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RADIO

FORMERLY PACIFIC RADIO NEWS

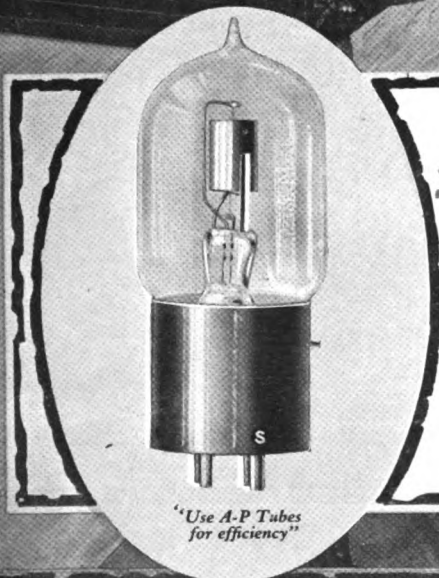
NOVEMBER, 1921

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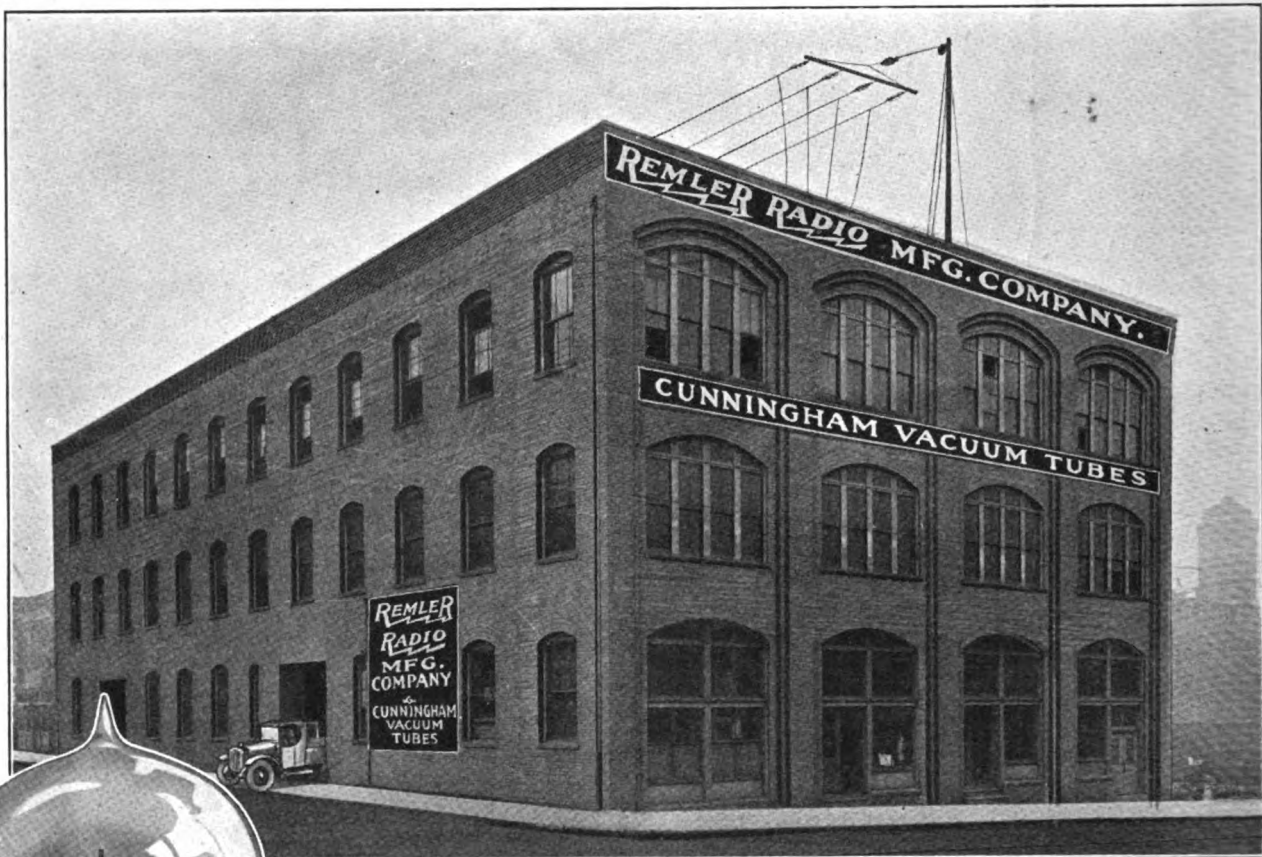
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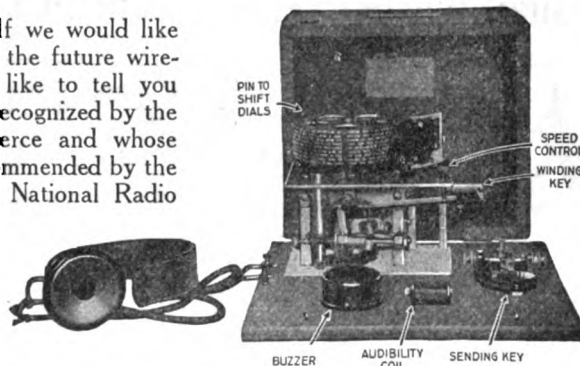


Both on sea and on land a fine future awaits the man who is qualified in wireless. No matter whether you wish to visit every nook and corner of the world or whether you prefer a land station, wireless awaits you.

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We wish to announce that on or about October the tenth, we will move to our new building, located at 1262 West Second St., Los Angeles, and then watch our dust.

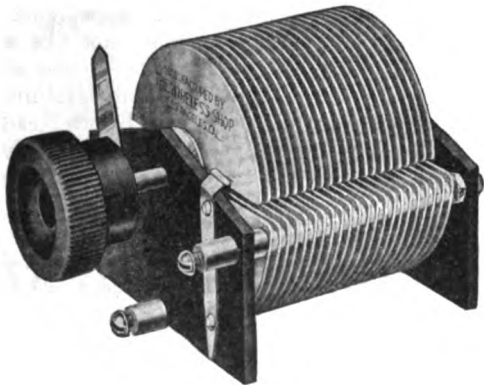
A special department will be maintained to take care of those little jobs you have always wanted in a hurry (but could never get). If you have a rush job, just try "THE WIRELESS SHOP."

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Published Monthly by Pacific Radio Publishing Co., Inc., 465 Pacific Building, San Francisco, California
Established 1917 as Pacific Radio News

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Advertising Mgr.

RADIO

Copyright 1921
Pac. Radio Pub. Co.

Subscription Rate:
\$2.00 per Year
in the U. S.
\$2.50 per Year
Elsewhere

Branch Offices: 147 Sixth Ave., New York City; 1306 Hartford Bldg., Chicago; 18 Boylston St., Boston; 1003 North Coronado St., Los Angeles
Advertising Forms Close on the First of the Month preceding date of Issue

Entered as Second Class Matter January 22, 1920, at the Post Office at San Francisco, Calif.
under the Act of March 3, 1879

Vol. III, No. 4

NOVEMBER, 1921

Per Copy 20 Cents

Radiatorial Comment

RUMOR hath it that the congressional re-organization committee has recommended that the control of radio communication be transferred from the Department of Commerce to the Post Office Department. To make such a change just as the officials now in charge really have solved the perplexing problems arising from conflicting interests of governmental, commercial, and amateur operators, would seem to be the height of folly. While we are heartily in favor of the spirit actuating the re-organization committee in its efforts to put more efficiency into Federal bureaus, we suggest to the members of the committee that to first sound out the sentiment of the radio fraternity before recommending any drastic changes in existing arrangements would be more likely to insure the eventual adoption of whatever recommendation they may make. Meanwhile, on the theory that a watt of prevention is worth a kilowatt of cure, protests are in order. To head off the matter in committee hearing will be easier than on the floor of Congress.

THOUSANDS of operators throughout the country will learn with regret that E. T. Chamberlain, the greatly beloved and respected Commissioner of Navigation of the Department of Commerce at Washington, is leaving this work to become head of the Bureau of Foreign and Domestic Commerce. This regret, however, is mingled with pleasure at the announcement that D. B. Carson will become the new Commissioner of Navigation. From his past record we have every reason to believe that Commissioner Carson will exercise the same sympathetic understanding of the needs of the amateur as did his predecessor. In leaving this branch of the service Mr. Chamberlain carries with him the best wishes of the entire radio industry.

GRAND publicity has been given the radio telephone in the West during the past month on account of the wonderful concert given by the stars of the Scotti Grand Opera Company, the radio sermon of Dr. Van Winkle of the First Christian Church of Oakland, and the radio music furnished by Steindorff's 60-piece band. This service, as furnished through the enterprise of the radio men, is helping to popularize radio more than would any other agency. Many men of mature years are buying receiving sets and soon can be counted upon as influential radio fans. To improve the music, to prevent duplication of effort and to avoid interference why could not the newly formed Pacific Radio Trade Association establish

central transmitting stations at strategic points and undertake co-operatively and thereby more effectively what is now left to individual firms?

SINCE the days of Robin Hood, down through the age of pirates and smugglers, and now in this time of bootleggers and Roy Gardners, the romance of excitement and adventure ever has been attached to playing the game of lawlessness. While our interest and our sympathy naturally goes out to those in trouble, law-breakers too often have been the heroes of literature. Small wonder it is then that there is insidiously created a desire to emulate these ancient deeds of valor, and to break those laws by which we are restrained.

You cannot blame the boy who thinks it big to break the law when he has been fed up on these stories and taught to admire the law breakers. On every hand, also, he hears his elders boast of their prowess in evading the speed cop and the prohibition sleuth. In the shelter of the home he himself has been judged by a lenient standard and held to a small degree of responsibility.

So when he gets his license he does not realize the seriousness of the rules that limit his wave length and his sending power. When he finds the 200-meter field too crowded he goes up a few notches, and when his feeble spark or tube is QRM'd by some big commercial station he throws in another ampere of radiation. But by so doing he plays havoc with legitimate business and government messages. The radio inspector steps in and shuts down his station and he learns, for the first time, that laws are not made merely to be broken.

However unpopular or unequitable a law may be, still it is a law, a rule of conduct for the protection of society, a means for providing the greatest good for the greatest number. If it is wrong, it will soon be repealed. But while it remains a law it should be obeyed.

Personally, RADIO believes that this limitation of wave length is hampering ambitious young men and is throttling legitimate development of radio communication. We believe that the amateur should be allowed to work up to 350 meters and that other stations should be raised accordingly, and we are doing our part to bring this about. But meanwhile we must obey orders.

You, as a radio amateur, can do your part by showing through your obedience of the present law your fitness to receive the privileges of a less restrictive law.

Now in Our New Home

Coincident with the change of name from Pacific Radio News to "Radio" we announce the establishment of editorial and business offices at 465 Pacific Bldg. San Francisco, where we will be glad to welcome our friends

The New Federal Arc Station at Palo Alto

By H. R. Pratt

THE Federal Telegraph Company, a California corporation and organized in San Francisco, has for years been known to all interested in the radio field as the first to employ modern radio equipment, using undamped waves for commercial long distance telegraph communications. For a number of years prior to the war this company, through progressive steps, developed in its research and engineering departments, the first practical continuous wave radio transmitter known to the engineering world, and built and placed in operation a chain of radio stations using the equipment which had been developed, embracing the western coast of the United States and the Hawaiian Islands.

The United States Navy Department, observing this important development, took occasion to investigate the system, which it found so well adapted for military communications that a contract was arranged for the Federal Company to install a complete set of its transmitting equipment in the Arlington (Va.) Radio Station, which at that time had just been completed and was the most powerful radio station in existence. The arc transmitter which was supplied on this contract gave such superior performance that additional contracts were immediately consummated by the Navy Department for a number of high power radio stations. During and following the period of the world war, the Federal Company equipped additional high power radio stations for the Navy Department, which have resulted in a chain of stations extending throughout all American possessions. All of this equipment was designed in California by Federal engineers and manufactured at the company's factory at Palo Alto.

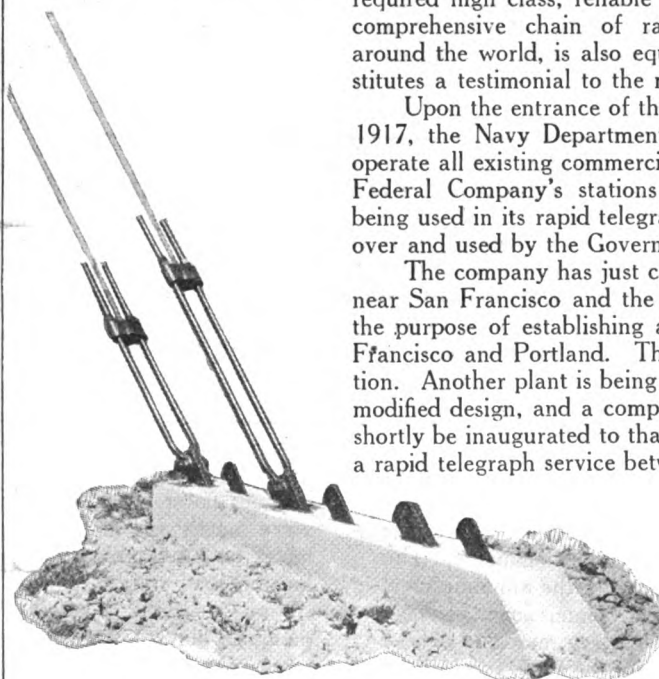
The experience of the Federal Telegraph Company through its years of activities has resulted in the development of arc radio transmitters to a very high degree of efficiency. The fact that the United States Navy Department adopted this system at a time when it

required high class, reliable radio equipment, and that the most comprehensive chain of radio stations ever built, stretching around the world, is also equipped with Federal apparatus, constitutes a testimonial to the meritorious features of the system.

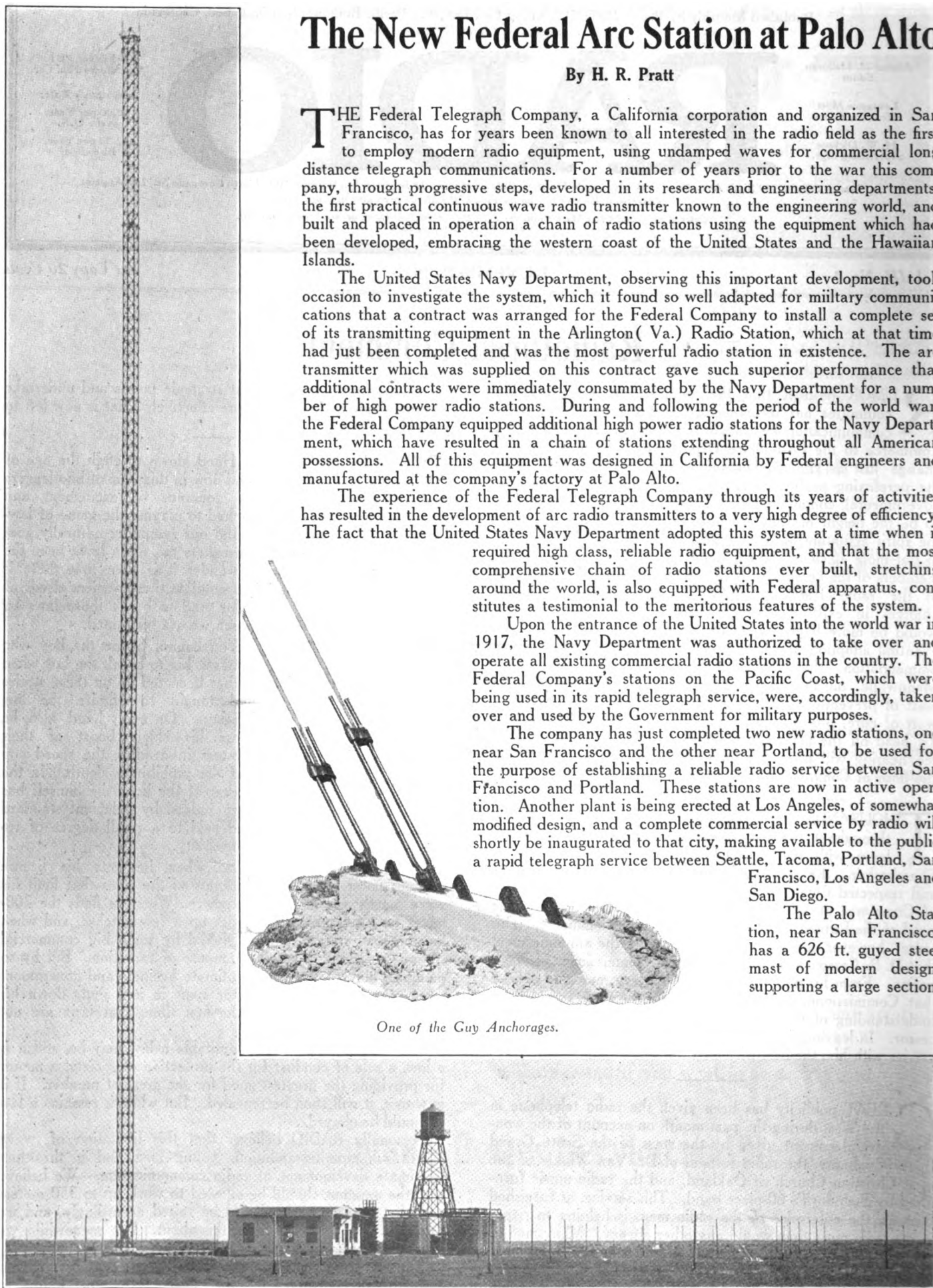
Upon the entrance of the United States into the world war in 1917, the Navy Department was authorized to take over and operate all existing commercial radio stations in the country. The Federal Company's stations on the Pacific Coast, which were being used in its rapid telegraph service, were, accordingly, taken over and used by the Government for military purposes.

The company has just completed two new radio stations, one near San Francisco and the other near Portland, to be used for the purpose of establishing a reliable radio service between San Francisco and Portland. These stations are now in active operation. Another plant is being erected at Los Angeles, of somewhat modified design, and a complete commercial service by radio will shortly be inaugurated to that city, making available to the public a rapid telegraph service between Seattle, Tacoma, Portland, San Francisco, Los Angeles and San Diego.

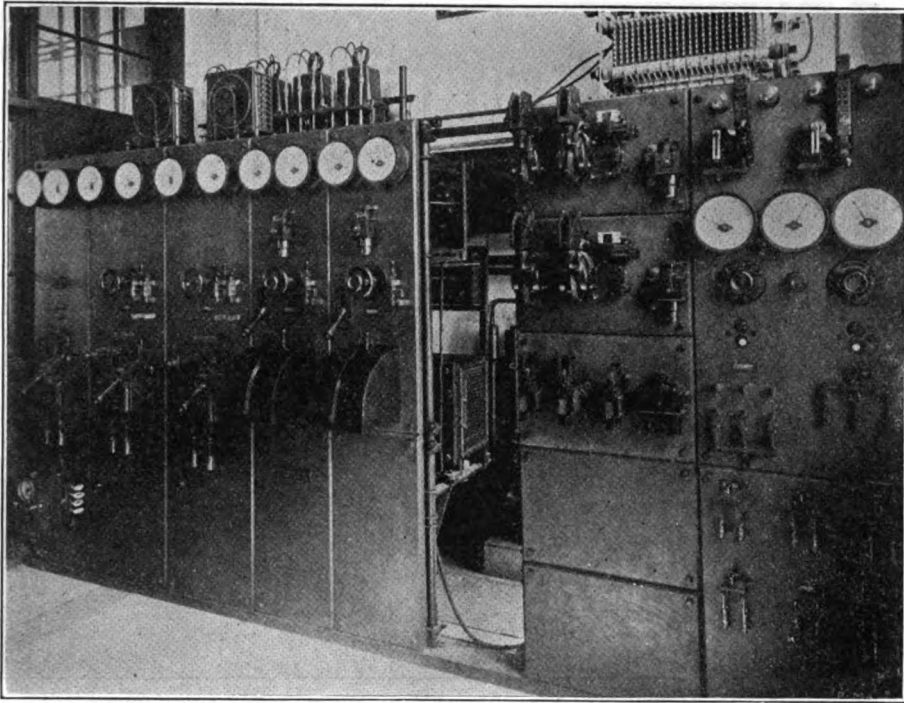
The Palo Alto Station, near San Francisco, has a 626 ft. guyed steel mast of modern design, supporting a large section-



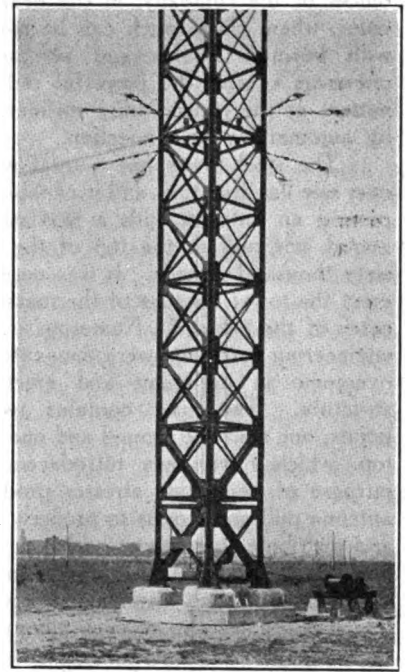
One of the Guy Anchorages.



The New Palo Alto Station of the Federal Telegraph Co., Showing 625 ft. Mast, Power House, Cooling Tower, Outdoor Condensers and Counterpoise Ground System.

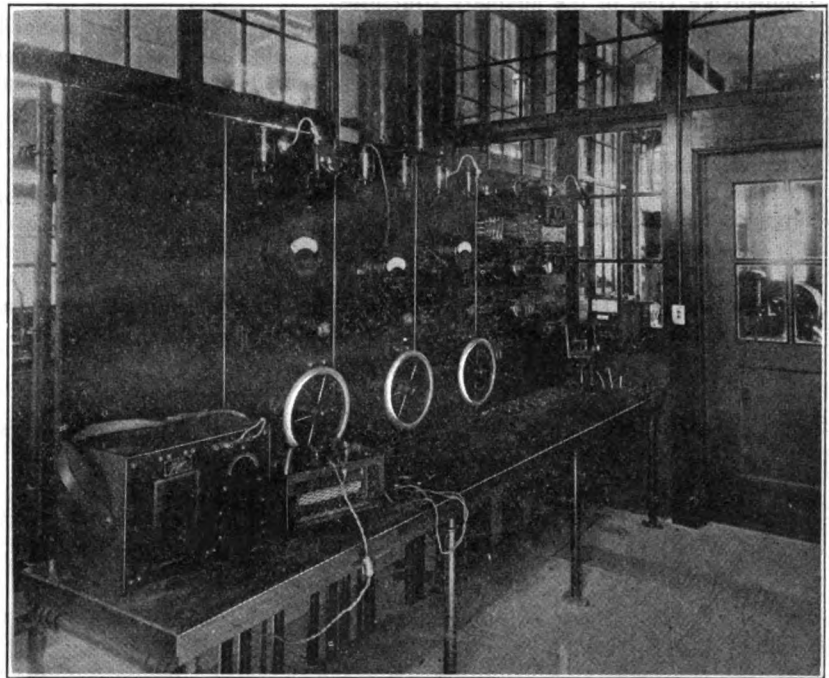


Main Power Switchboard.

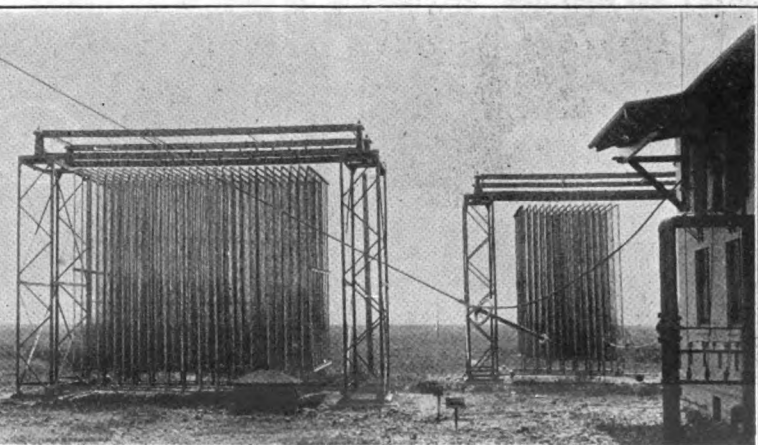
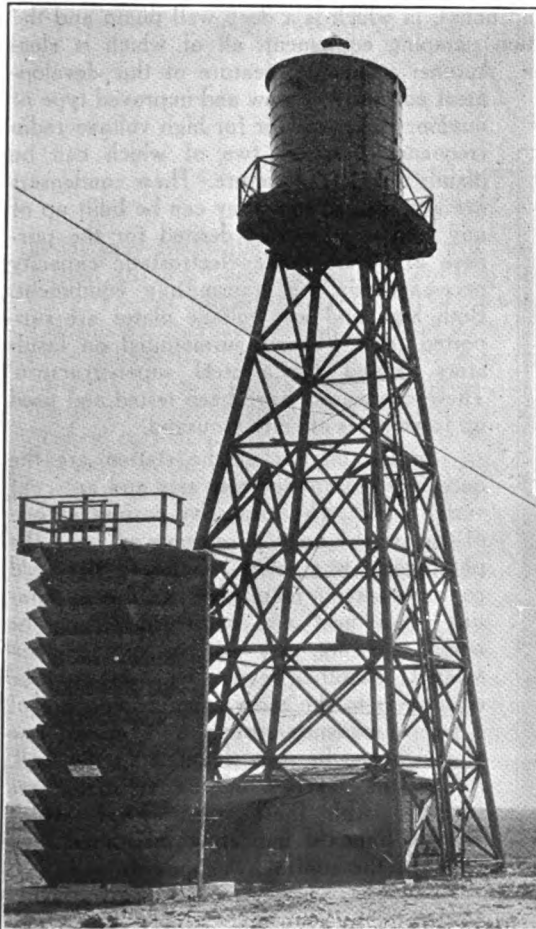


Base of 626 ft. Steel Mast, Showing Counterpoise Ground System.

alized umbrella antenna system. This covers an area of over 150 acres. Many new recent developments in the radio art have been taken advantage of in the building of these stations. Among these is the use of high speed and automatic equipment with multiplex communication channels. All receiving and transmitting operators are in the main



Station Control Switchboard and Table.



Auxiliary Structures Surrounding Power House, Including Outdoor High Voltage Condensers and Water System.

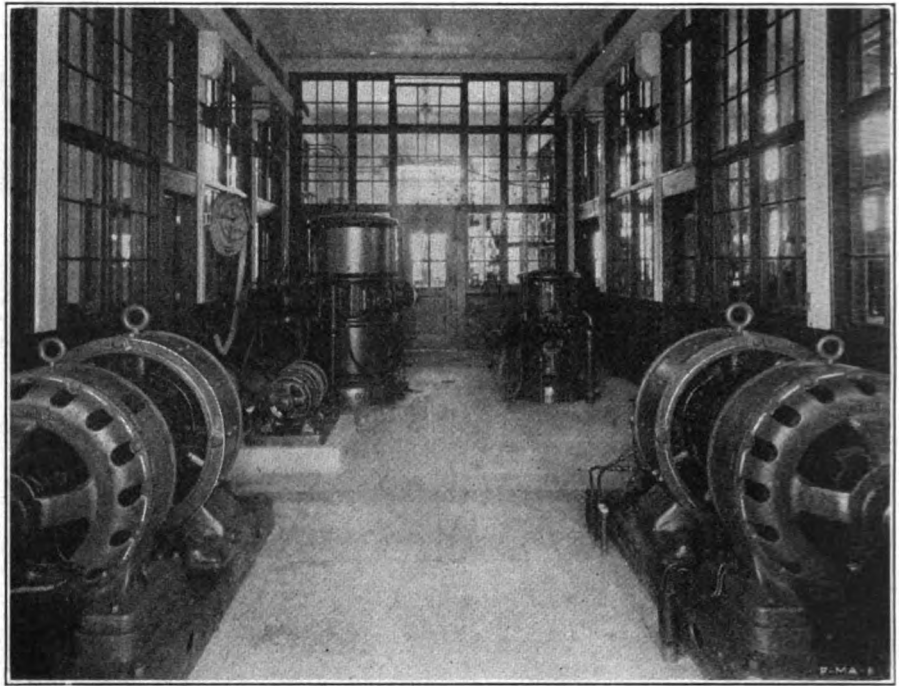
offices of the company, in the heart of the cities, where close touch can be maintained with business houses and offices. These operators control the powerful radio transmitters at the transmitting stations directly by automatic wire connection.

The steel tower has a total weight of over one hundred tons and is capable of supporting an antenna with a maximum horizontal side pull at the top of the mast of sixty thousand pounds. It was necessary to erect the tower because of the marshy character of the sub-soil. Numerous interesting engineering problems were encountered and overcome in designing and erecting this structure. The mast contains two pivot points, one near the ground and one near the top, which have been introduced for the purpose of permitting stresses produced by antenna pull and storms to properly equalize and distribute themselves, and it is this feature which enables this structure to support an antenna of such massive construction.

The greater part of each guy anchorage is under the surface of the ground. All of these are also supported on pile foundations in the case of the Palo Alto Station.

Prominent in the foreground of the accompanying view of the auxiliary structures surrounding the power house is one of the antenna lead-in cables and one of the high potential insulators used for this construction is visible where the connection is made to the side of the power house. There are several of these conductors distributed around the building, all of which are carried to the equipment inside through special antenna entrance windows, on each side of which are mounted large pillar insulators for supporting the cables.

Attached to the side of the power house can be seen the gas seal exhaust pipes from the various arc converter units installed within. These gas seals are provided with special valves so that the arc chambers may be readily cleaned auto-



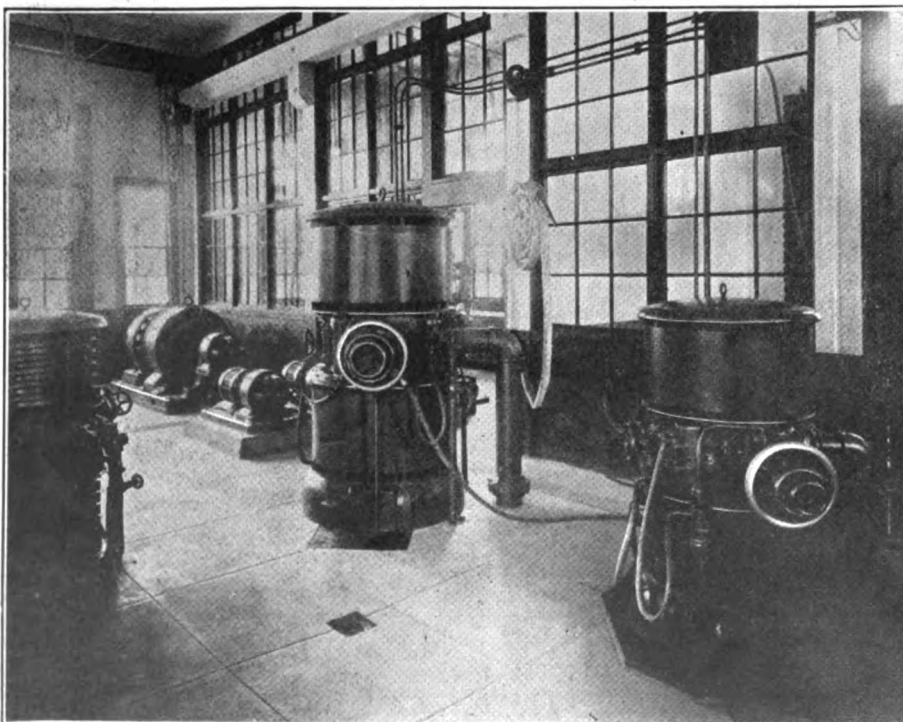
Main Power Machinery and Arc Room.

matically through a blower system. The blower used is mounted in a small, ventilated housing, which can be seen in the center of the picture.

In designing these stations it was decided to utilize a water circulating system for cooling the arcs and for the purpose of economizing in water, cooling towers of proper capacity to secure the desired heat dissipation were provided. One of these can be seen alongside of the water tank and tower in the picture. At the base of the tank tower is a combined store-room and pump house, in which is a deep well pump and the necessary station pumping equipment, all of which is electrically driven. Another interesting feature of this development consists of a new and improved type of outdoor air condenser for high voltage radio frequency currents, two of which can be plainly seen in the picture. These condensers are arranged so that they can be built up of any number of plates desired for the purpose of securing the electrostatic capacity necessary for the transmitting equipment. Both high and low voltage plates are supported from I-beams surmounted on insulators carried by a steel super-structure. These condensers have been tested and used up to voltages of sixty thousand.

In the interior of the station are the necessary motor-generator sets and arc converter units. The protective casings of one of the smaller units were removed when the photograph was taken, disclosing the field coil construction employed with this apparatus. This field coil construction can be noted as being very massive and well insulated. Another feature which should be of interest to the radio engineer consists of a radio frequency current transformer, one of which can be seen mounted on the wall. All of the stations of the company are equipped with these transformers, which operate standard indicating instruments located on the control switchboards.

(Continued on Page 136)



Main Power Machinery and Arc Room.

The How and Why of Radio Tuning

By B. F. McNamee

ONE of the most wonderful things about radio to the mind of the layman is the fact that many different pairs of stations can transmit and receive messages in the same locality and at the same time without interfering with each other—of course, providing that they are using different wavelengths. To understand the method by which this is accomplished is to understand the principle of tuning. And the object of this article is to explain in simple words the tuning idea, as well as some of the instruments used for this purpose.

First let us see how a transmitting station sends out a message on any particular wavelength. The aerial at the transmitting station consists of a number of wires suspended from insulated supports and having a wire connecting it with the sending apparatus. This sending apparatus consists of an arrangement for charging and discharging the aerial with electricity almost any number of times per second, as desired. Each time that this charging takes place, energy is radiated from the aerial in the form of an electro-magnetic wave.

If the charging and discharging of the aerial take place very rapidly, or, in other words, if waves are sent out from the

1,500,000 wave per second corresponds to a wavelength of 200 meters; a frequency of 300,000 waves per second corresponds to a wavelength of 1000 meters.

In order to see how waves of various lengths will affect a receiving set it will be necessary to consider **free oscillations**. We know that a clock pendulum will swing back and forth in a certain length of time if allowed to swing **freely**, and that this length of time will always be found the same, provided that the length of the pendulum and the force of gravity are kept the same. We all know that to shorten a pendulum is to cause it to oscillate faster, and that to lengthen it is to cause it to oscillate more slowly. In fact, any object which tends to vibrate or oscillate when moved from a position of rest will always taken a constant length of time for each swing.

Now we are ready for the important case where we have two pendulums or other vibrating bodies having the **same number of free oscillations per minute**, or, in other words, **tuned to each other**. Let us take the oft-repeated experiment shown in Fig. 2. A and B are two pendulums consisting of weights attached to strings of equal lengths. C is another similar pendulum, but either longer or shorter than the first two. All

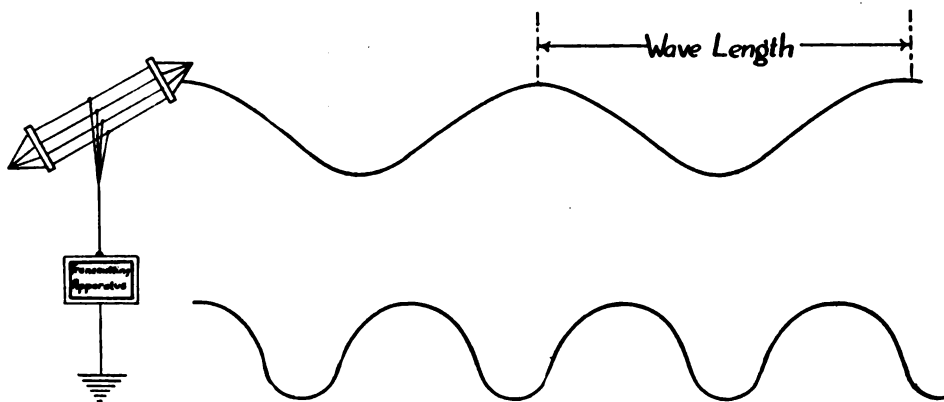


Fig. 1. Variation of Radiated Wire Length with Frequency of Vibration.

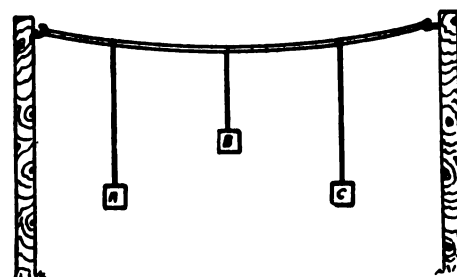


Fig. 2. Pendulum Demonstration of Tuning.

aerial very frequently, the first wave will have traveled only a short distance when the second wave is sent out. But if the waves are not sent out so frequently, one wave will have gone a distance of perhaps several thousand meters before a second wave follows it. Now the distance between the crests of two adjacent waves is called the wavelength. This is simply saying that a short wavelength is the result of a very high frequency current in the aerial, and that a currency of lower frequency in the aerial would cause a longer wavelength.

The speed at which these electric waves travel is the same as the speed of light—186,000 miles per second. Expressed in the metric system, this speed is 300,000,000 meters per second. Suppose a transmitting station should send out just one wave every second. The first wave would have traveled 300,000,000 meters before the second wave started. As these waves travel on, they will, of course, remain the same distance apart. So in this case the wavelength would be 300,000,000 meters. If the transmitting station should send out ten waves per second, each wave would have traveled only one-tenth of a second before the next wave was sent out. In one-tenth of a second a wave would travel one-tenth of 300,000,000 meters, or 30,000,000 meters, which would be the wavelength.

We see, therefore, that to find the wavelength corresponding to any particular frequency, it is simply necessary to divide 300,000,000 by the frequency. For example, a frequency of

three pendulums are suspended from a string stretched between two supports. Pendulum A is brought to one side and allowed to swing **freely**. There will be little or no effect on pendulum C, but pendulum B will commence swinging, very slightly at first, but gradually increasing in strength. This is a simple demonstration of tuning. Pendulum A transmitted a series of feeble impulses along the string supporting the pendulums. None of these feeble impulses was in itself sufficient to start the other pendulums swinging to any noticeable extent, and for this reason pendulum C does not swing. But in the case of pendulum B these feeble impulses were supplied at exactly the right time, so that each impulse added its effect to that of the preceding ones.

The same effect may be studied in a great many ways without setting up any special apparatus. Stand beside a rocking-chair and give it a series of slight pushes with the finger, in such a direction as to start it rocking. If the pushes are carefully timed to correspond with the free oscillations of the chair, it will, in a short time, rock as far as desired, but such a series of slight pushes will accomplish little if not so timed.

The simplest receiving set generally has a tuned circuit consisting of an aerial, a coil and an earth connection. If we give the aerial an electric charge it will discharge through the coil to ground, but the action will not stop at complete discharge any more than a pendulum will come to rest at the end of the

first half swing. There will be a current flowing back and forth through the coil, gradually decreasing in strength until it dies out completely. This is a **freely oscillating current**, and the number of oscillations per second will depend on the size of the aerial and of the coil.

Suppose that we wish to hear a station that is sending on a wavelength of 1000 meters. This means that waves from this station are striking the receiving aerial at the rate of 300,000 waves per second. Now if the coil and aerial are of such a size that the number of **free oscillations** per second in this circuit will be 300,000, this receiving circuit is tuned to the transmitting station in question. There is a feeble current started oscillating between the receiving aerial and earth by the first wave, and each succeeding wave adds to this current, because, as in the case of pendulums A and B, mentioned above, each impulse is correctly timed.

Now suppose that we wish to listen to a station that is sending on a wavelength of 200 meters. This means that waves are reaching the receiving aerial at the rate of 1,500,000 waves per second. In order to tune our receiving circuit so that it will freely oscillate at the rate of 1,500,000 times per second, it will be necessary to use a smaller coil, or to use only part of the turns. This corresponds in the pendulum experiment to saying that if pendulum A were shortened so as to swing a greater number of times per minute, it would be necessary to shorten pendulum B to keep the two in tune.

Besides **free oscillations** we have to deal sometimes with **forced oscillations**. If, in the rocking-chair experiment given above, the chair would freely rock back and forth ten times per minute, we could easily force it to rock back and forth three times per minute or twenty times per minute or almost any number of times per minute by taking hold of it and applying force. This corresponds in radio to having a receiving outfit in the immediate vicinity of a powerful transmitting station. The waves from the transmitting station in this case strike the receiving aerial with such strength that they may force an oscillating current of sufficient strength to cause interference even when the receiving circuit is tuned to some very different wavelength. This interference can be to some extent overcome by using very loose inductive coupling, to be described in a later article.

When a slight adjustment of the receiving tuner is sufficient to bring in or shut out a particular signal, the tuning is said to be **sharp**. On the other hand, if the signal remains strong over quite a range of adjustments on the receiving tuner, the tuning is said to be **broad**. In the case of some transmitting stations, especially spark stations, this broad tuning is caused by the radiation of the energy on a whole series or band of wavelengths instead of on one single wavelength. For example, a station that is supposed to be sending on a wavelength of 200 meters may be sending out more energy on 200 meters than on any other wavelength, but it may be transmitting some energy on many other wavelengths ranging from, say, 180 meters to 220 meters, and, of course, can be tuned in on these wavelengths.

Broad tuning is not always the fault of the transmitting station. It may result from forced oscillations, as mentioned above, or it may be the result of a poorly designed aerial and receiving tuner.

THE NEW FEDERAL ARC STATION AT PALO ALTO

(Continued from Page 134)

At the control switchboard and operating table of the station, located in a separate room, are the terminals of the incoming control lines, telegraph instruments and keys, high speed signaling relays, and the arc control switchboard panels themselves. One operator can run all of the transmitters at this station from this one position, where all controls are concentrated.

The main power switchboard of the station has panels

for each motor and generator in the plant. The main motors are 2,200 volt and of the synchronous type. Power is brought into the station through a three-phase underground cable, which terminates behind the switchboard.

The construction of these stations and the resumption at this time of radio commercial telegraph service on the Pacific Coast by the Federal Telegraph Company have been made possible through the recent organization of its affairs by its president, Mr. R. P. Schwerin.

HOW TO HEAR THE RADIO MUSIC IN THE AIR

There is radio music in the air, every night, everywhere. Anybody can hear it at home on a receiving set, which any boy can put up in an hour. One of these sets costs less than a phonograph. With it can be heard grand opera, orchestras, phonograph music, market reports, press summary, sermons and speeches. All that is needed is a hundred-foot clear span of copper wire, a couple of batteries and a cabinet set that can be bought from a radio dealer in every town.

First string an aerial between two chimneys, houses or poles about a hundred feet apart and twenty feet or more high. Use a porcelain insulator at either end, where attached, drop the wire down and bring it into a room through a window or a hole in the wall, and hitch it on to one of the set's terminals. All that is needed for an aerial are two insulators and a hundred feet of hard-drawn No. 14 copper wire. Attach a piece of the same kind of wire to the other set terminal and hook tightly on to a buried water pipe for a ground.

A six volt storage battery—an old automobile battery will do—is needed to furnish current to light the filaments in the vacuum tubes, which are the important parts of the receiving set. A 45 volt dry battery furnishes the current for the vacuum tube plates.

The elaborateness of the set depends upon the price paid, varying from \$25 to \$300, but every set contains three inductance coils, or variometers, and two condensers, which must be adjusted so that the receiving set is in tune with the sending set, as described in detail by Mr. B. F. McNamee in the preceding article.

A vacuum tube is used to detect the high frequency electric vibrations sent out from the transmitting set and received on the aerial. This tube acts like a one-way valve or rectifier and feeds the current to the telephone receiver just as in the ordinary wire telephone. This will bring in the sound loud enough to be heard by a telephone head-set and by itself constitutes a cheap receiving outfit.

But in order to be heard by every one in the room it is better to get a telephone receiver equipped with a horn and add two more vacuum tubes and transformers which amplify or make the signals louder. Still louder results can be attained with the further addition of any one of several loud-speaking telephones.

Most of the battery sets come in a cabinet in which are mounted the inductance coils, condensers, vacuum tubes, transformers and battery connections. The front of the set contains various dials which control the tuning and the amount of current from the batteries. The use of these dials will be explained in future articles or may be learned from any radio man in half an hour.

Such a set also detects wireless telegraph messages which anyone with a knowledge of the Continental code can read. No license of any kind is necessary to operate it and the music and news are free for all.

No better investment can be made as a means for making a home more attractive to the entire family. Radio brings fathers and sons together on a common basis of mutual interest. The women can easily tune in during the afternoon and have a constant source of entertainment for their guests. Any phonograph selection will be played on request to the operator in charge of the sending station. No home is complete without radio.

Cutthroat Competition in General Public Business

A Samuel Jones Story—By Volney G. Mathison

IT all had its beginnin' one cold afternoon when I was sittin' in my shack enjoyin' the ruddy warmth of the big coal-heater close abeam as I looked out of my big bay window an' watched the gusty flurries of hard, dry snow that swirled among the opposite cliffs an' foretold the approach of Alaskan winter.

Sick an' tired of readin' magazines an' doin' nothin', I was chewin' the rag with K-O-X-N on the little half-inch spark-coil that I use for short-distance monkeying around.

"Say, I'm gonna tell you somethin', Hell-Fire," I says on my key to my hard-boiled colleague over at Pirate Cove; "I've been thinkin' it over, an' I've come to the conclusion that the company I'm workin' for ain't got no sense—"

"Tell me somethin' new, S. J.," breaks in Hell-Fire, on his similar spark-coil; "I found out when I built these two stations that neither one of these codfishin' outfits got any brains worth braggin' about.

"There you are on Unga Island an' here I am on Popoff Island, less'n twelve miles apart, an' each with a wireless station powerful enough to reach the three hundred an' some miles to N-P-Q an' N-P-R. There's sure no sense in these two big stations bein' here together. If these fishin' concerns wasn't so much like a coupl' a scroppin' tomcats, they'd 've agreed to both use this big set here at Pirate Cove, an' only have a little spark-coil outfit over there at Unga—"

"Or both use th' big set here at Unga an' put th' spark-coil rig over at your joint—this station was here first, anyway," I comes back.

"Q-R-T! Q-R-T! Q-R-T! K-O-X-N and K-V-I, Q-R-T!" squeals a loud, mushy 500 cycle quenched spark, which I recognizes as belongin' to an old salmon-steamer lyin' over at the Squaw Harbor fish-cannery, about five miles away: "Say, lissen, can't you darned ginks struggle through a single day without startin' that same confounded never-endin' argument—it's gettin' staler'n five-year-old codfish! I'm tryin' to copy a little press from N-P-R—Bk will you!"

"Hey, you stinkin' ol' fish-barge, whadda'ya mean bawlin' ME out like that—don't ya know who I am?" howls Hell-Fire from his side of the creek. "If ya want press, copy it on arc like I do—or go without! If ya ever open up on me again at five miles with that blasted old busted-steam-whistle spark 'a yours, I'll come over there to th' fish-morgue an' ram your stutterin' ether-wreckin' key down your throat—an' I hope you got what I said, because if you haven't I'll

start up the diesel-engine on my big set an' throw enough kilowatts at you to knock your rusty ear-drums inside out! Hear me!"

A dead silence on the air follows this; so I figures the mutt on the fish-scow must'a heard.

"As I was sayin' a while ago, I think this codfish crowd is nuts," I resumes on the key as I look out of my window thoughtful-like at the heavy ocean swell boilin' among the rocks forty feet below: "Here they've got all kinds of good dough tied up in an engine an' generators an' a lott'a apparatus, as well as



The Great Northern Fisheries of San Francisco were in receipt of the following telegram:

"Send twelve audion bulbs; terrific explosion occurred last night. In addition, ship complete set of meters for power house, one armature, new left-side engine flywheel and sixty feet belting. Nosey Olsen hanging around when explosion occurred. Notify Swedish-American Life Insurance Co."

th' shack and an aerial over a hundred an' thirty feet high an' four-hundred long—an' what do they get out of it? About half-an-hour's run every day, sometimes less, handlin' th' company's private fish business an' a few stragglin' messages from th' insane an' moonshine-struck inhabitants of this here island. Outside of company business, during the last 10 days I ain't had but two messages—one goin' out from Soap Komedal's Pool Hall an' one comin' in fer Loo Hung's Hash House. Two messages in ten days! Think of it!"

"Ya ain't got nothin' on me," responds Hell-Fire, sendin' sorrowful-like, "I ain't had a blamed thing go out fer three weeks, an' only one collect night-letter come in, which was fer th' Corned-Beef

Kanaka, th' cook, an' he's broke—so I had to cancel it."

"Th' trouble with this station is that it's licensed wrong," I declares; "it's got a limited commercial license, which allows me to work on with N-P-R an' no other stations except N-P-Q, if N-P-R happens to be broke down. What I should have is a general public license to work with any an' all stations, ship or land. Besides, all th' Alaska wagons that go by, there's dozens an' dozens of shippin'-board steamers an' oil tankers makin' th' Great Circle from the States to the Orient; an' every night I sit an' listen to 'em gettin' th' brass-pounder's cramps from callin' the navy stations, with business to send. Th' gobs are too busy sendin' government deadheads an' makin' home-brew to bother with th' ships, an' if I had a P-G license I could gather up all that ship-business every night an' relay it to N-P-R on eighteen-hundred meters on my regular daily schedule.

"This station would get the six cents a word coast tariff; an' s'posin' I got only twenty-five messages a night averagin' about fifteen words, that'd be somethin' over twenty-five dollars' profit fer th' company—an' I'd have somethin' else to do besides sittin' around here burnin' up all th' coal in sight an' readin' 'Stormy Stories.'"

"Say, I'm sure glad you told me all that!" buzzes Hell-Fire, "I never thought of it before. I'm goin' to rush a letter out on that salmon-packer tonight to th' home-office explainin' th' whole lay-out to 'em an' tellin' 'em to get me a P-G license right away. I'm much obliged to ya fer th' idea."

"Much obliged, my eye!" I hammers back. "I was talkin' about MY station—not yours! We're only ten miles apart, an' that's too darned close to both be P-G stations. We'd be jammin' each other worse'n a coupl' a chatterin' old hens at a ladies' sewin' club—an', anyway, you've got plenty to do runnin' that jackass moonshine still 'a yours, without foolin' with ship's business!"

That night I gets my letter off to the home office.

What happened afterward I've got all nicely written down here in full detail, but th' ornery plug that calls himself th' author of this stuff says it's too profane to print; so here's where I go off watch an' leave him to finish it to suit himself.

(Notice to readers: After a lot of correspondence between myself and the Secretary of the Navy, I have obtained permission to publish the following messages from the files of N-P-R, the naval

radio station at Dutch Harbor that handles the outgoing and incoming business for K-V-I and K-O-X-N. Peace now prevails along the Alaskan peninsula, but fearing that the reading of this account of what happened up there last fall may stir up afresh the animosities of some of the hair-trigger citizens of Unga and Pirate Cove, the Secretary of the Navy has requested that no copies of the magazine in which these messages are printed shall be sent to the Shumagin Islands. Readers that fail to observe this request do so on their own responsibility.—V. G. M.)

Day Letter, San Francisco, Calif.

Radio, K-V-I, Unga, Alaska, via N-P-R:

Referring to your letter about radio station, we have obtained a general public license for K-V-I. Begin at once. Alaska Codfish Company.

Rush Telegram, San Francisco, Calif.

Radio, K-O-X-N, Pirate Cove, Alaska:

Great idea about ship business. We already got general public license for K-O-X-N. Grab everything in sight. Great Northern Fisheries.

Night Letter, Pirate Cove, Alaska.

Great Northern Fisheries, San Francisco:

Send best 600 meter regenerative receiver you can buy, also four-step amplifier. No business yet, but hear a ship coming from Japan and will probably get big string tomorrow night. Rush a good make hot-wire ammeter reading to seventy-five amperes. Radio K-O-X-N.

Day Letter, Unga, Alaska.

Alaskan Codfish Company, San Francisco:

Pirate Cove also got P-G license and jamming me with ten kilowatts every time I try to work anybody. Send one Hellkum Special Automatic Break-in-Key, forty gallons dynamo oil, six dozen spark plugs. No business yet, but will get a string tomorrow night. Rush ten thousand message blanks. Radio K-V-I.

Day Letter, Pirate Cove, Alaska.

Great Northern Fisheries, San Francisco:

Send by first boat an assistant operator. We must stand twenty-four hour watch to keep up with competitor at Unga. Getting only two hours sleep daily. Eleven Tr's last night, no paid business yet, but plenty soon coming. Ship two complete transformer secondaries, also new cylinderhead for diesel engine. Radio K-O-X-N.

Day Letter, Unga, Alaska.

Alaskan Codfish Company, San Francisco:

Enemy station hogged string last night from the ship I was waiting for last three days, but only Tr's, no paid stuff. Send another operator first possible boat; haven't slept since got P-G license. Ship twelve condenser sections, one gross of hundred ampere fuses, new hot-wire ammeter. Also engine crankshaft. Mail a

copy of the United States Radio Laws and Regulations direct to the Pirate Cove outfit. Radio K-V-I.

Day Letter, San Francisco, Calif.

Radio, Unga, Alaska:

Can't get any operator; they have all been reading about Unga in some wireless magazine and absolutely refuse to ship. Do best you can and don't let Pirate Cove crowd get ahead of us under any circumstances. Alaskan Codfish Company.

Day Letter, San Francisco, Calif.

Radio, Pirate Cove, Alaska:

Offered three hundred dollars per month for operator, but all positively refused to ship; said have been reading about you somewhere and think you are crazy. We hired a crimp to shanghai an operator, put him aboard schooner "Beulah" sailing yesterday, but when he learned ship's destination, jumped overboard. Keep up your great work; don't let Unga outfit get away with anything, no matter what you have to do. We are depending upon you. Regards. Great Northern Fisheries.

Telegram, Unga, Alaska.

Alaskan Codfish Company, San Francisco:

Hurrah; made great scoop last night, established communication over distance of 1500 miles with R-N-R, Russian Bolshevik wireless station in Gulf of Anadyr, Siberia. He will give us 300 words of paid code correspondence every night for Russian government's American bureau at Washington, D. C. Ship ten sets of sixty ampere key contacts, also 15,000 gallons gasoline. Radio K-V-I.

Rush Telegram, Pirate Cove, Alaska.

Great Alaskan Fisheries, San Francisco:

Ship one hundred pounds dynamite. Radio K-O-X-N.

Day Letter, Unga, Alaska.

Alaskan Codfish Company, San Francisco:

Have good reason to believe that Pirate Cove lunatic is planning to blow up K-V-I. Tin-Pan Smith and the Head Cracker have been hired at ten dollars a day each to guard station and wireless masts. Getting 250 to 350 words of business from R-N-R regularly every night. No other traffic. If can buy reasonable, send a machine gun. Radio K-V-I.

Telegram, Pirate Cove, Alaska.

Great Northern Fisheries, San Francisco:

Better charter an oil tanker quick; have been compelled to tie up all fishing boats account fuel supply exhausted. Radio station has burnt up all crude oil, gasoline, distillate and coal oil on the island; now burning moonshine costing forty dollars a gallon. Rudolph Krugscaller, Supt.

Telegram, Unga, Alaska.

Alaskan Codfish Company, San Francisco:

Ship a machine gun at any price. Fishermen of both companies have taken

up issue and are fighting daily out on fishing grounds. Enemy crowd's big schooner "Pirate King" attacked our dory fleet yesterday; sank four dories. Dago Mike, while under capsized boat, got fish hook in his nose and has gone crazy. Shotgun Sykes took command of our "Alasco Tiger" and went after enemy schooner, drove him on rocks in Man-Eater's Cove; now chasing crew all over the mountains on mainland. Ship 100 feet number 0000 copper wire for better ground connection; also twelve 300,000 volt aerial insulators. Radio K-V-I.

Day Letter, Pirate Cove, Alaska.

Great Northern Fisheries, San Francisco:

Terrific explosion occurred last night, caused by over-strength engine fuel. Send twelve audion bulbs, filaments of all but one broken by shock. In addition, ship complete set of meters for power-house panel-board, one main alternator armature, one exciting-generator armature, sixty feet belting, engine cooling water tank, new left-side engine flywheel, also enough lumber to close hole torn in side of power-house. Nosey Olsen was hanging around power-house at time explosion occurred. Notify Swedish-American Life Insurance Company. Radio K-O-X-N.

Another Day Letter, Pirate Cove, Alaska.

Great Northern Fisheries, San Francisco:

Forty-five Tr's, eight weather reports last night, one paid message eight words; our profit, forty-eight cents. Ship complete new receiving set, amplifiers, pair of phones, one gallon liniment for electrical burns and an aerial switch having at least twenty-four inches separation between switchjaws on sending and receiving sides. The Corned-Beef Kanaka was sniped by one of Unga outfit spying around here in a dory last night; recognized dory as Gumboot Hansen's, and we'll get him. Buy all 30-30 Winchester and 45 Colt ammunition in San Francisco. Radio K-O-X-N.

Day Letter, Unga, Alaska.

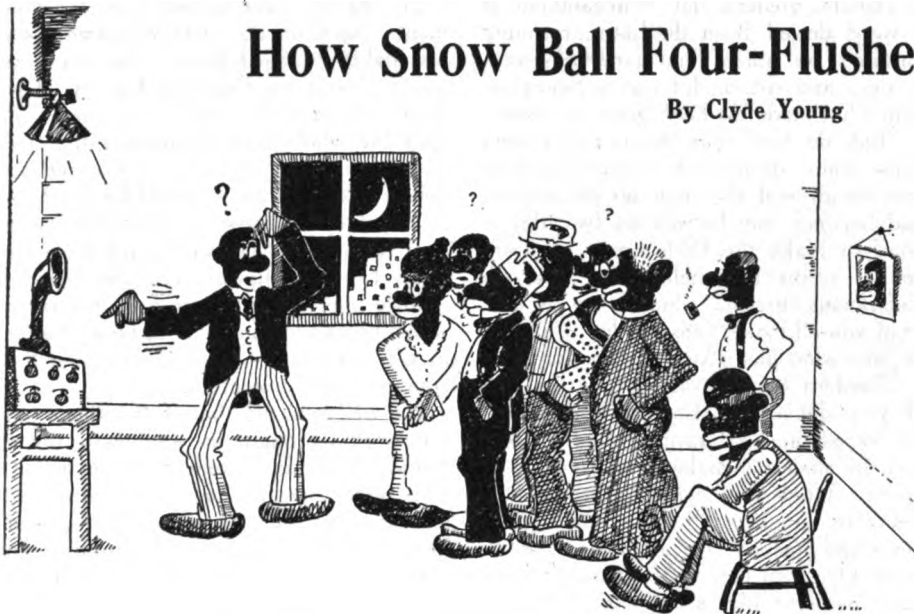
Alaskan Codfish Company, San Francisco:

All fishing has stopped. We are digging trenches around wireless station; expect attack from Pirate Cove outfit any minute. They put nitroglycerin in gasoline tank of Gumboot Hansen's dory last night; Gumboot and the boat went up in smoke this morning; tore fish wharf to pieces; haven't seen anything of Gumboot since, but dory rudder and piece of engine came down through roof of Soapy Komedal's Pool Hall this afternoon. Ship new pool table for Komedal, also four plain, standard-size tombstones. See if can buy second-hand cannon from army department. Radio K-V-I.

(Continued on Page 174)

How Snow Ball Four-Flushed and Lost

By Clyde Young



"These Were Critical Moments for Snowball."

J. HEATH

LAZARUS Jones Washington Smith arose early. Of course, this had nothing in common with the habits of Lazrus, his arising time as a rule being somewhat later—mostly somewhat. But he was in great spirits. That explains it. He reached for the telephone.

"Gahfield 'tre foah seben," he yawned.

"Hello. Am dat yo' all Winnie?"

"U-huh. Dat's me."

That voice. Oh, that voice. It made Laz's heart pound like a triphammer doing double duty. So soft and melodious. Synchronous note.

"Do you reelize who dis am?" he purred.

"U-huh."

"Could yo' pos'bly ascertain a date wid me on Fawty-fust Av'nu dis eb-nin'?"

"Ah dunno, Laz."

"Aw Win, don' yo' like me since dat Niggah Snowball been hangin' roun'?"

"Well, ah don' feel well, Laz. Ah been cryin'."

"Cryin'?"

"U-huh."

Laz thought fast. That is as fast as the limitations of his educational possessions would allow. Thoughts rushed through his brain with fearful rapidity. But all thoughts hinged on one point—Snowball—his hated rival. He must act. He already felt that something was amiss. That something his clouded vision told him was Snowball. In order to gain time he spoke again.

Winnie!"

"U-huh." That "u-huh" sounded like music to Laz. She heard a society lady use it.

"Wheah am dat lazy niggah, Snowball?"

"Laz?"

"Zactly. Meaning' ebery-thing in the sense of de word."

"If yo' refuh to Mistah White, he am in Bummin'ham."

"Great horn toads an' 'lil apples. Where'd he get de price ob transportem-tashun?"

"From me, Laz. Yo see ah been thinkin'. (Something quite out of the ordinary for her.) Ah been thinkin' I should do something foah de noble upheaval ob dis grate race of ouahs. Ahse gone into reasuch ob science. Ahse gonna pick music from de aiah. Ahse gonna talk through space."

Laz listened intently. He even concentrated, which, of course, was something extraordinary for him. But when a man's in love with a girl like Winnie Jazzbo, he is very apt to do most anything surprising. Turning over her conversation in his mind as she progressed, he came to the conclusion the heat must be having its effect.

"Yoah am gonna talk thru space, Winnie?"

"U-huh."

"Yessuh, jes' say, Hello heah and yo' all heah me here. Fac' is, Laz, we give one big demonstrashun an' wiahluss ball heah at mah house Sat'dy ev'nin' to which yo' all am cahjulie invahted."

"Miss Winnie ain' you feelin' well?" (Laz had drawn conclusions.) "Does yo' mean t' tell me yoh all can speak foh miles an' miles 'out no wiahs. 'Out no fone like dis one what I now dissipate?"

"Ah sho' do."

"Well, ahse 'cept dat invahtation. Ise be on han'."

ENTER one, namely, James Snowball White, expositer extraordinary, lately of the White-Jazzbo laboratories, who has entered into terminology and practical research as aforementioned. He was in the outskirts of Birmingham with five hundred dollars of Miss Jazzbo's

currency lookin for antenna's and other information. One would wonder why he did not deal directly with persons handling radio apparatus. Snowball had other intention, however, and was casting his optics in various directions, with his head lifted upward to the housetops. His eyes lighted as he espied a beautiful antenna. His instinct told him there must be a good outfit on the lee end of such a display of aerial alaberacy. Snowball had long since come to the conclusion he was not going to spend five hundred dollars on radio. True, he loved Winnie, but five hundred dollars was five hundred dollars. He must get the receiving set, of course. Get it he would. Snowball long since was noted for obstinacy.

Walking up to the front door of the residence which supported the object of his search he was confronted by an obstacle—a bull dog. But Snowball was speedy and before his Ingersol had moved a hair he had cleared the fence.

A lady came to his rescue, as she was drawn to the front of the house by the angry growls of the canine and the soothing words of Snowball in trying to calm the brute. (From the outside of the fence.)

"Lady, dat sho' am a fine dawg. But jes' now he am wrong. I am heah representing a learned community ob us folks wot wish to purchase some radio equipmunt. Yoh hab' de same ob dese heah premises and I thot maybe yoh' all could informashun me regawdin' de pos'ble purchase ob de outfit. May I talk to de man wot operates dat fine antennum?"

"Why, yes; come right in."

"Yes, mam; but ef it's all de same to yoh, lady, would you mine lettin' me see dat nice dawgie on de safe end ob a chain?"

After the dog had been disposed of Snowball was taken to the wireless house and introduced to the owner. A young man of high standing—5BM.

SNOWBALL was in great spirits. The time for the big demonstration and ball had arrived. It was Saturday evening. In the race to win the most coveted hand of Winnie Jazzbo, Snowball had the inside track with a thirty second start on the gun. Lazrus was so far behind he could never overtake him. As a matter of fact, Snowball figured Lazrus was balking at the post and would scratch (meaning out of the race). As Snowball expressed it, "Oh, boy; de prettiest dame in de wurd, wid a bankroll dat spells luxury. My point am seben an' my dice am loaded. May she neber know de truth."

The guests had all assembled and were

more or less nervous. The instruments were set up in one corner, decorated with black chiffon. Snowball wore white gloves and took on, more than the ordinary ham, the aspects of an undertaker.

Parson Ejilah Goosewing had promised to make the introductory address. He arose slowly, the difficulty being that lumbago had at one time made a vicious attack upon him. He adjusted his glasses, coughed, stroked his breast and made a quick gesture as of a man that had not yet learned to swim trying to keep his head above water.

"Ladies and gennelmen," began the minister. "Likewise, brederen and sistern. Permit me to exhibit de excrutiatin' pleasuh ob offerering foh you-al's sureme delectation and joy, uh ebenin' wid dat mos' renoundest scientis' ob the modern age ob the black race—dat is to say, ob de cullud or Affikin race.

"Dis gennulmun what I am a-introducin' is the greatest expositoh what ever expose. In fac', he am of such a renowned and exceedin' ebangelical expositionahy ability day he am been awahded de title ob 'expositoh extraordinary.' Dat means, brederen and sistern, dat he can and does and will expose such a expositionest exposition day you all won't be able to achieve no mental grasp on more'n half of it. Dis heah thing what he gwine expose am de wiahless tellefoam.

"Now, lookahere, bredern and sistern, if you'all am acquainted wid day wonderful and goashamighty grand book, de 'Fore Horse is the Eucalyptus,' den you all knows what is meant by dese terms. Foah, in the Eucalyptus, which am the in-between portions of the Bible, it am writ day in days to come, which now, already, is came, common men and women shall talk here and hear there. An' dat, brederen and sistern, am what is gwine happen right here dis evenin'."

"Us is here, and over dere is somebuddy. And dat somebuddy am gwine talk an' we am gwine hear and de prophesyin' in the big book am gwine be made full of fullfilment like a raisin is wid kick.

"Dis heah expositor what am gwine expose de hidden treasuh of the natchul, materiul and spirichul worlds, am gwine tie us, you and me which am here in dis room, right up close wid somewhere else. We don't know where at is we goin' listen from, but we is gwine listen away fum heah. And, fuddermore and in addishun hereto, dey ain' goin' be no wires in between. An' dat, brederen and sistern, is de real completion an fulfillment ob de prophesy. De good book say, 'Dem who is heah shall be heard fum hereafter,' heahafter bein' a Greek word fum de ancient Sands-kè-rit, meanin' today, which comes fum somewhere else.

"An' lissen, bredern and sistern, heah come the miraclest pahnt ob dis heah miracle. Hit was a broder ob ouah own race, one ob de Senagambians—I stops

to explain, bredern, dat 'Senegambian' is a word deried from de Latin, meaning hit ain't no sin if he gambles"—well, bredern and sistern, hit was a Senegambian what made dis heah great discovery.

"Foh de first' time de way has been made plain; de man ob science has done join hands wid the man ob de church, and between and betwux de two, dey is goin' to make the Bible come true wid copper wiahs and hellfire in fohm ob electricious currents, which is not de kine what you-all makes into bootleg wine, but de kine what has a kick jus' de same.

"Bredern an' sistern, look on de face ob your deliverer! Look at him! Don't be feared, he ain't gwine bite—but, oh, boy, he suah can make yaoh mouf come open! When you niggus gets done lissenin' to him bring the far fum de distance and make de near sit down approximately, right nex' doah, you all's faces goin' be long like a fishpole and youh eyes gwine stick out like de seven legs ob de mystical jellyfish—yes, I know. I done been dere.

"An' in clunclusion, bredern and sistern, lissen and take heed. In dese heah days dey is too much a-happenin' for a nigguh not to be treadin' de right path. You'all better get right down on youah knees right here—"

At this Snowball reminded the minister hoarsely that introductions was introductions, but "dey ain' nobody come heah foh to heah you-all sermonize, Brudder Goosewing," and the eminent colored divine changed the trend of his appeal to: "Get right down on your knees right heah and greet the man what gwine delivuh de cullud race from his heah state ob intellectual subjection and lead dem one an' all into de promised land ob free gin an fried chicken."

AS Snowball arose, the congregation responded with ethereal, oscillatory applause. A thunderous ovation ensued. Snowball stepped forward, bowing rapturously and at the same time depicting various degrees of the latest African jazz steps.

Lazrus sat in one corner in the utmost entanglements of despair. His chin had dropped considerable while his eyes were like those of a "dope" fiend who had'n't had a "shot" in the arm for days. He was looking for an opening to break this strangle hold that Snowball had fastened so securely upon his accomplishments. He wanted to get away and think. Of course, the vastness of the thing had fastened its fangs deep in the respect of Lazrus, but this was nothing. He could spend a night with a ghost with his thoughts centered on the winning of Winnie. While in these thoughts Snowball was talking:

"People, I will now do all—and more. If yo' will jes' precipitate you' undivided attention and ascertain a mos' conspicuous silence I will now pufohm."

He reached over to switch on the filament. No filament. A frown came upon his highly polished brow. No one was quicker to notice this than Lazrus. Oh, if something only could go wrong! If only the whole scheme would fail! He dare not think of it. But what a tremendous stroke of luck it would be for him.

Snowball was now working frantically over the set. Sweat was oozing from his pores like the Mississippi in flood stage. A little river was running down the table which he was leaning over in his endeavor to get a filament. He had forgotten the combination or something.

He well realized that if the thing did not work he might as well leave town. These were critical moments for Snowball. The most essential phase of the entire situation was the affection of Winnie and her personal regard for his knowledge. To fall down on a mere thing as of a hook-up to battery would be disastrous. He must stall.

"Folks dis wiahluss study ob high frequency am elaborate. De fundahmentahl princihplus are known only to a selected few. Myself bein' one ob dem few. De fust fundahmental am to secuah occilayshums. Dem occulayshums when obtained cause a constant flow of—or—of—Oh, yes, of lava to de condenser wich explodes wid combustshums ob various enfectants to a degree ob dangerous encirclings ob de ground exema."

Here he paused to observe the effect upon his audience. The audience was awestruck with such a flow of vocabulary and trying hard to follow him. Snowball had scored a three-base hit. Still the set was dead.

Winnie Jazzbo was beginning to smell a rat. She wondered if Snowball had thrown away her five hundred dollars with which she had entrusted him for such a good purpose. Had he bought a pile of junk?

Snowball jammed in a plug and, behold—she oscillated. He began slowly and with reverent precision to turn the knobs. The audience gasped and breathed hard as they drew closer, leaning forward with eyes aglow in expectancy. Slowly a voice was being tuned in.

"Hello, 5CR; hello, 5CR; this is 5BM calling at 5YI. Yes, my set was stolen. A colored person came to visit me yesterday and I had to leave the shack on an errand. When I returned he was gone and so was my set—"

Snowball waited for no more. He whirled and tried to stammer something. But Winnie was on him with a wicked looking razor. Lazrus—Lazrus, who had almost given up hope—came to life with a snap and rushed at Snowball with a whoop that could be heard for miles. Pandemonium reigned.

Snowball took the nearest window. He landed safely and went—in no special direction—but he just went.

The Continuous Wave Club of California

Conducted by Lawrence Mott, Associate Editor

EXCELLENT RESULTS FROM 6ALE

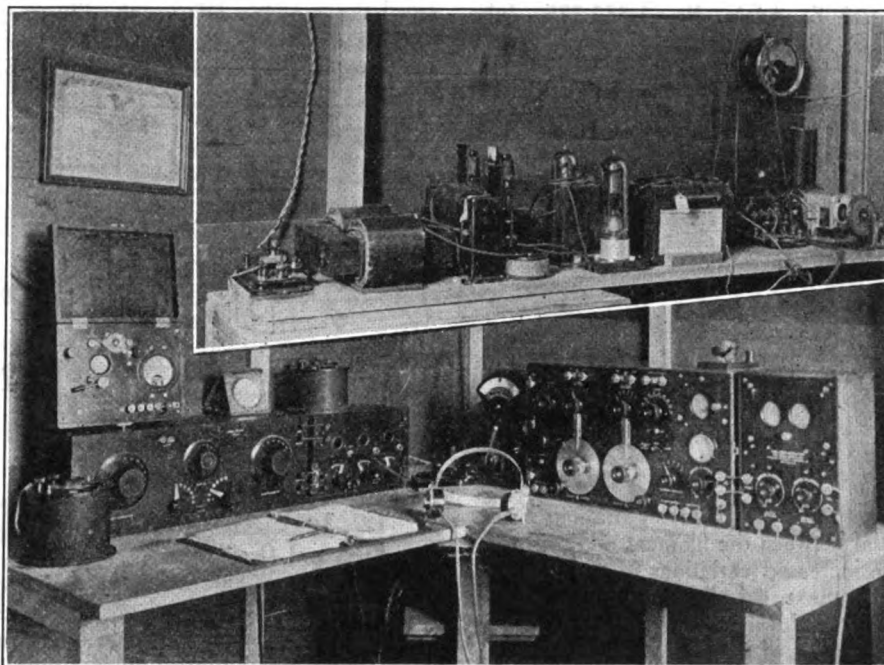
No better argument is needed for widespread adoption of CW than the excellent results obtained by 6ALE at Reedley, Calif. He is advised by 7ZT, ex 7DA, at Portland, Ore., and by 7ZM at Moscow, Idaho, that his signals are the loudest from the Sixth district and by 7ZJ that he is exceeded only by 6ZX. Furthermore, he is being copied consistently by 9AHC, Ellendale, North Dakota, who also says that he is hearing 2FP in New York.

This sending set, which is shown in the upper part of the picture, is owned and operated by W. W. Lindsay, Jr., P. O. Box 643, Reedley, Calif. He will be glad to hear from others as regards his audibility and modulation.

For transmitting, two 50 watt Radiotrons are used with 1500 volts 60 cycle a. c. on the plates. The well-known self-rectification circuit is employed. Filaments are also run on a. c. Voltage is maintained at the correct value by a series resistance in the primary of the step down transformer. The radiation varies with the line voltage from $2\frac{1}{2}$ to 3 amps.

An examination of the picture will give a good idea of the apparatus employed. From left to right appears the relay in primary of power circuit, high voltage plate transformer, filament heating transformer with by-passing condensers of .0024 cap. across the windings; radio frequency chokes are just below this. Next are the plate condensers of .0017 cap. with the two 50 watt tubes on either side, the grid condenser of similar cap. with its leak of 2000 ohms, and behind this the antennae inductance, which has a total number of turns of No. 16 D.C.C. copper wire, amounting to 39, 12 in the grid circuit and 27 in the plate side, with the filament on the center. Inside of this the antennae coil proper slides, in order to vary the coupling. This consists of 6 turns of No. 6 copper wire, which is self-supporting. At the right is the magnetic relay change-over antennae switch, and a tone wheel with its controlling resistance above it. The tone wheel has been tried with A.C. on the plates, and a very good tone has been obtained, although the signals are not as loud as the straight a. c. C. W. Above the wheel may be seen the antennae ammeter with lead running to the entrance bushing. Keys on the operating table control the relays and switches.

For receiving, a Grebe CR3 is used for all amateur work on 200 meters, while the Wireless Specialty Co.'s IP501 is used for all waves above 300, as the Grebe set does not work very well above this wave.



Radio 6ALE, Upper View Showing Transmitting and lower View Sending Equipment.

Radiotrons and Cunninghams are used for detection, while the amplifiers use Western Electric type of tube. The Magnavox (not in picture) is used where extra loud signals are wanted, especially for music. Music from San Francisco (6XAC) has been reported as being heard one-half mile from the set. A third step of power amplification is used to obtain these results. It consists of a U.V. 712 transformer connected in the usual manner with a 5 watt transmitting tube, with 200 volts on the plate.

The wave meter above the receiver is used to keep a check on the transmitting wave and also for measurements of antennae constants. The antenna consists of two 4-wire cages on 2 ft. crosses, spaced 60 ft. high and 50 ft. long. It has a natural period of above 180 meters and a capacity of .00054 mfd. It requires an inductance of $8\frac{1}{2}$ micro-henries to raise the wave to 210 meters, or only 6 turns of No. 6 copper, about $3\frac{1}{4}$ -in. diameter.

The ground is a buried counterpoise, consisting of 6 wires lengthwise, 80 ft. long, and 3 wires crosswise, 50 ft. wide, with the station in the center. Grounding switches, etc., are provided.

6ALE was formerly 2ARD in New York City, where he did considerable QSS testing. He is planning to put in two 250 watt tubes and is raising his poles to 80 ft. He is figuring on trying out a d. c. generator with tone wheel modula-

tion so as to compare with his present a. c. plate supply.

Mr. Lindsay has measured the actual power in-put of his set with a standard Weston portable direct reading wattmeter, finding that both 50 watt tubes running with 10 volts on the filament draw 200 watts on the primary side of the filament transformer, while the plates under the same conditions take 350 watts, or a total of 550. But as tube sets are usually rated the plate wattage is the only one to consider. For instance, in a spark set the current necessary to run the rotary gap is hardly added to the transformer input. This would tend to show the superior over-all efficiency of the tube set as compared to spark.

His co-worker, Mr. C. H. Weatherill, with a set of similar type with 5 watt tubes succeeded in raising 7ZT, 7OZ, 6AGF, and many other local stations, the power input being 50 watts.

Condensers are of .0017 mfd.

Inductance, $3\frac{1}{2}$ in. diam., 12 turns on grid, 27 on plate.

Antennae inductance, 6 turns of No. 6 inside of other coil. Slide for coupling variation.

Condensers across filament windings are of .0024 mfd. and are essential.

Dubilier protective device is used.

Milliammeter is 0-500.

Radiation meter, 0-5.

Radio frequency chokes, No. 250 honey-comb coils.

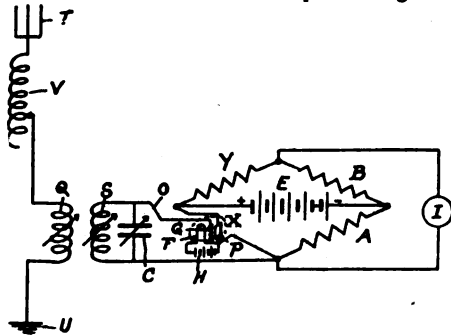
(Continued on Page 170)

Digest of Recent Radio Patents

Prepared by White, Prost & Evans, Patent Attorneys, San Francisco, who have been particularly active in the radio field for many years, and from whom may be obtained further information regarding any of the patents listed below.

Samuel E. Adair, No. 1,383,275, July 5, 1921—Amplifier.

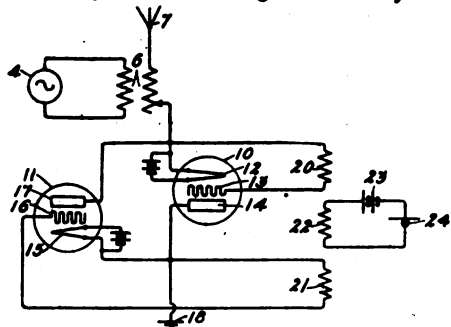
The plate circuit of a tri-electrode device is connected into one arm of a Wheatstone bridge. The grid circuit is connected to the source producing the



current to be amplified. Variations in potential between the filament and grid produce increased variations in the potential across the usual diagonal points of the bridge. "Howling" is eliminated, due to the absence of inductance or capacity in the amplified circuit. "Paralyzing" is eliminated, since there is no grid condenser. The character of the current to be amplified is not limited to oscillatory or pulsatory.

Raymond A. Heising, No. 1,383,807, July 5, 1921—Power Modulation for Radio Transmission.

A pair of thermionic vacuum devices are located directly in the antenna circuit, and they are so arranged that they are

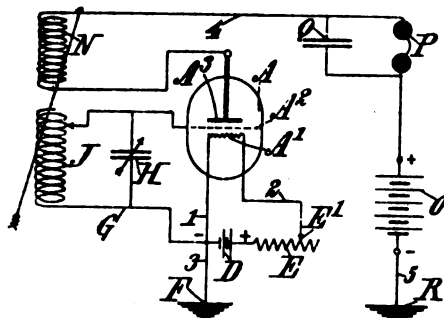


alternately conducting for alternate half-waves of the transmission current. Modulation is secured by simultaneously varying the effective resistances of the devices, as by a telephone transmitter inductively coupled to the grid circuits of both devices.

Athelstan A. Hall, No. 1,384,523, July 12, 1921—Wireless Signaling Apparatus.

This is a receiving or transmitting system without an aerial. Two earth connections are used, the portions of the earth situated between the two earth connections constituting the radiation element of the system. For receiving, a

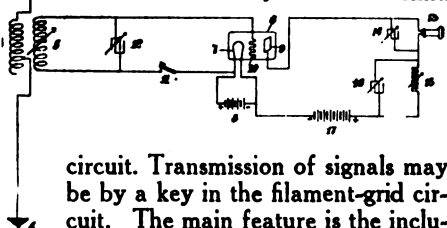
telephone receiver (P) or the like may be placed directly in this earth circuit and also in the filament-plate circuit of



a thermionic tube. This tube is made between the two circuits of the tube.

Roy A. Weagant, No. 1,384,108, July 12, 1921—Means for Generating Electrical Oscillations.

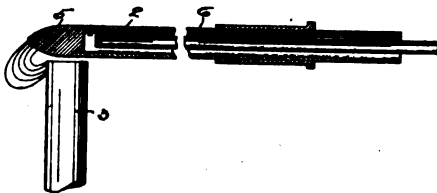
A thermionic tube is made to generate oscillations, and for this purpose the filament-plate circuit is connected to a direct current source through an adjustable resistance, and the filament-grid circuit is coupled inductively to the antenna



circuit. Transmission of signals may be by a key in the filament-grid circuit. The main feature is the inclusion of the adjustable resistance 15 in the filament-plate energizing circuit, by means of which the best effect for the generation of the oscillations may be produced.

Harold F. Elliott, No. 1,385,121, July 19, 1921—Arc Radio Oscillation Generator.

This invention relates to a Poulsen arc generator. The arc is made to follow a desired path by properly shaping the tip of the anode, so that it is bullet-shaped,

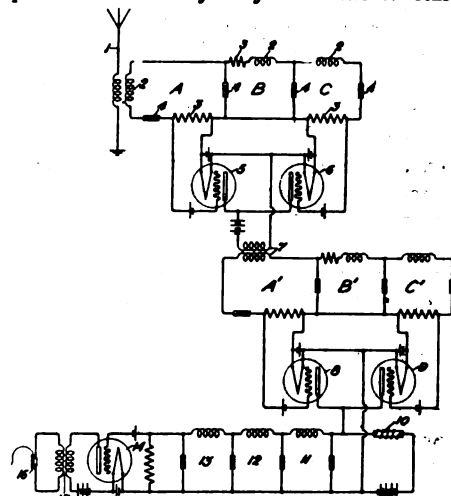


and the cathode is placed at right angles to the anode, slightly behind the tip. The arc sheet is thus made narrow and the tendency for the arc to jump to the pole tips is eliminated.

John Mills, No. 1,385,090, July 19, 1921—Radio Receiving System.

This system is for neutralizing the ef-

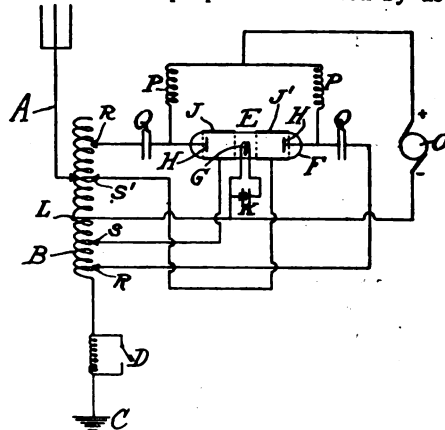
fect of impulsive disturbances, such as static, in a receiving circuit. The principle of operation is based upon the fact that impulsive excitation of a closed system, such as A, B, and C, result in free oscillations in each of these closed circuits which are practically undamped, and the oscillations in A and C are of the same magnitude and reversed in phase. Thus they may be made to can-



cel by opposing the oscillations of tubes 1 and 6. The useful signal is, however, not substantially diminished and is transmitted into the transformer 7. Another portion of the disturbances may be neutralized by the use of circuits A, B, C and so on.

Clair L. Farrand, No. 1,385,818, July 26, 1921—Radio Transmitter.

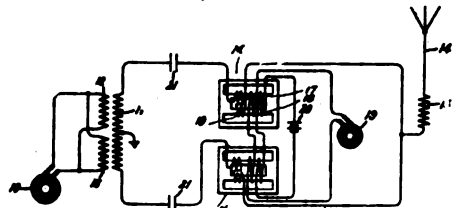
This system aims to use the filament emission in an oscillating tube more efficiently so that the useful value approaches more nearly the value actually emitted. This purpose is effected by us-



ing the emission from one filament (G) to influence a plurality of cold plates (H), so connected to the transmitting circuit that while one of the plates (H) uses the maximum value of current, the other uses the minimum.

Ernest F. W. Alexander, No. 1,386,830, August 9, 1921—Method of and Apparatus for Producing and Distributing Electric Current Waves of Radio Frequency.

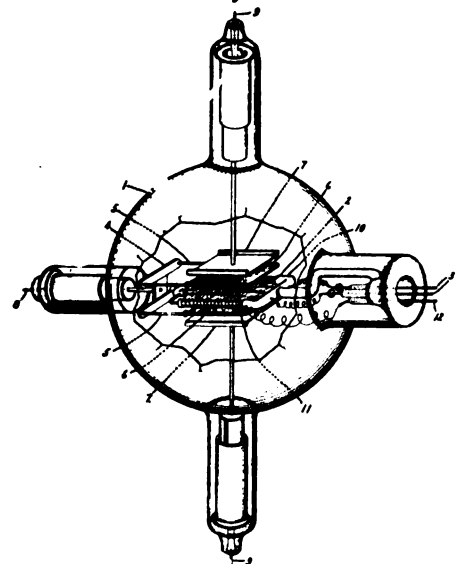
A scheme is described for sending a wave of varying amplitude; more particularly for causing the amplitudes of a radio frequency current to follow a sine law. To do this, use is made of two



parallel paths for the radio frequency current, one including the magnetic controller M and the other the controller N. These are so excited magnetically by the battery 20 and generator 19 that the impedances in the paths M and N vary periodically between zero and a maximum, the arrangement being such that when impedance of path M is a maximum, that of N is a minimum. This periodic variation is at the same frequency as that of the fundamental.

Albert W. Hull, No. 1,385,873, July 26, 1921—Electron Discharge Device.

This patent describes a thermionic vacuum tube so constructed that it has a negative resistance characteristic, which can be varied by a discharge controlling member, 11. If the potential difference between the heated cathode (2) and the plate (7) is made great enough, the emission of secondary electrons from this

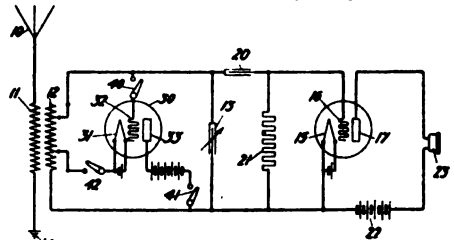


plate, due to bombardment of the primary electrons, increases faster than the primary emission as the potential difference is increased. This reduces the current flow between the anode (4) and electrode (7) as the potential difference is increased. By varying the potential of the controlling member (11), the relative current values are varied. A device of this

sort is much more sensitive than the ordinary tube for the reception or transmission of signals.

Ralph V. L. Hartley, No. 1,387,262, August 9, 1921—Receiving Apparatus for Wave Signaling.

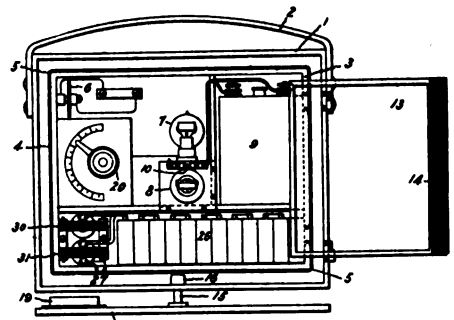
A system is described so arranged that telephonic or telegraphic messages may be received in the ordinary way, or else



by using the heterodyne principle. An ordinary thermionic detector, 15-16-17, in connection with the receiver 23 recognizes signals received by the tuned circuit 12-13. When switches 40, 41 and 42 are closed, the tube 30 is rendered active to generate oscillations of slightly different frequency so as to give beats recognizable by receiver 23.

Reginald C. Clinker, No. 1,386,840, August 9, 1921—Radiosignaling System.

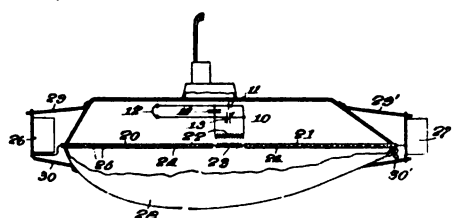
A compact portable receiving set, which does not use an elevated conductor, but instead a coil 3, mounted on the frame



4, which may be turned to get the best effect on pivot 15. In the frame 4 is mounted the tuning condenser and detector. The coil 14 is adjustable for variable coupling with coil 3, and is included in the plate circuit of the detector.

James H. Rogers, No. 1,387,736, August 16, 1921—Radiosignaling System.

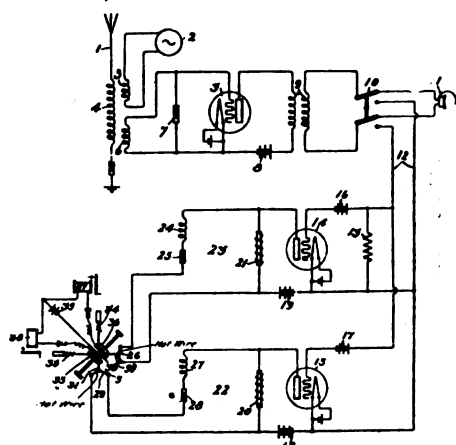
Instead of the usual elevated conductor for the antenna, a horizontal conductor is used, enclosed in a metallic sheath such



as the pipe 24. This conductor may be used on vessels, such as submarines, both for receiving or transmitting. The antenna coupling is effected by transformer 22-23.

Albert W. Hull, No. 1,387,984, August 16, 1921—Negative Resistance.

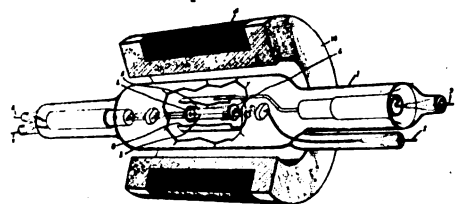
A thermionic device is described, in which the emission of electrons is made so great that the plate or third electrode receiving these electrons emits secondary electrons, which reduces the current flow.



The device thus acts as a negative resistance. Its use to amplify small variations of potential, which is applied between the cathode and the plate, is described.

Albert W. Hull, No. 1,387,985, August 16, 1921—Electron Discharge Device.

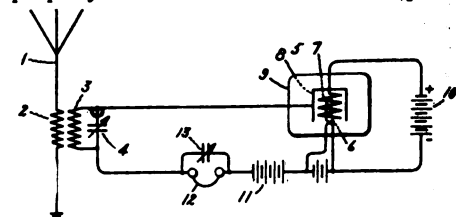
A negative resistance tube is described, having similar characteristics to those in the earlier Hull patents. The control of



the reception of electrons by the plate or third electrode is in this instance effected by the production of a magnetic field coaxial with the tube, which field may be produced by the current to be amplified.

Albert W. Hull, No. 1,387,986, August 16, 1921—Wireless Receiving System.

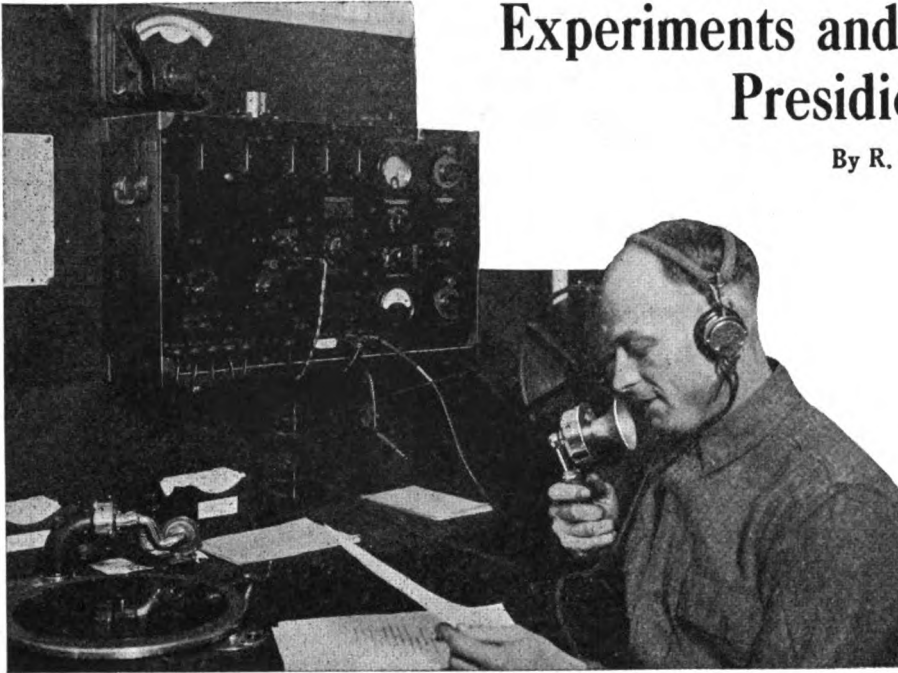
A thermionic tube having negative resistance characteristics constructed as described in the previous Hull patents, is used to reduce the damping (due to the resistance) in a receiving circuit to practically zero. This is effected by choosing properly the relative values of the posi-



tive and negative resistances in the receiver circuit. For receiving continuous wave signals, the negative resistance device can be adjusted so as to produce a slightly different frequency from that which is to be detected, so that the beats may become audible.

Experiments and Equipment at the Presidio Station

By R. C. Tavers



"Hello! 6XW calling"—Sergeant R. C. Tavers, the man with the million dollar voice."

The experimental work of the Signal Corps School, Presidio of San Francisco, Cal., was commenced about August 1, 1920, with the idea in view of determining the maximum efficiency of some of the signal corps equipment, especially so of the type 67-A telephone transmitter. To this end a considerable amount of work was done in selecting an antenna system, nearly every known type of antenna being tried with varying results. It was finally determined that the principal factor for the proper antenna was the ohmic resistance; the type of antenna having very little to do with the overall efficiency.

The first antenna was of the "V" type, 30 feet off the ground, and two-wire counterpoise, laying directly on the ground. This antenna had a resistance of about 40 ohms, and with it we were able to cover from 10 to 20 miles. This antenna was improved until it developed into a flat-top fan of 4 wires 65 feet high and 12 counterpoise wires raised about 3 feet off the ground. The resistance of this antenna was about 15 ohms, and under exceptional conditions we were able to carry about 900 miles. The present antenna is the "T" type, 4 wires 80 feet high with 16 counterpoise wires elevated 3 feet and the resistance is 10.2 ohms. The "T" type 10.2 ohm antenna carried as far and as well during the poor transmitting season as the 15-ohm fan antenna did during the better transmitting season.

During all these tests the same set and power was used, but the radiation varied slightly, naturally, with the increase and decrease of antenna resistance. With the old "V" type antenna we radiated about .4 ampere, while with the present one our radiation is about .8 normal. One of the

principal factors noticeable in the present installation is the enormous variation of antenna current with modulation of the voice. On a normal radiation of .8 ampere we are now varying the antenna current .2 ampere upward, or to 1 ampere. This would indicate that an excellent percentage of modulation was being obtained. This condition does not ordinarily prevail in the case of a high resistance antenna, say in the neighborhood of 25 ohms. The mere fact that high radiation is being obtained is not conclusive proof that the set will work a great distance when voice modulation is used. During our experiments we have had this fact brought home to us several times very vividly. In one instance we were radiating 2.5 amperes into the antenna with a new arrangement, and with the old set we were obtaining .6 ampere. The .6 ampere radiation was much louder than at 2.5 and both were very clear and distinct. This would indicate that while we were supplying an excellent carrier wave of 2.5 amperes, by our modulation arrangement we were only able to vary or modulate a very small percentage of this with the consequence of a weak voice signal.

As before stated, one of the reasons for opening up this experimental station was to experiment on signal corps apparatus. Another reason was to afford a means of educating the new amateurs just coming into the game and at the same time advocate the C.W. transmission for the amateur with a view of lessening interference. Considerable has been accomplished up to the present in both undertakings. In a recent test made by the school it was shown that there are 320 that are actually interested in the educational matter and concerts transmitted by this station. And from this same test re-

port it was shown that an audience of about 5000 people listen to the radio-telephone concerts. This is very encouraging in that about 60 per cent of these people know very little about radio except how to tune their set, but are very much interested and are glad of an opportunity to learn while enjoying music or other fun. To fill this want and to help in their learning we have established a department at the school for the amateur to answer their questions and help them in their problems both by mail and over the air during our regular concerts. All that we require is that in case they desire an answer by mail that an addressed and stamped envelope be enclosed with their questions.

With regard to C.W. transmission for the amateur, this method of radio communication is bound to supersede the old spark method, if for no other reason than the fact that the number of transmitting stations are increasing all out of proportion to the number that can satisfactorily transmit on a given range of wave lengths and about all we hear each evening is "break" and QRM. The average spark set is interfering from 50 to 150 and sometimes 300 meters. That is to say, while he is tuned to 200 meters, he can be heard very loudly from 25 to 100 meters each side of his tuned point. This is not so with C.W. It will be found to be exceptionally sharp, tuning within five meters and sometimes less, of the hump, thereby increasing the number of stations that can satisfactorily transmit on the same approximate wave length. There are a number of other arguments for C.W., but this one in itself would be sufficient reason for its adoption. In our operation we expect to acquaint the amateur with C.W. characteristics, give him the practice of tuning it, show him that it will work, that it is not so complicated as they would have us believe, and in general to encourage the new amateur to consider C.W. for his transmitting installation. To this end we have been rewarded with the results of about 25 C.W. stations who are now operating within a radius of 50 miles around San Francisco. By no means do we take the credit for these achievements. We are only one little cog in a gigantic wheel that has been grinding for C.W. for the past year and a half, and many truly wonderful circuits and material have been placed within easy access of the amateur to smooth out the humps of his C.W. problems, and the men who are re-

(Continued on Page 160)

6ZAF Furnishes Astronomical Time by Radio

For the first time radio has successfully furnished the official time for an important astronomical expedition. But in the words of Director W. W. Campbell of the Lick Observatory and head of the party that went into the desert wilds of Lower California to select observing stations for the eclipse of the sun, September 10, 1923, "it will not be the last time." An interesting story is involved in the part played by radio in this expedition and by 6ZAF, who in public life is A. H. Babcock, electrical engineer for the Southern Pacific Railroad and an enthusiastic radio fan.

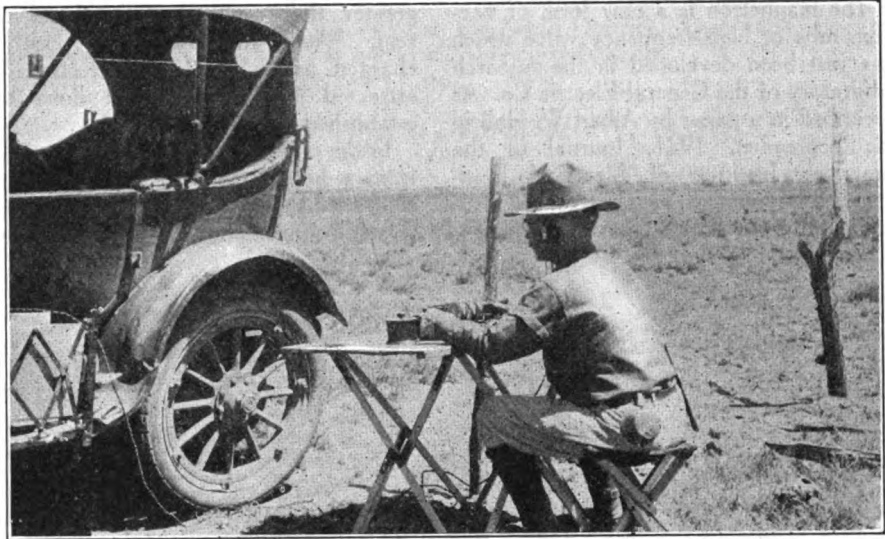
Late in the morning of the day on which this scientific expedition was to leave San Francisco, Director Campbell telephoned to Mr. Babcock that the chronometer on which they were to depend in making their observations of latitude and longitude had been broken and could not be replaced at the last minute. Whereupon 6ZAF said that if he could get together a receiving set and one of those devices that have made the dollar famous no chronometer would be needed. The time signals from San Diego would be more accurate than any single chronometer and could easily be picked up 200 miles away.

Director Campbell was sceptical, but carried away by the boldness of the plan and the necessities of the occasion, doubtfully consented to try the experiment. Through the courtesy of the Colin B. Kennedy Co. and Leo J. Meyberg, Mr. Babcock was able to assemble a simple, portable set.

So the first week in September saw this set as an important element of the equipment loaded into the automobile that carried the party from San Diego into the desolation of the desert hills and canyons to the south of the boundary between California and Mexico. The path of the eclipse will cross this inaccessible region whose clear atmosphere and lack of moisture is the astronomer's delight. The set was the joke of the party during the trip.

But, arriving at the scene of action, Mr. Babcock quickly strung 150 feet of aerial from a tree to a fence post, made a counterpoise, hooked up to the automobile battery, and at noon on the seventh of September, picked up the time signals and established their position.

Director Campbell vows that never again will he be without a radio set and any day we expect to hear that Lick Observatory is so equipped. At such time we hope to publish an illustrated description of the station and two years from now to chronicle the part played in the observation of the eclipse when Einstein's theory will again be tested.



6ZAF Picking Up Radio Time Signals in Lower California.

SCOTTI GRAND OPERA BY RADIO

Giving pleasure to an audience of over 5000 people in seven states was the unique experience of five brilliant stars of the Scotti Grand Opera Company on September 29 at San Francisco. As most of our Western readers enjoyed this opportunity to listen in on this great concert treat broadcasted by the Leo J. Meyberg Company from the Fairmont Hotel, they will be interested in knowing some of the details of transmission and reception.



—Photo J. M. Eaton, The Bulletin. . . .
Queena Mario, Joseph Hislop, Myrtle Schaaf
and Mario Laurenti, Singing the Quartette
from "Rigoletto."

The entertainment was made possible through the co-operation of the San Francisco Bulletin and Earl C. Ennis of the editorial staff, with Sheldon N. Petersen, manager of the Meyberg Company, who carried out the experiments necessary to overcome distortion and bring in the musical accompaniment so as to blend with the voices of the singers. The soloists sang directly into the phone and the quartet directed their voices upward into a horn suspended over their heads.

Mario Laurenti sang the "Toreador's Song" from "Carmen," while the quartet

from "Rigoletto" was sung by Queena Mario, Myrtle Schaaf, Joseph Hislop and Greek Evans.

The largest single audience reported was at Santa Rosa, Calif., where 700 persons listened to the music as given by the Press-Democrat's receiving set, in charge of Armand Saare, using a three-step amplifier and Magnavox. Sebastian Ruth of Olympia, Wash., reported good reception for an appreciative audience, as did also the base hospital at Palo Alto, when 30 patients listened in and likewise the State hospital at Agnews. Among hundreds of letters received were those from 7XD, Bozeman, Montana, 7XD, Billings, Mont., 7QL, Ranier, Ore., H. Romander, Smith River, 7TH, Walla Walla, Wash., and 6ARE, Auburn, Calif.

S. F. RADIO CLUB ELECTS NEW OFFICERS

Newly elected officers of the San Francisco Radio Club, Inc., include the following: President, H. W. Dickow; vice-president, C. Thompson; secretary, S. Fass; treasurer, C. Shomaker; Sergeant-at-arms, R. Burgess; Chief operator, C. Lane. The new officers were installed on Oct. 13 by Arthur H. Halloran, editor of "RADIO." The affair was one that no member of the club will ever forget. A stag party, radio raffle, refreshments, special radio telephone concert from the Fairmont Hotel station, lectures by Major J. F. Dillon, U. S. Radio Inspector; A. H. Halloran and T. Lambert of the Radio Shop, San Jose, were on the program of the evening. Mr. Lambert demonstrated his new universal long and short wave receiving equipment. A membership drive of the evening added a number of new candidates to the ever increasing roll of the club.

The Magnetron—a New Synchronous Detector

The magnetron is a new form of vacuum tube or high frequency valve which has just been developed in the research laboratory of the General Electric Co. As described in a paper by Albert W. Hull in the September, 1921, Journal of the American Institute of Electrical Engineers, this youngest member of the electric tube family differs from the kenetron,

greater the resulting unidirectional current. When the anode is positively charged, as on Fig. 19, the electrons are attracted to it and current flows thus established.

In the pliotron the current that can flow from a hot filament to a cold anode is controlled by a grid which acts as an electrostatic screen, shielding the hot filament

a simple kenetron arrangement. A solenoid (S), supplied by a battery (B3), superimposes a magnetic field parallel to the axis of the tube. If this field is weaker

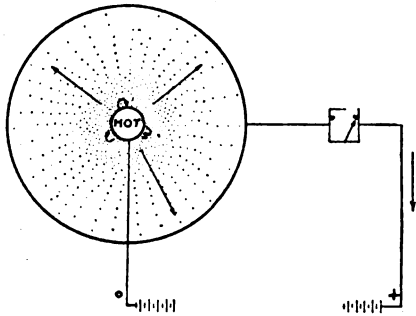


Fig. 19.

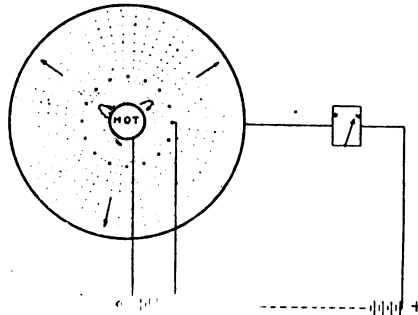


Fig. 21.

the pliotron or audion, and the dynotron chiefly in the method of controlling the flow of current between metal electrodes in vacuum. In its application as a synchronous detector in continuous wave telegraphy in the transoceanic receiving station of Radio Corporation, the magnetron acts as a simple high-frequency valve opened and closed at approximately signal frequency by a locally generated magnetic field, letting through first the positive peaks of the signal and then the negative, giving an audible tone. It is also being

from the positively charged cold anode. This grid is indicated by the circular series of dots in Figs. 20 and 21. In Fig. 20 the grid is at a negative potential with respect to the filament and repels the electrons so that they pile up around the filament and prevent any current flow. The valve is closed. In Fig. 21 the grid is positively charged and pulls the emitted electrons away fast enough to give a large current. The valve is closed. Obviously, with an alternating current the valve is

than a certain critical value, the full current will flow; if stronger, no current will flow, the magnetic field thus acting as a valve.

This action is indicated in Figs. 15 and 16, from which it will be noted that the superimposed magnetic field causes the electrons to take a spiral instead of a radial path. Fig. 15 shows the condition when the field is weak and the "valve" open, and Fig. 16 when the field is strong and the "valve" open. Similar effects are produced for tubes containing grids.

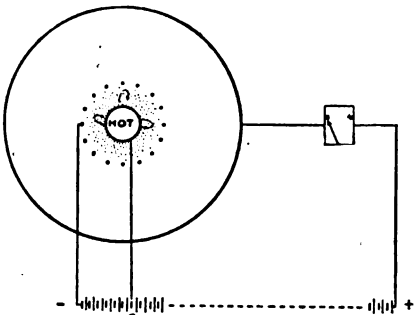


Fig. 20.

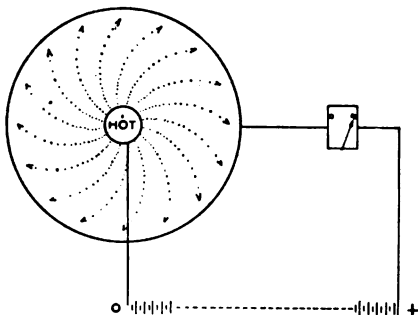


Fig. 15.

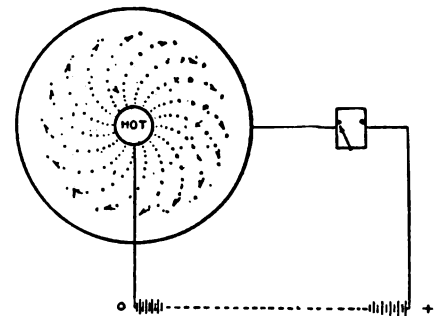


Fig. 16.

adapted to use as an amplifier and as a generator of high-frequency alternating current, a 25 kw. output already being possible.

So as to understand the principle of operation, first consider the kenetron rectifier, wherein the control of current from one metal electrode in vacuum to another is controlled by the temperature of the electrodes. The minute electrons, like little cannon balls, jump out of the hot filament, fly across the vacuum and plunge into the anode. The hotter the filament the greater the number of electrons emitted, and consequently the

open for only one direction and the current is rectified.

In the magnetron, instead of depending upon the heat of the filament and the difference of potential, as in the kenetron, or a positively charged grid as in the pliotron, control of current flow is maintained by magnetic field, as shown in Fig. 4. The cathode is a straight tungsten filament, the anode a circular filament and the magnetic field is created by a solenoidal coil wound directly on the glass tube.

Referring to Fig. 4, a battery (B1) heats the filament to incandescence, and another battery (B2) impresses a constant voltage between cathode and anode, the anode being positive. This is

In the opinion of Mr. Hull, from whose article these facts have been condensed, the application of the vacuum tube in general and the magnetron in particular to radio will be small as compared to its application to electric power engineering. As a lightning and surge arrester it will protect a d. c. machine or line. "One may predict that one year will see these tubes in use as kenetron rectifiers for series arc lighting. Five years will see them in substations replacing synchronous converters. In ten years they will be on electric locomotives, either as rectifiers, allowing the use of d. c. motors, or as variable frequency alternators, taking their power from a high-tension d. c. trolley line. Twenty years will see d. c. transmission lines, fed through transformers and kenotrons, at any convenient points, by alternations of any frequency, and tapped by the same tubes acting as magnetron alternators."

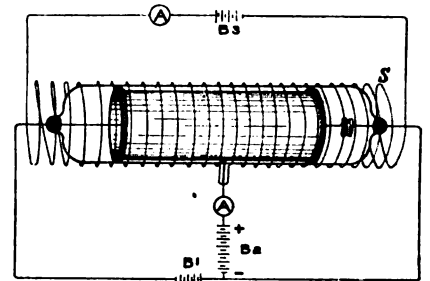


Fig. 4.



With the Radio Inspector

This department is conducted by the Radio Inspector of the Sixth District. Questions are answered free of charge. Your name will not be published. Initial your letter only.

Send your Questions to RADIO INSPECTOR'S DEPARTMENT, "RADIO"

Question: Is it unlawful to put an aerial across the street or put it on a telephone or electric light pole? M. B., Hollywood, Calif.

Answer: This is a matter depending on the local laws and regulations. However, usually the power and telephone companies do not allow any wires fastened to their poles, except those of affiliated companies.

Question: If my station is licensed for spark work, would it be necessary to have the license altered so that I may put in a C.W. set? H. C., San Diego, Calif.

Answer: Notify Radio Inspector's Office of such change. No change needed in the license.

Question: Would it be violating my oath of secrecy to make public through press or otherwise the government weather bulletins and official press? P.K.C., Santa Paula, Calif.

Answer: If the matter is sent out with the prefix "QST to all stations" it may be published. Official press is understood to be directed to naval vessels only, and should not be published.

Question: In what way does an "impact" transmitter differ from the ordinary spark transmitter? What are its advantages? Is there any difference between "impact excitation" transmitters and "impact" transmitters? Where can I get a wiring diagram of either of these transmitters? A. H., San Francisco, Calif.

Answer: Not sufficient space to cover these questions here. Refer you to Stone, "Elements of Radiography," and to the proceedings of the trial between Kilbourne & Clarke and the Marconi Co., and to the Proceedings of the Institute of Radio Engineers.

Question: Is it against the law to use the heterodyne system of reception, which causes oscillations to be sent out of the aerial and possibly interfere with other stations, without a station license? Satoshi Uchida, San Francisco.

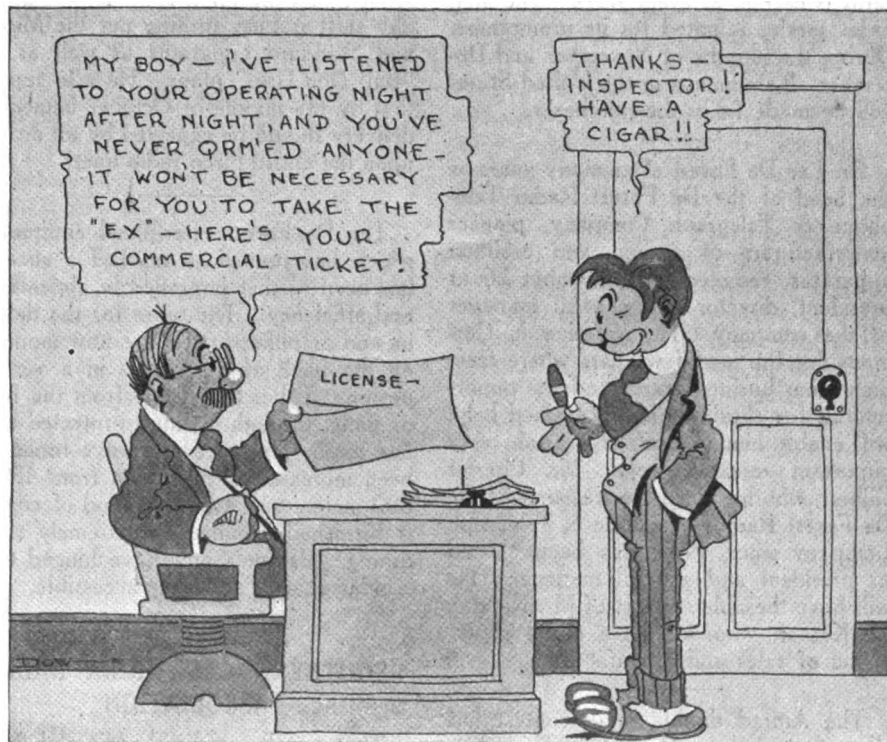
Answer: If the radiation which results from the operation of the station will interfere with the reception of signals or radiograms from beyond the jurisdiction of the state or territory in which the station is located, such station will be operating in violation of the law. (See Act of Aug. 13, 1912, Sec. 2.)

7SA
7SB
7SC
7SD
7SE
7SF
7SG
7SH
7SI
7SJ
7SK
7SL
7SM
7SN
7SO
7SP
7SQ
7SR
7SS
7ST
7SU
7SV
7SW
7SX
7SY
7SZ
7TA
7TB
7TC
7TD
7TE
7TF
7TG
7TH
7TI
7TJ
7TK
7TL
7TM
7TN
7TO
7TP
7TQ
7TR
7TS

Seventh District Amateur Stations

B. C. Barnes
L. E. Bracnt
W. A. Cnemrich
H. L. Fritz
T. L. Richardson
E. E. Griggs
Don Harris
A. J. Homchick
Hal Garrot
H. P. Heatlie
C. C. Howard
L. C. McManney
C. T. Hanes
H. G. Wascher
W. L. Duncan
M. W. Rice
H. F. Parslow
R. S. Bean
W. F. Turnbow
M. C. Knight
J. A. Kindle
D. G. Harvle
C. M. Landaker
C. L. Hyer
G. M. de Broekert
F. M. Curtin
R. K. Leonard
V. R. Kem
G. C. Perry
G. M. Leasia
G. C. Henny
J. K. Trescott
M. E. Tait
A. W. Emligh
H. T. Hayden
C. A. Lockwood
R. W. Mudgett
H. J. E. Young
A. H. Peterson
J. B. Darragh Jr.
Arvid Herner
J. C. Campbell
H. H. Howell
W. D. Thomson
John Pollak

336 E. 9th St., Eugene, Ore.
1804 Batchelor St., Miles City, Mont.
503 Melrose Ave., Seattle, Wash.
707 N. 65th St., Seattle, Wash.
USOHS, Hospital 59, Tacoma, Wash.
1518 First St., Aberdeen, Wash.
1711 Simpson St., Aberdeen, Wash.
904 First Street, Aberdeen, Wash.
4320 Meridian Ave., Seattle, Wash.
324 F Street, Aberdeen, Wash.
218 E. 63rd St. N., Portland, Ore.
1809 Hood St., Aberdeen, Wash.
806 19th Ave. N., Seattle, Wash.
760 Twelfth Ave., Seaside, Ore.
142 Eleventh St., Corvallis, Ore.
497 E. 28th St., Portland, Ore.
522 S. Main Street, Roseburg, Ore.
579 E. Ninth St., Eugene, Ore.
704 W. Fourth St., Aberdeen, Wash.
3645 35th St. W., Seattle, Wash.
230 Sam St., Monroe, Wash.
206 Montgomery St., Albany, Ore.
R. F. D. 4, Box 17A, Salem, Ore.
816 Thurston St., Albany, Ore.
345 Mill St., Eugene, Ore.
530 Thomas St., Hillyard, Wash.
421 N. Belmont St.
1509 W. Main St., Cottage Grove, Ore.
3712 Woodlawn Ave., Seattle, Wash.
1116 Heron St., Aberdeen, Wash.
Bay Ocean, Ore.
504 N. 31st St., Billings, Mont.
394 Guild St., Portland, Ore.
335 Grove St., Walla Walla, Wash.
Monroe & Cosgrove Sts., Townsend, Wash.
2117 S. 12th St., Salem, Ore.
Powell, Wyo.
1163 E. 17th St. N., Portland, Ore.
2304 N. 39th St., Seattle, Wash.
2560 Fifth Ave. W., Seattle, Wash.
1119 E. Harrison St., Portland, Ore.
Camp Lewis, Wash.
R. 2, Box 15, Medford, Ore.
Wilbur, Wash.
811 Washington St., Albany, Ore.



Things That Never Happened!

Monthly Broadcast of Radio News

Tresco, of Davenport, Iowa, wants to know whether the dealers and amateurs wish him to run another C.W. relay on Washington's birthday.

Leo J. Meyberg Company have moved their Los Angeles store to new and larger quarters, at 950 South Flower street.

Colin B. Kennedy Company state that concerts from their radiophone at Los Altos, Calif., have been heard at Brule, Nebraska.

The De Forest Radio Telephone & Telegraph Company is planning to re-establish their broadcasting station in New York City for the benefit of amateurs within a radius of 400 miles. Feeling that there is a demand for radio telephone news and music in that territory, three nightly concerts of one hour each, to be preceded by a general news program, is being planned. The wave length, time, etc., will be announced later.

The Ship Owners' Radio Service, Inc., is operating chain stores to render radio service to the amateur in exactly the same way as to the U. S. Shipping Board, the U. S. Navy, and many steamship companies, putting Citizen Radio on an equal basis with Commercial Radio. Sorsing is the only company maintaining a chain of stores throughout the United States and in Honolulu and London. A complete stock of every important line of apparatus is carried at every store. The mail order service is noted for its promptness. During the months of November and December all shipments in the United States will be made f.o.b. the purchaser.

Dr. Lee De Forest after many years as the head of the De Forest Radio Telephone & Telegraph Company, pioneer manufacturers of audion and oscillion apparatus, resigned on September 26 as president, director and general manager of the company. He will live in Germany for the next few years where freedom from business cares and the opportunities for obtaining highly trained help, will enable him to complete certain very important research work. Mr. Charles Gilbert, who has been the treasurer of the De Forest Radio Telephone & Telegraph Company since 1915, has been elected its president and general manager. He will have the able support of Mr. Randall M. Keator, who will have direct supervision of sales and manufacture.

The Amrad double prize contest has been extended to December 31, 1921, according to announcement by the Amer-

ican Radio & Research Corporation. Three prizes are offered in the first contest for the best name selected for the new basket-weave, wavy wound, Amrad variometer. Three prizes are also offered for the best name given for the new mahogany finished Amrad regenerative tuners, and detector two-stage amplifiers. Contestants are requested to see the new apparatus at their nearest dealer. They may also obtain descriptive literature regarding the new equipment from their dealer, or request Bulletins O and L from the company direct. Contest blanks may be obtained upon application to the contest department, care the company, at Medford Hillside, Mass.

John Firth & Co., Inc., reports that they are now in a position to make immediate delivery of the Vocaloud. They have been held up by an altogether unexpected and uncalled for mistake on the part of the cabinet makers, who were making the mahogany cabinets in which the instrument is mounted. It seems that an order for several hundred cabinets was placed, and, when long overdue delivery was finally made, it was found that the cabinets were not made in accordance with the specifications furnished. It was, therefore, necessary to place a duplicate order at once, and it is this order which John Firth & Co., Inc., reports is now being delivered and will permit of continuous prompt deliveries of the Vocaloud. Mr. J. Fosner, the production manager, reports that the night shift as well as the day shift is busy turning out the Midget and Standard apparatus as well as the "Bull Dog Grip" plugs. He also reports that by the middle of October immediate delivery should be expected by all dealers upon the entire Firco radio line.

The De Forest Inter-panel equipment, which has proved so marked a success, has been further improved in appearance and efficiency. The tubes for the detector and amplifier panels are now mounted on the back of the panels in a vertical position. Tubes are visible from the front of panel through opening protected by a fine mesh screen. Short wave tuner has been increased in maximum from 450 to 600 meters and a new method of control is furnished, eliminating extremely sharp tuning. Cabinets now have hinged tops, making rear of set easily accessible.

SOUTHERN CALIFORNIA RADIO ASSOCIATION

That a well organized radio club is the best booster the radio amateurs of any

district can use to increase their number is well illustrated in the attendance of the meetings of the Southern California Radio Association. Instead of closing down for the summer months, as is usually the case with most radio clubs, the Southern California Radio Association continued its regular meetings on the second and fourth Monday of each month throughout the entire summer. The attendance at these meetings was never less than 100 and most of the time nearer 150. Better still, fully 30 per cent of this attendance has been non-members and thus becomes one of the best sources for new members of the association.

Beside the regular business of the club, there is always an interesting talk or lecture, either by a member of the club or some outside lecturer. The club has in view a series of interesting and instructive lectures along radio and allied lines, and it is remarkable to see the interest shown and the attention given to the lecturer, many lectures lasting through the entire evening. The club has given a number of raffles in the past year and held a most successful "hard times auction," in which each member brought up some of his apparatus (no longer in use at his own station), and the same was auctioned off to the highest bidder. The sales of old apparatus that night amounted to in excess of \$150.

The Southern California Radio Association at its own expense sent a representative to the first annual A. R. R. L. convention in Chicago. Mr. V. M. Bitz, radio 6JD, represented the club, and we expect to have the pleasure of a very interesting evening listening to his story of the convention.

The club also has its lecturer whom it loans out to other societies. This lecturer, Mr. Edward T. Lowe Jr., assisted by the writer, recently gave a lecture before the biological branch of the Los Angeles Academy of Sciences with a demonstration of wireless telephony. The club considers its position enviable in that it has the complete co-operation of all the radio dealers in Los Angeles, the same facilitating its operation in many ways.

The Radio Club has done much to increase the general public interest in radio in Southern California, and this in connection with the increased use of the amateur wireless telephone and wireless concerts has been instrumental in interesting many men of mature age who, not caring to learn the code, enjoyed listening in for the concerts, and as a direct result, the club has on its membership roll a large number of the representative business men of Los Angeles.

LEX B. BENJAMIN.

CUTTING AND WASHINGTON RADIO STATION

Cutting and Washington Radio Corporation, 6 and 8 West 48th Street, New York City, N. Y., is operating a shore station at Easthampton, Long Island—call letters "WSA"—about 100 miles from New York City. The station handles general public correspondence to and from ships at sea and is equipped with special designed apparatus for both long and short range communication on wave lengths of 600 to 1900 meters. One of the characteristics of the specially designed transmitting equipment is the distinct tone of the spark which enables ship operators to pick WSA's signals out of a jam of signals from other stations and which also has excellent carrying qualities.

The antenna is a "T" type cage with cage "lead-in"—the antenna being supported by two steel towers each 165 feet high, topped off with 10-foot spars. A counterpoise grounding system is used which has proven very effective.

Calculations by all of the known methods indicate that the radiated power is conservatively three kilowatts, which experience has shown to be quite sufficient for long daylight ranges. It might be of interest to point out the fact that a power radiation of three kilowatts on the average ship would require from 50 to 55 amperes antenna current with an "L" type antenna about 75 feet high above deck and 225 feet long.

Some examples of the ranges covered by WSA are as follows: Signals were copied at night by the S. S. Black Arrow while a few hundred miles off the coast of Spain on her last voyage. Traffic was exchanged with the S. S. Essequibo over 1000 miles south of New York at night—signals from WSA being reported very QSA at the time and very easy to copy through QRM. WSA is consistently heard by ships in Bermuda Harbor in daylight. The S. S. Lapland communicates with WSA regularly from 500 to 800 miles in daylight. The S. S. Aeolus communicates with WSA approximately 2000 miles at night. These are not examples of "freak" work, but of every day communication since on "freaks" WSA has been copied in the Pacific Ocean, in Buenos Aires Harbor, in the English Channel, and at other exceptionally long distances.

To facilitate the rapid handling of traffic there are direct private wires to New York City. An office maintained in the Hotel Commodore, New York City, is also connected with WSA by direct private wire and delivers messages to steamship owners by telephone—all such deliveries being followed with confirmations

by messenger. A crew of expert operators was also selected for ability in accurate and rapid handling of traffic.

In co-operation with the Hotel Commodore press is sent nightly at 12:15 a. m. 75th meridian time on 1900 meters free of charge to all ships at sea. The transmitter at WSA is remotely controlled from the Hotel Commodore office for this purpose.

BREMERTON, WASHINGTON

The Kitsap County Radio Association was formed in February, this year, with an initial membership of about 25. Considering that the joint towns of Bremerton and Charleston have a total population of only about 20,000, we consider this a good showing, and have increased our membership to 35, with new members coming in right along.

Until recently we maintained quarters in Union High School here, but are now forced to find other club rooms, due to lack of space to accommodate us during the school year. We are desirous of finding suitable quarters to house not only our members, but a complete station, most of the apparatus for which we now have, consisting of 1/2 kw. rotary transmitter and De Forest unit panel receiver and amplifier.

Reorganization of the association has just recently been completed, with a view to broadening our work this coming season. We have a code practice table and instruction for half to one hour is given each meeting. As the majority of our members are new in the radio game, code practice is needed. We have only two licensed amateurs at present, but many more on the verge of blooming forth with a ticket. Great care is used that no one without license, uses any manner of transmitter in violation of the law. Several transmitters are almost ready to break forth, but are silent until licenses are obtained. At present, no satisfactory transformer station is established here for traffic purposes. Nothing but a spark coil, but several sparks and tubes coming up.

Personally, I have a 500-cycle Telefunken transmitter nearing completion, and a 15-watt tube-telephone-telegraph set, with which I hope to handle DX traffic.

Receiving conditions locally are poor and have always been, experiments having been made for several years by the local navy station (NPC) to better conditions, with the final conclusion that it is atmospheric or natural causes. However, short-wave stuff as far as Los Gatos, Calif., is heard pretty well here on detector and no amplifier.

Kitsap County Radio Ass'n.

By Howard S. Pyle, Vice President.

DEVELOPMENT OF RADIO TELEPHONE AND C.W. IN SOUTHERN CALIFORNIA

The usual crowd, gathered in Wesrad's store the other day, began swapping reminiscences, and it was amusing to reflect on the rapid development of the radio telephone and C.W. during the past year. Such tremendous strides have been made that contemplating the future—yea, even the near future, is a thing of only the wildest conjecture.

A little more than a year ago, Western radio burst forth on the ether with the first vacuum tube telephone transmitter in this locality. The effect was startling, although the phonograph concerts were much worse than the worst concerts you hear nowadays. On one particularly good night, a conversation was carried on with 6NY, in Whittier, about 20 miles distant. This was stimulating and experiments were "carried on" with renewed vigor. The transmitter, at that time, employed four De Forest tubes, little better than amplifiers, and using the De Forest system of grid modulation. The four tubes were all used as oscillators and the radiation meter ambled up to one-half an amp on state occasions. Those were the happy days!

Then Arno Kluge began juggling the intricate parts of a telephone transmitter and tests were carried on over the intervening blocks with beautiful regularity. Very shortly after Lex B. Benjamin, 6MK, and president of the Southern California Radio Association; and C. E. Blalack, 6JE, entered the C.W. field and from then on new radiofones appeared at frequent intervals.

At the present writing there are about 20 telephone transmitting stations operating in Los Angeles. Some of these stations are concert sets operated by the various dealers on scheduled evenings and the foremost transmitter is Wesrad's 50-watt set, which entertains all the surrounding countryside on Tuesday and Friday evenings.

It is interesting to compare the present 6XD transmitter with the original described above. The circuit has recently been changed and improvements are made almost every week. A great deal of experimentation is necessary to bring this size of transmitter to the point of perfection which it is desired to obtain. The present circuit is a great improvement over previous circuits used and in a coming issue the complete diagrams and data will be shown in these columns.

The Western Radio Electric Company has been foremost in their activities in introducing radiofones and C.W., as it has been their policy to remain abreast of radio advancement for the benefit of the trade. The Oakland store of this company will carry the same policy of sales and service into the San Francisco bay district.

Static Statistics from Everywhere

By Squawk McGuff

I find in a recent editorial from Spokane that they are hearing concerts from San Francisco, and that Spokane, whom we do not hear much about, is there, nevertheless. It is easy to understand the infectious enthusiasm of those people in Spokane when we get the proper "kick" in hearing concerts only a few miles. They hear them over 1000 miles. A sport that includes hearing things 1000 miles away offers the sort of thrill that cannot be disregarded. For some time radio telephones have carried music 1000 miles, and more over water, but inland transmission is much more difficult, as we all know, and to have heard the San Francisco concert was a noble treat for the Spokane enthusiasts.

The persistence of science constantly increases the effective radius of wireless communication. It is only about twenty years since wireless transmission over a few yards was considered something akin to a miracle. Today the range is 10,000 miles and the limit is not yet reached.

Marconi himself suggested the possibility of interplanetary communication. He has heard wireless signals that he does not think can have emanated from any source on the earth. They can be caught only by apparatus tuned to wave length five times greater than any wave our scientists know about. In 1924 Mars will be closer to the earth. Let's all wind a houseful of loose couplers for that wave length.

LOS ANGELES

The fellows are now getting together their resources for the winter campaign and there is much visiting, inquiring into ways and means and various other maneuvers conducive to general activity. There is also very much use of mild (?) language when the oil runs out of the condenser. These are happy times in the life of the amateur.

Some fellows brag about hearing ten feet from the cans, but that's nothing. The ash man can hear a block from his'n, and he doesn't have amplification, either.

Seems like these wireless telephones that are sending messages out over the air for the boys to pick up by radio are rather disturbing. As they listen they recognize the high pitched voice as belonging to "wimmins" and now they are all talking of installing a set with high tone. It's getting so now that if a fellow wants to be admitted to the sacred sanctum of a long distance listening-in station he must take a girl along with him to call out in an upper "C" tone "it's me!" when the chain will drop, the bolt slide and the key turn to reveal—. Now let's see, was that 6MH or who was it?

6JD took a trip one day
To the Con of the A R R L.
He made a speech and then returned,
And is now feeling pretty well.

That sounds pretty reasonable, let's
try another!

In Whittier, the 6AHA (Ah, ha!)
Where the tunes are trained to a nice
tra la,

Lives a gay young swain on pleasure
bent,

And many is the message he has sent.

FEATURES IN THE DECEMBER ISSUE OF "RADIO."

A. J. CHAMPREUX, engineer Pacific Telephone & Telegraph Co., will tell all about the Catalina Island Radio Installation, including details of connections between the radio and the ordinary two-wire telephone circuit, duplex radio telephoning with simultaneous telegraphy and automatic radio signalling system.

JENNINGS B. DOW, U. S. S. California, will start the first installment of a remarkable "C. W. Manual."

B. F. McNAMEE will continue the how and why of radio tuning with an article on "Tuning Apparatus."

PROF. A. K. ASTER, University of California, contributes a helpful technical article on radio frequency amplification by means of the "Armstrong Super Hetrodyne."

Special Christmas fiction, verse and humor in addition to all regular departments.

TACOMA

On of the last four days of September Tacoma had a great electrical display. The committee in charge of this exhibition offered the Radio Club of Tacoma free space if they would bring down their home made apparatus and show the public what they are doing. The Radio Club built their booth and conducted a most successful demonstration.

Horrors! "Fat" Weingarten, our Chicago conventioner, lost five pounds while East. He says now he will answer to the name only of Skinny. He must have had some time there, though.

Our club janitor is now passing out highly embossed cards, reading "my game is wireless" as his motto, and informing the members that he has gone into the

designing and construction work. Don't rush, fellows!

Yes, it's really so. Our esteemed professor of C.W. fame has entered the University of Washington. Remember, Otto, don't get into any of the arguments with the professors over there, as you used to argue at club here—although we know you could back them off the map! Good luck, Otto. It sure is lonesome over here without you and your keen wit.

PORTLAND

Portland has been meeting opposition to the new tariff schedule put into effect last month, when it was agreed to give it a two weeks' trial before further discussion as to its merits. This was done, but on account of the lack of co-operation of outside stations due to lack of knowledge of the new schedule, it was almost impossible for the schedule to receive a fair trial in such a short time. As it was soon discovered that it would almost be impossible to refuse tariff going through Portland after the traffic schedule it was decided to temporarily abolish the clause as published in the last P.R.N. stating, "however no traffic will be handled. In the event an LD station says 'QRJ1,' it is up to you to tell him 'QSU tomorrow night at schedule for traffic.'" It is requested that all other centers, having traffic for or through Portland, make schedules to correspond in such a way as to make connections with Portland at the right time.

("Tacoma will not be affected by this request, being a suburb of Portland."—7ZT.)

7JW, who made a tour of the South during the summer and inspected many of the leading stations, seems to have gained some ideas as to station construction, which he is going to try out. Since his return he has sold most of the old apparatus, and from the latest report has just finished constructing a new home made transformer for his new station. If everything goes as expected there will be a large demand for lightning protectors for receiving sets located locally.

During September Portland was honored by the visit of two of California's best, namely 6DP and 6PR. One evening of their visit was spent in a "Hamfest" at the 7XF station, where most of the "gang" had collected. It was here that the two "dippies" of the coast met. The conversation, or "Hamfest" between 6DP and 7DP that followed was too lengthy for print.

The southern stations are not the only ones that are enjoying a good radio con-

(Continued on Page 164)

New Apparatus and Supplies from the Radio Manufacturers

SIX STAGE AMPLIFICATION

With the new Firco Midget apparatus described in these columns last month it is possible to connect several units so as to get as high as six stages of amplification. The accompanying diagram shows the circuit employed. Ordinary amplifying tubes are used for the first two circuits, but harder tubes are better for stages 3 and 4, with a plate voltage of from 80 to 100 volts. If still higher am-

plification is desired stages 5 and 6 may be added, using 5-watt power tubes and a plate voltage of from 200 to 350 volts. The same filament battery is used for all tubes with an individual filament rheostat for each.

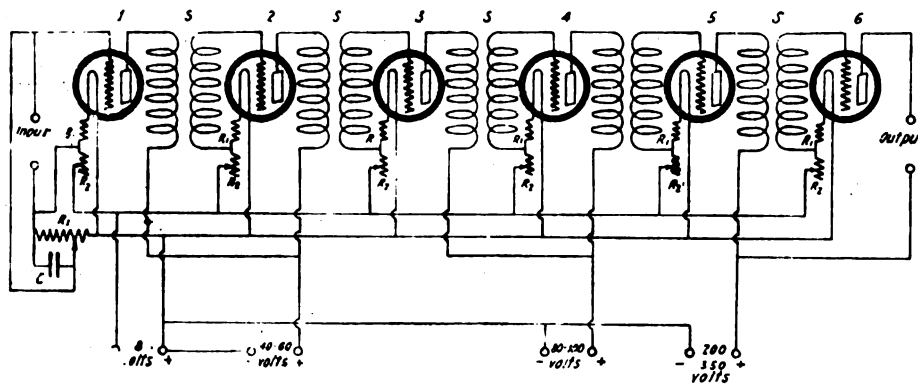
The elimination of howling or squealing is accomplished by the use of the Saco Clad transformer, cross-sectional view of which is shown herewith. It will be noticed that the primary and secondary windings are wound around a laminated core of silicon steel and totally encased within a laminated wall

of the same material. This laminated shield, as it might properly be termed, serves the double purpose of providing a most efficient path for the magnetic flux. The six-stage amplifier is actually nothing more than three two-stage amplifiers, coupled one after the other by short bus bars. In the same manner, a four-stage amplifier can be built by coupling together two of the Type 37A amplifiers.

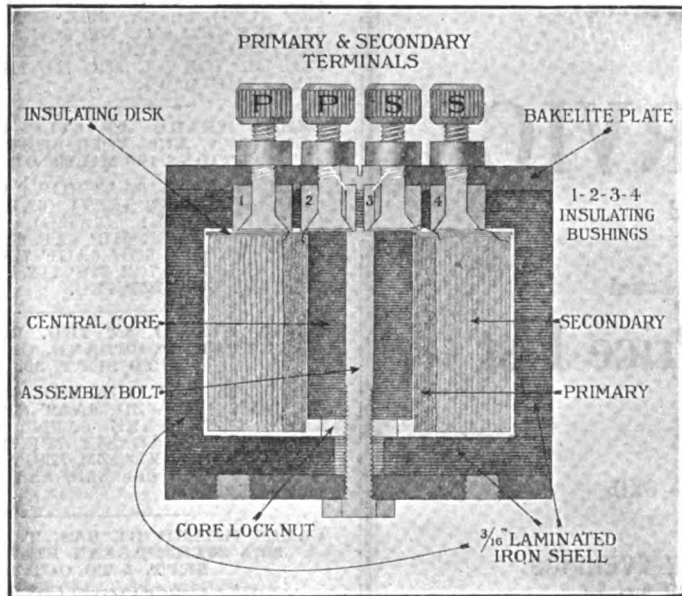
Service" than ever. A fine new catalogue of tubes, dials, rheostats, sockets, potentiometers, switches, vario-couplers, variometers and all apparatus parts for receiving sets as well as complete detector and amplifier panels, has just been issued and will be sent on application. "Radio Apparatus for Amateur and Experimental Use" is the title of a new catalog text which may be obtained from the Radio Corporation of America for 25 cents. It is especially concerned with equipment for continuous wave transmission and receptions, and furnishes the radio amateur with the data necessary for its efficient operation. The publication is in two sections, an instructional and a catalog. The instructional section deals with radiotron transmission, the details of a scientifically constructed station, transmitting tube circuits, their practical use, and general information to the amateur. The catalog section covers radiotron transmission tubes, kenetron rectifier tubes, transmitter accessories, radiatron receiver tubes, receiver accessories, antenna material and accessories. The Radio Corporation has taken the initiative in gathering this valuable information and it is thought that it will go a long ways towards popularizing continuous wave transmission.

Crossley Manufacturing Co., Cincinnati, Ohio, have issued several interesting circulars descriptive of their lines. Among these is a simple variable condenser operated by a cam so as to open and shut like a book, thus giving a uniform variation from .00006 to 0008 mfd. Another is a four prong V-T porcelain socket designed to prevent short circuit through careless insertion of tube, and adapted for side or base mounting.

The Chelsea Radio Company has recently developed an audio frequency amplifying transformer whose electrical characteristics are unusually well proportioned for the best operation with the new high impedance vacuum tubes. The characteristics given below were derived from an 800 cycle Vreland oscillator and the 1,000 cycle data computed for general comparison purposes.



Hook-up for 6-stage Amplification.



Cross Section of Saco Clad Transformer.

NEW RADIO CATALOGS

Catalog No. 21 from the Marshall-Gerken Co., Toledo, Ohio, is devoted to the Mageco System of Radio Telephony and Telegraphy. It contains illustrated descriptions and prices of both transmitting and receiving sets, as well as of all essential assembly parts.

E. T. Cunningham (Audiotron since 1915) and Remler Radio Manufacturing Co. have moved their offices to 248 First street, San Francisco, where larger quarters and greater manufacturing facilities will give either better "Cunningham

	1000 cycles ohms.	800 cycles ohms.
Primary, Secnd'y open.....	36,175	29,000
Primary, Secnd'y shorted....	1,875	1,500
Secnd'y, Primary open.....	1,875,000	1500,000
Secnd'y, Primary shorted....	55,000	44,000

The notable feature of this device is the high value of secondary impedance with the primary shorted. The core is of the shell type which greatly reduces stray fields, and the coil is of square section and results in an unusually high space factor. The connections have been so arranged as to eliminate all capacity effects between the primary and secondary windings.



There's a "ham" who lives miles from L. A.,
Where coyotes and cactus hold sway,
When he wants something fine
In the Radio line—
Just writes us, and gets it next day.

AND THERE'S MORE TRUTH THAN POETRY
IN THOSE LINES

WESRAD SERVICE

Once Tried—Is Always Used

Let's Get Acquainted Thru Our Latest

Stock Bulletin and Price List

Alias "Price Dictionary"

6XD — CONCERT SCHEDULE — 6XD
310 Meters—8 to 9 P. M.

TUESDAY, WEDNESDAY AND FRIDAY EVENINGS
SUNDAY MORNING CONCERT, 10 TO 11

"QSA—Fifteen Feet from the Phones
in Santa Cruz on One Step"

Western Radio Electric Co.

550 South Flower
LOS ANGELES

274 Twelfth Street
OAKLAND, CAL.

Special Distributors for Burgess "B" Batteries

CALLS HEARD

CALLS HEARD BY 7MQ, CORNELIUS, OREGON, JULY 20TH TO SEPT. 10TH—ONE TUBE ONLY.

Spark—6AE 6AR 6AID 6AAW 6AQU 6AAT 6AVB 6ACR 6AWH 6AEW 6ANW 6AFJ 6APE 6ABX 6AMR 6AMW 6AGF 6BK 6CH 6CO 6CV 6DP 6EA 6EB 6FH 6FR 6GF 6GR 6GN 6HC 6IC 6KA 6OC 6OH 6PJ 6TH 6TV 6VX 6WX 6WZ 6ZA 6ZK 6ZU 6ZX 6AVT 6ABX 6LV 6II 6IS 6KK 7AD 7AY 7BA 7BC 7BN 7BK 7BP 7CC 7CN 7CW 7DP 7ED 7EO 7FR 7GA 7GD 7GN 7IN 7IU 7IW 7IY 7KB 7KG 7KJ 7KN 7LW 7LS 7NA 7NN 7OZ 7QQ 7TZ 7XD 7YG 7YS 7ZJ 7ZK 7ZL 7ZN 7ZT 7ZW.
5BR (Canadian).
C W—6AWT 6ASJ 6AAT 6AWV 6AUL 6ALE 6ALU 6XAC 6XG 6XV 7HW 6MS 7NY 7QE 7RV 7XF 6AGC 7VW.

HEARD BY 6AUN FOR SEPT. 5-20, 1921.

6AE 6EA 6ER 6FK 6FR 6GI 6GE 6GR 6IB 6IC 6KA 6LC 6MH 6MN 6OH 6PO 6OK 6TV 6VM 6ZA 6ZU 6LX 6AAK 6AAT 6ACR 6ACY 6ADL 6AGF 6AID 6AIL 6ALE (CW) 6AOZ 6AQU 6ASR 6AVB 6AWI 6AWH 7BK 7BP 7CC 7GI 7IU 7KM 7KJ 7KW 7MZ 7OZ 7XO 7XF (CW) 7ZJ 7ZM 7ZJ 7ZT.

HEARD BY 6AVM, 2318 K STREET, SACRAMENTO, CALIF., ON ONE TUBE, FROM SEPT. 18 TO 28.

5ZA 6AGF (6ANJ-fone) 6ACY (6AFN) 6AWV (CW) 6AEI 6AJH 6AVY (CW) buzzer, 6ALE (CW) 6ALU 6ATQ 6ADL 6AEZ 6ATH 6AVD 6AWT (CW) 6AVR 6CP 6DP 6EF (CW) buzzer, 6EX 6FK 6GI (6IM) 6JY 6KS 6KC 6MH NK 6OC 6OD 6OM 6PJ 6SK 6TU 6VX 6ZB 6ZN 7XD 7BK 7ZT 7ZM 7BP 7OZ 7CC 7ED 7IU 7MO 7MY 7KJ 7IW 9AMB (CW).

CALLS HEARD AT 6ALP BY HILLIS BROWN, AUG. 7 TO SEPT. 7—ALL STATIONS 100 MILES OR OVER.

6PJ 6ZK 6AE 6AAT (CW) 6XAC (CW) fone 6AID (6KC) (6TV) (6ARW) (6AJH) (6AED) (6AKL) (6AKD) 6ZE (6ZB) (6FK) 6OT 6ACR 6DP 6AR 6VX 6TV 6AC 6ANP 6CC 6GF 6OH 6AGF 7IW 7ED 7DA 7HW 7XD 7ZM 7OZ 7PP 7IY 7ZJ 7BJ 7BQ 7HK 7LY 7GA 7ZT 7EO.

CALLS HEARD AT 7RO, R. G. HEITKEMPER, PORTLAND, ORE., AUG. 20 TO SEPT. 30.

6CV 6EA 6ER 6GK 6GR 6IC 6KI 6OH 6PR 6SK 6VX 6ZU 6AAT 6ABM 6ABW 6ABX 6ACR 6AEZ 6AFN 6AGF 6AID 6APE 6AWH 7AD 7AY 7FI 7HF 7IN 7IU 7JF 7KM 7NL 7XD 7ZM 7ZS. All the above were heard on one bulb and a three-coil tickler system.

CALLS HEARD BY 6AS, T. B. BROWN, 3675 20TH ST., SAN FRANCISCO, SEPT. 1 TO OCT. 1.

(6AR) 6AEZ 6AMB 6AID 6ADL 6ALU 6ALE (CW) (6AWV (CW) (6CV) 6EA 6EB 6EN 6FK (6GF) 6GI 6HY 6IC (6IS) 6JD (6MH) 6OD 6SK 6TF 6ZB 6ZN 6ZU 7BP 7BR 7ED 7FI 7GA 7IU 7KB 7KJ 7OZ 7ZM 7ZS (7ZT) 7XD.

CALLS HEARD AT 6AFO, SAN FRANCISCO

6DP (6EB) 6EN 6FK 6GF 6GP 6GR 6IC 6IS 6KA 6KC 6LC 6MH 6MN 6MZ 6OH 6PJ 6SK 6TU 6TV 6VX 6WI 6ZB 6ZN 6ZX 6XAD 6ABG 6ADL 6AEI 6AGF 6AJH 6ALE 6ALV 6AML 6AGU 6AVE 7BK 7IN 7KP 7KJ 7OZ 7ZT (7ZJ).

CALLS HEARD AND WORKED BY 6EB FROM APRIL 1 TO SEPT. 23.

6AAH 6AAT 6AAU 6ABH 6ABM 6ACR 6ACQ (6ADA) 6AEI (6AFO) 6AGC (6AIN) 6AJH 6ALE-ICW (6AMW) 6ANQ 6APE (6APH) 6ATQ 6XAD-ICW 6ZAE. (6AS) (6BK) 6BU 6BW (6FX) 6IM, 6KC 6KK 6PG-CW (6PJ) (6PO) 6TS 6VX (6WZ) 6ZB-CW (6ZU) (6ZX) (6ZZ). (7DA) 7IN 7IW (7ZJ) 7ZT and 7ZM.

CALLS HEARD BY 7OZ, GARRETT LEWIS, EUGENE, ORE., AUG. 19 TO SEPT. 20

5BR 6AE 6AL 6AN (6AS) 6AW 6AY 6EB 6EN 6EP 6EX (6FH) 6FT (6GF) (6GR) 6HC 6HP (6IC) (6IS) 6JE (CW) 6KA 6KE 6KM 6KP 6KY 6LC 6MH 6MN (6MK) (6OC) (6OH) 6OT 6PC (6PJ) 6PO 6PP 6PR 6PW 6TU (6TV) 6VC 6VK (6VX) (YWH) (6WZ) 6WO 6XW (CW) 6XG (CW) 6XAC (CW) (6ZN) 6ZU (CW) 6ZY 6ZAC 6ZAE 6AAT (CW) 6AAW 6ABG 6ABG (CW) (6ABH) (6ABM) 6ABU (6ABW) 6AEX (6ACR) (6ADL) (6AEW) 6AEZ 6AFA 6AFO 6AFN (6AGF) 6AGN (6AID) 6AIW 6AJH 6AKL 6ALA (6ALE-CW) (6AMW) 6ANK 6ANP 6APE (6AQU) (6ASJ-CW) 6ATQ 6ATV (6AVB) 6AVV 6AWH 6AWI 6AWS (6AWV-CW) 7AD 7AD-CW 7AY (7BA) 7BC 7BG 7BH (7BK) 7BP 7CB (7CC) 7CE(CW) (7ED) 7EO 7FI 7FQ (1GA) 7GI 7HW-CW 7ID 7IN (7IU) 7IY 7JJ 7KB (7KJ) (7KM) 7LS 7LY 7MW (7NL) (7NW) 7QQ 7RB 7XD 7XF-CW and fone 7YA 7ZB (7ZJ) 7ZM 7ZN 7ZO 7ZS (ZT) 9MH 6AK.

The above stations were worked with a 1/2 KW. set during ten nights, which were not consecutive. The old rotary 7OZ is discarded and will be replaced with the CW and a new Quenched gap outfit.

7MF of Eugene has discarded CW and has the old spark set of 7OZ.

There has been a lot of qrm. from a 500 watt CW set in Eugene at the aviation field (EF1). This set freezes the tubes and puts id on the blink till all their traffic is off. The field will be moved about the first week in October and DX will start.

This is all from Eugene this month. Will send you some more next month.

CALLS HEARD BY 6AWT, SAN FRANCISCO, FROM SEPT. 1 TO 22

6AE fone (6EA-WK) 6EN 6ER 6FK 6FR 6GI 6GF 6GP (6GR-WK) 6IB (6IC-WK) 6KA 6KC 6KP 6MH 6MN 6OH 6OK (6PO-WK) 6SK 6TU 6TV 6VH 6VM 6ZU 6ACR 6ACV 6ADL 6AID 6AJG 6ALE-CW 6AOZ 6AQU 6ASR 6AVB 6AWI 6AWH 7BK 7BP 7CC 7FI 7GA 7IU 7KM 7KJ 7KW 7MZ 7NL 7OZ 7XD 7XF-CW 7ZJ 7ZM 7ZS (7ZT-WK).

CALLS HEARD BY 7MF, EUGENE, ORE.

6AE 6AK 6AR 6CH 6EX 6FH (6GF) 6IG 6KA 6KM 6KX 6MF 6OC 6PR 6TV 6XAD (CW and music) 6VX (QSA) 6WZ 6ZX 6ZU 6AEZ 6ABR 6AWV (CW) 6AVY (CW) 7EX 7FI 7HC 7HW (CW) 7IU 7KJ 7KM 7LW 7MA 7NL 7PA 7QQ (ex-ZZ) 7SP 7XF (music) 7XD 7ZM 7ZS YA 9B. Any one hearing 7MF's CW please qsl.

CALLS HEARD BY 6EA, H. C. Seefred, APRIL 1ST TO SEPT 29TH.

Head: 6IF 6ZA 6AI 6AS 6BS (CW) 6BW 6CH 6DN 6FH 6FI 6FK 6GO 6JM 6MZ 6PO 6QR 6SR 6TC 6VK 6VL 6WO 6XZ 6ZB (spk. and ICW) 6ZE 6ZH 6ZK 6ZY 6ZZ 6AAK 6AAT (CW) 6AAU 6AAW 6ABH 6ABW 6ABX 6ACR 6ADA 6AFA 6AFN 6AFO 6ALA 6AOY (CW) 6AQW (CW) 6AWT (CW) 6XAD (ICW) 7FI 7GA 7HN 7IW 7NL 7XD 7YA 7ZM and 9ZN.

Worked: 6AE 6AK 6AR 6CP 6DP 6EX 6GF 6GR 6HC 6IC 6KC 6KM 6OC 6OH 6OW 6PJ 6PR 6SK 6TU 6TV 6VX 6WZ 6ZU 6ZX 6ABM 6AGF 6AID 6AJH 6AKL 6ALE (ICW) 6AMW 6ANK 6APH 6AVB 6AWH 7BP 7DA and 7ZT.

CALLS HEARD BY 6ACM, A. AND L. NEWMAN, 1700 SONOMA AVE., BERKELEY, CAL., FROM SEPT. 1 TO SEPT. 30.

6AK 6AR 6CV 6DA 6DP 6EA 6ED 6EN 6ER 6FH 6FK 6FT 6GC 6GF 6GP 6GT 6HY 6IC 6ID 6IS 6IZ 6JY 6KA 6KC 6KP 6KS 6KX 6LC 6MH 6OD 6OH 6PJ 6PR 6QR 6RS 6RZ 6SK 6TF, 6WI 6ZB 6ZN 6ZU 6AAT (CW) 6ABM 6ABS 6ACR 6ACV 6ADL 6AEI 6AEZ 6AFN 6AGF 6AGP 6AIB 6AIO 6AJH 6AKE 6AKI 6ALL 6ALN 6ALP 6ALU 6ANP 6APE 6APO 6AQU 6ATQ 6AVD 6AVR 6AVV 6AWH 6AWY 6AZD 6AZL 6BAP NK YA 7BK 7BP 7CN 7CU 1ED 7FI 7GA 7GO 7IM 7IN 7IS 7IU 7KD 7KJ 7KM 7MY 7NL 7NU 7OK 7OZ 7RA 7XC 7XD 7YA 7ZJ 7ZM 7ZR 7ZT 6GR.

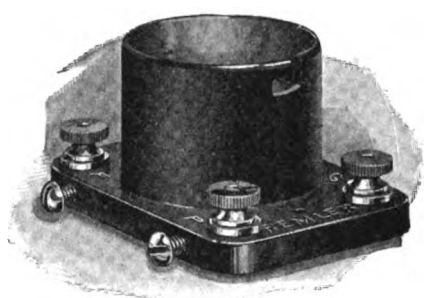
Daylight reception: 6AK 6IC 6FH 6GC 6GP 6KP 6PJ 6AAT 6ACR 6AZD 6AZL 6BAP. Any one hearing 6ACM please QSL.

CALLS HEARD AT 6ASJ, OAKLAND, CAL., FROM MAY 12 TO OCT. 2.

6AE (skp. and CW) 6AP 6CR 6DD 6DP 6EA 6EB 6EN 6ER 6FK 6GI 6IC 6ID 6IS 6IY (CW) 6JE 6KP 6KS 6LA 6LX 6MB 6MH 6MX 6OD 6OH 6OM 6PR 6TH (6TV) 6VX 6WU 6ZB 6ZU 6AAT (CW) 6ABG

DO IT NOW!

Are you missing part of the fun of the game because of poor apparatus, old apparatus or lack of apparatus you need? Are you proud of your equipment? Are you getting as good results as the other fellow—the best results? You should and can with the right apparatus. Check it over. Stock up. Make your set efficient, complete, up to the minute, and do it now. Run your eye down this list, check the items you need and order them.



Remler V T Sockets.....\$1.50	Murdock Radio V T Sockets. 1.00
De Forest V T Sockets..... 1.40	General Radio V T Sockets. 1.50

- De Forest reversible Rheostats.\$1.75
- Federal Amp. Transformers.... 7.00
- Remler Rheostats..... 1.75
- General Electric UV 712 Amp. Transformers 7.00
- Remler's Jr. Rheostats..... 1.00
- Remler large Nonbearing Sw... .65
- Murdock New Type reversible Rheostats 1.00
- Remler small Nonbearing Sw... .45
- Moorhead E. R. Detector tubes. 5.00
- Wireless Shop Panel Mounting Condensers
- Moorhead V T Amplifying tubes 6.50
- De Forest Condensers
- Radiotron Detector tubes..... 5.00
- Murdock Condensers
- Radiotron Amplifying tubes ... 6.50
- Insulators, 10 in.\$1.00
- Radiotron Power tubes..... 8.00
- Insulators, 4 in.50
- Magnovox New Type "14" horn.45.00
- One Stage Amplifier without case15.00
- General Radio Amp. Transformers 5.00
- Insulators, Ball40
- Murdock Phones, 2000 Ohms... 4.50
- Murdock Phones, 3000 Ohms... 5.50
- With new type head band, 50 cents extra

If you don't see what you want ask for it. Our stock is complete. Every piece fully guaranteed, and the lowest prices consistent with high quality, long wear and perfect satisfaction. You'll like our apparatus and our way of doing business.

TRY IT NOW.

CALIFORNIA ELECTRIC SUPPLY CO.

643 Mission Street, San Francisco

Radio Supplies that R right

A Live Wire Store with a Live Wire Radio Department and a Complete Line of Live Wire Radio Supplies



A BIGGER RADIO STOCK
Our Radio Department has been enlarged and we are now in a position to supply you with whatever you need in the radio line. Anything from the aerial insulator to the ground clamp.

VACUUM TUBES
We carry all of the standard makes of vacuum tubes. Radiotrons, Cunningham and A. P. Tubes, detectors, amplifiers and transmitters, at standard prices.

COMPLETE SETS
Built to your specifications. Any wavelength range, at a price that will not burn a hole in your pocket. Special concert sets also built to order.

SAN FRANCISCO'S UP-TOWN RADIO STORE
Do your radio shopping at the "Live Wire" store. In one of the leading residential districts of San Francisco. Why go miles out of the way when we can supply you with everything that you need?

Magnavox Loud Speakers All Sizes



Headsets—

WE carry a complete stock of radio headsets, including Murdock, Brandes and Baldwins. The new Murdock 56's are in heavy demand. Equipped with the new adjustable headband, the "non-hair-pulling" kind, 2000 ohms, \$5.00; 3000 ohms, \$6.00; maximum sensitivity, uniformity in tone, remarkable durability, exceptionally well built. Backed up by the liberal Murdock guarantee.

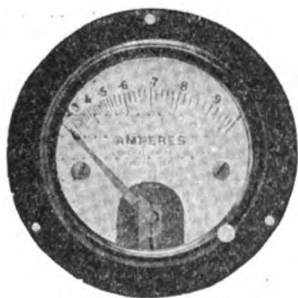


New Prices on Baldy Phones. Type C \$13.75

1230 Polk Street

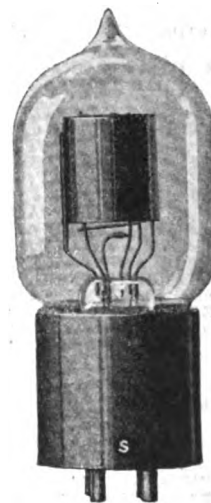
"If It's Good Apparatus We Have It"

San Francisco, Cal.



Announcement

After a year of extensive scientific, nautical and electrical development work and manufacturing, we have decided to extend our present business scope to cover the entire radio field with a new line of apparatus decidedly different from what you have been accustomed to in the past. The same reliable service that we have extended our customers in the past years will be yours in the development of our new radio department.



INSTRUMENT REPAIR WORK

We are equipped to repair electrical and radio measuring instruments of any type, make or size. Scientific, reliable work at moderate prices. Don't throw your burnt-out instruments into the discard. Send them to us for repair. Voltmeters, ammeters, frequency meters, hot wire ammeters, galvanometers and any other type of meters repaired.

VACUUM TUBES—All Makes

We carry a complete stock of every standard make of vacuum tube, both transmitting and receiving, A. P., Cunningham and Radiotrons. Vacuum tube accessories are also included in our line. C. W. apparatus is one of our specialties. Measuring instruments for C. W. transmitters, both A. C. and D. C., are always on hand.

We Stock a Complete Line of C. W. generators in voltages ranging from 500 to 2000 D. C., with either A. C. or D. C. motors. These can be had in 100, 200 and 500 watt sizes. Special Generators built to order. Armature Winding.

We also carry a good line of transformers for every use in a radio station. Standard makes of any type of radio apparatus always carried in stock.

This is Only an Announcement. Watch for Our Ad in the Next Issue

HEINTZ & KOHLMOS, 606 Mission Street, San Francisco, California

6ADL 6AGC 6AGF 6AGU 6AIR 6ALA
(6ALE-CW) 6ALU (CW) 6AMW 7BK 7BP
7CC 7DA 7DJ 7ED 7FC 7IN 7IU 7KJ 7KM
7MF 7NN (7OZ) 7ZJ 7ZM 7ZT 9HM. As I
am working nights, the above calls were
heard between 12 M. and 2 A. M. Any one
hearing my ICW or Voice please QSL,
Chas. L. Elvin, 929 Sixtieth Street, Oak-
land, Cal.

**CALLS HEARD BY 7ZT (EX-7DA),
PORTLAND, ORE., IN SEPTEMBER.**

(5BR-Canadian) 6AE 6AK 6AR (6AS)
(6AV) 6BW (6CH) (6CP) (6CV) 6CW
(6DP) (6EA) 6EB (6EN-CW) (6ER)
(6EX) (6FH) 6FX (6GF) 6GI (6GR) 6GX
6HY (6IC) 6II (6IS) 6JE (6KA) (6KM)
6KP 6LC (6MH) (6OC) (6OH) 6PJ (6PR)
(6QR) (6QT) (6SK) (6TU) (6TV) (6VK)
(6VX) 6WR (6WZ) 6ZB (6ZU) (6ZX)
(6AAT-CW) 6AAU 6AAW 6ABM 6ABW
6ABX 6ACR (6ADL) 6AEI (6AEW)
(6AEZ) 6AFN (6AGF) (6AID) 6AJH
(6ALE-CW) (6AMW) (6AMZ) 6ANK
(6APE) 6ATH 6ATO (6ATV) (6AVB)
(6AWH) (6AWT-CW) (6AWV-CW)
(6AWY-CW) 6AZU 6ZAD-CW ("NK")
"YA" (7AD) (7AY) 7BA (7BC) (7BK) 7CC
(7CE-CW) 7CN (7FI) (7IN) (7IU) (7IY)
7JF (7KJ) (7KM) 7LS (7MP) (7NL) (7OZ)
(7TJ) (7XD) (7ZM) (7ZS).

Krebs, Oklahoma, Sept. 29, 1921.

Editor, Pacific Radio News, San Fran-
cisco, Calif.

I have looked in your magazine and
several others, but without success, so I
am writing to you personally to ask if
there is any such "bird" as 6WV.

If there is, please inform him for me
that I heard his signals here on night of
Sept. 28, about 10:55 to 11:05 P. M. (here).
He was easily readable on one tube and
he was calling 9ZC-5ZA and also CQ.

At the time I was using only one tube,
three Duo-Lateral Coils and only "one"
Variable Condenser, it being shunted
across the secondary coil.

Yours sincerely,
THEO. R. HAMILTON,
Radio 5KZ.

**CALLS HEARD AND WORKED ON A ONE-
WIRE AERIAL ABOUT 80 FEET LONG,
BY 6AAK, SANTA BARBARA, CALIF.**

(6AE), 6AK, 6DP, 6FK, 6FY, 6HC, 6IC,
6KA, 6KC, 6LC, (6MH), (6MZ), 6OH, (6PJ),
(6PO), 6SK, (6TV), (6VX), (6ZX), 6XZ,
(6ZB), 6ZN, 6ZU, (6ZX), 6AAT, cw. and
phone. 6ABO, 6ABM, 6ABW, 6ACR, (6AFM),
(6AGF), 6AIC, (6AID), 6AIP in daylight,
(6AHJ, in daylight p. m.), (6ALE, cw),
6AMW, 6AQU in daylight, a. m., 6AUL,
phone and cw, (6XAD, cw), (6ZAD, cw).

San Diego can be heard and worked in
daylight. My radiation is 2 amperes on full
power. Above calls heard and worked during
August.

6KS ON ONE TUBE:

(6ZA), (6AE), (6AI), (6AH), (6AK), (6AR),
6BO, 6BU, 6BW, (6BX), (6CH), (6CP),
(6DP), (6EX), (6FH), (6GF), (6HC), (6HH),
(6IC), (6IM), (6JT), (6KC), (6KM), 6LU,
(6MZ), (6OC), (6OH), (6OW), (6PR), (6QR),
(6QS), (6SK), 6SL, (6TF), (6TH), (6TV),
(6VX), (6WZ), (6XZ), 6ZB, (6ZN), (6ZU),
(6ZX), (6ZZ), (6AAK), (6AAH), (6AAW),
(6ACM), (6ADA), 6ABY, 6AEW, (6AFW),
6AGA, (6AGF), (6AID), 6AIN, (6AIW),
6ALA, (6ANK), (6APH), (6ARS), (6XAD),
(6ZAA), 7DA, 7IN, 7YA, 7ID, 7ZJ, 7IW.

**CALLS HEARD BY 7SG, DON HARRIS,
1711 SIMPSON AVE., ABERDEEN,
WASH., SEPT. 6 TO OCT. 1.**

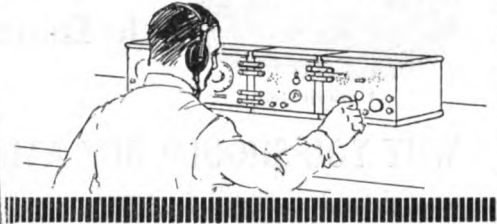
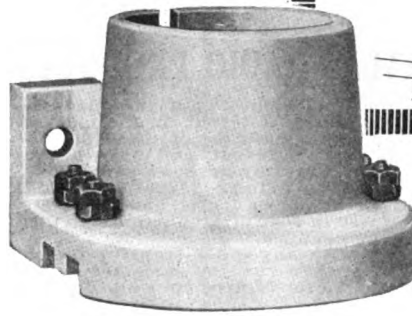
Canadian—5BR 6AK 6AX 6CC 6CD 6CH
6CP 6CV 6DP 6DT 6EX 6GF 6GP 6GR 6GX
6HX 6IB 6IC 6KS 6LC 6LR 6OD 6OH 6OW
6PJ 6PP 6PR 6QR 6RH 6RX 6SU 6TC 6TU
6TV 6VM 6VX 6WO 6WZ 6ZE 6ZK 6ZU
6AAH 6AAU 6AAW 6ARM 6ABO 6ABR
6ABT 6ABW 6ABX 6ACA 6ACE 6ACR
6AEI 6AEW 6AEZ 6AFN 6AGF 6AHX
6AID 6ALU 6ANG 6APE 6ARC 6ARK 7BC
7BK 7BP 7CA 7CC 7CF 7CS 7ED 7FI 7GA
7ID 7IU 7IW 7IY 7JF 7KB 7GK 7KM 7LW
7MF 7MO 7OZ 7XD 7ZG 7ZJ 7ZM 7ZN 7ZP
7ZS 7ZT.

**CALLS HEARD BY 6LV, WILLIAM
BAKER, SAN MATEO, CALIF.**

6CX 6DP 6EA 6EB 6ED 6EN 6ER 6GC
6GF 6HK 6IC 6IS 6JC 6JD 6KA 6KC 6KP
6LC 6LX 6MH 6MV OH 6OM 6PJ 6PP
6PR 6QR 6SK 6AAK 6ABW 6ACU 6AEI
6AGF 6AIE 6AIW 6AJE 6ALM 6ANK
6ANJ 6ANO 6ZA 6ZN 6ZH (phones and
C. W.) 6XAC 6XAJ 6ASJ 6ALE 6AVY
6AUL 6AWT 6AAT 6XG 6XC 6ZE 6XW
7ZM 7BK 7BY 7AD 7ZB 7ZJ 7ZT 7XD 7OZ
7IN 7IW 7IN 7BW 7ED 7YA 7YS.

CROSLEY

V-T SOCKET



PRICE

60¢

*Better—
Costs Less*

THERE must be good reasons
for its instant popularity—
why it was the hit of the
Chicago Radio Show—why today
it is the best seller.

It's the only socket made for both
base and panel mounting. It's made
in one piece, entirely of porcelain—
there is no metal shell—hence no
"ground hum." Its design elim-
inates possibility of short circuiting
filament across high voltage "B"
Battery. It is better—and costs only
60 cents. Be sure to use CROSLEY
SOCKETS in the radio set you
are building. Every live dealer
handles them—if yours doesn't,
send us his name and order direct
—we will ship prepaid.

**DEALERS: It's worth your while
to investigate the CROSLEY line**

Crosley Manufacturing Company

RADIO DEPT. P.

CINCINNATI, OHIO

Phone San Jose 2126-J

Established 1900
1200 Students

OUR WAR RECORD—200 Men Trained—130 Placed in Service

HERROLD COLLEGE OF ENGINEERING AND RADIO

SPECIAL ATTENTION TO EXPERIMENTERS
AND AMATEURS

467 South First Street

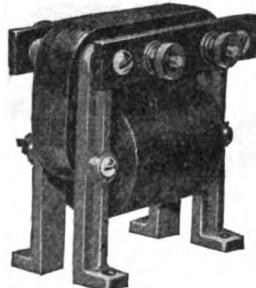
SAN JOSE, CALIF.

Say Radio to the Advertiser, it will help you.



Unmounted

ATLAS RADIO Products for Efficiency



Mounted

WHY YOU SHOULD BUY ATLAS RADIO PRODUCTS

Popular opinion has demanded that really efficient amplifying, modulation, filament heating and C W power transformers be put on the market and made available to the amateur. The great majority of these instruments on the market heretofore were highly inefficient, and have had a power factor in the neighborhood of 50%. ATLAS transformers will henceforth be rated on output, and will use double windings, larger windings, larger wire and larger cores in order that the power factor be as high as possible. This is being done at 100% increase in cost of production, but the selling price of the instruments will not be changed.

GUARANTEE: Run an efficiency test with any other transformer on the market and determine its power factor; then run the same test with Atlas transformers, and if they do not prove more efficient your money will be refunded upon request.

ATLAS AMPLIFYING TRANSFORMERS	
Mounted	\$ 5.00
Semi-mounted	4.00
Unmounted	3.50
Parts for same—	
Primary and secondary	2.50
Core	1.00
Four aluminum legs .....	.50
Panel and binding posts	1.00
ATLAS CW TRANSFORMERS	
Plate Transformers, 500 Watt, 1000-1500 Volts	
Mounted	\$24.00
Semi-mounted	22.00
Unmounted	19.00
Parts for same—	
Complete windings	15.00
Core	4.00
Supporting legs	3.00
Panel and binding posts	2.00
ATLAS CW CHOKE COILS 1½ Henry 500 M.A.	
Double semi-mounted	\$ 7.50
Single semi-mounted	5.50
Unmounted, double	6.00
Unmounted, single	4.00
Parts for same—	
Coils, each	2.00
Core	2.00
Supporting legs	1.50
ATLAS CW POWER TRANSFORMERS	
200 Watt, Secondary 350 and 550 Volts, Filament Winding 12 Volts Variable	
Mounted	\$19.00
Semi-mounted	17.00
Unmounted	15.00
Parts for same—	
Complete windings	12.00
Core	3.00
Supporting legs	2.00
Panel and binding posts	2.00
ATLAS FILAMENT HEATING TRANSFORMERS	
75 Watt, Filament Voltage 8-10	
Mounted	\$11.00
Semi-mounted	10.00
Unmounted	8.50
Parts for same—	
Complete windings	5.00
Core	3.50
Supporting legs	1.50
Panel and binding posts	1.00
ATLAS CW POWER TRANSFORMERS	
50 Watt, Secondary 375 Volts, Filament Winding, 10 V. Variable	
Mounted	\$14.00
Semi-mounted	13.00
Unmounted	11.00
Parts for same—	
Complete windings	9.00

Core	2.00
Supporting legs	2.00
Panel and binding posts	1.00
ATLAS CW TUNING INDUCTANCES	
6 Inch Formica Tubes No. 8 Enameled Wire	
25 turn inductance	\$ 8.00
30 turn inductance	9.00
35 turn inductance	10.00
ATLAS MODULATION TRANSFORMERS	
Mounted	\$ 5.00
Semi-mounted	4.00
Unmounted	3.50
Parts for same—	
Primary and secondary	2.50
Core	1.00
Four supporting legs .....	.50
Panel and binding posts	1.00
ATLAS FILAMENT HEATING TRANSFORMERS	
150 Watt Filament Voltage 10-12	
Mounted	\$16.00
Semi-mounted	14.00
Unmounted	12.00
Parts for same—	
Complete windings	8.00
Core	4.00
Supporting legs	2.00
Panel and binding posts	2.00
ATLAS CW CHOKE COILS	
1½ Henry 150 M.A.	
Double, semi-mounted	\$ 5.50
Single, semi-mounted	4.00
Double, unmounted	4.50
Single, unmounted	3.00
Parts for same—	
Coils, each	1.50
Core	1.50
Supporting legs	1.00
ATLAS RECEIVING AND POWER TUBE RHEOSTATS	
6 ohm 1.5 ampere for receiving tubes	\$ 1.00
6 ohm 7 ampere for 5 to 50 watt power tubes	2.00
4 ohm 16 ampere for 50 to 250 watt power tubes	5.00
ATLAS SPECIAL RHEOSTATS FOR CONSTANT VOLTAGE CONTROL OF POWER TUBES	
50 ohm 3 ampere at 110 volts for primary control of 5 watt power tubes	\$ 5.00
50 ohm 7 ampere at 110 volts for primary control of 50 watt power tubes	10.00
50 ohm 15 ampere at 110 volts for primary control of 250 watt power tubes	15.00
Prices quoted on other sizes on request.	
ATLAS DX-52 SUPER OSCILLATION TRANSFORMER, \$25.00	

Special sorted, tested and guaranteed Vacuum Tubes, all makes, at list prices.

Amateurs: Send 10 cents for Atlas Catalogue.
Dealers: Send for Catalogue and Discount Schedule.

The American Radio Sales & Service Co. MANSFIELD, OHIO U. S. A.

C. W. NEWSLETS

(Concluded from Page 171)

New members of the C. W. Club of California include 7RV, W. Morton, 6523 45th avenue, S. E., Portland, Ore., whose schedule is 11:10 p. m. Tuesday, Thursday and Saturday; 6AQT, M. Graham, 6784 Hollywood boulevard, Hollywood, Calif., wave length 202 meters, schedule 11:10 p. m. Monday, Wednesday and Friday, and 6ZAF, Allen H. Babcock, 2227 Piedmont avenue, Berkeley, Calif., wave length 375 meters, schedule not yet assigned.

Plans are in mind to enlarge the C. W. Club of California to the C. W. Club of America, due to requests from district C. W. workers, the increasing range of C. W. work and the greater scope of Radio. What think you Eastern men of the idea? Definite announcement will be made in an early issue.

Radio 6XN asks that his wave length be listed at 240.

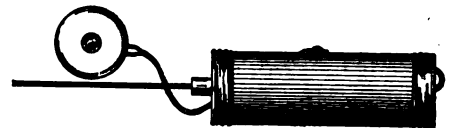
SKINDERVIKEN TRANSMITTER BUTTON



This famous button made in several styles for experimenters and wireless men. Super-sensitive style for detectophone work. Sends piano, violin and victrola music thruout the house. Common battery style for wireless telephone and amplifier use. Capable of passing a greater amperage than most transmitters. Price with complete instructions for use, \$1.00.

complete instructions for use, \$1.00.

The Wonderful Mechanical Stethoscope

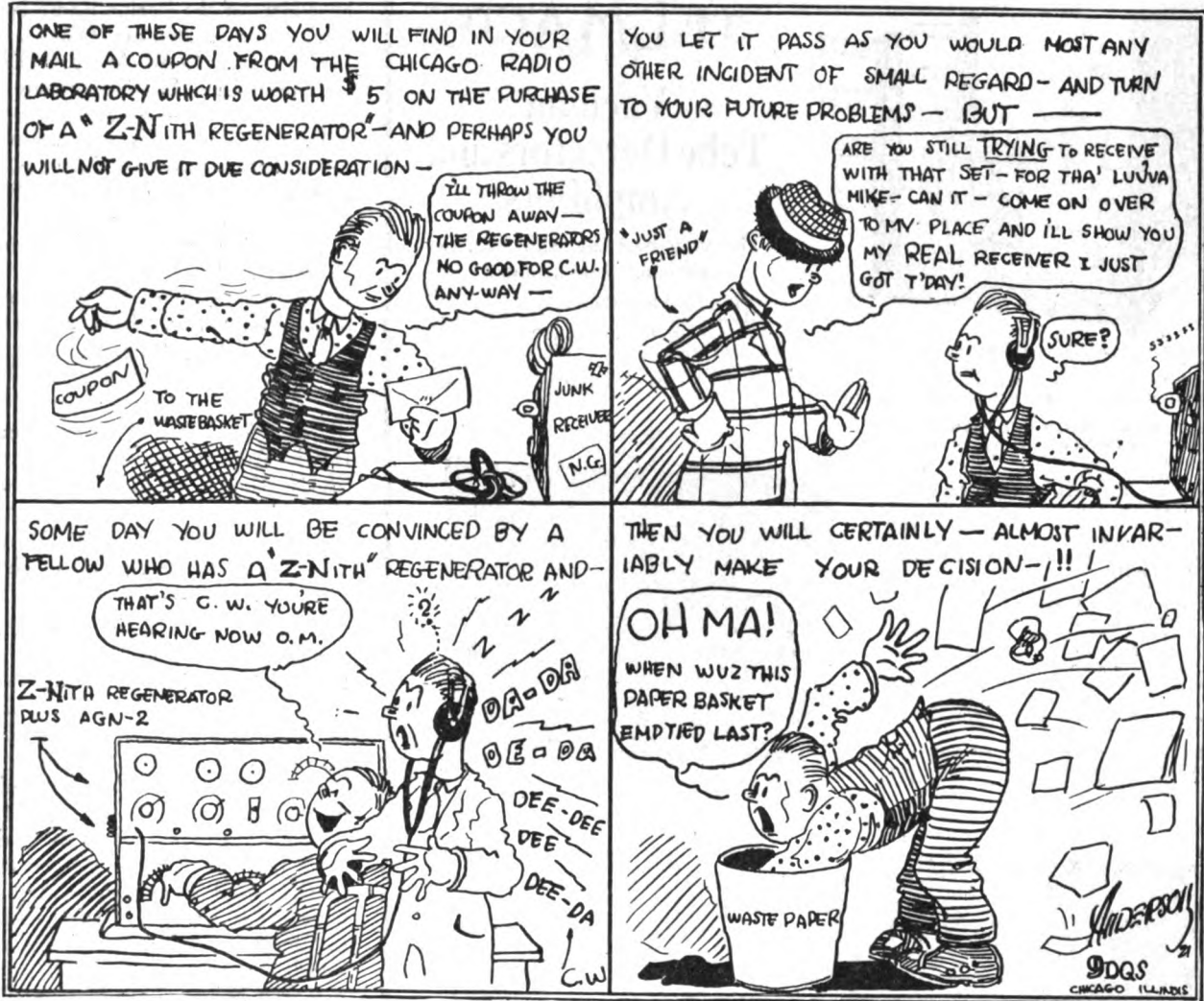


enables you to detect instantly any knock, loose parts or other trouble in auto engines which causes destruction and heavy expense, unless attended to at once. Auto Mechanics everywhere depend upon the Stethoscope for *inside information*. The Mechanical Stethoscope with authoritative Sound Chart offered to you on a money-back guarantee for only \$7.50 by mail, postpaid. Send for literature and letters of approval without obligation.

EXPERT TESTIMONY

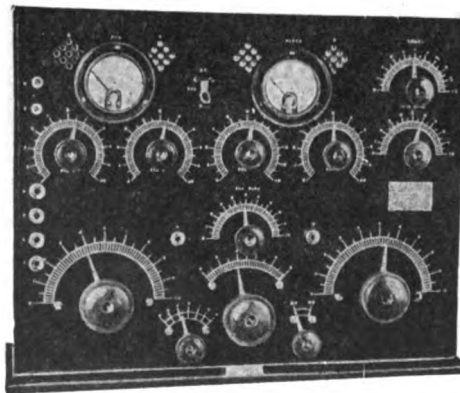
"IN my 18 years of using broom handles, screw drivers and other handy things to locate sounds with. I have never had anything that could beat the Stethoscope. If I could not get another, \$100.00 would not buy mine."
(From an automobile expert, name on request)

General Sound Transmission Corporation
114 LIBERTY ST., NEW YORK.
Dealers and Agents Wanted. Write for Literature.



QRX Fellows—Here's Your Chance to Save Five Dollars on a Real C. W. Receiver

BEST for SPARK



BEST for C. W.

To be useful in a modern radio station, a receiver must be equally satisfactory for the reception of spark and C. W. signals. A set designed to respond to either alone does not meet the needs of an up-to-date DX traffic station.

The new, improved Z-Nith Regenerator, with a range of 180-1000 meters, 180 coupling, variometers with balanced inductance and many other exclusive features, will

enable you to handle traffic with spark, C. W. and radiophone stations at will. In order to boom fall business, we are sending, without charge, a coupon, good for \$5.00 on the purchase of one of these wonderful new Regenerators to every person on our mailing list. If we don't have your name, and you want to take advantage of this unprecedented* offer—

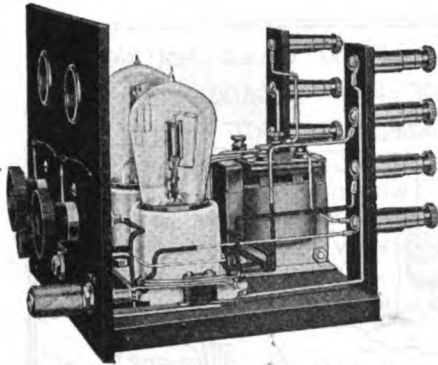
Z-Nith Regenerator

Write Us Now!

Chicago Radio Laboratory

6433 Ravenswood Avenue, Chicago, Illinois

Say Radio to the Advertiser, it will help you.



Vacuum Tube Detectors and Amplifiers

The very best that skill and experience can produce

THE CABINETS are constructed of selected quarter sawed oak; stained inside and out; waxed and finished. PANELS are of grade M $\frac{1}{8}$ in. Formica, $\frac{6}{8}$ in. high; grained finish. They are attached to drawer shelf, permitting complete assembly to be instantly removed and used without cabinet, if desired. FILAMENT CONTROL RHEOSTATS are of approved type.

TELMACO SPECIAL BINDING POST CONSTRUCTION, is used throughout, entirely eliminating all wiring from the front of the panel. AMPLIFYING TRANSFORMERS are of new type, designed to operate with maximum efficiency with the new type tubes. We furnish them FULLY MOUNTED.

The GRID CONDENSER and VARIABLE LEAK are wired in the detector circuit, the latter on the front of panel. SOCKETS are of high grade construction to fit tubes having standard four prong bases. LETTERING on panel is pantograph machine engraved and filled with best grade of white enamel.

FULL AUTOMATIC CONTROL JACKS are wired into these amplifiers. RADIO PLUG is furnished with the above.



PRICES

- Type TD-1, Telmaco Vacuum Tube Detector Unit, \$15.00
- Type TDA-1 Telmaco Detector and Single Stage Amplifier Unit 35.00
- Type TA-2 Telmaco Two-Stage Amplifier 40.00
- Type TDA-2 Telmaco Detector and Two-Stage Amplifiers 45.00

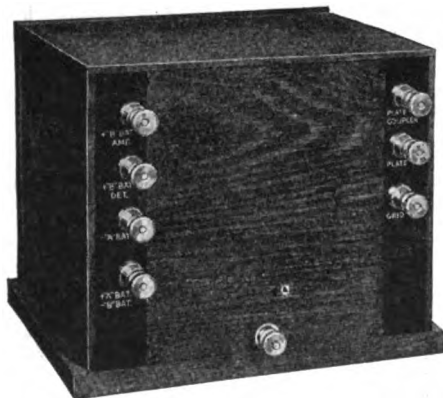
Order Direct From This Ad

Satisfaction guaranteed always or money refunded. Send for our complete new catalog, "P." You'll find it interesting; it describes everything in Radio.

Your panels engraved with our GORTON ENGRAVER. Price, 5 cents per letter. Minimum charge, \$2.00.

Radio Division

Telephone Maintenance Co.
17 N. La Salle St., Chicago, Ill.



DEALERS! We are distributors for nearly all Standard Lines. Write for our Special Proposition.

LETTERS TO THE EDITOR

Dear Sir: Will you kindly state in the next issue of the Pacific Radio News that 6GR is now located at: 6GR—.

EDW. ANDERSON,

1420 26th St., Sacramento, Calif.

Dear Editor: I would appreciate it very much to have my change of address placed in your magazine: "6AQU has moved his station from 117 West 45th St., Los Angeles, to 1937 Haste St., Berkeley." Have been reading the P. R. N. for a long time and it keeps getting better and better. Best magazine yet.

Very truly,

H. BECKER.

Dear Sirs: In looking over your Sixth District Amateur Stations I find you have 6ATN, M. E. Stuart, which should read M. E. Smart. Kindly rectify the error.

MERLE EDISON SMART,

Motor Route A, Fallon, Nevada.

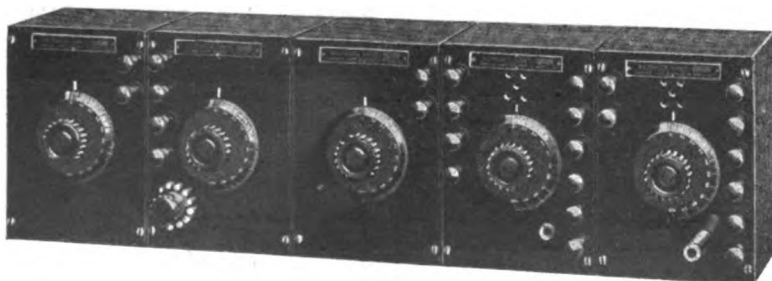
Dear Sir: I note in your October issue of Pacific Radio News there is an article written by Mr. Schuwendt describing the construction of a small C. W. Radio set, wherein he writes, "from which can be seen that the circuit used is the familiar Colpitts with grid method of modulation."

While the writer does not claim very great results, when this method of modulation is used, he most certainly objects to have the entire credit go to someone who did not first produce the circuit as drawn by Mr. Schuwendt on page 87.

If Mr. Schuwendt will carefully analyze Mr. Colpitt's circuit and then compare it with Logwood's circuit, he will note a similarity in grid modulation, but will not see much resemblance in the rest of the two circuits.

In the first place, Mr. Colpitt's circuit is an inductive feed back arrangement, while the Logwood circuit is a capacity coupled. In Mr. Colpitt's circuit he makes use of a C battery in the grid circuit, while in the Logwood circuit the grid leak is in series with the secondary of the

Service Radio Equipment



Service Unit Receiver

SERVICE equipment fills the needs of every Amateur. Built into each instrument is the care and precision that will insure perfect operation and long life. And to back this statement is a guarantee that absolutely protects the purchaser. Send for our bulletins now and let your next order be for SERVICE EQUIPMENT. Register on our mailing list and keep informed of the latest in radio development.

We have three ideals—

The first is SERVICE—so are the other TWO

SERVICE RADIO EQUIPMENT

Box 340 Central Sta.

Toledo, Ohio

Say Radio to the Advertiser, it will help you.

modulation transformer. Further inspection of the two circuits the H. F. oscillations are fed to the antenna through an oscillation transformer in the Colpitt circuit, while it is connected directly to the antenna in the Logwood circuit.

It was the idea of the writer to produce a circuit that did away with the well known four tuned circuit and be free from patent interference. To do this meant a single open radiating circuit, and the simplicity of the circuit devised by the writer is drawn out by Mr. Heising in the I. R. E. Proc., August, 1921. On pages 319 and 320 there is drawn the two circuits which are subject matter in this letter.

In a short time another patent will be issued to the writer which will show the filament earth connection erroneously left out in the patent already issued, which makes this circuit possible to oscillate efficiently. Very respectfully,

C. V. LOGWOOD,

Radio Engineer for the City of Chicago.

CUTTHROAT COMPETITION IN GENERAL PUBLIC BUSINESS

(Concluded from Page 174)

Special Extra Rush, San Francisco, Calif. Radio, Unga, Alaska:

During first two months of general public operation you handled 18,113 words of Bolshevik code correspondence. In accepting messages from a foreign radio station we become responsible for all forwarding charges that arise after we pass the traffic through our station. On this code the forwarding charges from Unga to Washington, D. C., totals thirty-six cents a word, to which we added our own six-cent tariff, and sent a bill for \$7607.46 to the Russian government. They wrote us a letter thanking us for handling their messages and enclosed a remittance of 14,916 rubles, which we have just sold as old paper for nine cents. Conferring with Great Alaskan Fisheries, we find our deficit account public operation of K-V-I will be about \$8100.00 greater than theirs. They probably have a much more intelligent operator than we, at any rate we are convinced we got enough of this public business stuff.

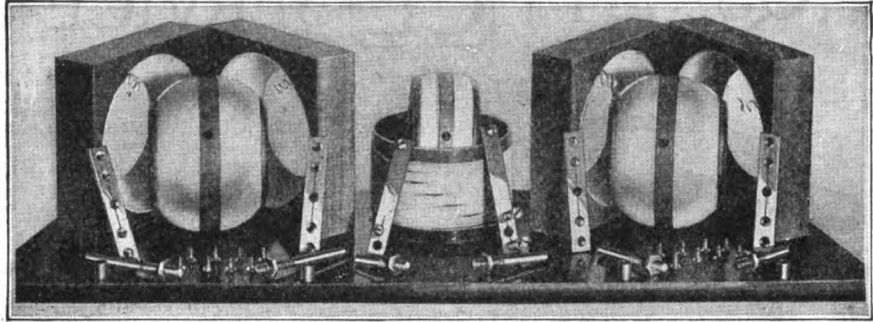
Your station has been returned to a limited commercial license. Do not accept any outside business from anybody under any circumstances or you will be immediately discharged. Alaskan Codfish Company.

Night Letter, Unga, Alaska.

Alaskan Codfish Company, San Francisco:

Ship immediately one thousand pounds each prunes and raisins, two tons each best quality barley and rye. Present stock completely exhausted account preparations for great peace celebration of Unga and Pirate Cove settlements. Also ship one hundred latest magazines for radio operator. Ed Hooley, Supt.

FAMOUS "CHI-RAD" K. D. VARIOMETER PARTS



All parts to build two variometers and one coupler. ALL WINDINGS IN PLACE—nothing to do but screw on bearings and connect up. Complete set can be assembled in 30 minutes. The biggest value on the market—order a set today. Immediate Delivery.

Price, complete as shown, \$10.00. Add PP on 6 lbs.

SPECIFICATIONS

Variometer forms 4 1/4 in. Sq., 3 in. wide when assembled. Coupler primary Bakelite 3 1/2 in. diam., 3 1/4 in. high. All shafts 1/4 in. diameter. 7 Primary Taps.

Range 150-475 meters. Special condenser to shunt secondary and increase range to 650 meters supplied for 35c extra.

Made specially for panel mounting—all screws covered by dials when assembled.

Immediate Delivery—Money Back Guarantee.

CAUTION

Due to the great popularity of "Chi-Rad" Variometer Parts they are being imitated. For your protection our name appears on every instrument. Accept no substitutes—insist on "Chi-Rad" Solid Mahogany Variometer Parts. Your dealer will get them for you. Dealers: Write for discounts on these Variometer parts. They will move fast and make you a handsome profit. We

are also jobbing all standard lines of Radio Apparatus. Why not buy all your Radio material from one, old reliable house and get full dealer's discount, plus "Immediate Delivery" from Chicago stock? Write for full information.

Chicago Amateurs: Come and inspect our new stock—largest and most complete in the Middle West.

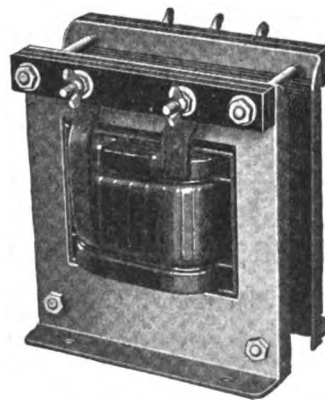
CHICAGO RADIO APPARATUS CO., Inc.

Phone: Harrison 1716

508 South Dearborn Street

CHICAGO, ILL.

Shell Type
Filament Transformers for C.W.



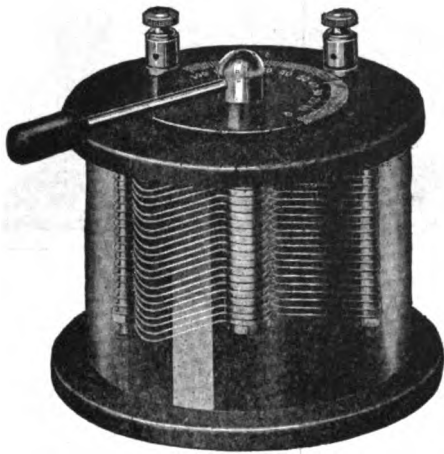
10 VOLT SEC., TAPPED AT CENTRE

1 or 2—50 Watt Tubes, Mounted.....	\$10.00
1 or 2—50 Watt Tubes, Unmounted.....	8.00
4 —50 Watt Tubes, Mounted.....	15.00
4 —50 Watt Tubes, Unmounted.....	12.00

Thordarson Electric Mfg. Co.

513 S. Jefferson Street, Chicago, Ill.

QUALITY **CE** SERVICE

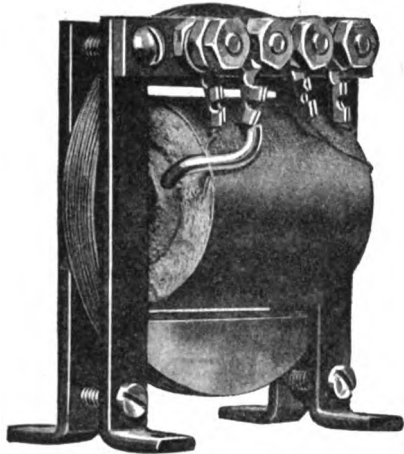


We don't say that C. E. apparatus is the only good radio equipment you can buy. But we do say that every piece of equipment in the C. E. line is made not just to sell but to serve.

For instance, when you buy this C. E. 43-Plate Rotary Variable Condenser for \$4.75 you know, of course, that you are not paying a high price for an instrument of this class. But you can be sure—because it is a C. E. product—that you are getting an instrument that will give you many times your money's worth in real satisfactory service. Note these quality features: Aluminum plates accurately punched with hardened dies

C. E. Rotary Variable Condenser.
 43-Plate, \$4.75.
 43-Plate, Unmounted, \$4.25.
 17-Plate, \$4.25.
 17-Plate, Unmounted, \$3.25.

—far superior to condensers with trouble making plates containing iron and steel. Both rotary and stationary plates are spaced with separators machined to an accuracy of one two-thousandth of an inch. The rotary plates are carried on a shaft made of finest tool steel mounted in a long, accurately machined brass bearing, insuring permanently accurate adjustment and long life. The entire Condenser is enclosed in a cylinder of the clearest and toughest flint glass and has a pressed metal base and a top of specially moulded insulating material highly polished. Readings are indicated on a black rotary dial with extension handle and sunken silver numerals and scale. Made in two sizes, respectively, equipped with 43 and 17 plates. The capacity of the 43-Plate Condenser approximately .0008 M. F. and of the 17-Plate Condenser approximately .0003 M. F. The fine workmanship and superior materials put into this C. E. Condenser are apparent in its handsome appearance and efficient service. Yet it costs no more than many inferior condensers. We have never departed from our high standard to meet a price and will continue to supply our condensers, as in the past, with accurately machined individual separators, aluminum plates and all the other quality features which distinguish them. Lower manufacturing costs, however, enable us to offer this C. E. Rotary Variable Condenser at the new low prices quoted below.



C. E. Amplifier Coll. Type Q. O.
 Mounted, \$6.50.
 Unmounted, \$4.00.

Then there is this C. E. Type Q. O. Amplifier Coil—a thoroughly practical, high grade audio frequency, iron core transformer capable of increasing the strength of signals to many times their original intensity. Specially designed for use with vacuum tube detectors. By using two or more of these coils, with as many amplifying tubes, a multi-stage amplifier may be made, securing still greater amplification. Supplied mounted, with panel, as illustrated, or unmounted complete with feet but without panel.

Send 6 cents for the C. E. Catalog showing our full line of radio equipment—Hytone Transmitting Sets, Oscillation Transformer, Regenerative Receiving Sets, Radio Telephone Receiving Sets, Two Stage Amplifier, Wavemeters, Tesla Coils, Spark Dischargers, Keys, Instruments, etc., etc.

CLAPP-EASTHAM COMPANY

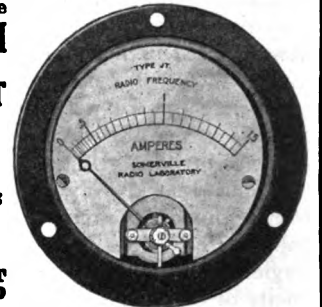
RADIO ENGINEERS and MANUFACTURERS

140 Main Street, Cambridge, Mass.

California Representative: LEO J. MEYBERG CO.
 San Francisco and Los Angeles

Know the **TRUTH**
 Use a **TYPE JT**

Thermo-Junction Radiation Ammeter
 0-1½, 0-3
 0-5, 0-10 Amp. Ranges
\$12 POST PAID



Generous size—¾ in. diam. Extremely accurate and rugged movement. Jewelled bearings. Supersensitive Thermo-Couple. No zero adjustment necessary.

Double the life of your UV 202 by using our now famous Type JX 0-15 A. C. Voltmeter. Jewelled bearings. Magnetic vane movement. Matches the TYPE JT ¾-in. diam.

(Also available) (in 0-10 Amperes), \$3.00 Postpaid.

Somerville Radio Laboratory
 New Address 178 Washington Street
 BOSTON, MASS.

THE PRESIDIO STATION

(Continued from Page 144)

responsible for these improvements are well known to the radio fraternity.

In conclusion I might give a description of our set and antenna system. The antenna system is composed of a "T" type antenna 80 feet long, 4 wires spaced 3 feet apart; both ends open and insulated from the spreader. This is by no means ideal and we expect to make some slight changes in the near future. The lead-in is 65 feet long and is rat-tailed down to the lead-in insulator. The counterpoise system is composed of 16 wires spaced 1 foot apart, placed directly under the antenna and raised 3 feet off the ground, and is well insulated from ground. The set used is a plain two-tube transmitter, using one as an oscillator in a Colpitt circuit and the other as a modulator in the Heising circuit, the tubes being the Western Electric VT-2. The two transmitting tube filaments draw 3 amperes and operates on a plate current of 90 to 110 milliampers, and the normal radiation is .8 ampere. The power supply of the set is a 28-watt dynamotor, Westinghouse make, the motor side of which is run by a 12-volt storage battery, this same storage battery operates the send-receive relay, the microphone and lights the filaments of both transmitting and receiving tubes. The generator side of the dynamotor furnishes the plate potential, about 350 to 450 volts.

PACIFIC RADIO TRADE ASSOCIATION

Organization of the Pacific Radio Trade Association has been accomplished at San Francisco and Los Angeles, with A. H. Halloran as president, Ellery B. Stone as vice president, representing Northern California and Nevada; A. J. Edgcomb as vice president representing Southern California and Arizona; Max

Do You Need a Vacuum Tube?

We will send you one free of charge if you secure 3 yearly subscriptions to "RADIO." You can have your choice of any standard receiving tube. Send \$6.00, the 3 subscriptions, and 25 cents for mailing the tube.

RADIO, 465 Pacific Building, San Francisco, Calif.



SPECIAL OFFER SEIBT PHONES
 Unequaled opportunity. Special purchase cut price to unheard-of figure. We pass the savings on to you. World famous Seibt Phones—the invention of Dr. Seibt, builder of Seibt Precision Instruments—were \$12.75.
 \$7.75
 Equipped with Firco No. 34B, round type, "Bull-Dog-Grip" Plug, for only \$9.25
 Nearest Firco dealer can supply you.

Wouldn't You Like to Own this Station?

TUNER, detector and 6-step amplifier for \$115.00! Real quality at a new low price level—so arranged that you can invest a little at a time and yet get results right from the start.

That's what you get in Firco Midget Sets. You can start with just the Firco Tuner (150 to 1000 meters) for \$15.00 and the Firco Detector for \$11.00. You'll get results at once, better than you ever expected. Then you can add a little at a time till you get a powerful station like the one shown here.

Or, hook Firco Midget Audion Sets on to your present receiving apparatus. But to preserve neat appearance and insure smooth operation, use Firco Audion Sets thruout. Then you're sure of results, because they're made to work together.

Read the price list below. Go to your radio dealer and let the sets speak of their quality for themselves. Then resolve to put every cent you invest in radio from now on into Firco apparatus—where you get the most for your money.

Note: Six steps of amplification are made entirely practical, without howling or squealing, by the use of Firco Saco-Clad transformers. Saco-Clad 100% shielded amplifying transformers are also sold separately, in individual cartons, for \$5.00.

Hook a Vocaloud onto any amplifying combination of Firco Sets, or other apparatus, and get your sig-

nals QSA all over your house. No batteries, no adjustments, no extras. Station type (shown above) in solid mahogany cabinets, \$30.00.

Pick up the weak signals with Seibt or Brown phones, also sold by Firco dealers under the Firco trademark. At the new low prices, Brown super-sensitive, imported Phones are an unheard-of bargain.

John Firth & Company, Inc., 18 Broadway, New York



FIRCO MIDGET RADIO SETS

- Tuner, 35A... \$15.00
- Detector, 36A.. 11.00
- Detector and One-step Amplifier, 37A.. 24.00
- Detector and Two-step Amplifier, 38A 40.00
- One-step Amplifier, 39A.. 18.00
- Two-Step Amplifier. 40A.. 30.00

BROWN PHONES

- Type A, Adjustable; was \$22.00, now.. \$18.00
- Type D, for Radio work; was \$20.00, now 16.00

FIRCO RADIO

MIDGET RECEIVING SETS

"Pioneers—since 1901"

Say Radio to the Advertiser, it will help you.

TRADE **ESCO** MARK

GENERATORS—MOTOR-GENERATORS—DYNAMOTORS



4 to 32 Volts for Filament—350 to 2000 Volts for Plate.
Capacity 20 to 2000 Watts—Liberal Ratings.
Write for Bulletin 237, which lists over 200 Combinations.

**MOTORS AND GENERATORS DEVELOPED
FOR SPECIAL PURPOSES**
PIONEERS IN MANUFACTURING
High Voltage Direct Current Radio Generators

Electric Specialty Co.

STAMFORD, CONN., U. S. A.
217 South Street



Loewenthal as secretary treasurer; Hall Berringer as secretary at Los Angeles, and E. T. Cunningham, Colin B. Kennedy and A. F. Pendleton as directors. Enthusiastic and well attended meetings have been held at both Los Angeles and San Francisco, constitution and by-laws adopted and committees appointed.

The District I committees are as follows:

Program Committee

D. E. Lyon, chairman; E. Portal, J. F. Dillon, L. Ets-Hoskin, C. B. Nelson.

Membership Committee

H. C. Hopkins, chairman; H. W. Dickow, S. Warner, C. Hassler, Tom Lambert, San Jose.

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"ILLINOIS" THE RELIABLE
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Three Styles; No. 1, Panel; No. 2, Open Type as shown; No. 3, Fully Encased. Anti Profiteer. Less than pre-war prices. Fully assembled and tested.

	Style No.1	No.2	No.3
67 Plates,	\$7.00	\$8.00	\$8.50
43 "	3.50	4.50	4.75
23 "	2.75	3.75	4.00
13 "	2.25	3.25	3.50

Money back if not satisfied. Just return condenser within 10 days by insured Parcel Post.

Options:—With Style No. 1—Instead of Scale and Pointer, a 3. inch Metal Dial at 50 cents extra, or a 3. inch Bakelite Dial at \$1.00 extra. Large Knobs. Both excellent values. Or we will, if desired, supply the Condenser with smooth 3-16 inch center staff, without Scale, Knob and Pointer, at 15 cents off the list to those who prefer to supply their own dial. Vernier with single movable plate applied to 13, 23 or 43 plate condenser, \$3.00 extra.

We allow no discounts except 5 per cent on orders of 6 or more.

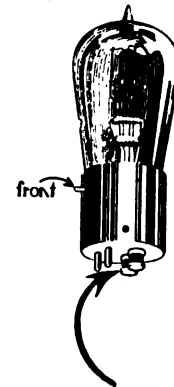
Sent Prepaid on Receipt of Price
Except: Pacific States, Alaska, Hawaii, Philippines and Canal Zone add 10c. Canada add 25c.
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**Make Your Tubes
"Burnout" Proof**

This tiny fuse, slipped directly on filament terminals of any standard bulb, protects your tube against burning out.

**RADECO
SAFETY FUSE**
(Patent pending)



NOW, while your tube is in perfect condition, pin one dollar to this advertisement and be guarded against all future vacuum tube expense.

RADECO Safety Fuses come in ¼, 1, 1½, 2, 2½ and 3 amp. sizes. Slip directly on filament terminals of any standard bulb. Used in **\$1.00** any standard socket. **FOUR FOR...**



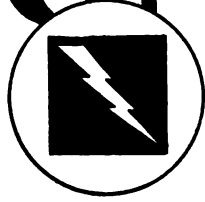
We carry complete stock of all radio apparatus. Order from any Standard catalog.

MAIL ORDERS
Be sure and specify the size or sizes when ordering by mail.

Radio Equipment Co.

630 WASHINGTON STREET,
Boston, Mass.

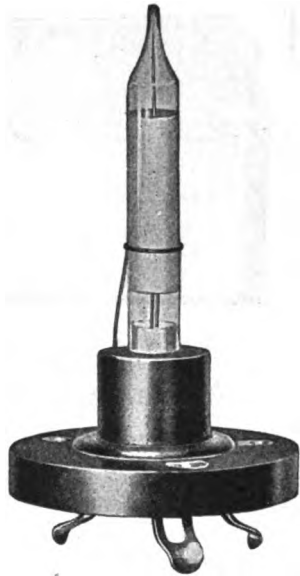
CONNECTICUT RADIO



The New Electron Tube

Detector and Self Amplifier

(Fully protected by patents in the principal countries throughout the world)



This Tube, the Sensation of the Chicago Radio Show, is new in principle and in operation. Hence it offers these notable advantages:

- No B Batteries
- No Tickler
- No Grid Leaks
- No Filament Adjustment
- High Selectivity
- Extreme Sensitiveness
- (Equal to one stage of amplification)

- Much Longer Life
- Uniformity of Tubes
- (All equally good)

It represents the result of over four years' exhaustive research, the study of nearly 2000 tubes, with complete records of the characteristics of each one. It has had thorough tests in our own research laboratories, and months of continuous operating use.

Only after gaining this full knowledge of its characteristics, its remarkable possibilities, and its practical usefulness, are we ready to offer it to radio workers as a forward step in a great field.

Made up in the complete CONNECTICUT Detector Set at \$35.00; Detector Unit alone, \$12.00; Tubes (for replacement), \$3.50.

We shall be glad to furnish you with further information on request. Or ask your dealer to show you the set.

CONNECTICUT TELEPHONE & ELECTRIC COMPANY
Meriden Connecticut

80 Britannia Street

Say Radio to the Advertiser, it will help you.

Dealers and Amateurs Have You Our Proposition?

What is more unpleasant and aggravating than an ill-fitting Battery? Make up your mind once and for all, you will have a battery that will satisfy you and your followers, a battery that does not corrode before the time expires, a battery that has proven to outlast any other make on market. Make up your mind that this time you will buy a battery that follows the lines of your outfit, that from the very day you connect your wires to the battery it will increase your service and stand up to its test.

SAB-IS-CO batteries combines the three features that you have been looking for—Battery, Guarantee and Price. Our variable battery observe so closely the posts that economize and give you the full value for the money.

For the SAB-IS-CO battery, whether variable or plain, large or small, are made of the very best and highest grade material that science can produce. Select your styles and order them by number, as follows:

- No. 923 Small, plain\$1.25 each
- No. 923 Small, variable 2.00 each
- No. 925 Large, variable 3.50 each
- No. 925 Large, plain 2.10 each

Dealers, have you our proposition?—Send for your discounts.

Amateurs, if you cannot obtain a SAB-IS-CO battery from your dealer, write direct to us for your discounts, and we will send you free of parcel post charge. Your money will be refunded if found not satisfactory. Mention your dealer's name when ordering.

Watch for our advertisement in the November issue

J. H. SABINSKY & CO.

640 Broadway - - - - - New York City

BAKELITE-DILECTO

The standard insulating material for all radio work. Water-proof, permanent, strong, used by all important manufacturers of wireless apparatus and others requiring the utmost in insulation.

Furnished in sheets, rods and tubes.

We also manufacture VULCANIZED FIBRE in sheets, rods and tubes and CONITE, a special insulation, in sheets or rolls, from .005" to .020" thick.

Let us show how our standard products can be made to solve your insulation problems. Pacific Coast dealers carry a full stock of Bakelite-Dilecto, Vulcanized Fibre, Continental-Bakelite and Conite.

THE CONTINENTAL FIBRE CO.

NEWARK, DELAWARE

DUCOMMUN HARDWARE CO., 219 Central Ave., Los Angeles, Cal.
CALIFORNIA ELECTRIC SUPPLY CO., 643 Mission St., San Francisco

233 Broadway, New York City 332 S. Michigan Ave., Chicago, Ill.
525 Market St., San Francisco, Cal. 411 S. Main St., Los Angeles, Cal.
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Write for Our Price List

Regenerative Sets,
Audion Bulbs for every purpose,
Special Antenna Wire,
Insulators, Dials, Variometers,
Condensers of every kind,
Radio Magnavox, Amplifiers and Parts.

1014 Sixth



Sacramento

STATIC STATISTICS

(Continued from Page 150)

cert every night. The Northwestern Radio Manufacturing Company (7XF) is giving us the latest jazz every night from 8 to 8:30 p. m. The records are furnished by the Remic Song Shop of this city, which makes it possible for the latest to be available at all times.

As 7ZB had just returned from a trip to Tacoma and Seattle you no doubt will understand that he was all filled up on theory and had to inform 7ZT and 7ED of some of his findings and conclusions arrived at through 15 minutes of scientific study and consultation with 7BK.

BANG

Smashing "B" Battery Prices
"WIZARD"



From Manufacturer to User All Batteries Sent Postpaid

Announcing:

Wizard's 2 new improved type "B" Batteries

- No. 1632, 1 Tap, 45 Volt Variable Battery. Size 6 in. x 5 in. x 2-38 in. Price \$2.80. Weight 3 3/4 lbs.
- No. 1630, 6 Taps, 27 Volt Variable Battery. Size 6 x 3 x 2-38 in. Price \$1.80. Weight 2 1/4 lbs.

These new types are not made of the same size cells as a small size "B" Battery. The volume of a cell used in these types is 4.7 cubic inches, as compared with 2.5 cubic inches, the volume of a cell used in the small "B's".

You can easily see that the life of these two types are almost double the life of the small "B's".

No. 1632 has one tap at 22 1/2 volts.

These prices seem unbelievable, as do all other "WIZARD" prices, but are made possible only by dealing direct with the consumer.

Thousands are realizing the money that can be saved in the course of one year by purchasing from "WIZARD." Always remember we pay all P. P. charges. Write for Bulletin No. 6. Other "WIZARD" types:

Cat. No.	Size	Taps	Volts	Wt. lb.	Price
1623 Plain	3 3/4 x 2 1/4 x 2	2	22 1/2	1	\$1.00
1623 Variable	3 3/4 x 2 1/4 x 2	5	22 1/2	1	1.20
1625 Plain	6 3/4 x 4	x3	22 1/2	5	1.85
1625 Variable	6 3/4 x 4	x3	5	22 1/2	5 2.25
1626 Plain	6 3/4 x 8	x3	45	10	3.75
1626 Variable	6 3/4 x 8	x3	6	45	10 4.15

Send all money orders to

Wizard Battery Co.

1315 42nd St. Brooklyn, N. Y. Dept. R

A DEPENDABLE RADIO TELEPHONE

For the Amateur

Here is the Complete Circuit—it Works—

Look over our New Catalog, Select the Necessary Apparatus and Order it from your Nearest Dealer

Radiotron Transmission combined with Kenotron Rectification and Magnetic Modulation constitutes the ideal amateur set

ANTENNA SERIES CONDENSER UC-1015 Price \$5.40	OSCILLATION TRANSFORMER UL-1008 Price \$11.00	TRANSMITTER GRID LEAK UP-1719 Price \$1.10	GRID CONDENSER UC-1014 Price \$2.00	RADIOTRON POWER TUBES UV-232 5 watt output Price \$8.00 (One or two may be used)
MAGNETIC MODULATOR UP-1346 Price \$9.50	Fig. 1-A 100 5 to 115 volts 50-60 cycles			BLOCKING CONDENSER UC-1014 Price \$2.00
ANTENNA AMMETER UM-530 Price \$6.00				KENOTRON Rectifier Tubes UV-216 Price \$7.50 each
FILTER REACTOR UP-1626 Price \$11.50	POWER TRANSFORMER UP-1368 Price \$25.00	FILTER CONDENSER UC-1631 Price \$1.35	FILTER CONDENSER UC-1632 Price \$1.35	RADIO FREQUENCY CHOKE See page 15 of our catalog for complete how-to-make-it instructions.

The above circuit diagram is but one of many appearing in our new Catalog where the necessary apparatus for each circuit is clearly and accurately described. By following the advice given therein and purchasing the leading items listed, the amateur is assured of the maximum efficiency at a minimum of power consumption. And remember, that the new Magnetic Modulator makes the operation of a radio telephone set exceedingly simple.

If you live in the United States and have not already secured your copy of our combined instruction book and catalog, send 25 cents today to

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Radio  **Corporation**
of America
 233 BROADWAY — NEW YORK CITY

Say Radio to the Advertiser, it will help you.

Service from Seattle

**INTELLIGENT - SPEEDY
RELIABLE**

Our stock includes practically everything the experimenter and amateur could need.

Our prices eliminate the necessity of buying elsewhere.

Our technical department still maintains its free consulting service. Write us when in need of information on anything connected with radio.

Send for our "Right-Price" List.

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Standard Amateur Radio Equipment

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ON SHIPBOARD
AT SHORE STATIONS
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—RADIO INSTITUTE— OF AMERICA

Conducted by the greatest and most experienced radio telegraph organization in the world.

Thorough training given in radio operating, traffic, and in damped and undamped systems.

Tuition ten dollars a month for either the day or evening sessions or both combined.

RADIO CORPORATION OF AMERICA
Phone Douglas 3030 331 New Call Bldg., San Francisco

THE NEW YORK ELECTRICAL SHOW AND THE PART PLAYED BY RADIO

At the New York Electrical Show, from September 28 to October 8, the Radio Corporation of America was one of the most important exhibitors, with exhibits of transoceanic radio communication, marine radio communication and radio sales. One of the features of the exhibit was a 100-watt, C.W. and radio telephone, self-rectifying set, employing Kenotron rectifier tubes and the new magnetic modulator placed on an operating table in such a manner that every piece of apparatus was clearly shown and connected by colored wires. A 10-20 watt C.W. and phone set, using D.C. on plate, was also in operating order on this table with the same unique manner of showing connections. Another important exhibit was the Radiotron and Kenotron exhibit, where every tube in the Radiotron and Kenotron family was shown. Other important apparatus was a Klinschmidt automatic tape perforator and tape recorder as used by the Radio Corporation in its high power transoceanic services when radiograms from Europe and other countries are inscribed on tape in a correct and accurate manner.

Assemble Your Own Apparatus

We are now manufacturing Radio Apparatus of improved designs, and furnish stock parts for those who desire to build their own cabinets. These prices can not be beat.

COMPARE THESE PRICES

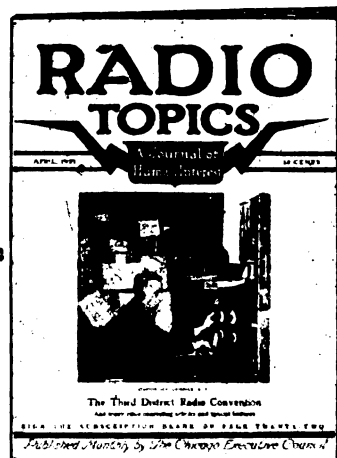
Triple Honeycomb Mounting (for panel mounting)	\$5.00
Variometer wood parts (unassembled and unmounted)	2.00
Miniature D. P. D. T. panel Switch	1.00
Vario-coupler Rotor .....	.50

"Paragon" equipment is not merely assembled - - - but BUILT.

Send 10 cents for Bulletin and future announcements.

PARAGON ELECTRIC CO.,
215 North 6th Street, H.

Newark, New Jersey



AMATEURS EVERYWHERE
are reading this national radio journal.

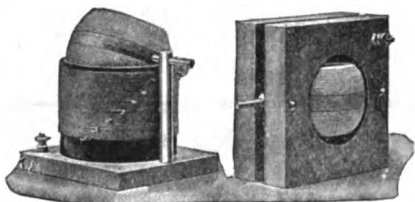
It is interesting and different. Each copy is worth the price of a year's subscription—One Dollar. Write today for Sample Copy

RADIO TOPICS
4533 N. Sawyer Ave., Chicago, Ill.

PLAN TO CONTROL WORLD'S WIRELESS

An international wireless company for the control and development of the greater part of the world's radio facilities has been organized at Paris by representatives of the wireless interests of Great Britain, France, Germany and the United States. The American delegation was headed by Owen D. Young, vice-president of the General Electric Company, and included Edward J. Nally and J. W. Elwood, president and secretary, respectively, of the Radio Corporation of America, and a large staff of experts. The Westinghouse interests also were represented. British interests were represented by Godfred Isaacs of the British Marconi Company; those of France by E. Tiradeau of the French Wireless Company, and those of Germany by C. Shapiro of the Telefunken Company. Radio facilities of the four countries will be pooled, but each country under the plan will retain control over its respective territory. It is thus hoped to eliminate great waste occasioned in the past by duplication of equipment by the different organizations, and at the same time to place at the disposal of the international company unlimited funds for an extensive program of development and research.

This conference followed the international radio congress, which recently ended two months' work in Paris and which recommended to all the governments represented greater use of wireless and closer co-operation between the big powers.



Variometers Couplers \$3.75

EACH

These instruments embody finest workmanship and best materials, all wooden parts genuine mahogany, coupler primary wound on formica tubing. Metal parts of brass. Wound for maximum results on short wave work. Will tune to 600 meters with small condenser. Shafts 3-16 in. With Chelsea Dial and Knob \$1 extra. Send for bulletin describing unwired regenerators and other apparatus.

FREDERICK WINKLER, Jr.

304 COLUMBUS AVENUE

New York, N. Y.

\$5 AUDION PANELS \$5

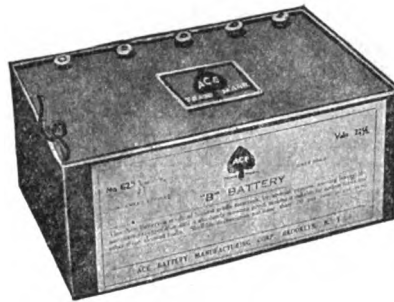
Panel is lettered, has grid leak and condenser, dial, posts for tickler, etc. Send 3c in stamps for enlarged lists and data.

50c for Audion Bulbs 50c
"ARK" RADIO SUPPLY
97 Hill St., Shelton, Ct. R.

LONGER LIFE
MORE THAN A TRADE MARK



BETTER SERVICE
A SIGN OF "B" BATTERY QUALITY



The new "Ace" # 627-45 Volt Variable "B" Battery is rapidly creating a remarkable reputation as to "Price," Quality, Service and Weight. The special size cell construction guarantees from 50% to 75% longer life than any 2 small size "B" Batteries. 16 Taps, 30 Voltage readings of from 1½ to 45 Volts obtained. Absolutely the best "B" Battery offer ever made. Size 6 in. x 5 in. x 2½ in. —weight, 3¾ lbs. Price, \$3.50. Demand "ACE." If your dealer does not carry "Ace" write to us. This list contains the six popular type "ACE" "B" Batteries.

Cat. No.	Plain	Size	Voltage	Lbs.	Taps	Price
623	Plain	2½ x 2 x 3%	22½	1		\$1.50
623	Variable	2½ x 2 x 3%	22½	1	5	1.75
625	Plain	3 x 4 x 6%	22½	5		2.50
625	Variable	3 x 4 x 6%	22½	5	5	3.00
626	Plain	3 x 8 x 6%	45	10		5.00
626	Variable	3 x 8 x 6%	45	10	6	6.00



Write for Cat. # 20. Ace Batteries are silent, moisture proof and absolutely guaranteed. DEALERS—Get in on this fast selling item.

264 Atlantic Ave. ACE BATTERY MFG. CORP. Brooklyn, N. Y.

10c Charges Your Battery AT HOME WITH AN F-F Battery Booster



and your Wireless Station will never be closed because of a discharged battery. Is it not gratifying to feel that your filament Storage Battery will always be ready when you want it and that you will never have to give up in disgust when working a distant station? The F-F Battery Booster is a Charging Apparatus, unflinching in its ability to deliver service day and night; is rugged, foolproof and requires no skill to operate; charging automatically and operates unattended. Screw the Plug into a lamp socket, snap clips on battery terminals and watch the gravity come up. Ammeter shows amount of current flowing. Everything Complete in One Compact, Self-Contained, portable Unit. The F-F Battery Booster is a Magnetic Rectifier for 105 to 125 Volt 60 Cycle Alternating Current. New Models at Pre-War Prices:

- Bantam Type 6 charges 6 Volt Battery, at 6 Amperes.....\$15
- Bantam Type 12 charges 12 Volt Battery, at 5 Amperes..... 15
- Type 166 charges 6 Volt Battery, at 12 Amperes..... 24
- Type 1612 charges 12 Volt Battery, at 7 Amperes..... 24
- Type 1626 Combination Type charges both 6 Volt and 12 Volt Batteries at 12 and 7 Amperes..... 36

The larger ampere capacity Types are recommended for the larger batteries, or where time is limited. Shipping weights, complete with Ammeter and Battery Clips, 12 to 15 lbs. Order from your Dealer, or send check for Prompt Express shipment. If via Parcel Post, have remittance include Postage and insurance charges, or have us ship C. O. D. Order Now, or Write for Free Descriptive Booster Bulletin No. 33.

THE FRANCE MFG. CO.

General Offices and Works: Cleveland Ohio, U. S. A.
Canadian Representative: Battery Service and Sales Company, Hamilton, Ontario, Canada.

"THE LARGEST RADIO CHAIN STORE SYSTEM IN THE WORLD"

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SORSINC PAYS THE POSTAGE
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TRY OUR MAIL ORDER SERVICE AND TEST ITS PROMPTNESS

And When You Need
a B Battery Try
A SORSINC



6400 Milliamper
Hours
Extra Long Life
For Reception
For Transmission
"The Largest B-
known"
\$4.00

RECOMMENDATIONS:

No. 30 Paragon Socket, condensite base.....	\$ 1.00
No. 120A Fada Rheostat, thermoplax.....	1.25
No. 110A Fada Series—parallel Switch.....	.75
No. 111A Fada Ser.—par. Switch with 8 contacts and 2 stops.....	1.00
No. 112A Fada Inductance Switch.....	.50
No. 113A Fada Ind. Sw. with 8 contacts and 2 stops.....	.75
No. 303 R-S Antenna Ammeter 0-2½.....	5.75
No. 156 General Radio Socket.....	1.50
No. UR-542 RCA Porcelain Socket.....	1.00
No. UV-712 RCA Amplifying Transformer.....	7.00
No. 226-W Federal Amplifying Transf.....	7.00
No. A-2 Acme Amplifying Transformer.....	5.00
No. 21A Saco Clad Amplifying Transf.....	5.00
Parts for DeForest CV-500 Var. Cond.....	3.00
Parts for DeForest CV-1003 Var. Cond.....	4.75
Parts for DeForest CV-1503 Var. Cond.....	5.05
No. UV-200 Radiotron Detector Tube.....	5.00
No. UV-201 Radiotron Amplifying Tube.....	6.50
No. UV-202 Radiotron 5 Watt Trans. Tube.....	8.00
No. UP-1718 RCA 5000 ohm Grid Leak.....	1.65
No. UP-1719 RCA 5000 ohm Grid Leak.....	1.10
No. PX-1638 RCA Rotary Grid Chopper.....	7.25
Acme 50 Watt CW Transf., Mounted.....	15.00
No. 300-W Federal Filter Coil 800 M-A.....	7.50
No. 311-W Federal Filament Transf. 200W.....	15.00
No. UC-1632 RCA 1 mfd. Filter Cond.....	1.85
No. UC-1631 RCA ½ mfd. Filter Cond.....	1.35
RCA C.W. Instruction Book.....	.25

DEALERS—We are Jobbing all the important lines.
Write to our nearest Office for our Proposition.

SHIP OWNERS RADIO SERVICE, Inc.

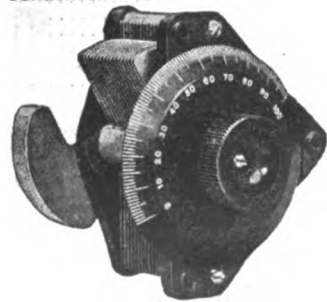
80 Washington Street, New York City

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CHELSEA Variable Condensers

Condenser No. 3



(Die-Cast Type)

No.	Capacity	Type	Size	Lbs.	Price
2	.0011 m. f.	Mounted	4½x4½x3¼	1½	\$5.00
2	.0006 m. f.	Mounted	4½x4½x2¾	1½	4.50
3	.0011 m. f.	With Dial	4½x3x4	2	4.75
3	.0011 m. f.	Without Dial	4½x3x4	2	4.35
4	.0006 m. f.	With Dial	4½x3x3¼	1½	4.25
4	.0006 m. f.	Without Dial	4½x3x3¼	1½	3.85

Top, bottom and knob are genuine bakelite, shaft of steel running in bronze bearings, adjustable tension on movable plates, large bakelite dial reading in hundredths, high capacity, amply separated and accurately spaced plates. Unmounted types will fit any panel and are equipped with counterweight.

Purchase from your dealer; if he does not carry it, send to us.

Bulletin upon request.

CHELSEA RADIO COMPANY

13 FIFTH STREET CHELSEA, MASS.
 Manufacturers of Radio Apparatus and Moulders of Bakelite

**NEW PACIFIC COAST TRAFFIC
 MANAGER TO BE APPOINTED**

The American Radio Relay League has requested Pacific Coast members to suggest names from whom to select a successor to A. E. Bessey as Pacific Coast district traffic manager. Pressure of other work has compelled Mr. Bessey to resign this position, but he continues as a director of the League. As the League notice did not reach Western members until Oct. 10th, action was to be taken on Oct. 15th. A request for delay was wired to Hartford, Conn., so that agreement might be reached locally before recommendations were made. Several excellent men are available—men of mature years, executive ability and a sympathetic understanding of the perplexing problems involved. The several radio clubs have their names under consideration and the indications are that the right man will accept this duty. The Pacific district has been divided so that hereafter Sebastian Ruth will care for the Northwest and Mr. Bessey's successor will look after California, Nevada and Arizona.

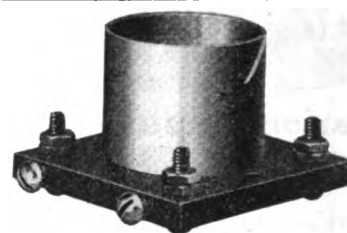
**The "QSA" Line of Equipment
 OUR CATALOG**

—is now ready. You can't afford to be without it. It lists the cream of radio apparatus made by the Leading Manufacturers. Each item a leader in its class, carefully selected by our expert. You will find it fills the gaps left by other catalogs. Generously illustrated. Don't do any buying until you see our catalog. You'll be glad we tipped you off. Sent for 10 cents in stamps or coin. This amount may be deducted from initial purchase amounting to 1.00 or more.

Send for it TODAY

INDEPENDENT RADIO SUPPLY CO.
 3716 W. Douglas Blvd. Dept. P-11
 Chicago, Ill.

"Better Results With Less Effort"



KEYSTONE V. T. SOCKET

Built to last—Formica base ¼ in. thick, 2¼ in. square, tube made of heavy gauge aluminum, with our new type locking notch. This socket can be mounted on base or on panel (screws furnished); springs are heavy phosphor bronze, and all metal parts nickel plated. Will fit all standard four prong tubes and by removing two screws, tube can be shifted to fit power tubes.

The best Socket made at the extreme low price of \$1.25 postpaid.

DEALERS: We have an attractive proposition for you.

Order from this adv. or send for literature.

KEYSTONE RADIO COMPANY

Manufacturers
 Drawer 307 Greenville, Penn.

BOY SCOUTS ENTERTAIN BY RADIO

On Oct. 3 the Boy Scouts of Oakland, Calif., entertained Oakland and hundreds of amateur radio operators in widely separated places with a wireless concert from the Fairmont Hotel, San Francisco. The receiving mechanism was operated by Boy Scouts, while the transmission was handled by the Leo J. Meyberg station on the roof of the Fairmont. Paul Steindorff took his entire sixty-piece orchestra to the Fairmont Hotel especially for the occasion, and his program was one of the most important radio demonstrations ever attempted in the west. Two songs were given by Miss Elfrida Steindorff and speeches in favor of the Boy Scout drive were delivered by Mayor James Rolph of San Francisco and Abe Leach, head of the committee which has the drive for funds in charge.

MINISTER PREACHES BY WIRELESS

An innovation in church services was introduced, Oct. 2, by Rev. H. A. Van Winkle, pastor of the First Christian Church of Oakland, Calif., who preached from the Hotel Oakland by wireless, not only to the members of his own congregation, but to thousands of others scattered for miles around on land and sea. Rev. Van Winkle sat in the hotel at a wireless telephone and preached his sermon into the receiver. Through the medium of the magnavox and wireless, thousands of listeners in different places heard his talk on "The More Efficient Way." The usual church music was also given over the radiophone by the choir. The Hotel Oakland Station is operated by P. D. Allen of the Western Radio School.

RADISCO

"Your Assurance of Satisfactory Performance"

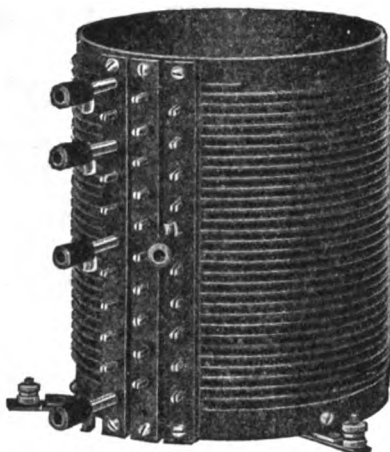
RADISCO COUPLERS, COILS, "B" BATTERIES, AND OTHER GOOD INSTRUMENTS ARE FOR SALE AT 28 RADISCO AGENCIES ALL OVER THE U. S. SEE RADISCO SPREAD IN SEPTEMBER RADIO NEWS.

"B" BATTERIES

AN **EVEREADY** PRODUCT

43V. Batteries, tapped.....\$5.00
 22½V. Batteries, Navy Type..... 3.50
 22½V. Batteries, Commercial Type 2.50
 Latter two types especially adapted to Cunningham and Radiotron Tubes.
 Postage Prepaid Anywhere in U. S.
ETS-HOKIN & GALVAN
 Wireless Engineers
 10 Mission Street San Francisco

ARE YOU on our mailing list? Hundreds of amateurs received our October Bulletin. Did you? It contains a list of used apparatus at bargain prices. Everything in perfect condition and shipped subject to your approval. If the apparatus listed is not better than we claim it to be, we refund your money without question. Many fine instruments are offered for sale this month. Send for the list right now. It's free. Western Wireless Works, 5534 Edgerly St., Oakland, Cal.



C

W

Acme C. W. Inductance

5-in. Formica Tube; 30 turns heavy copper wire, tapped each in the form of slotted studs; tubular insulated terminals of proper size to fit studs. A Grid Coil is also available and easily adapted to this inductance.

Type L-1 C. W. Inductance \$8.00
 Type G-1 Grid Coil 2.00

* * * * *

C. W. Power Transformers, Choke Coils, Amplifier, Detector, Spark Transformers, Special Transformers, Modulation Transformers, Amplify-

Write for bulletins of the most complete line of C. W. Apparatus

Acme Apparatus Company

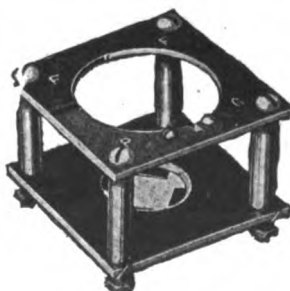
182 Massachusetts Avenue
 Cambridge 39, Mass.

TRANSFORMER AND RADIO ENGINEERS AND MANUFACTURERS
 New York Sales Office, 1270 Broadway

SOMETHING NEW

Made to Please You and Priced to Please Your Pocketbook

By departing from conventional design in audion sockets we have combined the advantages of all, the disadvantages of none and a price lower than any. Think of it—a sturdy, easily mounted socket that is heat proof, has bakelite-dielcto insulation, handy binding posts, etc., all for 75c.



Type 126, Tube Socket
 Price 75c Postpaid

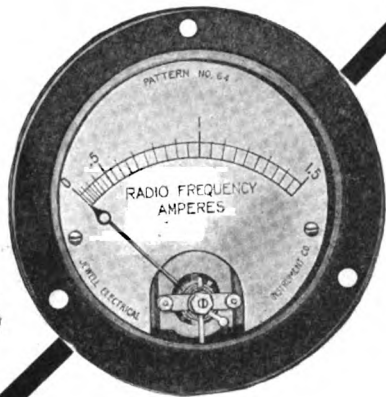


Type 122 Rheostat
 Price 90c Postpaid

And here's a smooth running rheostat that takes panel space 2 inches in diameter, needs one hole to mount has six ohm resistance, all off and all on positions and a brass panel bushing. Priced at 90c.

THE WILCOX LABORATORIES
 LANSING, DEPT. J., MICHIGAN

Say Radio to the Advertiser, it will help you.



Use Thermo-Couple Instruments for C. W.

☐ All long distance C. W. operators use thermo-couple ammeters. ☐ Precise electrical measurements are the basis for the successful operation of any C. W. set. ☐ Unreliable and inaccurate instruments will result in the unreliable operation of any set. ☐ Government Bureau of Standards tests have shown Jewell thermo-couple instruments to be accurate and reliable.

Price \$12.00

Get Our New Radio Instrument Circular From Your Dealer

JEWELL ELECTRICAL INSTRUMENT CO.
CHICAGO

C. W. CLUB OF CALIFORNIA (Continued from Page 141)

Mr. Lawrence Mott,
Catalina, Calif., Avalon.

Dear Sir: As I sit here and listen to the very excellent music being rendered by the new set of L. J. Meyberg, while reading your page in "Radio" devoted to California C.W. Club, it occurred to me that you were doing an interesting and good work. (Pardon jazz in writing, but the durn phonograph is reproducing "Sweet Mama") so I decided just on the spur of the moment, to offer my little bit for your use if suited, together with proof of the DX records.

The set of which I shall give diagram was built by myself early in the phone game here in Los Angeles, in fact the only other regular phone set working was one operated by 6XN.

You will note from both cards that voice was put through, though not very successfully insofar as communication was concerned, the C.W. being used for that purpose. But voice was understood.

The radiated amperage when working 7ZT was .5 and when working 5ZA was .4. The set was at that time at Olive (when working 5ZA only), 30 miles east of Los Angeles, and 6ER was signing off hence the card was addressed to him. Had to use series condenser, 43-plate Murdock, in order to reduce down to 200 M.

Am now using a more advanced set

FREE

(FOR THIRTY DAYS)

Your choice of one of the following premiums given free with one subscription to "RADIO" at \$2.00 a year.
Remler 3" dial and knob. Remler Grid Condenser, Remler Bakelite Socket, Remler Grid Leak, Remler Rheostat.
12c must be included for Mailing Charges.
(FOR THIRTY DAYS)
RADIO, 465 Pacific Bldg., San Francisco

NEW MOTORS FOR ALL PURPOSES
STANDARD MANUFACTURERS
PROMPT DELIVERY
ALL SIZES UP TO 5 H.P.
We Specialize In Small Motors & Generators
ALL PHASES AND FREQUENCIES IN STOCK AT ALL TIMES
Largest exclusive Mail Order Small Motor dealers in the world.
CHAS. H. JOHNSTON, Box 33, West End, Pittsburgh, Pa.
WIRELESS, TELEPHONE GENERATORS
500 VOLT - 100 WATT - 3400 R. P. M.
FOR MOUNTING MOTOR GENERATOR SETS.
\$28.50 EACH
WRITE FOR CATALOG

Radio Amateurs of COLORADO, UTAH, NEBRASKA and WYOMING, do you know
DENVER
Has the Largest Wireless Supply Store in the Middle West?
A complete stock of all standard Radio Supplies, from which we make IMMEDIATE DELIVERY
Special: De Forest Radiophone
Start with the "Interpanel" system and thus avoid discarding apparatus
Write for our Bulletins and Price List. We will give prompt Mail Order Service by Parcel Post or Express, as requested.
Our "REYNRAD" Short-wave Coils are best on the market, \$2 each.
REYNOLDS RAD'CO, Inc.
613 19th St. DENVER, COL.

C. W. or Spark

A Universal Break-In-Key

Send and Receive at the Same Time with This Automatic Relay

Why bother with an aerial switch when this break-in-key will take its place? It is an automatic relay that breaks the power circuit, breaks the aerial circuit and shorts the receiving set, all in one operation. When the key is down you send, when it is up you receive. Works on 3 volts.

You can hear the other station while you are sending and stand-by until he is through. Fool-proof and fully guaranteed to deliver the goods. Bakelite base, all metal parts highly nickel plated. Diagram furnished with each relay. Will handle 1 K.W. Price, only \$9.75, postpaid anywhere in the U. S.

Permanent Reduction on Variometers and Variocouplers, \$4.50 and \$3.50, respectively. Postage 25c. See last month's ad.
Send for Monthly Bulletin

Western Wireless Works

5534 Ederly Street, Oakland, Calif.
DISPLAY ROOMS—5387 Bond Street

and can supply information if you care to have some for future use.

Apologizing again for the jazzy nature of this letter, due to the music that continues to haunt me, I am,

Yours for C.W. predominance,
6JE.

Chas. E. Blalack.

A sense of justice compels me to add that in both these instances, 7ZJ and 5ZA I was qsp'd by spark friends.

Sept. 17, 1921.

Mr. Lawrence Mott,
Avalon,
California.

Dear Sir: I wish to be enrolled as a member of the progressive C.W. Club of California. My C.W. set consists of two 50-watt tubes. At the present time through the lack of proper high voltage I am only radiating 1½ amperes on C.W. and 1 ampere on voice.

I would like to be placed on your C.W. schedule as soon as possible. It will only be two or three weeks until I will have the proper high voltage. At the present time my wave length is 210 meters. This is the lowest I can get, as I have only one complete turn in the antenna and one in the ground circuit. Sincerely yours,

PAUL D. LANGRICK,
(Radio 6ATB).

510 North Lake Street.

NEW C.W. CLUB MEMBERS

7RV—W. Morton, 6523 Forty-fifth avenue S. E., Portland, Ore. Schedule: 11:10 P. M., Tuesday, Thursday and Saturday.

6AQT—M. Graham, 6784 Hollywood boulevard, Hollywood, Calif. Schedule: 11:10 P. M., Monday, Wednesday and Friday.

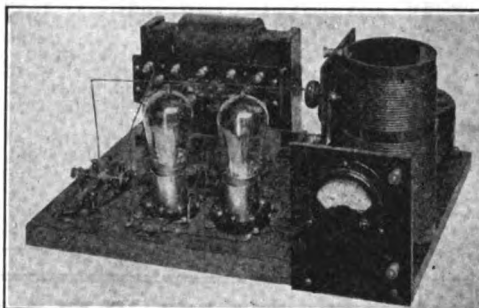
JURY RECOMMENDS RADIO COMPASS

Responsibility for the wreck of the steamer Alaska off Blunt's Reef recently has been placed on Capt. Harry Hobey by a coroner's jury which returned its verdict after several weeks of taking testimony in the cases of two persons drowned. Captain Hobey went down with his ship. Other officers were exonerated.

Blame for the wreck was placed on Captain Hobey because of his failure to check his position by radio compass bearings, failure to take soundings and failure to observe proper precautions at hearing fog warnings. The coroner's jury recommended that more general use be made of radio compass bearings, furnished by the U. S. Radio Service, and that owners of passenger-carrying vessels be required to equip their ships with a listening device for the detection of submarine sound signals from submarine bells.

BKUMA YRLSEUG—TWO HUNDRED beginners tell how memorize wireless code in thirty minutes to two hours. Booklet, six red stamps. Dodge, Box 220, Mamaroneck, N. Y.

An Amateur C. W. Set That You Can Easily Assemble Yourself



Connects directly to 110 volt A.C. lighting circuit — Approximate Range 400-500 Miles — Conservative Range 250 miles.

The approaching Radio season will well show a decided increase in C. W. transmission.

The remarkable ranges which may be obtained by even the most simple C. W. transmitter have changed the entire amateur outlook. Previous to the event of C. W. transmission a range of 50 to 100 miles was average work. Today an amateur—skilled or unskilled—can assemble a simple C. W. trans-

mitter which will surpass his expectations. The illustration above shows a simple C. W. set, the parts of which are attached to a baseboard. Anyone can assemble this outfit and wire it up. We have selected the necessary units for assembly, as follows:

Parts for Amateur C. W. Outfit

- 1 "Acme" 200 watt power transformer.....\$20.00
 - 2 Radiotron UV 202 5 watt transmitting tubes..... 16.00
 - 2 "General Radio" tube sockets..... 3.00
 - 1 "National" Rheostat, 3 ohms, 6.5A..... 5.00
 - 1 "Tuska" 3-circuit inductance..... 12.50
 - 1 Grid Leak, 10,000 ohms..... 1.25
 - 3 condensers..... 3.00
 - 1 C. W. Key..... 3.00
 - 1 Radiation meter 0-2.5A, T. A. W..... 5.00
 - 1 B. D. Panel for meter (with pole and binding post).... 1.50
 - 1 Wood base(stained)..... 1.50
- Complete parts, packed, ready for shipment.....\$72.25

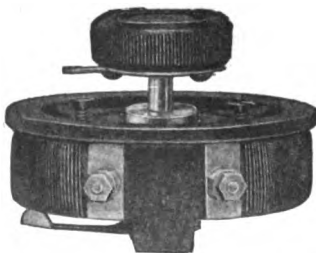
ATLANTIC RADIO CO., Inc.

727 Hoylston Street
Boston, Mass.

We have a liberal supply of the Radio Corporation's new Instruction Book on C. W. Operation, and will gladly send you a copy direct, at once, on receipt of 25 cents.

Branch, 15 Temple St.
Portland, Me.

UNEXCELLED FILAMENT RHEOSTAT



A vacuum tube filament rheostat must be more than a mere current regulator. It must be an instrument mechanically and electrically perfect. To eliminate tube noises the switch blade must make smooth and positive contact.

Our Type 214 Rheostat is made exactly for this severe service. It is made in several sizes, for receiving tubes, for 5 watt transmitting tubes, for grid biasing, and is made for front of panel or back of panel mounting.

Price \$2.50

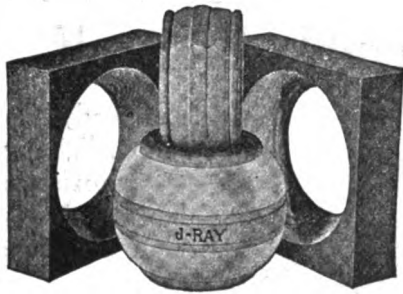
All described in free bulletin 909C

GENERAL RADIO COMPANY

Massachusetts Avenue and Windsor Street Cambridge, 39 Massachusetts

Say Radio to the Advertiser, it will help you.

VARIOMETERS AND VARIOCOUPERS



in knockdown form will enable you to make a large saving in the cost of your receiving outfit. Beautiful non-shrinking mahogany wood is used thruout, with accurate turning and perfect workmanship. The best buy possible at the following prices:

- Variometer, unwound.....\$2.00
- Stator..\$1.00 Rotor..\$1.00
- Variometer, wound.....\$3.90
- Stator..\$2.10 Rotor..\$1.80
- Coupler Secondary Ball.....\$.75

All parts drilled and ready for assembling, with directions furnished.

We carry a complete line of Radio Supplies. Will you try our Service?

J-RAY MFG. CO., 2131 DeKalb St., St. Louis, Mo.
Send for Catalog

WE USED OUR BEAN

IN DESIGNING

THE PARKIN DIAL RHEOSTAT (pat. pending) and by mounting the resistance element in a circular groove in the back of a 3" molded Bakelite dial eliminated one part and saved you the cost of a dial. The groove being recessed, allows the dial to clear the panel by the usual distance of 1-16". An off position is provided and a stop on the dial engages the stationary contact at the extreme positions. The 360-degree rotation insures fine adjustment. A brass bearing insures a true running dial and smooth action.

All figures and graduations are filled with brilliant white enamel. All brass parts nickel plated. Bakelite knob. Resistance is 5 ohms, carrying capacity 2 amps.

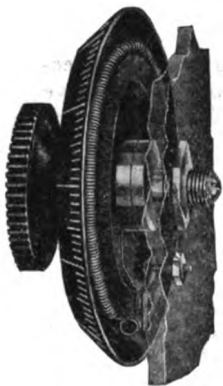
No. 77 Parkin Dial Rheostat, postpaid.....\$1.75

FOR SALE BY ALL LEADING DEALERS.

Send for free catalog, No. 3, describing our complete line. Dealers: Write for proposition.

PARKIN MFG. CO.

SAN RAFAEL, CALIF.

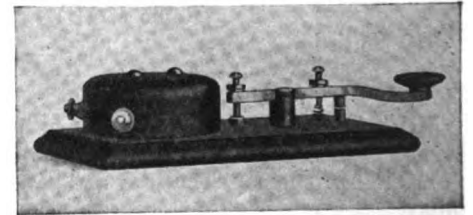


THE HAM'S SOLILOQUY

*Obey or not obey, that is the question:
Whether 'tis better in the end to suffer
The laws and rulings of the radio inspector
Or to take up arms against the troubles of the air
And by opposing end them; to quit, to send
No more, and by quitting to say we end
The QRM and the thousand natural shocks
Our flesh is heir to? 'Tis a consummation
Devoutly to be wished. To quit, to stop,
To stop, perchance to miss, aye there's the rub,
For while we stop what concerts come
When we have taken off that tickler coil
Must give us pause. There's the respect
That makes pleasure of so long hours.
For who would bear the whips and scorns of dad,
The scant pocketbook, the spark-set's vexations,
The pang of a discharged cell, the code's mix-up,
The tubes' burning out, and the scoffs
That patient merit of the unworthy takes,
If 'twere not for the fun and fascination
Of being a radio bug? Who would these bur-
dens bear,
To curse and swear at interference,
But that the chance of hearing something after
dark
From that undiscovered country of the air from
whose bourne
Every message comes, puzzles the will
And makes us rather bear the ills we have
Than pass up the sport of radio.*

—A. H. H., with apologies to Shakespeare.

LEARNERS SETS



With code, instructions, lever key (all brass) and the **AJAX BUZZER** \$1.80. Sending keys bakelite base, lever type, all machined brass, \$1.50. Unmounted \$1.00.
60c—AJAX HYTONE BUZZERS—60c external tone adjustments. All postpaid.
AJAX ELECTRIC CO., 8 Palmer St., Cambridge, 38, Mass.

Tresco Tuners are Complete
No Loading Coils are Needed

USED ALL OVER THE WORLD

- 5000 to 20000 M.....\$10.00 add P. P. Type R.S.
- 700 to 5000 M..... 10.00 add P. P. Type A.S.
- 200 to 700 M..... 10.00 add P. P. Type C.S.

Coils of either for panels, \$6.00 plus P. P.



Knocked-Down Panels for Our
Turners—Set Them Up and Save Money

Consists of Formica Panel—drilled ready for parts—one Rheostat, one 11 Plate condenser, H. V. switches, points, base and necessary binding Posts. V.T. socket, \$1.00 extra. Shipping weight, 4 lbs. Price, \$6.00. Add Parcel Post.



KNOCKED DOWN
CONDENSERS

Assemble and save money

- 11 Plate.....\$1.80
- 21 Plate..... 2.25
- 41 Plate..... 3.20

Add P. P.



TRESCO
BINDING POST

H.R. Top, Polished Nickel Base, as cut, \$1 for 10 of them. Add P. P. The best made for your panels.

- Filament Rheostats.....\$1.25
- 5 Watt Tube..... 1.50
- Switches, our type..... .60
- Switch Points, doz..... .45

Dealers in Every City

TEL-ELECTRIC CO., HOUSTON, TEXAS — Distributor for Southwest

10c Brings Wonder Catalog of 24 Pages

TRESCO - DAVENPORT - IOWA

Send for

ABC

Catalogue

A marvelously easy to understand instruction book on most advanced radio methods, because it describes in detail the unusual mechanical and electrical features and simplicity of the complete ABC line. Sixteen pages, clearly illustrated, in two colors. Every price quoted in this catalog represents a new low level for apparatus of recognized quality. Send 10c for latest ABC catalog, "Professional Radio Equipment at Amateur Prices." Request Catalog CX11.

WIRELESS EQUIPMENT CO., Inc.
32 Austin Street, Newark, N.J.



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

**KENNEDY
EQUIPMENT**

Announcing

the new

**KENNEDY INTERMEDIATE WAVE
REGENERATIVE RECEIVER**

TYPE 220

RANGE 175 TO 3250 METERS

Detects, regenerates or oscillates as desired at any point in its range

This new receiver fully sustains the reputation for high quality which Kennedy apparatus has established. We believe there is no other receiver on the market which displays such concentrated quality value in design, workmanship, finish and performance as is embodied here.

You will be interested to know more about this new unit. Ask your dealer to show it to you. If he has none in stock, we will gladly send you Bulletin 201 on request.

THE COLIN B. KENNEDY COMPANY

INCORPORATED

RIALTO BUILDING

SAN FRANCISCO



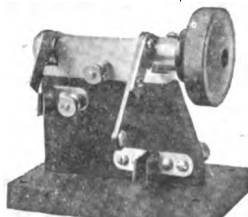
**“Signal” Radio Apparatus Pleases
Professional and Amateur**

Because it is built to the exacting requirements of the professional radio-electrician, SIGNAL wireless products are bound to fulfill every requirement of the exacting amateur. And the name SIGNAL is the only thing to be certain of in buying!

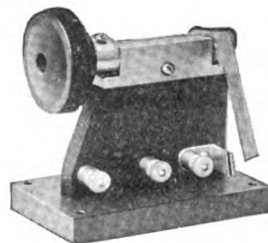
AERIAL CHANGE-OVER SWITCH

Reduced to fewest words, the superiority of this SIGNAL Switch is due to the fact that it has the good features found in highest priced amateur change-over switches, plus all the qualifications of the modern antennae switch. Lack of room prevents recounting these features here; one point alone should suffice, however, as an ex-

ample: That is the arrangement whereby the aerial is drained of any accumulated charge before the switch reaches receiving position. Search and you'll find this feature only in the most



Transmitting Side



expensively built commercial aerial switches. And any operator who is “wise” to the nasty kick in telephone receivers, when shifting quickly from send to receive, will appreciate this SIGNAL advantage.

THE SIGNAL “V. T.” SOCKET

The only vacuum tube socket on the market today that will take any of the standard four-prong tubes, either Detector, Amplifier or Oscillator, without changing or adjusting. And this is not the only distinguishing mark of this SIGNAL socket—the others are all told



in the latest SIGNAL Bulletin of High Class Wireless Apparatus, which is yours for the asking.

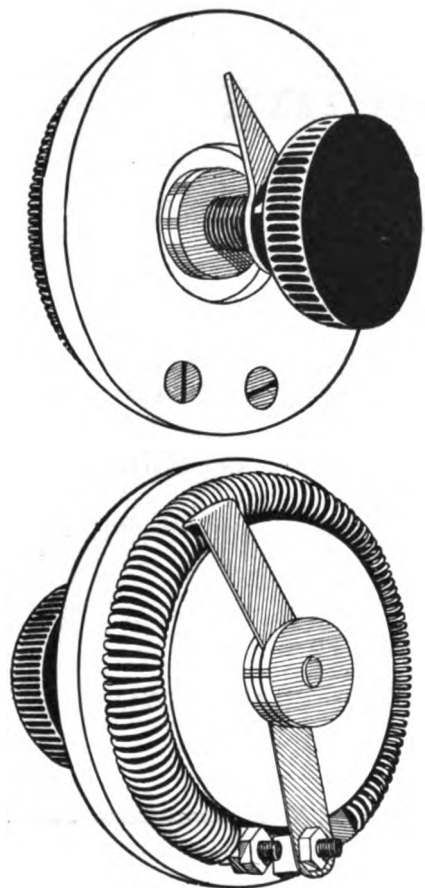
Write for the SIGNAL literature now—it is free. Address

Signal Electric Manufacturing Company

MENOMINEE, MICHIGAN.

Say Radio to the Advertiser, it will help you.

SHRAMCO --REO--



For your power tube--

New type Shramco Reo, No. 90P.
1.5 ohm Nichrome resistance.
Current capacity 6 amperes.
Price \$2.00, 1 lb. postage.

BACK MOUNTED panel rheostat, specially designed for the Radio-tron U.V. 202 and other transmitting tubes. Resistance element (1.5 ohm) is "Nichrome" wire, mounted on a solid block of asbestos. Allows unusually accurate and delicate variation of the filament current. All metal parts brass. Spring phosphor bronze blade. Base 3 in. Overall height 2 1/2 in. Handsomely finished and accompanied by an unconditional guarantee of complete satisfaction. Get the most out of your expensive power tube by using a good rheostat. Order a Shramco Reo today! Now ready for immediate shipment.

For your vt. Detector and amplifier, use the original Shramco Reo, type 90. "Nichrome" resistance of 6 ohms. Price \$2.00 plus postage for 1 lb. We also make the "Midget" Shramco Reo, 5 ohms resistance, 2 1/4 in. base.

SNOTTON RADIO MFG. COMPANY

P. O. BOX 3, SCRANTON, PA.

Catalogue "K," listing a complete line of high grade parts at reasonable prices, sent to any reader of Pacific Radio News for five cents in stamps.

GENERAL PUBLIC BUSINESS

(Continued from Page 138)

Telegram, Unga, Alaska.
Alaskan Codfish Company, San Francisco:

Outposts report entire Pirate Cove gang preparing embark in dories and power boats, heavily armed. We are well entrenched in; allies arriving daily from outside islands; will help us defend Unga against enemy. Ship complete new transformer primary, rotary-gap motor, exciting generator armature, three fire extinguishers and one dozen Hellkum Never-Fail, Kick-back Preventers. Superintendent Hooley wants three bundles first quality grave-digger's shovels. Radio K-V-I.

A Red (Government), U. S. N., Dutch Harbor, Alaska.

Commander Thirteenth Naval District, Bremerton, Wash.:

Information at hand indicates that it may soon be advisable to send a number of gunboats up to the Shumagin Islands. Full details being forwarded in a report which you will receive by next mail schooner leaving here some time next summer. Naval Radio, Dutch Harbor.

Rush Telegram, Unga, Alaska.
Alaskan Codfish Company, San Francisco:

Pirate Cove gang are coming. Radio K-V-I.

Rush Telegram, San Francisco, Calif.
Radio, Pirate Cove, Alaska.

Having checked up Superintendent Krugscaller's latest reports and examined our bills in this office, we find that general public operation of Pirate Cove radio station for two months has cost as follows:

Apparatus and repairs shipped..\$3152.21
Telegrams about radio..... 98.76
Extra engine fuel..... 2640.00

Total.....\$5890.97

Against this we have a tariff on three paid messages received, totalling 26 words at six cents a word, amounting to \$1.56, and leaving a deficit of \$5889.41. This does not include boats and dories smashed by fighting fishermen. Public service operation of K-O-X-N is hereby suspended. You are now returned to a limited commercial license. Great Alaskan Fisheries.

Day Letter, Unga, Alaska.
Alaskan Codfish Company, San Francisco:

No fight. Enemy abandoned plans for attack, following receipt of advice that Pirate Cove P-G license has been cancelled. I have driven competitor out of the field by superior operating ability and feel that I am entitled to a substantial increase in my salary. Russian code messages running about 500 words a day at present. Please advice at once about salary. Radio K-V-I.

Say Radio to the Advertiser, it will help you.



Wish
Your
Friend
a

Merry Radio Xmas

only two months more and
Christmas will be here again

Make it a Radio Xmas and "shop early"

The most appropriate gift for a radio friend is a subscription to a radio magazine.

Send him

RADIO

for one year

Just write his name and address on a piece of paper, send us \$1.50, and we will enter his subscription for one year, starting with the December (Xmas) number—the big 68-page holiday issue. Our regular subscription rate is \$2.00 a year, but the holiday price is only \$1.50.

Besides sending him the magazine for a year, we will mail him a beautiful Christmas card, telling him of your holiday gift. The card will reach him on Christmas Eve.

Send us the order today and avoid the rush!

All Subscription Orders for this special offer must reach us before December Fifteenth.

RADIO

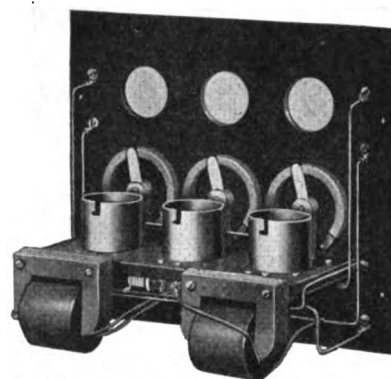
465 Pacific Building
San Francisco, Calif.



G. M. PROUDFOOT DETECTOR AND TWO-STEP AMPLIFIER

Highest Quality Lowest Prices

Detector and One-Stage Amplifier
\$25.00
is duplicate of above only one unit less



The Operating Characteristics of All Our Instruments Are Equal to Any on the Market Regardless of Price.

\$35.00

The design and construction are such that maximum amplification is obtained and no howling. Panel 3/16 in. hand rubbed and engraved with white letters. Instruments look better than photographs. Cabinet 5 in. deep. Bakelite is 7 1/2 in. x 8 3/4 in. Plug for fones furnished with each instrument.

CABINETS
QUARTER SAWED OAK
WITH WAX FINISH—
MAHOGANY FINISH
IF DESIRED

NOTICE
CLEAN CUT WIRING

NOTE THESE PRICES

Detector Cabinet, Fixed Condenser, Grid Leak, complete	\$ 10.00
One-Stage Amplifier	18.00
Two-Stage Amplifier	25.00
Detector and One-Stage Amplifier	25.00
Detector and Two-Stage Amplifier	35.00
Detector and Three-Stage Amplifier	65.00
Long and Short Wave Receiving Set— 150-25,000 Meters	195.00

ALL INSTRUMENTS
TESTED IN LABORATORY
AND
UNDER WORKING
CONDITIONS

EVERYTHING
GUARANTEED

361 E. OHIO STREET

G. M. PROUDFOOT

CHICAGO, ILLINOIS

We manufacture our own jacks, which allows **shortest connections possible** and more permanent construction than with telephone jacks. Automatic filament control by plug, \$10.00 additional.

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

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

Doctor Wu



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

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

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

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

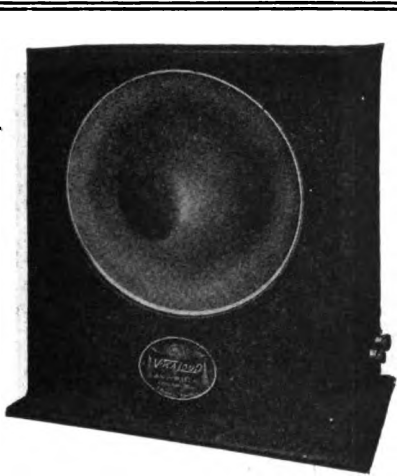
THE SINE OF



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

THE RIGHT KIND

Say Radio to the Advertiser, it will help you.



— THE —

VOCALoud

THE IDEAL loud-speaker. Requires no batteries, no adjustments, no extra equipment whatever. Just hook Vocaloud on to your receiving apparatus and get your signals QSA all over your house! Your order shipped at once.

Station Type, \$30.00

(In mahogany cabinet, as shown)

Laboratory Type, \$25.00

(Mounted on solid metal base)



CORWIN'S Improved SWITCH

MANY SWITCHES give their manufacturers more profit.—none give their users more satisfaction. Try a Corwin Switch. As good as it looks!

Brass shaft is moulded right into the moulded knob. It can never come loose. All metal parts nickel-plated brass. Contact radius 1 3-4 inches. 90 cents—5c Postage.

NEW RADISCO VARIO-COUPLER

Accurate to the .002 part of an inch. Moulded base, Formica tube, all metal parts brass.

\$7.50 Postpaid

Corwin's 1921 catalog contains 32 pages of Corwin, Radisco, and other good instruments. You'll find it lists a good instrument for every part of your station at prices that don't "take the joy out of life." Send for your copy today. 10 cents.

A. H. CORWIN & COMPANY

Dept. G8, 4 West Park St.,
NEWARK, N. J.

John Mills, No. 1,385,091, July 19, 1921
—Signaling.

A receiving system arranged to minimize the possibility of the production of false signals due to static, etc. The detector tube 3 transmits the signal to two circuits, 22 and 23, the latter being tuned to the audio frequency of the signal. By balancing the energy dissipated in these two systems, this energy being integrated for a period longer than that of the oscillation in circuit 23, it is possible to neutralize the disturbing influences. The energies are transformed into heat in the wires 26 and 29, which jointly control a contact 32 between two stationary contacts. Static disturbances have equal effects on wires 26 and 29 and the contact 32 simply moves parallel to the faces of the stationary contact while no signal is sent. Due to the use of integrated energy, irregularities in the instantaneous values of the disturbances have no bad effect.

POLITICAL SPEECHES BY RADIO

Now comes a suggestion from Chester Rowell, member of the California Railroad Commission, that by means of radio a candidate can sit at home and address gatherings of the entire electorate assembled in public squares, public halls or private homes equipped with magnavoxes and radio receiving sets. Ah, but where would the minatory finger of Sam Shortridge be, or the clenched hands of Hiram? Under this plan Theodore Roosevelt never could have shown his teeth or Bryan his seersucker suit. But the suggestion opens the mind to what the future has in store.

Classified Advertisements

Advertisements in this section are three cents per word net. Remittances, in form of currency, money order or stamps, must accompany order.

RADIO CABINETS—Mahogany or oak finished or unfinished, to your design. Send rough sketch for quotation. Prompt service. Formica cut to size. Radio supplies, parts, etc. Pacific Radio Exchange, 439 Call Bldg., San Francisco, Calif.

STOP! LOOK! AND ACT! V. T.'s. With each Radiotron UV200 V. T. detector or A-P Moorhead V. T. detector or Radiotron U. V. 201 V. T. Amp. or A-P Moorhead V. T. amp., we will supply free of charge your choice of either a Murdock V. T. socket, improved contact type, or a Remler Bakelite smooth running rheostat, latest type. Radiotron UV200, \$5. Radiotron Amp. V.T. UV 201, \$6.50; Moorhead A-P detector, \$5.00; Moorhead A-P Amp. V. T., \$6.50; Remler Bakelite rheostat, latest type, \$1.00; Murdock V. T. socket, \$1.00. We absolutely guarantee the foregoing apparatus. Only new and high-grade equipment carried in stock. All orders are filled within twelve hours and shipped postpaid and insured, thereby saving time and money. Remember us. The Kehler Radio Laboratories, Dept. F, Abilene, Kansas.

MURDOCK ROTARY GAP, complete, \$6.00. Harold Thiel, 27 Elgin Park, San Francisco, Cal.

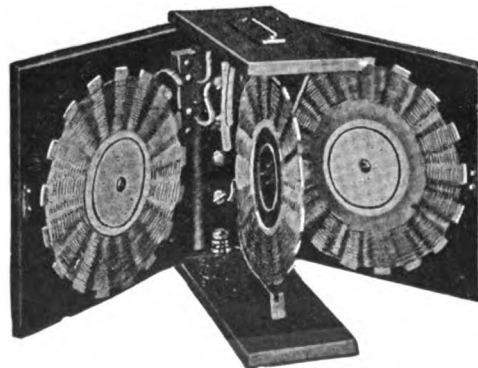
COMPLETE I K.W. transmitting set of radio 6AE1 for sale, \$65.00. A bargain. Harvey Blackmun, Winton, Cal.

THE BEST Christmas gift that you can send your radio friend is a subscription to "RADIO." We will send him a beautiful Christmas card, telling him of your generous gift. Let us have the order now. Shop early and avoid the rush. Pacific Radio Pub. Co., Inc., 465 Pacific Bldg., San Francisco, Calif.

STUNG AGAIN—He thought he could get away with it, but it N. D.-O. M. cheap apparatus never did and never will give satisfaction. He tried others, but finally turned to us. Why? Because we make nothing but first-class apparatus, using standard makes of instruments, and yet our prices are low. Now he's satisfied. Try us and see why. "There's a reason." Yours truly, Montebello Radio Shop, Montebello, Calif.

ONE ESCO 550 Volt 1/4 Amp. Motor Generator, 110 Volts A. C. Never used. \$75.00. Perfect condition. Cost \$85.00. 1 Jewell 0-500 Volt Meter, \$10.00; cost \$15.00. Reason for selling: going out of the radio game. C. MAASS, 250 21st Ave., San Francisco.

SPIDER WEBS



Cut Shows Front Panel Removed

Exclusive Westinghouse Agents for our Territory

WONDERFUL
REGENERATIVE
SIGNALS

NO MAGNETIC
LEAKAGE

\$5.50
Plus 30c
Postage

NEW DUPLEX
1000 METER
SET ON HAND

HERROLD LABORATORIES

"Everything for the Amateur"

407 SOUTH FIRST STREET

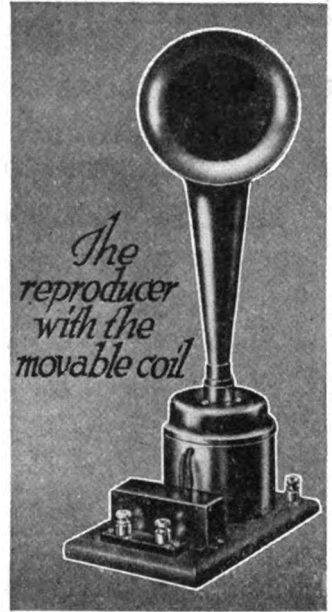
SAN JOSE, CALIF.

Who Enjoys Your Set?

Do you? Of course, but think what sport it would be to discard those awkward, tiresome and uncomfortable head sets—do away with them entirely—and get everything loud and clear all over the place.

And wouldn't it be great to treat your friends and neighbors to a radio music concert whenever you felt like it, or let them enjoy hearing the news events of the world as you pick them up by wireless.

And you can—with the Radio MAGNAVOX—do all this and more, easily and inexpensively. Ask your dealer about this marvelous wonder instrument or write us direct. Do it now, and make your set the source and center of enjoyment it should be.



THE RADIO MAGNAVOX

A beautiful and efficient outfit, made in two sizes. Type R-2 uses $\frac{1}{2}$ ampere in field. Type R-3 1 ampere. Any amount of current can be used without distorting signals or injuring apparatus. Any one can operate the MAGNAVOX. Price, complete as illustrated—Type R-3 \$45 Type R-2 with 22" horn...\$110

At your dealer or direct from factory



Dealers: Write for Proposition

Send for FREE Card—

illustrating and describing the hook-up and operation of the Radio MAGNAVOX and the famous "movable coil" which makes it so efficient. This interesting card free. Send for it NOW.

General Offices and Factory

OAKLAND, CALIFORNIA

New York Office
370 Seventh Avenue
(Penn. Terminal Bldg.)

FEDERAL HEAD TELEPHONES

Rugged—Lightweight—Sensitive



These Head Telephones were developed under the rigorous specifications of the Army and Navy for war-time use and proved highly satisfactory. The construction affords a light weight and sensitive head set that will satisfy the most exacting amateur.

No. 53-W Federal Head Telephones, 2200 ohm....Price \$ 8.00
No. 52-W Federal Head Telephones, 3200 ohm....Price 10.50

Write for Bulletin 103-W.B. describing latest C.W. and Spark Transmitting Equipment Receiving Apparatus and parts. Amplifying Transformers, Head Telephones, Pieophone, Variable Condensers, Anti Capacity Switches, Filament Control Jacks and Plugs, Etc.

Ask your dealer for Federal equipment. If he does not have them tell us his name

Federal Telephone & Telegraph Co.

1738 Elmwood Avenue, Buffalo, N. Y.

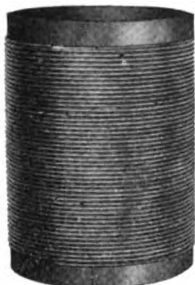
< STANRAD >

GEN Works 1000 Miles on 10 Watts CW

You Can, Too!

With Apparatus Designed for

RESULTS EFFICIENCY SERVICE



The "STANRAD" inductance is built for RESULTS—that's what you want—RESULTS!

It has 54 turns of copper wire wound on a 4-inch threaded formica tube. The wire cannot slip or come loose.

The margin at each end makes it easy to mount by means of brackets, mounting posts, etc.

One or two-coil winding. **\$5.00**
Threaded tube only..... **3.75**
Inductance for 100 watts. **10.00**

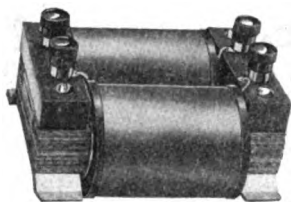
The choke coils are wound on fiber spools. This eliminates break-downs. Binding posts are provided for connections, and aluminum feet to simplify the mounting. The inductance, approximately 3 henrys, is enough to clear the worst hum.

500 M. A. **\$7.50**
150 M. A. **6.00**

If your dealer cannot supply you, write direct.

STANDARD RADIO COMPANY

1048 So. Olive St., Los Angeles, California



FORMICA

SHEETS - TUBES - RODS

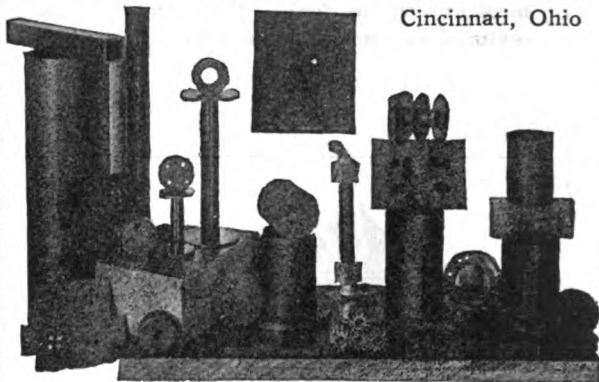
Made from Anhydrous Redmanol Resins

Formica is a homogeneous waterproof insulation with exceptionally high dielectric properties. It is readily machined and does not warp or shrink.

Formica is the ideal material for panels and other insulation parts of Radio Apparatus, on account of its superior electrical and mechanical properties, as well as its splendid appearance.

THE FORMICA INSULATION CO.

Cincinnati, Ohio



Pacific Coast Representatives:

Hermans-Griffith Co., Sheldon Bldg., San Francisco

Jobbers: Leo J. Meyberg Co., 428 Market St., San Francisco; Wireless Shop, 511 W. Washington St., Los Angeles; Northwest Radio Service Co., Seattle, Washington.

Announcement

We are pleased to announce to our many satisfied customers that in addition to continuing our Mail Order Service which has made a wonderful record for SPEED, we have recently put on the market the "PUGET" products, a combination of the best engineering, designing and high-grade workmanship. This line includes:

**Puget High Voltage Transformer, Puget Variometers
Puget Vacuum Tube Panels, Puget Transmitting Condenser,
Puget Protective Devices, Puget Amplifier Sets
Puget Short Wave Regenerative Sets
and Others**

Nothing but High-Grade Apparatus Carries the name "PUGET"

Send for price list. Order anything from our list and receive it by return mail.

Northwest Radio Service Co.

609 Fourth Avenue

SEATTLE

WASHINGTON

FIELD WIRELESS

Firefly and cricket
Have set up their wireless
In the fields, and tireless
They flash and click-click it.

What are they saying?
The long day is over;
The dew's on the clover:
It's time to stop playing.

There's more. They are spelling
Which way the wind's blowing.
How fast thing are growing,
How good they are smelling.

Oh! I wish I could utter
Half that they're sending
And receiving, blending
Their spark and their sputter.

Sometimes you feel creepy
To think they are talking
With things that go walking
When people grow sleepy.
—B. A. Botkin, in N. Y. Evening Post.

President R. P. Schwerin of the Federal Telegraph Company has concluded a contract with the Chinese government by which that government is to issue bonds, which apparently are to be turned over to the company, with which to construct five radio stations of great power at various Chinese ports.

Valuable New Features Added to Eveready Battery

The manufacturers of Eveready Wireless B Batteries announce two new features which are now being built into the No. 766 Battery, and which greatly increase its usefulness.

No. 766 Battery is now being made with wood container, of the same character as No. 774. This wooden case is impregnated with melted paraffine, making the battery, which is also sealed in wax, practically impervious to moisture.

A second feature—and one which is welcomed by all radio fans—is the installation of variable voltages. One negative and five positive terminals give a voltage of 16½, 18, 19½, 21 and 22½. Each terminal consists of a flat brass strip with 3-16 hole in end for binding post.

These new features of the No. 766 are in line with ideal of the manufacturers of Eveready Products—to lead with the best.

And the price remains the same—\$3.50.

No. 766

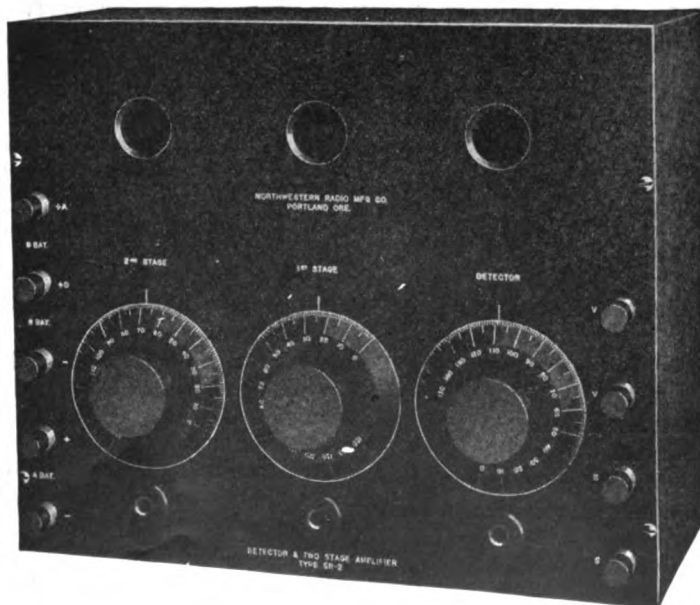


No. 766

NATIONAL CARBON CO., Inc.
 599 EIGHTH STREET
 San Francisco California

NORTHWESTERN RADIO

A Superior Line of Receiving Apparatus



A detector and two stage amplifier that will give you results. This instrument is in use in many stations in the Northwest and its performance is a proven fact. You must see this set to appreciate its value. Material and workmanship are the best.

Specifications — Panel quarter inch grade XX bakelite dielecto. Gorton pantograph engraving. Oak Cabinet finished in flemish oak.

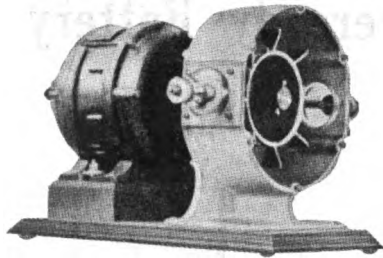
Knobs and dials are machined from sheet bakelite and turn TRUE. All socket supports are constructed of bakelite and cast aluminum.

Write for Catalog

Detector and two stage amplifier Type SR-2.
 Size of panel 10 1-2x12 3-4. Complete less tubes and battery \$70 f.o.b., Portland.

NORTHWESTERN RADIO MANUFACTURING CO.
 1556 East Taylor Street Portland, Oregon

Say Radio to the Advertiser, it will help you.



Benwood Rotary Quenched Spark Gap

The finest synchronous gap made
A REAL GAP AT A REAL PRICE

The outstanding features are:
A Removable & Renewable Point Rotor
Green Pyrex Glass Insulators
Silent in Operation
Visible Spark

Furnished with machined aluminum coupling that makes slippage impossible and at the same time, makes the adjustment for synchronism a simple affair. Complete, as shown, on hardwood base with finest 1800 RPM motor available:

\$65.00 aluminum housing \$60.00 Bakelite Housing

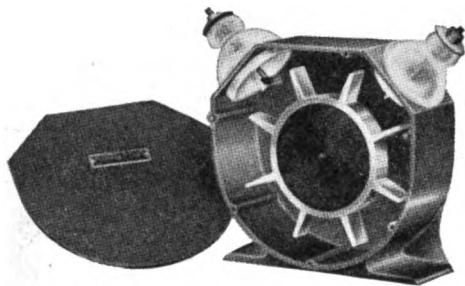
MOTORS SEPARATE (SYNCHRONOUS), 1800 RPM 1/4th H. P. (Prepaid) \$30.00
ALUMINUM GAP SEPARATE, with glass insulation and type "R" disc. 28.00

The Benwood 'Super' Gap

Complete as shown with
Green glass insulators
Removable point disc (machine stamped)
Bakelite insulation

ANY NOTE
INCREASED RADIATION
VISIBLE SPARK

New Low Price, \$22.00



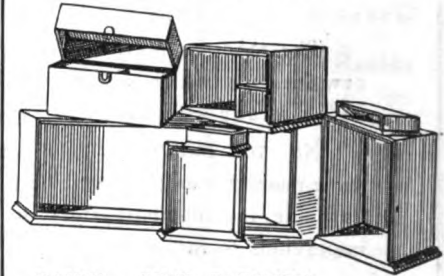
Send for our new fall and winter "BENWOOD BULLETIN" and note our prices

The Benwood Company, Inc.

1300 Olive Street, St. Louis, Mo.

De Forest Cabinets

Hand rubbed, waxed early English finish. Quartered oak.



PANEL Width	SIZE Height	CABINET DEPTH	
7 1/2"	7"	8"	.....\$3.00
9 1/2"	7"	9"	..... 3.50
7 1/2"	11 5/8"	6 1/2"	..... 3.00
7 1/2"	6"	2"	..... 1.25
7 1/2"	7"	5 1/2"	..... 2.50
18 1/2"	11 1/2"	7"	..... 4.90
11 1/2"	11 1/2"	6 3/4"	..... 4.25
11 1/2"	14"	6 1/2"	..... 5.25
8 3/4"	1 3/4"	4"	..... 1.50
13 1/2"	7"	10"	..... 5.00
9"	9"	6 1/4"	..... 6.75
8"	9"	6 3/4"	..... 5.25
10 1/2"	9"	6 3/4"	..... 5.00
15"	9"	6 3/4"	..... 5.75
14"	9"	6 3/4"	..... 4.00
18 1/2"	9"	6 3/4"	..... 6.25
23"	9"	6 3/4"	..... 7.50
27 1/2"	9"	6 3/4"	..... 9.00
32"	9"	6 3/4"	..... 10.00
8 1/2"	17 1/2"	18 1/4"	..... 7.00
9 1/2"	7"	4 1/4"	..... 3.50
11 3/4"	8"	4 1/4"	..... 2.00
4 1/2"	4 1/2"	1 3/8"	..... .90

De Forest Radio Tel. and Tel. Co.

1391 Sedgwick Avenue
New York City

Cut the High Cost of "B" Batteries Use a "HIPCO"



The ONLY REFILLABLE battery. Tapped every 1.5 volts. New cell can be installed in a few moments.

Battery, POSTPAID\$3.00
Renewal Cell, POSTPAID..... .25

Have a COMPLETE stock of all makes STANDARD apparatus, parts and materials, which can be supplied IMMEDIATELY from stock, all of which is sold at catalogue price.

Motor Generators and Dynamotors
Distributors for the Complete PARAGON Line

The Ray-Di-Co Organization (Ray-Dee-Ko)

1547-C N. Wells

Radio 9AG

Chicago, Ill.

WESTINGHOUSE BROADCASTING STATION

The Westinghouse Electric & Manufacturing Company announces that it has opened a radio telephone broadcasting station at its plant in Newark, N. J., and, with the cooperation of the Newark Sunday Call, is supplying news and concerts which can be heard by wireless operators within a radius of 200 miles. Every night at 8:05, Eastern Standard time, an entertainment consisting of a digest of the day's news, government reports, and a musical entertainment is given. A special feature of the entertainments is a children's hour every Friday night at 7 o'clock, when songs and stories for the youngsters will be radiophoned.

During the world series baseball games every ball, strike and other play was reported as soon as made from this station, so that thousands were able to enjoy the games. Similar service will be provided for the major football games and other important events. The Westinghouse Newark station operates on a wave length of 360 meters and its call letters are WJZ. It should be easily heard as far south as Baltimore and as far north as Albany, while under favorable conditions the messages should be audible in practically the entire area east of the Mississippi river, and as far east as the Bermuda islands.

Say Radio to the Advertiser, it will help you.

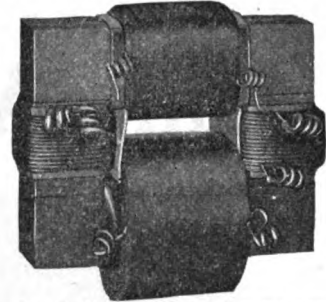
Guaranteed De Forest Parts for C. W. Apparatus Below Cost



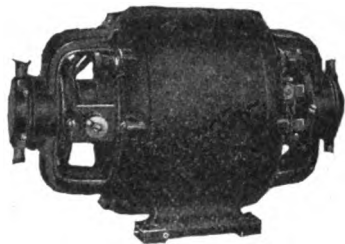
Inductances for transmitters up to 50 watt capacity. 50 turns of wire wound on threaded formica tube. 7 or 26 positive taps. Proper spacing between turns for maximum efficiency. \$8.50.



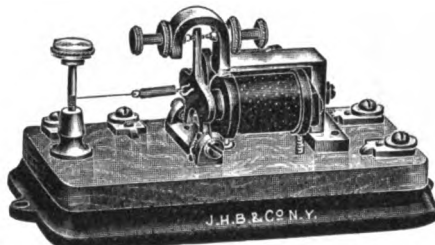
Guaranteed Standard makes of head tele-phones below cost—
 Murdock No. 55—3000 ohms.....\$4.50
 Federal No. 53W—2200 ohms..... 7.00
 Federal No. 52W—3000 ohms..... 9.50
 Red Head —3000 ohms..... 7.50



Acme C. W. power transform-ers. Unmounted. For 60 cycle, 110 volt supply, 3 secondary windings. 6, 12 and 1000 volts, with center tap on high voltage. Designed to furnish 500 volt D. C. when using standard rectifier tubes. Works efficiently with all makes of tubes. \$12.50.



Guaranteed ESCO dynamotors, 110 volt D. C. to 500 volts D. C., 100 watts. Ball bearing type; one unit. This is the best possible outfit for C. W. plate supply. Smooth running. Noiseless in operation. Large overload factor of safety. Reduced to \$65.00.



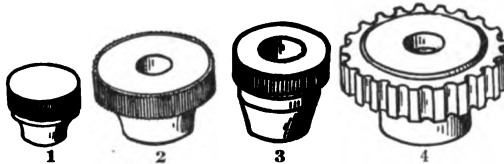
Bunnell relay operating on 6 volt battery. Ideal for electroc-magnetic transfer switch. \$3.98.



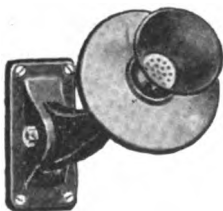
Guaranteed standard indicat-ing instruments at manufactur-er's cost—
 Hot Wire Ammeters—General Radio—scale 0-7, \$7.00; Hot Wire Ammeters—General Radio—scale 0-2, \$7.00; High Frequency Am-meters—Roller Smith—scale 0-5, \$22.50; Filament Ammeters—Roller Smith—scale 1.5-0-1.5, \$8.00; W. Filament Ammeters—Weston—scale 6.0-0-1.5, \$9.00; D. C. Ammeters—Splitdorf—scale 0-2, \$5.75; D. C. Ammeters—Split-dorf—Scale 0-3, \$5.75; D. C. Am-meters — Splitdorf — scale 0-5, \$5.75; Hot Wire Ammeters—Gen-eral Radio—scale 0-10, \$7.00; D. C. Milliameters—Splitdorf—scale 0-150, \$5.75; D. C. Milliameters—General Radio—scale 0-250, \$7.00; Filament Ammeters—Amer. Ever-ready—scale 1.5-0-1.5, \$3.80.



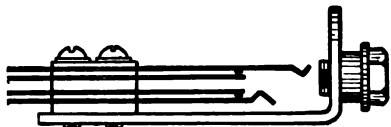
Ward Leonard vitrohm resist-ance units for filament current adjustment and other uses. The best obtainable. Absolutely constant resistances—
 5 ohms with ferrules, 7 1/4" x 3/4", 90c; 60 ohms, no ferrules, 2" x 3/4", 65c; 90 ohms with ferrules, 2" x 3/4", 75c; 5000 ohms, graphite sec-tors, 2 1/2" x 3/4" x 1/4", for adjustable grid leak resistance, 55c.



Knobs for switches, rheostats, variometers or condensers—
 No. 1, 3/4" top diameter, 6c; No. 2, 1 1/4" top diameter, 8c; No. 3, 1 5/16" top diameter, 10c; No. 4, 1 1/2" top diameter, 15c.



Panel type microphone on japaanned arm ready for mounting. Low resistance. No. 262W. \$4.00.



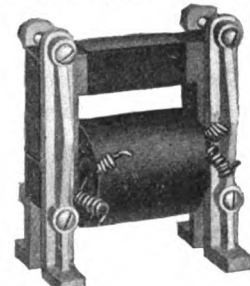
Federal telephone jacks with polished nickle plates, No. 1423W, 90c.

DE FOREST DUO-LATERAL COILS
 At lower cost than imitations

NOTE REDUCED PRICES

The mounting bands have been perfected so they are absolutely impervious to mois-ture; lower distributed capacity, lower high frequency resistance, and better made in all respects than any other coils of this type now on the market.

DL-25	\$1.40	DL-300	\$1.75
DL-35	1.40	DL-400	1.80
DL-50	1.50	DL-500	2.00
DL-75	1.50	DL-600	2.15
DL-100	1.55	DL-750	2.35
DL-150	1.60	DL-1000	2.60
DL-200	1.65	DL-1250	3.00
DL-250	1.70	DL-1500	3.50



Acme A3 modulation transform-ers on mounting brackets. Ex-ceptionally efficient input trans-former for Radio telephone work. \$5.00.



Perfectly insulated control buttons. D. P. D. T.; push locking type, for battery circuits, trans-fer switches, etc. \$1.50.

De Forest Radio Telephone & Telegraph Company

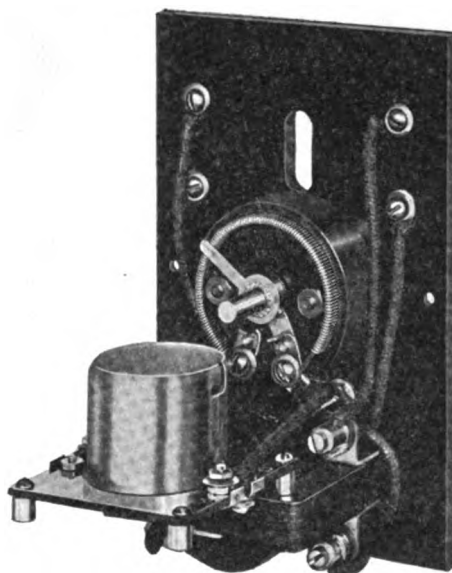
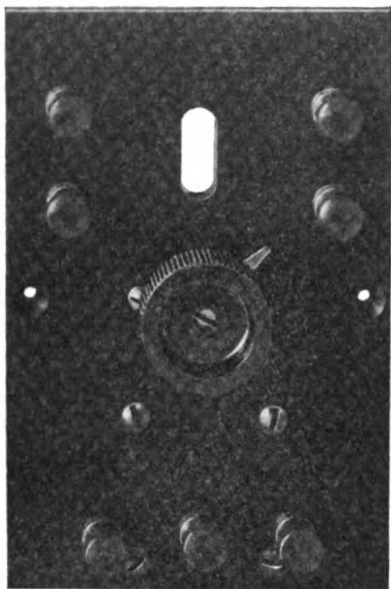
1391 Sedgwick Avenue, New York, N. Y.

Inventors and Manufacturers of High Grade Radio Apparatus

Say Radio to the Advertiser, it will help you.

BLISS

Unit Amplifiers and Panels



The most pleasing feature of this Amplifier is its compactness. All the instruments are mounted on the panel, and when mounted in a cabinet the panel is very easily removed, making all parts easily accessible at all times. The Transformers are General Radio make and are designed for the U. V. 202 Radiotron. Tube Sockets are standard, four-prong type. Panel is of well finished XX Bakelite and may be mounted on a base or in a cabinet with other units. Supplied without tubes or batteries. Wiring diagrams accompany each amplifier. AN IDEAL AMPLIFIER.

No. W-609 One stage Amplifier.....	\$15.00	No. W-612 Paragon Rheostat with Bliss Moulded Bakelite Knob	\$ 2.00
No. W-610 One stage Amplifier Panel.....	2.25	No. W-613 Insulated Binding Posts.....	.12
No. W-611 Tube Socket Mounted on back of Transformer	6.25	No. W-614 Complete set of Parts for W-609 Amplifier without wire and connections and not assembled.....	11.34



No. 301 BLISS Improved Switch, as illustration, Edgewise contact type with a genuine molded Bakelite Knob. 1 3-8 in. in diameter with a radius of 1 3-8 inches. Nickel plated lever.....\$.60

No. P-501 BLISS Moulded Bakelite Knob. 1 3-8 inches in diameter. POSTAGE PREPAID

R. W. BLISS COMPANY

(Department P.)

42 Davis Street

Wollaston, Mass.

RADIO APPARATUS

Distributors of Reliable Radio Apparatus to Schools, Colleges, Radio Clubs and Experimenters All Over the World!

"PITTSOCO"

SERVICE FILLS ORDERS
FOR "GREBE RADIO" ANYWHERE!
THAT APPARATUS OF PROVEN
MERIT!



"PITTSOCO"

SERVICE DISTRIBUTES RADIO
CORPORATION'S PRODUCT ALL
OVER THE WORLD! TRY
US AND SEE!

AMPLIFYING TRANSFORMERS

- No. UV-712 Radio Corporation\$7.00
- No. P-1 Amrad, mounted 4.50
- No. P-2 Amrad, unmounted 3.75
- No. QO Clapp-Eastham, semi mounted 4.00

AMPLIFIERS

- No. DA Westinghouse, Detector and two stage, in beautiful cabinet.....65.00
- No. RORK Grebe two step with automatic filament control, a beauty...55.00
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- No. P-2 Ground Wire No. 4 Weatherproof, per ft.; special value at... 0.06
- No. P-3 Porcelain cleats with screws for No. 4 wire, per pair..... 0.10
- No. P-4 "Pittsoco" ground clamp..... 0.20

"B" BATTERIES

- No. 7623 Standard, 22.5V small..... 1.50
- No. 7625 Standard, 22.5V large 2.65
- No. 7650 Standard, 22.5V variable ... 3.50
- No. 763 Eveready 22.5V small 2.25
- No. 766 Eveready variable 16½ to 22½ volts, large 3.00
- No. 766 Eveready, 22.5V, large..... 3.00
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- No. ROCC Grebe .0002MF 1.00
- No. ROCC Grebe .0005 MF 1.20

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- No. MW-1 Radio Corporation, ½, 1, 1.5, 2, 3 or 5 megohms, each complete 1.25
- Grid leaks only 0.75
- Bases only 0.50

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- No. P-3 Vocaloud, Laboratory type...25.00

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- No. 550 Murdock, moulded 1.00
- No. P-1 Amrad, new price 0.75

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- No. UV-217 Radio Corporation, 150 Watt "Kenotron" rectifier, for UV-203 tubes26.50
- No. P-1 DeForest, 20 Watt rectifying tube, for use with 5 watt tubes 7.00

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- No. 56 Murdock, double, 3000 ohms... 6.00
- Brandes, Superior, double 8.00
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- No. 93 Remler "A" Battery type..... 0.75

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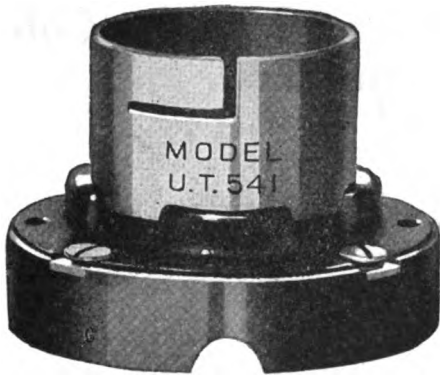
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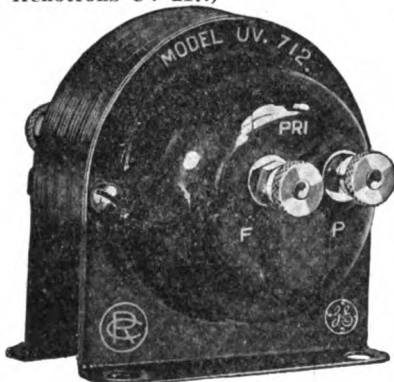
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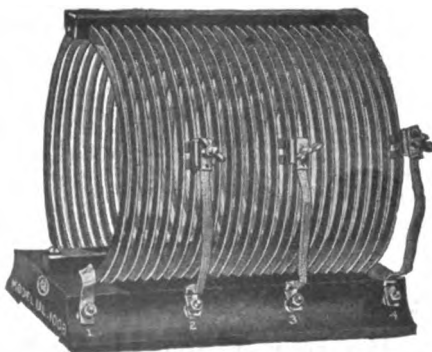


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MODEL UT 541.....\$2.50
 (Designed for Radiotrons UV-203, Kenotrons UV-217.)



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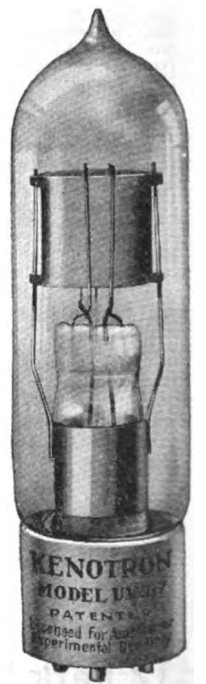


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35	35	1.40	.50
50	50	1.50	.60
75	75	1.50	.60
100	100	1.55	.65
150	150	1.60	.70
200	200	1.65	.75
250	250	1.70	.80
300	300	1.75	.85
400	400	1.80	.90
500	500	2.00	1.00
600	600	2.15	1.15
750	750	2.35	1.35
1000	1000	2.60	1.60
1250	1250	3.00	2.00
1500	1500	3.50	2.50

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Brandes Trans - Atlantic	12.00
Brandes Navy	14.00
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156 General Radio	1.50
550 Murdock	1.00
R300 DeForest	1.60
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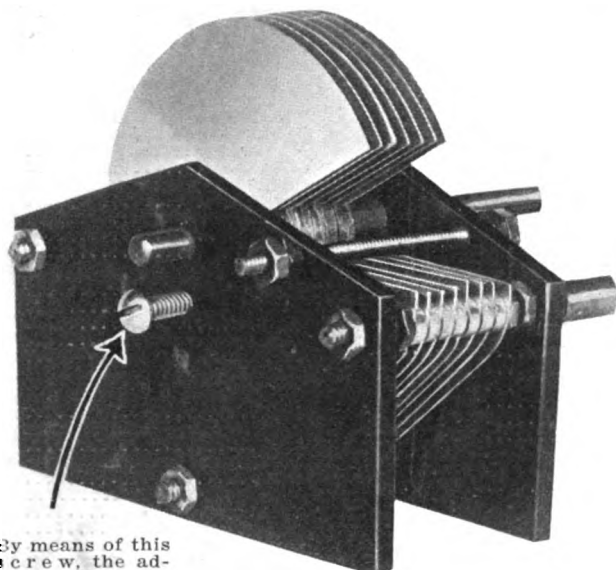
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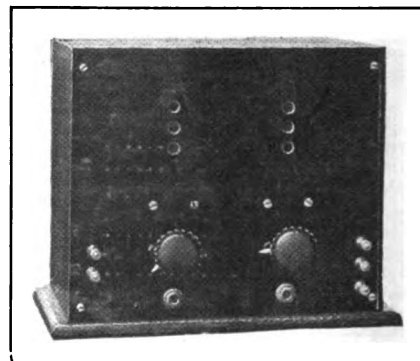
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