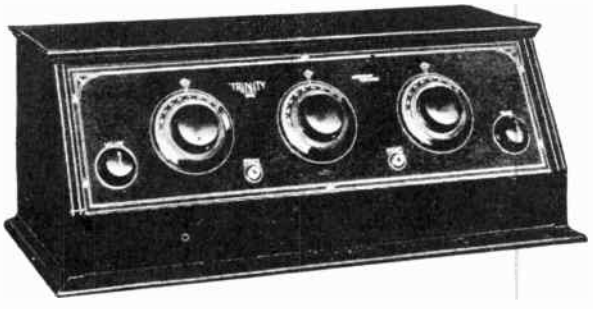
The TRINITY SIX dealer franchise is awarded only to selected dealers. If you want a TRINITY SIX, and no dealer has yet been appointed in your town, we will send you a set upon receipt of $50 and your dealer's name and address.

If you are not convinced that TRINITY SIX is the greatest Radio value ever offered, return it and get your money back. If you keep it, as we know you will, we will credit the local Trinity dealer with the sale.

Booklet, "The Value Only Beacon Can Build"—sent on request.

BEACON RADIO MFG. CO., INC.
Broadcast Receiver Division
Dept. RN 1225 323 Berry St., Brooklyn, N. Y.

Licensed under 88 U. S. Navy patents.



Mahogany-Finish Cabinet
with Anti-Hand Capacity Aluminum Panel

Size: 28" x 11" x 13". Holds 135 volts "B" battery, or 90 volts "B" battery and six dry cell "A" batteries. Genuine Bakelite 4" dials.

PILOT

Pilot Electric Mfg. Co.

Antique Wireless Association / Robert Hertzberg

l to r: Robert Hertzberg, Isidor Goldberg, Zeh Bouck, John Geloso, Alfred Ghirardi, Robert Kruse
ca. March 1929

Though it claimed to have been established in 1908 and to have used the name "Pilot" since April 1918, the Pilot Electrical Manufacturing Company was formally organized by Isidor Goldberg in January, 1922. Robert Hertzberg (editor of Pilot's house organ *Radio Design* from 1929 to 1931 says:

"The firm made batteries for a while in a loft in Manhattan, then moved to slightly larger quarters at 103 Broadway, Brooklyn. It made some small parts here, but didn't go into real manufacturing until it moved to a much larger place at 323 Berry Street, a few blocks away." (letter to the author, July 1983).

Goldberg organized the Beacon Manufacturing Company (still at 323 Berry Street) in early 1926 to make broadcast sets, offering three models under the "Trinity" name before abandoning the venture in January, 1927. In fact, a whole flock of subsidiary companies existed at various times, all owned by, or associated with, Pilot: the Nakken Television Corporation, the Twin-Coupler Company of Poughkeepsie (which made coils for many Pilot models), Speed (Pilot's mail-order branch), Allan Manufacturing Company (manufactured Pilotron tubes) and several others. But the cornerstone was Pilot's parts manufacturing operation. Quoting Hertzberg:

"Pilot was one of the very few real fabricators of the radio industry. In a crowded factory in Brooklyn, NY, it made its own tools and dies and manufactured all the bits and pieces of its components and assemblies. It did all its own turning, stamping, winding, plating, forming, etc. Automatic screw machines and power presses competed for floor space with the Bakelite molders, spray booths, etc."

On March 11, 1929, Pilot was re-incorporated as Pilot Radio and Television Corporation, and on April 27, its name changed once more to Pilot Radio and Tube Corporation. The first Pilotrons appeared in November. In 1930, it moved to Lawrence, Massachusetts, and while this story and Pilot's subsequent demise properly belong to the 1930's, beyond this book's scope, Hertzberg explains what happened (*AWA Old Timer's Bulletin*, December 1970):

"With the Brooklyn factory taxed to capacity, the management was hunting for new facilities even before October, 1929. They soon found a cluster of huge buildings in Lawrence, Mass., formerly a cotton mill whose business had been transferred to the warmer labor climate of the Carolinas. The banks were anxious to get this white elephant off their hands, and sold it to Goldberg for hardly more than the original cost of the freight locomotives that pulled cars around within the grounds of the establishment.

"Lawrence in 1929 and 1930 was something less than an attractive town. However, practically the entire engineering staff and administrative personnel along with the production workers, moved up willingly because their salaries were high and jobs in other firms were scarce. Unfortunately, the interruption of output and continuity proved disastrous. After a particularly bitter winter over 1931-1932, Geloso returned to Italy, the key executives scattered around the country, and the whole operation collapsed within a short time. Goldberg himself returned to New York, organized a new firm (also called Pilot — author), *did war work, made TV and hi-fi equipment on a smaller scale, and died about ten years ago.*

"Applying his Pilot experience to the Italian industrial scene, Geloso became an important manufacturer and employed thousands of people in several factories. During World War II he was denounced as an "American" by the Fascists and he and his family barely survived five years of hiding on a farm. He bounced back quickly after 1945 with an extensive line of components and assorted radio, TV, and hi-fi sets including a couple of high-grade ham receivers and transmitters."

Radio News (Dec. 1926), p. 735

Five Sets In One Kit

You Can Build Any of These Hook-Ups

And Many Other Famous Circuits

All Using Only TWO CONTROLS with the New

PILOTONE UNIVERSAL KIT

Pilotone Universal Kit Contains

1 Drilled and Lithographed Front Panel (7 x 18)
1 Drilled Sub-Panel (7 x 17)
1 Pilot Light
2 2" Bakelite Sub-panel Brackets
2 700-ohm Resistances (Dampers)
1 .006 By-Pass Condenser
1 .002 By-Pass Condenser
2 Vernier Dials
5 Universal Sockets
1 Filament Switch
1 Pkg. Washers
1 Pkg. Nuts
2 Pkgs. Asst. Screws
38 Flexible Leads
1 .00025 Grid Condenser
1 Grid Leak
9 Marked Binding Posts
2 Audio Frequency Transformers
1 10-ohm Rheostat w/knob
1 20-ohm Rheostat w/knob
1 3-Point Jack
1 4-Point Jack

5 Tube Tuned Radio freq. **3 Tube 3 Circuit**
3 Tube Reflex **2 Tube Reflex**
3 Tube SHORT WAVE

HERE is the kit all set builders have been waiting for. It contains all the parts necessary (except tuning coils and variable condensers) to enable the amateur to *quickly* and *easily* assemble any of these famous circuits. No tools are needed except a screw driver and a pair of pliers. These hook ups are so designed that they all accommodate themselves to the two dial control panel as shown in the illustration. Every enthusiastic fan will want to own this kit. You cannot duplicate the parts at our price and you cannot duplicate layout or plans at any price unless you get at least 5 separate kits. The first demand for these kits will doubtlessly quickly exhaust the immediate supply. *Get your kit without delay.*

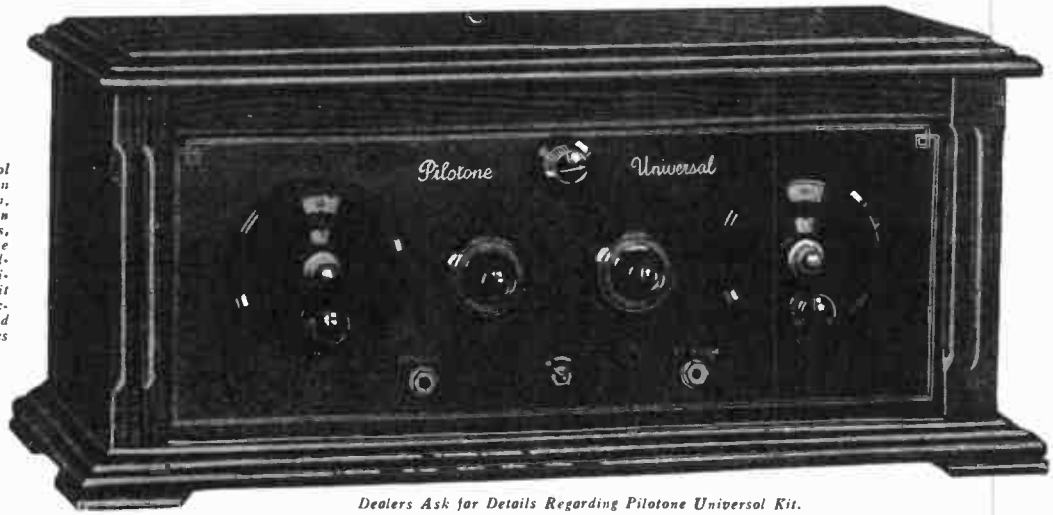
On sale at radio departments of S. S. Kresge Co. stores or if there is no Kresge Co. store in town take THIS AD to your dealer and order through him. The man behind the counter will advise regarding correct Pilot Condensers and coils to be used with this kit. If no Kresge store or dealer is convenient this kit will be sent with catalogue of condensers and coils postpaid upon receipt of .....

$17.90

Handsome walnut finish cabinet send $7.50 additional.

Send Post Office or Express money order. Address Dept. 1226

PILOT ELECTRICAL MANUFACTURING CO.
323 BERRY STREET **BROOKLYN, N. Y.**



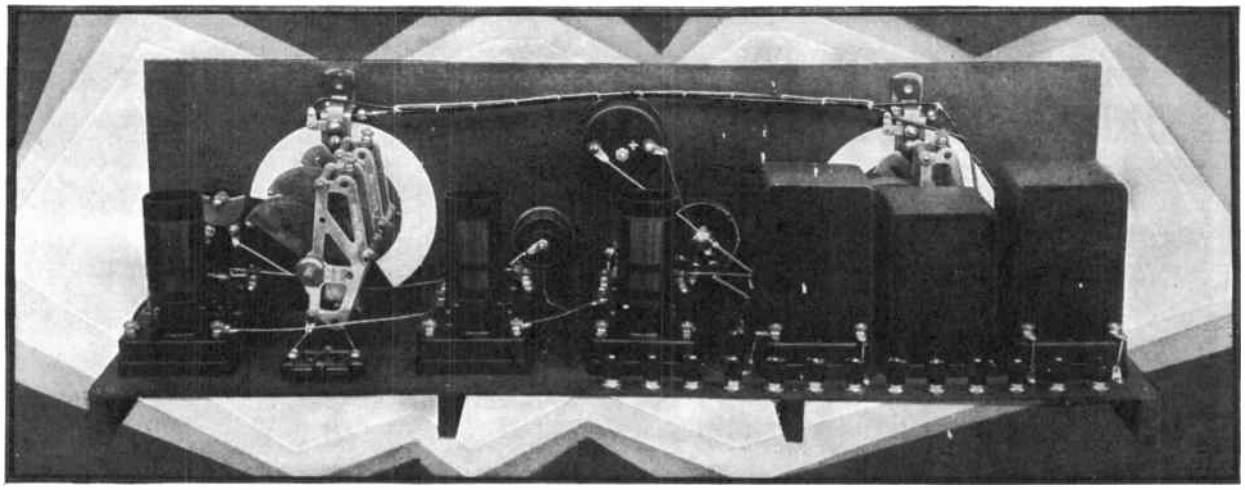
Pilotone Universal Kit is the creation of Merle Duston, head of the Duston Radio Laboratories, Detroit, Mich., one of the world's leading radio authorities. Each circuit was built and successfully operated before the kit was placed on sale.

Dealers Ask for Details Regarding Pilotone Universal Kit.

Made By Worlds Greatest Radio Parts Manufacturer

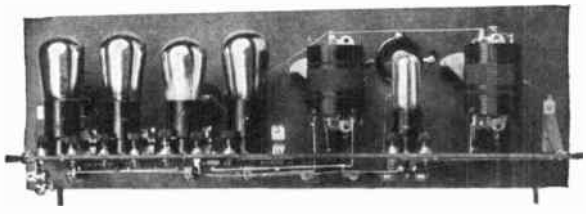
Universal Dec. 1926 $17.90 kit

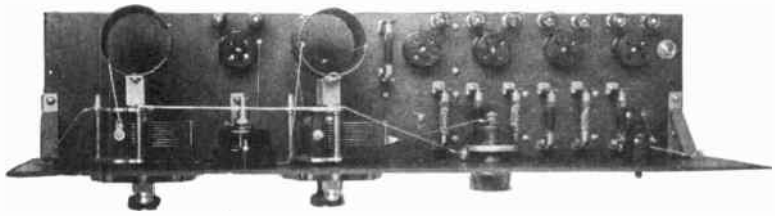
Financial data on page 260



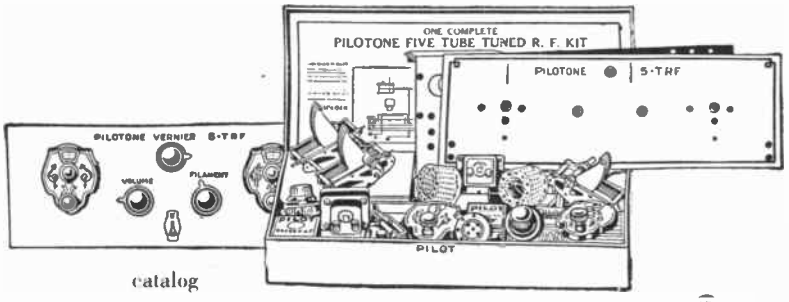
Think of it! A complete A.C. set, tubes and all, at a price everyone can afford!

SP-5 Oct. 1927 "about $75" (parts only, no kit). Designed by Milton Sleeper, first editor of *Radio Design*. Similar models described in *Radio News*, Nov. 1927, pp. 498-501.



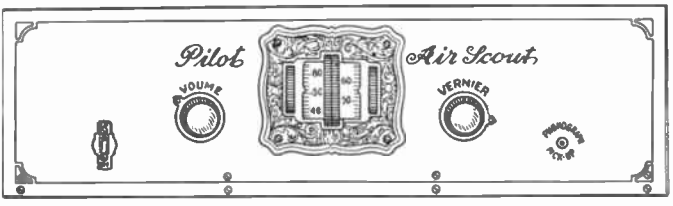


X-11 Oct. 1927 kit
Described in *NY Telegram*, July 9, 1927, p. 4.
Revised circuit July 16, p. 6.



catalog

Pilotone 5 TRF Feb. 1928 (approx) $33.50 kit



Front view of PILOT Air Scout, showing the simple controls.

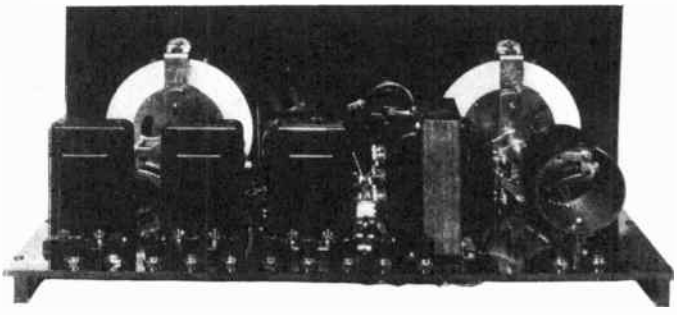
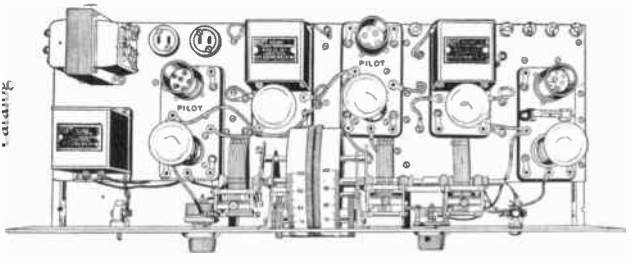


Fig. 2. A special feature of this set is the moisture-proof transformers and filter.



Air Scout 14 Feb. 1928 $75 kit

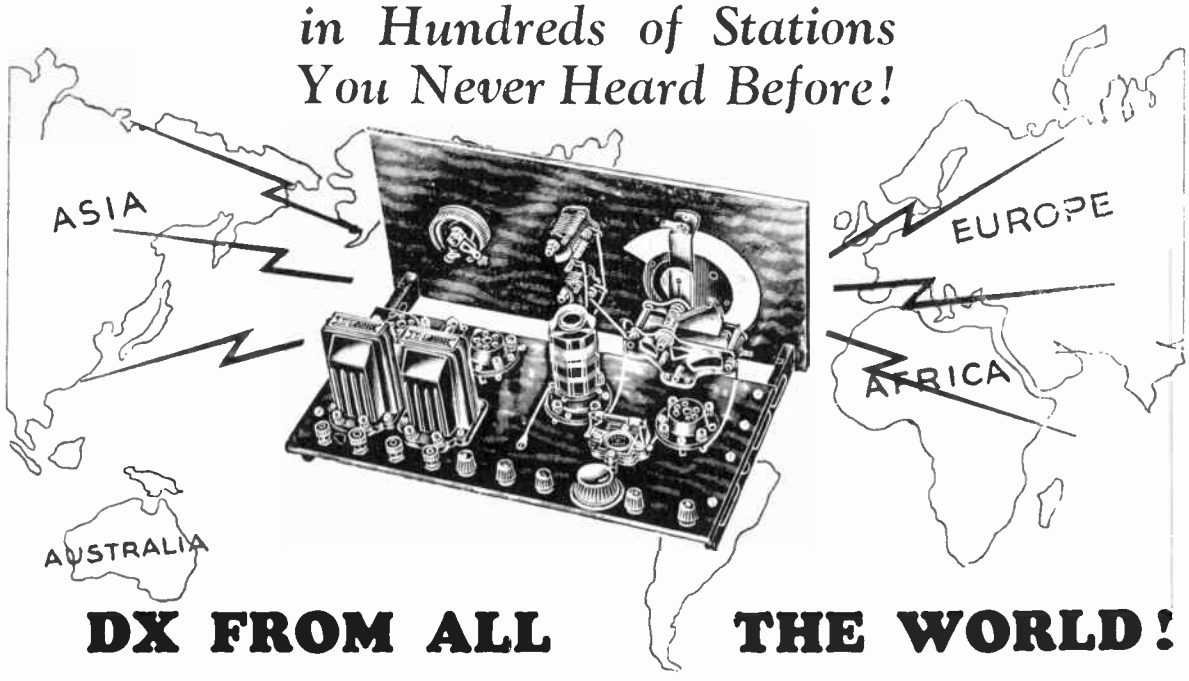
Air Hound Sept. 1928 kit
Described in *NY Telegram*, April 14, 1928, pp. 10, 16.

Hear Stations the World Over

WITH THE

SHORT WAVE PILOT WASP

This New 3-Tube Short Wave Receiver brings in Hundreds of Stations You Never Heard Before!



DX FROM ALL THE WORLD!

Listen to short wave broadcasts day and night from England, Italy, France, Germany and also American stations when static blankets the regular broadcast channels. The Pilot Wasp is ideal for receiving Television broadcasts soon to be transmitted on short wavelengths. For those who do their globe-trotting via radio, the Wasp is the receiver.

Can be assembled for

$21.75

in Kit form including 5 Pilot Plug-in Coils—17 to 500 M.

Ask your custom set-builder about the Pilot Wasp Short-Wave Receiver designed by Pilot engineers assisted by R. S. Kruse (of QST magazine fame). This set, with its 11,000 mile range, is simple to build and cheaper to assemble than any broadcast receiver. Panels drilled and engraved. The five Pilot Plug-in coils cover all wavelengths from 17 to 500 meters.

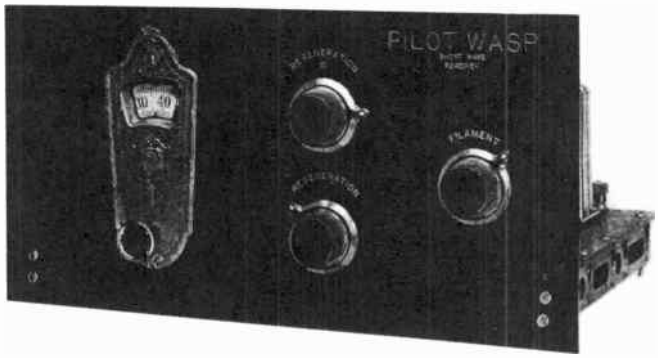
Get the Pilot Wasp Construction Blueprint from Your Local Store for 10c or Send Direct to

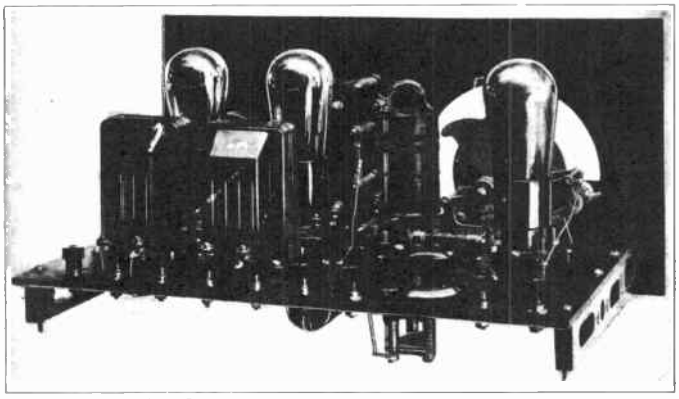
Pilot Precision Radio Parts

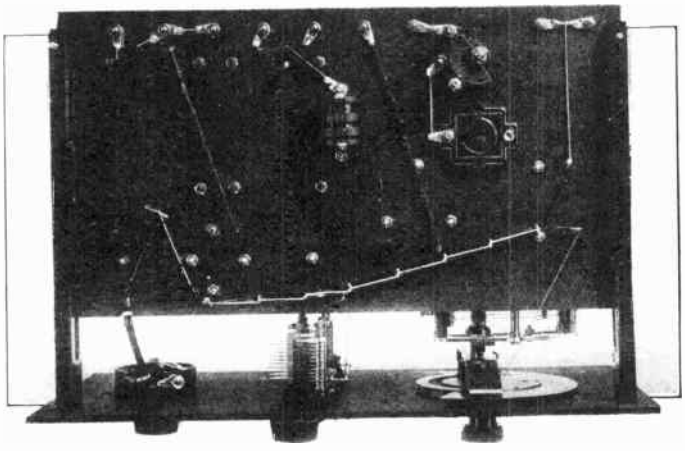
PILOT ELECTRIC MFG. CO INC.
323 BERRY ST. BROOKLYN, N.Y.
TRADE MARK REGISTERED
"WORLD'S LARGEST RADIO PARTS PLANT"

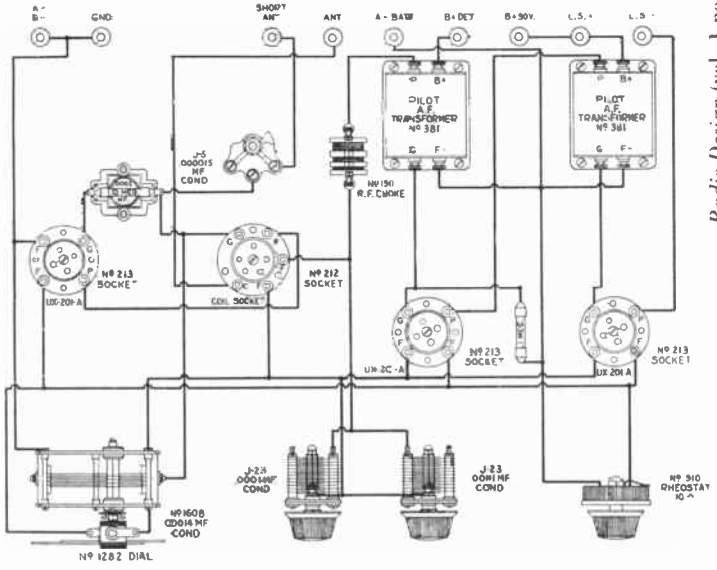
Sound Engineering Characterizes PILOT PARTS

Wasp (K101) May 1928 kit $23.80 June, $16.85 Sept., $18.50 Oct., $21.75 Jan. 1929.
Described in *NY Telegram*, May 26, 1928; *Radio Design*, Vol. 1 No. 3 (Sept. 1928), pp. 26-30; *Radio World*, Oct. 13, 1928, pp. 4,5; *Radio News*, Dec. 1928, pp. 541, 576.









Radio World (Oct. 13, 1928)

Radio Design (vol. 1 no. 3, Sept. 1928)

Genuine PILOT Coils

As Designed by R. S. Kruse and M. B. Sleeper

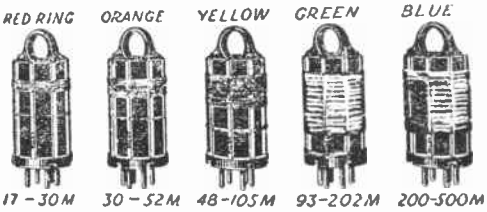
available in quantity

SHORT WAVE

PILOT WASP

made to PILOT specifications by

TWIN COUPLER COMPANY, INC.



WARNING We are sorry to say that some dealers who have been advertising Pilot Wasp kits are actually supplying junk parts and distressed merchandise. To duplicate the results obtained from the original Pilot Wasp, ask your dealer for the official Wasp Assembly Sheet, and insist upon the exact parts called for in Assembly Sheet.

DX From All the World With This 11,000 Mile Short-Wave Set, 17 to 500 Meters

GET THE PILOT WASP ASSEMBLY SHEET FROM YOUR DEALER OR WRITE DIRECT TO EITHER COMPANY

PILOT ELECTRIC M'F'G. CO., INC.
323 BERRY ST., BROOKLYN, N.Y.

TWIN COUPLER COMPANY, INC.
Poughkeepsie, N. Y.

NY Telegram (June 30, 1928)

Red Handle	17 to	30 m.
Orange	" 30 to	52 m.
Yellow	" 48 to	105 m.
Green	" 73 to	202 m.
Blue	" 200 to	500 m.

These S. W. coils and the WASP receiver were designed by R. S. Kruse and M. B. Sleeper. Official WASP sets and coils are used by U. S. Army, Byrd Expedition, and foremost operators of the ARRL. Several ships have reported reception of the Tunney fight from WGY across the Atlantic. New York amateurs have received confirmation cards from Australia, England and Holland broadcast stations.

11,000 Miles on Wasp Set

Are you getting world-wide reception? You can with a WASP short wave set, 17 to 500 meters. Complete construction kit for 3-tube WASP, with 5 coils, Micarta panels, etc., blueprints, and 48-page instruction giving 700 S. W. station calls, postpaid in U. S. A. or Canada $18.50

Set of 5 plug-in coils only, postpaid..... $5.75

48-page Instruction Book and Blueprint..... $1.00

SPEED, Inc., FASTEST MAIL SERVICE

163-D BROADWAY
BROOKLYN, N. Y.

Radio World (Oct. 13, 1928), p. 3

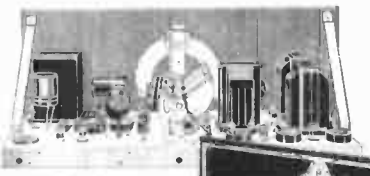
PILOTONE
LICENSED UNDER U S NAVY PATENTS
ELECTRIC

Here's the A-C Kit you've been waiting for!

CUSTOM-SET BUILDERS

As rapidly as manufacturing permits, stores are being supplied.

If your local store cannot supply you write us direct and we will see that you are taken care of.



Above—"The Works" showing built-in "A" Power.

At Right—Front Panel, beautiful in its single control simplicity. Standard size 7" x 18" fits all cabinets and consoles.

Use this Pilotone "B" Eliminator No. K-105 designed especially for the receiver or Pilot "B" Pack No. 5, or any other standard eliminator.

Can be assembled for less than $27.00

including Built-in "A" Power

"B" ELIMINATOR EXTRA

Think of it! A 6-tube all-electric receiver with features found only in the most expensive factory-made sets . . . at a price that seems unbelievable . . . all because the Pilotone Kit is produced by the World's Largest Radio Parts Plant!

All-Metal construction insures greatest accuracy, ease of construction and professional appearance.

Full details in current issue Radio Design Quarterly published at 314 Broadway, Brooklyn, New York. Subscription [illegible] per year.

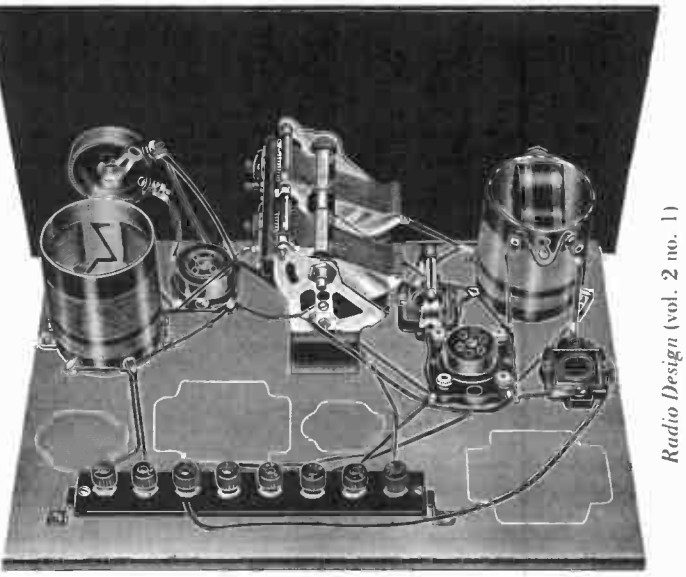
Features!

- Latest commercial-type all-metal construction.
- All holes stamped—no drilling!
- Single control, Illuminated Dial.
- No batteries—all electric A-C operation with built-in "A" power.
- Uses all standard A-C tubes which are correctly biased to prolong filament life.
- New compensated triple gang tuning condenser.
- Latest push-pull amplification.
- Simplified construction means simplified assembly.
- Full Size construction Blue Prints furnished.
- Licensed under U. S. Navy Patents.

PILOT ELECTRIC M'F'G. CO. INC.
323 BERRY ST. BROOKLYN, N.Y.
TRADE MARK REGISTERED
"WORLD'S LARGEST RADIO PARTS PLANT"

Please say you saw it in RADIO NEWS

K102 Pilotone 6 Jan. 1929 $27 kit

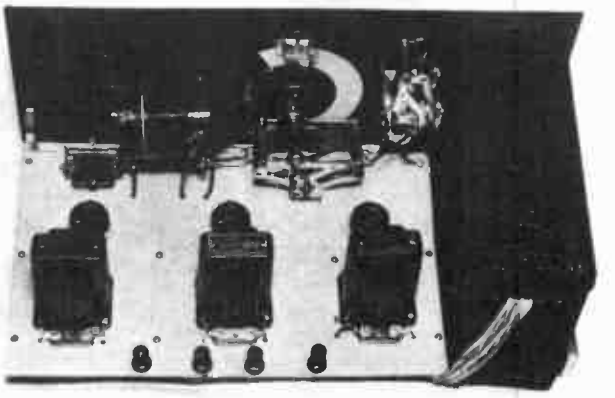


How the Little Pal looks all assembled and wired. The white outlines on the baseboard show where the sockets and transformers of the amplifier are placed. These parts can be put in later if you want to work a loud speaker.

Little Pal May 1929 parts list only

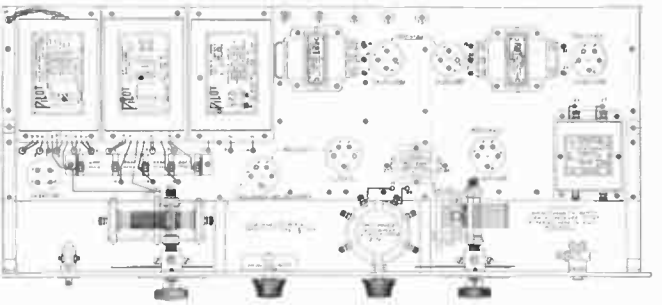
Radio News (Feb. 1929), p. 711

Radio Design (vol. 2 no. 1)

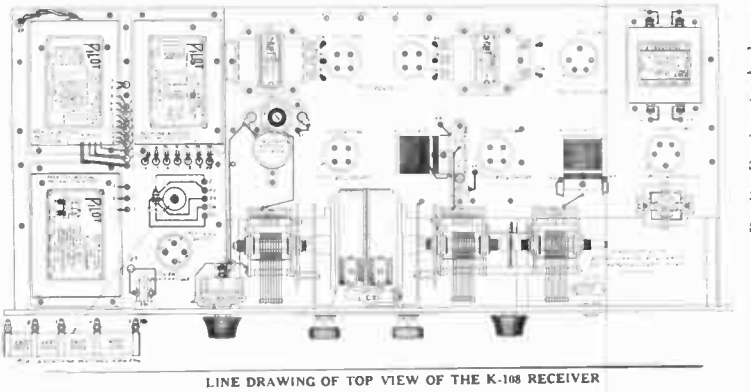


AC Three August 1929

Radio Design (vol. 2 no. 2)



TOP ASSEMBLY AND WIRING DIAGRAM OF THE SG-105.



LINE DRAWING OF TOP VIEW OF THE K-108 RECEIVER

Radio Design (vol. 1 no. 4)

SG105 Jan. 1929

K108 Jan. 1929

Announcing a NEW Radio Thrill!

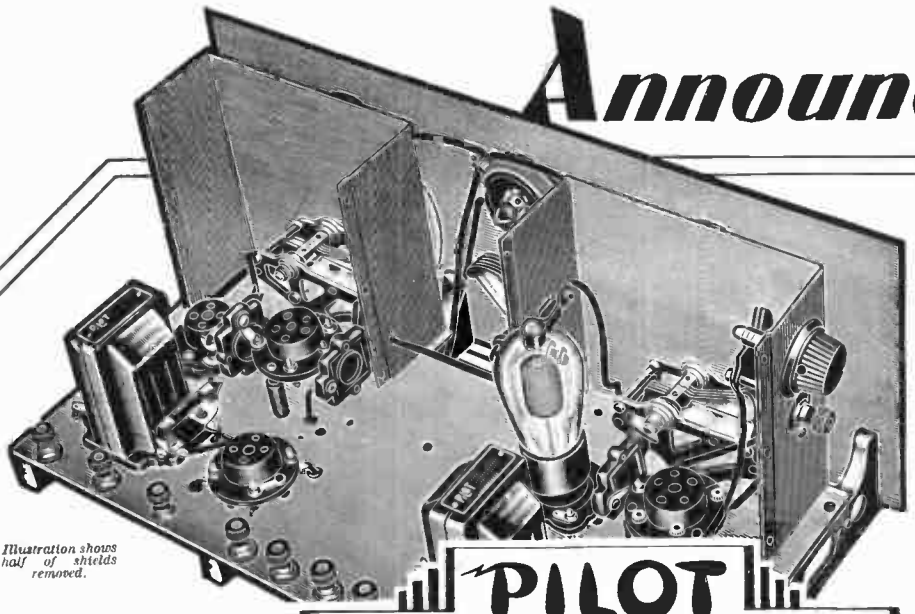


Illustration shows half of shields removed.

The Super-Wasp Kit combines in one receiver Short-Wave AND Broadcast Reception from 14 to 500 meters.

Assemble it and hear it the same evening!

PILOT DOUBLE-DUTY

SHORT-WAVE BAND — BROADCAST BAND

SUPER WASP

TUNED SCREEN GRID 14 TO 500 METERS

Check These FEATURES

Designed and developed by Robt. S. Kruse, the Super-Wasp covers 14 to 500 meters, making it a splendid broadcast receiver as well as a most efficient short-wave set.

Two sets of plug-in coils are furnished.

The only Short-Wave Receiver having a stage of Tuned R. F. with Screen-Grid Tube, giving greatest Sensitivity and Selectivity.

Condenser-Controlled Regenerative Detector. All-drilled metal chassis.

Smooth operation, consistent results, easy to tune!

Splendid loud-speaker results.

HERE'S THE KIT.

The Super-Wasp shifts from *short wave* to *broadcast band* as quickly as you shift from one speed to another in your car!

When America signs off, international short-wave broadcasts open a whole *new* world of entertainment. With your Super-Wasp you hop from continent to continent; Distance dissolves and you bring in 10,000 miles as easily as you now bring in locals; Remember, this four-tube wonder not only brings in the four corners of the earth, but is *in addition* a splendid super-sensitive *broadcast receiver!*

RETAIL PRICE
(Catalog No. K-110)
Including 2 sets of 5 coils each, full-sized blue-print and complete assembly data.
$29.50

If There Is No Pilot Dealer In Your Locality, Write Us

More Features

No A.C. Hum pick-up. Completely shielded R.F. and Detector Stages eliminate hand de-tuning effects.

Low losses—ingenious design reduces all R.F. connections to one and a half inches or *less!*

Illuminated Vernier Dials for both condensers.

Simplicity of assembly due to "sectional cans" and minimum wiring. Assemble and operate it same evening!

On very first test received loud and clear broadcast programs from Chelmsford, *England;* Costa Rica, *Central America;* PCJ Eindhoven, *Holland;* Manitoba, *Canada,* etc.

SEND FOR RADIO DESIGN

50c brings you one year's subscription to "Radio Design" Quarterly Magazine, chock-full of latest Radio, Short-Wave and Television Developments. "Radio Design," 103 A Broadway, Brooklyn, N. Y.

THE PILOT SUPER-WASP KIT IS MADE IN WORLD'S LARGEST RADIO PARTS PLANT!

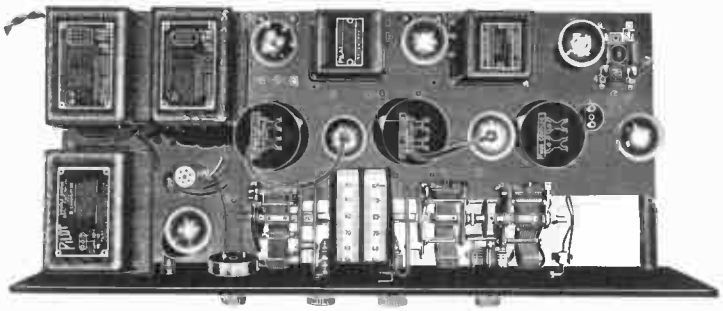
PILOT ELECTRIC M'F'G. CO INC.

323 BERRY ST. BROOKLYN, N.Y.

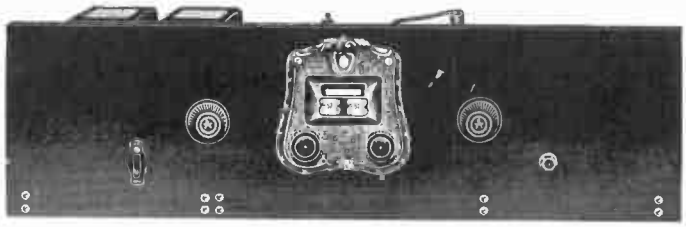
ESTABLISHED 1908 TRADE MARK REG.

K110 Super Wasp
May 1929
$29.50 kit

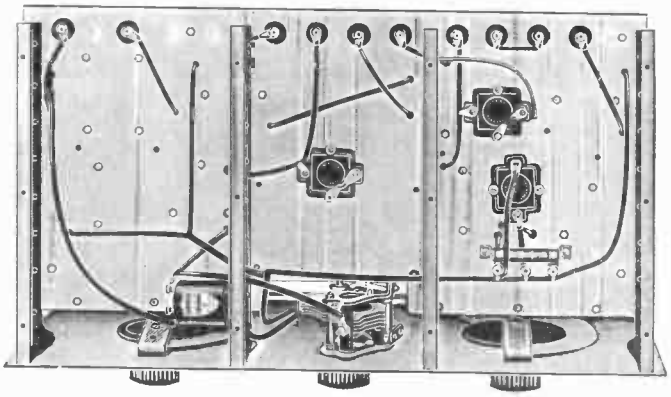
Construction articles in *Radio Design*. vol. 2 no. 1 (ca. May 1929),pp. 7-15, 51; *Radio News*, June 1929, pp. 1109-1112.

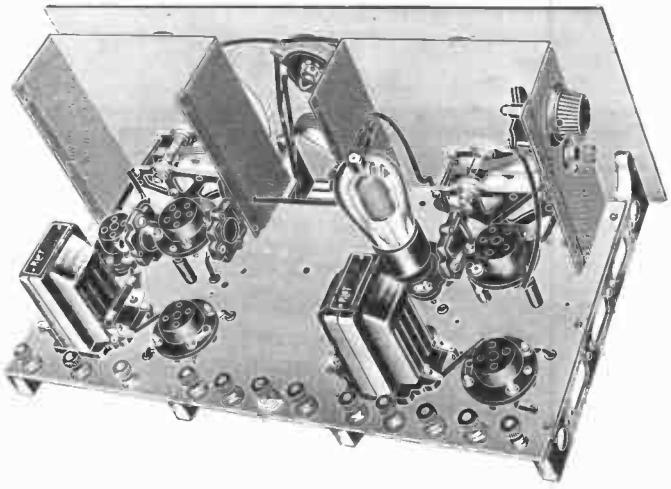


TOP VIEW OF A COMPLETELY ASSEMBLED AND WIRED K-106



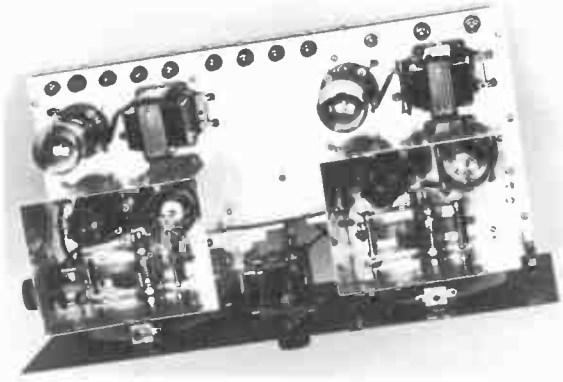
K106 AC Screen Grid May 1929

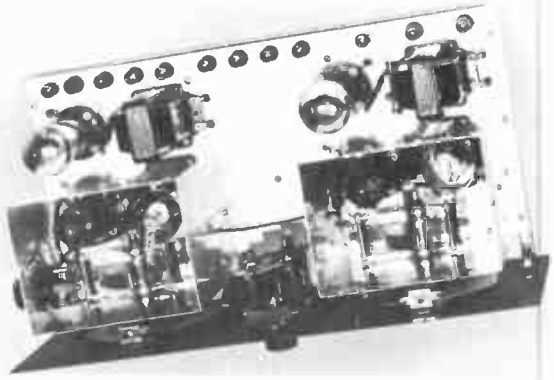




Rick Ferranti

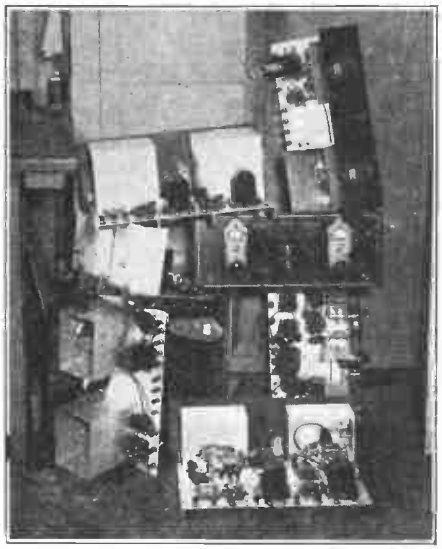
Above: The assembled and wired Super-Wasp with the backs of the two shield cans removed to show the placement of the parts. Notice how the two five-prong sockets for the plug-in coils are elevated above the sub-panel by insulating bushings. Below: what you see when you turn the set over. The three fixed condensers are spaced away from the sub-panel by ¼ inch hexagonal spacers. The various wires running through the sub-panel pass through eyelets which have smooth sides that will not cut the spaghetti.





Rick Ferranti

By the aid of a parlor stereoscope or, after a lot of practice, without it, you can see this Super Wasp in three dimensions.



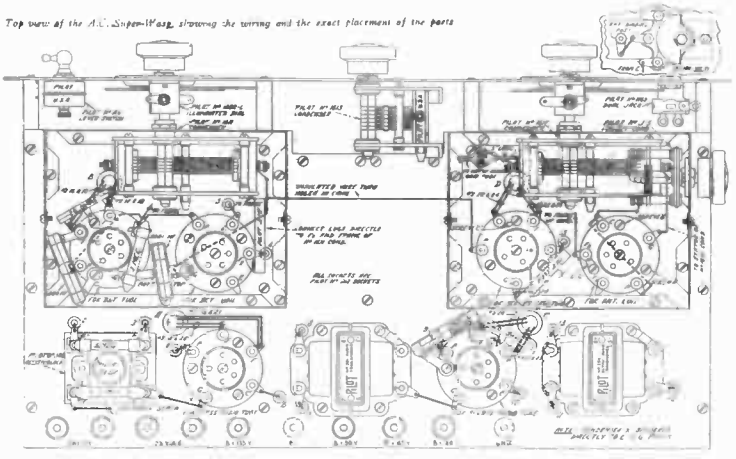
Some of the experimental A.C. Super-Wasps piled up in a corner of the Pilot laboratory. These sets were rebuilt as often as six times.

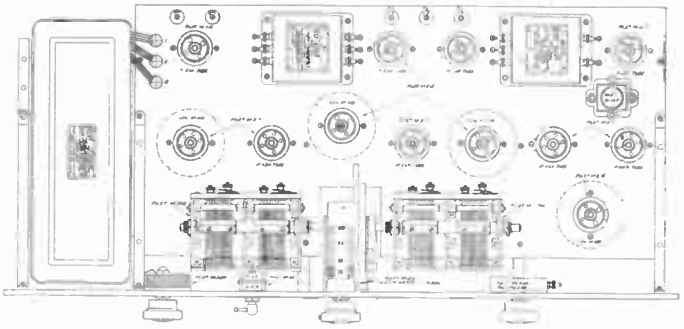
New England Wireless & Steam Museum

Front panel view of a completed A.C. Super-Wasp.

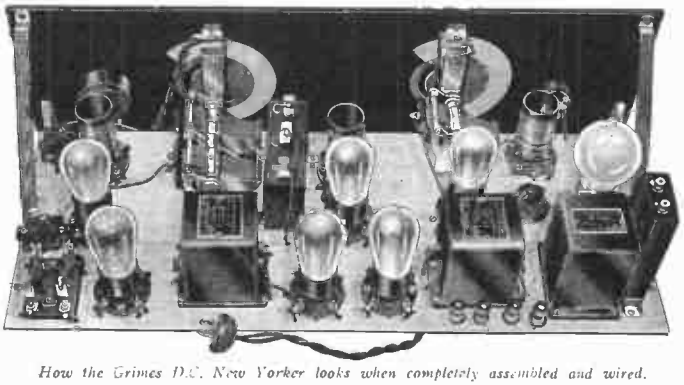
K115 AC Super Wasp Oct. 1929 $34.50 kit
Technical article in *Radio News*, Jan. 1930, pp. 618-620, 666.

Top view of the A.C. Super-Wasp, showing the wiring and the exact placement of the parts





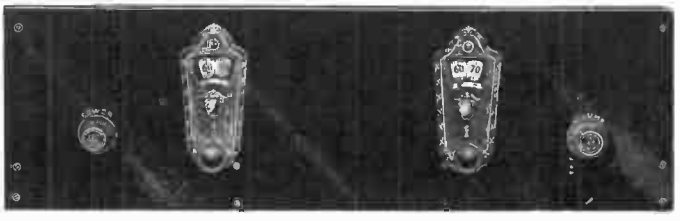
Top view of the Pilot Twin Screen-Grid 8, showing positions of parts. The three holes A, B, C, in the upper left corner of the sub-panel, carry the wires from the K-112 power pack to the underside. The dotted circles around the tube sockets indicate the PT2 and PT3 plug-in coils, which were designed especially for screen-grid circuits.



How the Grimes D.C. New Yorker looks when completely assembled and wired.

Simplicity marks the appearance of the Screen-Grid 8 front panel.

K117 Twin Screen Grid 8 Oct. 1929



Front panel view of the D.C. New Yorker.

K118 DC New Yorker Oct. 1929

All illustrations from *Radio Design* (vol. 2 no. 3)

PILOT SCREEN-GRID NEW KIT

COVERS 200—600 METERS

Amazes Experts!

KIT No. K-123. Complete kit of parts for Pilot Screen-Grid Receiver, including Walnut-finished metal cabinet, but without Power Pack. *Custom Set-Builders' Price in U. S. A.* **$29.75**

KIT No. K-122. Complete kit of parts for Pilot Screen-Grid Receiver, including drilled front panel. (Does *not* include cabinet or Power Pack.) *Custom Set-Builders' Price in U. S. A.* **$25.50**

KIT No. K-124. Complete kit of parts for Pilot Screen-Grid Receiver, including Walnut-finished cabinet and ABC Power Pack. *Custom Set-Builders' Price in U. S. A.* **$46.25**

FEATURES OF THE PILOT SCREEN-GRID KIT

Embodies Push-pull audio and all latest refinements of high-priced screen-grid receivers.

Two screen-grid amplifiers fully shielded (7 tubes including rectifier).

So sensitive it operates perfectly on a 10-foot indoor aerial — no outside antenna required.

Highly selective—razor-edge tuning.

Very simple to assemble and wire. Removable bottom on cabinet permits easy access.

Operated by practically all 171-A power packs.

USE PILOTRON RADIO TUBES, "endorsed by professionals," for these RECEIVERS—and wherever EXCEPTIONAL RESULTS are REQUIRED!

BECAUSE we make Pilotrons ourselves—and are SURE of their quality.

BECAUSE Pilot's Screen-Grid and Short-wave Receivers were engineered to make FULL USE of the superior quality built into Pilotrons!

When the A. C. Super-Wasp demanded the development of a tube to meet the exacting requirements of A.C. Short-wave work, Pilotron P-227 was the result—an outstandingly superior tube for broadcast receivers!

SHORT WAVE FOR A. C. OPERATION

KIT No. K-115. The A. C. Super-Wasp, designed by David Grimes, John Geloso and Robt. S. Kruse, is a 10,000 mile thriller utilizing Screen-grid and specially developed Pilotron 227.

Use your own ABC Power Pack or Pilot K-111 at $16.50, especially designed for the Super-Wasp. Power Pack Extra.

Custom Set-Builders' Price in U. S. A. **$34.50**

FOR BATTERY OPERATION

KIT No. K-110. The original Super-Wasp, used all over the world where A.C. is not available. Also preferred by many S.W. fans. *Custom Set-Builders' Price in U. S. A.* **$29.50**

PILOT RADIO & TUBE CORP.

RETURN THIS COUPON

RADIO INTERNATIONAL GUILD
103 Broadway, Brooklyn, New York

Enroll me as member of Radio International Guild, sending membership pin, certificate, card, and current issue of "Radio Design," the Guild's official organ (also 3 additional quarterly issues). I enclose 50c, coin or stamps, to pay for everything for one entire year.

Name .....
[Please write or print plainly]

Address .....

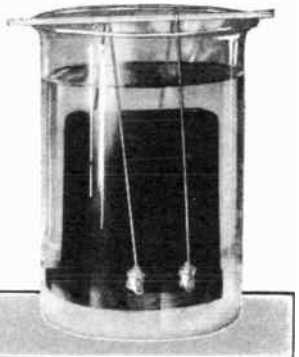
City ..... State .....

WORLD'S LARGEST RADIO PARTS PLANT ESTABLISHED 1908

323 BERRY STREET BROOKLYN, N. Y. U. S. A.

P.E. 6 first advertised Jan. 1930

AUDIO FREQUENCY TRANSFORMERS



Number one . . . of little dramas in the life of the largest radio parts factory in the world

By KIMBALL HOUTON STARK

MY first introduction to audio frequency transformers was in the early part of 1917. Amplifiers were at that time in the front line trenches of radio engineering both as regards their technical capabilities and because of their importance in military and naval communication during the war.

Well do I remember some of the earlier transformers of that day, constructed in the same way as the usual telephone transformer, or spark coils; a bundle of soft iron wires, some three or four inches long, a half inch in diameter, around which a primary coil was wound. Then on the outside of this primary coil came the secondary winding. Wooden coil ends were slipped over the ends of the core, and the whole assembly mounted on a wooden block with leads coming out to binding posts.

Later came the conventional closed core type transformers and hundreds and thousands of amplifiers were built during the later days of the war and mounted in radio equipment made under special contract for the United States Army and Navy, obviously, for use under the most severe conditions. These closed core transformers, certainly a great improvement, still had relatively little iron in the core and insulation even as required by rigid government specifications, did not always protect the coil. The result, expansion of the coil due to wide temperature changes and humid conditions both as met with in tropical countries and on board naval vessels.

Both expansion of the coil and the absorption of moisture obviously was due to improper impregnation of the coil winding, the absorption of moisture being the most disastrous. As quick as an infinitesimal bit of moisture penetrated the coil windings and broke down the insulation, trouble became apparent that eventually led to short circuiting the turns and completely destroying the transformer.

TRANSFORMER TROUBLES IN THE EARLY DAYS OF BROADCASTING

Along during the year nineteen twenty-three, after broadcasting became popular and radio receivers were being manufactured by the thousands, audio frequency transformers gave many manufacturers not only a productive nightmare, but an empty pocketbook.

It so happened that I was associated at that time with a radio manufacturer who used many thousands of transformers in high-grade complete receivers. I remember shipments were going out each day, a hundred receivers or more a day. Over night letters came pouring into the factory saying, "My set has gone dead. It was O. K. last night and I was receiving a wonderful program when all of a sudden everything went dead, the tubes of the receiver still burning. I can't understand it, for I just purchased my set a week ago." I had to read letter after letter like this, some of them referring to receivers a day old, some a week old, and some of them months.

What was to be done? Here was a problem extremely difficult to eliminate both commercially and technically and with audio frequency transformers going bad one after another, a large production schedule was shattered, resulting in tremendous dollars and cents losses.

Night and day worries and work by the entire engineering staff finally placed all the blame on the audio frequency transformers.

How did it happen? Very fine magnet wire as was used for the secondary windings of the transformers was extremely scarce those days. The insulating coating on the wire was found not to be uniform because in many instances the acid solution used to clean the wire previous to the time the enamel coating was placed on it had not been completely removed. With only an infinitesimal speck of acid remaining on the wire, corrosion eventually resulted, and the fine wires short circuited or broke altogether and the receiver became inoperative.

As an indication of the magnitude of troubles that many manufacturers were experiencing at that time, a veteran radio salesman reported to me that he saw one day in Tampa, Florida, some two hundred high-grade receivers, selling at an average of one hundred and fifty dollars each, laying in the warehouse of a radio distributor, returned by customers as defective and all because of damaged audio frequency transformers.

I am relating these early experiences and conditions because they contain a terrific object lesson and so emphatically illustrate the reverse condition that exists today as regards the manufacture and use of audio frequency transformers.

At the time that I assumed the editorship of Radio Design, one of the radio engineers employed by the Pilot Electric Mfg. Co., Inc., was one of the men with whom I was associated on radio work during the war and who at that time did a great deal of work in connection with the design and manufacture of audio frequency transformers. He knows intimately the problems that troubled us at that time and aided in their solution. He also knew my interest in transformers, both past and future.

It was an extreme pleasure to me to accept his invitation to be conducted through the Pilot factory and be shown how present-day audio frequency transformers are designed, manufactured and tested. The things I saw on that trip so impressed me that I have sup-captioned this story, "Little Dramas in the Life of the Largest Radio Parts Factory in the World."

HUNDREDS OF THOUSANDS OF CORE LAMINATIONS PER DAY

After a good morning handshake, my engineer friend (we will call him the usual fictitious Bill) said, "Let's start at the beginning and go right up the line," and so my first impression was that of seeing special automatic high-speed punch presses, stamping out iron laminations for the transformer cores and doing it at the rate of nine thousand pieces an hour.

It is only possible to use such automatic machinery when production requirements run into enormous quantities, for each press costs thousands of dollars. The dies for the presses, even though made of the finest tool steel, hardened under scientific temperature control, become dull quickly and require constant sharpening and inspection for wear.

All tools and dies are made in the Pilot tool room, which employ some thirty experienced toolmakers and die-sinkers. A tolerance of one ten-thousandth of an inch to these men is part of their day's work.

After the laminations are punched they are cleaned with sawdust to eliminate the oil and lubrication used during the punching process. Then they go to a row of tumbling machines which round the corners of all the edges, remove the scale, etc. Bill told me that special attention is taken in purchasing sheet steel in strip form for punching laminations and that all purchase orders specify steel with a given metallurgical content. Even frequent chemical analysis of production runs and shipments are made such that the unit magnetic flux density, permeability and low hysterisis losses of the completed transformer will be uniform under given conditions.

PILOT TRANSFORMERS ARE ENCLOSED IN A GENUINE BAKELITE ONE-PIECE CASE

From the punch press department we went over to the bakelite molding department. Here a row of thirty-eight special hydraulic and electrically operated molding presses turn out thousands of bakelite pieces a day, not only transformer cases, but for the construction of some two hundred different radio parts. Rather than use the old-fashioned method of pouring the bakelite powder into each mold separately, practically all parts are molded from the bakelite powder made into the form of "pills," each pill containing just enough powder to mold one piece.

This method is, however, not employed for the transformer cases, for they are rather large and to secure a better distribution and insure perfect cases, accurately measured amounts of bakelite powder is carefully placed in each mould.

The hydraulic molding presses are of course heated by steam, and are capable of exerting thousands of tons of pressure on the moulds during the molding process. Each transformer case as it comes from the molds

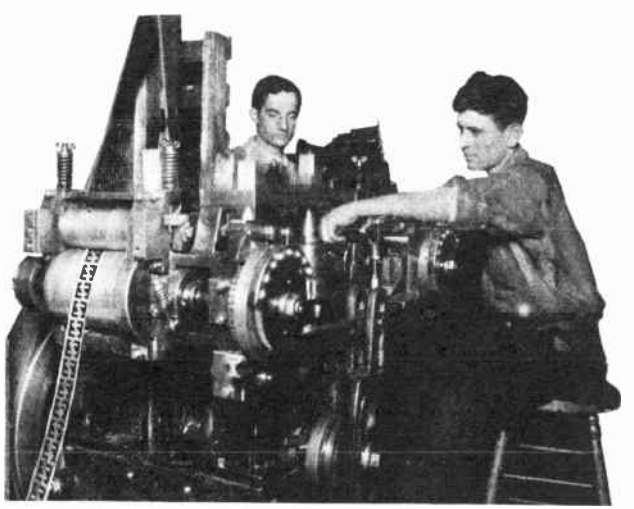


Fig. 1. Automatic punch presses stamp out audio frequency transformer core laminations at an amazing speed, and are operated day and night.

is carefully inspected for flaws and rough edges.

In the Pilot factory the bakelite molding presses, even as the automatic screw machines and punch presses, are on a day and night production schedule, and thousands of cases are turned out each day.

I knew Bill's liking for details, and the enormous amount of hard work spent in working out the production engineering problems allowing the use of such high-speed automatic tools, punches and presses as were being used. Every part of each operation fascinated me not only because of results accomplished, but because of the speed and precision with which thousands and thousands of parts are produced each day, all under accurate production control and test inspection, and the way he weathered the storm of my million-and-one questions is a real tribute to Bill.

I could see Bill's face beam and break into smiles as he told me one clever thing after another, and how one difficult problem had been solved, with every man ready to tackle a harder one, but I relatively knew that he was holding out on me, and that he was going to show me the most impressive and most important part of his work as a climax.

Fig. 2. Moulding bakelite audio frequency transformer cases.

TRANSFORMER COIL WINDING

Up on the sixth floor we found one of the largest coil winding departments that I have ever seen.

Most radio manufacturers are content to purchase their audio frequency transformer coils as well as other types of coils used, from outside sources, but the Pilot policy is to manufacture every bit of its product within its own factory and within the scope of its own production and test control. Thousands of dollars have been spent in designing special coil winding equipment and adapting machinery and men to the specific requirements of Pilot production methods.

A long row of coil winding machines are kept busy nearly every day in the year, and each machine automatically winds fourteen delicate transformer coils at one time, so that one can easily realize that the total number of coils produced daily, runs into large numbers. To realize the number of thousands of miles of enameled copper wire used each day is astounding.

Coil winding, using small sized wires, such as are required in audio frequency transformers, necessitates extremely close control of the winding machines, careful and accurate adjustments to each moving part and strict attention of each operator during the winding process.

The number of turns of each winding is of extreme importance and all of the automatic coil winding machines have been designed and developed to absolutely eliminate human errors during operation. A green light flashes on when the operator nears the required number of turns (indicated by revolution counters) and a red light flashes on instantly when the exact required number of turns has been wound on the insulating cores. Extreme care is taken in winding the coils to mechanically secure the leads both at the beginning and at the end of the windings.

After each unit of fourteen coils are completely wound the entire unit is cut up into individual coils, by a special machine using high-speed steel cutting disks.

VACUUM DRYING AND IMPREGNATION

Fig. 3. Automatic coil winding machines turn out thousands of transformer coils each day.

Here begins another series of important operations, that is the electrical testing of the coils. As each coil comes from the cutting machine it goes to the test and inspection bench and is tested for continuity of winding. After the coil receives its first test and is found perfect, then it goes to vacuum drying ovens and is given a heat treatment that absolutely eliminates all possibility of moisture remaining either in the windings or in any of the paper or cardboard used for insulation.

The next operation is impregnation. All coils are immersed in special impregnating solutions that thoroughly insulate and hermetically seal the coil against moisture absorption.

EACH TRANSFORMER COIL MUST PASS TWENTY-FIVE EXACTING TESTS

Now comes a series of electrical tests, and as Bill and I reached the special test bench, he introduced me to Mr. John Geloso, chief engineer of the Pilot company.

Mr. Geloso took particular pleasure in pointing out to me the very ingenious testing equipment which he has designed for audio frequency transformers, and in pointing out to me not only the policy of careful inspection and tests given each product manufactured in the Pilot factory, but also he gave me the engineering design reasons for many details of the construction of audio transformers. In addition he proved his conclusions with practical reasons for his engineering specifications based on the circuit requirements of present-day radio receivers.

As the tray of coils that we had been following through the factory reached the test bench, Mr. Geloso, personally, put them through their paces, and explained each operation and what it meant. In these tests each coil receives six individual tests which I am listing one by one, because it is on the success of these tests and on the repeat check of all of these tests that the efficiency and reliability of each transformer depends.

First, however, let me give you just a bit of an idea as to the type of equipment used in these tests. We see before us a direct current voltmeter, some seven or eight inches in diameter, with a large open scale reading. At the left of the voltmeter is a thousand cycle electrically maintained tuning fork oscillator.

Mr. Geloso explained that the current from the oscillator is coupled to the primary and secondary windings of the transformer coil under test and to a sensitive vacuum tube voltmeter, readings being taken on the large instrument before us. In addition the entire set-up incorporates a sensitive direct current megohm meter. It was explained that each coil is tested on a dummy core, such that the test conditions will be the same as those under actual use.

(1) Placing the dummy core and coil in position, Mr. Geloso quickly placed the leads from the coil into clip terminals and closed the switches of the test instrument. An immediate reading gave proof of the continuity of the circuit of both primary and secondary coil windings, which constitutes number one of the six tests.

(2) By pressing a button, the instrument circuit was arranged for the megohm test and proof of total absence of leakage between the individual turns of the primary coil individually and the secondary coil individually was obviously indicated by the fact that no decreased reading was indicated on the instrument due to leakage of the coils under test. Additional proof, however, that a leaky coil (such as might be caused by one turn of a coil winding laying on top of another turn with thin enameled insulation between or by any discrepancies in the process of manufacture up to this point, such as moisture still being present in the coil because of deficiencies in vacuum tank drying or impregnation) would be clearly indicated, was demonstrated by Mr. Geloso, for placing his fingers across the primary terminals to which the primary coil was attached, the voltmeter showed a decreased reading, indicating a leakage current. Shifting to the secondary coil terminals, the same condition obtained.

(3) This test is the same as test No. 2 above for primary coil and secondary coil windings individually, except that this test

checks for leakage between the primary and secondary windings themselves.

(4) The reversal of leads such as might occur by the coil leads being twisted previous to their being soldered to the terminals on the transformer case is also immediately indicated by a decreased reading on the voltmeter, such coils of course being immediately rejected.

(5) Mr. Geloso was particularly pleased to put his test instrument through its most difficult paces for us and showed us that by winding a couple of turns of wire around the outside of the coil and leaving them open, that nothing happens to the voltmeter indications, but as quickly as they are shorted, an immediate indication was shown by the voltmeter, and he explained to me that in this way he was able to check extremely accurately the possibility of short circuited turns in each winding. It can be recognized that this is an extremely sensitive test for in the majority of instances if a transformer coil winding should be shorted between turns, usually a whole layer of winding is shorted rather than one or two turns, and the voltmeter drops back nearly to zero. Three turns indication in some eight or ten thousand gives one an idea of the sensitivity of this test.

(6) The last and final test is that of gain ratio or the step-up in voltage due to the primary and secondary transformer coil windings with a given signal input. As is usual in production tests, this is not a measured check, for each transformer is given a high figure of merit and this reading is taken as a standard. No coil or transformer which shows an indication of voltage gain lower than the standard is accepted.

Personally, I could appreciate the feelings of Mr. Geloso as he so courteously explained all of these things to us and I likewise appreciated his pride in the success of a good job well done, for part of my own worries during the war was the testing of some eight or nine hundred special radio compass receivers. I knew of the enormous speed with which these instruments had to be designed, manufactured, and tested, at that time, and also the extreme importance of rigid test specifications and of never letting one receiver get my O. K. on its test card unless it was right, for life and death depended on the reliability of each receiver. I could not help but be pleased with the thought that here was an engineer in peace time holding the test specifications of the parts manufactured under his supervision to as rigid or even a more rigid standard.

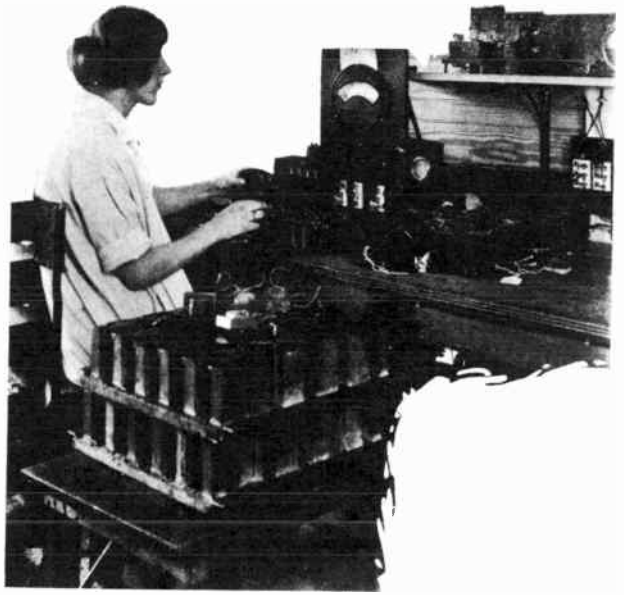


Fig. 4. Every Pilot audio frequency transformer must pass twenty-five exacting tests before it leaves the factory. It must be right.

CORE ASSEMBLY

Meanwhile the bakelite cases and laminations which we had seen manufactured earlier in the morning had not been standing idle, but had been transferred by conveyor from the fifth floor to the sixth floor of the Pilot factory.

Going over to the lamination assembly department, Bill pointed out to me immediately an extremely clever stunt and a very practical and common sense one. In the old days I remember how audio frequency transformer cores were assembled, counting the laminations or guessing at it as closely as possible and letting the impossibility of putting any more laminations in the core justify the end of the operation. In the Pilot factory the number of laminations used in each core is uniform, never varying a single lamination each way. This is accomplished by weighing the laminations for each assembly. Obviously the quantity as well as the quality of the iron that goes into audio frequency transformers is important and here we see an instance of uniformity of the assembled transformer and careful workmanship. As quickly as the laminations are assembled into the transformer core, the assembly is routed back to the electrical test bench and again the six rigid electrical tests, that I have previously told you about, is given each assembled coil and core. This time, of course, the tests are made with the actual core in place rather than by use of the dummy core.

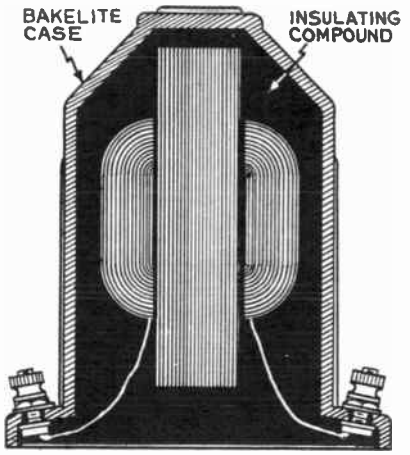


Fig. 5. Line drawing of Pilot moisture proof transformer showing that the entire core and coil assembly is hermetically sealed in the bakelite case.

THE CORE AND COIL ARE ASSEMBLED IN THE BAKELITE CASES

After the second series of six individual tests is given the assembled coil and core, it is taken over to the bakelite case department, inserted in the case, the leads properly checked and soldered to their correct terminals.

Again the transformer goes back to the test bench and receives for a third time the same six tests to insure that the operator has not reversed the leads when making connections, and to make absolutely certain that the assembly is near perfect.

MOISTURE PROOF TRANSFORMERS

As Bill and I were discussing the thoroughness of the tests given each transformer during the assembly and as I was telling him how much better transformers were being made today than six or seven years ago, he gave me a rather significant look and said, "Remembering all of our old past experiences and troubles and even though you tell me that what you have seen so far proves to you the quality of our present-day transformers, now I am going to show you the real reason why we feel that the Pilot transformer, over and beyond its electrical characteristics, is a mighty good one."

Following a tray of assembled transformers that had passed their last series of electrical tests, we found ourselves in a second impregnation department. You remember that I have told you how each individual coil is given a long-time impregnation in special impregnating tanks. In this department we found that the coil and core of the transformer is impregnated with a second special insulating compound by pouring each case full and hermetically sealing the entire assembly within the bakelite case. Tanks of insulating compound are kept at constant temperature by continual check with thermometers.

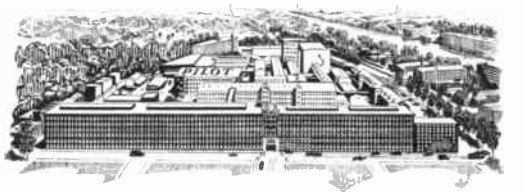
Bill explained that in reality the process consists of two pourings, the first pouring being at a lower temperature so as to under no circumstances injure the coil winding. Then when this first pouring has cooled slightly a second pouring is made which entirely seals up the transformer. This second solution is at a higher temperature than the first and cools with a glossy finish, giving the transformer a beautiful finished ap-appearance.

AGAIN EVERY FINISHED TRANSFORMER GETS ITS FINAL ELECTRICAL TEST

After the transformer had been finally finished, and the impregnating compound has hardened into a solid block it goes back again, and receives its last series of six electrical tests, making twenty-five separate tests on each instrument.

Fig. 5 illustrates a cross sectional view of the finished Pilot moisture-proof transformer. The solid black of the drawing illustrates the fact that the insulating compound completely covers and seals in both the coil and core of the transformer.

The Factory that Produces Pilot Radio



This group of buildings comprises the new Pilot plant. The main building is equivalent in length to about five ordinary city blocks.

TWENTY-three years of electrical and radio manufacturing experience has brought the organization which is at present known as the Pilot Radio & Tube Corporation to unquestionable leadership among all radio factories of the world. Since 1908 Pilot has grown from a tiny shop, a one-man outfit, into a great industrial organization specializing in radio receivers and parts and doing business all over the world. The two whirring bench drills that comprised the most important equipment in the original shop in 1908 have become roaring batteries of automatic machines, ranking with silently powerful rows of hydraulic Bakelite presses. The tiny shop of 1908 has given place to increasingly larger quarters, the present headquarters being a tremendous plant in Lawrence, Mass., having a floor space of a million and a half square feet.

HOW FILTER CONDENSERS ARE MADE

No. 2 of a series of trips through the largest radio parts plant in the world

By ROBERT HERTZBERG

Above: A group of Pilot filter condensers, showing the wound units before being sealed, and the completed condensers themselves.

WHEN you go into a radio store and ask for a filter condenser you receive a little metal can with a pair of binding posts stuck in the top. You look at it and say, "Gosh! that's a simple thing. I bet the manufacturer makes a lot of money on it."

The filter condenser *does* look rather simple, but in this case, as frequently happens, appearances are misleading. All you see on the outside is a metal can, a label and some connection terminals; what you cannot see, inside, is a roll of paper and metal foil that represents numerous operations performed by expensive and complicated machines, and the skill and efforts of highly-trained engineers and mechanics.

So that you may be able to fully appreciate the filter condenser, which performs an important function in radio circuits, let us make a trip through the condenser department of the Pilot Electric Manufacturing Company, of Brooklyn, the largest parts firm in the world, and learn just how a filter condenser comes into being. The visit will be interesting as well as instructive, and after it's over you will be able to talk intelligently about condensers and what goes into them.

Perhaps you have obtained the idea, possibly from some old textbook, that all condensers consist of layers or stacks of tinfoil separated by sheets of paper or mica. When you enter a large sunlit room on the sixth floor of the Pilot factory you will be surprised to learn that filter condensers are not stacked, but are wound just as coils are. In this room, which is thoroughly ventilated to make it dust-proof, are half a dozen condenser winding machines like the one shown in Figure 1. You will ask immediately,

"Why must the room be dust-proof?"

NO DUST ALLOWED!

The answer is that if dust gathers on the surface of a condenser while it is being wound it will tend to break down later when it is subjected to high voltages. Many mysterious failures of condensers that seemed to be absolutely perfect were finally traced to dust, so now the Pilot condenser room is kept as scrupulously clean as a hospital operating room.

Each winding machine consists of an upright case on the inside of which are mounted a number of spindles, which in turn support large rolls of paper and of aluminum foil. After a machine has been "loaded," and the ends of the various rolls brought out through slits in the front of the case, it is closed tightly. The side of the case is of glass, so that the operator can observe the rolls constantly. To start a condenser, the girl first pulls out the ends of the papers and secures them around a polished spindle. She presses her foot against a lever, and a motor causes the spindle to wind on a few turns of paper. Then the girl carefully pulls out the ends of the aluminum foil, centers them accurately on the papers, and again starts the motor. A counter on the spindle shaft tells her when the correct number of turns for any particular size of condenser have been wound on. She stops the machine five turns before the actual required number, and places small strips of tinned copper against the foil. These are the connection lugs, which are held securely in place by the tightness of the winding.

The girl then runs off the final five turns, and clips the ends of the aluminum coil. She lets the paper run a few more turns before cutting it. After cutting, she pastes down the end of the outermost paper and pulls the completed condenser off the spindle. She simply squeezes it flat and places it in a tray.

The paper used in Pilot condensers is .0004 inch thick, and is of the highest grade available. It is exceptionally free from carbon and dust, a fact that accounts for the

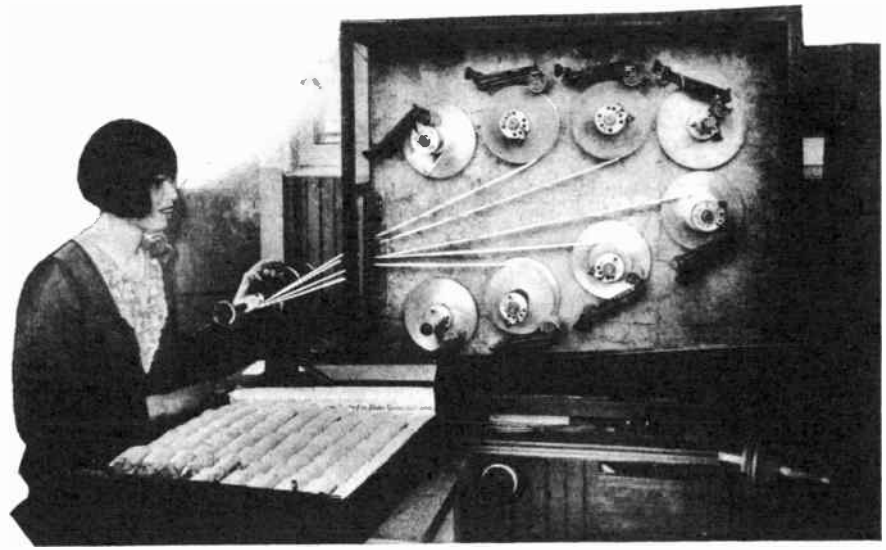


Figure 1: Side view of a condenser winding machine. Notice how the sheets of paper and metal foil feed through the end of the case onto the winding spindle.

strength and long life of the devices. The aluminum foil is .00025 inch thick. Both paper and foil are supplied in rolls of various widths, for the various sizes of condensers.

The foil in all cases is 3/8 inch narrower than the paper, so that there is a 3/16 inch overlap of paper on each side of the foil. This is more than enough to prevent arcovers.

The setting of the foil inside the papers is a very delicate operation, and is done by highly skilled girls. If either foil or paper is offset the merest fraction of an inch on the winding spindle, the condenser will wind unevenly and after a few turns the foil and paper will wrinkle.

After the winding operation, the rest of the condenser assembly process is one unending fight against moisture. Moisture is the deadly enemy of condensers, just as it is of transformers, and the same precautions that make the famous Pilot moisture-proof transformers so reliable are exercised in the construction of the Pilot filter condensers.

HEATED IN OVEN

The condensers, after being wound, are loaded in a huge three-ton oven, which holds 1,600 of them at a time. The door of the oven is left open one inch, and the condensers are steam heated for two hours. The door is then shut tight, and all the moisture that has been driven out of the condensers by the heat is drawn out of the oven by a big vacuum pump (Figure 4). The vacuum is left on for an hour and a half, and thoroughly removes every last remaining trace of vapor.

The drying oven, as shown in Figure 2, is as high as a man and is fitted with shelves on which the condensers are placed in long racks.

After the door of the oven has been opened, the condensers are shifted quickly to the impregnating tank, which is six feet high and four feet in diameter. This tank is a combination vacuum and pressure tank, and is surrounded by a steam jacket by means of which its contents can be heated. It is protected on the outside by a covering of asbestos. (See Figure 3.)

The racks holding the condensers are suspended inside this tank, and the heavy cover lowered down and clamped air-tight. The vacuum pump is turned on for fifteen minutes, to draw out any slight moisture that the condensers might have absorbed from the air during the brief handling period.

After this initial measure, the vacuum pump is shut off, and molten halowax is drawn from a reserve tank into the impregnating tank. The condensers are left to soak in the wax for one hour and twenty minutes. Then the valve leading from the reserve tank to the impregnating tank is shut off, and air pressure of 60 pounds is applied to the latter tank for ten minutes. This pressure forces the wax into any tiny crevices in the condensers that may have escaped the previous soaking. Finally, the valve leading to the halowax tank is again opened, and the air pressure forces the remaining wax of the impregnating tank back into it, leaving the latter tank empty for the next batch of condensers.

Each stack of condensers, after it leaves the impregnating tank, is placed in a large arbor press, and a certain predetermined

pressure is exerted on them. This is done to make the condensers assume their rated capacity. The capacity of any condenser consisting of a large number of plates or of many rolls of paper and foil is dependent to a considerable extent on the pressure applied to it. The tighter the assembly, the higher the capacity, usually; and vice versa.

After being squeezed down properly, the condensers are swung from the press by chains and left hanging over night in a cooling tank. This is simply a large open tank from which moisture and other vapors are drawn away by a powerful exhaust fan.

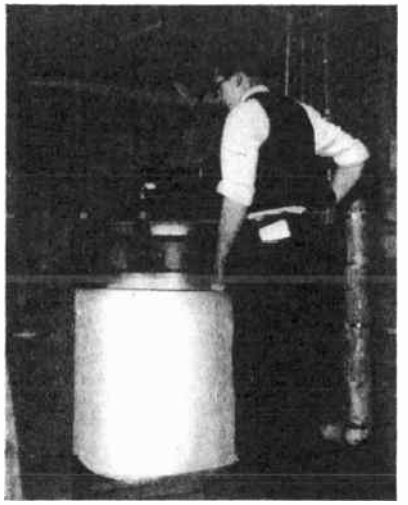


Figure 3: The impregnating tank, in which the dried condensers are impregnated with wax.

If we were to come back the next day, we would see the now thoroughly dried condensers ready for their initial tests. They feel as hard as rocks, and can be subjected to the most punishing treatment without suffering more than dented edges.

The matter of testing is an extremely important one, and some complicated and expensive apparatus has been installed for the purpose in the Pilot plant. Two big motor-generators, connected in series, supply 5,000 volts of direct current, lower values being obtained through resistances mounted behind the control panels shown in Figure 5. These generators are enclosed in double locked wire cages, which cannot be entered unless the current is turned off first.

The smallest Pilot condenser, the No. 801, which has a capacity of 1 microfarad and an operating voltage rating of 180, is tested for one second at 800 volts. If it is defective in any way it will immediately break down under this high voltage, and a red lamp will light. The No. 9302 condenser, of 2 mf. capacity and 300-volt working voltage, is subjected to 1,200 volts. Other sizes are tested with proportionately high voltages, up to 5,000 volts.

It takes a pretty good condenser to stand up under these flash voltages. Those that pass the test very rarely develop trouble later when they are operated on their normal voltages; in fact, the percentage of returns is so small that the condensers might be said to be perfect. Of course, many condensers break down during the initial test, because of some microscopic weakness in the paper; tiny flaws of the trouble-making kind cannot always be detected in the paper before the winding process, and if they are discovered in the flash test, the condensers are thrown away.

The rest of the assembly process is simple. The lugs of the tested condensers are riveted to a moisture-proof fiber strip, on which are two screw binding posts. The whole unit is placed in a steel can, which has been lined with impregnated paper to guard against "grounds" to the metal. The cans, 100 at a time, are filled with paraffin to the level of the fiber strips, and after the paraffin has cooled, they are topped off with a layer of black pitch.

Not yet fully satisfied, the Pilot engineers route the completed condensers back to the testing benches, where they are again flash-tested at the same voltages as before. After this final inspection they are labelled and packed, and shipped to every corner of the earth where radio is known and used.

After you leave the factory you will draw a breath of fresh air (that odor of wax *is* irritating) and you will now say, "Gosh, a filter condenser isn't as simple as it looks, after all. It's a real job to make one."

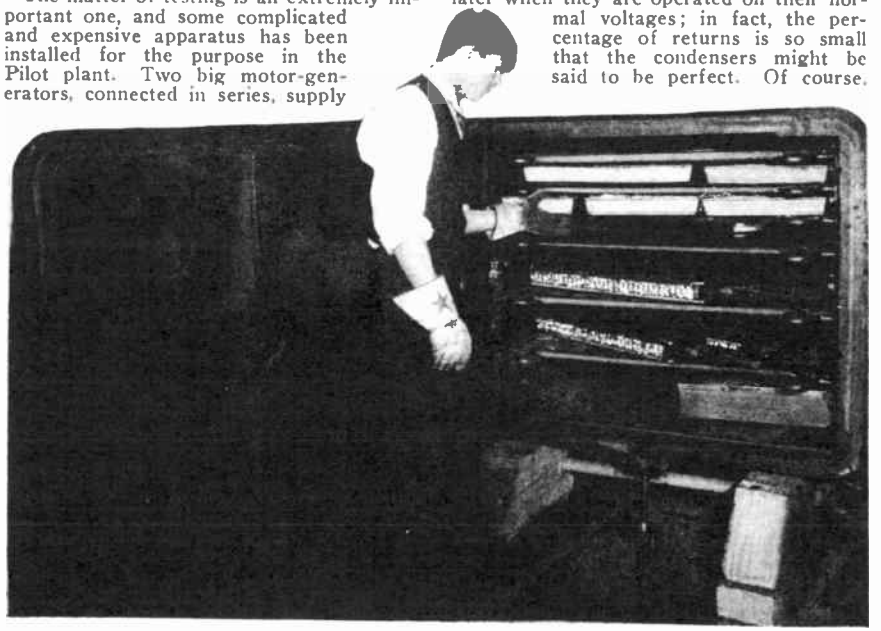


Figure 2: The three-ton oven in which the condensers are thoroughly dried before they are impregnated with wax.

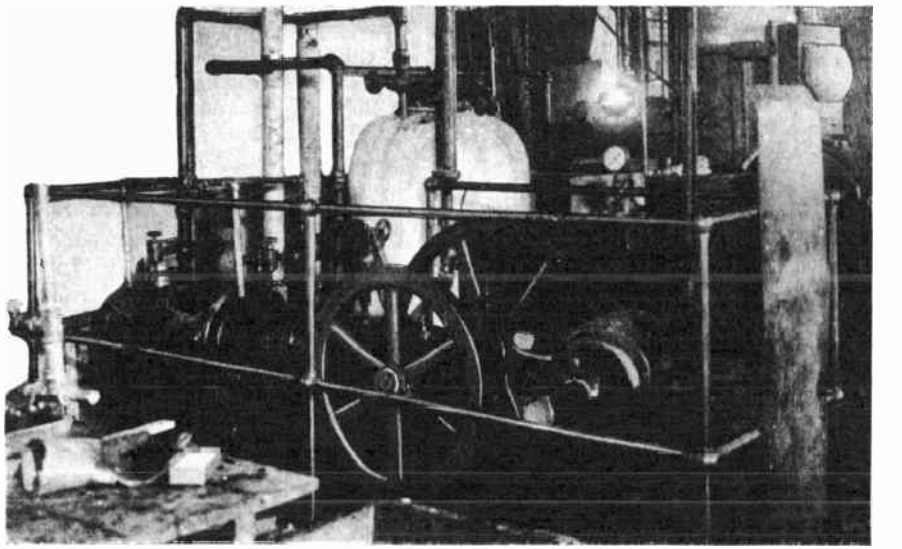


Figure 4: The machinery that creates the vacuum for the drying oven and the impregnating tank.

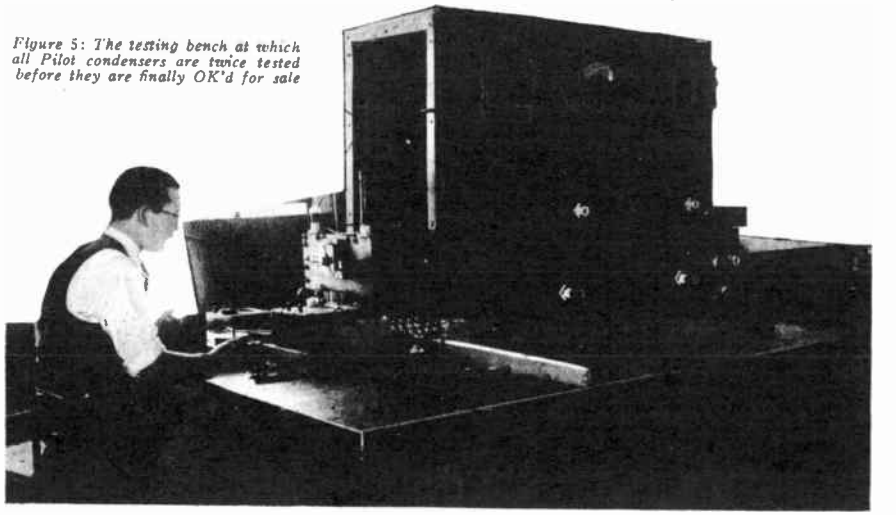
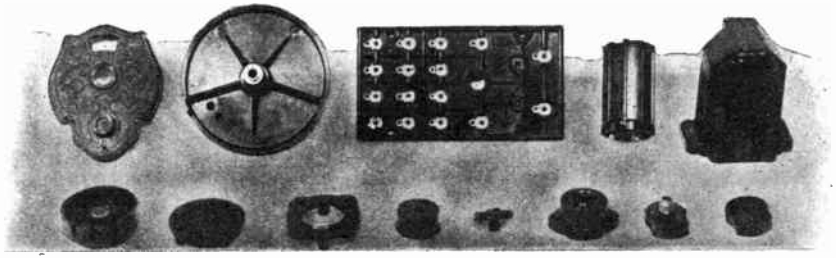


Figure 5: The testing bench at which all Pilot condensers are twice tested before they are finally OK'd for sale

How Bakelite Radio Parts are Molded

No. 3 of a series of trips through the Largest Radio Parts Plant in the World

by ALFRED A. GHIRARDI



A group of Pilot parts molded of solid Bakelite. Top row (left to right): art dial, drum dial, terminal plate, coil form, transformer case. Bottom row: Volumyrad form, socket parts, and snap switch.

TO the average American, the sight of Bakelite in one form or another is a common, everyday experience. It is used for shaving brush handles, coffee percolator tops, pipe stems, fountain pens, telephone receiver and transmitter cases, in radio receivers and for thousands of other purposes. The processes by which this versatile material is made into useful articles are not complicated, but nevertheless very few people are familiar with them. It is the purpose of this article to explain in simple language how the hundreds of different Bakelite molded parts used in Pilot radio apparatus are made in the world's largest radio parts plant. Every Bakelite molded part is made right in the plant, in keeping with the Pilot policy of producing every part under one roof under the constant supervision of trained engineers.

For those readers interested in the "how" and "why" of things we will first explain just what Bakelite is and the reasons for the various manufacturing processes.

WHAT BAKELITE IS

Bakelite, an American product, was invented by Dr. L. H. Baekland in 1907 after exhaustive research. The principal ingredients used in its manufacture are phenol (commonly called carbolic acid) and formaldehyde. Phenol is obtained from coal tar and formaldehyde is made from wood alcohol. Under certain well defined conditions these two odoriferous materials combine chemically to form a solid, resin-like substance differing in every way from the ill-smelling liquids from which it is made, a substance that is odorless and tasteless, and possessing altogether different chemical and physical characteristics. This resinoid is the starting point for all Bakelite products.

Molding material is prepared by mixing the original Bakelite resin with various filling ingredients, such as wood flour, asbestos, etc. Suitable coloring pigments are employed to produce various color effects. Thus in the Pilot factory black Bakelite is used for sockets, coil forms, dial drums, etc.; mahogany or walnut for dials and knobs; and yellow, red, green, orange and blue Bakelite for the handles on short-wave coils.

The filling ingredients are mixed with the Bakelite resin and ground together for hours. The resulting powder is then run between hot rolls, causing the wood-flour to be thoroughly impregnated by the molten resinoid. Sheets of material resulting from this operation are ground to a powder which is then sifted and thoroughly mixed to insure uniformity. This powder constitutes the molding material ready for the market, and it is in this form that the Pilot company receives the raw Bakelite in steel drums from the Bakelite Corporation.

MAKING THE PRE-MOLDS

The first step in the Bakelite molding department of the Pilot plant is shown in the photograph, Fig. 1. Rather than use the old-fashioned method of pouring the powder into each mold separately, practically all parts are made from preformed "pills", "biscuits" or "pre-molds" of compressed Bakelite powder of the exact weight required for the object to be molded. These are made by the pre-mold machines pictured in Fig. 1. They consist of a metal hopper containing the Bakelite powder and a mold of the size and shape best suited for the particular object. The machine is motor driven and automatic in its operation. Several machines require only one operator to fill the powder hoppers and remove the pre-molds when the receptacles are full. The correct quantity of powder is put into the mold and then it is compressed to a self supporting "biscuit" or pre-mold. By using these pre-molds the Pilot company has eliminated waste due to defective parts caused by either too much or too little Bakelite powder. Each pre-mold contains the exact amount of powder required for the object.

Fig. 1: Pre-mold machines which prepare the Bakelite for the molding presses.

The next stop is the actual molding. The pre-molds of compressed powder are put into the lower half of a heated mold. The molds are made of hardened steel and are mounted in powerful presses. Provision is made for heating the molds to the exact temperature of 350 degrees Fahrenheit, required for the chemical change which the Bakelite undergoes.

The press forces the two halves of the mold together and as the temperature rises the resinoid binder first melts, while the steadily increasing pressure forces the plastic mass into every crevice of the mold cavity. Only a few minutes are required at a pressure of 2,000 pounds per square inch to cause the resinoid to be transformed into its permanent, strong, infusible, insoluble state.

The pre-mold has been transformed into a solid mass as a result of the chemical reaction produced by the combined heat and pressure. We thus have the peculiar phenomenon of a material solidifying or "freezing" by as much heat that initially softened it.

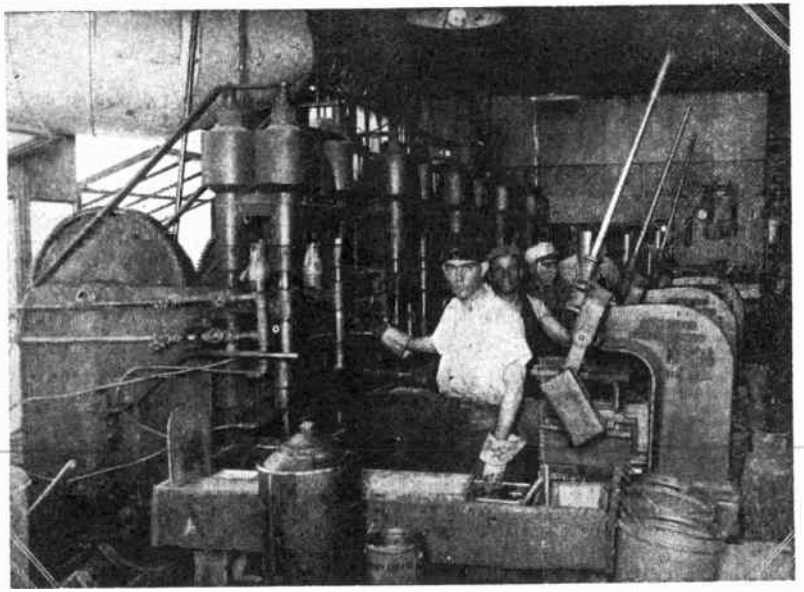


Fig. 2: A battery of five Terkelson mechanical Bakelite molding presses.

Look at a Pilot knob or dial. That metal bushing in it was molded into the Bakelite in one operation!

The photograph of Pilot Bakelite parts at the head of this article illustrates the use of metal inserts. The flat piece of Bakelite in the upper center of the picture is a terminal plate for the new K-111 and K-112 power packs. The sixteen drilled and plated brass metal connection tabs are molded into the Bakelite plate at the time it is made. Notice the cross-ribbing scientifically placed for strengthening the plate. You would have to break the plate to get one of those inserts out. Moreover, the heat from the soldering iron used to solder the wires to the connection tabs later will not soften the Bakelite or loosen the tabs.

MOLDING PRESSES

The twenty-two molding presses used in the Pilot plant are of two types, mechanical and hydraulic. The layout employed in the press room is a result of a long study by the Pilot engineers. The relative arrangement of the presses, the mold loading tables, the die strippers, the inspection tables, all have been carefully planned so that there is practically no waste of time or no unnecessary handling operations between the time the pre-molds are made and the finished molded product is loaded on to the belt conveyors for distribution to the various assembly departments.

MECHANICAL PRESSES

Fig. 2 shows a battery of five Terkelson mechanical presses. Continuous or follow-up pressure is obtained in this type of press by the use of four powerful springs enclosed in the cylinders at the top of the machine. By applying the pressure through the springs, the line pressure is maintained during the curing process. To operate the press, the operator loads the mold and places it between the two platens of the press. Then he grasps the curved safety release lever on the right and the straight starting lever on the left. This throws in the electric motor on the base, normally running without load, and the horizontal arm on a toggle moves the upper die block downward, first quickly and then slowly for the last 3/8 inch.

An automatic regulator throws out the clutch when the correct pressure is obtained, allowing the motor to run free again. The operator can read the pressure by a dial mounted in front of the machine. The springs then maintain the correct pressure, which can be set for one to about fifty tons. Heat for the chemical reaction is applied to the mold by steam. To release the press, the safety lever is again thrown out, and the starting lever opened. The mold is then lifted out and the work extracted.

To increase production, two molds are made for each machine. While one mold is in the machine, the operator strips the work from the other and loads it with the raw pre-molds. In this way the presses are kept working practically continuously. The arbor presses shown at the right of Fig. 2 are used for separating the molds and pressing the finished pieces from them.

HYDRAULIC PRESSES

Figs. 3 and 4 show some of the Dunning and Boschert hydraulic presses used. These consist essentially of two pressure surfaces which are brought together and held in that position by means of a ram acting in a steel cylinder. Water forced into the cylinder under the ram by means of a small hydraulic pump builds up the necessary pressure to force these platens together. When this pressure is released, the water flows back to the pump reservoir and is used over and over again. The plates are heated to the required temperature by steam.

The press shown in Fig. 4 is capable of exerting a total pressure of 112 tons. After the pressure has been applied and the Bakelite formed, it may require as much as five tons of pressure to separate the two halves of the mold. The molds can be opened on the smaller press by merely opening a valve to release the pressure acting on the ram. Then the weight of the ram, the table and lower half of the mold are sufficient to cause the mold to open. On the layer presses a special valve is opened to create a hydraulic pressure to move the lower table of the press down and open the mold. In these presses as the entire molds are large and too heavy for convenient handling, the two halves of the mold are made so that the upper part is smaller than the lower and can be slid in and out from the upper platen of the press for removing the Bakelite pieces. The lower half of the mold is loaded with the pre-molds. Fig. 4 shows a hydraulic press with a mold for forming four Pilot drum dial wheels in one operation. Fig. 3 shows a mechanic stripping the Bakelite audio transformer cases from a four gang mold.

In all of the presses used in the Pilot plant, the molds are heated indirectly by steam which is generated in gas fired boilers. After the steam has given up most of its heat to the mold it is returned back to the boiler. Thus the heat which it still contains is made use of and not wasted.

PRODUCTION SCHEDULE

In the Pilot factory the Bakelite molding presses are on a mass production schedule, and are in operation twenty-four hours a day for a large part of the season. As many as 34,000 pieces have been turned out in a single day, every one under the control and rigid inspection of the Pilot engineering staff.

The molded parts as they come from the molding machines are examined by inspectors and defective parts are immediately destroyed. Some parts require slight finishing, but most of them are ready for assembly when they come from the presses. The parts leave the hardened and polished molds exact and accurate in their dimensions and faithfully mirror the lustre of the mold surface. Even the minute markings and graduation on dials are produced in the molding operation as accurately as though machined.

MULTIPLE CAVITY MOLDS

In line with the idea of quantity production of high grade parts at low cost which prevails throughout every department of the Pilot plant, Bakelite parts are not molded one at a time. Practically all the molds are made with multiple cavities, so that many parts are molded during each operation of the press. The number of parts made at a time depends upon the size of the part being made. For instance, the binding post dies mold 55 binding posts at one time. Cases for the No. 390 series of audio transformers are made four at a time in the four gang mold illustrated in Fig. 3. Drum dials are also molded four at a time in the mold shown in Fig. 4. Thus the output of each molding cycle is increased without increasing the cost of operation of the molding machines.

METAL INSERTS

One great advantage resulting from the use of molded Bakelite parts is the fact that metal parts may be embedded in the product at the time of molding, thus saving much labor and expense over the method of doing this work by hand after the molding operation has been completed.

Fig. 3: Removing four Bakelite transformer cases from the die.

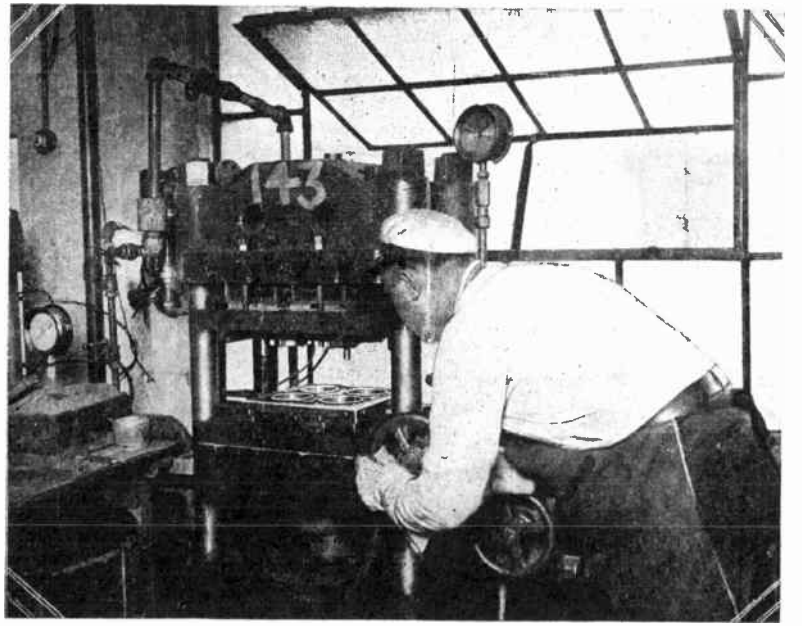


Fig. 4: A hydraulic molding press capable of exerting a pressure of 120 tons.

Console Model
of the Priess Straight Eight
A handsome two-tone, inlaid, Walnut Console Cabinet with built in loud speaker, enclosed loop rotated by a knob on the panel and ample size compartment for all batteries.
List Price, including loop and Loud Speaker, but without other accessories . . $285

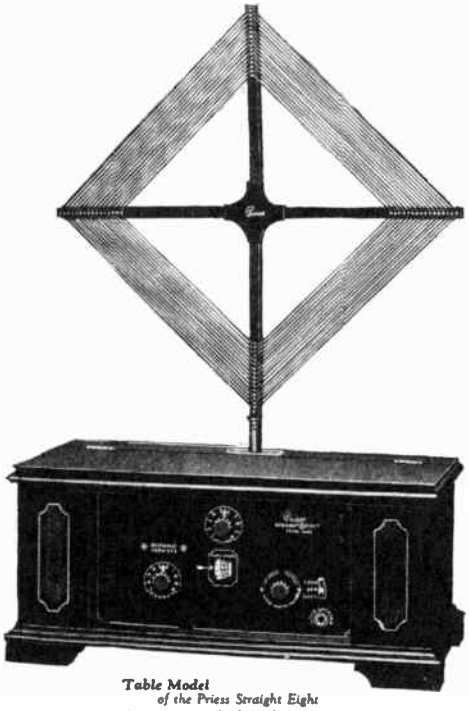


Table Model
of the Priess Straight Eight
A two-tone inlaid, Mahogany Cabinet with battery compartments on each side. Equipped with patented collapsible all bakelite, low loss loop.
List price, complete with loop, but without accessories $175

It's loop operated!

the NEW—

Priess

TRADE MARK

STRAIGHT 8 EIGHT

—an eight tube, loop operated receiver having unexcelled distance getting ability

THE Priess Straight Eight was built and designed primarily for great distance reception.

A new patented principle in radio design is used that gives the Priess Straight Eight a greater energy amplification before the detector than any other set.

Here are the distinctive Priess features that offer Priess dealers no class competition:—

- *—Loop operated,*
- *—Eight tubes,*
- *—5 stages of radio frequency, before the detector,*
- *—Single tuning control with visable wave length indicator graduated in one meter divisions,*
- *—Tunes in a station only on one point—no harmonics,*
- *—No locally manufactured static from oscillating tubes,*
- *—Sensitivity control,*
- *—Volume control,*
- *—One control for filament and cutting in or out audio stages,*
- *—Enclosed loop in console models operates by knob on panel.*

The Priess sales policy gives full and complete dealer protection against unfair competition, price cutting, price reduction, and dumping surplus stock on the market which, together with our liberal dealer discount, insures real, legitimate profits.

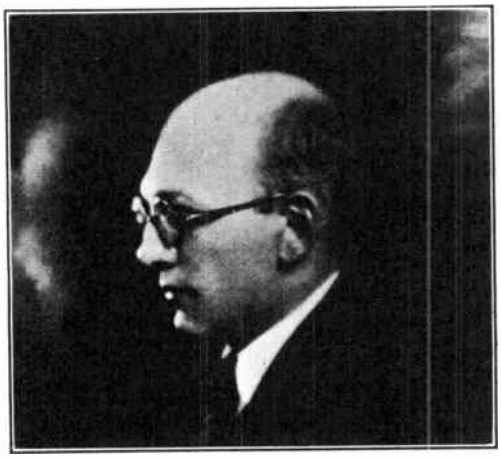
The loop operated Priess Straight Eight permits you to sell the lightning shy prospect; to sell the antenna forbidden apartment dwellers; to sell on demonstration while your competitor is erecting the antenna that consumers consider a nuisance.

Write or wire us immediately for dealer reservation so that we may arrange the earliest possible demonstration of this wonder set by our jobber in your territory. As we are limiting our dealer franchises according to the size of trading areas, we suggest that you act immediately.

PRIESS RADIO CORPORATION
693 BROADWAY NEW YORK, N.Y.

PRIESS

Priess Radio Corporation



Amateur Radio (Jan. 1924), p. 447

WM. H. (Bill) PRIESS
Chief Engineer of De Forest Radio Tel. and Tel. Co., and the man who made "reflex" popular.

If William H. Priess didn't leave much of a mark in radio, it wasn't for lack of trying.

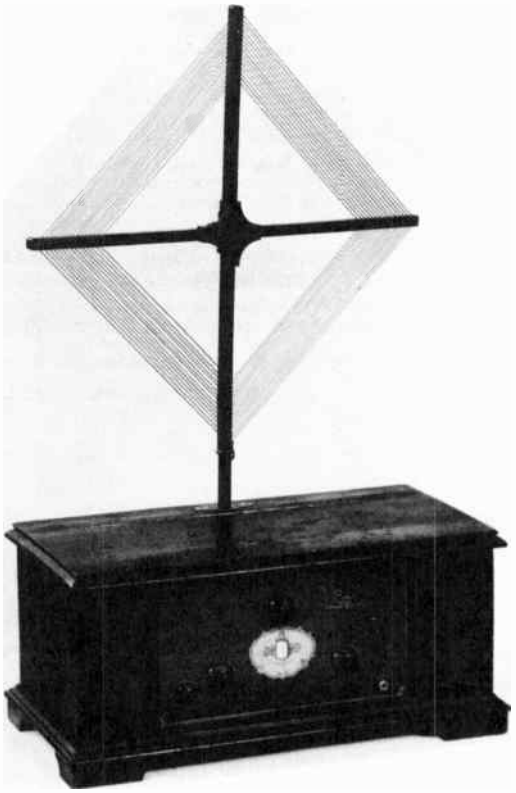
Born in Staten Island and educated at the College of the City of New York, he spent his first summer after graduating in 1910 as a stage electrician, but he soon buckled down to a job as Radio Inspector at the Port of New York. In April, 1917, he joined the Navy and the Radio Test Shop at the Washington Navy Yard where Lt. Eaton's group was responsible for designing all the standard Navy receivers and amplifiers. Priess, along with L.L. Israel and L.C.F. Horle, and Professor Hazeltine as consultant, designed the SE143, SE1420, the SE1000 amplifier, and various direction-finding sets, among many other duties.

In January, 1918, after working unsuccessfully on a submarine detector, Priess joined the Army and went to France. By July, he had developed a portable loop transmitter-receiver for front-line communications. In 1919, he joined Wireless Specialty Apparatus Company where he designed mica transmitting condensers and equipment for building them, obtaining numerous patents in this field.

At about this time, his patent applications dating from his Navy days, particularly those on reflexing (amplifying radio and audio frequencies successively in the same tube), must have been progressing in the Patent Office because he licensed the De Forest Company to use this system in its Model D7, designed in mid-1922. Soon he took over as chief engineer at De Forest, redesigning the D7 into the D10 and collecting a reported $400,000 in royalties (or $3.50 per set, which is more likely) during and even after his tenure *for a patent that was never granted!* In his 1950 autobiography, Lee de Forest (who had nothing to do with the company's management during this period) railed against the "asinine" contract with Priess.

In October, 1924, the Priess Radio Corporation was organized. *Radio Retailer & Jobber* commented, "That there was a very unhappy family under the De Forest factory roof has been no secret for months." The same source states that Priess lost $90,000 in his first season, and $300,000 in all, before going bankrupt on March 22, 1927. The *Jobber* quoted a former official as saying, "Mr. Priess, in his enthusiasm and inventive ardor, looks upon a partial development or possible improvement as a triumph already accomplished, before actual tests and the getting to the bottom of things often prove the contrary." The editor also made the snide comment that "Bill" was "always a costly experimenter in the laboratory."

At the bankruptcy auction, Priess bought his old plant for $12,000, changed the company's name slightly, and continued in business, although not making broadcast sets. In the early 1930's his International Television Radio Corporation experimented with mechanical television systems, but nothing ever came of this work.



Ralph Thorn

Straight 8 (PR4) August 1925 $175
Console (PR6) $285
Described in *NY Sun*, August 29, 1925, pp. 1,8.

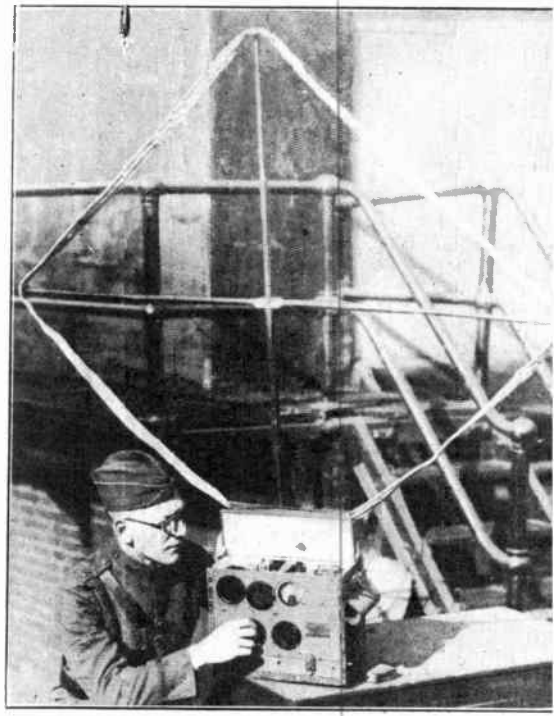
PR3 Jan. 1925 $145 Console PR5 $225

(From *Radio Retailer and Jobber*, June 1925):
"The Preiss Radio Corp. by the way, has announced that it has recalled both of its former types of receivers, to make way for the new set now being introduced. Many of the receivers returned straightway to the home of their production without being called."

Technical articles in *Radio Review*, May 1925, pp. 14, 15, 33; *NY Herald Tribune*, Jan. 25, 1925, P. 3; *Phila. Inquirer*, Jan. 25, 1925, p. 20.

NY Herald Tribune (Feb. 8, 1925), p. 17

Priess designed this mercury-filled variable capacitor in 1922 (patent 1,555,253).

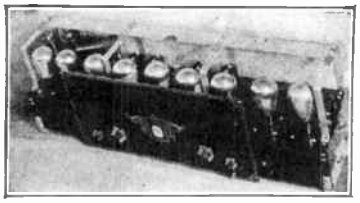


William Priess, with his SCR112. This set, a quenche transmitter and one-tube receiver was made by Emil S Technical articles in *Everyday Engineering*, April 192 68,86; *Radio News*, Dec. 1919, pp. 270-308; Jan. pp. 334,386; Feb. 1920, pp. 406,436; April 1920, p May 1920, p. 610.

A loop operated set that METROPOLITAN DEALERS can sell with assurance of complete customer satisfaction—

the New Priess TRADE MARK STRAIGHT 9 NINE

It's loop operated!



Inside View of Straight "9" Nine.
This illustration of the inside of the Straight "9" Nine chassis clearly shows the tube arrangement and rear shield.

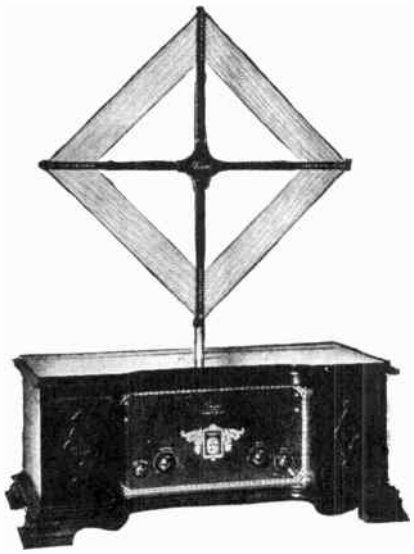


Table Model Priess Straight "9" Nine Set in handsome, figured mahogany cabinet of simple and graceful design. Top mounted collapsible bakelite loop.
List price **$195.00**

Console Model Priess Straight "9" Nine.
A two-tone, figured walnut console cabinet, splendidly proportioned; loop inclosed, front operated; switching mechanism and plug system for A. C. equipment; built-in cone speaker; ample space for batteries; full enclosure of all mechanism when not being operated, giving very charming appearance to cabinet. Complete magnetic shield between A. C. accessories compartment and set. No inter-action between loop and set.
List price, without accessories..... **$335.00**

By comparative tests, the Priess Straight 9 stands in a class by itself. Write for full particulars about the Priess dealer franchise.

—a nine tube loop operated receiver, designed for Metropolitan areas, congested districts and places where interference causes dissatisfaction with the ordinary set.

The new Priess Straight "9" Nine is the crowning achievement of many years' specializing in the design of loop receivers. Made in both table and console models.

The set contains three tuned radio, three untuned radio, detector and two audio in all nine tubes. If desired, power tube can be used in the last audio stage and the new 200-A tube for the detector.

The set has a single dial control, direct reading wave length, illuminated dial and a range from 203 to 555 meters.

Straight-line, wave length condenser with exaggerated spacing on shortest wave lengths.
Great sensitivity and distance on loop alone.
Selectivity of three-tuned circuits.
Shock mounted last radio tube and detector tube.
Shell shielded.
No-play vernier drive on main tuning.
All primary parts of set designed and built at Priess plant.

For 1926-27 we shall also continue making the famous Priess Straight "8" Eight.

The past year has conclusively demonstrated the astonishing success of the Priess Straight "8" Eight—particularly in non-congested territories and in rural districts. Acceding to popular demand, we shall continue to make the Straight "8" Eight for the coming season with improved circuit to adapt system to resist destructive effects of Southern climate. List Price, $175.00

Write or wire us for dealer reservation subject to demonstration. We are limiting our dealer franchises according to size of trading area. A PRIESS dealer franchise gives complete protection against price cutting and dumping. Act NOW to secure your territory.

PRIESS RADIO CORPORATION
697 BROADWAY NEW YORK, N.Y.

Models first advertised July 1926. Described in *NY Herald Tribune*, August 29, 1926, p. 4.

KOLSTER

	gross sales	profits
14 mos. ending Dec. 31, 1927	$11,039,678	$715,864
year ending Dec. 31, 1928	$13,152,336	$161,727
year ending Sept. 30, 1929	$13,937,597	($916,232) loss

MAGNAVOX

	gross sales	net	after taxes etc.	after dividends	surplus
year ending 12/31/23					$933,801
year ending 12/31/24	$1,032,919	$317,337	$224,405	($31,375)	$902,426
year ending 12/31/25			($45,654)	($191,814)	$710,612
6 mos ending 12/31/27	$438,507	$90,568			
3 mos ending 3/31/28			$20,482	no dividends after 2/26	
6 mos ending 12/31/28	$866,084	$627,426			
3 mos ending 3/31/29			$71,273		

MUSIC MASTER

year	gross sales	net profits	
1922	$191,795	—	
1923	$1,487,612	$123,754	
1924	$3,687,947	—	
1924*	$3,065,947	$385,232	*first 11 months loss
1925	$3,617,013	($420,718)	

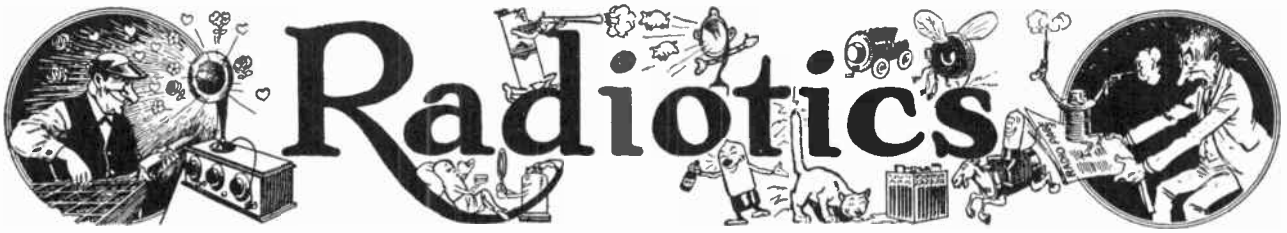
OPERADIO

A credit report issued in Sept. 1924 notes the following, as of March 1924:

CURRENT ASSETS		CURRENT LIABILITIES	
Cash in bank	$26,655.39	Accounts payable	$22,429.81
Accounts receivable	17,462.54		
Notes receivable	7,125.00	Capital stock	20,000.00
Merchandise inventory (cost)	26,543.33	Surplus	40,209.77
FIXED ASSETS			
Furniture and fixtures	1,254.75		
Machinery and equipment	2,549.04		
Delivery equipment	474.53		
Small tools	575.00		
TOTAL	$82,639.58		$82,639.58

PILOT

year	gross sales	net profits
1927	$857,172	$161,039
1928 Jan-June	552,110	
July-Aug	208,000	
Sept-Dec	659.000	
total	1,419,141	322,622
1929 Jan-June	706,399	
July-Aug	446,765	
Sept-Dec	677,362	
total	1,830,526	404,162
1930	1,720,436	62,361
1931	1,251,850	(215,579) loss



TOUGH LUCK, LUTHER!

Popular sporting event reported by the *Cleveland News-Leader* of August 15: "One of the stars of the past week's broadcasts in Cleveland was Luther Jackson, who SANK at WTAM Monday night." Apparently these ether waves are a lot harder to swim against than the English Channel.

Contributed by H. K. Jones.

JUST ONE MORE CONTROL

New adjustments for radio receivers announced by the *Radio World* of Aug. 21 (advertising section): "5-ply Walnut VERNIER Piano Finish Cabinet." No, Oswald, I can't get your bed-time story if you will persist in turning the walnut vernier. It changes the *finish* of the program.

Contributed by Joel H. Dearth

RIDE 'EM, COWBOY!

Program forecast in the *Nampa, Idaho Free Press*, Aug. 13: "Cowboys from Montana, Oklahoma, Texas and New Mexico . . . are here to take part in Chicago's wild west RADIO . . ." We suppose that the stations in the Windy City have a special brand of wild ether waves for the boys from the West to ride over.

Contributed by James L. Young

HOW SCIENCE DO ADVANCE

Another obnoxious by-product converted to something useful, as told in the *New York Sun* of Aug. 21: "The 'B' eliminator illustrated utilizes a TUNE for rectifying purposes . . ." If an eliminator simply must hum, we prefer that it should hum a tune. It would be a cure for that tired feeling when DX just ain't.

Contributed by Chas. G. Coombs

DAT'S WHERE MA MONEY GOES

The Radio Four of WGY recently put on the air an Old Song Program, and in telling about it the *Radio World* of Aug. 21 said that "The QUARTER sang, 'Billy,' 'Just a Baby's Prayer at Twilight.' . . ." Have you heard the expression "Money Talks?" Well, dar she am.

Contributed by Dale Phillips

SOUNDS ALMOST GOOD TO EAT

Advertisement in the classified columns of the *Lincoln, Nebraska State Journal* of Aug. 15: "Five-tuhe Thompson radio-NU-TRODIVE for sale cheap." Whether this thing grows on trees from the front part of its name or whether it dives into the ether waves is something that we would like to find out.

Contributed by A. L. Henrikson

SOUNDS LIKE FLORIDA REAL ESTATE

Indication of the change of the times in the *Boston Post* of Aug. 5: ". . . the directional loop consisting of several turns of wire on a FARM four or five feet square is used." After much research, Mike of our Investigation Department announced that the wire is used for fences around this farm. We were disappointed.

Contributed by Allen E. Dudley

WHAT THE WELL-DRESSED FAN WILL WEAR

Fashion advertisement in the *Boston Globe* for July 27: "437 Women's Summer Dresses, $3.75, each. All of standard manufacture. Panels, switches, sockets, rheostats, coils, condensers, transformers, panel shields, resistances, micadons, etc. The reductions are enormous. Women's Economy Dress Store—2nd floor." What can we add?

Contributed by G. E. Thompson

IF you happen to see any humorous misprints in the press we shall be glad to have you clip them out and send to us. No RADIOTIC will be accepted unless the printed original giving the name of the newspaper or magazine is submitted with date and page on which it appeared. We will pay $1.00 for each RADIOTIC accepted and printed here. A few humorous lines from each correspondent should accompany each RADIOTIC. The most humorous ones will be printed. Address all RADIOTICS to

Editor RADIOTIC DEPARTMENT,
c/o Radio News.

HOORAY FOR SCIENCE

New type of the lowly washing utensil mentioned in the *Evansville*, Ind., *Press* of Aug. 13: "New Vacuum TUB amplifies current two million times." This is another case we put Mike of our Investigation Dept. on, and he says that it is a cross between a wash-tub and a vacuum tube. Look at Fig. 1.

Contributed by Paul Seiler

WHOOPS, DEARIE, WATCH THE MIKE!

Announcement in the *Pittsburgh Press* of Aug. 3, which tells the eager world of New Yorks' well known station "WEAF HOOP-UP 9 P. M. Max Jacobs and his Chamber Symphony orchestra." Evidently Mr. Jacobs' musicians are full of pep, vim and vigor, to be so listed.

Contributed by Clarence Thompson

WAS THE SET OWNER ILLUMINATED TOO?

An illuminating advertisement from the *St. Louis Post-Dispatch* of Aug. 15: "L2M Ultradyne 'B' ILLUMINATOR for sale, complete, $100." We heard the expression many a time and oft that the "Tubes Won't Light," but now we have this wonderful gadget which lights up everything including the B part of the set.

Contributed by E. G. LeMoine

A SECOND PIED PIPER OF HAMELIN

In the *Indianapolis Star* for Aug. 14 we have the following, in the programs of broadcasting for the day: "WQJ, Chicago, (447.5) 9 P. M. Radio RATISTS." Now are they using rats to develop radio? Sorta hard on the girls, don't you think? You know they just can't *stand* rats (aside—except in their hair, remember?)

Contributed by W. I. Mangus

TREAT HIM GENTLY, BROTHERS

Reminiscences of undergraduate days in the Sept., 1926 RADIO NEWS (Rasco advertisement): "INITIATED binding posts . . ." Do you more or less Solemnly swear to keep the secrets of the Royal Order of Uncommon Binding Posts? Yea, verily, Great Electron, I will. (Who's got a cigarette?)

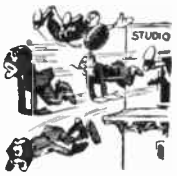
Contributed by H. Robert Potts

ANOTHER COLUMBUS OF SPACE

From the *Birmingham News* of Aug. 22 we have this transportation novelty: "Railway System to Install Radio. C. M. & St. Paul to Operate Lines Through Ether Wave Method." We were totally unaware that there is a special method of operating trains through the ether, but we know enough now to keep still when anything like this comes up for discussion.

Contributed by Wood Rowe Purcell

WHERE DO THEY LIVE, ANYHOW?



In the *New York Daily News* of Aug. 6 we have the following fresh air note: ". . . tonight when the Wandering Minstrels and the Anglo-Persians TAKE THE AIR from this studio." None of the radio studios that we have been in ever had a great excess of fresh air floating around and we wonder why the minstrels should choose a place like that to get their air supply.

Contributed by M. Yankofsky

AGAIN WE SAY, WHAT NEXT?

In an advertisement in the *Miami, Fla., Herald* of Aug. 2 there is this startling information: "Large stock of Parts and Accessories, including ARMATURE Transmitting Equipment . . ." Good bye to the motor truck, now that armatures are now being transmitted by radio. Ain't Science wonderful?

Contributed by Henry B. Graves

PRETTY GOOD FOR A BEGINNER!

Announcement by the old reliable *New York Evening Post* on its moving day (Aug. 30): "Marconi TURNS TO RADIO! Senator Marconi has announced the perfection of a wireless loud speaker." Keep it up, Senator, and you may yet make a name for yourself in the radio art.

Contributed by F. B. Thorne

Radiotics

QUICK, WATSON, THE NEEDLE!

In the classified ad department of the *Los Angeles* (Calif.) *Examiner* for August 2 appears this rare gem: "Most wonderful radio instrument in the world, finds lost people, etc." This "low-loss" instrument must be some little Sherlock Holmes. What an addition it would be to the Burns Agency!

Contributed by Albert Geduldig.

A WARNING

The July 28 edition of the *Salem* (Mass.) *Evening News* states that "an antenna must be kept clean and be well INCULATED." We can readily understand why each little antenna should receive its weekly shower, but radio fans must be sure to buy antennas that are already "inculated", as the Society With The Long Name is on the watch for those who attempt this delicate operation.

Contributed by Charles A. Smith.

OF COURSE!

An article on trouble-hunting in a pamphlet issued by the Boonton Rubber Company, of Boonton, N. J., advises the experimenter to "remove tubes from SOCKERS when changing connections." Surely this would he best, for how could a delicate tube withstand the brutal attack of a socker?

Contributed by Henry Willier.

SOME COIL!

The *Radio World* for July 25 in one of the articles gives the specifications of a very unusual coil, "using No. 24 SOC." We advise the baffled set-builder to try the extra-size counter of the hosiery department or else to use a full pair of socks, size 12.

Contributed by Raymond Madill.

TRUTH WILL OUT

The *Minneapolis Tribune*, Minneapolis, Minn., for March 22 advertises a "one-tube radio pop-corn cabinet, fits on Ford car." So—*this* is where all the popping and cracking has been coming from! And we've been blaming it all on the poor little "B" battery.

Contributed by R. D. Lewis.

TWO-IN-ONE

The Questions and Answers department of *Popular Radio* for September advises the inquiring fan that "three standard sockets should be used for the last three tubes and one 199 type of socket for the first two." This is a novel and intriguing departure from radio practice. We like the idea—but what do we use to get that second tube in? A shoe horn?

Contributed by J. B. Greenman.

A MARTYR TO SCIENCE

The *Evening News*, Harrisburg, Pa., for February 28 has a tremendous scoop! The condition of the battery, they say, was not tested by a hydrometer but "by a VOLUNTEER!" What sacrifices man must make to Science! And just before he entered the battery, we'll bet this hero "only regretted that he had but one life to give" for his hobby.

Contributed by Edward H. Bitner.

TAXI! TAXI!

An Advertisement in the *American Radio Transmitter* for April offers for sale a "three-spring filament control HACK." Here's a good chance for some enterprising chauffeur to get hold of a nice radio-controlled taxi and save himself a lot of driving. It ought to be sold cheap, too, with one spring gone.

Contributed by Warren D. White.

ABSENT TREATMENT?

Radio Doings for July 18 runs an article about a set which "has been known to take MASSAGES . . . from points as far distant as 6,000 miles." You can't fool us! *We* know what station those massages came from—WOC, the Famous School of Chiropractic!

Contributed by Milton Pace.

FOR THE THIRSTY

The radio section of the *Hartford Times* (Hartford, Conn.) for August 19 has an article headed "Chart for Use in CELEBRATION." This is hot stuff! We never *can* find one of those "talk-softly" places when we want to celebrate—map of them would be great! Where can we buy it?

Contributed by Paul B. Wheaton.

IF you happen to see any humorous misprints in the press we shall be glad to have you clip them out and send to us. No RADIOTIC will be accepted unless the printed original giving the name of the newspaper or magazine is submitted. We will pay $1.00 for each RADIOTIC accepted and printed here. A few humorous lines from each correspondent should accompany each RADIOTIC. The most humorous ones will be printed. Address all RADIOTICS to

Editor RADIOTIC DEPARTMENT,
c/o Radio News.

NO TUBE SETS NEEDED THERE

On May 24 the *Springfield Republican*, of Springfield, Mass., in relating that some stations were going to increase their power, said that "Station WBZ, Springfield, would broadcast with 20,000 watts." All the good people of this vicinity need is a crystal detector and a loud speaker and that volume of WBZ's should knock them over.

Contributed by Dr. H. S. Thomson.

A HOT ONE

In the Radio Trouble column of the *Boston Daily Advertiser* (Boston, Mass.) for August 18, a radio fan states that he "is using a FUR-TUBE neutrodyne with U. V. 199 tubes" and can't understand why it won't operate one of the new type loud speakers. Suffering tubes! Who can blame them on a hot August day? They should by all means be removed and kept in cold storage till next winter, when they may bring in Alaska or the MacMillan Expedition.

Contributed by Charles A. Smith.

BANG! BANG! ALSO BOOM

In the Cumberland, Md., *Evening Times* of July 25 in giving advice to coil winders there appeared "start the coil with thread and FIRE." This is something that should have been used by the A. E. F. in the recent argument across the drink, when the gun plants were working so hard.

Contributed by P. Amtower.

SMACKS OF TAMMANY HALL

The *Wichita* (Kan.) *Beacon* of July 15 in reporting a speech said that "it was broadcast over the country by a national HOOK-UP OF A DOZEN CITIZENS." Is this one of these here political rings, that due to the influence of radio on the vocabulary of these United States, is now called a hook-up? Somebody elucidate, willya?

Contributed by E. R. Siefkin.

AND THAT'S TRUE

On July 19 the *Philadelphia Inquirer* had in answer to a radio question in which it was told that "Very little will be gained in distant DECEPTION." Now, boys—and girls, we want you to remember this, and if you do not get complete data on a station even though you feel *pretty* sure which it is, don't tell anyone that you've heard it.

Contributed by Raymond Madill.

ALONE AT LAST

In Montgomery Ward's latest catalogue there is an advertisement of a pair of ear-phones which reads: "Very comfortable. Excludes all external noises." This is an excellent idea. Personally, we have always detested the nosey individual who tries to listen-in on the program by leaning against the other side of our phones. We shall send in our order at once.

Contributed by H. L. Westrate.

THE HEIGHT OF OPTIMISM

The *Mankato Daily Free Press*, Mankato, Minn., for March 2, reports, with determined cheerfulness, that the Saturday radio program was excellent and "the static was fine." This is a novel and very admirable point of view. We only wish there were more little Pollyannas like this to brighten up the radio game.

Contributed by Ewood Graham.

NOW WE KNOW

The *Montreal Daily Star* for August 11 in an article on relief to Arctic traders by radio remarks: "The message . . . was picked up by the American Radio DELAY League." Aha! So *that's* why we have to wait so long for news from the Arctic Explorers!

Contributed by W. D. McClellan.

SHE'S A LIVE WIRE

The *St. Louis* (Mo.) *Star* for August 21 publishes a query from one of its readers who wants to know: "Whether or not a paper GIRL condenser is just as good as one having mica as a dialectric." Of course, we don't know, but we should say she was much better—if you don't mind being "shocked" a little.

Contributed by Donald Bond.

THE MODERN MIRACLE

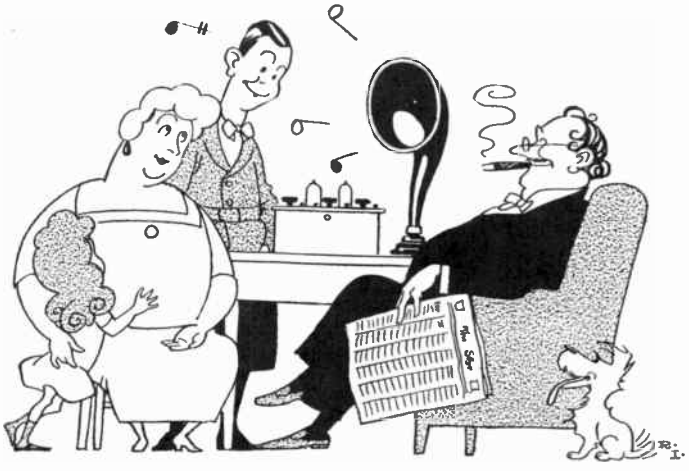
The *Los Angeles Evening Herald* of Los Angeles, Calif., announced, on July 18, something which should prove a boon in this poverty-stricken world of ours. The item begins: "Over a BREADCASTING station in Chicago just a twinkle of an eye ——" This is a remarkable innovation. We suggest a slogan for this station: "Say it with flour" and recommend liberal breadcasting during the dinner concert hour.

Contributed by Conrad Pembrook.

Index

Combined Index for Volumes I and II

Personal names are in lower-case type, trade names and company names in capitals. Company names that are also chapter titles are in bold face.



Some reviews of volume one in this series . . .

A fantastic book. . . .
The name of Vestal Press is already well known to the collector, through a number of historical radio books, and the publisher has found in Alan Douglas an author who, it is apparent, has made available a great deal of information in his fluent text and illustrations.
Funkgeschichte (Journal of the Gesellschaft der Freunde der Geschichte des Funkwesens)

. . . superbly legible reproductions of ads and catalog copy about the manufacturers and their wares. In every way a . . . systematic and higher-quality product . . . this series has considerable historical as well as collectibles-reference value. Recommended wherever interest in old radios runs high.
Booklist

Drawing on contemporary trade publications, popular literature, and manufacturer's brochures, Douglas has used his own 5000-volume reference library and many borrowed resources to piece together an amazingly complete picture. . . . All of the illustrations are beautifully reproduced, making this work a browser's delight in addition to a definitive reference source.
Hands-on Electronics

. . . the most comprehensive book on the subject and will undoubtedly be used as reference for many years.
The Old Timer's Bulletin of the Antique Wireless Association, Inc.

I do not think I'm going too far out on a limb in saying that this will become **the** *definitive book on American broadcast receivers of the 1920s within our lifetimes. . . . The photographs in this book are truly of professional quality. For those of you wishing to identify unusual sets in your collection or for those wanting to learn more about the sets made by a particular favorite manufacturer, this book will be unbeatable. . . . if you could buy just one book on the antique radio hobby, this should be it!*
Antique Radio Classified

. . . Vestal Press did a fantastic job of taking these poor half tones and making them look better than the originals. My hat is off to them. . . . I highly recommend you purchase a copy . . .
Radio Age

If one were required to write a one-word review of this great new book, it might well be "WOW!" That would apply to both printing quality and literary content. Clearly, this is a **must** *addition to the library of every collector of broadcast receivers made during the first decade of the broadcast era-1920s.*
The Antique Radio Gazette

. . . shortwave sets, table models, floor models and circuit diagrams are so beautifully reproduced that most of the dials and controls can be easily read. It is indeed a wonderful reference book for collectors. . .
The Canadian Amateur Radio Magazine

The success of the first volume of this three-volume series has established author Alan Douglas as a leading authority on history of radio manufacturing and development in America. Volume two extends the wealth of information through an additional 31 manufacturers, providing extensive detail regarding their products and their manufacturing operations. Volume three will cover the field from RCA through Zenith.

Our modern electronic world is based on the developments of many early twentieth-century contributions outlined in this series. Today we are surrounded by electronic marvels at every turn, themselves probably only teasers for what will be available in the future. In this series Mr. Douglas provides the historical foundation for the study of this industry and how the manufacturing got its start.

The Vestal Press has been publishing archival-quality books with particular attention to the highest standards of reproduction for illustrations, diagrams, and photographs since 1961.

ISBN 0-911572-77-5

For additional copies of this book or for our complete catalogue write to:

Vestal Press

The Vestal Press Ltd.
P.O. Box 97
Vestal, New York 13851