

Radio Topics

July-August
1922

20 Cents



LARGEST STOCK IN THE MIDDLE WEST OF QUALITY RADIO APPARATUS

C. W. APPARATUS

C. W. Transformers	Price	Condensers	Price	Vacuum Tubes	Price
No. UP-1368 Radio Corp. 325 watt.	\$25.00	No. UC-1819 Farodon, for receiving.	\$ 8.75	No. UV-200 Radiotron, each	\$ 5.00
No. UP-1016 Radio Corp. 750 watt.	38.50	No. UC-1831 Farodon, for transmit'g	9.00	No. UV-201 Radiotron, each	6.50
50 watt 350 volt, Acme, unmount'd.	12.00	No. UC-1631 Filter, 1/2 mfd.-750 V.	1.35	No. UV-202 Radiotron 5 Watt	8.00
50 watt 350 volt, Acme, mounted	15.00	Radio Corp.		Radio Corp.	
200 watt 550 volt, Acme, unmount'd.	15.00	No. UC-1632 Filter, 1 mfd.-750 V.	1.85	No. UV-203 Radiotron 50 Watt	30.00
200 watt 550 volt, Acme, mounted	20.00	Radio Corp.		Radio Corp.	
500 watt 1000-1500 volt, Acme unmt'd	20.00	No. UC-1634 Filter, 1/2 mfd.-1750 V.	1.50	No. UV-204 Radiotron 250 Watt	110.00
500 watt 1000-1500 volt, Acme mont'd	25.00	Radio Corp.		Radio Corp.	
Choke Coils		No. UC-1635 Filter, 1 mid.-1750 V.	2.00	Electron Relay	5.00
No. UP-1625 Filter Reactor, Radio		Radio Corp.		APVT Amplifier	6.50
Corp. 160 M. A. Capacity	\$11.50	No. UC-1014 Plate and Grid, 3000 V.	2.00	Kenotron Rectifiers	
No. UP-1627 Filter Reactor, Radio		.002 mfd., Radio Corp.	2.00	No. UV-216 20 Watt Radio Corp.	\$ 7.50
Corp. 300 M. A. Capacity	15.75	No. UC-1015 Antenna Series, 7500		No. UV-217 150 Watt Radio Corp.	26.50
No. UP-415 Plate Circuit Reactor,		V. .0003, .0004, .0005 mfd.,		Tube Sockets	
Radio Corp.	5.75	Radio Corp.	5.40	No. UR-542 Porcelain Radio Corp.	\$ 1.00
Acme Single 150 M. A. Capacity	4.00	No. UC-1803 Special-10,000 V.	5.00	No. UT-541 Porcelain Radio Corp.	2.50
Acme Single 500 M. A. Capacity	6.00	.000025 mfd. Radio Corp.	7.00	No. UP-552 Bakelite Radio Corp.	1.50
Acme Double 150 M. A. Capacity	6.00	No. UC-1806 Special 6,000 V. .002		No. UT-501 Mountings Radio Corp.	4.00
Acme Double 500 M. A. Capacity	8.00	mid. Radio Corp.	2.00	No. UT-502 Mountings Radio Corp.	1.50
Modulation Transformers		No. 577 Type Dubilier mica Cond.,		No. GR-1 General Radio	2.75
No. UP-414 Microphone, Radio Corp.	\$ 7.25	Grid Cond., by Pass. Antenna		No. R-400 De Forest Inverted Type	1.00
No. A-3 Acme Semi-mounted	5.00	Series Cond., etc. 1000 Volts -		No. 550 Murdock, Bakelite	1.50
Filament Heating Transformers		Filters		Tone Wheels	
Thordarson, unmounted, for 250 Watt		No. 170 Tuska (special price)	\$11.20	No. PX-1638 Rotary Grid Chopper,	
Tubes, 10 V. Secondary	\$ 8.00	Microphones		Radio Corp.	\$ 7.25
Thordarson, mounted, for 250 Watt		No. 323W Western Electric	\$ 4.00	Motor Shaft Bushings, 1/4 or 5/16 in.	.20
Tubes, 10 V. Secondary	10.00	No. 260W Federal	7.00	Meters	
Thordarson, unmounted, for 450 Watt		No. M-3 Hand Type, Joy and Kelsey	6.00	No. UM-530 Antenna Ammeter, 0-2.5	
Tubes, 10 V. Secondary	12.00	Grid Leaks		Amperes, Radio Corp.	6.00
Thordarson, mounted, for 450 Watt		No. UP-1719 Transmitter 5000 Ohm	1.10	No. UM-533 Antenna Ammeter, 0-5	
Tubes, 10 V. Secondary	15.00	(5 Watt Tubes) Radio Corp.	1.65	Amperes, Radio Corp.	6.25
Acme 50 Watt, Fully Mounted	12.00	No. UP-1718 Transmitter, 5000 Ohm		No. 74 Jewell Thermo-Couple	12.00
C. W. Inductances		(50 and 250 Watt Tubes) Radio		No. 54 Jewell-D. C. Flush Type	
No. UL-1008 Osc. Trans. Radio Corp.	\$11.00	Corp.		0-100, 200, 300, 400, 500 Milli-	
No. CW-100 Edgewise wound copper,		Motor Generators		amperes	8.00
25 turns	10.00	Robbins & Meyers 100 Watts, 500 V.		No. 127-A General Radio Hot Wire	
No. 181 Tuska (Special Price)	5.25	110 Volt A. C. 60 Cycle Service.	\$68.00	.05, 1, 2.5, 5 and 10 Amperes...	7.75
No. 182 Tuska (Special Price)	7.00	Robbins & Meyers 200 Watts, 500 V.			
No. 183 Tuska (Special Price)	8.75	for 110 Volt A. C. 60 Cycle			
		Service	85.00		

Westinghouse Regenerative Receivers	
Type RC, Detector and Amplifier in	
one Cabinet	\$130.00
Type DA, Detector and Two-Step Am-	
plifier	68.00
Type RA, Tuner	68.00
Type RE, Aeriola, Jr.	25.00
Type CB, Loading Coil	5.00
Grebe Regenerative Receivers	
No. CR-3 170-600 Meters for Relay	\$65.00
Work	
No. CR-5 150-3000 Meters with Tube	80.00
Control	
No. CR-8 150-1000 Meters with Tube	80.00
Control	
No. CR-9 150-3000 with Detector and	130.00
Two-Step	
Audion Control Panels	
No. RORA Grebe, with cabinet	\$12.50
No. RORH Grebe, with tick, connec-	
tions	17.50
No. RORK Grebe, Two-step Amplifier	55.00
Transmitting Condensers (Dubilier)	
No. 12225-500 Watts 14000 V. .007	
cap.	\$30.00
No. 12226-1000 Watts 21000 V. .007	
cap.	45.00
Variable Air Condensers	
No. 3 Chelsea, .0012 mfd. Unmounted.	\$ 4.75
No. 4 Chelsea, .0006 mfd. Unmounted.	4.25
No. 3660 Murdock, Panel Mounting,	
43 Plates	4.00
No. 3680 Murdock, Panel Mounting,	
23 Plates	3.25
No. 11 Plate Perfection K. D. Con-	
denser	1.25
No. 21 Plate Perfection K. D. Con-	
denser	1.60
No. 41 Plate Perfection K. D. Con-	
denser	2.25
No. CV-500 De Forest Variable Con-	
densers (Parts)	3.20
No. CV-1003 De Forest Variable Con-	
densers (Parts)	5.60
No. CV-1005 De Forest Variable Con-	
densers (Parts)	6.25
Grid Leaks	
Nos. UP-509 to UP-525 .05 to 3	
Megohm Radio Corp.	.75
Rotary Spark Gaps	
No. P-1 Benwood Sound-Proof	\$30.00

Benwood "Super" Gap	
	22.00
Rheostats	
No. PR-535 Filament Panel Mounting	\$ 3.00
Radio Corp.	
No. PT-537 Filament Panel Mounting	10.00
Radio Corp.	
No. PR-536 "A" Battery Potenti-	
ometer Radio Corp.	2.00
No. 81 Remler 3 Ampere Capacity	1.75
No. 12474 Paragon Back Mounting	1.50
Amplifying Transformers	
No. UV-1714 Radio Frequency Amp.	
Transformer	6.25
No. UV-712 Intervalve Radio Corp.	\$ 7.00
No. A-2 Acme, Semi-mounted	5.00
No. 226-W Federal	7.00
No. AA 3 to 1 Ratio Unmounted	3.35
No. AA 3 to 1 Ratio Mounted	4.25
No. AA 10 to 1 Ratio Unmounted	3.50
Variometers and Variocouplers	
Mesco Variometers	\$ 5.00
Mesco Variocouplers	4.00
No. 500 Remler Variometers	6.00
No. 503 Remler Variocouplers	5.40
Telephones (Pair)	
No. 480 Mesco 1000 Ohms	\$ 6.50
No. 1 Type "C" Baldwin's Navy	
Standard	12.00
No. 2 Type "E" Baldwin's Super-sensi-	
tive	13.00

The following material is offered sub-
ject to prior sale only:
1 No. P-100 De Forest Control Panel,
less "B" Batteries and Tube; just the
thing for experimental work; reg.
price \$67.50; special sale price \$25.00

Brandies' Transatlantic 2800 Ohms	12.00
Brandies' Navy Type 3200 Ohms	14.00
Brandies' Superior 2000 Ohms	8.00
No. 56 Murdock 2000 Ohms	5.00
No. 56 Murdock 3000 Ohms	6.00
Loud Speakers	
Type R-3 Radio Magnavox	45.00
Station Type Vocaloud	30.00
Laboratory Type Vocaloud	25.00

Mesco Loud Speaker (the latest Loud Speaker on the market using Type "C" Baldwin Phones)	
	15.00
Victrola Attachment	15.00
Graphonola Attachment	15.00
Plugs	
No. 47-A Western Electric, Brass	\$.75
No. 12159-W Federal, Brass	2.00
No. 15 Federal	1.75
Jacks	
No. 12158-W Federal N. P. 2 Circuit	\$ 1.00
No. 12157-W Federal N. P. Closed	
Circuit	.85
No. 12156-W Federal N. P. Open	
Circuit	.70
No. 1435 Federal Filament Control	1.20
No. 1438-W Federal Filament Control	1.50
Mesco Wireless Spark Coils	
No. 459 1/4 in. Operates on 5 Dry	
Cells	\$ 4.50
No. 460 1/2 in. Operates on 5 Dry	
Cells	5.40
No. 461 3/4 in. Operates on 5 Dry	
Cells	7.20
"A" and "B" Batteries	
No. 760 E. R. Batts 4 1/2 V, each new	
style; same as 703, with flexible	
leads; each	.27
No. 763 Everready "B" 22 1/2 Volt	\$ 2.25
No. 766 Everready "B" 22 1/2 Volt	
large size	3.00
No. A-141 Red Seal Sparker "A"	2.28
6 Volt 60-80 amp. Vesta Batt, each	20.00
Battery Charging Equipment	
Rectigon Battery Charger, 2 1/2 amperes	18.00
Rectigon Battery Charger, 6 amperes	28.00
Bulbs only, 2 1/2 ampere size	4.00
Bulbs only, 6 ampere size	8.00
Antenna Wire	
No. 10177-7 Strand No. 22 Tinned	
Copper	1.50
No. 10178-7 Strand No. 20 Hard	
Drawn Copper equivalent to No.	
12	2.00
No. 14 Soft Drawn Copper (80 feet	
per lb.); per lb.	.40
No. 443-7 Strand No. 20 Phosphor-	
Bronze	2.50
(Prices for Wire in larger quantities on application)	

OUR NEW WIRELESS CATALOGUE NOW READY FOR DISTRIBUTION

MANHATTAN ELECTRICAL SUPPLY CO., Inc.

17 Park Place, New York

114 SOUTH WELLS ST., CHICAGO
1106 Pine Street, St. Louis

604 Mission St., San Francisco

A Lesson from the Stars



In the garden of a country home two men were talking. Near them sat a small boy, looking at the stars.

Said one of the men: "I am making a product that I know is the best in its class—and still I can't sell it."

There was a moment of silence. . . . Then the second man called to the boy who sat near them. "Son," he said, "if you had your choice of any of those stars up there, which one would you choose?"

The boy promptly pointed to the brightest star in sight. "That big one over there!" he said.

The man who had addressed the boy turned to his companion. "As a matter of fact," he said, "there are other stars in the heavens which the boy cannot see that are far brighter and bigger than the one he chose. But he didn't know the other stars were there—and so he couldn't choose them. That's why your product isn't selling. People simply do not know it exists."

"I know what you mean," said the first man, "advertising. But I have tried advertising in the past—two or three times—and it didn't work."

His companion seemed preoccupied with the stars. . . . "If we stand here and watch the sky for a few minutes," he finally said, "we shall see a shooting star. It will spurt across the heavens for a second, and then it will die out. There are thousands of shooting stars every night. People pay little attention to them and they are instantly forgotten. That's the kind of an advertiser you were.

"The Pole Star," continued the speaker, "has stayed on the job so long and so faithfully that its very name has come to mean 'a guide, a controlling principle.' And that's the way to advertise. There are certain products today whose names are regarded as a guide to satisfaction and a controlling principle of quality. They are the pole-stars. In this present economic situation, it is the pole-stars that are doing the business."



RADIO TOPICS

ADVERTISING DEPARTMENT

1114 NORTH BOULEVARD

OAK PARK, ILL.



FEDERAL NO. 9—
Two Step Amplifier
PRICE IN (U. S. A).
\$58.00

to electrical and mechanical detail, and inspected with the same precision that has held **FEDERAL** apparatus in its high place for the last 20 years.

Federal

AMPLIFYING UNITS

THE FEDERAL Detector and Amplifier Units mark the highest stage of vacuum tube equipment development. In these new units are incorporated improvements that are distinct achievements in the art and innovations which make them vastly superior to devices of the same purpose that are available to the radio enthusiast today. They are designed with the same high grade engineering skill, built with the same careful attention

FOR EXPERIMENTAL AND AMATEUR USE

Federal Apparatus is the Recognized Standard

Let Your Nearest Radio Dealer Give You Further Information

Federal Telephone and Telegraph Company

GENERAL OFFICES AND FACTORY: BUFFALO, N. Y.



Die-Cast Wood **HORN**
Clear Speaking

LEND A NEW DELIGHT TO RADIO

Gives a soft, clear, voice-like reproduction. **MADERA-WARE** is made by a new process, from selected wood, reduced to a fine "flour" and cast under tremendous pressure and heat. This die-cast wood is denser than the hardest seasoned violin wood. It has wonderful acoustic properties—clear, reproducing the semi-tones and over-tones that give character to the human voice—spoken or sung. Instrumental broadcasted music takes a new character and sweetness when heard through the **MADERA** Clear-speaker.

It can be used with the loudest amplification for public places, or with ordinary Head set phone for household entertainment.

Furnished in three styles.

No. 802. Horn, height, 23 $\frac{3}{4}$ in.; width, 13 $\frac{5}{8}$ in.; depth 11 $\frac{1}{4}$ in. **\$18.00**

No. 801. Horn, height, 20 $\frac{1}{2}$ in.; width, 10 in.; depth, 7 $\frac{3}{8}$ in. **\$15.00**

No. 800. Horn and Cabinet. Height, 22 inches over all. Horn, 18 in. high; opening, 10 in. dia. **\$25.00**

Horns are equipped with convenient device for attaching phone. Send for circular.



American Art Mache Co.

6315 N. CLARK ST., CHICAGO

DEALERS: Every Radio owner will want a Madera the moment he hears it. Our discounts are liberal.

RADIO TOPICS

The National Radio Monthly



The Magazine employees are taking a breath of air after having completed the largest Magazine cover job. The tent is over 25 feet long.

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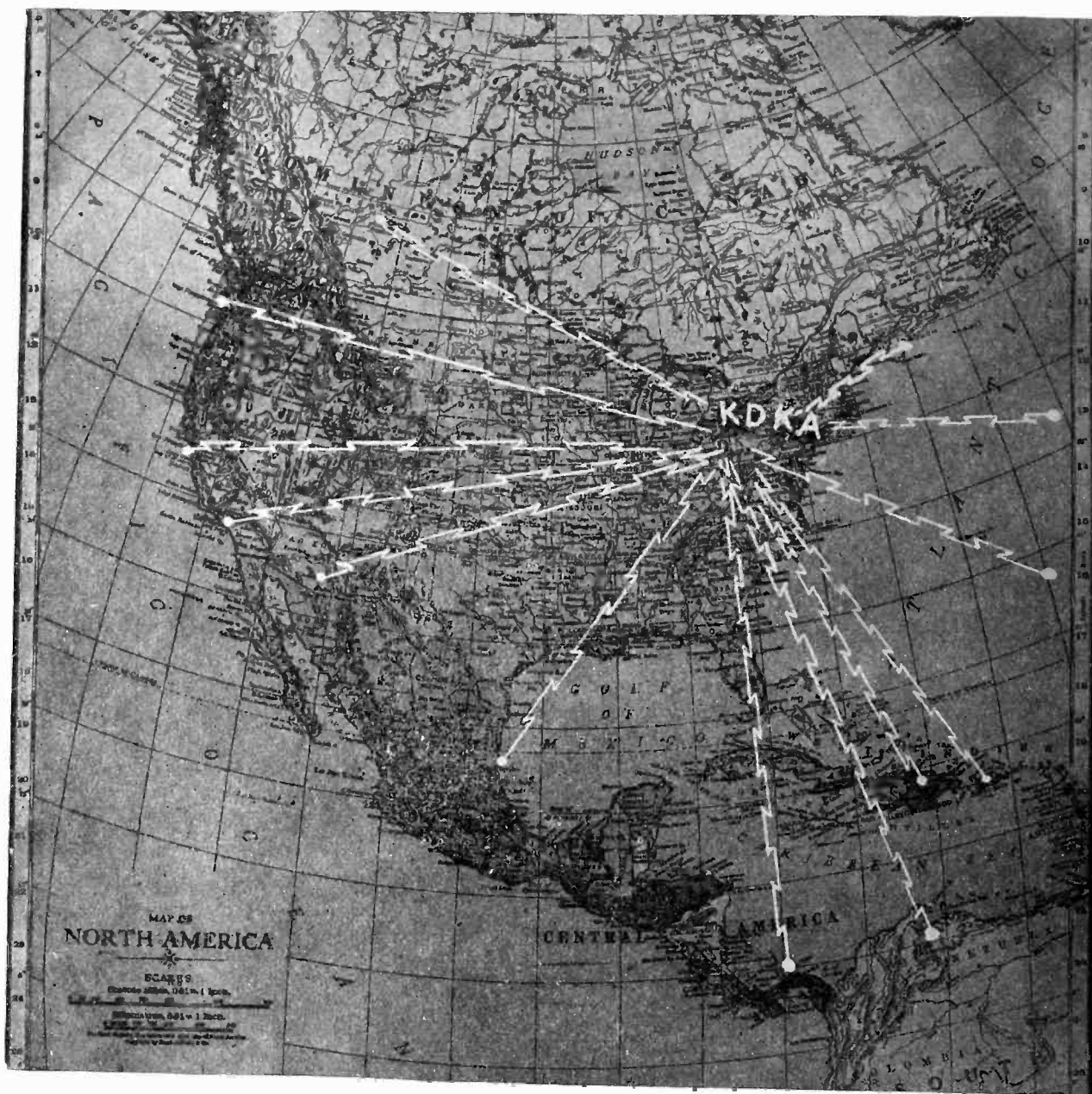
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Radio Broadcasting Spans the Continent

RADIOPHONE station KDKA of the Westinghouse Electric & Manufacturing Company at East Pittsburgh, Pa., has made another record in radio broadcasting. This broadcasting station, which has been in operation since 1920 and which was the first radiophone station in the world established for the regular broadcasting of entertainment, now holds the record for the immense area covered by its concerts.

The lines on the map radiating from East Pittsburgh, Pa., where radiophone station KDKA is located, show the great distance at which programs of entertainment, traveling in the ether, have been heard. It, of course, by no means marks the limit of their travel, as the points marked on the map are only those from which accurate reports have been received.

A list of the more distant points at which KDKA's

programs have been heard shows that the concerts go out in a circle, having a radius of about 2,000 miles. This conclusion is based upon reports that have been received from such points as Edmonton, Alberta Province, Canada; Centralia, Washington; San Francisco, California; Los Angeles, California; Tucson, Arizona; Tampico, Mexico; Puerto Cortes, Honduras; the Canal Zone, Panama; Venezuela; Santo Domingo; Porto Rico; Halifax, Nova Scotia, and from ships on the high seas.

The immense area included in this gigantic circle and the enormous number of people to whom KDKA's programs are available will give a good idea of the present importance of radio broadcasting.

KDKA is only one of four stations established by the Westinghouse Company. The others are located at Chicago, Ill.; Newark, N. J., and Springfield, Mass.

Radio Topics

Volume II

JULY-AUGUST, 1922

Number 6

William Jennings Bryan Speaks to the Radio Audience

WILLIAM JENNINGS BRYAN, the "Great Commoner," had the largest audience of his long career as a public figure and orator when he spoke recently in Pittsburgh, and his address was broadcasted by the Westinghouse Electric and Manufacturing Company.

The "Great Commoner," who, by the marvelous powers of his oratory, has held spellbound thousands of persons, found that his large audiences were greatly exceeded in numbers by the invisible audience which heard his address delivered from the pulpit of the Point Breeze Presbyterian Church, Pittsburgh, Pa. It was reliably estimated that 250,000 persons were in the invisible audience, in thirty-six states and in many sections of North and South America, which was swayed by the oratory of the noted world figure,

even though the "Great Commoner" could not see them nor could they see him. The ether was the connecting link between the orator's voice and the

listener's ears. The address, one of Mr. Bryan's greatest, was transmitted from the Point Breeze church by wire to the Westinghouse radio telephone

broadcasting station, KDKA, at Pittsburgh, from where it was broadcasted.

The oratorical "display" of the "Great Commoner" by radio telephone and the efficient manner in which it was broadcasted by the Westinghouse Company resulted in a deluge of letters to the Westinghouse Company congratulating both Mr. Bryan and the Westinghouse Company for their cooperation in the joint effort which afforded thousands, who otherwise could not have heard Mr. Bryan speak, an opportunity to hear him. More than 4,000 congratulatory letters were received.

This broadcasting of Mr. Bryan's address over practically the entire western hemisphere

is one of the latest demonstrations of the possibilities of radio communication—and radio is still in its infancy. Who can foretell where it will end?



William Jennings Bryan recently addressed his largest audience when he spoke over the radiophone

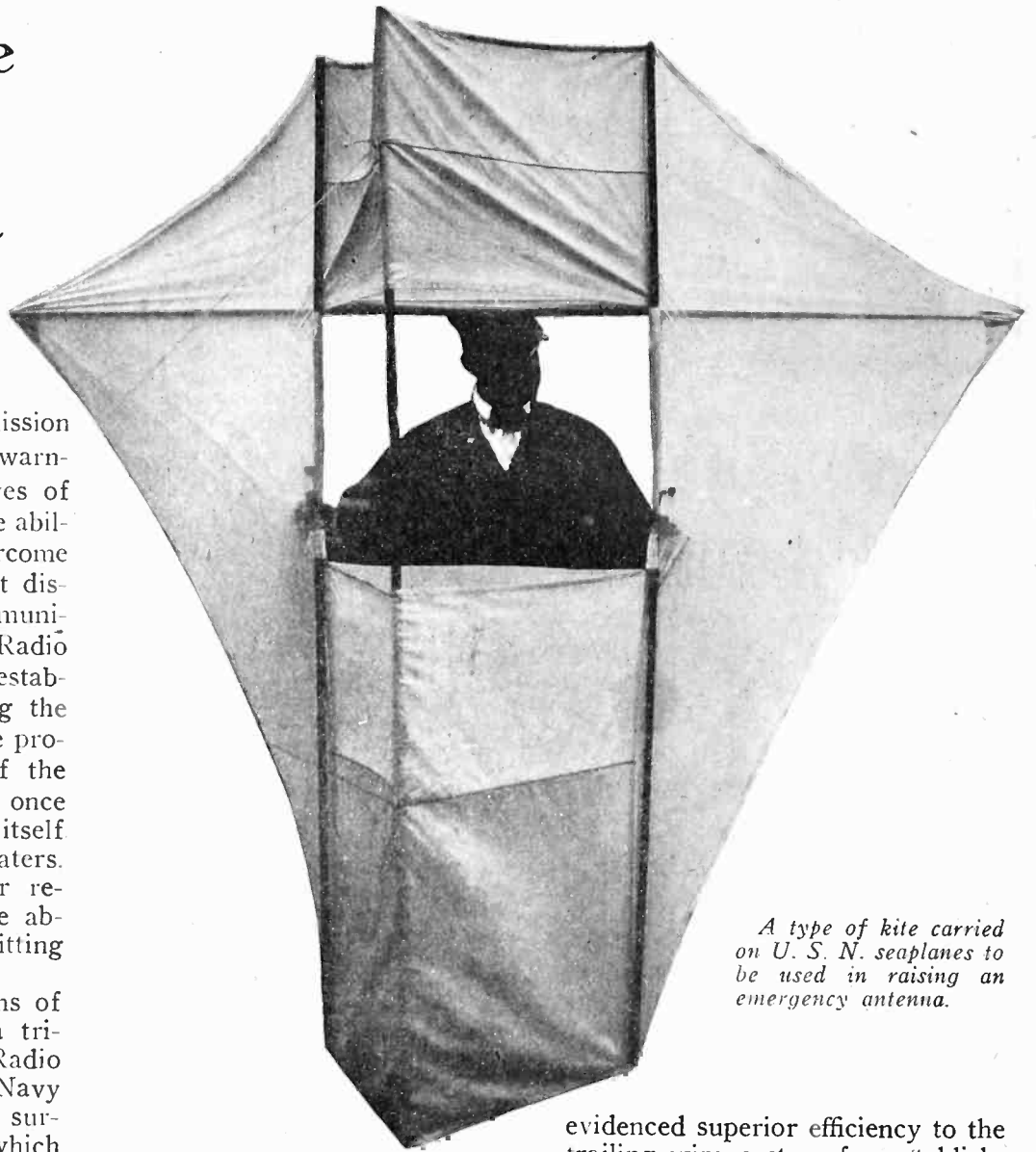
The Kite Radio Antenna

By S. R. Winters

A SEAPLANE, on its mission of service, is without warning incapacitated and the lives of its crew are in jeopardy. The ability to summon aid would overcome the dangers that threaten, but distress signals cannot be communicated to relief agencies. Radio communication cannot be established, the antenna, involving the use of a single or double wire projecting from the fuselage of the seaplane proving ineffectual once the craft is disabled and finds itself helplessly floating on the waters. Succor, even though not far removed, cannot be had in the absence of facilities for transmitting distress signals.

Now, thanks to four months of experimentation, carried to a triumphant conclusion by the Radio Division of the United States Navy Department, seaplanes may be surrounded with safeguards by which relief may be summoned in the event of mishaps or disabilities. A pastime of youth—namely, kite-flying—has been capitalized. An antenna, taking the form of a kite, has been recently designed by Lieutenant C. D. Palmer of the Navy Department as a means of establishing wireless communication between a seaplane in distress and other units of aircraft or radio shore stations in a position to extend succor. The emergency type of antenna may be suspended in the air to a height of approximately 300 feet by the use of the kite formation. Aircraft just alighting on the water or already thereon can immediately employ this antenna system in broadcasting distress signals.

The radiating powers of this kite arrangement were demonstrated beyond a peradventure recently by a series of interesting tests conducted in the Chesapeake Bay. Seaplanes, detailed from the naval air station at Anacostia, D. C., alighted in various parts of the Chesapeake Bay. The newly devised antenna, with its



A type of kite carried on U. S. N. seaplanes to be used in raising an emergency antenna.

kite formation, was rigged up and by the use of conventional wireless equipment general calls were sent out to all neighboring radio stations. During the second observation test of this type of antenna the aircraft alighted in a portion of the Chesapeake Bay which is of equal distance from the following naval radio stations: Virginia Beach and Norfolk, Virginia, and Cape May, New Jersey. Signals were dispatched from the kite-like antenna, with the result that Cape May, Norfolk and Virginia Beach stations answered immediately from aircraft. A reliable exchange of communication was effected.

The tests conducted in the Chesapeake Bay to determine the efficiency of this emergency antenna embraced an area of 100 miles, a figure representing the average distance obtained by aircraft when in flight. The kite aerial repeatedly demonstrated its capacity in maintaining communication between planes and shore radio stations. In some instances this type of antenna

evidenced superior efficiency to the trailing wire system for establishing communication. Commander S. C. Hooper, chief of the Radio Division of the Navy Department, is of the opinion that the kite arrangement has so conclusively demonstrated its value as to warrant a recommendation that all seaplanes be equipped with this emergency outfit. Planes in the service of the Navy Department are to be provided with kite-like antenna without exception. It is a precautionary measure that may safeguard human life and property.

A radio antenna partaking of the likeness of a kite is, to be sure, not unknown to wireless enthusiasts. Vacationists on boat excursions have demonstrated the use of this formation of an aerial, and during the war captive balloons and kites were experimented with to a considerable degree. However, the kite formation antenna probably receives its first large and serviceable application in the decision of the government to provide all of its naval seaplanes with this safety device.

All the necessary apparatus can be placed on a small table.



Radio on Your Yacht

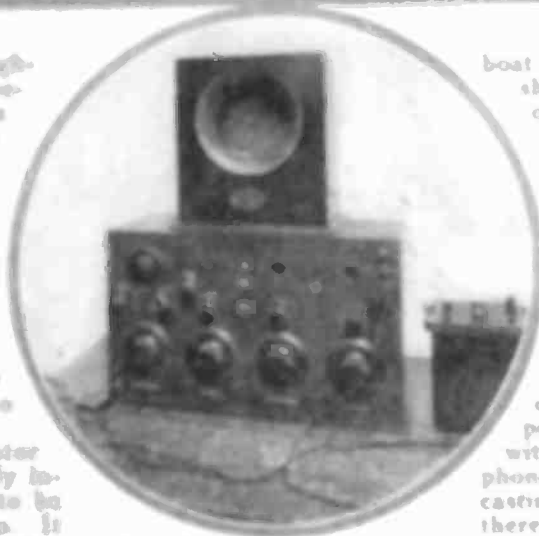
Rapid Strides Made in Developing the New Art—Its Value and Advantages When Installed on the Motorboat

By Wm. J. Jorgensen

Photographs by M. Rosenfeld

WHEN in every walk of life throughout the entire country are beginning to realize that wireless is no longer a mysterious field of dots and dashes requiring technical knowledge. They know that radio telephony is becoming a commercial possibility and are greatly interested in following the progress of this rapidly advancing art. Already the wonder of yesterday is becoming the prosaic, the commonplace of today. Most of the big newspapers are now giving daily columns devoted to news of radio activities.

By far the greatest number of motor boatmen and yachtsmen are sufficiently interested in things new and scientific to be also attracted by the wonders of radio. It is entirely feasible to equip any cruising boat with a portable radio apparatus to enable it to keep in touch with the activities of the world of practically all times. This does not mean, of course, that the small boat can be supplied with transmitting apparatus to enable it to hold conversations with the hills at home or with other boats at a distance. It does mean, however, that the cruiser may enjoy a continuous stream of entertainment which is being freely distributed through the air from numerous large stations. The receiving apparatus which will bring this to the ears of the listener is relatively simple and, owing to the absence of surrounding structures, the signals can be received with greater freedom on the



A combined receiver and amplifying unit of larger size with loud speaker

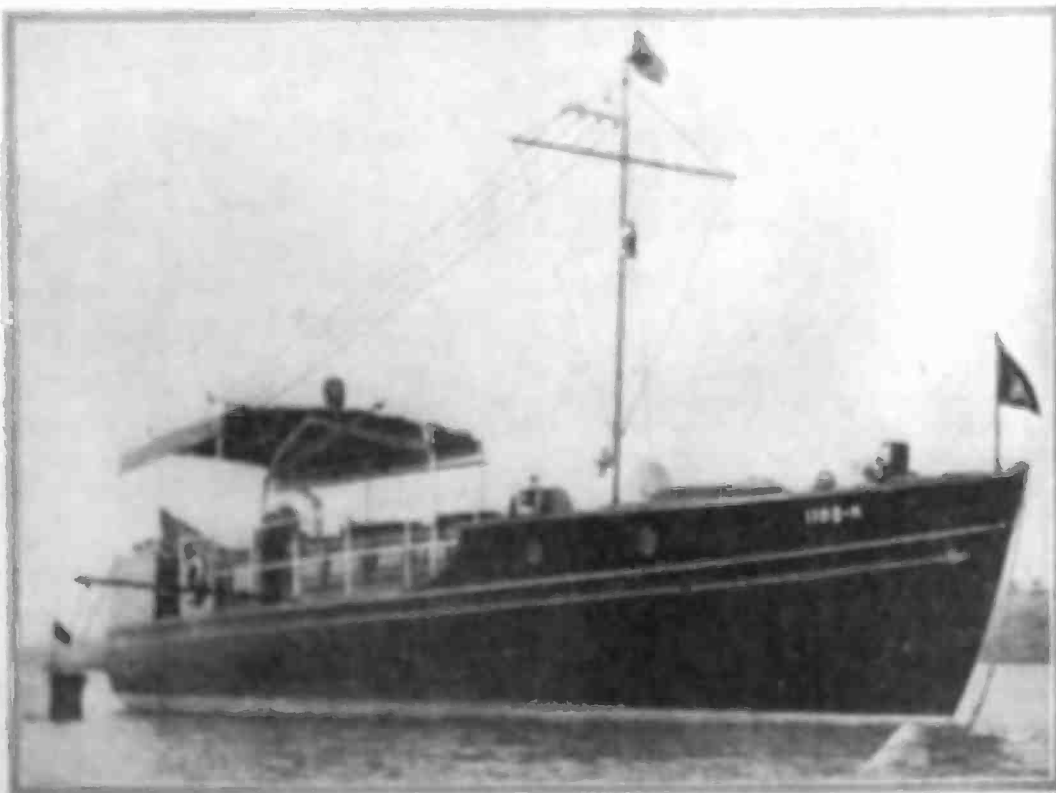
boat than under similar conditions on shore. Salt water, on which the bulk of our yachting is done, forms a most excellent ground, and the rigging of the aerial equipment is also a relatively simple operation.

At the present time it is estimated that there are about 500,000 radio telephone receiving sets in operation in the United States. A large portion of these are equipped with a device called amplifiers. By means of these, the received signals may be magnified and their volume increased to such an extent that all persons on a boat are enabled to hear without being required to use headphones. From a large number of broadcasting stations throughout the country there are being sent out at definite intervals current weather reports, news items, market quotations, time signals, special entertainments for children, concerts, dance music, speeches, sermons, orchestral recitals and musicals. News to suit all tastes.

For so valuable an asset, its cost and upkeep is trifling.

As an entertainer it outranks the phonograph, as an educator it is most far-reaching, and as a commercial possibility it is without equal.

The operation of these sets is a very simple matter. Too simple to be complicated by technical terms and descriptions. Just a few wires on the mast. Your machine. Your equipment. A glance at the paper to see what the program will be. Adjust the receivers and the world opens before you without effort.



Aerial equipment is readily installed on the average cruiser. The sea forms an ideal ground circuit

Courtesy Motor Boat

The Wireless Wonders

By Walt Mason

Illustration by Henry J. Peck

I LOUNGED along the steamer's deck upon a wide, wide sea, and I beheld old Captain Heck come waddling up to me.

"We've had a wireless from New York, a thousand miles away, and cops are waiting you at Cork," I heard the captain say. "It seems you broke a traffic law before you came aboard; you cut a wart, some copper saw, with your James Henry Ford. And now across the heaving foam they flash the news to me; the world of wa-



ters is our home, and merry men are we. We'll have to send you back again when we have reached the shore, and they will put you in the pen for seven years or more. To me it seems a wondrous thing how, in the ether waves, like Nemesis, pale Science flings her noose o'er fleeing knaves. You bust a statute on the land, and think you'll dodge your doom, and on my deck you calmly stand, without a thought of gloom. But Science gets you, though you

*"Whereas the captain danced a jig,
And tried to sing and smile,
Until the tempest blew his wig
To starboard half a mile."*

roam from Troy to Zuyder Zee; the world of waters is our home, and merry men are we."

Whereat the captain danced a jig, and tried to sing and smile, until the tempest blew his wig to starboard half a mile. I sat upon a coil of rope, my eyes suffused

with tears, and thought of all the wireless dope I'd read in recent years. I thought of how the world admired Invention's gifted throng, when fifty million poles were wired to carry news along. They strung the wires beneath the deep, a thousand versts or two, and while the nations snored in sleep the throbbing tidings flew. "This is the limit," people said, "of what man can achieve; our fathers, rising from the dead, this thing would not believe. We never could convince our sires who rest beneath the sod, that lightning flies along the wires and bears men's words abroad."

The captain at this juncture came, and said to me, "I wist, I should put fetters on your frame, and gyves upon your wrist. For one who'll navigate a Ford has venom in his craw, and may go diving overboard, to dodge avenging law. But I will take a chance, me lad, for I'm a seaman true, and I have brought a liver pad to soothe and comfort you; and here you have a fine-tooth comb, and here a dish of tea; the world of waters is our home, and merry men are we."

When men first talked this wireless graft, it seemed to me absurd; I leaned against a fence and laughed, by fool emotions stirred. Some day I thought, the pigs may fly, and hens may learn to swim, and we may see, as we go by, cows roosting on a limb. Some day the fish may climb the trees to join the brooding owl, and boobs may play with bumble bees, and not rear up and howl.

These wonders all may come to pass, to jar the human crew; but wireless talk is sounding brass, and bunk and piffle, too. Such thoughts as these I used to state, I would not understand; and now, alas! the coppers wait to pinch me when I land.

The captain says, "Cheer up, me lad! A frown is not in style; and things are really not so bad if you'll but sing and smile. Here is an optimistic pome in cantos twenty-three; the world of waters is our home and merry men are we."



If local regulations become much more stringent, they'll have a meter put on our antennas to calculate the amount of signals received. The meter man at the left will have an interesting job.

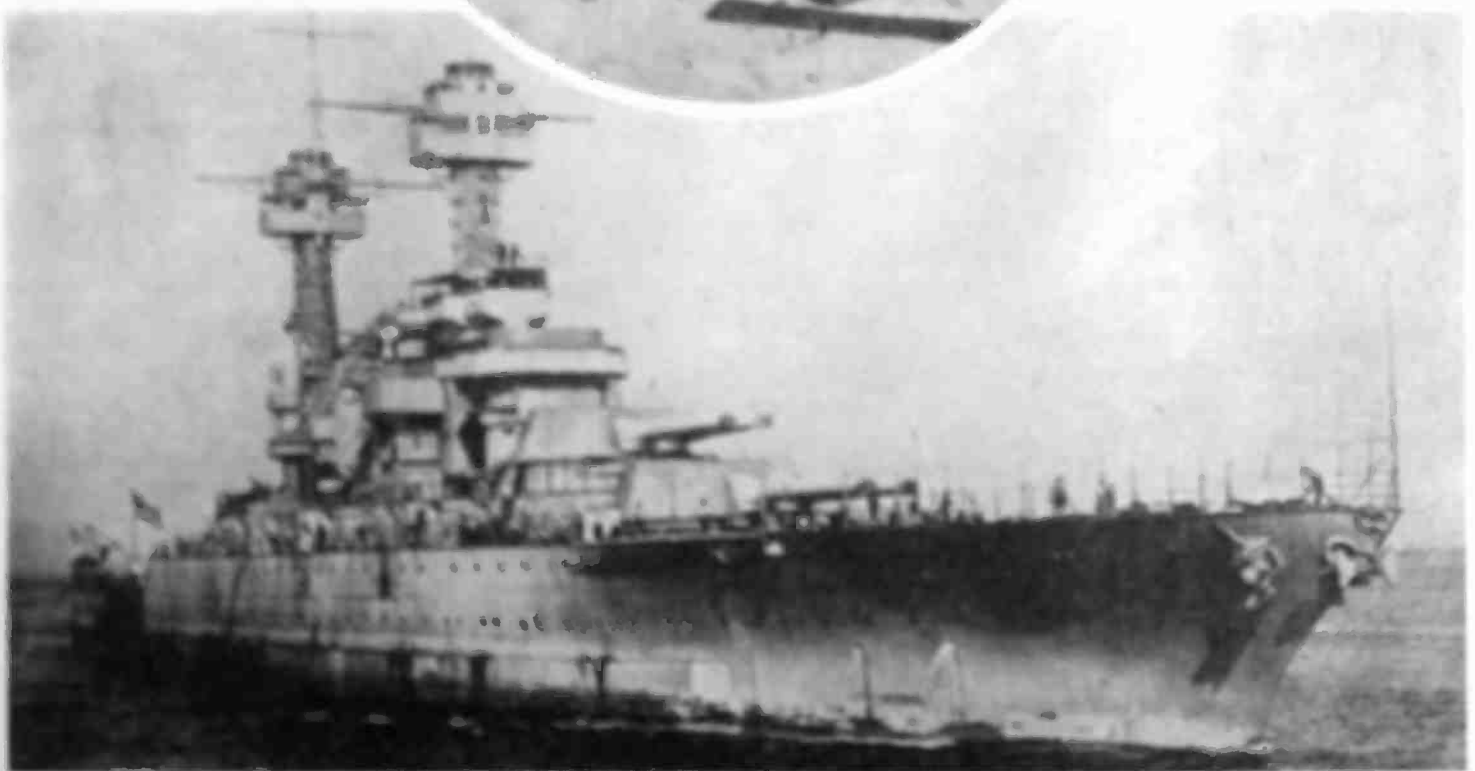


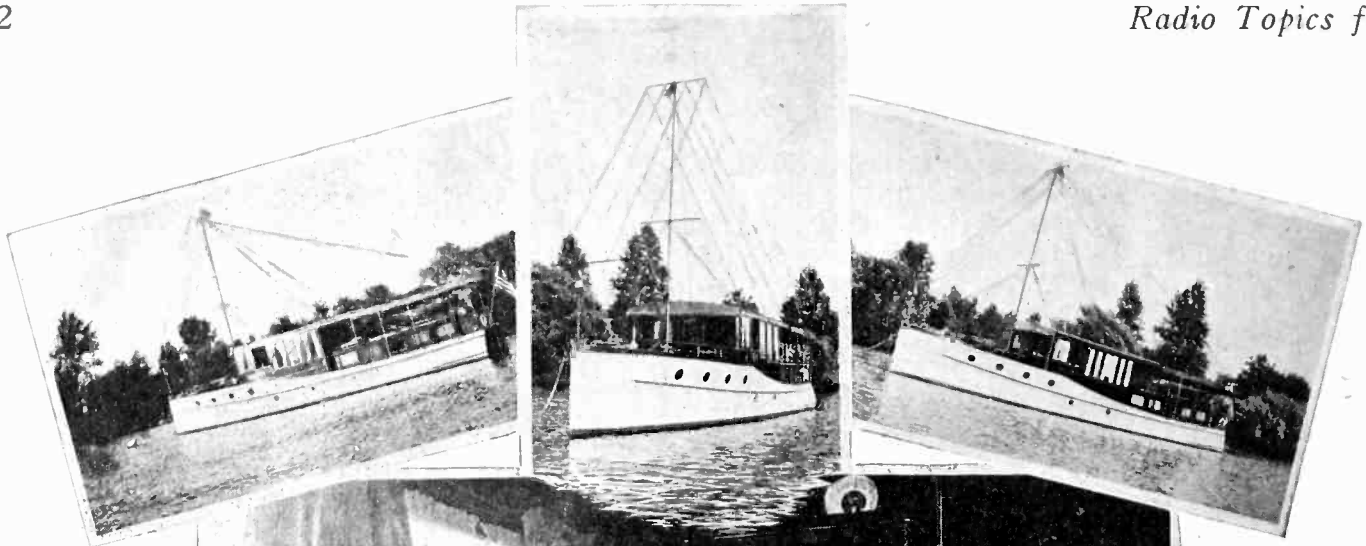
The young lady at the right keeps a card index of the radio stations.



Listening radio starts please the kiddies. This chap is glad that his dad brought him a set.

Many manufacturers in A. at the time being carry as many as seven complete radio sets. It is hard any of which may be operated remotely.





The accompanying views of the *Vacuum III* show a model boat installation. It takes up very little space



Radio Transmission from Boats

Take the peril out of cruising on small crafts by installing a sending set on board

AT THIS time of the year one of the most popular of sports is boating, a large portion of which is done with small cruisers. Bad storms, accidents, lack of gasoline or oil, any one of which may endanger the lives of those aboard, are incidents that will occur on the best of regulated boats.

Only a few weeks ago a sturdy power boat cruising on Lake Michigan ran out of gas and was given assistance only after two days of terror to those aboard the disabled boat. Should a storm have sprung up, quite likely all would have been lost. Think what a difference it would have made had they had a radio transmitter available. Any one of five commercial and hundreds of amateur land stations were within range of the smallest five watt set and help would have been secured in an hour or two.

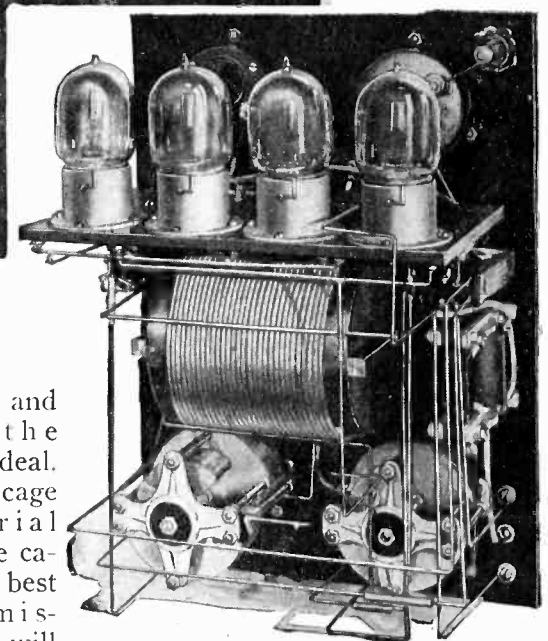
The receiving apparatus is, of course, a source of much pleasure on board, but with the addition of a small sending set, which really does not require a great outlay, you are protecting lives and money. It also gives you that sense of security that comes with the realization that you may talk to the shore at any time.

An antenna running from the top of the main mast

to the bow and back to the stern is ideal. The small cage type of aerial having large capacity is best for transmission, and it will be found much easier to construct.

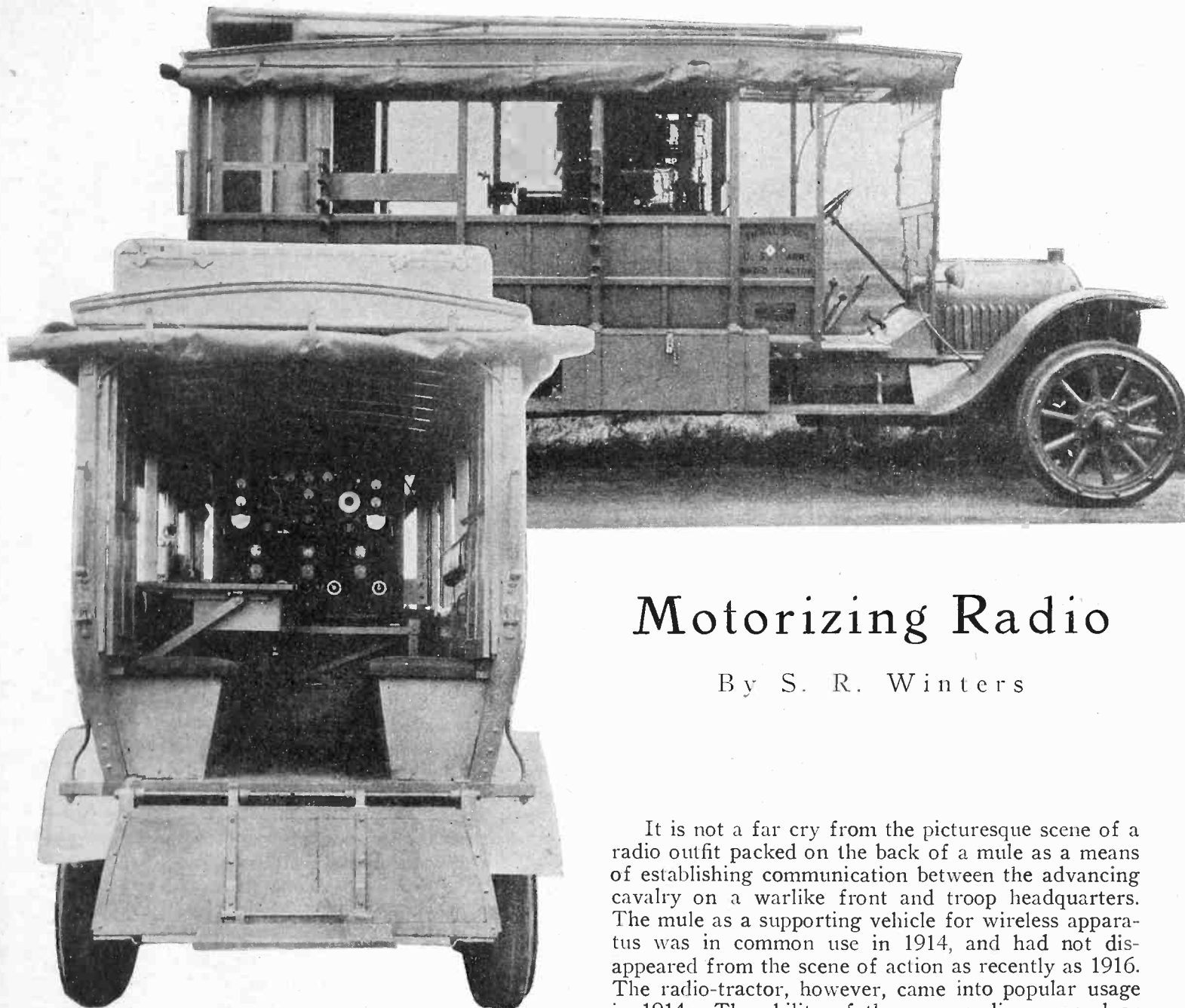
The cage antenna is employed on most of the battleships for this reason. The water makes a perfect ground. Both antenna and ground leads running to the apparatus should be well insulated. The size of the transmitter to install depends upon the greatest distance that the boat will ever be from any shore stations. The range of a radio transmitter is considerably greater over water than over land. A twenty watt set such as is shown in the illustration is capable of sending the voice consistently over a distance of 100 miles and will telegraph two to four times as far.

Complete sets ready for installation are made by the Benwood Company, and for those that wish to build their own accurate plans may be had from the Experimenters' Information Service. A generator supply 500 to 1,000 volts will be required. Motor generator units are available which operate anywhere from a 6 volt storage battery to 110 volt supply to



A 20-watt transmitter such as this will send a 100 miles consistently

(Continued on Page 37)



Motorizing Radio

By S. R. Winters

It is not a far cry from the picturesque scene of a radio outfit packed on the back of a mule as a means of establishing communication between the advancing cavalry on a warlike front and troop headquarters. The mule as a supporting vehicle for wireless apparatus was in common use in 1914, and had not disappeared from the scene of action as recently as 1916. The radio-tractor, however, came into popular usage in 1914. The ability of the commanding general or members of his staff to proceed more rapidly than the means of communication was the necessity or mother of invention that gave birth to the radio-tractor.

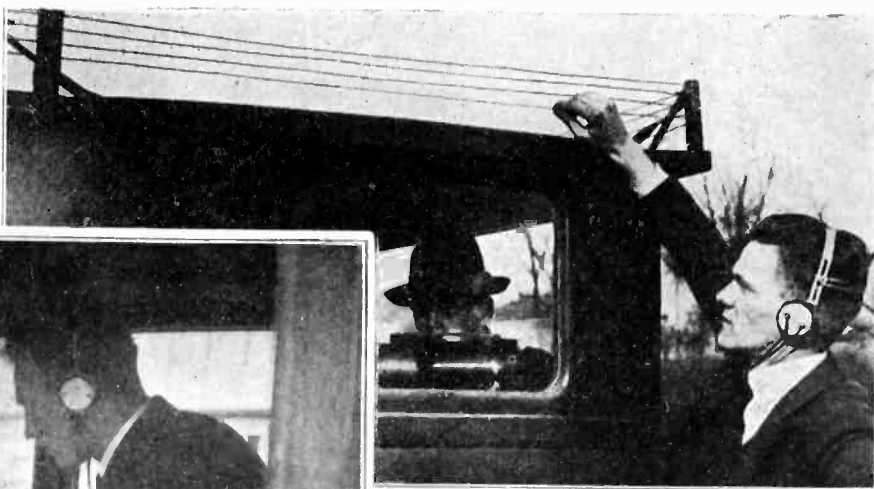
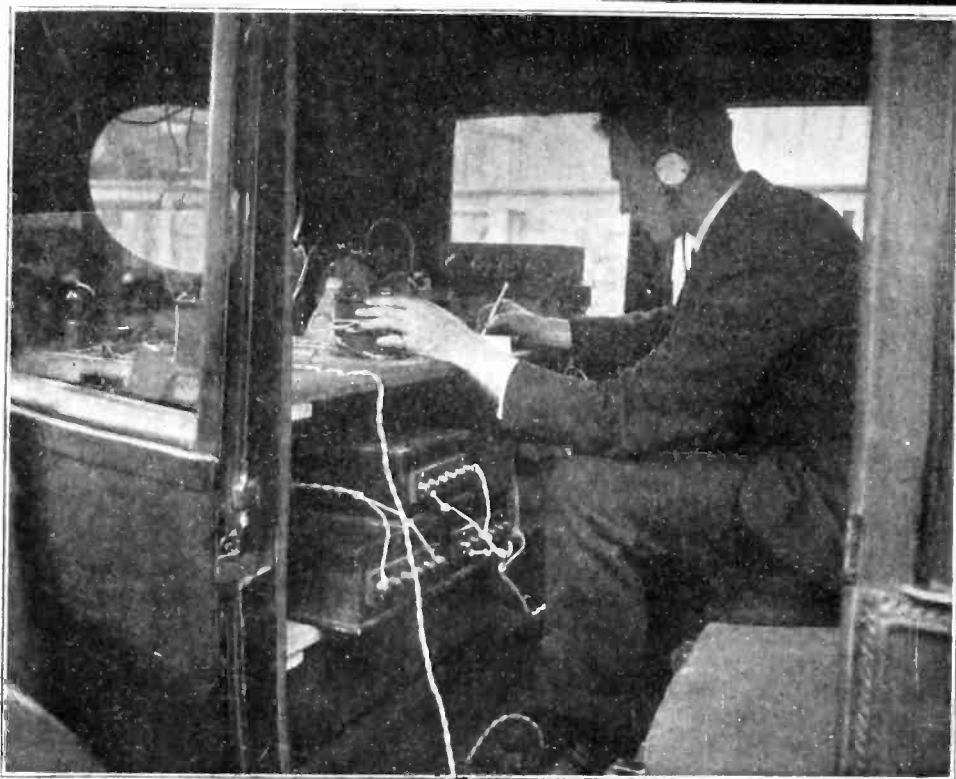
Hence "Motorizing Radio" dates from the trail-blazing activities of the Signal Corps of the United States Army on the troublous Mexican border in 1914. The first installation of a radio-telegraph set on a motor vehicle as a means of establishing rapid communication between troop headquarters and an advancing army was actually made by Brigadier General Edgar Russell for use by Brigadier General George Scriven. The event, now signalized by the "swell-ground" development of radio-telegraphy and radio-telephony, transpired on the Mexican border in 1914. Henceforth the usefulness of the mule in the role of transport for wireless equipment was doomed, barring emergency services in war-defined areas where rugged mountains preclude the use of motor vehicles. This beast of burden can scale rugged cliffs and unfrequented areas not accessible to the motor truck.

The radio-tractor of the Signal Corps of the United States Army is self-containing, and the radio research laboratory of this branch of the government

WITH approximately 10,000,000 motor vehicles in operation in the United States, the possibilities of linking this form of convenient transportation to rapid communication facilities, afforded by radio-telephony and radio-telegraphy, are well-nigh limitless. Persons prone to compare the amazing growth of the art of wireless to that of the automobile industry can well visualize a future time when these two utilities will be functioning as side-partners.

The recent introduction of the radio-telephone-equipped automobile, the use of wireless apparatus on motor trucks for negotiating bread deliveries in a city, the increasing popularity of the radio tractor of the United States Army, the application of a radio-telephone to an automobile for service in a cosmopolitan police department and the novelty of a radio-controlled miniature automobile are among the late demonstrations signifying a tendency of the art of wireless and the motor vehicle to form a close corporation. These, and numerous other evidences in that direction, justify the title of this article, "Motorizing Radio."

Here is a *Flivver* Sedan carrying an elaborate assembly of apparatus used by the traveling salesman for demonstrations.



The antenna may be strung around the top and the frame of the car; makes a good ground, acting as a counterpoise aerial.

is constantly making modifications in the interest of efficiency and compactness in its portable radio equipment. The motor vehicle employed as transport for wireless apparatus carries its own antenna in a rack on the side of the tractor, ready for setting up at any point within five minutes' time or less. The antenna is built in sections and can be easily dismantled when the radio-tractor is to be removed from one point to another. These sections are so built that the height of the antenna may be varied as needs dictate. A device for installing the aerial is carried on top of the truck. Ordinarily the height of the antenna ranges from 80 to 120 feet, with an equally variable range for the reception and transmission of communications. There are nine Signal Corps areas in continental United States, and a radio-tractor is assigned to each of these divisional units. Also, the Philippine Islands, the Panama Canal Zone, and other provinces where the Signal Corps extends its services are provided with these radio-tractors.

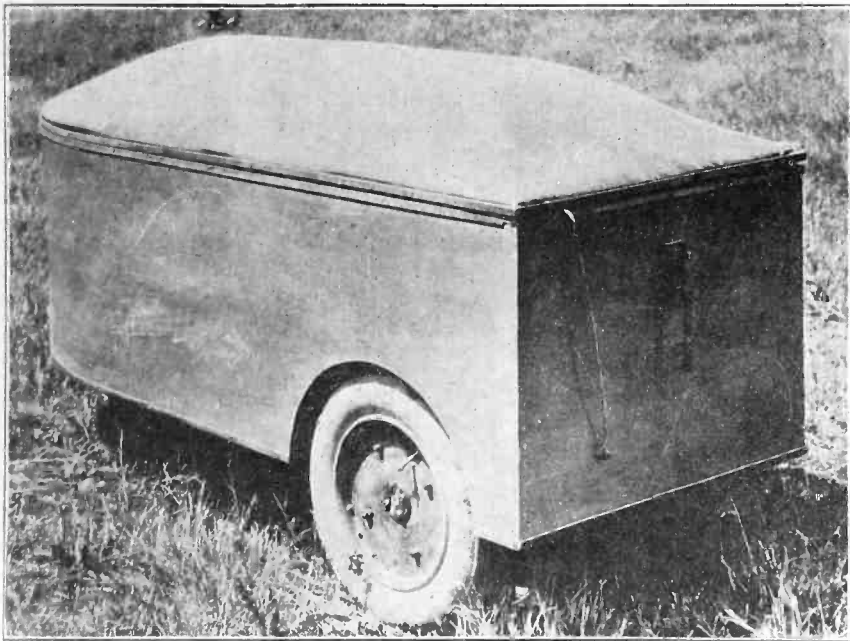
Such are the efforts of the Signal Corps of the United States Army in "Motorizing Radio" as an effective instrument of warfare. The peacetime applications of these wireless-equipped units are evident. The opportunities for pressing them into service in emergencies are likely to expand their usefulness once such applications are effected. The recent distressing circumstances incident to the turbulence of the Father of Waters is a case at point. These spark sets could have been employed in sending out calls for assistance, the portableness of the out-

readily issued by these portable radio facilities.

The sectional masts maintained for service by the Signal Corps in times of war are not absolutely essential to the quick formation of an antenna. Any system which employs poles would suffice, or in the absence of such a prearranged convenience a tall tree would effectively serve as an antenna. It has been the experience of the Signal Corps, however, to be unable to find suitable trees in certain localities. In sections of Kansas there are few trees, and also on the Mexican border the timber growth is of such a dwarfish size as to preclude its service as towering antennas, necessary to the functioning of the radio-tractor. The truck itself—the supporting vehicle of this mobile wireless installation—weighs approximately five tons. Obviously, substantial bridges and passable highways must be provided to insure the successful movements of the radio-tractor in any particular area where its services are demanded.



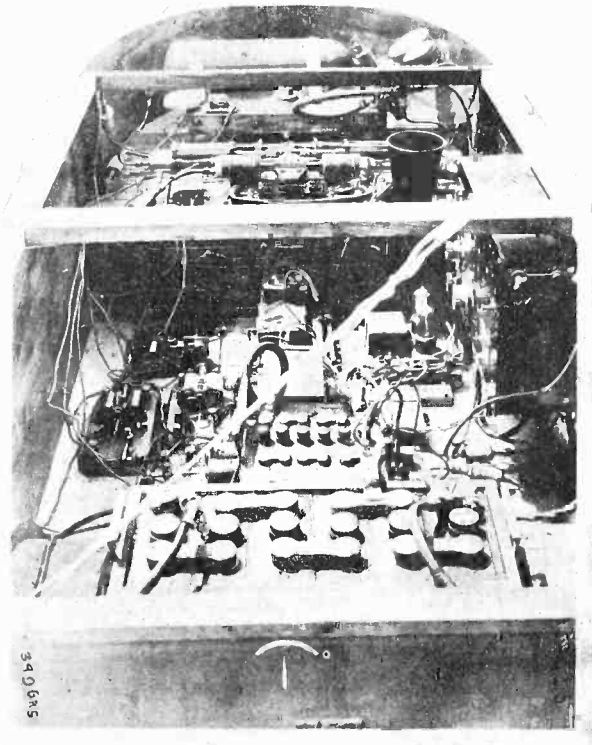
Transmitting from moving cars has been accomplished.



This little car is controlled solely by radio.

EQUIPMENT of passenger-carrying automobiles with radio-telephones is an innovation that is calculated to contribute a notable chapter to the expansion of the subject, "Motorizing Radio." The Chevrolet Motor Company of Washington, D. C., recently introduced this type of vehicle equipped with facilities for the reception of vocal speech and music. This portable outfit operates in an automobile in the absence of a "ground" wire. When this motorized conveyance is thus provided with conveniences for garnering communications from out of space, the city dweller and his family may go on a summer vacation, and as long as the camp is located within one hundred miles of a broadcasting station amusement and informational communications may be extracted from the ether. County agents and other representatives of the United States Department of Agriculture, ordinarily provided with automobiles for traversing the sparsely settled rural districts, could employ to advantage "Motorized Radio" as a vehicle for lecturing and otherwise disseminating useful information on improved agricultural practices. A minister of the gospel, or in the countryside the so-called "circuit-rider," by the use of a radio-telephone affixed on an automobile could exhort to many congregations, though these audiences be widely separated. The politician, in efforts to mend

The mechanism of this radio-controlled vehicle looks very complicated—and it is—however, the principle is comparatively simple.



his political fences, could advantageously employ the radio-equipped motor-car to distribute his spell-binding orations to the remote as well as frequented sections of his district. Of course, in this instance he would have to establish a broadcasting station and provide his constituents with radio-telephones for their automobiles. Such wireless installations are versatile in their applications, lending themselves to easy removal from automobiles to homes or offices.

The butcher, the baker, and the candlestick maker may avail themselves of the conveniences of radio-telephony when coupled with the transportation facilities of motorized vehicles.

Already the General Baking Company of Philadelphia is negotiating deliveries of bread throughout the Quaker City by installing radio-telephones on its delivery trucks. Thus the office and manufacturing



The summer camp is not complete without radio. The Scouts in a camp find it a most enjoyable diversion.

headquarters are enabled to keep in constant communication with its delivery facilities and direct their movements without awaiting the return of the drivers to headquarters. Preliminary experiments, involving observations as to the efficiency of these wireless-equipped motor-trucks, developed the fact that a driver heard instructions from his home office located three miles distant. Such reception of instructions from out of space was possible notwithstanding that this particular operator was in close proximity to the Philadelphia navy yard, when messages were being transmitted to sea-faring vessels. The bread deliveryman was enabled to overcome the confusing noise emanating from the high-powered navy transmitting apparatus by use of a loud-speaking horn affixed to the seat of his motor vehicle. The manager of this bread-baking enterprise is quoted as saying that the novelty of the radio-telephone, when placed at the convenience of the deliveryman, lends zest to his otherwise humdrum job. Aside from a reception of instructions pertaining to the delivery of the "staff of life," he is enabled to hear concerts, market quotations, lectures and theatrical performances. Withal, his duties are interspersed with a university extension course and entertainment that rob life of its serious aspects.

Crabs, oysters, fish, and other sea foods possess perishable qualities which render imperative that the element of time intervening their capture at the sources of supply and the points of consumption be reduced to a minimum. "Motorized Radio" is a hurry-up agent that may substantially abridge the duration of time elapsing from the moment sea foods are untangled from the seines and nets until the crabs are appraised as a choice "dish" on the menus of cosmopolitan hotels and cafes. A transportation company, operating from Washington, D. C., to towns in southern Maryland, installed radio-telephones on its motor-trucks that ply between the National Capital and the sources of supply for crabs, fish and oysters. This innovation, coupled with the installation of refrigerating facilities on motor vehicles thus employed, enables constant communication to be maintained between headquarters and the mode of conveyance assigned to the transportation of these perishable commodities. Rapid transportation facilities and hurry-up means of communication go hand in hand in minimizing the time element from the moment the fisherman makes a "haul" to the instant when consumptive demands are supplied. Formerly, if we are to accept a computation of this transportation company, 80 per cent of the soft-shell crabs originating in southern Maryland and destined for consumption in Washington and other cities were exacted by spoilage influences. The "Motorizing of Radio" may relieve this unhealthy condition.

Chicago, Illinois; Berkeley, California, and possibly other city police systems have "Motorized Radio" as a means of quickly dispatching instructions from headquarters to "patrol wagons," as they are popularly or derisively known, when on their criminal-carrying errands. The police department of Chicago, by the use of the so-called "resonance wave coil," developed by the Signal Corps of the United States Army, has provided an automobile with both receiving and transmitting facilities for police service. The advantage of this particular "resonance wave coil," a compact form of antenna, is that only a detector and a pair of telephones are employed as receiving apparatus. Con-

stant communication between the radio-equipped automobile and patrolmen on their "beats" is possible, inasmuch as this form of receiving set is so compact as to be worn on the sleeve of the uniform of the officer. Although this method of policing a city is still in the experimental stage, it may prove of substantial value in crime detection as practiced in the future. The Berkeley police system is contemplating the installation of radio-telephone on all the automobiles in its service, thus enabling the issuance of instant instructions to its police officers wherever located.

ONLY recently the Coast Guard of the United States Treasury Department and the Radio-Communication Section of the Bureau of Standards succeeded in maintaining effectual radio-telephone communication between shore stations and life-saving boats. The navigation of these storm-tossed vessels renders it imperative that dangling wires, towering antennas or other apparatus projected above the deck level be reduced to a minimum. Hence the Radio-Communication Section of the Bureau of Standards was confronted with the difficulty of installing radio apparatus on life-saving boats, and yet such equipment must not prove to be an obstruction in the handling of the boat and casting of the life-saving lines. The problem was satisfactorily solved, a form of coil antenna being employed. But, for the purposes of this article, the significant thing is that in conducting the preliminary tests a radio-telephone loop transmitting outfit was installed on a motor truck. The character of the experiments at once assumed a degree of portability which contributed to their dispatch and success. Consequently, with the life-saving boat six miles from land effective communication was maintained between it and the shore station.

Traffic laws were disregarded, the flexible warnings of semaphores ignored, and the traffic officer utterly astounded, when recently a miniature automobile made its way over the streets of Dayton, Ohio, in the absence of a person aboard. The queer spectacle was a radio-controlled automobile, an invention of Captain R. E. Vaughn of the engineering division of the Air Service of the United States Army. This cigar-shaped car, eight feet long, three feet high, and two and one-half feet wide, operates in the absence of masts and aerials, complete control being possible from a guiding automobile any distance within seeing range of the latter machine. Start, stop, reverse, steer to the right or left, blow a horn or ring a bell, or even fire a pistol, are the variable performances attributed to this radio-controlled vehicle. These functions are possible by controls which are obtained by pressing buttons on an automatic transmitter, this sending the proper combinations of dots and dashes operating each control. The range of operation, at present, is influenced by the distance covered by the eye of the operator.

THE system of control developed by the engineering division of the Air Service is applicable to anything mechanical that moves in the air, on the earth, on or under the waters. Contemplating the uses of a radio-controlled automobile—other than a novel hobby for the inventor—the suggestion is advanced that as an instrument of warfare the strangely manipulated device could be detailed to destroy machine-gun nests. This could be accomplished without

(Continued on Page 42)

The question as to the advisability of allowing the broadcasting of advertisements, you will find the answer to whether it can or should be done in this article.

Advertising by Radio



Radio is bringing joy to many, such as these in hospitals. Advertising by radio would soon take away the real interest.

By J. C. McQuiston

Manager, Department of Publicity, Westinghouse Electric & Manufacturing Co.

THE full possibilities of the radiophone are not yet known. The popular reception given to it during the past year has been sufficient to stir the whole of our population. Radio now takes the place of the weather and health as the chief subject of conversation. It is no wonder that just as soon as the public recognized the use of radio, advertisers gave consideration to this wonderful agency for spreading selling information. The experience that has been gained in the short time that the radiophone has been rendering service to the general public may even now give us a fair idea of some important limitations to this wonderful medium.

Whatever statements, however, that are now made are based wholly upon the possibilities of the present development or radio sending and receiving apparatus. Of course, what may follow no one can tell, but even with the present limitations the radiophone, as a means of broadcasting from a central point to great distances, will prove a wonderful benefit to mankind.

By way of preface, I wish to say that radio broadcasting will not, in my opinion, supplant, or interfere with newspapers as a medium of disseminating news, nor with concerts, churches, theaters or movies, as entertainment features.

On the contrary, it has been proved that the broadcasting of

news bulletins by radio, and the publication of radio programs have increased materially the circulation of newspapers. I will risk the statement that since radio broadcasting was begun, the total circulation of all newspapers has been considerably enlarged, and I believe the publishing of radio broadcasting programs and other features pertaining to radio by the newspapers have been responsible in a very large measure for this increase.

Churches that have broadcasted their services have actually found that the attendance at services has increased rather than diminished; and although it is true that some few members of the church may prefer to hear the services while lying in bed, there are hundreds who never go to church and who, hearing the appeal of the pastors, are not satisfied to receive all their sermons by radio, but will respond to that natural desire to hear direct, and to see the speaker.

The same thing is true with reference to amusements. Certain amusement houses have had connection with our radio service for over a year and they are very glad, indeed, to continue the service because the hearing of artists by radio simply intensifies the desire to actually be present in the theater to witness the performance.

In the sporting field, the hearing of the reports from the baseball diamond, play by play, and inning by inning, will not keep people away from the game. On occasions, they will take their reports in this fashion, particularly, if confined in a hospital, or at home, indisposed, or too far away to get to the ball park. However, the listening by radio will intensify a desire to be present at another time. I might go on to enumerate, but I think it is unnecessary to do so. It is clear enough, I think, that the radiophone will simply supplement the newspaper work, and entertainment work of all kinds, and is not an agency to fear, but rather one to make use of in the right way.

Amusement promoters, singers, and other artists were alarmed when the phonograph was introduced. However, as we all know, there was no need for alarm because the phonograph has actually stimulated business for the theaters and other entertainment enterprises.

People, hearing the reproduction of voice on the phonograph, are impelled, when they can, to go to hear and see the artist.

We now arrive at the most important point of our discussion. If radio broadcasting is an agency that is rendering, and can continue to render valuable service to the people, it must be protected.

When there were few stations broadcasting from widely separated centers, the reception was satisfying; at least, there was little to disturb outside of the natural static conditions. However, quickly one sending station after another has been started and today there are all over the country pretty close to 300 stations putting out programs, if not nightly, occasionally.

It is clear, I think, that since all these stations are on the same wave length, 360 meters, there is bound to be increasing confusion and that a government regulation of wave lengths is positively imperative to maintain the efficient service of radio broadcasting. This control of the use of radio is in the hands of the Department of Commerce,* now giving careful consideration to the general subject, and there is now recommended a band of wave lengths for radio broadcasting for the purpose of avoiding experiences of recent months of three and four stations broadcasting simultaneously.

However, irrespective of all this, let us come to the real subject of advertising by radio. Can it be done, and should it be done? Already the conference that has been in session in Washington to consider the proper regulation of radio broadcasting has recommended the prohibiting of advertising by radio. It is perfectly natural that this ruling should be made at this time, because if advertising were permitted, it goes without saying that all the good work that has been done in giving valuable information and pleasant entertainment for the people would be destroyed. This action of the committee is at this time very necessary, and those who have been enjoying radiophone service will surely appreciate the necessity for such action.

Let us think of the billboard for a few minutes. Why is it that the billboard has always had trouble? From the beginning there have been those who would remove it from the face of the earth. I think the answer is that somehow or another the billboard has been offensive to the people, and even though billboard promoters have raised the art to an exceedingly high standard, even in the face of this, billboard sign work is always in trouble with local and state associations.

We all know how persistently the advertising man has worked to get free advertising through the

movie, and we know that it is pretty generally true that he hasn't got it. The reason is well known. The public will not stand for direct advertising when they go to see high class moving pictures.

Let me ask you whether the public will wish advertising to come to them through the agency of radio broadcasting? Remember that this advertising will go right into the home. It will invade the place where the family is enjoying the full benefits of privacy and detachment from business cares. The broadcasting to thousands of homes of advertising information concerning, say, "things for women and things for men," probably the butcher with his meats; the baker with his bread; the tailor with his clothes, and the grocer with his crackers and cheese—what kind of a home will it be anyhow? You may say you can turn it on at will and turn it off when you want to, but even so, who will want it? How valuable will be the media if the public will not support it? Personally, I don't think they will support it.

Advertising must ride on some service, and in riding on that service it must not destroy the service. The editorial page of a publication pretty generally determines the quality and extent of the circulation. Therefore, the value of a medium for advertising must always play second fiddle to the editorial and written pages. It is, therefore, true that advertising must "stand by" until it finds a way to associate itself with radio broadcasting without, in any way, destroying the refinement and enjoyment and general satisfaction that comes from receiving news bulletins, baseball scores, lectures, sermons, bedtime stories, concerts, etc., etc.

Has advertising been tried by radio? In our own case, at the beginning of our broadcasting work we mentioned, for a short time, our heating appliances and those things made by us that generally appeal to the public. We very soon found that we were cheapening something that was well worth while. This came to us so forcibly that we quickly dropped it and we have not been advertising anything, not even our radio apparatus, in connection with our broadcasting work.

I recall one experience that came to me shortly after trying out advertising by radio. One day last

year when I visited Indianapolis and met a number of business men there, I was quizzed a great deal about radio broadcasting, and I told them something of the starting up of the mother station KDKA at Pittsburgh as a regular broadcasting station. One of the business men present asked for the privilege of telling of the experience he had had, and this being granted, he described a visit he had made to Chicago to buy a Westinghouse receiving set with all supplemental equipment. He pictured his return home and the work entailed in putting up the aerial and connecting up the battery, and that sort of thing. Then he explained that the first thing he heard was: "Electrify your home and make it modern for good housekeeping. Use electric ranges, coffee percolators, toaster stoves, and electric irons. If you are interested in a standard of quality, ask for Westinghouse."

"Now," said the speaker, "for all of this I went to Chicago and spent several hundreds of dollars and a great deal of my time to install it, only to get some advertising matter."

Now, of course, my friends told this half in jest and half in earnest, and yet it proved to me that advertising was the thing that would not easily find a welcome in the radiophone program, and our company, since that time, has omitted advertising from its broadcasting program.

There is a kind of advertising, however, which for want of a better term may be called "collective and educational," which, if properly censored, may be made a part of radio broadcasting programs—for example, talks on styles for women, the well-dressed man, sanitation, the value of a photograph, etc. Addresses of this kind, not inspired by any particular institution, but given out unselfishly, naturally develop an increase of business. Some work of this kind has been done, and I believe the public will support this sort of thing.

In closing I give as my opinion that advertising must be inoffensive to the public, and any advertising that enters the home must be welcome. If it is in any sense an intruder it will fail, just as an agent at the door is turned away if his appearance or manner is objectionable.

*See June issue Radio Topics—"A New U. S. Bill to Regulate Radio."

How to Charge Your Radio Battery

The charging of the "A" Battery, an important phase, is explained in detail in this article.

MINIATURE storage battery cells are offered by various manufacturers for supplanting the small dry B battery used with vacuum tube receiving sets. These batteries consist of eight to fifty small cells. The recharging of these batteries presents a serious problem. The small cells require a very low charging rate, varying from 1-10 to 1 ampere, depending on their size, but due to the number of cells employed the charging voltage required is high.

DIRECT CURRENT CHARGING

Where direct current is available it is very easy to charge these batteries by connecting them in series with a 40-watt lamp. It is essential that the positive battery terminal be connected with its positive line, otherwise the batteries would discharge instead of charge.

As 90 per cent of the homes wired with electricity in the United States are supplied with alternating current the charging of any type of storage battery presents a much more complicated problem than were direct current available.

Various types of chargers are on the market for the three-cell "A" battery used for heating the lamp filaments. Practically every radio enthusiast uses one of these machines to eliminate the inconvenience and expense of lugging his battery to a service station when it requires recharging.

By means of a simple connection it is said to be possible to recharge any radio B battery with the type of charger used for the A battery. Figure 1 illustrates the connections employed.

SOME OTHER PHASES

The charger Fuse C is removed so as to open normal charging circuit. One side of the 110-volt alternating current line is connected with the charger armature at N, the other going to the positive terminal of the B battery through a 110-volt lamp L in series which acts as a current reducing resistance.

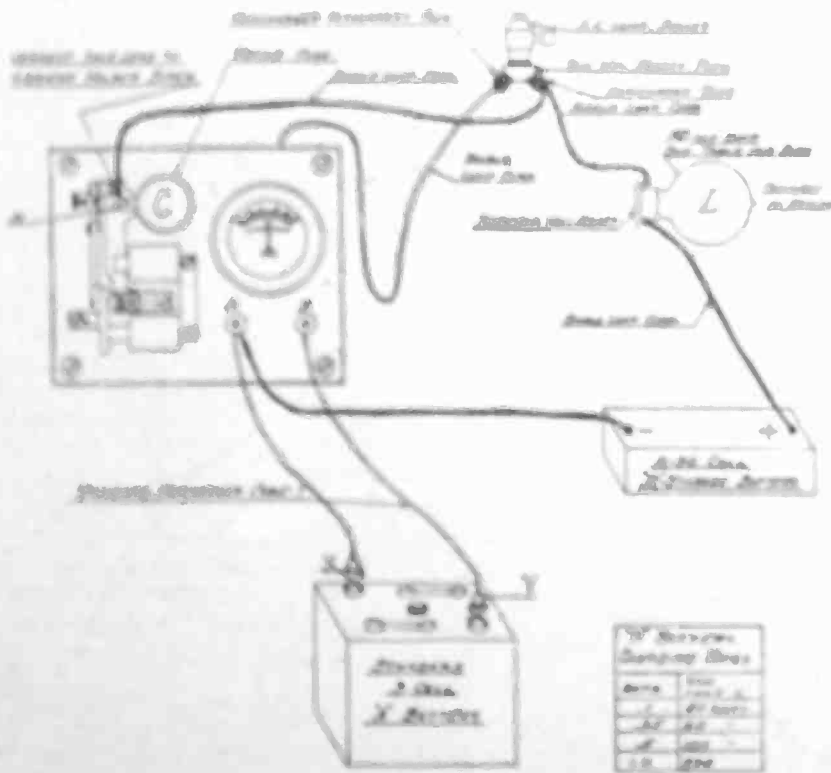
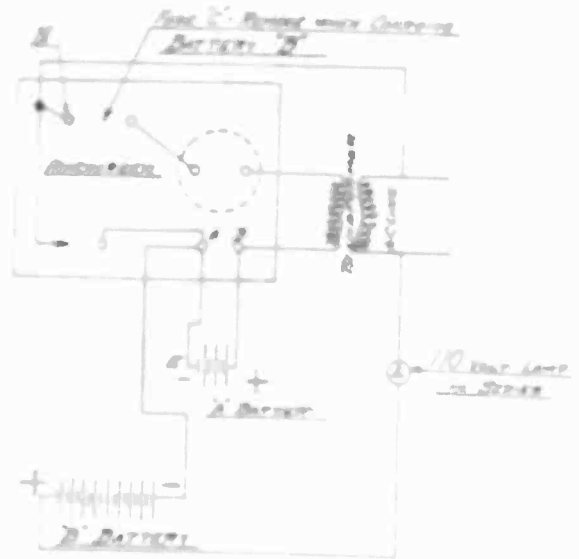


FIG. 2.



SCHEMATIC DIAGRAM

LAMP L BURNS WITH LESS THAN 100 WATT POWER WHEN CHARGING IS IN PROGRESS. IF LAMP IS EXTRA BRIGHT, TURN OFF POWER IMMEDIATELY AND REVERSE B BATTERY TERMINALS A & B.

FIG. 1

The charging circuit is completed from the negative terminal of B battery to terminal A of the charger.

The three-cell six-volt A battery is connected with the charger terminals A and B in the usual manner. As soon as the alternating current supply is turned on the charger armature should start to vibrate and act as a rectifying valve, completing the B battery charging circuit during the proper part of the A. C. cycle, thereby delivering to the B battery a series of intermittent uni-directional current impulses.

THIS IS NECESSARY

It is necessary that either the positive or negative pole both of A and B battery be connected with the charger terminal A. If this is not done B battery will discharge instead of charge, as indicated by the series lamp L glowing with intense brilliancy. When connections have been properly made and B battery is charging this lamp burns dimly.

A simple method of making the proper connections is shown in Figure 2. The material required may be purchased at a cost of less than \$2 from any electrical dealer, and consists of one two-way socket plug or duplex current tap, one attachment plug, one porcelain wall receptacle, one 10 foot lamp cord.

(Continued From Page 18)

You will enjoy this short story wherein radio plays an important part.

Inductive Reasoning

By H. H. Moulton

IT SEF where the state police and the revenue agents are goin' ta use radio to catch bootleggers that come over the border," Samuel Havens remarked as he tossed aside the evening paper.

"Yes? Why, I read only the other day that they'd caught several of them who had radio sets in their automobiles," his wife commented.

"Well, well! Looks as if we listeners-in 'ud hear some lively stuff pretty soon. 'Fore long we won't hafta buy newspapers—we'll jus' pull up our chairs 'round the table at night and let the old horn tell us everything that happened durin' the day. There'll be a dozen or more broadcastin' stations in the neighborhood and each one'll send out a different line o' dope—one'll be all sportin' news, another'll handle general stuff, 'n'ther'll be another one sendin' out fashion notes and the latest cookin' recipes for the wimmin folks! Why, they're already givin' out bedtime stories for the kids!"

Minerva Havens' enthusiastic spouse paused to rekindle his odoriferous pipe.

"Rave on, Sam," she said with mock seriousness. "You forgot to say that the bedtime stories interest you more than they do your son!"

"Pshaw! Ma, jus' 'cuz you saw me listenin' real intent like one night you think that tomfoolery held my 'tention. Why, you jus' happened to see me when I wuz makin' a delicate adjustment—or clos tunin'—or whatever ya wanta call it."

"Perhaps so, beloved," the little lady returned with dangerous sweetness, "but isn't it rather strange that you do all of your 'close tuning' when the bedtime stories are being sent; never when there's an operatic piece or an intelligent lecture being given?"

"Aw, you make me sick! I listen to them, too, an' you know it, Ma Havens!" her husband retorted, with an attempt at indignation.

"Maybe you listen, Sam, but you close your eyes and snore real loud, I notice."

"You've got the funniest notions

o' any woman I ever did see. Sittin' there insinuatin' I can't sit through a serious lecture! I s'pose you're the only one with any brains in this family, huh!"

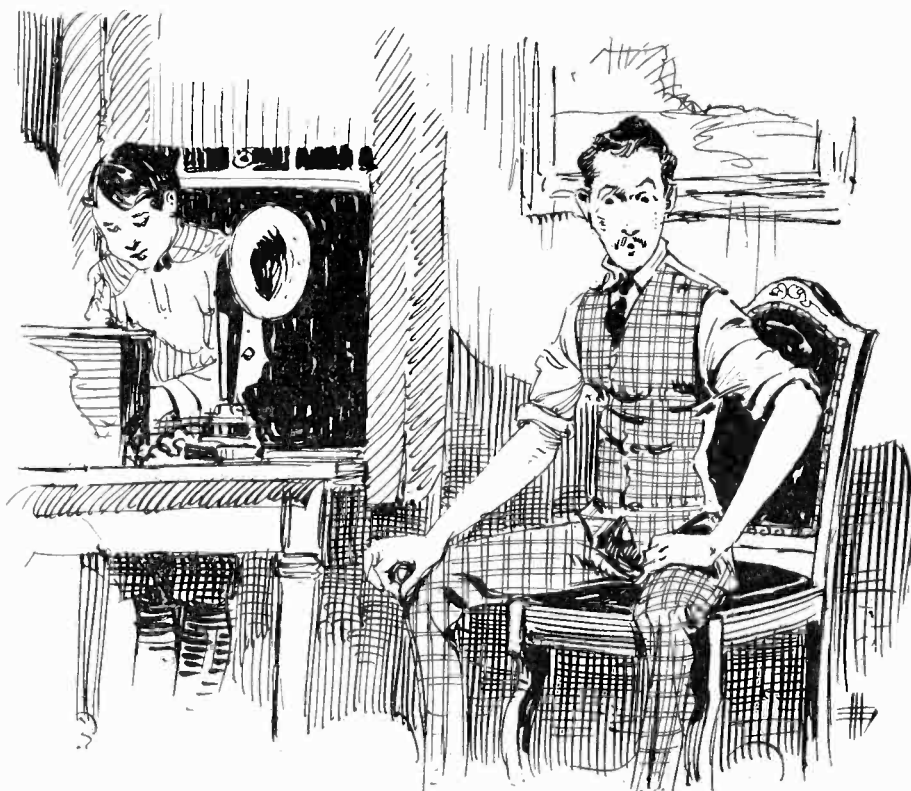
Fortunately, before the domestic tussle gained further headway an interruption in the form of a youth of fourteen summers made its appearance.

"Pa," the red-haired lad exclaimed. "I jes' heard the funnies' talk—it sounded real loud, too. Come on in an' listen."

Havens placed his pipe on the

selves before the little black panel behind which were hidden the sensitive instrument that detected and made audible the waves that constantly flew through the ether. Jimmy brought the rheostat around and gave one of the knobs on the panel a slight turn. The vacuum tubes faintly shone, a crackling and rasping sound came out of the large horn and a few moments later a man's voice ensued therefrom:

... yes, yes ... there are a couple of cases up in Montreal that I've got to go up and take care



Yes! Yes! ... there are a couple of cases up in Montreal ... there's no danger at all.

nearby table and regretfully arose from his comfortable chair. His son led the way into the adjoining room in which were contained the partly purchased, partly home-made receiving instruments.

"Your father won't be interested, Jimmy, unless it's a bedtime story they're sending."

Jimmy Havens emitted a youthful giggle, not loud enough for his parents to hear—nay, for to arouse his father's ire tonight would be foolhardy; he would need a new "B" battery in a few days.

The father and son seated them-

of ... yes, it's coming off in a few days ... what? ... no; there's not a chance in the world; no danger at all ... all right, then, I'll tell Carroll about it in the morning ... good-by."

The voice trailed off into nothingness. Soon the crackling in the horn was resumed. Havens looked at his son with a wild light in his eyes.

"What'd ya hear 'fore I came in, Jimmy?" he demanded.

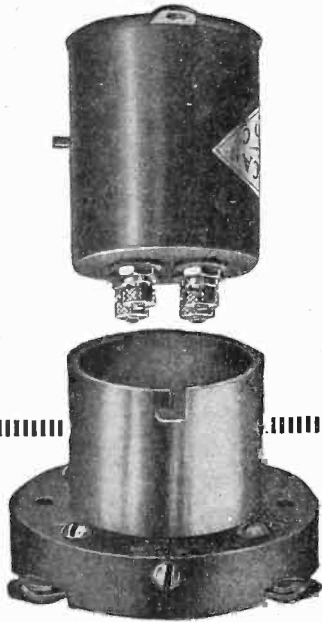
"Oh, this guy gave a lot o' names, an' said something about the 'bor-

(Continued on Page 28)

Department of RADIO ENGINEERING

Radio Topics Institute

N. E. Wunderlich
Chairman Advisory Board



Do You Realize:

That a large quantity of inferior radio apparatus and accessories is being pawned off on the unsuspecting buyer? Why do you ask for "Colgates" even though you may have never used their products before? Just because they have gained your confidence through persistent advertising! Follow that same policy when buying radio supplies.

This Department of RADIO ENGINEERING conducted by Radio Topics Institute makes extensive tests of its advertisers' products. We will be glad to make recommendations to prospective buyers. Inquiries and apparatus for test should be shipped prepaid to Radio Topics Institute, 1112 North boulevard, Oak Park, Ill.

Radio Frequency Amplifiers

Institute Research

A YEAR or so ago, radio-frequency amplification was rather a deep mystery but with the great influx of new radio enthusiasts there has come a demand for the best.

Audio-frequency amplification, indeed, works quite well but the many advantages of radio-frequency amplification, the incoming signals are amplified at their original frequency and by the time that they reach the detector they are of great strength. Thusly, it is possible for one to receive signals which, without the radio-frequency amplification, would be too weak for detection and which, therefore, would not be heard.

Another advantage is the precise selectivity of radio-frequency reception. Stations transmitting cannot be heard until the receiving set is tuned to exactly the frequency of the transmitted wave. All interference from undesired stations is overcome and static as well as other

atmospheric disturbances are reduced to a negligible point.

The radio-frequency transformer illustrated above has come through a most satisfactory test. This particular transformer has a number of distinctive features, prominent among which is the fact that it may be inserted into a standard tube socket. Transformers may be interchanged at will. It is all contained

be used without the socket.

When employing radio-frequency, the tuning point is quite simple. In the diagram is shown a variometer shunted by a variable condenser. Another method is to use spider web or D type variometers connected in series with a variable condenser, the variometer being constructed upon the same shaft as the condenser.

In the diagram, R10 are the radio-frequency transformers and R3, R2, audio-frequency transformers. This makes an ideal combination that will give entire satisfaction. It makes possible the reception of signals when employing a loop or electric-light wire antenna.

When constructing such a set, however, take pains to make it right all the way through, both mechanically and electrically. The 200 ohm potentiometer with variable center contact plays an important part in the circuit, although the circuit will

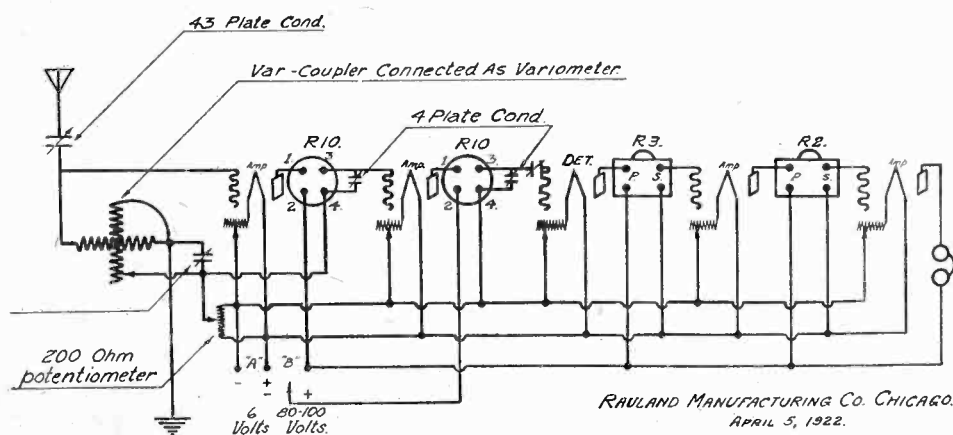


Diagram of connections when using 2 stages of radio-frequency, detector and 2 stages of audio-frequency amplification.

in a neat, nickel-plated shell the same diameter as the standard tubes. It also has a stop and guide pin and the small binding posts make good contact, assuming a correct position on the spring contacts of the socket. It, of course, may

(Continued on Page 41)

Blight of the Underwriters Now Falls on the Radio Field

Radio Receiving Sets, Each Involving About as Much Fire Hazard as a Bathtub, Now Made the Subject of Elaborate Rules, Which Through Widespread Propaganda Are Being Used to Spread Fear and Mistrust Among Radio Amateurs and Property Owners

Radio Equipment and Fire Insurance Regulation

Radio fans should give heed to fire insurance rules in connection with the hooking-up of radio equipment, otherwise the rates on their properties may be raised or the insurance refused entirely, warns the Bureau of Standards of the Department of Commerce, in calling attention to the fact that fire insurance regulations governing the installation of radio apparatus are to be revised.

ABOVE is a copy of the latest piece of fire-insurance fear propaganda. It was sent to newspapers throughout the country for reproduction and delivery to millions of readers on a Sunday morning of last month—obviously with the purpose of arousing fear and mistrust of the hundreds of thousands of amateur radio sets now in use, and so throwing even “wireless” installations into the clutches of the underwriters and their inspectors, in the same way that the wiring business has suffered from Underwriters’ control.

RADIO RECEIVING SET RIVALS WHITE ENAMEL BATHTUB AS A FIRE HAZARD

An ordinary radio receiving set, as every reader of RADIO TOPICS knows, involves about as much fire hazard as a white enamel bathtub.

Even the authors of the Underwriters’ new rules freely admit that antennas installed wholly inside of buildings represent *no fire hazard whatever*.

Such fire hazard as accompanies a radio receiving set, they point out, lies *in the lightning hazard to the antenna* that extends outside of the building.

And how much lightning hazard is that? Isn’t the lightning or fire hazard of an antenna extending outside a dwelling or other structures, only comparable to the light-

ning or fire hazard of any of the following structures?—as much and no more?:

Electric light wires,
Metal flag poles,
Wire clotheslines,
Metal roofs,
Metal cornices,
Telephone wires,
Metal gutters and down spouts.

For years we have all been subjected to these familiar lightning hazards, without the underwriters formulating rules or sending out scare notices that the finding of a metal roof or a metal cornice on a house is sufficient cause to invalidate insurance!

For generations the underwriters have been utterly oblivious to the dangers of metal gutters and downspout. Probably if the said underwriters ever become aware that every gutter and downspout is itself an aerial, pulsating with every radio impulse that threads the ether, doubtless copper gutters and downspouts will also go under the ban. For, indeed, every metal cornice, every tin roof, every metal flagpole, and every fence wire, is an aerial.

But the underwriters being familiar with these objects, and knowing that lightning strikes literally only about one house in a million, have very sensibly raised no lightning hazard scare about these useful exposed metal structures on our houses and buildings.

“IF IT’S ELECTRICAL—IT MUST BE HAZARDOUS!”—THAT’S UNDERWRITER PHILOSOPHY

It is only when anything or any object is electrical or even *seems* to be electrical in character, that the official animosity of the underwriters’ forces is aroused and the machinery of fear propaganda is set to work.

Take the rules for radio receiving sets reproduced herewith. As

guides for the erection of amateurs’ antennas these regulations are excellent and desirable. Mr. W. S. Boyd and his committee which formulated these rules are most competent engineers and have been most faithful in the discharge of their responsibilities. It was their understanding that the rules now promulgated would be tentative only, and would involve no insurance riders or policies.

But no sooner do these excellent rules appear, than their technical elaborateness is immediately seized upon by the underwriters’ bureaus and inspection department—which have recently been holding out grasping hands toward the growing radio field—and these rules are made to serve as clubs for the use of inspectors and inspection authorities who are without enough electrical brains or radio knowledge to perceive the ridiculousness and unfairness of their actions.

As the result of the recent Sunday paper publicity threatening radio owners with having the insurance rates on their property raised or their insurance canceled altogether, fear and consternation have been thrown into the minds of hundreds of thousands of radio users, parents have become alarmed and have forbidden the use or purchase of sets, and landlords have refused to permit innocent and *electrically-inert* wires to be strung across their roofs. The great wave of interest and enthusiasm for radio has suddenly received a body-blow from that long-time deterrent of electrical progress—the underwriters’ system.

The way this fear propaganda works to the misfortune of the lay public and to the injury of the electrical and radio business, is exemplified by the following letter which appeared in the *New York*

Tribune, Saturday, April 29. It tells the story of a hospital patient who, as you read this, probably lies on his sick bed, deprived by the condition of his eyes, of whiling away the hours by reading, and deprived of the enjoyment and relaxation of listening to radio concerts by the fear propaganda of the underwriters.

RADIO FOR HOSPITALS

To the Editor of *The Tribune*:

Sir: I have a relative at the Post-Graduate Hospital who is suffering from an eye affliction, which prevents him from reading. He will be there six weeks. I wished to install a radio, but was refused permission because the fire insurance companies would cancel policies if this were done. Radio entertainment would mean so much to hospital patients that it seems as if something should be done to obtain permission to provide it.

DR. SAMUEL SEMUELS.

So far has the propaganda of fear been carried against radio and so absurd are the restrictions becoming against the amateur putting up a little piece of wire that involves no more electrical or lightning hazard than do metal gutters, downspouts, metal roofs, metal cornices, wire clothes lines and other familiar metal structures, that it is about time for the great army of radio enthusiasts to take a firm stand against the underwriters' unreasonable requirements.

So far as cancellation of insurance on the premises is concerned, our radio friends should be informed that RADIO TOPICS and other investigators have not been able to find any instances in which insurance has ever been canceled because of violations of the Electrical Code (of which the new radio rules form a part).

HALF OF BUILDINGS WIRED CONTAIN SAFE VIOLATIONS OF CODE

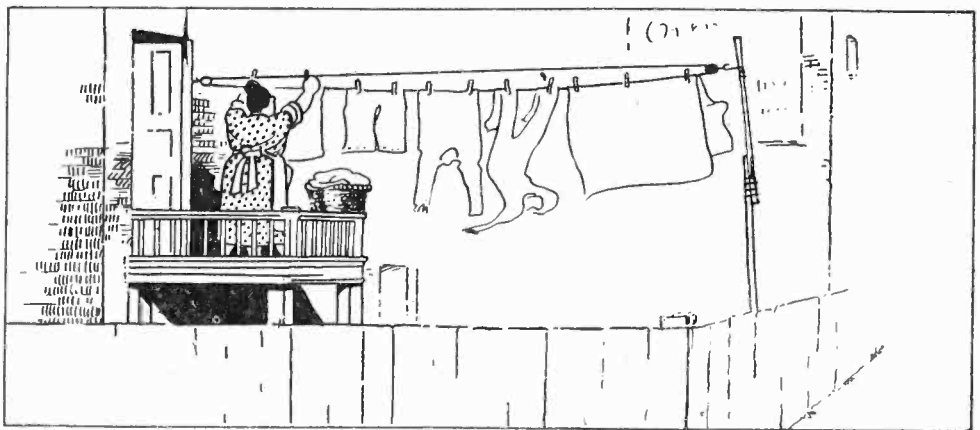
If indeed the underwriters ever set out to enforce such regulations and to withhold or cancel insurance because of violations of the radio clauses, they would be confronted by the fact that today from half to three-quarters of the houses and buildings on this continent contain violations of the code as re-

spects electrical wiring. And obviously any attempt to cancel insurance because of Code violations, either radio or wiring, would wipe out half to three-quarters of the fire insurance business, besides demoralizing the insurance business generally. Of course, the insurance managers and the local agents, being sensible business men, will not permit the vagaries of their inspection bureaus to go this far and put themselves out of business.

"If I have an antenna on my house, and my house burns down from any cause, will the insurance companies use as a pretext for refusing to pay my insurance the fact that my antenna is not put up in accordance with their rules?" This

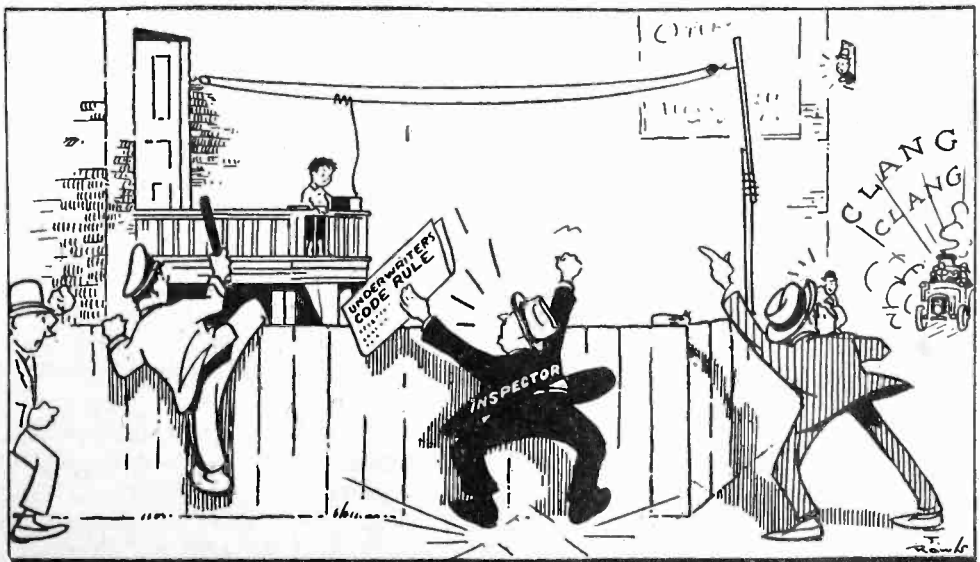
is a question which has disturbed the sleep of many a radio enthusiast and property owner since the start of the underwriters' campaign against radio. The answer, of course, is found in the insurance companies' sensible practice of paying their losses without any question of Code violations, in spite of the fact that from half to three-quarters of the houses insured contain perfectly safe violations of the National Electrical Code. If the insurance companies ever raised the point of Code violations as a reason for resisting payment of their losses the insurance protection on no man's house would be safe and the insurance business would be demoralized!

**When Is a Harmless Wire or a Metal Object a Terrible Fire Hazard?
Answer: When the Underwriters Think It's Electrical!**



Mrs. O'Flaherty's wire clothesline has never heretofore been branded as a horrible fire hazard by anybody—not even by the underwriters.

Nor have the revered underwriters in their wisdom ever broadcasted fear propaganda warning the public against metal gutters, downspouts, wire fences, tin roofs, metal flagpoles, metal cornices, etc., with the threat of having insurance policies cancelled or rates raised on premises so equipped.



But if little Willy O'Flaherty connects up his harmless \$4.50 crystal receiving set (containing not even a dry battery) to his mother's non-hazardous wire clothesline, there is at once created a terrible fire hazard—in the minds of the underwriters, their inspectors, and now also, alas, the public who are being frightened by propaganda like the sample reproduced on the opposite pages.

Proposed Revision of Rule 86 of the "National Electrical Code" on Radio Equipment

With Discussion and Explanation Prepared by the Radio Laboratory of the Bureau of Standards.

The following report of the Technical Subcommittee on Radio Equipment (National Electrical Code Rule 86) has been approved by the Standing Committee on Signal Systems, Wireless and Lightning, and in co-operation with Mr. Dana Pierce, Chairman of the Electrical Committee, is promulgated in order to produce field experience to substantiate the wisdom of the proposed rules before final submission to the Electrical Committee for incorporation into the 1923 edition of the National Electrical Code. Neither the Standing Committee nor the Electrical Committee has authority to suspend or replace the present rule 86 of the National Electrical Code, but this report is issued by the authority granted to the chairman of the Standing Committee and the Chairman of the Electrical Committee for the information of inspection departments having jurisdiction over the application of the Code.

THE following requirements are submitted as proposed revisions of Rule 86 National Electrical Code:

RADIO EQUIPMENT

NOTE: These rules do not apply to the Radio Equipment installed on shipboard.

IN SETTING UP RADIO EQUIPMENT ALL WIRING PERTAINING THERETO MUST CONFORM TO THE GENERAL REQUIREMENTS OF THIS CODE FOR THE CLASS OF WORK INSTALLED AND THE FOLLOWING ADDITIONAL SPECIFICATIONS: FOR RECEIVING STATIONS ONLY.

ANTENNA

a. Antennas outside of buildings shall not cross over or under electric light or power wires of any circuit of more than six hundred (600) volts or railway trolley or feeder wires, nor shall it be so located that a failure of either antenna or of the above-mentioned electric light or power wires can

result in a contact between the antenna and such electric light or power wires.

Antennas shall be constructed and installed in a strong and durable manner and shall be so located as to prevent accidental contact with light and power wires by sagging or swinging.

Splices and joints in the antenna span, unless made with approved clamps or splicing devices, shall be soldered.

Antennas installed inside of buildings are not covered by the above specifications.

LEAD-IN WIRES

b. Lead-in wires shall be of copper, approved copper-clad steel or other approved metal which will not corrode excessively and in no case shall they be smaller than No. 14 B. & S. gauge except that approved copper-clad steel not less than No. 17 B. & S. gauge may be used.

Lead-in wires on the outside of buildings shall not come nearer than four (4) inches to electric light and power wires unless separated therefrom by a continuous and firmly fixed non-conductor that will maintain permanent separation. The non-conductor shall be in addition to any insulation on the wire.

Lead-in wires shall enter building through a non-combustible non-absorptive insulating bushing.

PROTECTIVE DEVICE

c. Each lead-in wire shall be provided with an approved protective device properly connected and located (inside or outside the building) as near as practicable to the point where the wire enters the building. The protector shall not be placed in the immediate vicinity of easily ignitable stuff, or where exposed to inflammable gases or dust or flyings of combustible materials.

The protective device shall be an approved lightning arrester which will operate at a potential of five hundred (500) volts or less.

The use of an antenna grounding switch is desirable, but does not obviate the necessity for the approved protective device required in this section. The antenna ground-

ing switch if installed shall, in its closed position, form a shunt around the protective device.

PROTECTIVE GROUND WIRE

d. The ground wire may be bare or insulated and shall be of copper or approved copper-clad steel. If of copper the ground wire shall not be smaller than No. 14 B. & S. gauge and if of approved copper-clad steel it shall be not smaller than No. 17 B. & S. gauge. The ground wire shall be run in as straight a line as possible to a good permanent ground. Preference shall be given to water piping. Gas piping shall not be used for grounding protective devices. Other permissible grounds are grounded steel frames of buildings or other grounded metallic work in the building and artificial grounds such as driven pipes, plates, cones, etc.

The ground wire shall be protected against mechanical injury. An approved ground clamp shall be used wherever the ground wire is connected to pipes or piping.

WIRES INSIDE BUILDINGS

e. Wires inside buildings shall be securely fastened in a workmanlike manner and shall not come nearer than two (2) inches to any electric light or power wire unless separated therefrom by some continuous and firmly fixed non-conductor making a permanent separation. This non-conductor shall be in addition to any regular insulation on the wire. Porcelain tubing or approved flexible tubing may be used for encasing wires to comply with this rule.

RECEIVING EQUIPMENT GROUND WIRE

f. The ground conductor may be bare or insulated and shall be of copper, approved copper-clad steel or other approved metal which will not corrode excessively under existing conditions and in no case shall the ground wire be less than No. 14 B. & S. gauge except that approved copper-clad steel not less than No. 17 B. & S. gauge may be used.

The ground wire may be run inside or outside of building. When receiving equipment ground wire is run in full compliance with rules

for Protective Ground Wire, in Section d, it may be used as the ground conductor for the protective device.

FOR TRANSMITTING STATIONS ANTENNA

g. Antennas outside of buildings shall not cross over or under electric light or power wires of any circuit of more than six hundred (600) volts or railway trolley or feeder wires, nor shall it be so located that a failure of either the antenna or of the above mentioned electric light or power wires can result in a contact between the antenna and such electric light or power wires.

Antennas shall be constructed and installed in a strong and durable manner and shall be so located as to prevent accidental contact with light and power wires by sagging or swinging.

Splices and joints in the antenna span shall, unless made with approved clamps or splicing devices, be soldered.

LEAD-IN WIRES

h. Lead-in wires shall be of copper, approved copper-clad steel or other metal which will not corrode excessively and in no case shall they be smaller than No. 14 B. & S. gauge.

Antenna and counterpoise conductors and wires leading therefrom to ground switch, where attached to buildings, must be firmly mounted five (5) inches clear of the surface of the building, on non-absorptive insulating supports such as treated wood pins or brackets equipped with insulators having not less than five (5) inch creepage and air gap distance to inflammable or conducting material. Where desired approved suspension type insulators may be used.

i. In passing the antenna or counterpoise lead-in into the building a tube or bushing of non-absorptive insulating material shall be used and shall be installed so as to have a creepage and air gap distance of at least five (5) inches to any extraneous body. If porcelain or other fragile material is used it shall be installed so as to be protected from mechanical injury. A drilled window pane may be used in place of bushing provided five (5) inch creepage and air gap distance is maintained.

PROTECTIVE GROUNDING SWITCH

j. A double-throw knife switch having a break distance of four (4) inches and a blade not less than one-eighth (1/8) inch by one-half

(1/2) inch shall be used to join the antenna and counterpoise lead-ins to the ground conductor. The switch may be located inside or outside the building. The base of the switch shall be of non-absorptive insulating material. Slate base switches are not recommended. This switch must be so mounted that its current-carrying parts will be at least five (5) inches clear of the building wall or other conductors and located preferably in the most direct line between the lead-in conductors and the point where ground connection is made. The conductor from grounding switch to ground connection must be securely supported.

PROTECTIVE GROUND WIRE

k. Antenna and counterpoise conductors must be effectively and permanently grounded at all times when station is not in actual operation (unattended) by a conductor at least as large as the lead-in and in no case shall it be smaller than No. 14 B. & S. gauge copper or approved copper-clad steel. This ground wire need not be insulated or mounted on insulating supports. The ground wire shall be run in as straight a line as possible to a good permanent ground. Preference shall be given to water piping. Gas piping shall not be used for the ground connection. Other permissible grounds are the grounded steel frames of buildings and other grounded metal work in buildings and artificial grounding devices such as driven pipes, plates, cones, etc. The ground wire shall be protected against mechanical injury. An approved ground clamp shall be used wherever the ground wire is connected to pipes or piping.

OPERATING GROUND WIRE

l. The radio operating ground conductor shall be of copper strip not less than three-eighths (3/8) inch wide by one-sixty-fourth (1/64) inch thick, or of copper or approved copper-clad steel having a periphery, or girth (around the outside) of at least three-quarters (3/4) inch (for example a No. 2 B. & S. gauge wire) and shall be firmly secured in place throughout its length. The radio operating ground conductor shall be protected and supported similar to the lead-in conductors.

OPERATING GROUND

m. The operating ground conductor shall be connected to a good

permanent ground.* Preference shall be given to water piping. Gas piping shall not be used for ground connections. Other permissible grounds are grounded steel frames and artificial grounding devices such as driven pipes, plates, cones, etc.

POWER FROM STREET MAINS

n. When the current supply is obtained directly from street mains, the circuit shall be installed in approved metal conduit, armored cable or metal raceways.

If lead covered wire is used it shall be protected throughout its length in approved metal conduit or metal raceways.

PROTECTION FROM SURGES, ETC.

o. In order to protect the supply system from high-potential surges and kick-backs there must be installed in the supply line as near as possible to each radio-transformer, rotary spark gap, motor in generator sets and other auxiliary apparatus one of the following:

1. Two condensers (each of not less than one-half (1/2) microfarad capacity and capable of withstanding six hundred (600) volt test in series across the line and mid-point between condensers grounded; across (in parallel with) each of these condensers shall be connected a shunting fixed spark gap capable of not more than one-thirty-second (1/32) inch separation.

2. Two vacuum tube type protectors in series across the line with the mid-point grounded.

3. Non-inductively wound resistors connected across the line with mid-point grounded.

4. Electrolytic lightning arresters such as the aluminum cell type.

In no case shall the ground wire of surge and kick-back protective devices be run in parallel with the operating ground wire when within a distance of thirty (30) feet.

The ground wire of the surge and kick-back protective devices shall not be connected to the operating ground or ground wire.

SUITABLE DEVICES

p. Transformers, voltage reducers, keys, and other devices employed shall be of types suitable for radio operation.

DISCUSSION AND EXPLANATION OF THE ABOVE PROPOSED REVISION OF RULE 86 ON RADIO EQUIPMENT—

These rules do not apply to radio equipment installed on shipboard,

(Continued on Page 32)

RADIO TOPICS

The National Radio Monthly

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RADIO TOPICS is on sale the 10th of preceding month. Manuscript and advertising forms close the 22nd of second month preceding issue.

OAK PARK, ILL., JULY-AUGUST, 1922

CHANGE OF PUBLICATION DATE

A change has been effected in our publishing dates beginning with this one which we are calling the July-August issue. The next number, the September issue, will be on sale August 10. Thus the readers will get the latest news and each issue will remain alive for almost two months, a distinct advantage to all advertisers.

Manuscripts and advertising copy must now be in our hands the 18th of the second month preceding issue in which it is to appear. Copy for the September issue should be sent in before July 18.

Subscriptions and contracts will be moved forward accordingly.

ANOTHER STEP FORWARD

ONLY a short time back we were marveling at the discovery of crystal minerals which could be used to detect radio signals. Then, came the two element vacuum tube, followed by the three element tube. Along with this came Armstrong's regenerative and feed-back circuit. The origination of the ball type variometer by Paul Godley employing the tuned-plate regenerative circuit was thought to be the ultimate in receiving apparatus. Hundreds of thousands of dollars have been expended, court battles too numerous to mention have been fought, all over this particular circuit, which, a month ago, was acknowledged as the supreme. The Radio Corporation of America and its associated companies went to great efforts in securing for themselves the exclusive rights of the patents on this circuit.

It is generally admitted that radio is in its infancy but surely no one looked for any immediate, startling development. But it had to come, and it did.

On the night of June seventh, before the assembled body of the Institute of Radio Engineers, Edw. H. Armstrong presented four of his newly discovered circuits which are rightly termed Super-Regenerative. Now, they are the ultimate in receiving circuits. Greater selectivity in tuning, ever so much greater amplifications and comparatively simple in construction.

Whether the Super-Regenerative will junk the original regenerative remains to be seen. The manufacturers were quick to realize the possible importance. It is reported that a conference was held with Mr. Armstrong by the thirteen licensees under the former patents and that these same manufacturers will be licensed to manufacture under the new patents, with the same royalty agreement.

This is another stride forward in the direction of future developments, more of which is bound to come from time to time.

THE TIDE TAKES A TURN

A few months ago the tide of radio interest was sweeping in, bringing with it hundreds of thousands of people that wanted to purchase apparatus, hundreds of new manufacturers, thousands of new dealers, and schemers of all sorts.

Everyone who had a slight suspicion of what radio meant became a radio expert over night. Millions of dollars have been spent and are still being spent. In an editorial a few months ago we predicted a slump that was bound to come during the summer season and also explained and warned of an inflated market. But some people cannot be told; they must learn by experience, which is probably the best way after all.

And now the tide is beginning to turn, leaving many high, dry and broke upon the beach of finance and business. Retail buying has dropped off about seventy per cent and the dealer is finding his shelves stacking up with dead stock. The wherewith to pay his many bills is the question that some are unable to answer, with the result that failures are being reported every day.

The opinion seems to be prevalent that the general interest will come back stronger than ever this fall. Possibly it will; we sincerely hope so, though we believe that it will settle down to a steady normal business averaging about sixty per cent of what it was during the spring. Markets have changed and it will be a difficult proposition to sell anything but the best. Dealer as well as prospective buyer can well afford to use discretion. You will not go wrong on apparatus or supplies that are consistently advertised and you won't go wrong in dealing with concerns that do the same.

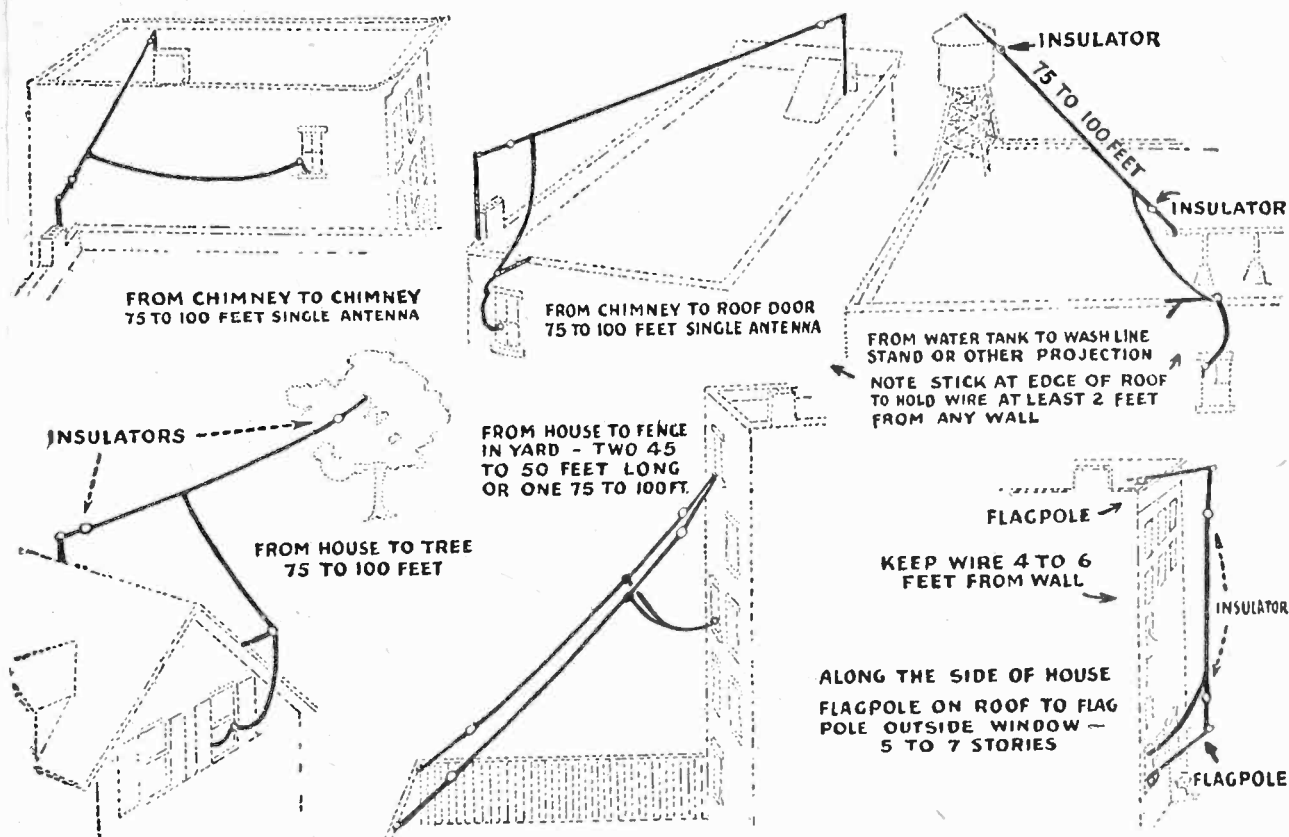


Diagram showing a few easy methods to install antennas upon apartment houses or suburban homes.

Installing the House Antenna

IMPORTANT as the correct connections of your radio set may be, of equal value for good reception is the installation of your antenna in the best possible manner. The accompanying chart explains some of the more common and effective methods of putting up your antenna.

Note that the antenna may be horizontal, vertical or diagonal to the earth. For average crystal receiving sets the length may vary from 75 to 90 feet, with lead-in wires, which will bring the sum total to not more than 115 feet. Note the following facts:

1. Keep the antenna and lead-in wires from 3 to 5 feet away from the building. If erected on a roof place the wires on poles at least 6 feet high. If running from the house to a fence or to a tree, connect your insulators 3 to 5 feet away from the building and fence.
2. If possible, use a single wire for receiving, but if this is not possible, run 2 wires 35 to 45 feet long and at least 3 feet apart.
3. For best results, connect your lead-in to one end of the antenna, not to the middle, for such connection gives the advantage of greater effective length.
4. The antenna may be put up between two houses; from chimney to chimney; from chimney to roof-door; between wash lines on roof; from roof or window to tree or fence; from one window at one end of a flat to another window 30 to 40 feet or more to a side.

Some radio enthusiasts have had very good results by connecting to a metal bedspring, to the electric doorbell wires, to wires run around the moulding near the ceiling of a room. In fact, almost anything may be used for an antenna if your set is sufficiently sensitive and if you are near to a powerful broadcasting station.

With the usual small crystal set, an outdoor antenna is, however, always recommended. Sometimes if your aerial fails to give satisfaction try changing its direction. This occasionally helps considerably.

Inductive Reasoning

(Continued from Page 20)

der, an' said somethin' about gettin' a good stiff price."

"What wave length are you using?"

"It's about 450, but it doesn't make much difference. I wouldn't tune him out at all. Must be some guy right close."

"Didn't that sound like Oscar Billings' voice to you, son?"

"Yep; that's what I wuz thinkin' right along. He ain't got a radio set, though."

"I could swear it was Billings," the boy's father said, arising and walking toward the door. "Let me know quick if ya hear anything else like that."

"All right, dad."

Mrs. Havens looked up from the newly darned sock in her hand.

"What! Is the Peter Rabbit story over so soon?" she chided.

"Lissen, Ma; all jokin' aside. We jus' heard ol' Oscar Billings talkin' by radio."

"Mr. Billings? The man next door? Why, I didn't know they had a radio station. I saw Mrs. Billings only this afternoon and she didn't mention a word about one."

"That's just' it, Ma. 'Course she wouldn't. She's too wise."

"W-why—I don't understand—what—"

"Ma Havens," he began, lowering his voice and assuming his most confiding tone, in order that the morsel he was about to offer might seem unusually choice, "Oscar Billings is a bootlegger!"

"W-h-a-t!"

Mrs. Havens sat upright in the wicker chair with such suddenness that the multitude of socks, together with her sewing basket, went tumbling down to the floor.

"S'fact!" Samuel declared, strutting around the room, thumbs beneath his suspenders, in the manner of a man bearing important and confidential news.

"Why, I never heard of such a thing! Who have you been listening to now, Sam Havens?"

"Ah, you do not begin to realize, my dear Mrs. Havens, the wonders of radio. Our son just captured a most mysterious message—I heard Billings himself talking—tell about some booze deal of his up in Canada."

"You must be mistaken, Sam. Mr. Billings is a respectable citizen; furthermore, he is one of the leading lawyers in this town," Minerva declared in defense of the

husband of her next-door neighbor.

"Makes no difference, Ma. The best of 'em are in the game. Remember the little prop'sition I had offered to me las' winter?"

"Humph! They wanted you to be a tool, Sam Havens—what'd they call it—stool-pigeon, that's it!"

"My goodness, you're in a pleasant frame of mind tonight. You're as sarcastic as they make 'em."

"Truth hurts, don't it, Pa?"

"Not half as much as your lies do. I'm goin' ta put a flea in the sheriff's ear, though, 'bout this feller Billings," he exclaimed, turning the conversation into impersonal channels.

"That's just like you—sending our entire police force off on a wild goose chase so that crooks can come in and rob us right and left."

"O-o-h!" the long-suffering husband moaned. "You wouldn't be satisfied if you had a million dollars!"

"Not unless I had you along with it, dear," she replied sweetly, picking up the miscellany of the sewing basket that was strewn at her feet.

Havens relit the smelly pipe one more and resumed his pacing back and forth. His hands clasped behind him, his head slightly bowed, he was the picture of deep meditation. His wife had her work before her once again and was busily darning Sam's eighth sock.

From behind the closed door that connected with Jimmy's room came a jazzy fox-trot. Apparently the evening concert was in progress. The music sounded rather good, Sam reflected. His thoughts reverted to his next-door neighbor. Billings was, as his wife had remarked, one of the most prominent lawyers in town. He had been on the mayoralty ticket at the last election and had given his lucky opponent a hard run. In the face of such evidence Sam's faith in Billings was buoyed up—yet—that conversation—

"It might interest you to know, Sam Havens, that Mr. Billings has been home for the past three days with a severe cold," Minerva announced.

"Pshaw! that might jus' be an excuse to cover up some shady doin's. That's an ol' gag."

"If you were as suspicious of your enemies as you are of your friends," she scolded, "you probably wouldn't be stung so often."

Sam couldn't think of any fitting

retort, so he swallowed his rage, jammed his shabby fedora on his head and slammed the door as he went out. That was the best way, he told himself resentfully, to get the best of a woman—they'd always have the last word if you stayed within earshot.

He struck off down the darkened street in a jaunty manner, crossed over at the corner and headed for Tulley's pool parlor. Five minutes later he was sitting on the edge of an unused pool table, confiding his secret in the ear of the short, fat sheriff. That individual listened intently, his chubby hand unconsciously rubbing the shiny star that adorned his checkered vest.

"Now, r'member, Pete, this 'ere information jus' sort o' come to yer ears in a roundabout way. Don't want my name connected with it at all."

"Don't worry, Sam; nobody'll ever know who put me wise. You're sure it was Billings, though?" the sheriff queried in a monotone.

"Absolutely sartain, Pete! I'd know his voice anywhere."

"Well, leave the rest to me, Sam. If there's anything that ain't straight goin' on, you know who'll enforce the law!" he boasted.

It would not be amiss to remark at this point that Sheriff Tubbs' political aspirations had at numerous times been interfered with by the opposition displayed by the Hon. Oscar Billings. Their respective political parties fought keenly at each election, and more than once had the enterprising lawyer run amuck of the sheriff in the courtroom.

After Havens had joined a group of pool players at the next table the sheriff turned over in his mind the news that he had just heard. If it was true, he mused, that Billings was mixed up in any booze deal—hmm—what good propaganda for next election!

* * * * *

The next day, when it became common knowledge that Mr. Oscar Billings had taken the No. 7 D. & H. flyer for Monreal, the hearts of several individuals fluttered with delightful anticipation.

"Wild goose chase, eh?" Havens muttered in the general direction of his wife. "Thought I wuz a fool last night."

"Yes," Minerva assented with an ambiguity that troubled her husband.

The evening meal passed in silence from then on, save when Jimmy broke the stillness of the

heavily charged atmosphere with innocent questions, to which it is feared he did not receive very enlightening replies.

The next evening as Samuel Havens was returning from the lumber-yard in which he worked, he met his son. Together they walked toward the little two-family house where Ma Havens was preparing dinner.

"Say, Pa," the boy began, "the funnies' thing happened this afternoon."

"Well?" Havens mumbled inquiringly.

"I wuz lissenin' in and all of a sudden I heard Ma's voice comin' out of the loud-teller. I went out in the other room and there wuz Ma talkin' over the phone."

"Over the telephone!" Sam vociferated.

"Yop. An' do ya r'member las' night when we heard Billings' voice? Well, he wuzn't talkin' into a radiophone at all. He wuz jus' talkin' over the phone to a guy in town."

The elder Havens stared at his son in amazement. They were approaching the house now and he reduced his gait, struggling for time in which to absorb this incredulity.

"That's absurd, Jimmy," he finally stammered. "W-why, how c-could ya hear what wuz bein' said over the phone with yer radio?"

"Easy, Pa," the boy replied, cheerfully. "Ya se, my aerial runs the same way that the telephone wires do and the induction from them wuz picked up by the aerial and I heard what wuz bein' said."

They were half-way up the stoop by now and Havens laid a restraining hand on his son's shoulder.

"Are ya absolutely sartain 'bout that, Jimmy?"

"Yop; that's why I couldn't tune out. When anybody wuz talkin' over the phone in our neighborhood I couldn't hear the music—they drowned me out."

"Does Ma know 'bout this, son?"

"Yop. We doped it all out together this afternoon. Ma said she'd read 'bout somethin' like it before. Ma's been studyin' up on radio, ya know."

"Humph! Lot she knows about it!"

Silence for a moment, then:

"Well, come on in, Jimmy; s'pose I gotter face the music."

Minerva Havens, however, did not intimate to her husband that she was familiar with the phenomenon that had transpired the previous

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night and again that afternoon. Throughout the evening she displayed little interest in radio, confining her conversation to routine events and the usual gossip of the day.

Shortly after 8 o'clock the door-bell rang. Minerva left the room and returned shortly, followed by Sheriff Peter Tubbs.

"Hi there, Sam!" the officious little man began. "Say, what kind of a bum steer did you hand me last night, anyway?"

"W-why, wassa matter?" came

from Sam, his face turning very pink.

"Why, dammit, man, I spent over \$5 of the county's money telegraphin' up to Montreal. Billings was up there on a case all day. He's up there defendin' Joe Carroll in that lumber case. Where'd ya get yer tip, anyway?" he demanded.

"Er—er—why, Jimmy picked up that strange message by wireless the other night, an'—"

"Sam Havens!" his wife interrupted loudly, "don't you dare go and put the blame for that on my Jimmy! You know right well who

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worked up that crazy notion—Jimmy didn't dream of such a thing!"

The tirade continued for for or five minutes. Havens squirmed about in his chair uneasily, his face flushed with anger and embarrassment. The sheriff was enjoying himself hugely. Even Jimmy, though they did not know it, had his ear glued to the door of the next room, suppressing numerous giggles.

Finally Sam Havens got the sheriff to one side and whispered in his ear: "Kin I fix it up with ya, Pete—y'know—the money ya spent for telegraphin', 'n all?"

"W-e-ll, 'tain't 'zactly right, Sam, y-understand—yet, of course—if——"

When Sheriff Tubbs returned to Tulley's pool parlor twenty minutes later the habitues of that place were dumfounded to hear him order a round of smokes (a round of anything else being impossible) for the house.

There were about two dozen fellows in the room and Old Man Tulley handed out his straight fifteen-centers. Tubbs laid a new, crisp five-dollar bill on the counter, pocketed the change and walked toward the door, leaving the loungers exchanging opinions as to this unusual and unprecedented showing of generosity.

But the sheriff knew. Election day was coming around once more.

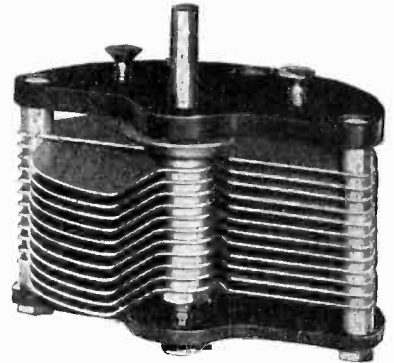
COMPLETION OF PROCESS

(Continued From Page 19)

The two-way socket plug is screwed into the lamp socket and the standard charger attachment plug screwed into one side. An attachment plug is inserted in the other side of the current tap, one lead being connected in series with the 110-volt lamp L of the proper size, the other lead running direct to screw N of the vibrator assembly. The other terminal of lamp L is connected with the positive terminal of B battery running to terminal A of the charger. Fuse C of the charger is then removed, A battery connected and lamp socket on.

It is impossible to charge both A and B battery at the same time, as with fuse C in place the B battery will discharge through the transformer secondary. As the charger ammeter is not connected with the fuse is out this instrument does not indicate the charging rate B battery. When lamp L burns dimly the batteries are charging properly, no other indication is required.

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THE RADIO SEARCHLIGHT

The radio searchlight, a method by which radio waves transmitted from a broadcasting station can be reflected in any desired direction, just as light rays are directed from a searchlight, was announced by Senatore Guglielmo Marconi in his address before a joint meeting of the Institute of Radio Engineers and the American Institute of Electrical Engineers in New York, Tuesday night, June 20.

At present radio waves, upon leaving the antenna, scatter in all directions. His apparatus, which in no way resembles a searchlight, but is a series of wires arranged in a special way on towers or masts, sends the message through the ether in one direction only, Marconi said. He amplified his words by a demonstration in the hall. Messages transmitted were picked up clearly on one side of the room but could scarcely be heard with similar receiving apparatus on the other, and vice versa.

With his system of reflectors, Marconi stated that he had successfully conducted radio telephone conversations between London and Birmingham, a distance of 100 miles. This is a record in long distance radio transmission and reception with very short waves. In all these experiments the wave length varied from one to twenty meters.

The reflectors make it possible for the receiving station to reproduce a telephone song or speech about 200 times louder than is now possible and without distortion. The transmitting aerial can be used both for transmitting and receiving at the same time.

"In these days of broadcasting, it may still prove to be very useful to have a practically new system which would be to a very large degree secret when compared to the usual kind of radio," said Marconi.

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Marconi described a revolving transmitter and reflector which acts as a kind of wireless lighthouse or beacon. "By means of the revolving beam," he stated, "it is possible for ships to ascertain in thick weather the bearing and position of the lighthouse."

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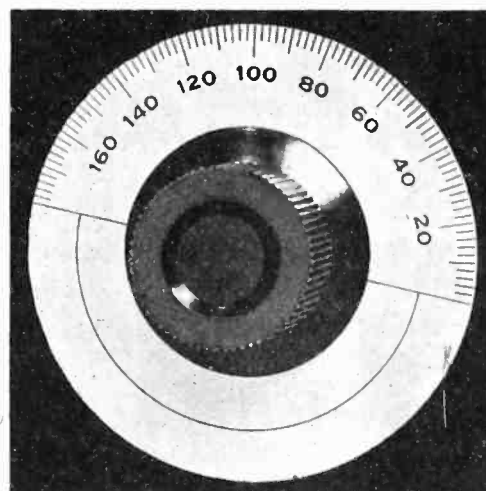
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PROPOSED REVISION OF
RULE 86

(Continued from Page 25)

but have been prepared with reference to land stations.

RECEIVING EQUIPMENT

a. *Antenna* — Indoor receiving antennas are not included within the requirements of this proposed rule, which provides for the protection of radio equipment against lightning. Indoor receiving antennas and auxiliary apparatus are, however, included in the general requirements covering the wiring of signal systems, for it is obviously desirable to insure, for example, the freedom of all receiving apparatus from contact with electric power circuits either inside or outside of buildings.

It is desirable that electrical construction companies install radio antennas and apparatus for persons who are not familiar with electric wiring. This will tend to insure the installation of antennas and apparatus in a strong and durable manner. It is important that antenna wire be used in such size and tensile strength as to avoid its coming in contact with any electric power wires whatsoever.

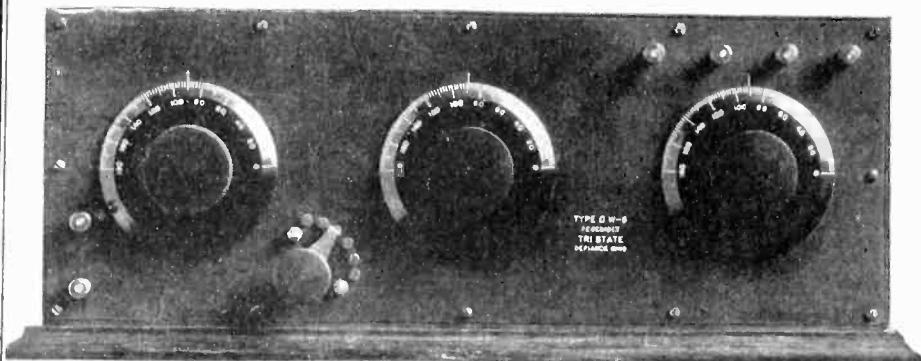
The size and material of which the antenna is made should depend, to some extent, upon the length of the span which the antenna must bridge. It is suggested that for the ordinary receiving antenna about 100 feet long No. 14 B. & S. gauge soft drawn copper wire can safely be used. If other materials are used, the size which is chosen should be such as to insure tensile strength at least equal to that of the No. 14 soft copper wire suggested above.

The requirements covering splices and joints in the antenna span are for the purpose of avoiding accidental falling of such wires upon light or power wires of less than 600 volts where it is found necessary to cross such lines. The rules, it will be noted, permit crossings with lines of 600 volts or less, if they do not happen to be trolley wires or feeders to trolley wires. In such a case, it is desirable to use wire of a larger size than No. 14 B. & S. gauge in order to minimize the chance of accidental contact of the antenna with the power wires.

The interchangeable use of copper and of approved copper-clad conductor is suggested on account of the fact that these two kinds of wires are practically equivalent

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in their conductivity for high-frequency current.

b. *Lead-in Wires*—No mention is made of the insulation from the building of the receiving antenna or lead-in wire except that this lead-in wire should run through a bushing. The latter provision is chiefly to protect the wiring against the possibility of short-circuiting with electric power lines which may run in the wall and whose location may be unknown to the persons installing the radio equipment. This requirement serves also to protect the antenna lead-in wire against contact with metal lath or other metal parts of the building.

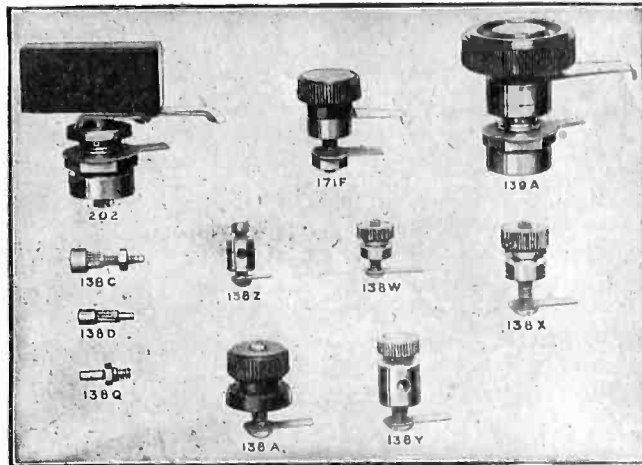
From a signaling standpoint it is desirable to use insulators for receiving antennas in order that wet weather may not cause the antenna to become partly short-circuited to the ground.

c. *Protective Device*—The requirement for a protective device to be connected between the antenna and ground terminals of the receiving set is for the purpose of carrying lightning discharges or less violent discharges caused by induction or by atmospheric electricity to the ground with a minimum chance of damage to the receiving apparatus, building or operator. A fuse is not required as a part of the protective device, though lightning arresters which are provided with fuses will not necessarily fail to receive approval. If a fused lightning arrester is used it makes it less likely that the antenna terminal of a receiving set will be put at a high voltage in case the antenna falls upon an electric light or power wire. The absence of the fuse, on the other hand, makes it possible for the antenna, if it accidentally falls across the power wires, to become fused at the point of contact and thus fall to the ground and eliminate the hazard. The antenna terminal of the receiving set should be connected to the point of junction of the fuse with the arrester.

Lightning arresters may be used inside the building, and in such a case they will receive better protection from moisture and mechanical injury than lightning arresters placed on the outside of a building wall.

Protective devices of reliable manufacture are approved by the Underwriters' Laboratories and can be depended upon to operate at the required voltage. The use of a cheaply constructed, home-made arrester is not recommended, since it may easily get out of order and

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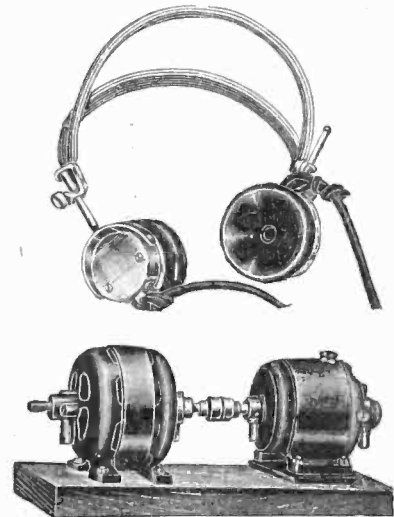
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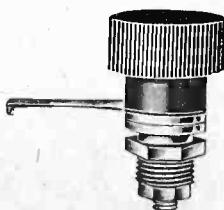
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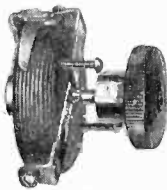
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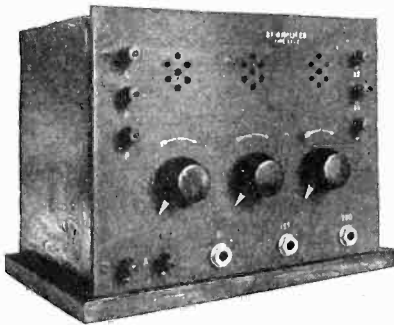
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fail to operate at the low voltage which is desirable. Arresters should be inclosed in such a way as to protect the breakdown gap from dust. One disadvantage of the vacuum tube type of arrester is that it may cease to function without giving warning that it is inoperative. A list of the approved protective devices and ground clamps is contained in the "List of Inspected Electrical Appliances," published by the Underwriters' Laboratories. This list is revised semi-annually and may be consulted upon application to the principal office of the Underwriters' Laboratories, Inc., 207 East Ohio street, Chicago, Ill., and at offices and agencies throughout the United States and Canada.

While an arrester connected between the antenna and ground is regarded by many as sufficient protection, it is somewhat safer to install a switch in parallel with it as an added protection. Particularly if the arrester is inside of the building and the ground connection is made to a radiator, it is desirable to use in addition the outside ground connection.

If the antenna is properly connected to the ground such connection prevents the antenna from becoming a hazard to the building and its contents and may act to supplement the protection given by lightning rods. The arrester should have the most direct connection to the ground which it is feasible to make, otherwise the antenna may become a hazard with respect to lightning.

d. Protective Ground Wire—
If the ground wire of a receiving set passes through a wall it should be insulated for the same reasons as the antenna lead-in wire referred to in paragraph "a" above.

If the ground wire is exposed at all to mechanical injury it should be of larger size than the minimum permitted under the rules and certainly not smaller than No. 10 B. & S. gauge. It should, for mechanical protection, be enclosed in wood molding or other insulating material. Ground wires should not be run through iron pipe or conduit because of the choking effect at radio and lightning frequencies.

TRANSMITTING EQUIPMENT

j. Protective Ground Switch—
On account of the larger size of the ordinary transmitting antenna it is more likely to be subject to damage from lightning, and on account of the high voltages produced by radio transmitting equipment it

(Continued on Page 36)

“ALL AMERICAN” Radio Frequency Transformers

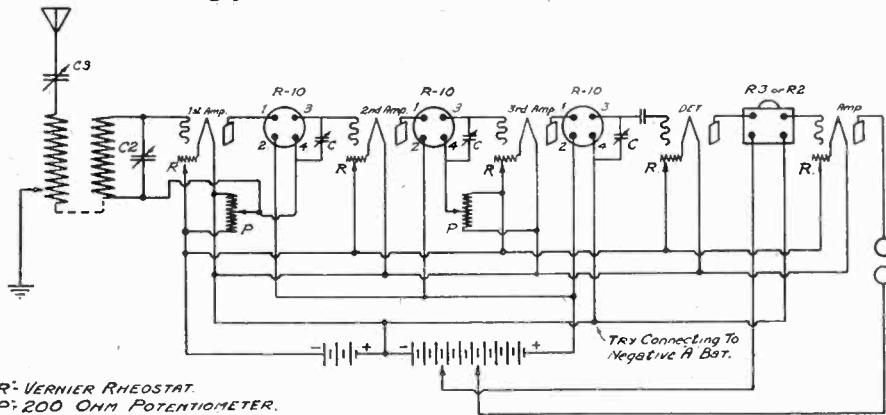
In another part of this issue is found a recommended hook-up for two stages of Radio Frequency using the All-American Radio Frequency Transformer.

Radio Frequency is the thing today—it puts an end to howling—gives a clear reproduction, eliminating distortion.

Weak signals are amplified before detected. Thus long distant stations, otherwise too weak, are brought in; and, when the All-American Type R-3 and R-2 AUDIO Frequency Transformers are used, their messages are made strikingly audible.



Type R-10 Radio Frequency Transformer
\$4.50



R-1 VERNIER RHEOSTAT.
P-1 200 OHM POTENTIOMETER.
C-1 5 PLATE VARIABLE CONDENSER.
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RAULAND MFG. CO., CHICAGO APR.-10-'22.

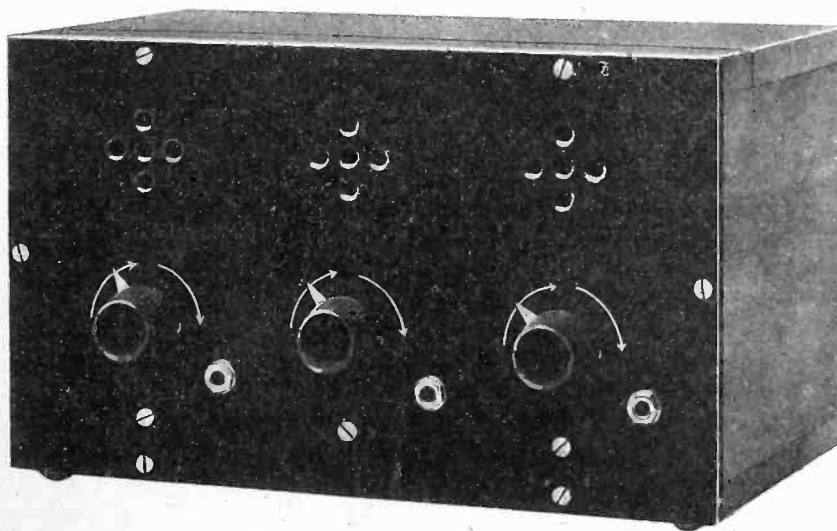
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Detector and Two Stage Amplifier

Simplicity of design and ease of control are the outstanding features of this dependable piece of apparatus. The component parts are of the same high grade as our other units, and apparatus is inclosed in a highly polished mahogany cabinet and provided with rear binding posts with all connections properly marked.

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SEND 10c FOR OUR NEW CATALOG—JUST OFF THE PRESS

Sieffert Radio Laboratories

210 Main Street

Evansville, Indiana

**PROPOSED REVISION OF
RULE 86**

(Continued from Page 34)

is desirable to provide for the use of a double-throw switch for connecting the antenna either to the transmitting apparatus or to the ground. The use of this switch makes it possible to entirely disconnect the antenna from the transmitting apparatus when not in use.

The objection to slate-base switches is chiefly from the radio engineering viewpoint, on account of the absorption of water by many kinds of slate and the presence of conducting streaks.

Under this rule one has the choice of the standard 100-ampere 600-volt single-pole, double-throw switch or a special antenna switch using 60-ampere copper which has an air-gap distance of at least four inches.

o. Protection from Surges, Etc.
—On account of the difficulty which has been experienced by the induction of voltages in the supply lines of a transmitting station, it is advisable to use a protective device across the terminals of each machine or transformer connected to this power line. It would also seem desirable to connect a similar protective device across the power line and near the point of its entrance to the building and on the house side of the meters.

It is desirable that research on the performance of protective devices and the means for avoiding surges and "kick-backs" in the power lines be promoted.

For further suggestions regarding good and bad practice in the installation and maintenance of signal wires and equipment reference should be made to "National Electrical Safety Code, third edition, October 31, 1920, Bureau of Standards Handbook No. 3," and especially section 39. This is obtainable for 40 cents from the Superintendent of Documents, Government Printing Office, Washington, D. C.

The 1920 edition of the "National Electrical Code," which contains the regulations of the National Board of Fire Underwriters, including Rule 86, which is now the rule in effect covering radio signaling apparatus, may be referred to at any local inspection department of the fire underwriters or may be purchased by sending 10 cents to the National Board of Fire Underwriters, 76 William street, New York City.

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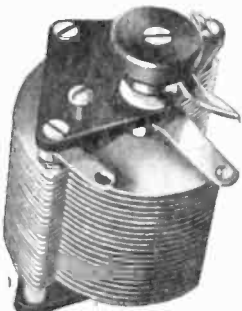
National Radio Institute, Dept. 1107 Washington, D.C.

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The construction is very rigid; the aluminum used in the plates is .026 inch thick. The bearing plates are 3-16 inch black Formica. Two connection strips are furnished.

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A LETTER TO THE EDITOR

By Mark Cohen, E. E.

In these days when there is one born every minute with a bakelite knob and a pair of jacks in his hand perhaps it is permissible for we old-timers to extend encouragement and advice drawn from our long experience to these newcomers. Perhaps I will be pardoned for this article.

I still remember distinctly my first set. It was constructed in the Paleozoic age of the art. How swiftly those six months have passed.

Radio is descended from a long line of health and home wreckers. Its ancestors include the party line telephone and the apartment house phonograph. Its mother must have once sung in a church choir and its father evidently plays the saxophone. In no other way can one account for the variety and magnitude of discord a good set is able to emit.

Radio communication is carried on by means of waves. Waves are divided according to the following classification: Wireless waves, heat waves, sound waves, light waves, marcel and ocean waves. Wireless waves are reputed to travel 186,000 miles per second. This almost approximates the speed of marcel waves carried by some of our modern flappers. Wireless waves are damped and undamped. Marcel waves are bleached and unbleached. Wireless waves are caused by oscillations. Marcel waves cause oscillations. Wireless waves work better in the dark. So do marcel waves. Wireless waves must be provided with grounds. Marcel waves often provide sufficient grounds. Wireless waves work best with audions. Marcel waves work best without any audience. Wireless waves are restricted by the government. Marcel waves are restricted by nothing. By means of a coupler wireless waves are led to a detector. By means of a detective marcel waves are led to an uncoupler. The longest wireless waves are about 20,000 meters. The longest marcel wave lasts about six months. (Editor's note: For reconciliation of time and space units see Einstein's theory.)

The first radio waves were observed by Hertz. The latest radio waves are observed by hurts, also. In the later case the hurts are in the pocketbook.

One feature of radio is its broadness. This is one thing which is as broad as it is long. The best mod-

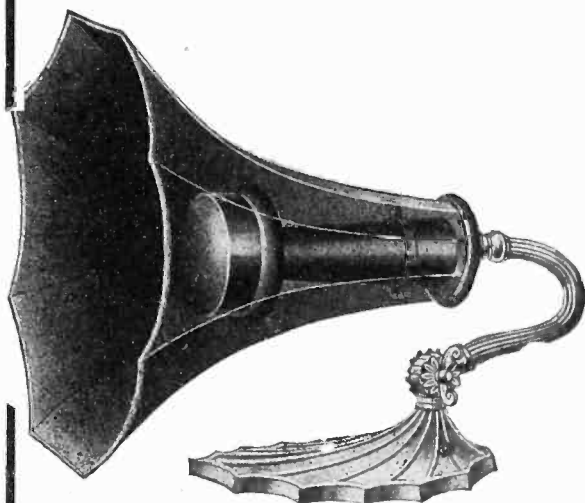


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RADIO TRANSMISSION FROM BOATS

(Continued from Page 12)

sary to have a government station license, and the set must be operated by a licensed radio operator. Application forms for these licenses may be had from the nearest radio inspector. Under an amateur license the set must be tuned to 200 meters or less, but it might be advisable to be in a position to change to 600 meters, this wave to be employed in case of distress only. Commercial land stations keep a continual watch on 600 meters and are liable to be of more assistance than amateurs.

The progressive yacht clubs have a place in the radio field that is valuable as well as unique. Think of the service a club might render its members with a complete radio installation. Programs may be sent out as well as information of interest to its members. During races those at the club may be informed as to the detailed progress of the contending boats. The Editor would appreciate hearing from clubs or boat owners who have applied radio to their clubhouse or boat.

ern sets are equipped with jacks. It takes a lot of jack to equip one, too.

Some radio systems operate on the "beat" principle. There is no patent on this principle, as lots of people have used it for years.

Persons viewing a radio outfit for the first time are apt to get shocked. This is not so much a matter of potential as of expletive.

The principal parts of a wireless are the wires. These are the aerial wires, ground wires, copper wires, D. C. C. wires, S. C. C. wires, S. S. C. wires, D. S. C. wires, enameled wires, wire coils and just plain wires.

The most sensitive thing about the radio is the owner's pocketbook.

For the benefit of the practical minded I will now describe two receiving sets, one of which I personally designed, built and operated in the aforementioned Paleozoic age of the art and the other of which I recently purchased.

My first set comprised a single slide tuner, a crystal detector, using silicon as piece de resistance, and a 75-ohm receiver. I also had two fixed condensers to go with this set, but as I did not know where to insert them I left them out.

The tuner was constructed of a dented and discarded rolling pin wound with 200 feet of barbed wire pieced out with the salvage from a dismantled buzzer. The slider was fashioned from a sheet-brass gear wheel, which had been left over when I fixed the family alarm clock. If I remember rightly, the slider rod was of real brass. I cannot explain this radical departure from conventional design. The principal constituents of the detector were laboriously cut from a beer keg hoop with my mother's embroidery scissors. (I realize it would be impossible to duplicate this detector today due to lack of material). All connections were made in the most approved manner, using Gem clips and McGill fasteners. All joints were soldered with a mixture of sealing wax and Wrigley's chewing gum. My aerial was suspended in the back yard. It was so high that it was necessary for my mother to use a step-ladder when she hung the family wash on it on Monday mornings.

With this set W A and N Y came in so strong that even my old man could hear them with his tin ear. I also regularly heard the navy yard, some ships and an occa-

sional amateur. In those days the density of messages did not exceed about four to the square meter. This set was the joy of my existence.

As to the other set, I purchased it the other day. Let me say, however, that in the meantime I had achieved long pants, grown to manhood, acquired a college degree or two, had accumulated a family and a couple of fortunes (more or less), never losing my interest in the art.

One day I drew all my millions out of Wall street, mortgaged my house, sold my four automobiles, hocked my watch, shook the pennies out of the baby's bank, and hurried uptown about twelve blocks and made the first payment on a 1922 model receiving set. As this set came all boxed in, I can only take the salesman's word and my own deductions as to what I got.

This outfit, I believe, comprised 14 stages of radio-frequency amplification and 27 stages of audio-frequency amplification. It consisted of 8 variometers (imported from Hoboken), 5 vario-couplers (Swiss movement), 41 14 carat vacuum tubes filled with rare and inert gases, 3 solid gold variable condensers, 18 diamond-studded fixed condensers, 17 grid leaks (platinum setting), 12 rheostats (mother of

pearl model), a chased silver head set with 14,000 ohm receivers with radium treated diaphragms, an ivory-mounted "A" battery, a "B" battery (Tiffany setting), and a whole alphabet of other paraphernalia, including 2 amber insulators and 5,000 feet of silver aerial wire. The whole set was housed in a de luxe cabinet covered with a wonderful bas-relief executed by Carver Way, the New York sculptor. The upholstery was blue velour and the cabinet design was by Knight & Day, eminent architects, who designed the Washington monument, the Tower of London and the Bridge of Sighs. In a word, this was the set par excellence. It was licensed under the Armstrong patents and the Marquis of Queensberry rules.

With the aid of my brother-in-law, a professional operator (real estate), I set up the apparatus in my home, which is located about three miles as the crow flies—that is to say, toward New York—from Newark, N. J. With the assistance of a steeple-jack we erected two 400-foot towers on top of the local Woolworth building and strung the aerial between them. That night after supper I carefully adjusted my set to 360 meters wave length and waited for 7 p. m. It came

(Continued on Page 40)

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of Radio Topics, published monthly at Oak Park, Ill.

Before me, a notary public in and for the state and county aforesaid, personally appeared Norman E. Wunderlich who, having been duly sworn according to law, deposes and says that he is the editor of Radio Topics and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in Section 443, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor and business managers are:

Publisher—Radio Topics, Inc.
Editor—N. E. Wunderlich.
Managing Editor—N. E. Wunderlich.
Business Managers—N. E. Wunderlich.

2. That the owners are (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding one per cent or more of the total amount of stock): N. E. Wunderlich, Nanko C. Bos, J. J. Novak, B. W. Stolte.

3. That the known bondholders, mortgagees, and other security holders owning or holding one per cent or more of total amount of bonds, mortgages, or other securities are (If there are none, so state): None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is..... (This information is required from daily publications only.)

NORMAN E. WUNDERLICH.

(SEAL) Subscribed and sworn before me this 19th day of June, 1922.

M. WALPOLE,
(My commission expires May 25, 1925.)

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The mechanism of the receiver itself is very superior. The magnets are so designed as to exert a center pull on the diaphragm. This flexes it equally in every direction and eliminates practically all distortion. At the same time, the concentration of the magnetic force within a small area reduces the magnetic resistance and adds to the sensitivity of the receiver.

The magnets are of tungsten steel, insuring strength of operation with practically no variation.

Telephone receivers are ordinarily rated in ohms. This rating is not entirely correct, since the number of turns of wire wound on the magnets determines the efficiency, and the resistance is only incidental. We use the same size wire on our 1500 ohm and 1000 ohm receivers. On the 1000 ohm receiver, there are 4400 turns of wire, while on the 1500 ohm receiver, there are 6800 turns.

The correct electrical principles being incorporated into the design, the receivers are of very high efficiency.

The polarity of the winding is indicated within the case and also on the telephone cords. This assures proper connection of the headset in a vacuum tube circuit.

WITHOUT a cent of cost we will send you a pair of Manhattan 2000 ohm Radio Telephone Receivers.

In spite of the shortage of good, medium-priced headsets, we have been able to secure a large quantity for our readers. The retail price of these phones is \$6.00. A one-year subscription to Radio Topics is \$2.00.

All you have to do to secure the receivers is to send us one three-year subscription (\$6.00), or three one-year subscriptions (\$6.00), which you can readily secure from your friends.

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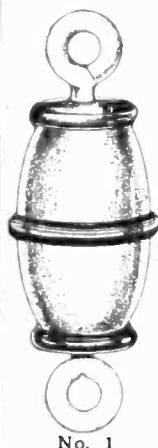
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A LETTER TO THE EDITOR

(Continued from Page 38)

and went and all was quiet. I tuned some more. Still nothing doing. I went over all my connections and resoldered all doubtful looking ones. I listened again. The silence could be heard for miles around. Then I peeled off my coat and got to work. I changed the plate voltage, I varied the lamp current, I shifted the coupling, turned my rheostat, tuned my primary and likewise the secondary. I experimented with my grid leaks, I adjusted my receivers, I added lamps, I cut them out. I reversed an azimuth with my variometers, I fiddled with my variables. I got up and walked around my chair and rubbed the set with a rabbit's foot, and then did everything all over again. I am afraid I even swore. But I never heard a chirp. My brother-in-law took my place and we tried all possible permutations and combinations over again. We heard nothing.

Finally a happy thought struck me. Doubtlessly the broadcasting station at WJZ had broken down. It was highly probable. After all, broadcasting was yet in its infancy and minor troubles were only to be expected. I informed my brother-in-law of this brilliant surmisal. He did not accept the idea without some protest. Where were the spark sets? Why had we not heard some of them? But I explained that no doubt every one was listening in for the concert. My brother-in-law did not think so, but was quite willing to go downstairs and play pinochle.

We went below and started a four-handed game with my wife and sister-in-law. About 10 o'clock my son Sam came in from the Boy Scout meeting.

"Say, Pop," exclaimed my young hopeful, "you orter been at the Scouts. Charlie Smith gave a demonstration of receivin' WJZ's broadcasting, usin' a umbreller for a aerial and a single slide tuner and a piece of silicon and a 75-ohm receiver. He let me hold the umbreller, too, Pop!"

"Well," said I to my brother-in-law. "What the hell are you laughing at?" That broke up the card game because my sister-in-law is very religious and don't want her husband contaminated. She took him home and wouldn't let him come over to our house for a week.

Since that time I have written to all the magazines, to the newspapers, to Dr. Steinmetz, to Herbert

RADIO



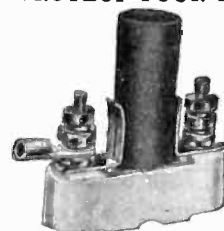
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Approved by Underwriters to Replace Ground Switch.

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PROTECTION FROM THE INSIDE
Automatic safety features of the Jacobus permit inside installation, just the same as for the protector on your telephone line.

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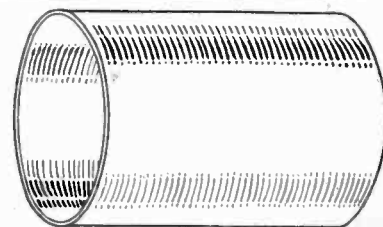
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Hoover, to Babe Ruth, to Bill Bryan and to the Lodge brothers, Henry C. and Sir Oliver. All have invariably replied that my set should have a range of 8,000 to 10,000 miles. I have hired professionals and bribed amateurs to try and locate the trouble. My set has been inspected by policemen, ministers, bellhops, bootleggers, college professors, carpenters, firemen, by members of Congress, by bank presidents, by editors, by highway robbers, by undertakers, by members of A. O. H., the I. W. W., the Y. M. C. A., the K. C., by Moose, by Elk, by Owls, by Masons, by Odd Fellows and by members of every conceivable trade, profession, vocation, calling, religion, color and previous condition of servitude. No one has as yet produced anything that by the widest stretch of imagination could be construed as messages. I have one hope left. I have just made an appointment with Sir Conan Doyle. If he fails I am through and hereafter when I want to enjoy a radio concert at home I will accompany my son to the Boy Scouts and there hoist the umbrella of Democracy over the Plymouth Rock of Silicon.

I am very discouraged. Hoping you are the same, I remain,

Yours truly,
MARK COHEN, E. E.

P. S.—Kindly hurry the check along, as I have another payment due on my set next week. M. K.

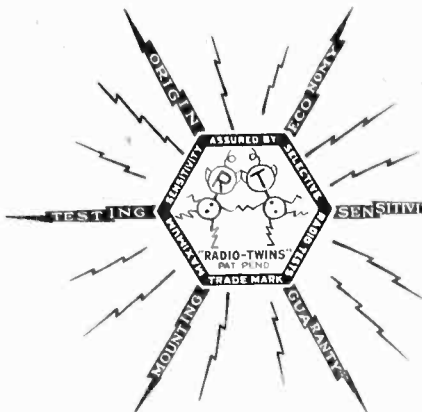
RADIO FREQUENCY AMPLIFIERS

(Continued from Page 21)

function without it. If the set does not work at first, trace out your connections and see if they are correct. Also, change the tubes about. Tune slowly as it is possible to pass right by or through the wave without knowing it if tune is done other than very slowly.

Keep your connecting wires at a reasonable distance from each other so as to prevent mutual inductance.

Receiving sets using radio-frequency are just now appearing upon the market, one of which is being tested by Radio Topics Institute at this time. A report, together with interesting photographs of this set, will be published in an early issue. The Department of Radio Engineering will gladly answer any queries concerning radio-frequency amplification.



"RADIO-TWINS"

"HERAGON" Super-Crystals

HAVE SIX POINTS OF SUPERIORITY


1. **ORIGIN.** Very few mines furnish sensitive or "live" mineral mixed with insensitive "dead" ore, and then it is separable only by radio-testing.
2. **ECONOMY.** Two large twice-tested live twins in one mount cost 50c, or unmounted 40c, whereas you pay for single unmounted crystals 50c, usually dead ones at that.
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4. **SENSITIVITY.** Any radioist knows that of six crystals bought, five are worthless. In "Radio-Twins" the intense rectifying area is twice that of the best of the old single mounts.
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6. **GUARANTY.** We guarantee 200% sensitivity in every 100 mounts. Anyone returning one insensitive "Radio-Twins" mount will receive two new ones instead.

UNMOUNTED are each radio-tested once; wrapped in tin foil and packed together in one neat dirt-proof Hexagon-labeled tin box. 40c at dealers only.
MOUNTED are two twice-tested crystals set in opposite ends of one "Radalloy" mount. 50c per mount, at dealers only.

KINDS AND COMBINATIONS ARE SHOWN BELOW BY THE
"CRYSTAL FAMILY"

YOUR FRIENDS ARE OUR FRIENDS
after you have listened to the "Radio-Twins" clear speech.
Foote Mineral Company, Inc.

Manufacturers and Wholesalers Only Established Forty-Six Years
103 N. 19th Street, Philadelphia



The Crystal Family: Sensitite-"Galena, Radio-"Pyrite and Aero-"Silicon

ORDER your September copy of
RADIO TOPICS now

It will contain complete constructional details and circuits of the Armstrong Super-Regenerative Receiver.

A Better Variometer



ESTRU LATTICE VARIOMETERS AND VARIOCOUPERS are small compact instruments with no unnecessary frame work, which makes them most easily wired.

MAXIMUM EFFICIENCY by lumped inductance and low distributed capacity.

SHARP TUNING. Ideal for portable sets and for those who assemble their own, because of easy accessibility.



IMMEDIATE DELIVERY

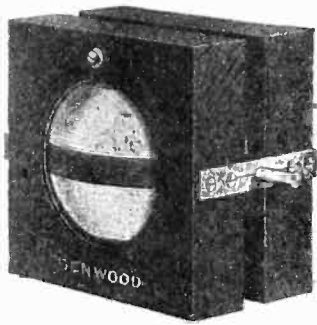
VARIOMETER	- - -	\$5.00
VARIOCOUPLER	- - -	\$4.50

MAIL ORDERS PROMPTLY FILLED
DEALERS: Write for Our Proposition

Northern Radio Supply Corporation

544 West Washington Street Chicago, Ill.
Main 2230-2231

"Benwood" Apparatus -- Higher Efficiency



Finer Tuning

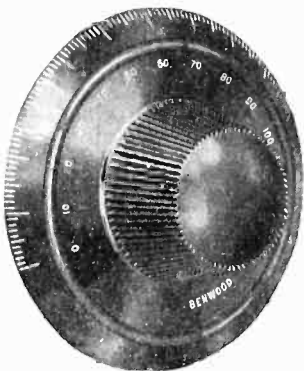
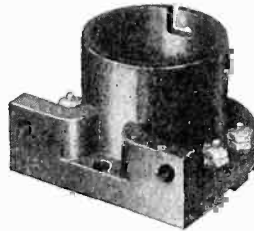
Phone Signals Louder and Clearer

PROPERLY designed and constructed, large d.c.c. wire used and no shellac, paint or varnish allowed to cover the wire and diminish the effectiveness. Minimum distributed capacity, minimum distance between stator and rotor, positive contacts. Will give splendid results on wave lengths from 150 to 650 meters when used with any standard variocoupler. Price each, **\$5.00**

"Benwood" Vacuum Tube Socket

Solid Bakelite, Panel or Base Mounting

SOLID, highly polished, molded Bakelite, specially designed for either base or panel mounting—the only one of its kind. Firmly holds any standard four-prong detector or amplifier tube. Minimizes ground hum and noises in operation of amplifier. Terminal posts plainly marked. Base is $2\frac{3}{8}$ inches square, height $1\frac{1}{2}$ inches. A good buy at **90c**



The New Improved "Benwood" Dial Control

THE "Benwood" controls all have solid Bakelite knobs of extra large diameter, which minimize all body capacity effects, and the new tapered design fits the fingers perfectly. The knurling is particularly fine and sharp.

Solid Bakelite Knob and Dial

Graduated 0° to 100°—all markings clearly defined in white and stamped into the solid Bakelite—won't wear off. Ribs on reverse side prevent turning too far. Set screw deeply countersunk and easily reached.

BC 7—	Benwood" control 4" 1 3/8" 2" at base.	\$1.75
BC 8—	"Benwood" control 3 3/4" 1 3/16" 1 5/8" at base.	1.50

Bakelite Binding Post

AS shown, these have the tapered, knurled, solid Bakelite grip, which fits the finger tips and matches the dials shown above. Exposed metal part highly nickel plated. Diameter $\frac{5}{8}$ inch. Complete with two washers, each **25c**



CATALOG—Send 10c in stamps for the Benwood catalog and price list, also complete catalog and price list of De Forest radio equipment.

DEALERS—We manufacture a complete line of radio apparatus. We have stock on hand and ready to ship. Write or wire for our attractive proposition.

The **BENWOOD** Co. INC.
RADIO
"WORLD-WIDE MAIL ORDER SERVICE"

1115 OLIVE STREET

ST. LOUIS, MO.

Motorizing Radio

(Continued From Page 16)

risking the life of a soldier, inasmuch as other conveyances require the presence of an operator. Another possible use—one, however, of doubtful application in view of the farmer's distrust as to the practicability of the apparatus—is that of guiding a tractor in plowing a field while the farmer sought repose in his front porch. Then, too, if the tractor could be guided unerringly, along the unbroken furrows the classic phrase,

"The Plowman homeward plods his weary way," would be thrown into discard. The tractor, accepting this somewhat far-fetched suggestion on its face value, could be directed by radio-control into the garage at sundown.

When the imagination is unbridled the future opportunities for "Motorizing Radio" unfold with such profusion as to almost dim the vision by their very multiplicity. Corporations may keep

in constant touch with their salesmen, manufacturing concerns may be in daily touch with their branch offices and in turn with their traveling representatives by use of the radio-equipped automobile, and the taxicab of the city may have its movements directed by instructions from headquarters when instructions are flung into space. A highway engineer may issue instructions to road supervisor, even though the two be far removed. Uncle Sam's motion-picture-theater motor truck, now operating under the direction of the Bureau of Commercial Economics, can be equipped with a radio-telephone. This would add value to its purpose of demonstrating pictures of travel and industry throughout the United States. The motor-trucks now guarding the storm-swept area in the State of Washington, when a tornado laid low 6,000,000,000 feet of timber, would have their usefulness enhanced by wireless installations, thus having immediate contact with the outside world in the event of an outbreak of fire in this tangled brush-heap. The Postoffice Department could equip its parcel-post and mail-collecting trucks with radio outfits, and in the event of hold-ups or robberies an alarm could be forthwith sounded. Boy Scouts on their frequent hikes to distant points from local headquarters may keep in touch with the latter by a centrally located radio-equipped automobile. Indeed, the present and future expanding uses suggested by the title of this article, "Motoring Radio," are almost limitless.

RIPPLES VS. BILLOWS IN RADIO

In wireless, electric energy is flashed into space in waves. The distance from one wave crest to another is called "the wave-length" and is usually expressed in meters. In these days, when radio is the hobby of millions, the wave-length may be anything from 200 to 20,000 meters. In other words, the ether of space is shaken into terrific billows compared with which the mightiest upheavals of the ocean are mere ripples.

"As far back as 1895 and 1896 I had obtained some promising results with waves not more than a few inches long," said Marconi. He then proceeded to describe how he had returned to his original idea of using short waves.

Notes of the Trade

HERE is every indication of a wonderfully big revival of trade starting this fall and the wise dealer is laying in a plentiful supply of the widely advertised products, which will be the stock in most demand.

Radio-frequency is becoming more and more popular, as indicated by the arrival on the market of some well constructed sets at reasonable prices. The States Radio Corporation, recently organized in Chicago, has just placed on the market a radio-frequency receiving set which has many new and unique points. It consists of a tuning device employing flat inductances, two stages of radio-frequency amplification, detector, and two stages of audio-frequency amplification. The front panel is of brass.

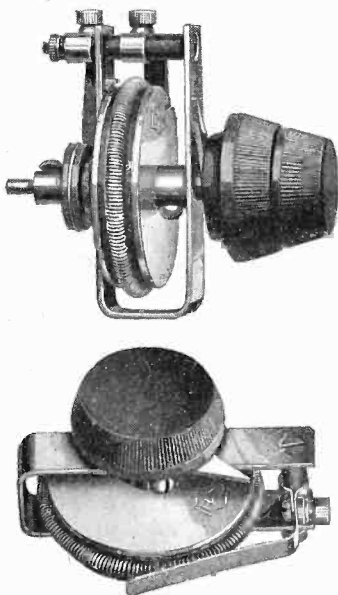
The States Radio Corporation factory covers about 10,000 square feet of space. Mr. Anatol Gallos, formerly Chief Electrical Engineer of the new Chicago Union Depot, has taken up the position of Radio Engineer for this concern. Mr. Fred L. Damarin has resigned from the Jones-Flaherty Corporation and is employed as Assistant Engineer. Mr. L. Pease and S. W. Wnoroski have also been retained. Mr. Hayes, sales manager, has planned an extensive sales campaign, and advertising is being executed by the Shuman-Haws Company.

Chicago Radio Apparatus Changes Hands

The Chicago Radio Apparatus Company, 415 South Dearborn street, Chicago, previously owned by Messrs. C. C. Klentz and L. L. Lynn, have sold their interest to W. J. Carney of the Carney Coal Company of Chicago. Business will continue without any changes.

The All-American Electrical Manufacturers have changed their name to the Rauland Manufacturing Company. They are the only ones at present making a radio-frequency transformer which can be inserted in a standard tube socket, a very novel and practical idea. They are now located at 35 South Dearborn street, Chicago.

The Manhattan Electrical Supply Company is now manufacturing a "licensed" crystal detector under a patent license from the Wireless Specialty Company. The latter firm is about to prosecute all unlicensed manufacturers of crystal detectors or crystal receiving sets, as they hold all of the original patents covering same.



The two above illustrations show the new rheostat now being manufactured by the Cutler-Hammer Manufacturing Company of Milwaukee, Wis. It is furnished in two styles, with vernier for amplifier tubes. They will carry one ampere and have an operating range from zero to four ohms.

The rheostats are designed for panel mounting and are readily adjustable for panels ranging from one-eighth to one-half inch in thickness. All metal parts are finished in polished nickel.

The Shuman-Haws Advertising Company, 230 East Ohio street, Chicago, are making a specialty of radio accounts. They are at this time handling the accounts of the American Art Mache Company, Tresco, Joy & Kelsy Corporation, J. E. Jenkins, States Radio Corporation, Barawick Company, United Manufacturing & Dist. Company, Rauland Manufacturing Company.

TUNING COILS

Cross Weave Tuning Coils, the heart of a receiving set; just the coils for bringing in the Radiophone Broadcasting stations, 180-500 meters. Price \$1.25 each, or set of three coils, Primary, Secondary and Ticker Coils, \$3.50 per set with circuit diagram.

CONDENSERS

Phone and Grid built of the best material obtainable. Price \$1.00 each.

MOTOR-GENERATOR SET

250-Volt DC 175 WATT Generator and 110-Volt AC 60 Cycle (any cycle) motor. The best there is. Price \$78.00 complete.

AERIPHONE

The wireless telephones. Price \$35.00 to \$300.00.

PANELS

OF GUMWOOD BLACK FINISH Treated with a special process made by us. Will not warp or shrink and is not affected by temperature changes. Waterproof and possesses high dielectric properties. Easily machined and will not crack or BREAK. Looks as good as Bakelite. We are prepared to ship promptly the following sizes:

6" x 6 "x 1/4" thick	.....	\$ .60
6" x 7 "x 1/4" thick	.....	.75
6" x 10 1/2 "x 1/4" thick	.....	1.00
6" x 12 "x 1/4" thick	.....	1.25
9" x 12 "x 1/4" thick	.....	1.50
9" x 14 "x 1/4" thick	.....	1.75
12" x 14 "x 1/4" thick	.....	2.20
12" x 21 "x 1/4" thick	.....	3.00

Strips 3 1/2 x 6; 3 1/2 x 8; \$.40 each; 3 1/2 x 10, 3 1/2 x 12, \$.60 each; 3 1/2 x 18, \$.75 each. Add Postage for 1 lb. for Panels up to 6 x 12 x 1/4; and 2 lbs. for larger sizes. We will be pleased to quote prices on these panels cut to a different size on receipt of your specifications. NO FREE SAMPLES.

National Radio Co.
MARSHALL, MINN.

MAKE MONEY AT HOME

You can earn from \$1 to \$2 an hour in your spare time writing show cards. Quickly and easily learned by our new, simple "Instructograph" method. No canvassing or soliciting; we teach you how, guarantee you steady work at home no matter where you live, and pay you cash each week.

Full Particulars and Booklet Free
AMERICAN SHOW CARD SCHOOL
48 Ryrie Building, Toronto, Can.

RADIO PANELS

Cut exactly to size and shipped the same day your order is received—1/4 in. thick, \$.01 1/2 per sq. in.; 5-16 in., .02c. Made of the highest grade of black fiber. This material possesses high dielectric strength, is inexpensive, unbreakable, takes a nice finish, and is easy to work.

We Pay Postage—Try Us

Radio Instrument & Panel Co.
26 N. Desplaines St., Chicago, Ill.

Cardboard Tubing

Seamless—Grey
In Any Length Up to 28 Inches
Per in. or Per Fraction Foot

2 1/2, 3 and 3 1/2 in. dia.	.....	3 1/2c	30c
4, 4 1/2 and 4 3/4 in. dia.	.....	4c	35c
5 in. diameter	.....	4 1/2c	42c
5 1/2 and 6 in. diameter	.....	5c	50c

Postage extra; shipping weight 1 lb. per ft.

Binding Post, Switch Levers, Magnet Wire, Switch Points, Sliders and Slider Rods. Write for our prices

Dealers Write for Discounts

Michigan Radio Co.
2173 Hiliger Ave., Detroit, Mich.



On Radio Equipment
Means
Your Assurance of Efficient Reception

Ask Your Dealer to Show You the
CW-3 RECEIVER
"A REVELATION"

DEALERS—WE CAN DELIVER PROMPTLY

**JENKINS MANUFACTURING
COMPANY, Inc.**

4607 Ravenswood Av.

Chicago, Ill.

ORDER
YOUR

SUPER-ANTENNA Now

(Copyrighted—Patent applied for)

JUST use nearest lamp socket; no outside antenna necessary for your receiving set. Listen to the broadcasting from any room in the house. It is foolproof, fireproof and shockproof. This is the original unit designed by the country's foremost engineers. Results are equal or better than with the outside antenna.

Price \$2.80.

SUPER-ANTENNA CO.

Quincy, Ill.

SOLE DISTRIBUTORS

**Everything Worth While
for RADIO**

WIMCO represents all the leading manufacturers, offering you a most complete and varied line of all standard apparatus. Whether it is so small a part as a switch point or a complete receiving set you can bank on WIMCO'S recommendation of what to buy. Exclusively Radio Jobbers and Manufacturers, we live to serve you efficiently and promptly.

Dealers everywhere are satisfied with the service and the square deal they always get from WIMCO. May we count you among our satisfied customers?

Drop us a line, telling your needs, and we'll come right back with a real dealer proposition.

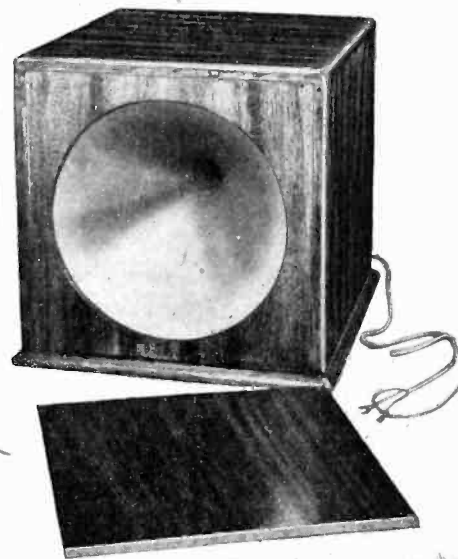
WIRELESS MFG. CO., CANTON, OHIO
EXCLUSIVELY JOBBERS

Mr. Clausing, formerly with the U. S. Bureau of Standards, is now connected with the Howard Radio Company, 9 South Clinton street, Chicago. They are manufacturing a diverse line of apparatus and parts.

Mr. M. B. West, formerly district superintendent of U. S. Naval Communication, located at Great Lakes, has resigned to take up a position with the Chicago Radio Laboratory. Mr. Kruse, for a long time connected with the U. S. Bureau of Standards and later with Crufts Laboratory, is now with this company. They have an immense organization producing some newly designed, neat appearing receiving apparatus which it is stated will be sold only through music and phonograph dealers.

New Loud Speakers

Numerous new loud speaking devices are appearing on the market. One of exceptional merit is manufactured by the American Art Mache Company, Chicago, which is made of art mache paper, pleasingly designed and well finished.

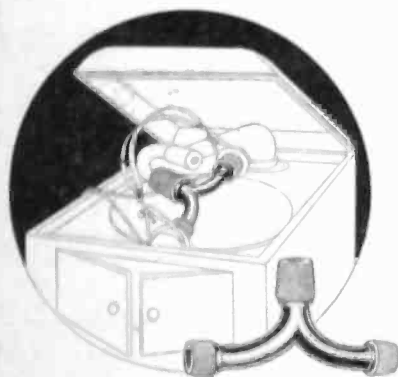


The H. B. Davis Company of Chicago is about to bring out a new loud speaker as illustrated here. It is made of a patented material which it is claimed gives a clear tone having very superior acoustic properties.

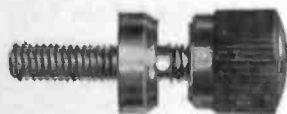
The well-known Telephone Maintenance Company, which has for some time had on the market a low-priced loud speaker, reports unfilled orders on hand at this time for their speaker totaling over 20,000.

The Pioneer Radio Corporation, exclusive distributors and jobbers, are now distributing a new device to be plugged into the electric light socket to take the place of an antenna. It is retailing at only a dollar and a half.

The Ravenswood Radio Corporation has begun an advertising campaign for their radio-frequency receiving sets which employ one stage of radio-frequency, detector, and two stages of audio-frequency amplification, together with the necessary tuning unit, contained in one cabinet. Distribution of this set, which is being retailed at \$125, will be handled by the Pioneer Radio Organization, 1626 Masonic Temple Building, Chicago, who are also jobbers for the Phonotach shown below.



This simple little unit is put in place of the Sound Box on the tone arm of any phonograph, thus converting the phonograph tone chamber into a loud speaker. It is retailing at \$3.

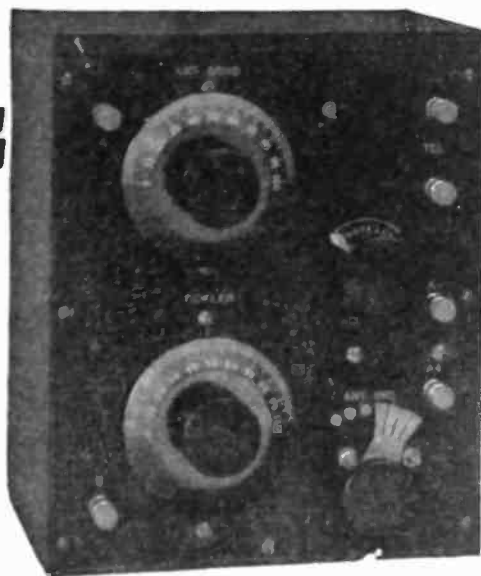


The H. H. Eby Manufacturing Company have designed a new binding post similar to their EN-SIGN and JUNIOR posts, which are already familiar to the trade, and embodying many of the novel features which have made their line so popular for use on radio apparatus.

This post, which they have named "ACE," has a nickel-plated brass base with solid 8-32 threaded stem extending approximately one-half inch below the base. The base of the post is heavily knurled to prevent turning when mounted, and a hole is drilled through the neck sufficiently large to take a No. 15 bare wire.

—you Can't buy a better receiving set anywhere at any price

\$40⁰⁰



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

SPECIFICATIONS

Clapp-Eastham Type H. R. Regenerative Receiver

- Panel—Condensite handsomely finished.
- Cabinet—Solid Mahogany.
- Condenser—Balanced type, 2 Rotary, 3 Stationary Plates. Built as a Vernier.
- Dials—Indestructible metal. White figures on black ground.
- Antenna Inductance—Wound on Formica Tube.
- Plate Inductance—Wound on molded ball.
- Rinding Posts—Black Rubber Covered.
- Switch—Fan Blade.
- Rheostat—C. E. Type H 400.
- Circuit—Single circuit regenerative.
- Licensed under Armstrong U. S. Patent No. 1,113,149.
- "B" Battery—Contained in compartment inside cabinet or external as desired.

QUALITY—and at a reasonable price—is the appeal that the Clapp-Eastham Type H. R. Regenerative Receiver makes to men who know wireless equipment. The specifications and the Clapp-Eastham reputation tell them the story. To the novice, the appearance of the set, the clear, sharp tones, its wide range, and the perfect regeneration on all wave-lengths between 180 and 825 meters, is convincing evidence. The quality in the solid mahogany Cabinet is reflected all throughout the set. Ask your dealer to show it to you. If he's temporarily out—and he may be, because the demand has been phenomenal—write us. Send 6c in stamps for the C-E Radio Catalog. If you're at all interested in wireless you ought to have it.

Clapp-Eastham Company

Radio Engineers and Manufacturers

118 Main Street

Cambridge, Mass

CLASSIFIED ADVERTISING

Classified Advertising Rates ten cents a word for each insertion, cash to accompany order. Ads for June should be in before May 20. Minimum ten words, full count.

TELEGRAPHY

Telegraphy (Morse and Wireless) and Railway Accounting taught thoroughly. Big salaries. Great opportunities. Oldest, largest school. All expense low—can earn large part. Catalogue free. Dodge's Institute, Union St., Valparaiso, Indiana.

HELP WANTED

STOP DAILY GRIND. START SILVERING MIRRORS, auto headlights, tableware, etc. Plans free. Clarence Sprinkle, Dept. 40, Marlon, Indiana.

FOR SALE

A-1 GALENA, perfect, tested and guaranteed, imbedded in special metal, price 35c; AA-1 GALENA (genuine), 50c postpaid. NATIONAL SPECIALTIES, 32-T Union sq., N. Y. C.

HELP YOURSELF by HELPING us to dispose of a very large quantity of miscellaneous apparatus, parts, etc. It will mean a guaranteed saving to you of from 25% to 50% on whatever you may need now or later. NO JUNK. Only practical apparatus, parts, etc., listed. SATISFACTION GUARANTEED. Here are a few items, all brand new:

Variometers, list \$5, sale price.....	\$3.80
Varicouplers, list \$4, sale price.....	3.00
Variable Condensers, very best on market today—	
23 plate, lists \$4.25 sale price.....	3.55
43 plate, lists 4.50, sale price.....	3.85
0 to 2.5 ammeters, (CW) list \$13.25, sale price.....	7.75
Thordarson 8 in., 8-tooth rotor, 3/16 in. bushing, list \$5, sale price.....	3.75

FREE complete list sent to anyone asking for it. DO NOT HESITATE. WRITE today.

DX RADIO COMPANY (Not Inc.)
Summit, Ill.



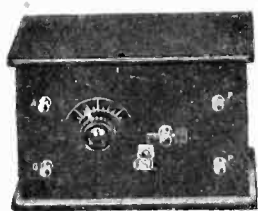
Kellog V-T Socket
the durable socket
Kellog molded lamp sockets fit all standard four prong based vacuum tubes. Extra heavy solid base 7-16 inches thick. Four German silver springs with rounded ends firmly held in position in deep grooves, cannot touch mounting surface. Double end nickel plated binding posts. Connections can be made under the socket as well as above. A practically indestructible construction. 75c each, postpaid.

75c ea.

COMPLETE RADIO EQUIPMENT
The item above is merely a sample of the excellent line of radio equipment that is handled by the Apex Radio Company, Inc. All orders for sockets or other standard equipment will be filled the day received. Send two cent stamps for our new price bulletin.

APEX RADIO CO., INC.
1105 W. 69th St.
Chicago, Ill.

Superior Receiving Set, \$4.75



IN CABINET COMPLETE AS SHOWN
Guaranteed to bring in concerts louder than any other crystal set made, regardless of price. We will prove this to your satisfaction or refund your money.


Parts for "SUPERIOR" set ready for assembling **\$3.25**
GENUINE "STEINMETZ" TESTED GALLENA **15c**
2,000 ohms phones **\$5.00**
Vacuum Tube Detector **\$5.50**

Only a limited number left. Send at once.
SOUTH HILLS RADIO CO.
411 Charles St., Knoxville, Pittsburgh, Pa.

RADIO MAILING LISTS

We have just compiled a list of 6,400 Radio Dealers, none worth less than \$3,000.00, covering the U. S.
Per M. **\$7.50**
329 Radio Manufacturers. Per List **4.00**
652 Radio Supply Jobbers. Per List **7.50**
14,000 Radio Amateurs and Managers of Radio Stations. Per M. **7.50**
Can furnish any other mailing list wanted.

TRADE CIRCULAR ADDRESSING CO.
166 W. ADAMS ST., CHICAGO
Franklin 1183



Solder Your Connections
for best results. Get the "Wonder" a Self Heating Iron. Use it anywhere without stove. No workshop complete without it. Cheap to operate. Generates own vapor in two minutes. Absolutely safe. So simple a child can operate. Nothing to get out of order. Use it as blow torch also. Boxed complete with solder. Salamonic and full soldering directions. Send \$2.00 cash or money order. Shipped prepaid anywhere in the U. S. Send order now.
Dealers—a big seller, write for proposition.

North Shore Radio Works, Dept. B-599
810 Davis Street, Evanston, Ill.

States Radio Corporation



501 South Jefferson Street
CHICAGO
Manufacturers of
HIGH GRADE EQUIPMENT
IMMEDIATE DELIVERY
2 Stage Radio Frequency detector, and 2 Stage Amplifier. In attractive mahogany cases. Simple, reliable tunes to all broadcasting, giving clear reproduction—local and long range. No wiring to do.
Ask for STATES RADIO and get the best.

The Girl Reserves

Radio is taking hold everywhere with the ladies. The latest entry into this field is a live wire club called the Girl Reserves, which is a distinct organization with headquarters at the Y. W. C. A., at 610 Lexington avenue. Although they have no set of their own as yet, they display an extraordinary interest and a tremendous amount of ambition to learn the secrets of the air. Studying radio has become a regular part of the program for each meeting and it is necessary for every girl to have a knowledge of it before being promoted from the rookies to the regulars. Credit for starting the Radio Club is due chiefly to Miss Irene Schultz, who through her untiring efforts has brought to light a real bunch of Radio enthusiasts.

Let us dwell for a few moments on the other activities of the Girl Reserves. Their summer camping parties have anything of their kind beaten by a mile.

Picture for yourself the sun rising from behind the hills, its first rays striking a row of snowy white tents. Wafted on the cool morning breeze comes the delicious odor of coffee and flapjacks, cooking over little fires attended to by the winsome campers.

In the heat of the afternoon the urge of a cool lake nearby is irresistible and the cry is, "All in for a swim!"

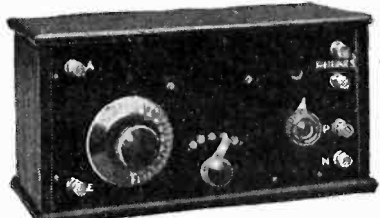
Then comes the evening, with its huge bonfires and toasted marshmallows, merry chatter and camp songs, while the dark, forbidding forest lends enchantment to the scene. Everything becomes hushed and someone suggests getting out the Radio sets to listen in on a good night selection from New York, Chicago, Boston or even Toronto, Canada.

Finally all is quiet, the little tents stand out in a sharp silhouette against the silvery moon and only the sighing of the wind through the trees breaks the oppressive stillness.

Now to get down to business again, we find this as a summary: Meetings, dances, concerts and parties in the winter; hikes, camps and sports in the summer. That's the life of the Girl Reserves in a nutshell.

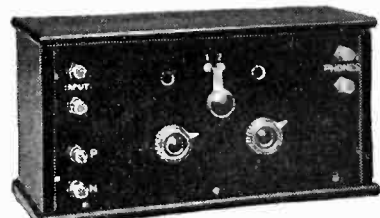
Now that their hat is in the ring other Radio Clubs will have to watch their step for such a crowd of "go-getters" are well nigh invincible.

CROSLEY HARKO SENIOR RADIO RECEIVER



Complete tuner and audion detector assembled on a formica or other high grade dielectric panel, mounted complete in mahogany finish cabinet. Range, 150 to 600 meters, non-regenerative hook-up. Price without battery, tube or phones.....\$20.00

CROSLEY TWO-STEP AMPLIFIER



Complete with amplifying transformers, sockets, rheostats, switch, binding posts, etc., mounted on formica panel in mahogany finished cabinet. Price complete as shown in illustration **\$25.00**
We make a complete line of radio apparatus. It's "better—and costs less." Send for circulars.

Crosley Mfg. Co.
Radio Dept. T-5. Cincinnati, O.

WIRELESS Telephone and Musical Concerts,
Also
Hawaiian and German Stations
Read With a Single Bulb

Are you satisfied with your receiving set? Would you like to build one that will receive over 6,000 miles on a single bulb and quit experimenting? One that will be the equal of any, regardless of claims or price? Using the instruments you now have, you will be able to duplicate the long distance records you read about every day.

Get our simple diagram of a complete short and long wave receiver, 175 to 20,000 meters, with which we read Honolulu, California, German, South American, French and English stations and practically all the high powered foreign and domestic stations, amateurs as far west as New Mexico and numerous telephone and musical concerts come in good.

Diagram and complete instructions, leaving nothing to guess about, will be promptly mailed for 50 cents in coin or stamps. Wire a set up and quit wasting good money.

VIRGINIA NOVELTY CO.
MARTINSBURG, WEST VA.

R U

INTERESTED IN
SCIENTIFICALLY DESIGNED
RADIO APPARATUS?

ESTRU

Lattice Variometers
List Price \$5

Lattice Variocouplers
List Price \$4.50

Are a development of months of careful study; small, compact design; no unnecessary framework; maximum efficiency by lumped inductance; low distributed capacity; sharp tuning; ideal for portable sets.

Manufactured By

**Dalton, Whittier, True
Co.**

2905 West Madison Street
CHICAGO

DEALERS—JOBBER AND LARGE USERS OF CRYSTAL SETS

We are in a position to make your outfits cheaper than you can yourself. We make every part, so can talk price. Immediate delivery.

We feature a set that measures 3 in. by 4 in. by 5 in. For price write, wire or call

WIZARD RADIO CO.
1014 Century Bldg., Chicago

FROST FONES
SOLD EVERYWHERE
HERBERT H. FROST
154 W. Lake St., Chicago

RADIO

Equipment

Big FREE Catalogue



THIS FREE catalogue tells you the kind of a Wireless Telephone to own, so that you receive in your own home all the latest news, music, church services, lectures—everything broadcasted throughout the United States.

Every home will soon have a wireless telephone outfit. We now offer complete outfits from \$15 up.

Everyone interested in radio should see our low prices on parts and accessories. Write for this book. Learn about the miracle invention of the age. Easy to install, as simple to operate as a regular telephone.

One copy of this booklet is yours, FREE
Write for your copy.

Montgomery Ward & Co.
Dept. R-3 Chicago

Radio and Railroads

Radio is to be applied to the running of trains on the Pere Marquette Railroad between Detroit and Grand Rapids to test a new contrivance that is said to insure safety from collisions. It is a modification of the block system used in Europe, with the human element eliminated, the working being wholly automatic.

Each 1,000 yards of railway track will constitute a zone to be guarded by an electrical contrivance which will, through an apparatus on the locomotive, notify the engineer that the zone in front of him is clear and safe in every respect. Should there be an accident ahead, the engineer will receive the notification "Caution" on entering the zone. At the next zone he will be notified, "Danger," and it will be his duty to stop the train. Should the device prove successful it is likely to be adopted by all the railroads in Michigan.

The question of train control has exercised the minds of railway superintendents all over the country for years, and after an exhaustive hearing before a Congressional committee the government has ordered all railways to adopt some satisfactory plan before the year 1924.

Two trains on the Big Four Limited running between Cincinnati and Cleveland, Ohio, have been equipped with transmitting and receiving sets. The set on one of the trains is operated by Fletcher H. Hiles, an employe, who has a license to operate. He is developing the idea so that messages may be received and transmitted for the benefit of both the railroad company and the passengers. In case there is something in the way of orders for the trainmen from the company officials the set will be in readiness to receive or send them at all times while going at full speed. There will be no guess work as to when a train will reach a certain station to be reached by telegraph as in former times. Passengers may communicate to distant cities or to passing trains.

As an entertainment the receiving set installed by Mr. Hiles has proved a big success for the passengers who have enjoyed the concerts picked from the big broadcasting stations.

Lackawanna Railroad officials have been using their radio receiving and transmitting set on one of their flyers between Ithaca and New York City for some weeks

\$4.00

3,000 Ohms

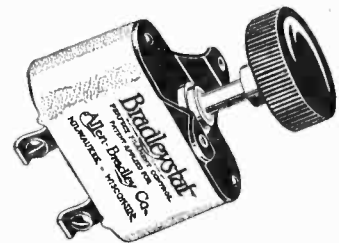


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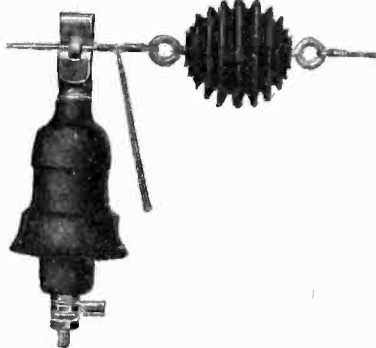
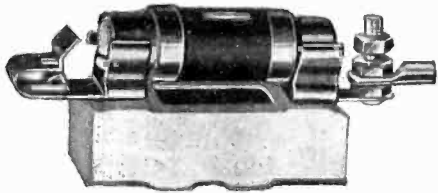
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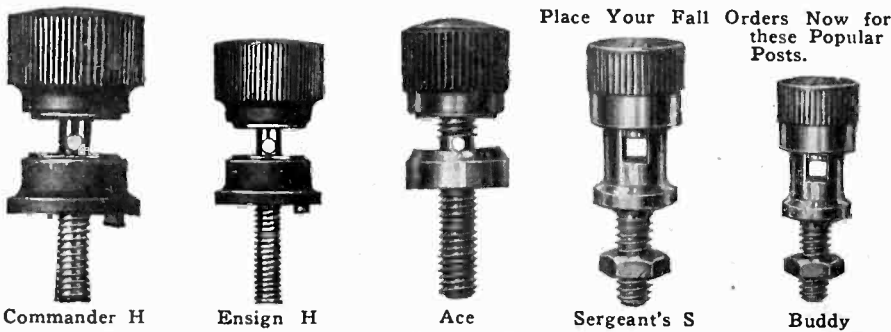
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past. It was installed by two New York amateurs in co-operation with the professional radio men of the railroad. George D. Murray and D. W. Richardson are the amateurs who put over the first entertainment for the Lackawanna, and since then passengers have enjoyed concert receiving on numerous trips.

Although much of the radio work is being done at the Schenectady, N. Y., factory, the General Electric Company is using its local factories to help meet some of the demand for vacuum tubes. The Edison Lamp Works at Harrison and the National Lamp Works are both busy turning out vacuum tubes of the smaller sizes. The Sprague Works at Bloomfield, N. J., and the plants at Bridgeport, Conn., are all working on tube bases, transformers, sockets and other parts of radio equipment. This ought to be good news to all amateurs who are waiting for accessories.

A receiving set has been installed in the box office of the Globe Theater, Broadway and Forty-fifth street, New York, for the reservation of seats by radio from passengers of incoming steamships. Mr. Dillingham, the manager, has become a radio bug ever since he hired Edward F. Glavin to exhibit his wireless controlled automobile in the Hippodrome. It is expected to extend the service to out-of-town folks, who may broadcast from Chicago or other points middle West or South before coming to New York.

A new record in wireless telegraph receiving was made by Theodore R. McElroy, a telegraph operator of Boston, on May 6, during the three days' elimination test at the Boston Radio Show. McElroy received fifty-one and one-half words a minute, transcribing messages on typewriter by international code wireless. McElroy now holds the championship of the United States, having beaten the record recently made by Jose Seron of New York and formerly cable operator of Chile, who is in the employ of the Radio Corporation of America.

Seron won the title at the recent Amateur Radio Show in New York.

The DUCON in a Lamp Socket —and you hear Radio Music

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How to Double and Triple Signal Strength

Simply unscrew one of your lamps, substitute a Dubilier Ducon, connect the Ducon with any standard receiving set—and you hear the music perfectly!

If an antenna is already installed, the Dubilier Ducon will enable you to hear the broadcasting station two and even three times as loud as you would without it. Make the necessary connections between the Ducon and its socket, the antenna, and the receiving set—and you will be amazed at the wonderful results.

Save Expense of Switches and Lightning Arresters

The Ducon is the result of research conducted by the Dubilier Condenser and Radio Corporation, whose condensers are used all over the world by the principal governments and radio companies. This should be a guarantee that the Dubilier Ducon will fulfill the claims here made for it.

When thus used, the Dubilier Ducon does away not only with antennae but also with switches and lightning arresters and saves all the money that they cost.

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The Dubilier Ducon is a perfect protective device itself and much cheaper than lightning arresters or switches. It safeguards your set. There is no danger of shocks or short cir-

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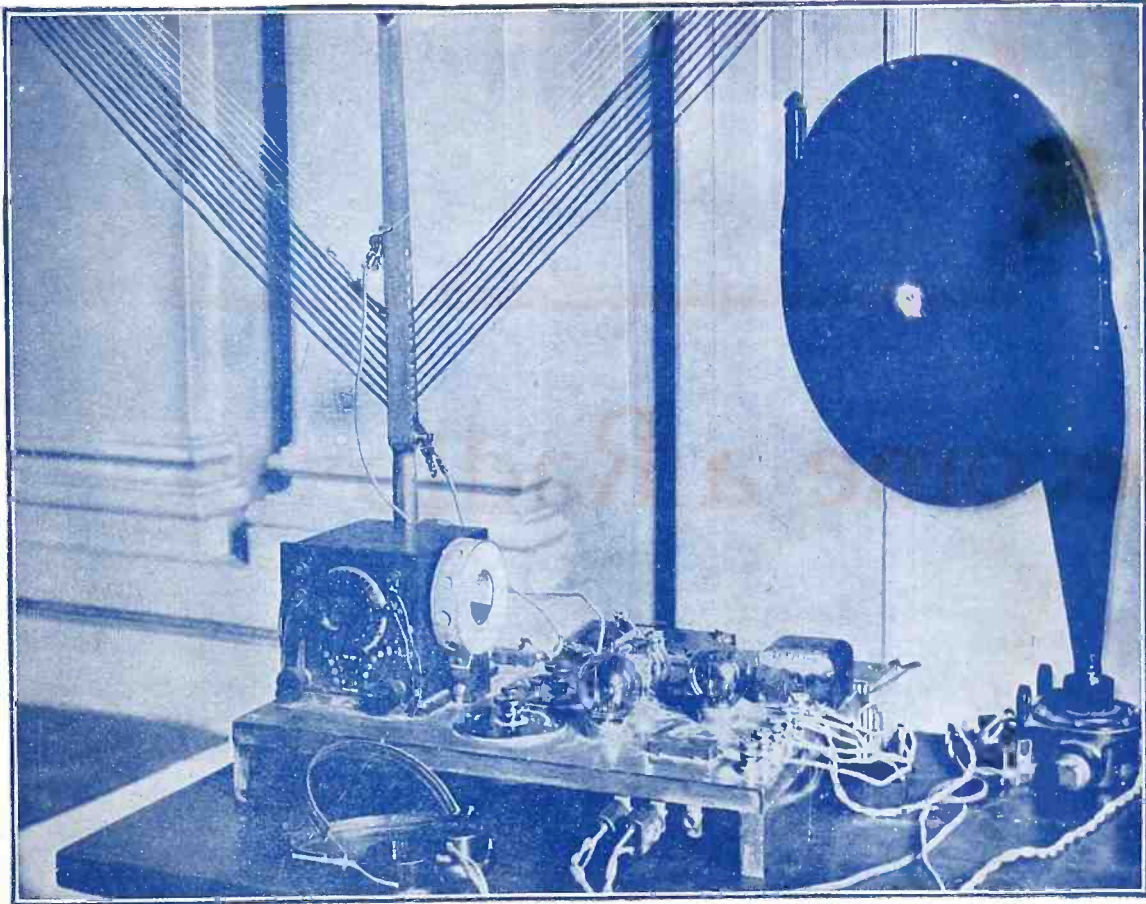
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When Major Edwin H. Armstrong recently demonstrated his new super-regenerative receiver before the Institute of Radio Engineers, he was able to receive from the famous WJZ station at Newark (25 miles distant) by the use of three vacuum tubes, although only a small loop aerial was used in the steel framed building of the Engineering Societies, New York City. The program was reproduced with such great volume that it filled the lecture hall and corridors.

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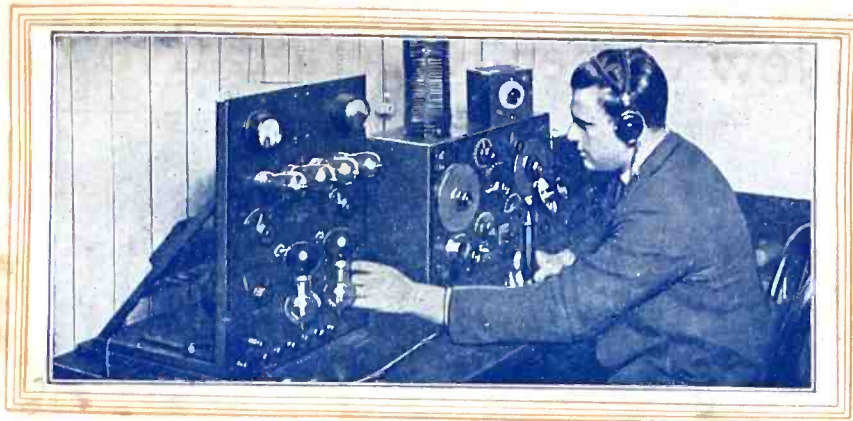
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