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RADIO

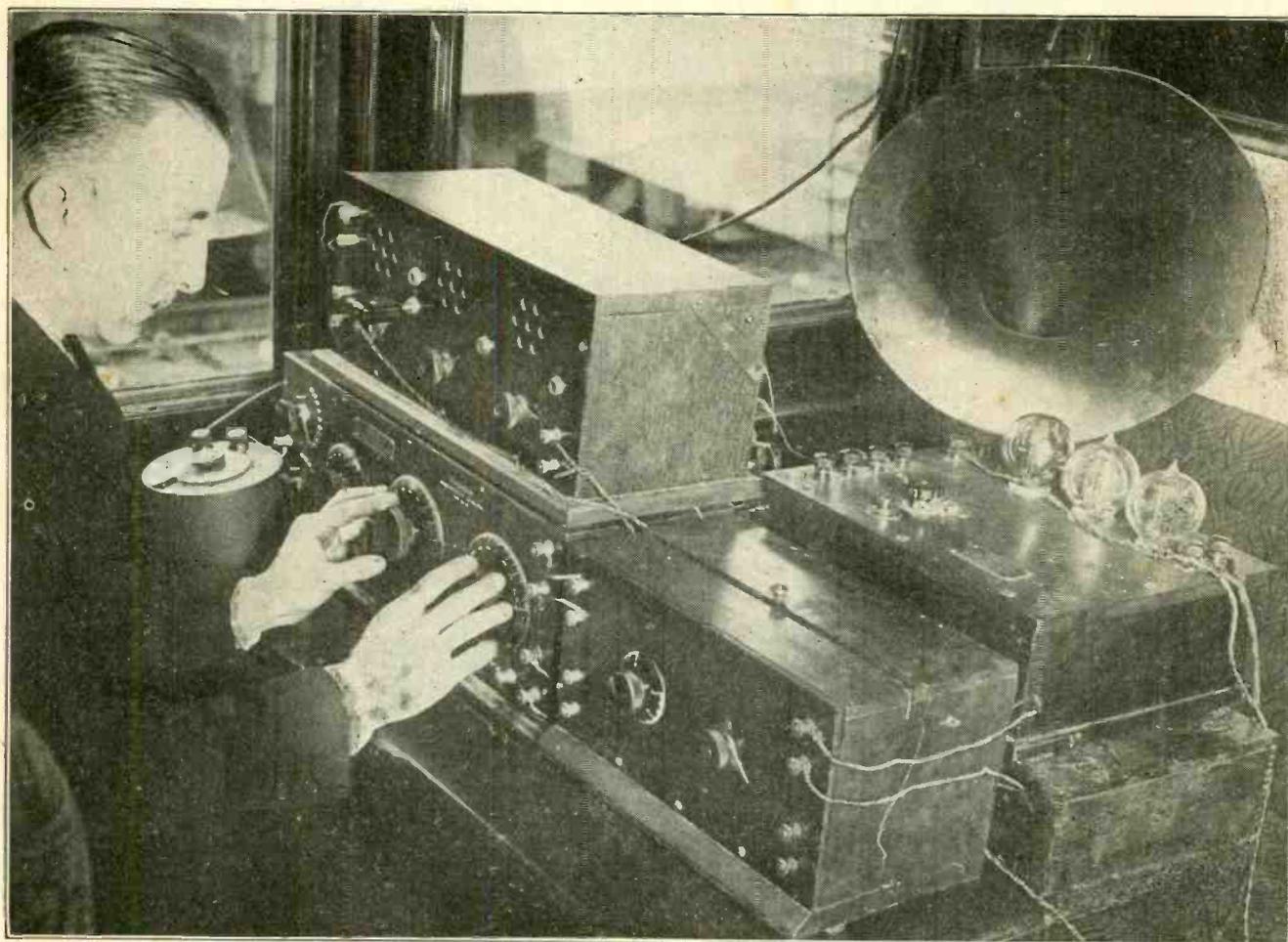
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WORLD

ILLUSTRATED

WEEKLY

Radio Set of a 65-Mile-an-Hour Passenger Train



(C. Kadel & Herbert)

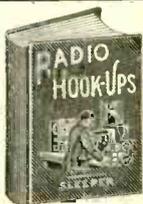
Travelers can no longer say that a railroad journey tires them. The illustration shows how the D. L. & W. R. R. is solving the problem of making a railroad trip a pleasure. Mr. H. Erb is shown operating a radio set on a train going 65 miles an hour. It is not necessary for the passengers to go to the baggage car now, in order to hear broadcasting, for radio is installed in all day coaches and Fullmans, even the drawing rooms of a car have loud-speakers. The set used on the D. L. & W. train is the well-known regenerative with three stages of radio-frequency, two stages of audio-frequency, and a power amplifier to enable faint signals to be amplified to their utmost, so that the low aeriels used on trains may be utilized to the best advantage. On account of these low aeriels, radio-frequency amplification is used.

Broadcasting Most Important Factor in Nation's Existence—See Page 10

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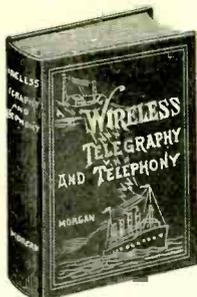
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VOLUME TWO OF
RADIO WORLD

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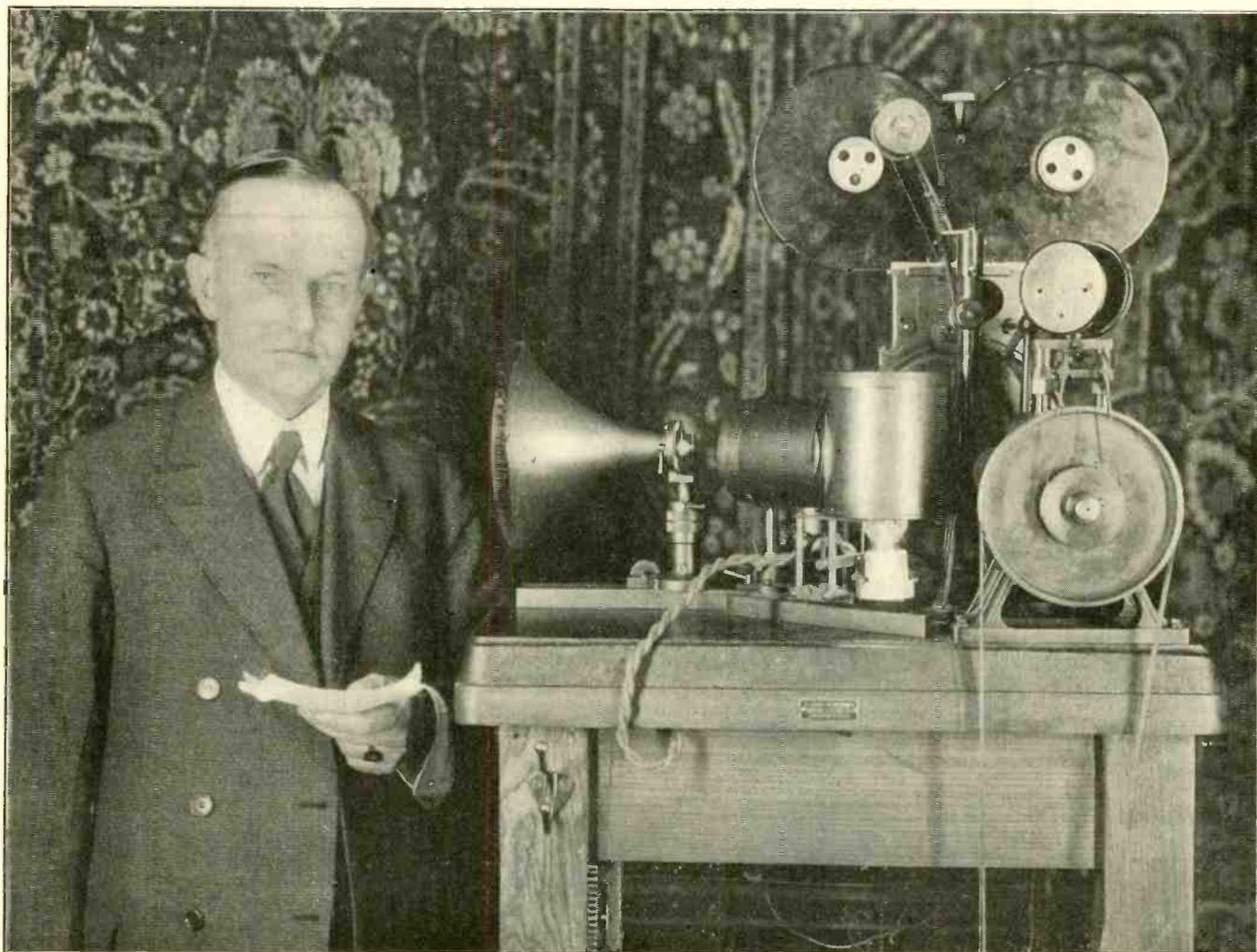
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Vol. II, No. 14. Whole No. 40

December 30, 1922

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The Vice-President Talks by Radio



Vice-President Coolidge standing by the machine which enabled his voice to be broadcast over the country. The device is fully described in the accompanying text.

ONE of the most notable radio events of recent date was the broadcasting of three important speeches to the people, by Calvin Coolidge, Vice-President of the United States; John S. Weeks, Secretary of War, and Edwin Denby, Secretary of the Navy. This was the first time that the spoken words of three of the nation's leading executives reached all corners of the country in one day. The broadcasting was done by WGY, of the General Electric Company, Schenectady, New York. This fact was made possible by use of the pho-

tophone, a new device for photographing the voice and, later reproducing it with perfect clearness. The machine was set up in a hotel in Washington ten days prior to the speech-making. The Vice-President and the War and Navy Secretaries spoke into a small recording-horn. As they did, their voices caused a small diaphragm to vibrate to which is attached a tiny mirror, scarcely smaller than the head of a pin. This oscillation, or flickering, of the mirror reflected a beam of light upon a moving photographic film thus recording the

human voice accurately with the overtones, the delicate shadings of speech, and other characteristics which make one voice sound different from another. The film was taken to Schenectady and was broadcast twice from the WGY studio, the first time at 7:30 P. M. and again at 10:30 P. M. for radio fans in the Western States. In reproducing, the film is passed before a strong ray of light and the zig zag markings on it which the sound waves photograph, create electric waves which pass through an arrangement of vacuum tubes.

How to Make a Single-Blade Vernier

By Ortherus Gordon

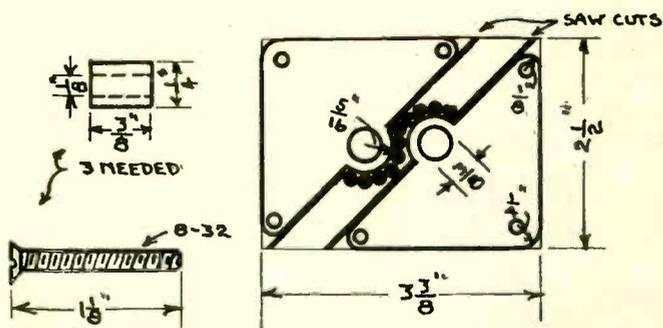


Figure 1—Complete details of the stator plates, bolts, and bushings for the panel mounting of a single-blade vernier.

THE reasons for presenting the workshop plans for a single-blade vernier condenser are many. In the first place, some amateurs may prefer such an instrument over an additional swinging blade on the regular variable, as suggested in a previous article. The present instrument has the advantage of being entirely independent and may be shifted about from circuit to circuit as needed. It has appeared in this form on the market. I have made one for myself and am satisfied that vernier control is necessary for sharp and efficient tuning.

Incidentally, I was curious to determine whether or not the vernier being separate from the main instrument made any difference. Some local amateurs were loud in their insistence that the distributed effect would be greater than the tuned-capacity effect; but I found out that, if such was the case, it was in no way noticeable.

The unit, as it is shown here, is a convenient and well-designed affair. Special pains were taken to make it as simple as possible. All the work may be done with the ordinary tool chest, vise and bench. When finished, the vernier condenser mounts on a panel with the other parts of the receiving set. Mine cost 54 cents, not counting the spare washers and pieces of brass found in my scrap heap.

The stator was made first. I took a piece of brass sheeting (although aluminum or copper will do) about 1/16 of an inch thick and marked it as shown in Figure 1. Owing to the semicircular lugs it was impossible to economize on brass. I cut out the two stator triangles with hacksaw and drill, then smoothed the edges and rounded off the corners with a file. When sawing plate brass, put the brass deep into the vise so as to prevent chattering. Protect the brass with wooden blocks, so the teeth of the

vise will not sink into the surface. The two stator blades were then put in the vise together and drilled in the center with a 3/8-inch hole, and at the corners with 1/8-inch holes, as shown in Figure 1. Since I was designing the instrument for a panel, I cut three short lengths of brass tubing, 3/8 of an inch long, and large enough in inside diameter to take an 8-32 brass bolt with a flat head. In my case, with a panel 1/4

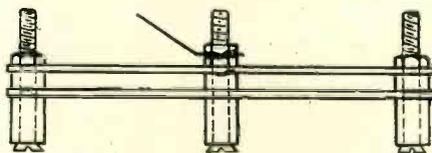


Figure 2—How to put the stator together.

of an inch thick, these bolts were 1 1/8 inches long. Then I took three aluminum washers (although brass or copper would serve just as well) 1/8 of an inch in thickness; and with these accessories, I put the stator together temporarily, as shown in Figure 2.

The rotor blade I cut out of thin brass with shears. It is semicircular, with a radius of 1 1/4 inches. A 1/8-inch hole is bored in the exact center of the blade, so that it will fit over the reduced diameter of the shaft, which is a 1/4-inch brass rod turned down to 1/8 of an inch at one end and threaded with the popular 8-32 die. The making of this shaft, by the way, is one of the jobs of the

instrument. There are three in all; the other two are the making of the fiber space-washers. Everybody isn't lucky enough to have access to a high-speed lathe, but that needn't discourage anyone. The shaft may be built without a lathe in this manner.

Take a short length of brass tubing, instead of brass rod, and tap one end for about 1/4 of an inch down. Then get hold of the ever-needed 8-32 bolt and screw it in until it is solid. Then saw off the head at the required length from the tubing, and presto! the job is done! See Figure 3.

Now, the two fiber washers, or bushings, are problems. It is too bad they cannot be dispensed with entirely; but unfortunately, they are vital parts of the instrument. The rotor must be insulated from the stator. Fiber, or hard rubber, or composition of some other kind are the only materials suitable for making the bushings as shown in Figure 3. I worked many hours to redesign the instrument so that these washers could be omitted. Although I succeeded, I always returned to the washer idea as the easiest way in the end.

I rummaged around in my "odd bits" box and finally came across some old fiber-washers which could be patiently filed until they had something that resembled a shoulder on them. If I remember rightly, it took me two hours to fit those fiber bushings the way I wanted them—to drill them so No. 1 would slide over the 1/4-inch part of the shaft and No. 2 over the 1/8-inch diameter.

The other details, such as the connecting lugs, explain themselves. The assembly was very simple. The washers go in place as shown in Figure 4, and the rest of the parts placed in the one and only way a variable condenser may be put together. Then it is mounted on the panel as shown. A graduated dial,

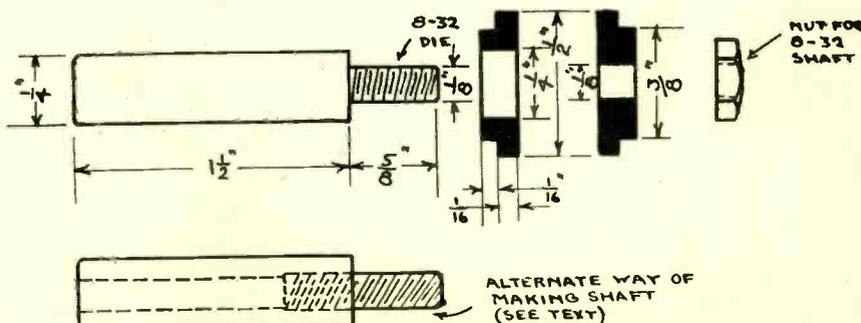


Figure 3—Schematic details of rotor and rotor shaft.

The Ossiphone an English Device Not Sold Here

IN RADIO WORLD No. 35, dated November 25, there appeared an article entitled "With the Ossiphone Even the Very Deaf May Hear Radio," by Ortherus Gordon. It described the invention of Mr. S. G. Brown, London, England—a simple instrument which, it is claimed, conveys sound to the brain by enlisting the aid of the bones in the body of the deaf person, hence its name.

So many inquiries have come to the offices of RADIO WORLD, since the publication of this article, from deaf persons who want to know where the device may be purchased, that the editors wrote Mr. Gordon for further information on this on this point. We publish his letter herewith.—THE EDITORS.

EDITOR RADIO WORLD: In reply to your query regarding the ossiphone, I am glad to give what further information I can about that instrument.

The ossiphone was invented over a year ago by Mr. S. G. Brown of London. He designed it for use with an instrument which he called an "aural box" into which a person desiring to converse with a deaf person spoke. This aural box was nothing but a sound-box and microphone, which relayed its vibrations to the ossiphone which the deaf person held in his hand with the knob pressed tightly against a knuckle. Then it was discovered that a radio receiver could be substituted for the aural box with wonderful possibilities for the deaf.

As far as I know, the ossiphone has

Radio-Wire Tables

By Frederick J. Rumford, E.E., R.E.

No. 5—Double Silk-Covered Wire

Showing the Number of Feet in a Pound and Fractions of a Pound

APPENDED is the fifth of a series of five tables of radio wires which the amateur will find useful for many purposes.

Size	1/8 lb.	1/4 lb.	1/2 lb.	3/4 lb.	1 lb.
20	39	78	156	234	312
21	48	96	192	288	389
22	61	122	244	366	493
23	78	156	312	468	631
24	99	198	396	594	779
25	120	240	480	720	966
26	150	300	600	900	1202
27	192	384	768	1152	1542
28	239	478	956	1434	1917
29	310	620	1240	1860	2485
30	363	726	1452	2178	2909
31	460	920	1840	2760	3683
32	581	1162	2324	3484	4654
33	711	1422	2844	4266	5689
34	888	1776	3552	5328	7111
35	1066	2132	4264	6396	8534
36	1254	2508	5016	7524	10039
37	1333	2666	5332	7998	10666
38	1777	3554	7108	10662	14222
39	2064	4128	8256	12384	16516
40	2666	5332	10664	15996	21333

The following tables have already been published:

- No. 1—Enameled Magnet Wire, RADIO WORLD, No. 34, dated November 18.
- No. 2—Single Cotton-Covered Wire, RADIO WORLD, No. 35, dated November 25.
- No. 3—Double Cotton-Covered Wire, RADIO WORLD, No. 36, dated December 2.
- No. 4—Single Silk-Covered Wire, RADIO WORLD, No. 38, dated December 16.

not yet appeared on the American market. I have reasons to believe that it is on the market in England; but an examination of English periodicals does not reveal an advertisement to that effect. I had some inquiries from readers of the RADIO WORLD in regard to the manufacture of the ossiphone, and I

cautioned all to be careful of patent infringements. Such an invention as the ossiphone is certain to be protected in every civilized country in the world.

There is one man in England who, perhaps, could give information on the commercial aspect of the ossiphone. He is Mr. Philip R. Coursey, editor of "Wireless Age," London. He may even put a correspondent in touch with the inventor.

I realize the immense utilitarian benefit of the ossiphone.

(Continued from preceding page)
or a plain knob, is added as desired. The instrument is connected either in series or in parallel, the result

being the same. I have no idea what the capacity of this home-made instrument is, but it is small enough to make tuning a critical function.

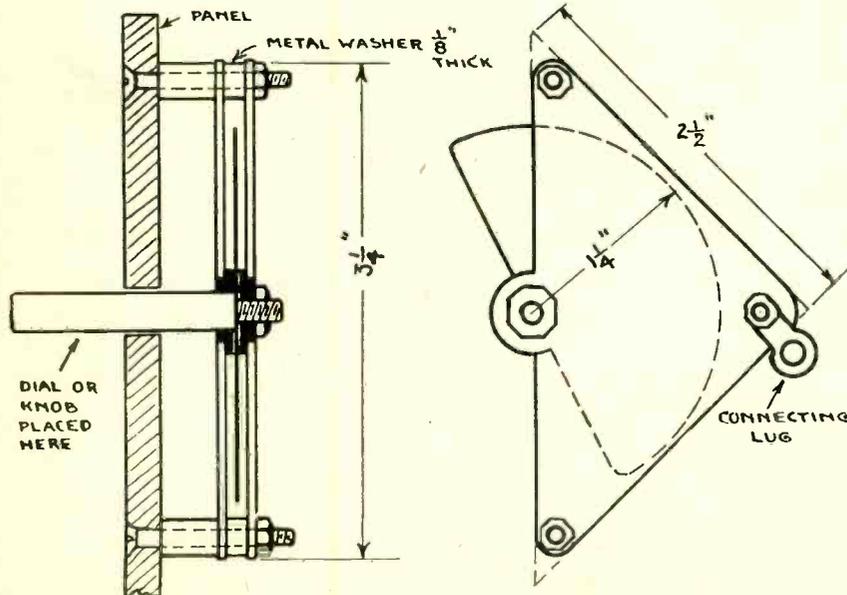


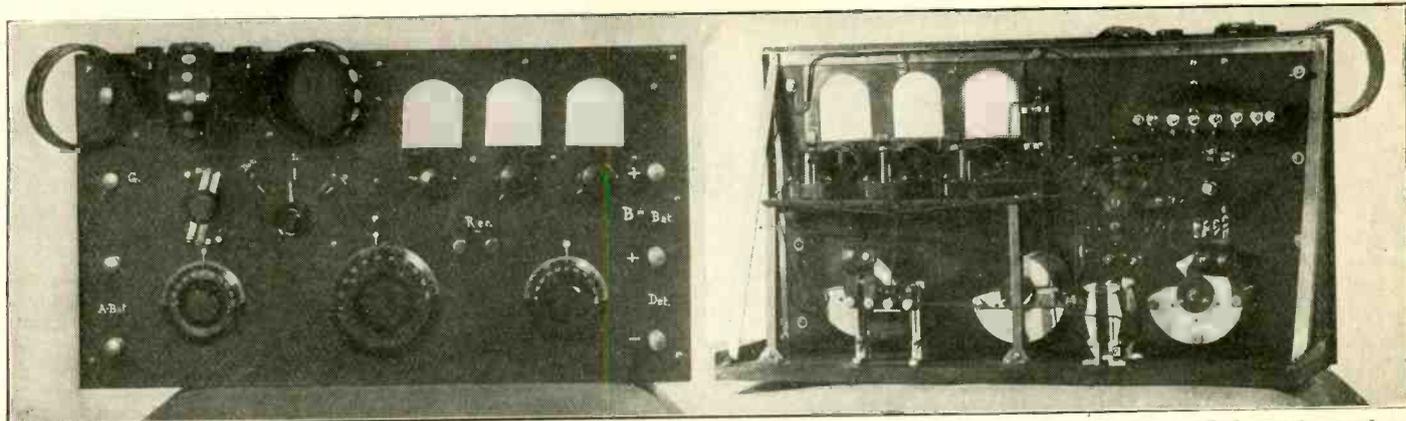
Figure 4—Assembly of the single-blade vernier condenser, as described by Ortherus Gordon, showing also the manner of mounting on the panel.

Damped Waves in Spark Sending Waves

By George W. May, R. E.

FOR radio telegraphy, sending is accomplished with a high-voltage spark capable of producing from 150 to 200 sparks a second. Each of these sparks produces a radio-wave train having from 15 to 25 waves which have a frequency of about 1,000,000. Imagine a space of 300,000,000 meters containing 150 or 200 short-wave trains, equally spaced, the length of each little wave train being very short compared with the space between them.

The radio signals would then consist of dots and dashes containing a large number of noises made on the receiving apparatus by a larger number of these wave trains; while the dots would consist of a smaller number of wave trains which would produce the buzz for a shorter time.



Front and rear views of the set designed and constructed by Edward Pina. The utmost care was taken in its construction. All the work was done under conditions which might impel the average amateur to doubt. It is worthy of note that, in point of construction, there are few sets that can surpass it. Note the specially designed anticapacity directly above the amplifying transformer and between the two condensers. The honeycomb coils were designed and hand wound by the builder especially for short-wave work.

Prize Set Built on Kitchen Table

FOR originality and clever wiring there is much to admire in the set, described in this article, the work of Mr. Edward Pina, an amateur, residing at 326 West 20th street, New York City. All the work on this set was done on the kitchen table of his home, without the use of any tools except those generally found in an amateur's shop. It serves to illustrate how an amateur, if he is a careful worker and takes his time, can construct apparatus that is comparable to many of the manufactured sets in point of construction. The features of this set are:

By John Kent

Panel made of special hard fibre. Original anticapacity switch controlling, independently, the detector and each amplifier without the use of jacks and plugs.

Specially wound honeycomb coils for reception on 360 to 400 meters, 600 to 800 meters, and so on.

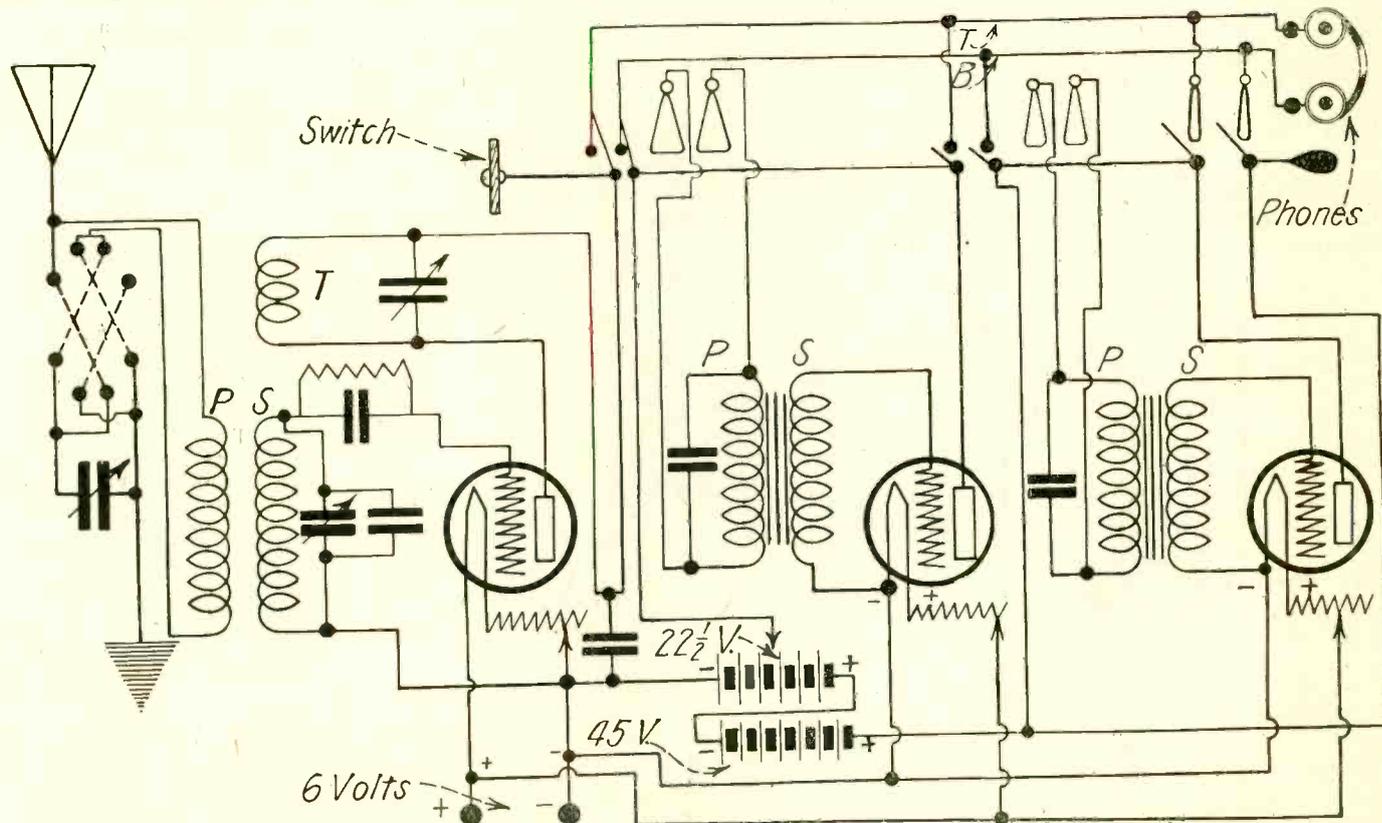
Flexibility by the use of series parallel switches.

In the rear view of the set may be seen the special anticapacity switch, located right over the transformer. It is constructed in such a manner

that the detector is connected at all times while the amplifiers are thrown in or out as desired. All leads are materially shortened by use of this switch. It is an enormous help in short-wave work.

All the variable condensers are equipped with clips which allow small fixed-condensers to be placed in parallel with them. This allows a fixed increase in capacity which, the builder has found, helps considerably in short-wave work.

This set won a prize at the Evening Telegram Radio Show, held in the 71st Regiment Armory, New York City, last May, before it was



Schematic diagram of the connections of Edward Pina's set. The anticapacity switch is shown on the upper portion. It is so arranged that the switch arms of the detector are connected either to the phones or the first stage of amplifier. By reason of the fact that the arms of the amplifier side are wider, they permit the second step to be connected in by just a slight turn of the handle. A fixed condenser is shunted across the regulation secondary-condenser and, also, across the primaries of both amplifying transformers.

Construction of a 1½-volt Wet Cell

By Robert L. Dougherty

IN the past few months, the 1½-volt tube has come into general use. One of the great drawbacks in using a dry cell in connection with this tube is its short and uncertain life. You may operate your set, to-night, on the dry cell and suddenly find that your battery is going "dead," and you will miss a fine concert just because you have no other battery on hand—and all the stores are closed.

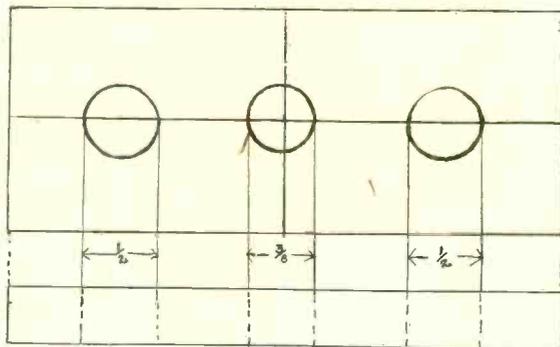
While the wet cell has its drawbacks, if it is placed in a conspicuous place it is not as attractive as a manufactured dry-cell with its nicely printed outside cover, but it has the advantage of being fairly constant. If care is taken to remove the elements after using the cell, and washing them in water—which is an easy matter—it will last many hours longer than any other dry cell. Its elements can be easily and cheaply replaced.

There are two kinds of batteries that will lend more readily to home construction than some of the others—salomonic and sulphuric-acid cells.

In the salomonic cell there is not the danger generally attributed to the sulphuric-acid cell, although the elements used in the construction of both cells are identical.

The necessary materials are 2 carbon rods, about 5 inches long and ½ inch in diameter; 1 standard wet-battery zinc; a small fruit jar, or

Figure 1. Diagram showing how the three holes should be bored in the block of wood in the construction of a 1½-volt wet cell. The correct measurements and guide lines are also given. The wood may be cut in circular shape, the exact fit of the jar, if a neater-appearing finished article is desired.



large tumbler; a few ounces of salomonic, and a piece of wood.

Drill the wood in the same manner as shown in Figure 1, and put the three elements in the two carbon rods on the outside and the zinc in the center. It is best that the carbon rods be held in place by a couple of wood screws, as this will make it easier to connect them. The carbons may be connected by a narrow metal-strip. Fill the jar about three-quarters full with water and add the salomonic until no more will dissolve. The completed element is then immersed in the solution and the battery is ready to connect up. Such a cell will furnish 1½ volts. Where it is advisable to make a neater-looking job, the wood may be cut in circular shape, the exact fit of the jar.

The second battery uses a sulphuric-acid solution, in connection with an element made identical to the one above. Sulphuric acid is a

dangerous material if not handled carefully. If spilled on anything, it will eat in quickly. In case of such an accident, wash immediately with ammonia. Be sure that you don't mix any of the ammonia with the solution in the battery.

The solution should be made up as follows:

One part bichromate of potash, 1 part sulphuric acid (10 per cent solution) to four parts of water.

Fill the jar about ¾ full with this solution. Put in the elements and the cell is ready for use.

Always be certain to pour the acid into the water, otherwise the acid will spatter due to the heat generated in the chemical action.

The only replacements are occasionally a zinc and a carbon element, and a few drops of water as the solution evaporates.

Any number of these cells may be hooked up in series for any voltage wanted.

(Continued from preceding page)

completed. It won on points of construction alone, as it was not completely wired when exhibited and could not be operated.

The panel is supported by upright brass standards fastened to the baseboard and running completely around the outside of the panel.

It took over three months to construct this set, Mr. Pina working from 7 until 10:30 every evening. This will give the reader some idea regarding the pains taken in order to perfect it. Every article used is of the finest make.

"Any amateur," said Mr. Pina to the writer, "with a little time and trouble, can construct apparatus. The only thing necessary is ability to handle tools and patience to do a good job thoroughly."

Subscribe for RADIO WORLD. \$6.00 a year, \$3.00 six months, \$1.50 three months.

B. of S. New Radio Work

Directive Radio-Transmission Tried on a Wave Length of Ten Meters

THE enormous increase in the use of radiotelegraphy and telephony during the past two years has created a demand for apparatus capable of being operated with a minimum of interference. Wherever the need is not for broadcasting but for point-to-point communication the case seems hopeless, unless directive transmission can make it possible. Directional transmission on very short wave lengths (below 20 meters) may offer a solution to this problem.

Recent reports by Marconi, Franklin, and others show that interesting and valuable data have been obtained on directive radio transmission using wave lengths below 20 meters. The Bureau of Standards has just completed a series of similar experiments, the preliminary results of which confirm the work of these investigators. The experiments conducted at the Bureau of Standards were made with a parabolic reflector (cylindrical type), which was designed for a 10-meter wave length. It was made by constructing a parabolic wooden frame with an aperture of one wave length. This frame

was suspended in the air and 40 wires spaced 1 foot apart were suspended from it. The source, located at the focus, consisted of a 50-watt electron tube. The output from this tube was coupled to an antenna, which was a linear oscillator of the Hertzian type, which was tuned to a wave length of 10 meters. The complete reflector system was arranged so that it could be rotated.

Numerous polar curves were obtained by rotating the reflector and taking readings of the received current at every 10° position of the reflector. The receiving apparatus was located 170 feet from the reflector in most of the work and consisted of a loop antenna (single turn) with a thermoelement in the loop circuit. A portable galvanometer was connected to the thermoelement.

With all adjustments correctly made at the reflector, good directional transmission was obtained. With the reflector turned 20 degrees from the direct line to the receiver, the received current dropped off to one-half of what it was with the reflector directed to the receiver. There was practically no radiation over an angle of 270 degrees, while the majority of the radiated power was confined to an angle of 30 degrees.

98 Stations Now Send Weather News

United States Government Radios 8,000 Words Daily of this Important Information. One Great Lakes Station Handled 150,000 Words from June to December

IN order to get an idea of the immensity of the weather broadcasting carried on daily, an estimate of the number of words transmitted daily by the Governmental stations is fixed at 8,000. A reduction is made on Sundays, when approximately 6,000 words are handled. At the Naval station at Alton, Illinois, approximately 150,000 words are handled during the Lake shipping season between April 15 and December 15. This is one of the largest traffic schedules of the whole system of 98 stations.

Radiotelegraphy, although an invaluable factor for several years in receiving and sending data on weather to and from ships, was not recognized until recently as a medium for the general dissemination of forecasts, according to Professor C. F. Marvin, chief of the United States Weather Bureau, in his report to Secretary of Agriculture Wallace.

The use of radio by the bureau, throughout the country, was limited because of the necessity of using code, he explains. "With the intro-

By W. R. Service

duction of radiotelephony, which makes it possible for anyone to receive the messages in spoken words, the broadcasting of information over the interior has increased enormously," he declares. A year ago, the daily forecasts of the Weather Bureau were broadcasted from twelve stations in seven States, principally by radiotelegraphy; whereas, on July 1, 1922, ninety-eight stations in thirty-five States were carrying daily weather forecasts and warnings chiefly by radiotelephony.

Government and Private Stations Used

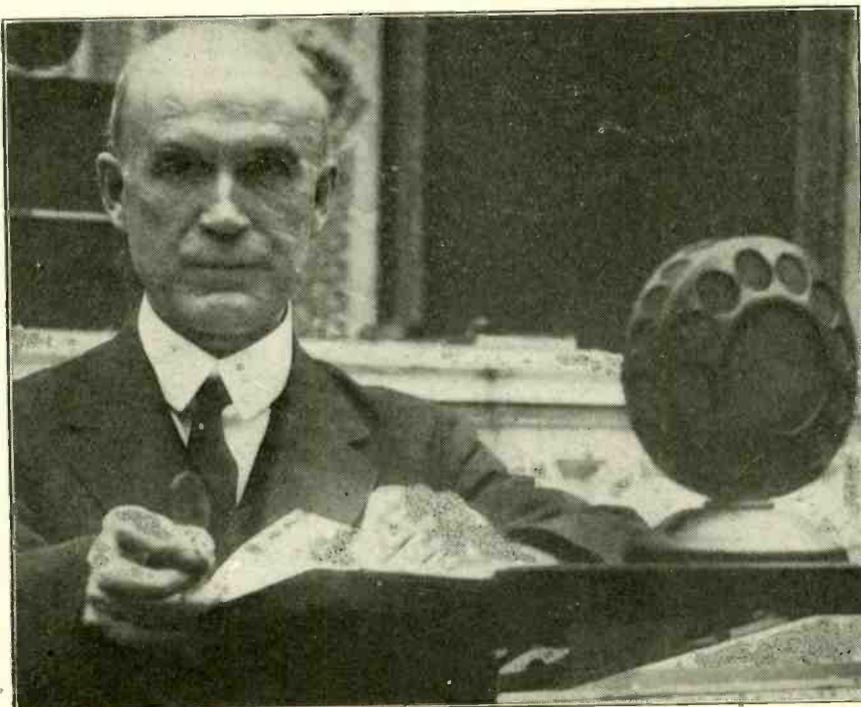
All broadcasts are sent out from governmental, commercial, and private stations, without expense to the Bureau. A special wave of 485 meters has been assigned by the Department of Commerce, and to avoid interference and duplication, only two stations in a city are licensed to transmit weather information, although many others

would gladly cooperate. It is estimated that, at the end of the year, 25 per cent. of the licensed broadcasting stations were engaged in distributing this valuable meteorological information. The broadcasts are supplied to the radio stations from neighboring meteorological stations by telephone. Undoubtedly the service could be placed on more efficient basis and materially extended, the Chief of the Bureau states, if funds were available for telegraphing information to radio stations not now included in the system, and engaging more employees.

The value of radiotelegraphy in this special service has been demonstrated, Professor Marvin declares, pointing out that its future usefulness "cannot be estimated." Hundreds of farmers who do not get a forecast service by the telegraph, or through the daily press, and for whom code broadcasting was of little use have installed receiving sets during the year. They now obtain the weather forecasts and warnings, so important in their occupations, as promptly as do business interests in urban communities. A great future increase in rural receiving stations is inevitable, the weather officials believe.

Another important accomplishment in radio work during the past year, was the inauguration of a program of broadcasting the twice-daily forecasts, cold wave, frost, and other warnings and information issued for the States lying in the Chicago and Washington forecasts districts. From April to November, a summary of weather conditions as they affect the crops during the week preceding is also included. This service began in June, 1922. Radiotelegraphy and high wavelengths are utilized, as telegraphy is more reliable for long-range transmission. The radio-receiving stations, equipped for high-wave reception, receive a direct service thereby, and local radiophone stations are enabled to broadcast for their districts. Material extensions were also made during the year in the radio-bulletin service for the benefit of marine and aviation interests. The chief of the Weather Bureau is gracious in his thanks to the officials of the Naval Communications Service

Congressman Fess Makes Radio Speech



(C. National Photo and Wide World Photos)
Congressman Simeon D. Fess, of Ohio, about to make a speech by radio, in the House of Representatives. At the right is the microphone to catch his remarks. This is not to be a regular Congressional "stunt." It was simply a "try-out." And it worked.

Peanut-Tube Hook-Ups I Have Used Successfully

By P. F. Metzler

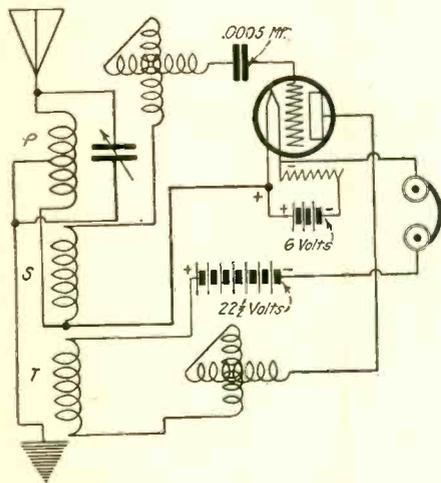


Figure 1—Schematic diagram suggested by Mr. Metzler. Note that the ends of the primary and secondary are connected for fine tuning. The use of the tickler coil, in conjunction with the variometers, gives a very selective circuit, and one that oscillates freely. Drawn by S. Newman.

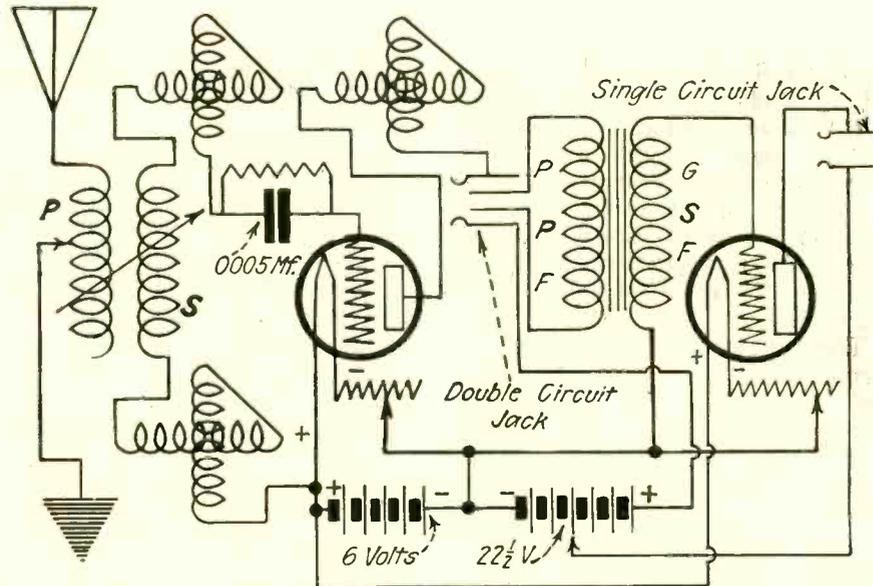


Figure 2—In the above circuit the third variometer in the filament gives stability of oscillation, making the circuit oscillate over the entire range of the coupler. Drawn by S. Newman.

MANY diagrams have been published of hook-ups employing standard makes of vacuum tubes—both detector and amplifying tubes. I will describe a few hook-ups employing the Welsh relay radion or “peanut” tube. The more I experiment with this little tube, the better results I have secured, especially using it as a detector tube.

The construction and arrangement of the coils used in these hook-ups were fully described in my article in RADIO WORLD, No. 26, dated September 23.

In Figure 1 accompanying this article, you will note that the end of the primary and the end of the secondary connect to the filament. I might suggest that a switch be placed here so as to disconnect the primary and the secondary at will, as with the connections shown it is more difficult to tune as it is much sharper. While the spark stations are not operative let this connection remain loose; but when one starts up, make this connection which practically cuts them out. Note that no grid leak is used with this hook-up.

In Figure 2 either a vario-coupler or a loose coupler, may be used. A variable condenser also may be used in the primary circuit to great advantage. You will note that this is a little different from the other hook-ups using two variometers. The one in the filament end of the secondary makes it much more selec-

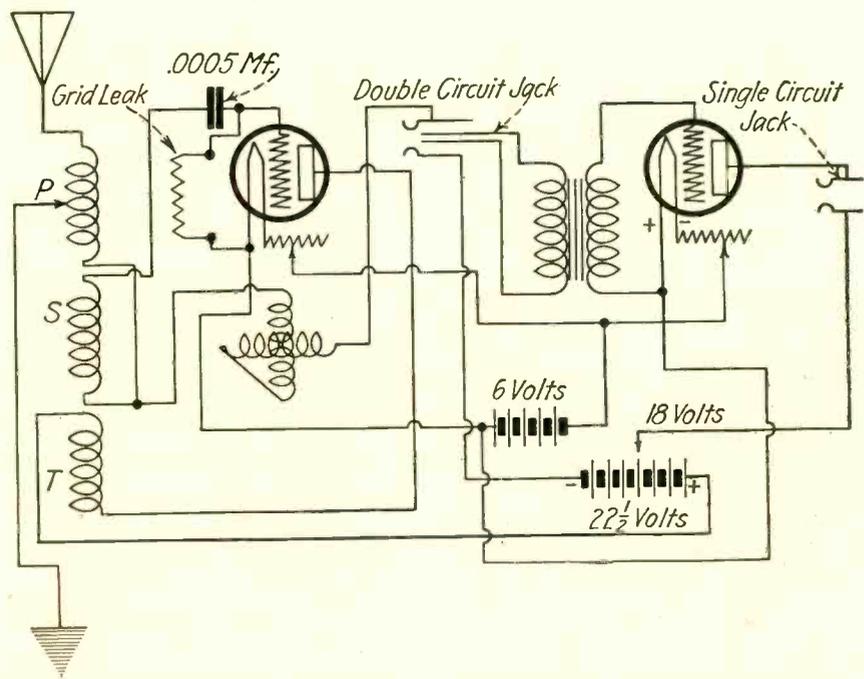


Figure 3—As in Figure 1, the end of the primary is connected to the end of the secondary. Note also that the grid leak does not shunt the condenser but, instead, connects from the grid side of the condenser to the side of the filament.

tive and also helps to make the circuit oscillate more powerfully.

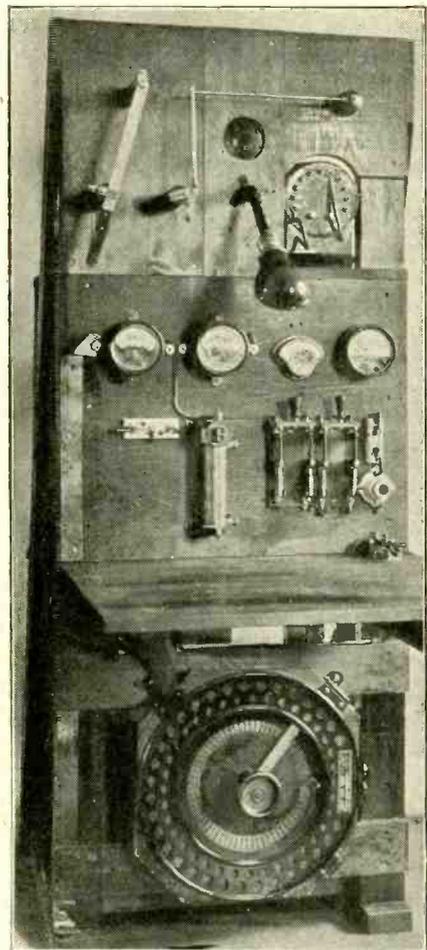
In Figure 3 the grid leak leads to the filament and does not shunt the condenser. This arrangement was found most satisfactory. In both Figures 2 and 3, there are but 18 volts used on the amplifying tube for the plate voltage. This is, of

course, operated with Welsh radion relay.

I have been successful with all of these hook-ups. For instance, on the night of November 29, I heard WZY, KDKA, WJZ, WBAP, WHK, WHAS, WMH, WGM, 2XC, WOC, 2XY, WSB, WFAT, WIGR, WJAH, and WMAB.

Latest Device to Send Speech by Radio

By S. R. Winters



Front view of electron-tube transmitter of completely modulated waves, described in the accompanying article.

SPEECH modulation of radio-frequency currents is responsible for radiotelephony and its fascinating applications. The vibrations of speech are complex and the task of any form of telephony is to faithfully copy, or reproduce, electrically, at the receiving point the sound wave voiced at the transmitting station. The telegraph key, used in the transmission of dots and dashes, is the visible difference between radiotelegraphy and radiotelephony. In the latter mode of communication, the telegraph key is displaced by means capable of varying the antenna current employed in transmission to harmonize with the sound waves of the voice. A carbon microphone is the device commonly employed for this purpose.

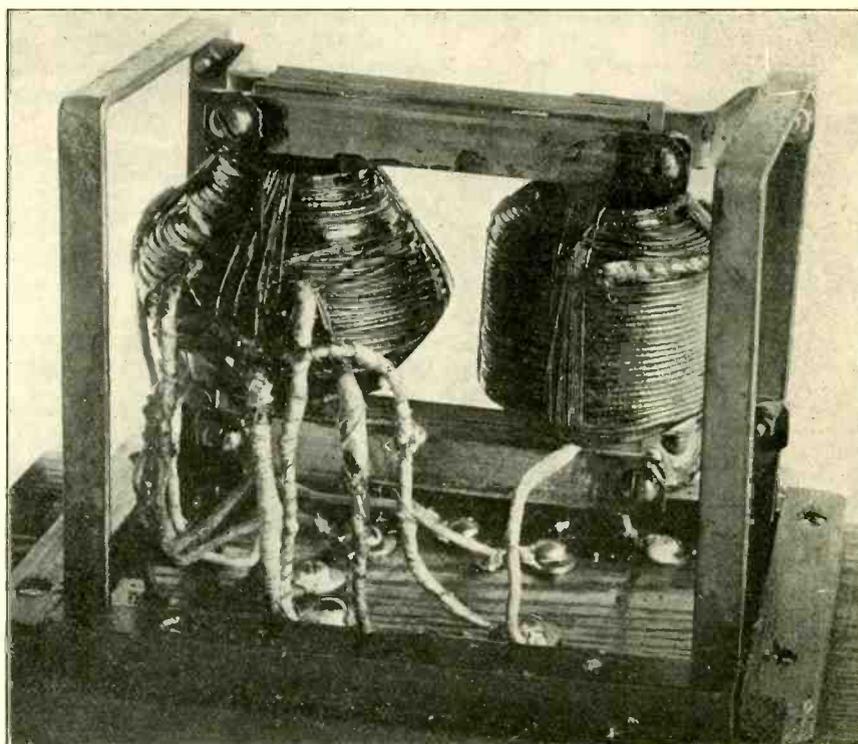
Credit for a new invention belongs to Lewis M. Hull of the Radio-Communication Section of the Bureau of Standards, United States Department of Commerce. The apparatus has been vested with such

structural features as to command attention in three particulars: The possibility of operating an electron-tube transmitter from the exclusive sustaining strength of an alternating electric-current source which compares favorably in efficiency with similar sending apparatus utilizing direct current; the requirement of a high-voltage generator or battery is obviated; and, finally, it has the additional virtue over a continuous-wave transmitter in that the communications transmitted thereby may be received over a limited distance by use of a non-oscillating detector. The application of this apparatus in fog signalling and direction finding experiments held at the Bureau of Standards have proved the above claims.

This transmitter employs a type-P pliotron tube. The plates, as well as the filament, are fashioned of tungsten and the former are stamped with rings having a common center, to avoid twisting or bending when subjected to excessive heat. A companion unit of the type-P pliotron tube, in the operation of this transmitter, is a 500-cycle, 150-volt alternator. The power output of this storage-house of electric energy exceeds 200 watts in an antenna having from 8 to 15 ohms resistance and

a natural wave-length below 200 meters. The adjustable wave-length range extends from 500 to 1,000 meters. The result is the ability to radiate completely modulated electromagnetic waves, rendering feasible their reception by means of crystal detectors. The original experimental unit was designed to operate at short wave-lengths.

The compensating winding of the filament-circuit transformer, illustrated in one of the photographs, consists of 100 turns of No. 16 wire, with a tap every dozen turns from 30 to 100. The filament rheostat lends itself to service in adjusting the filament electrical-impulses for any steady value of primary voltage on the transformer. The series compensating winding also makes it practical to adjust the transformer to the source of electric supply in the circuit so that the filament strength may attain a safe maximum when the load is thrown on. The inventor of this transmitter suggests that if ample power is available from the generator it is advisable to overcompensate the transformer, thereby rendering it possible to heat the filament at curtailed electric consumption except when the key is pressed. The incorporation of the series compensating winding in the filament transformer was considered



Filament transformer showing compensated winding used in connection with the electron tube transmitter of completely modulated waves.

Radiograms

The Latest Important Radio News Briefly Told for the Growing Army of Radio Fans

THE "Missouri Broadcasters' Association" has been organized, seeking to eliminate radio interference in the interest of transmitting stations and owners of receiving sets. Their rearrangement of broadcast schedules eliminates practically all of the troublesome interferences which have been increasing for the past three months among Missouri broadcasting stations. This reorganization of radio programs doubles the value and service of the average receiving set, and marks a new boost resulting in increased demand for complete sets as well as for the assembling of home built receivers. The officers of the Missouri Broadcasters' Association are Jedell Mayes, president; Leo Fitzpatrick of Kansas City, secretary.

Radio will carry the inaugural address of Governor-elect Alfred E. Smith throughout New York State on January 1. Transmitting apparatus will be placed in the Assembly Chamber, where the ceremonies will be held, amplifiers in the Senate Chamber and on the Capitol steps will transmit the address to the assembled crowds, while thousands of private radio stations will receive the message broadcast.

A cable was sent recently to the amateurs in England to tune in their radio instruments on the 360 meter wave length to listen to H. Gordon Selfridge, jr., who broadcast from the Radio Corporation—Westinghouse Station WJZ at Newark, New Jersey. Mr. Selfridge, jr., assistant manager of the Merchandising Division of the Great London Store, is on a three months' tour in the United States investigating the methods of the American department stores. His father, Harry Gordon Selfridge, is a post-graduate of Marshall Field & Company, Chicago. Mr. Selfridge, jr., on his return trip from the Pacific Coast heard a concert from WJZ while he was in Kansas City. He hopes that this experiment will result in establishing really satisfactory reception of an American station in the British Isles.

Slackers in church contributions are not going to be able to hide behind the radio set. According to the size of a check received by a New York church after the broadcasting of one of its services the radio audience is more deeply touched than the church audience. From one little family which listened in

on the church service came a check for \$11.35. Multiplying this amount by the number of families to whom the radio church service has become an establishment it is seen that the total represents more money than is taken in by all the churches combined in a year's time.

President Scripps, of the United Press, has started out on a two years' cruise of the world, accompanied by radio. He will make the voyage on his 152-foot yacht, "Ohio," which has a cruising radius of some 9,000 miles. The first stop will be Jacksonville, Florida. A 2-kilowatt spark transmitter and a complete receiving equipment have been installed on board and are in charge of J. L. O'Connell, operator. Mr. Scripps wants to keep in touch with the world.

A young-lady singer participating in a broadcast concert at Anaconda, Montana, was heard by relatives at Alert Bay, 2,000 miles away. They were greatly surprised when, listening in, they heard her voice for the first time in five years.

Radio operators on ships in the Pacific tune in on Honolulu station for the midnight time-signals, and then by a quick adjustment catch the noon time-signals from Nauen, Germany.

The Public Health Service wishes to learn the extent of its radio audience through an appeal to all who "listen in" on its broadcasting programs to communicate by post card to the Surgeon General, Public Health Service, Washington, D. C. Officials of the service declare that they believe theirs is the greatest radio audience in the world, as health programs are regularly broadcast from ten different stations scattered from coast to coast, but they desire to back up their belief with facts.

A musical program, broadcast from WGY, Schenectady, New York, was plainly heard at Cherbourg, France, by the chief radio-operator and others on the steamer "America" while the ship was at dock in that port. Dr. W. R. Whitney, director of the General Electric Company's research laboratory, who is traveling abroad, talked with Chief Operator Black of the "America" and learned for the first time that WGY had successfully bridged the Atlantic. According to Dr. Whitney, Operator Black stated that a concert from the Schenectady station had come in so well that when he removed the telephones from his ears and laid them on the table in his room the music was plainly audible to those nearby. Cherbourg is 3,100 miles from Schenectady. This feat establishes a WGY record for transmission to the East only. This station has been heard in Hilo, Territory of Hawaii, which is 5,200 miles from Schenectady by direct air-line.

KGB, the Tacoma, Washington "Ledger"-William A. Mullins Electric Company radio broadcasting station, is inaugurating a novel feature. It is planned to broadcast weekly reviews of the current leading radio periodicals and books, published in the interim, reading these reviews over the radiophone on a regularly assigned day each week. The reviews will be prepared with care by a staff of three—two radio experts to digest the material and a newspaperman to write the reviews.

Radio added luster to the "Tree of Light," the huge Christmas tree annually given a place in Madison Square, New York City. The Radio Corporation of America installed a set in the branches, with several powerful voice projectors. The special program from WJZ was given, and thousands heard radio for the first time.

The present laws governing radio transmission in England and France prohibit their amateurs from using more than ten watts, which limits their range, but on December 21, when they began transmitting their signals to American amateurs, they were permitted by their governments to use 1,000 watts, which will enable them to participate in the tests involving two continents. The French amateurs transmitted on wave lengths between 180 and 300 meters.

As Coué Might Say:—

"Week by week, in every way, RADIO WORLD is getting better and better."

The Beginning of a "Bug"

By R. L. D.

(With Apologies to K. C. B.)

JUST THE OTHER night,
I MET a friend of mine
I HAVEN'T seen in years;
AND, OF COURSE, we told each
other * * *
JUST how much * * *
WE THOUGHT each had changed,
AND HE invited me * * *
UP TO his house * * *
AND I ACCEPTED the invitation.
I WAS introduced * * *
TO HIS wife * * *
AND his son * * *
AND LITTLE daughter.
AND HIS RADIO SET—
HE TRIED to get me
INTERESTED in * * *
IT but I couldn't * * *
SEE HOW any grown man
COULD SIT at a table
LIKE HE did * * *

AND FOOL with a lot of knobs
AND FIDDLE WITH levers
UNTIL I heard a man
TALKING, AND he said:
"THE NEXT selection played
BY MISS SMITH will
BE 'MEDITATION' from 'Thais.'"
AND THAT IS my favorite
PIECE OF music.
AND IT WAS SO
WONDERFULLY clear and
NICE that when * * *
MISS SMITH finished
I APPLAUDED loudly,
AND THEY laughed at
ME! * * *
AND, anyway, next
WEEK I'm going
TO BUY A BIG one
FOR MYSELF alone.

Radio and the Woman *By Crystal D. Tector*

A FRIEND dropped in the other day. Spying my radio set, she made a wry face and said: "Oh, mercy! Has your husband one of those things, too? My Joe bought one about two months ago, and since it is working, he comes home, rushes through his supper and then goes and puts those phones on—and he doesn't budge until about twelve o'clock. He is as talkative as a stone; and every time I start to say something, he either shushes me or else looks with that far-away look. It's simply terrible! It's worse than living with a mummy." I wonder what she would say if he didn't have the radio "bug" and went out every night. She should be glad that she has something to keep him home.

WELL, who would have thought of it but a woman? I went visiting the other afternoon. It was raining and my hostess had a sore foot. No one had thought to bring knitting. Do you know what we did? We got out her son's buzzer-practice set and sat there all afternoon and learnt the code. And we formed a little club and intend to practice every Tuesday afternoon until we are all able to copy twenty words a minute. Then we are going down and get first-class licenses.

I THINK it is just terrible! I refer to the way the average radio salesman imposes on the average customer. I was listening to a young man who thought he knew more than is good for him, talking to a poor little confused woman who had the perfectly good intention of buying her cousin a set for his Christmas. Something like this took place:

"Well, madam, you see if your antenna hasn't sufficient length, you will have to add inductance into the primary circuit. Then again if—" and so on for about fifteen minutes until the poor thing was so confused that I interrupted and said:

"Listen, here, young man! You aren't talking to Professor Steinmetz. Tell this young woman just what she'll need in order to set up a simple set."

He looked at me and blushed. Later, when in the subway to make a dinner engagement, I saw the same young man closely studying a book. It was a well-known volume on making radio simpler for the layman.

I RECENTLY bought a fairly large map of the United States, in order to keep a record of broadcasting stations, but found that putting ink and pencil marks on it didn't improve its appearance any. So I went out and bought a number of large colored thumb-tacks and printed the call letters of the stations on them. Then I took a piece of string and pasted small pieces of paper on it to represent distance. When I hear a new station, I apply another thumb-tack. I have a ready reference both as to stations received and the actual distance they are located from my town.

FRIEND HUSBAND and myself went visiting last week—and we didn't enjoy ourselves one bit. Sonny had a nice radio set and there was a good program on; but he kept switching around all the time to see if he "couldn't get it in louder." The result was that it sounded like a Chinese cabaret.

VISITED the editor of RADIO WORLD last week to wish him Merry Christmas. I never knew that one man could keep so busy. I remained in his sanctum about ten minutes and then just had to get out. He made me ashamed of myself for loafing. He blamed it all on National Radio Week. I believe him. I think that National Radio Week has done more to stimulate radio than any one thing that has happened since Marconi became a "bug."

EVER since amateur radio communication has been established between France and the United States, Friend Husband has seriously considered "scrapping" the set. He is worried over the fact that the French stations might start broadcasting the latest fashions, and, he says, when they start doing so the American husband owning a radio set will be kept broke buying new clothes. How good of him to think of others!

HE was a neighbor of ours for about a week. Friend Husband met him on the train, and invited him to drop in and listen to a radio concert. During the intermission, like a lot of other "hams," I began to cut loose in all the latest radioese. I kept it up for about fifteen minutes—and all the time he was smiling sort of funny. Finally he and Friend Husband got to talking about business. F. H. confessed to being a lawyer, and then our guest sprung the surprise of my young life.

"I'm consulting engineer for one of the largest radio companies in the country," he glibly uttered.

Friend Husband is still alive. But he'll laugh himself sick if he isn't careful.

Radio Adds Joy to Her Home



(C. Kadel & Herbert)

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

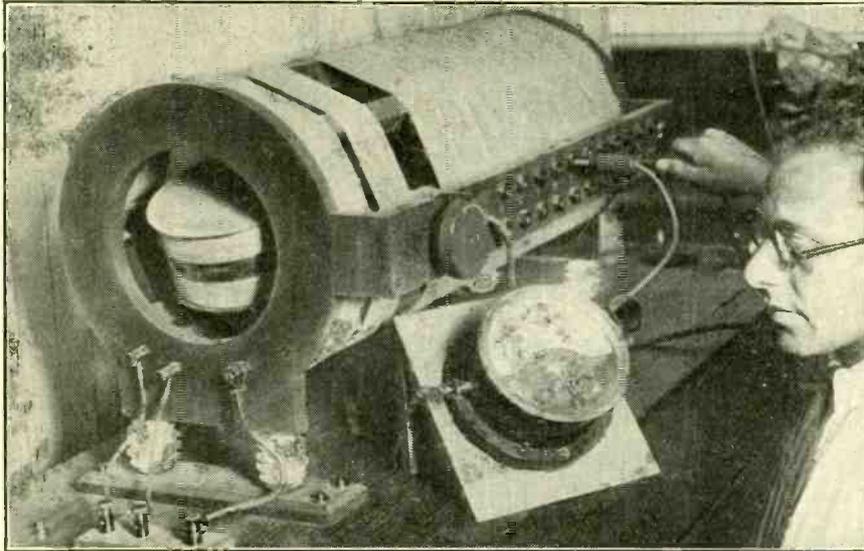


(C. Kadel & Herbert)

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

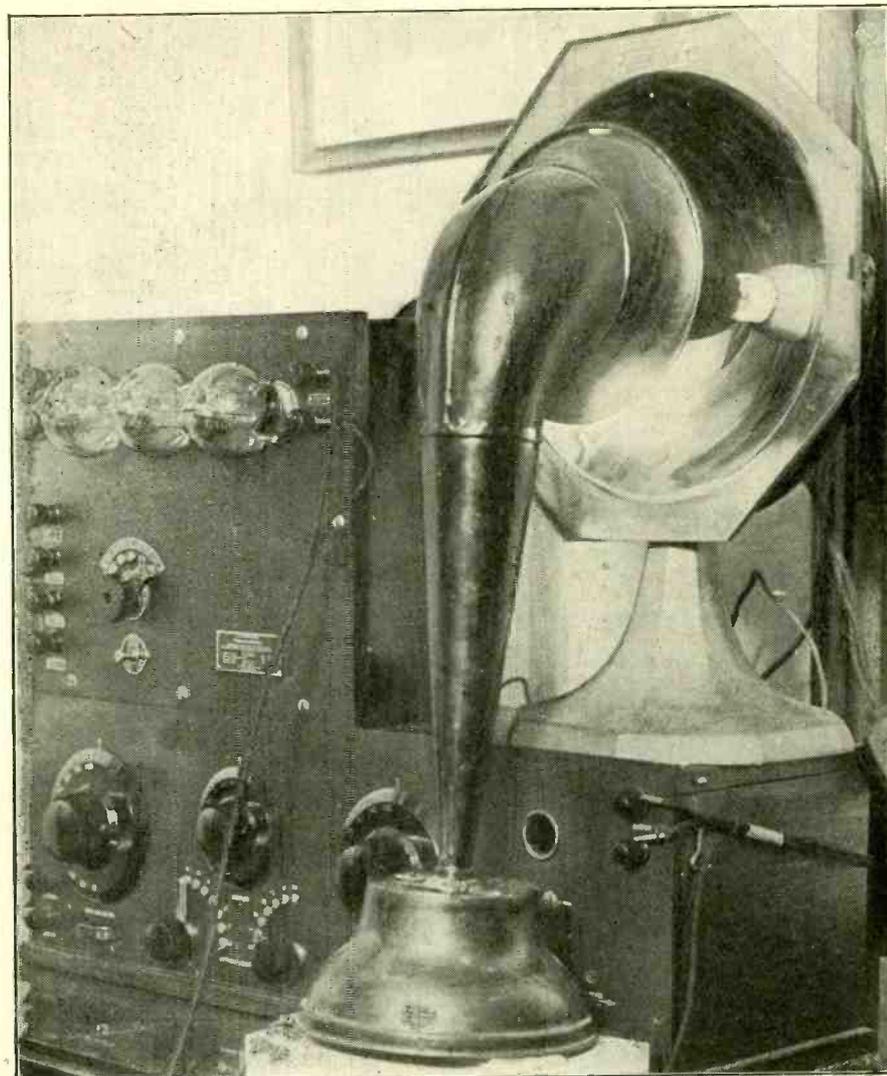
News-Photos S 1923 with

Captions
By
Patrick
Nichols



(C. Kadel & Herbert)
(Above) Huge inductance used at the College of the City of New York Radio Laboratories on the powerful transoceanic transmitter. This instrument was specially built by the students of City College for the circuits used. The tickler may be seen just inside the small coil.

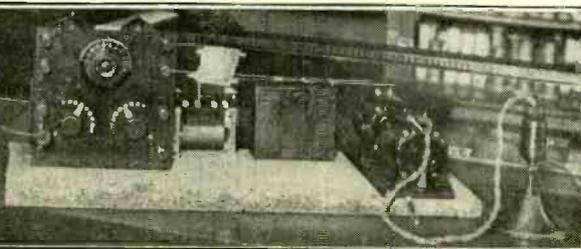
(Right) If you want to make your loud-speaker more powerful, try the stunt shown here. It is a well-known fact in scientific circles that parabolic-shaped objects will throw sound waves, or heat- or light-waves better than conical-shaped objects. For that reason, all powerful search-lights have parabolic reflectors. This is just what an object like the heater in the illustration will do if you place a loud-speaking horn before it. You will have to experiment as to the proper distance that the horn must be placed from the center, as the acoustic properties of the objects surrounding it have a great effect on it. This experiment has the same effect as if you lengthened the horn of the loud-speaker. If you don't happen to have a heater handy use a tin dishpan or a large bowl, which is even better than the pan.



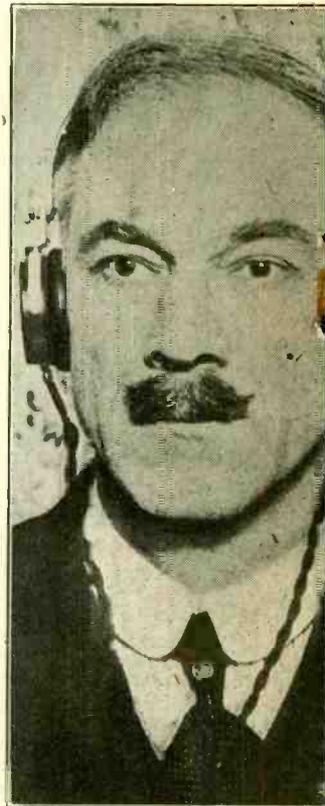
(C. Kadel & Herbert)



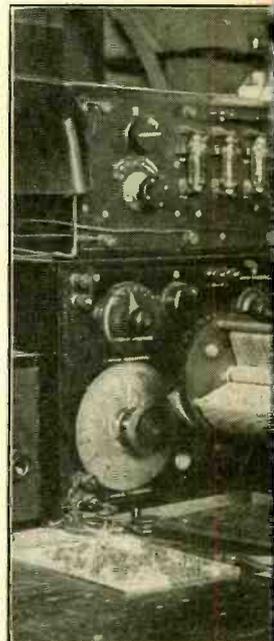
(C. Underwood & Underwood)



(Left) The world's smallest radiophone transmitting set—the smallest radiophone set in use. Despite its small size, it is said to be very efficient and is in use at station 9 CEX. It has a range of 75 miles. Note the small generator-set which is used to supply the necessary high voltage for the plate circuit. Two tubes are used—one oscillator and one modulator.



(C. World Wide Photos)
(Above) Step right up, ladies and men! Absolutely the only one in No, we are not referring to the the radio receiving set he is wearing scarf pin. C. Saunders, Beecham, claims to have invented the smallest set. Here he is shown wearing tie. This is the result of years' experimentation.



(C. Kadel & Herbert)
(Above) Where research work Ringe is testing out a new type which allows the operator to is in laboratories such as this

How Radio Starting Plenty of Pep



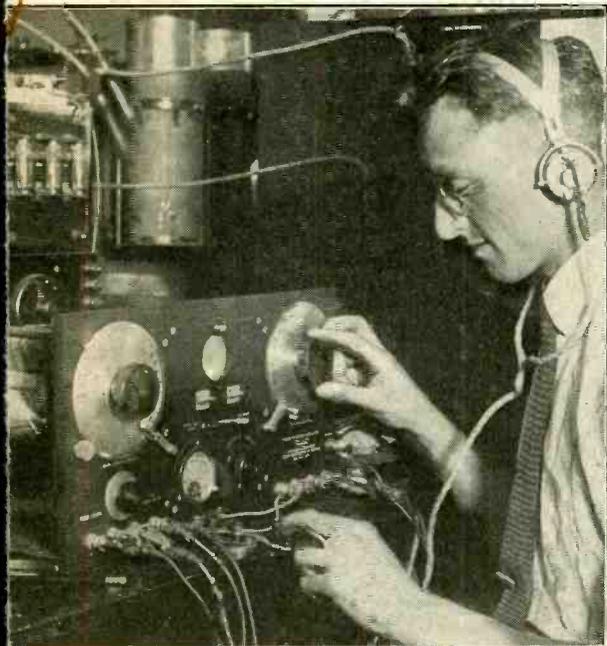
and gentle-captivity! man—it is being a England, the best radio it in his of experi-

(C. Kadel & Herbert)
 (Above) Not every dog in the world is privileged to have his own Rolls-Royce and listen to radiophone music. But "Duke," prize Boston bull, being of the canine aristocracy, is not to be confounded with other dogs. In a special interview granted the photographer, this peer of dogdom remarked that he would rather listen to KDKA than gnaw a nice juicy steak-bone. But, of course, all dogs are not so well educated as "Duke," and their thoughts run to more mundane matters.

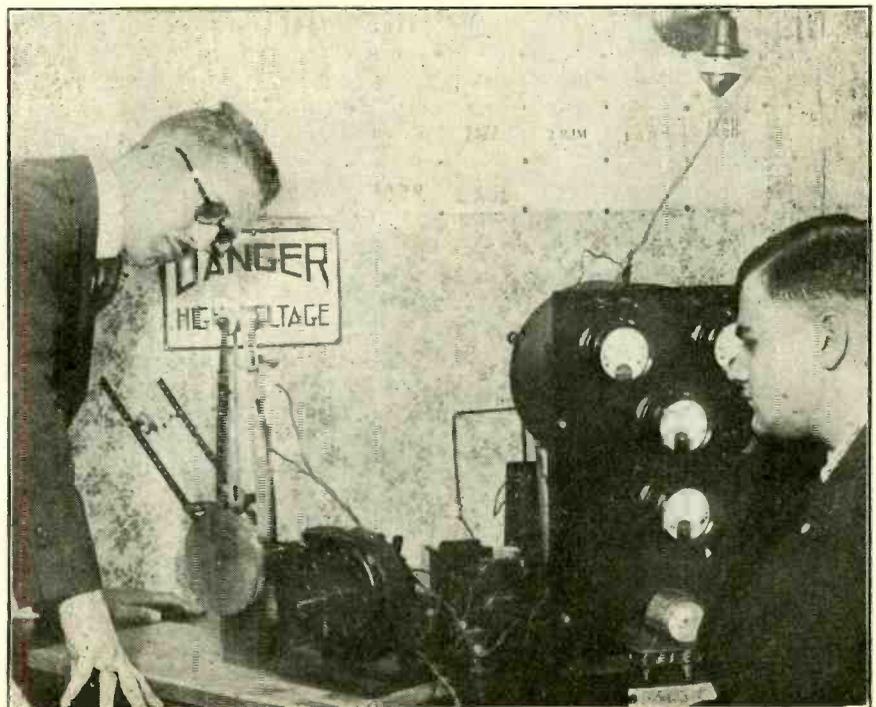


(C. Kadel & Herbert)
 (Above) The ideal set for the outdoor man. The set is absolutely water and weather proof. It was constructed by Wendell Kilmer to withstand any kind of weather. The set proper is regenerative, employing both radio- and audio-frequency. Excellent results have been accomplished using a barbed-wire fence as an aerial—and that in a pouring rain! As the photograph shows, the entire cabinet is shielded so that no capacity effect will be felt.

(Below) The first American amateur station to be heard in France during the official American Radio Relay League tests. Fred H. Schnell, at left, is the traffic manager of the league; at the right, is Perry Bragg, owner of the station. The photograph shows them testing out the automatic sender with which they called France. This was used so as to enable the operator to keep a constant watch on the apparatus. These radioists are to be heartily congratulated for being the first to actually get into communication with Great Britain and France.



is conducted in the College of the City of New York. Abraham... of transatlantic receiver. Notice the milliammeter on the panel... see how much current is passing through the plate circuit. It is, that most of the leading engineers are constantly conducting experiments to improve radio.



(C. International News Reel)

With the DX Nite Owls

A Canadian's Fine Work

From Clifford Dafoe, 152 Patterson Avenue, Chatham, Ontario, Canada

I HAVE read in RADIO WORLD a number of letters from different owners of receiving sets who claim to have "busted" a few records in receiving. If Mr. Weis is proud of his home-made set, I should be tickled pink with mine. I have a single-circuit regenerative set with one step of audio-amplification. Variocoupler, 11-plate variable condenser, grid leak, and condenser, phone condenser, point switch, dials, and panel are all home-made. It isn't very elaborate or imposing in appearance, but it sure works! I am inclosing a list of long-range stations I made last night, just as I heard them. I had a friend with me, with another set of phones, so the list may be proved.

I have a letter of verification from KHJ, Los Angeles, as I heard him first on November 13: KHJ, KGN, CJCG, CFCN, CKAC, CFCF, WNAC, WAAC, DN4, WHB, WDAF, WBT, PWX, WBAP, WFAA, WSB, also 6XB, and 6BT in San Francisco. These last two carry off the long-range championship for this locality. I have to share the honors with Mr. Collins, owner of the radio shop here, who, as well as myself, has heard all the above stations, using a Grebe CR 9.

You United States boys have it all over us in Canada on the transmitting end, but we'll make you step to keep up with us on the receiving end. I never log a new station simply by the call letters, but wait until the name of the company or the town and State is given. I find this the only accurate way.

The equipment of my set is as follows: English (Mullard) tube used as a detector, and Meyers R. A. C., No. 3, with Chelsea transformer as amplifier. I find either Brandes 2000-ohm or Sterling (English) 8000-ohm phones give almost equal results, though my favorite is the Sterling set.

My aerial is a single wire, 80 feet long, 13 feet high at one end and 16 feet high at the other end, where a 4-foot lead-in is connected which runs through a window to my set. My ground lead is about 12 feet long and is attached to the water pipes.

My set isn't a freak in any way. I use a standard hook-up and have built one for my sister and one for a friend. The three sets work just about the same. The secret is in the value of the grid leak and grid condenser, also the phone condenser. I don't know what value they are as I just experimented till they worked right. I wish to thank W. W. J. for the help he unknowingly gave me in adjusting my set.

Hoping this may find space in our paper.

* * *

Aerial 200 Feet Long

From M. P. Bailey, Moscow, Idaho

I NOTICE a letter in RADIO WORLD No. 35, dated November 25, from Kenneth F. Smith, Birmingham, Alabama, regarding the number of stations he has been able to hear and which he claims is a record. I believe that I have him beaten, but do not consider that I have made a record as yet.

Not counting our local broadcasting station, the nearest station that I have picked up is at Portland, Oregon, about 400 miles away, while the farthest station

The Editors of RADIO WORLD will be pleased to receive sketches of hook-ups of the various "DX Night Owls" sending in records, with a view of publishing them.

Other letters from the DX "bugs" will be published from week to week.—The Editor.

heard is Atlanta, Georgia, about 2,000 miles. However, I counted the stations on my log about two weeks ago, and had 59. Since that time, I have picked up several more. My long-distance ones include WOC, Davenport, Iowa; WHB, Kansas City, Missouri; KSD, St. Louis; Dallas, Texas; Fort Worth, Texas; Winnipeg, Manitoba; Minneapolis; Louisville, Kentucky.

My set is a home-made single circuit with two stages of audio and no radio amplification. I have a single-wire aerial about 200 feet long and use a water pipe as a ground. The aerial is about 20 feet high. I do not count any station that I cannot understand through the Magnavox.

I have on file replies from most of the stations heard, as I usually write them of the reception. I was able to pick up St. Louis several nights ago broadcasting a dance program from the Hotel Statler. They were so loud that we could have danced by it. This is about 1,500 miles.

* * *

Responds to the Hooting

From Norman Peterson, Concord, Contra Costa County, California

HEARING the Hoot! Hoot! of the night owls, I respectfully submit what I think is a record. "Maybe they are and maybe they ain't!" Here we go: WHB, Kansas City, Missouri, 1,300 miles; WBAP, Fort Worth, Texas, 1,400 miles; CFCN, Calgary, Canada, 1,400 miles. Detector tube, variocoupler, variable condenser—that's all!

* * *

With Detector Tube Only

From Perkins Bennegan, 637 Poplar Avenue, Fresno, California

SINCE everybody else seems to be doing it, I have decided to tell my receiving record. I have heard about 70 different stations, and usually get about

A Real Nite Howl!



Ripley in "The Globe," New York

20 each night. My best record for 4 hours is 21 stations; 5 hours, 23; 6 hours, 26. The stations I get clearly and loud each evening range from KHJ, KFI and KWH, Los Angeles; KDPT, San Diego; KFAF, KLZ, DD5, DN4, Denver; KZH, KDYL, Solt Lake; KFC, Seattle; KGG, KGW, KYG, Portland, to KUO, KFDB, KDN, San Francisco.

For my DX work: WOC, Davenport, Iowa, 1,600 miles; PWX, Havana, 2,500 miles; KSD, St. Louis, 1,600 miles; WDAP and KYW, Chicago, 1,800 miles; WSB, Atlanta, Georgia, 2,000 miles. That's a pretty good record for one night's work!

On December 2, I heard all the above stations. I don't have such luck every evening, but nights similar to that are not so rare. I won't say that these stations came in loud enough to be heard all over the house; but they do come in fairly loud. PWX came in very QSA.

My set consists of a detector tube only. I use a variocoupler and variable condenser for tuning. My aerial is about 40 feet high.

* * *

Accepts Mr. Smith's Challenge

From Jack Cowan, 512 Cotton Avenue, West End, Birmingham, Alabama

IN RADIO WORLD, No. 35, dated November 25 is a letter from Kenneth T. Smith. It so happens that we are located in the same city but so far have not had the pleasure of meeting. However, I accept his challenge, so here goes to "get my feet wet."

I have a home-made set, also, with two stages of audio-frequency, aerial 125 feet long, 35 feet high. On Saturday night, November 25, the following stations were brought in clearly over my loud-speaker, which, by the way, is only a 6000-ohm phone and an ordinary Grafonola horn:

WCR, Buffalo; WBAD, Minneapolis; WDAP, Chicago; WNAD, Norman, Oklahoma; WEAP, Fort Dodge, Iowa; KHJ, Los Angeles; 8XAK, Springfield, Ohio; WSB, Atlanta; WOM, Atlanta; WOC, Davenport, Iowa; WBAP, Fort Worth; WKM, Memphis; KSB, St. Louis; WDAF, Kansas City, Missouri; WHAS, Louisville; WFAA, Dallas.

On other nights, I have heard up to eighteen stations. I make no record of stations received in my log unless they are audible enough to be heard over my loud-speaker. Within the last sixty days, I have heard sixty different stations, all of which are located over 250 miles from Birmingham, Los Angeles being the greatest distance.

* * *

In One Year!

From Joseph Muntyan, 246 East 90th Street, New York City, N. Y.

I NOTICED an article in one of the papers the other day entitled, "Does It Pay to Assemble Your Own Set?"

My answer is, "Yes!" I knew nothing about radio until about a year ago. I bought parts of a crystal set and assembled it myself, getting as good results as may be expected from a crystal. But the results did not satisfy my wishes. Later I bought a blue print of a "long and short-wave honeycomb coil set with 2-step amplifier." I completed the set about three months ago. It took me two weeks to assemble the set as I took my time with it, making sure that all connections were made right and properly soldered. I have two cabinets, one for the receiver and the other for the 2-step amplifier. For

With the DX Nite Owls

(Continued from preceding page)

loud-speaker, I am using a single Baldwin phone, type C, which brings in the music of the nearby stations clear and loud enough to dance by. Furthermore, it is a pleasure to tune in and out the different stations on this set, as I do not experience the hissing and buzzing sounds that so many complain of when they put their hands close to the set. In appearance and operation this set is as good if not better than some of the higher-priced sets on the market to-day. Following is a list of radiophone stations I have received to date with a wire connected to the fire escape as aerial. The landlord would not permit me to put an aerial on the roof:

WJZ, WHN, WWZ, WOR, WAAM, WEAJ, WOO, WBS, WGY, WHAS, WOZ, WRW, WOE, WHAZ, WWJ, WOC, KDKA, WIP, WFI, WBZ, WVP, WBAN, WNAC, WGI, KYW, WDAP, WHB, WJAX, WAAC, WMAK, WGR, WSB, WDAF, WBAP, KSD, WMAS, WQAA and IXD.

I have letters and post cards from most of the stations confirming my statements; and, furthermore, I keep a record of the time and date that I receive the stations. All the above-named stations were received by using 2 D-L 50 and 1 D-L 75 coils, including station WVP. I would like to know what results I would get by using an aerial 150 to 200 feet long.

This is another instance where it is not necessary to have an aerial in order to do good work. It is quite possible that if the writer were to put up an aerial such as he suggests in his letter, his results would be improved. Landlords must be landlords, and, evidently, the poor radio amateur is never appreciated until it is too late.—The Editors.

Heard in New Brunswick

From Hollis Baird, River de Chute, Carleton County, New Brunswick

I HAVE noticed letters in RADIO WORLD regarding receiving records. With Giblin-Remler coils in a standard tickler-circuit using radiotron tubes, mica variable condensers and only one step of audio with 22½ volts plate-voltage I get the following stations: WJZ, WGY, WWJ, KDKA, WBZ, WEAJ, WBAY, WNAC, NOF, WHAZ, WOR, WIP, WGL, WLW, WAAN, Columbia, Mississippi;

Transatlantic Tests Successful

France Copies Signals of American Amateurs for First Time, December 13

FIRST reports on the transatlantic tests of the American Radio Relay League, received at the league headquarters, Hartford, Connecticut, on Wednesday, December 13, show that twenty-five American amateurs were heard in England and thirteen in France. For the first time in the history of amateur radio the French were successful in copying the signals from American amateurs. December 12 marked the start of the tests, and they will continue until December 31.

The following were heard in England: 1-BGF, Perry O. Briggs, 52 Girard avenue, Hartford; 1-YK, Polytechnic Institute, Worcester, Mass.; 2-GK, A. G. Kastemayer, Schenectady, N. Y.; 2-NZ, E. R. Raguse, Tottenville, N. Y.; 2-XAP, Rensselaer Polytechnic Institute, Troy, N. Y.; 2-ZK, George C. Cannon, New

WOO, CKAC, Montreal; WFI, WGI, WHK, KSD, WDAP, CFCA, Toronto.

These stations are from 475 to 1,400 miles from here, with the exception of CKAC, which is only 275. The majority of them are heard regularly.

Of course there are better records than mine; but I think it is better than Mr. Merklein's.

* * *

Mr. Miller Adds to His Set

From W. Miller, Box 222, Southern Methodist University, Dallas, Texas

LAST night (December 13) being a quiet night for Dallas, I was afforded the opportunity to do a little stepping with my one-tube contraption. At various intervals between the hours of 6 o'clock and 11 o'clock I received stations WPA, WWJ, WOAI, WDAF, WGM, WOC, WBAP, WHB, WOS, KSD, WNAV, KFAF, PWX, KDKA, WGY, KLZ, WCX, KLN, WSB, KZN, KHJ, WDAJ, WLAC, KDPT and enjoyed opera from KYW.

I submit this information as one night's results—not claiming a record. This performance should prove satisfactory to any "night owl."

My circuit is as set forth in RADIO WORLD, No. 30, dated October 21, with several improvements.

Since adding these improvements, I have added six more States to my log, which now totals 33, besides Havana, Cuba; Tampico, Mexico; and several Canadian stations. Not so bad for a novice!

* * *

Without Any Grid Leak

A Suggestion to Increase the Range of Mr. W. Miller's Circuit

REGARDING the hook-up of Mr. W. Miller, published in RADIO WORLD, No. 30, dated October 21, which has attracted unusual attention among amateurs throughout the United States and Canada, RADIO WORLD has received the following interesting suggestion from Dr. Willis L. Hale, 47 North Washington Street, North Attleboro Massachusetts. Dr. Hale writes:

"Increase value of Miller circuit 100 per cent by leaving out all grid leak and use a vernier rheostat. It's a dandy! Good for 1,000 miles any night."

Rochelle, N. Y.; 2-ZL, J. O. Smith, Valley Stream, L. I.; 3-ZW, Walter A. Parks, Washington, D. C.; 8-AQO, C. P. Meredith, Cazenovia, N. Y.; 8-AWP, S. Woolworth, Syracuse, N. Y.; 2-EL, H. H. Carman, Freeport, N. Y.; 2-BML, H. H. Beverage, Riverhead, L. I.; 2-LY, C. A. Wood, Port Richmond, N. Y.; 3-BGT, C. S. Risley, Atlantic City, N. J.; 3-IIC, G. L. Diechman, Baltimore, Md.; 3-ZY, L. A. Dunham, Washington, D. C.; 4-FB, A. Bush, St. Athens, Ga.; 4-PI, L. Rexach, San Juan, Porto Rico; 7-PO, G. E. Kensey, Seattle, Wash.; 8-GQ, R. Moore, Columbus, Ohio; 2-ZS, C. R. Runyon, Jr., Yonkers, N. Y.; 3-XD, University of Princeton, Princeton, N. J.; 4-BX, G. S. Smith, Wilmington, Del.

The following stations were heard in France: 8-AQO, C. B. Meredith, Cazenovia, N. Y.; 1-YK, Worcester Polytechnic Institute, Worcester, Mass.; 1-BGF, P. O. Briggs, Hartford; 1-BCG, Minton Cronkhite, Greenwich; 2-XAP, Rensselaer Polytechnic Institute, Troy, N. Y.; 2-ZK, George C. Cannon, New Rochelle, N. Y.; 3-HG, G. K. Diechman, Baltimore, and others.



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Model C Magnavox Power Amplifier insures getting the largest possible power input for your Magnavox Radio.

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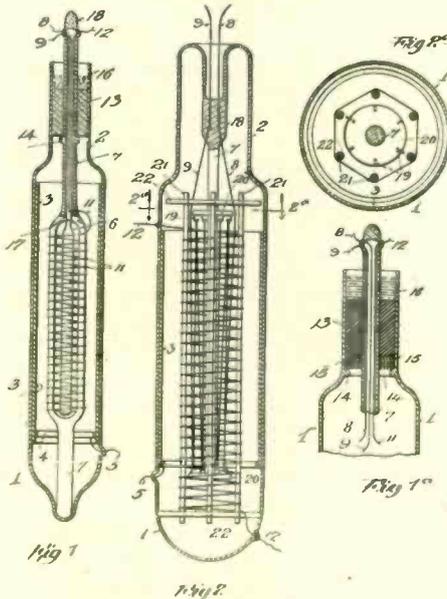
Latest Radio Patents

Lee de Forest Discovers New Oscillation

No. 1,437,489. Patentee: Lee de Forest, New York City, N. Y.

THE latest radio invention of Dr. Lee de Forest appears to have a number of advantages over the present types of oscillations. Told in his own words, Dr. de Forest says:

"I provide a glass vessel containing the usual three electrodes, the filament, or glower; the grid; and the plate, or wing—the vessel being designated generally by reference numeral 1. The vessel 1 is preferably tubular in form and constricted at one end to form a neck 2. In Figure 1 the neck 2 is open, as indicated. The plate or wing element 3 is preferably in the form of a cylinder, and is positioned close to the wall of the vessel, or, preferably, plated directly on the wall of the vessel, and may be of any desired suitable material such as silver, platinum, tungsten or the like. Fitting in close contact with the plate is a band of tungsten, or nickel, or the like, indicated at 4, to which is connected a lead wire 5, sealed through the wall of the vessel as shown. The filament or glower electrode 6, which is preferably carbon, tungsten, or oxide-coated platinum, is as shown, in the form of a loop or "hair-pin," anchored at its lower end in a glass frame 7. The glass frame 7 is in the form of a glass rod which rests at its lower end against the bottom of the vessel. Intermediate its ends, the frame is formed with yoke arms which form a space between them, in which space the



Four figures, showing diagrammatically the most important parts of Dr. deForest's invention.

filament 6 extends. Above the yoke portion of the glass frame or rod the rod is hollow, and the respective leads 8, 9, of the filament extend upwardly in the hollow rod and are sealed through the wall."

tectors of radio-frequent oscillations, and, also, as amplifiers of feeble currents.

These electron tubes comprise an evacuated bulb containing a source of electrons, a metal "plate" member and a "grid" member consisting of fine wire or a perforated metal sheet interposed between the source of electrons and the "plate" member.

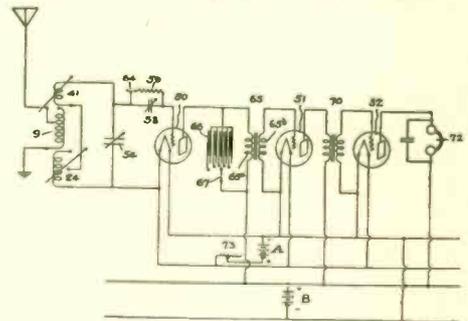
In the arts of space telegraphy, telephony and the like, the electron tube finds great application; but the particular method employed to enable the tube to function properly on one of its several uses is not a part of this invention. The specific requirements of the use to which the tube is put will necessitate adaption of the tube to meet these requirements. However, such adaption is only for the purpose of obtaining a certain capacity or obtaining some result which does not alter the fundamental characteristics of the tube. To cause the tube to function in any of its capacities as a detector, high-frequency current generator, or as an amplifier, it is only necessary to properly place it in the circuit of which it is to be a part. The tube must have suitable coating elements in the circuit. This fact is well known to experts.

The objects of this invention are as follows: To provide an electron tube having an arc for a source of electrons, this arc being confined in a tube containing a vaporizable material; to provide an electron tube capable of sustained and prolonged usage. In continuous-wave telephone work, the filament of the oscillator and modulator is subject to a great strain from the high voltage and amperage of the grid and plate circuits so that the life of the tube is very short. In Mr. Mueller's device, the filament is done away with, thus increasing the life of the tube.

New System Applied to Coupling Apparatus

No. 1,437,772. Patented December 5, 1922. Patentee: John B. Nowlan, Denver, Colorado

THE object of my invention," says Mr. Nowlan, in his transcript, "is to provide a radio-receiving apparatus of high selectivity whereby signals transmitted on adjacent wave lengths may be received and isolated for reproduction without undue interference. Another object is to provide a circuit arrangement in a radio-receiving apparatus for securing extreme accuracy in the coupling of the tuned circuits of the receiving apparatus; also to provide a construction of coupler for securing accurate adjustment of coupling of the tuned circuits of the receiving apparatus; and to provide circuit connections and an arrangement of parts where-



Combination of a primary circuit including a primary winding, and a secondary circuit comprising a pair of windings, each directly connected in series and each cumulatively coupled to the primary winding, the secondary circuit beginning at one end of the windings and continuing in a single direction through other secondary winding to the end. These ends form the sole terminals of the secondary circuit for connection with the radio receiving apparatus.

by simplicity in adjustment, compactness and selectivity in the different parts of the receiver circuits is secured, with means on a receiver panel whereby the apparatus may be protected against heavy surges and electrostatic charges, and may also be protected when not in use by direct connection of the antenna with ground."

The radio-receiving apparatus of this invention comprises an insulated panel carrying the radio equipment supported on the rear thereof and housed within a cabinet. The apparatus includes a radio-frequency oscillating circuit which may be an antenna ground-circuit, a coil-collector circuit, or a ground system balanced against a free ended extended conductor. The oscillation circuit includes a primary inductance tapped at selected points to switch contacts whereby the desired amount of inductance may be included in the oscillating circuit.

Coming Events

The editors of RADIO WORLD will gladly publish news items of all contemplated radio shows and expositions. Keep us posted by mailing full information.

SECOND NATIONAL RADIO EXPOSITION, direction International Trade Exposition Co., Chicago, January 13 to 20, inclusive, 1923, George A. King, director of publicity, 417 South Dearborn Street, Chicago, Ill.

PERMANENT RADIO FAIR FOR BUYERS, Hotel Imperial, New York City. Open from September, 1922, to May, 1923.

AMERICAN RADIO EXPOSITION, Grand Central Palace, New York City, December 21 to 31, Colwell & Korbell, Flisk Building, New York City, directors of publicity.

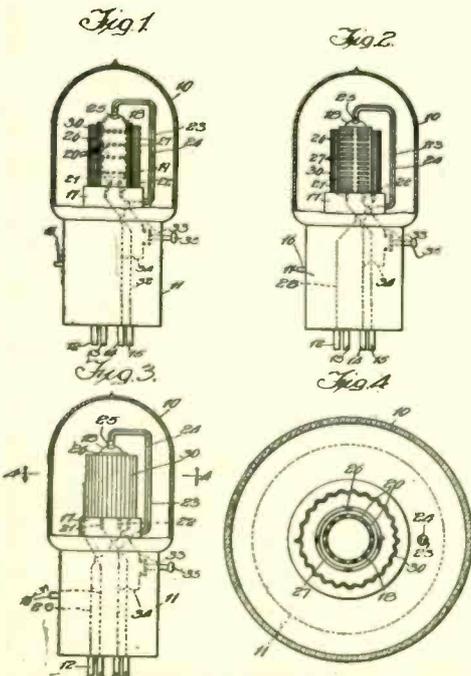
SECOND DISTRICT RADIO CONVENTION, Hotel Pennsylvania, New York City, March 1, 2, and 3, 1923.

FIRST UNIVERSAL EXPOSITION OF INVENTIONS AND PATENTS, Grand Central Palace, New York City, February 17 to 22, inclusive, 1923.

New Electron Tube

No. 1,437,607. Patented December 5, 1922. Patentee: Eugene L. Mueller, Chicago

MR. MUELLER'S invention relates to electron tubes and, more especially, to electron tubes where in the source of electrons comprises an arc. Electron tubes are of general use as sources of high-frequency current, de-



Four figures, showing diagrammatically the elements of construction in Mr. Mueller's new electron tube.

NAA to Be Chief Government Broadcaster

Takes Place of NOF, Which Will Resume Its Experimental Work

NAA, the great Naval Radio Station at Radio, Virginia, near Arlington, D. C., becomes the United States Government's chief broadcasting station for official information on January 3, 1923. On that date, all regular broadcasting previously handled by NOF, the radio experimental station of the Navy at Anacostia, will be transferred. Thereafter, NOF will resume its experimental and research work, which may include the broadcasting of the Navy and Marine Band music in the interest of modulation tests.

A special wave length of 710 meters from the Government and public broadcasting band was assigned to NAA by Herbert Hoover, Secretary of Commerce, on December 15, at the request of the Interdepartmental Radio Committee. This was done in order that the several regular circuits of the Army and Navy located there may be operated simultaneously without interference which occurred when phone broadcasting was undertaken on the lower governmental wave lengths from the main antenna.

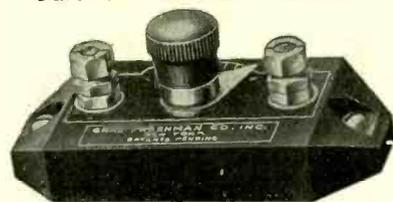
The new radiophone transmitting set was especially made for NAA at the Naval Radio Laboratory at Anacostia. It is based on the master-oscillator, power-amplifier system, and employs six 250-watt tubes, giving an output of 1½ kilowatts. The apparatus is arranged so that the waves from 400 to 2,200 meters may be used in transmitting, and the power is derived from a 2-kilowatt generator. When transmitting on 710 meters, a special single-wire antenna, stretched from the top of one of the 400-foot towers, is used. This new circuit does not interfere with any of the other circuits, although used simultaneously. The height of the antenna gives practically the same efficiency as the multiple-tuned antenna used at Anacostia. When transmitting on the high-wave length, 2500

meters, the large antenna will be used and other circuits will be interrupted temporarily. The design of this special set will permit of excellent modulation for the sending of speech and even music, Naval radio engineers say.

Transmitting ranges will vary with the season and with the day and night; but it is expected that a range of several thousand miles may be attained in night-time transmission during the winter months, although this may fall off in day-time sending during the summer months to a 250-mile radius.

Recent broadcasts of the President's congressional address are reported to have been heard as far west as Chicago and Detroit, which speaks well for the work of NOF on 427 meters. Basically, the new set for Arlington is built on the results of radiotelephone broadcasting experiments conducted from Anacostia and a knowledge gained from the operation of the well-known set at NOF.

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Six New Broadcasters

LICENSES issued to broadcasting stations on 360 meters during the week ending December 16 include the following:

WOAL—Cole County Tel. and Tel. Co., Mattoon, Ill.

WPAK—North Dakota Agricultural College, Fargo, N. D.

WPAT—St. Patrick's Cathedral, El Paso, Tex.

WPAH—Wisconsin Department of Markets, Waupaca, Wis.

WOAY—John W. Wilder, Birmingham, Ala.

KFDH—University of Arizona, Tucson, Ariz.

Radio Entertainment for Hire

A NEW phase of the radio game is that of entertainment service furnished on call, just like an orchestra service. If you wish radio entertainment, a Washington radio concern announces that it will bring a set, install it and guarantee entertainment from the ether suitable for a social evening, "or no charge."

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Marvelous wrinkle remover and cleanser.	
Amber Royal Perfume.....	\$4.00
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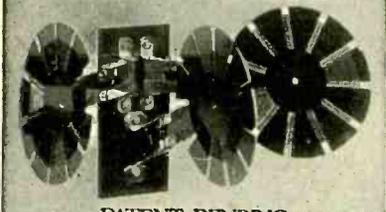
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Organ Recital by Radio
WJAX, Cleveland, Sends Out a Fine Program from World's Largest Instrument

AN unusual feature recently broadcast by WJAX, radio station of The Union Trust Company, Cleveland, was the organ recital by Edwin Arthur Kraft, a well-known Cleveland organist, at the new Cleveland Public Auditorium, Tuesday evening, November 28.

This program was of especial interest to radio fans because of the unusual character of the organ on which the recital was played. The Cleveland Public Auditorium organ is the largest in volume of any organ in the world and has been the cause of much interest on the part of musicians as well as much curiosity on the part of the public. It occupies a space 30 by 30 by 20 feet, and requires a force of 70 horse-power to blow it. Three hundred miles of wire were used in its construction. It has 5 manuals, 125 black keys, 180 white ones, 32 pedal keys, and 160 different stops. Each stop gives the effect of a different instrument, any one of which may be played alone or together with any or all of the others, with the result that almost any desired orchestral effect may be obtained. The largest pipe is 25 inches by 30 inches by 33 feet long and the smallest pipe 1/4 of an inch in diameter and only 3/4 of an inch long. There is, also, an echo organ placed 325 feet away from the main organ which makes it possible for the organist to obtain particularly unique effects.

The tonal quality of the organ brings out the broadcasting loud and clear.

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2 Transformers, Best grade. @ \$2.95 each.....	5.90	9.00
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2 Tube sockets, none bet. @ 45c ea.....	.90	1.70
2 Tube socket brackets @ 15c ea.....	.30	.50
14 Binding posts, nick. plat. @ 3c ea.....	.42	.84
12 ft. of best spaghetti tubing @ 4c.....	.48	.84
15 feet copper connecting wire.....	.30	.45
1 set blueprints giving wiring details.....	.10	.25
	\$12.95	\$21.03

Some other savings are:
Frost Phones, 2000 ohms.....\$3.95 \$5.00
Dictograph, 3000 ohms..... 5.95 8.00
Western Electric, 2200 ohms..... 9.25 12.00
Detector Tubes, Cunningham, New..... 3.95 5.00

Radio Parts Manufacturing Company
15 PARK PLACE DETROIT, MICHIGAN



CHRISTMAS OFFER

SEND **\$3.60**

Cash or Money Order Only, and we will mail you postpaid a pair of 2,500-ohm phones with a MONEY-BACK GUARANTEE that they are as good in workmanship and material and as loud and clear as any \$6.00-\$8.00 phone made.

SYKES MFG. COMPANY
15 SPRINGFIELD AVENUE
NEWARK, N. J.

At Your Service!

There appeared in RADIO WORLD, dated April 1, 15, and 29, the following articles:

April 1—A 500-Mile Radiophone Employing a 5-Watt Tube, by Frank A. Hahnel. "Tell Me, Please, How Will This Set Receive?" by E. L. Bragdon. Short Cuts in Receiver-Circuit Design, by O. C. Roos. Making a Short-Wave Regenerator, by Fred. Chas. Ehlert.

April 15—First Principles of Electricity as Applied to Radio, by John P. Miles. Your Storage Battery, by E. L. Bragdon. What Makes Radio Possible, by Edward Linwood. Ground Connection as Vital as Antenna, by Fred. Chas. Ehlert.

April 29—Valuable Pointers on Aerial Construction, by Edward Linwood. What Is Meant by Tuning, by E. L. Bragdon. Radio-Frequency Amplification and Regeneration, by Frank Armstrong. Honey-Comb Coils and Condensers, by Edward Linwood. Charging the Storage Battery, by E. L. Bragdon. How to Construct the Variocoupler, by Frederick I. Rumford.

Each copy sent on receipt of 15c. per copy, or the three copies for 45c.; or better still, send your subscription beginning with any one of these numbers, and we will send this paper for 52 issues, and you will then have a complete file for ready and constant reference. RADIO WORLD, 1493 Broadway, New York.

KDKA Breaks Its Record

Its Music Picked Up by Steamer in South Pacific Ocean, 5,000 Miles Away

BROADCASTING a concert 5,000 miles is the proud record of KDKA, the radiophone broadcasting station of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pennsylvania.

This latest achievement of KDKA, which first started operating November 2, 1920, was brought to the attention of the Westinghouse broadcasting officials on the receipt of a postal card from E.

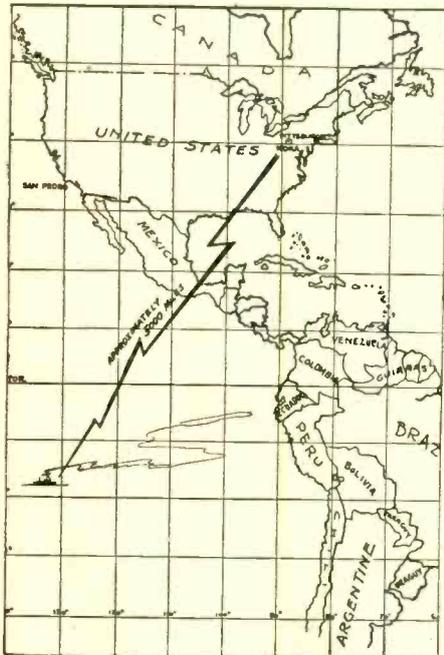


Chart illustrating the distance—5,000 miles—covered by music broadcast from KDKA.

G. Osterhoudt, radio operator of the steamer "J. A. Moffett," in which he tells of hearing KDKA while off the coast of Peru, a distance of, approximately, 5,000 miles.

The card, which was mailed in San Pedro, California, contained the following:

"Westinghouse Electric & Manufacturing Company,
East Pittsburgh, Pa.
KDKA

Gentlemen:

At 9:30 p. m. (local time), on October 5, while off the Peruvian coast, 3,453 south of San Pedro, California, I heard your phone on 360 meters, playing "Stumbling." The QRN was quite heavy but I am positive that it was your phone. I am using a honeycomb set with an audion detector (Audiotron). Please verify this, if possible, and oblige,

Very truly yours,
E. G. Osterhoudt, Opr.

S.S. 'J. A. Moffett,' care Radio Corporation of America, 109 Steuart Street, San Francisco, California."

This request has been verified by a glimpse into the back programs of KDKA with the result that this station has broken its own broadcasting record which was set last spring when a ship in the port of Iquique, Chile, heard an entire concert. The distance of the ship from the broadcasting was approximately 4,200 miles, so that the new record beats the old by 800 miles.

To many anxious inquirers RADIO WORLD has no free list. One copy is sent as a voucher to each advertiser or advertising agent represented in current issues. All other copies are paid for on subscription or through the news trade.

DELICATE SOLDERING

Both the manufacturers' and amateurs' problem on all fine work is readily solved by the instrument constructed for this particular purpose.

THE POST SOLDERING IRON

Platinum Heating Unit—Interchangeable Tip—Universal Current



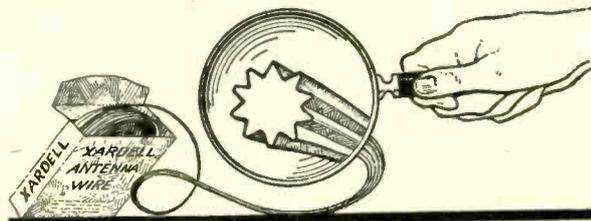
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\$6.00

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POST ELECTRIC COMPANY, (Div. 509) 30 E. 42nd St., New York



Something Brand New in Antenna Wire

\$1.50

PER
HUNDRED
FEET

That will at once appeal to you. It is different and better than any makeshifts to date, being hard drawn from the finest copper having a corrugated surface with 10 collecting points on its cir-

cumference. This gives a greater collective and gathering surface. The result is extreme sensitiveness, and an increase in the range and clearness of any set from the simplest crystal type to the finest V. T. Receiver.

Packed in neat cartons of 100 feet, 200 feet and 500 feet.
Dept. C. Postage paid.



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RADIO WORLD now has 70,000 readers. We are making a drive for a hundred thousand before the end of the year. Ninety per cent of our readers renew their subscriptions. A marvelously high average.

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RADIO WORLD, the national radio illustrated weekly, is the oldest radio weekly, having the largest circulation. Radio manufacturers and distributors appreciate that RADIO WORLD is a most profitable medium to carry their trade notices.

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1493 BROADWAY

NEW YORK CITY

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Short Cuts in Receiver-Circuit Design, by O. C. Roos.
Making a Short-Wave Regenerator, by Fred. Chas. Ehlert.

APRIL 8.

Do You Know Your Receiving Equipment, by James D. Gordon.
Why a Crystal Is Called a Rectifier, by Walter Emmett.
Is Radiotelephony Dependable? by O. C. Roos.
Mounting Crystals in Your Detector, by E. L. Bragdon.
Storage Batteries for Radio, by Fred. Chas. Ehlert.

APRIL 15.

First Principles of Electricity as Applied to Radio, by John P. Miles.
Your Storage Battery, by E. L. Bragdon.
What Makes Radio Possible, by Edward Linwood.
Ground Connection as Vital as Antenna, by Fred. Chas. Ehlert.

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Valuable Pointers on Aerial Construction, by Edward Linwood.
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Charging the Storage Battery, by E. L. Bragdon.
How to Construct the Variocoupler, by Frederick J. Rumford.

MAY 6.

The Advantages of Radio Frequency, by Harold S. Potter.
How to Construct, Protect and Operate a Storage Battery, by George W. May.
The Beginner's Catechism, by Edward Linwood.
Tuning and What is Meant by It, by Fred. Chas. Ehlert.
New Frequency Amplifier Brings Faintest Waves in Strong, by G. W. May.

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My Practical V. T. Detector and Two Stage Amplifier, by Frederick J. Rumford.
The Principles of Radiotelegraphy, by Walter J. Howell.
The Reason for the Loop Aerial, by George W. May.
Tuning and What is Meant by It, by E. L. Bragdon.
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The Design of an Amateur Receiving Set, by C. White.
The B Battery and the Plate Current, by George W. May.
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How to Construct One- and Two-Slide Tuning Coils, by George W. May.

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The Vacuum Bulb's Start in Life, by C. White.
How to Select the Right Set, by E. L. Bragdon.
The Beginner's Catechism, by Edward Linwood.

Test of Inductance Coils, by Fred. Chas. Ehlert.
Short Waves from a Simple Receiver, by Stanley Bryant.

JUNE 24.

How to Make Your Radio Cabinets, by W. S. Standiford.
How the Crystal Detector is Used to the Best Advantage, by C. J. Williams.
How to Construct a Long-Wave Regenerative Receiver, by George W. May.
Tested Invention of Major Armstrong Amplifies Set 100,000 Times, by John Kent.
Repairing Cracks in Hard-Rubber Storage Battery Jars, by W. S. Standiford.
The Beginner's Catechism, by Edward Linwood.

JULY 1.

Novel Unit-Detector and Amplifier, by Frederick J. Rumford.
Why You Must Use a Condenser, by C. J. Williams.
How Wave Lengths Travel, by Fred. Chas. Ehlert.
Radio World's Revised Dictionary, by Fred. Chas. Ehlert.
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Radio's Place in the Phenomena of Nature, by E. L. Bragdon.
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Armstrong's Superregenerative Amplifier Fully Explained, by John Kent.
Operating a Transatlantic Station, by Fred. Chas. Ehlert.
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Reducing Strays and Static, by Fred. Chas. Ehlert.

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Assembling a Detector and Two-Stage Amplifier, by H. S. Stanford.
Combined Radio and Audio Frequency Amplification, by C. White.
The Beginner's Catechism, by Edward Linwood.
Locating Your Aerial, by Harold Day.
Facts for Beginners, by Fred. Chas. Ehlert.

JULY 22.

When Your "Movies" Come by Radio, by Stanley Bryant.
Underlying Principles of the Vacuum Tube, by George W. May.
Practical V-T Detector Panel, by Frederick J. Rumford.
Revised Radio Dictionary, by Fred. Chas. Ehlert.
The Beginner's Catechism, by Edward Linwood.
Importance of Aerials to Radiation, by C. White.

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The Vacuum Tube as a Transmitter, by Charles H. Plath.
My 20-Kilowatt Tube and Its Uses, by Irving Langmuir.
Importance of the Capacity Switch, by E. L. Bragdon.
The Truth about Lamp-Socket Aerials, by Harold R. Hart.

AUGUST 5.

How to Construct and Operate the Armstrong Superregenerative Circuit, by John Kent.
Using Radio Frequency to Extend Range, by George W. May.
Things Every Radio Fan Must Know, by E. E. Hawley.
Revised Radio Dictionary, by Fred. Chas. Ehlert.

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The Work of the Audio-Frequency Transformer, by George W. May.
Practical Measurements of Capacity and Inductance, by W. A. Dickson.
Experimenting with Armstrong Circuit Produces Unusual Hook-up, by Dr. O. S. Kelly.
How to Secure Perfect Regeneration, by Fred. Chas. Ehlert.

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Using Two Tubes for Receiving, by C. White.
The Storage Battery as an Important Factor in Radio Reception, by Donald Van Wyck.
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How to Build a Spider-Web Receiver, by Frederick J. Rumford.
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Hints for Fans, by C. F. Rye.

SEPTEMBER 2

Generating C-W for Transmission, by C. White.
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Practical Circuits for Regenerating Loud Signals, by O. S. Kelly.

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Radio Ideas for the Amateur to Test Out by Carl Masson.
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How to make a Honey-Comb Coil with a Two-Stage Amplifier, by Fred. Chas. Ehlert.
Perfect Short-Wave Radio-Frequency Amplification, by George W. May.

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How to Make a Two-Tube Superregenerator, by Frederick J. Rumford.
Methods of Amplifying Radio Signals, by B. Brabury.
Voice Distortion in Vacuum-Tube Receivers, by W. A. Dickson.
Charging a Battery—from a French Radiolist's Point of View, by Marius Thouvals.
Working Diagrams for Beginners.

SEPTEMBER 23, 1922

New V T Hook-up Worth Testing Out, by P. F. Metzler.
New Method for Lighting Filaments, by C. White.
Why the Radio Compass Is the Fighting Element of Science, by Ortherus Gordon.
Complete Table of Symbols Used in Radio Reception, by Fred. Chas. Ehlert.
The Radio Primer, by Edward Linwood.
Complete Method for Building an Electron-Tube Detector Unit, by Experts of the United States Bureau of Standards.

SEPTEMBER 30, 1922

Increasing the Wave Lengths of a Receiving Set, by George W. May.
The Importance of the Variometer to a Receiving Set, by Donald Van Wyck.
Successful Stunts of an Amateur Radiolist, by C. F. Rye.
Employing Jacks with a Two-Stage Amplifying Receiver, by Fred. Chas. Ehlert.

OCTOBER 7.

Superheterodyne Receiver as Applied to the Armstrong Superregenerative Circuit, by Charles R. Leutz.
Constructing a Radio-Frequency Regenerator, by C. White.
Why the Open Antenna Is Best for the Radio Listener, by C. D. Wagoner.
Broadcasting Stations of United States and Canada.
The Radio Primer for the Beginner, by Lynn Brooks.

OCTOBER 14.

Neat Home-Made Tube Socket, by Gordon S. Arthur.
Vessels Now Guided Through Fog by New System of Radiotelegraphy, by Ortherus Gordon.
What Makes the Receiver Work, by Donald Van Wyck.
Using the Variocoupler in a Short-Wave Receiver, by George W. May.
Regenerative V-T Receiver for Short Waves, by Fred. Chas. Ehlert.

OCTOBER 21.

Important Improvements in Radio Receivers, by C. White.
Be Sure of Your Ground Connection, by Fred. Chas. Ehlert.
How Radio Was Installed in Our Home, by Hattie Briggs Hartman.
One-Tube Regenerator Hook-up for Loud Sigs, by Harold Day.
Every Radio Set Has a Reliable Range, by John Kent.
The Theory of Radio Communication, by Horace Beers.

OCTOBER 28.

A simple Super-regenerative Receiver, by Harold S. Potter.
Vacuum Type of Arrester Safe, by Fred. Chas. Ehlert.
How to Make Your Aerial Function, by Horace Beers.
How to Avoid Interference When a 360 Meter and a 400 Meter Station Are Operating Simultaneously, by C. W. Horn.

NOVEMBER 4

Receiver for Amplifying Weak Signals, by Horace Beers.
How to Learn the Code, by Ortherus Gordon.
Detectors—and How They Work, by Donald Van Wyck.
One of the Most Delicate Parts of a Receiver, by George W. May.
Wave Meter for Amateur Operators, by United States Bureau of Standards Experts.

NOVEMBER 11

How to Build a 100-Meter Concert Receiving Set, by Frederick J. Rumford.
Wide Field for Experimenting with Aerials, by Donald Van Wyck.
Single-Tube Superregenerative Receiver, by C. White.
Utilizing Ford Spark-Coils for Audio-Frequency Transformers, by Ortherus Gordon.
Why It Is Necessary to Tune In, by Arthur G. Shirt.

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New Bureau of Standards
Radio Literature

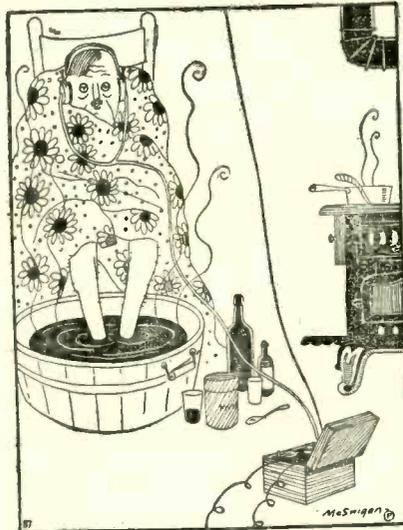
TO meet the increasing interest in the use of radio-receiving apparatus, the Bureau of Standards of the Department of Commerce is publishing a series of circulars descriptive of simple receiving sets. The first two of this series are Bureau of Standards Circulars No. 120 and 121. These two circulars describe the receiving sets which use crystal detectors. The third paper of this series is Bureau of Standards Circular No. 133 and may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5 cents a copy.

This circular is a description of an electron-tube detector and gives instructions for its operation. A receiving set employing an electron-tube detector is more sensitive than a set employing a crystal detector, and may be expected to give more satisfactory results. The tuning devices, antenna, lighting switch, ground connection, and telephone receivers with which this electron-tube detector is used may be those previously described in Circulars 120 and 121.

Broadcast Bill's Radiolays

By William E. Douglas

HAD some snow out here last week, first we've had this year, reckon that's to let us know winter's gettin' near. 'Course winter has advantages, there's nothin' much to do, no corn to plow, er cultivate, but there's a cow er two that every mornin', hot er cold, to milk out in the shed, while all you city fellers are tucked in yer comfy bed. With winter there comes Christmas time with all its joy an' cheer, which after all, I reckon, is the best time of the year. With snow an' sleet comes coastin' an' a lot of bob sled rides an' when the creek is frozen we kin skate a bit besides. I've noticed, too, in winter, radio "comes in" the best, which bein' true I s'pose I should forget about the rest of winter's inconveniences like thawin' out the pump, with weather down to zero, when yer swing yer arms



an' jump to keep up circulation. Gosh! I hate to do the chores when its as cold inside the barn as it is out of doors. When I get up these mornin's it's as dark as pitch outside an' 'fore I get the chores done I am almost froze beside. Last week I caught an awful cold, worst one I've had fer years. My nose wuz like an eight-day clock, an' eyes chuck full of tears; my back ached an' my head ached, I felt ninety-four years old. I wish some doc could find out how such things could be controlled. I soaked my dainty feet in mustard baths till they were pink—I'd hate to tell you how much lemonade Min made me drink. All wrapped up in a comforter there's nothin' I could do but listen to my Radio an' I wuz feelin' blue because on every Tuesday night they broadcast singin' lessons which helps me find an outlet fer my musical expressions. While I don't need no lessons still it keeps me up to date on how to tell the other boys who ain't so fortunate. But Tuesday I wuz feelin' bad, it kinda got my goat—all stuffed up with that cold of mine I couldn't sing a note.

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Guaranteed Special Type for Broadcasting with Bulb, Batteries, Phones, Aerial..... \$27.00

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With every \$5.00 purchase. These tubes are tested before shipping, and we offer them this way, as many of our customers will want parts to complete their outfits, such as "B" batteries, etc., and an extra bulb is always acceptable when it can be purchased for an additional \$1.00.

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Equipped with Electric Light for Morse Telegraph and Buzzer for Wireless. Regular price \$2.50. Special

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Trutone has been pronounced the best on the market by experts. It has a clear, true tone. Every radio fan should try Trutone and compare it with others. If YOU don't find Trutone the best, your money will be refunded. It is sold on a ten-day trial money-back guarantee. If not carried by your dealer write us.

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ALL MOLDED UNIVERSAL COMBINATIONS 5 Units in 3

- F. R. S. Molded Variometers\$6.00
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Bank Windings are interchangeable for direct mounting on either Variometer or Variocoupler.

Universal—Accurate—Interchangeable

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Set includes two Federal Transformers, Condenser, two-molded variometers, molded variocoupler, three V. T. sockets, filament rheostats, dials. Read 'Em binding posts, switch points; in attractive cabinet and drilled panel; complete, ready to hook up. **\$40**

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That Armstrong Circuit

So much interest has been displayed in the special article, "TESTED INVENTION OF MAJOR ARMSTRONG AMPLIFIES SET 100,000 TIMES," by John Kent, that appeared in RADIO WORLD No. 13, dated June 24, 1922, the publisher decided to put aside a number of copies for those who were not able to get this issue when published. Copies will be sent, postpaid, on receipt of 15c., or send in your subscription, \$6.00 for one year (52 issues), \$3.00 six months, or \$1.50 three months, and subscription will be started with the issue containing the article about Major Armstrong's Amplifier.—RADIO WORLD, 1493 Broadway.

Radio Romance

By Dr. Frank Crane

FEW of us realize the romance of radio. To very many it seems to be merely another form of amusement, another mechanical device in addition to talking machines and pianolas.

There is a very large number of people, however, to whom radio opens up a new world.

If you will take into our imagination the picture of the many who are shut in and have little communication with the outside world we begin to see in radio wider possibilities for enriching life.

Hospital patients can redeem their hours of loneliness by listening in. The concerts and lectures and stories broadcast from central stations, affairs which may not be alluring to those of us who are vigorous and well, are to these people a godsend.

Henry Smith Williams calls our attention to the remote workers on the frontiers of civilization. "Imagine yourself," he says, "a lumberjack working month in and month out in a northern logging camp, which you leave at most twice in the year, on Christmas and on the Fourth of July. For months together you are shut out from all physical contact with what we ordinarily speak of as the world. No newspapers, no letters, no rumors even of what is going on a hundred miles away."

Then, with a simple radio outfit the lonely man may take his place at the world's table and resume his touch with humanity.

Then let your imagination call up these things:

The lonely lighthouse or lightship, where men live for months in solitude.

The explorer, far from civilization in the forests of Canada or the jungles of Africa, being able to keep constantly in touch with those at home.

The Desert of Sahara, which is already dotted with radio stations from which French garrisons receive instructions.

Alaska. Recently the first station was established at Fairbanks.

The Boy Scouts. Especially in England, the boys are using radio. With a radio outfit there is no excuse for getting lost.

The detection of crime. William J. Flynn, former Secret Service chief, says that radio is especially valuable in broadcasting description of criminals.

The use of radio on ships in remote parts of the sea and on air vessels.

The influence of radio in unifying humanity. Dean Schneider of the University of Cincinnati, says: "What perhaps appealed to me more than any other phase of the possibilities of the radio telephone is its potent influence in bringing together all peoples of the world, in cementing human relationships, in doing away with discord and promoting international understanding and sympathy."

Finally, think of how radio could be used by Arctic explorers.

Every one of these items is intriguing to the imagination.—From "The Globe," N. Y. (Copyright, 1922, by Frank Crane and "The Globe," N. Y.)

Hears Her Own Play by Radio

AS Miss Zona Gale, famous author, listened in at her home in Portage, Wisconsin, one evening, recently, she heard the voice of WGY, broadcasting station of the General Electric Company, speak her name and convey the greetings of the studio players who were about to present, as the evening's program, the play made from her book, "Miss Lulu Bett." The following day, her acknowledgment came in a telegram to WGY in which her manager, F. L. Van Epps, said:

"Miss Gale acknowledges your greetings. Lulu Bett coming through fine."

The play was given by the studio actors of WGY, headed by Edward H. Smith.

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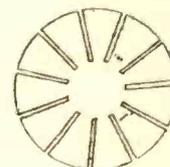
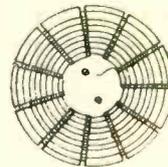
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Inductance wound complete. \$2.00
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Diagram for connections free with order.

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Simple to Use
 Just plug in at any 110 v. A. C. lamp socket—attach clips to battery—turn on current and you have your own charging plant.

A compact portable Recharging unit that will fully charge a 100 AH battery overnight for 5c. to 10c.
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 1681 Fillmore Avenue Buffalo, N. Y.

Garden Hose Saves Day
Radio Manufacturer Does Quick Thinking When Returns Fail Doctor
Listening in to World Series

WHEN the radio returns of the World Series baseball games were being broadcast at least one unique turn was given this event. As is generally known, the voice of the broadcaster was transmitted from the Polo Grounds, New York City, to Newark, New Jersey, where the broadcasting was done.

One of the directors of the Freed-Eisemann Radio Corporation of New York was giving a "radio baseball party" at his home in Far Rockaway, Long Island, when the telephone-bell rang. It appears that Dr. Richard H. Hoffman, a New York physician and one of the director's friends, had also been "listening in" to the radio returns at his own home. But in the middle of a very exciting play his storage battery ran down.

In haste he hurried to phone his friend to inquire what to do. The radio corporation director offered to assist him, and this is how it was done:

Instead of continuing to "listen in" on one loud-speaker horn a second was connected in series. Then the gardener brought in the lawn hose, which saved the day. One end of the hose was stuffed down the throat of the loud-speaker and the other fastened to the mouth-piece of the land-telephone. "Central" set the connection to the doctor's home telephone, and Dr. Hoffman, listening to the receiver of his land-telephone, was able to hear every play. Thus the plays were transmitted from the Polo Grounds by land-phone to Newark, by radio to Far Rockaway, by garden hose to a land-phone again, and by land-phone to the elated doctor, whose own set had broken down at an inopportune moment!

Fifty-two issues for \$6.00. Sub. Department, Radio World, 1493 Broadway, N. Y. C.

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INCREASE YOUR CRYSTAL RANGE
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Here is an efficient economical way to use your Metrola, Edison, Brunswick, etc., as a wonderful loud speaker.
 This adapter is constructed of molded composition. It eliminates metallic and distorted sounds. Guaranteed to be satisfactory or money refunded.
 If your dealer cannot supply you send us \$2.00 and we will mail one by parcel post prepaid.
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Attention! Fans and Amateurs!

Have you built your own receiver?
 Are you experimenting with any particular hook-up?
 Are you improving your set?
 Are you doing any interesting constructive work in radio?
 Why not share this knowledge with your thousands of brother fans who read **RADIO WORLD** every week?
 We want pictures of receiving sets with descriptions of how you overcame some difficulty, or of any additional part or unit that you have added to obtain better results. These are the things that, probably, the other fellow is looking for. Send in your information; pictures or whatever you have done to improve the art.

Remember the beginner is looking for them.
 We intend to print in this paper, each week, pictured information and description of value to radio amateurs. If you have found a newer or better way of doing anything, don't keep the secret but tell it to your thousands of brother fans.
 Send in a photograph of your set with or without accompanying diagrams and measurement. State whether you figure in the picture yourself, or not, and without any expense whatsoever to you we will make an engraving and publish it. Be sure to write your name and address plainly on photograph.
 Send in your picture at once, or if you have not made a set or done anything else in making radio material, tell the boy next door all about this offer.

Address Technical Editor
RADIO WORLD, 1493 Broadway, New York City, N. Y.

"Button, Button, Who's Got the Button?"

THE old game, "Button, Button, Who's Got the Button" has just been applied to radio broadcasting. When the younger radioists meet, they ask one another how many radio buttons they have—the one with the greater number being the winner. Several stations now have individual buttons and many others have orders on file. W. Dandridge Terrell, jr., fourteen-year-old son of the chief radio inspector, of the Department of Commerce, is the "inventor" and owner of the new radio-button scheme. He is supplying broadcasting stations with identifying buttons of different colors bearing their name, call, and frequently their slogan. Distribution of the buttons is made by the stations to listeners-in who report having received their broadcasts.

Many fans are already proudly displaying the buttons of their favorite stations on their coat lapels or on banners hung on the wall over their receiving sets. Those possessing the most buttons are local champions. As new broadcasters adopt buttons, the scope of the game increases and there are more buttons added to the penants of the receiving stations. A prize pennant is planned for the receiver securing the most buttons in a given time.

The young inventor, who is a pupil in the Force School in Washington, is believed to have started something new in the way of advertising and both broadcasting stations and fans are enthusiastic over the plan. Among the first stations to adopt buttons were WSB, the Atlanta "Journal," and WFAA, "The News," Dallas, Texas.

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This department is intended for everybody who wants quick action on short announcements covering the buying, selling, exchanging or general merchandising in the radio field. Readers of RADIO WORLD will find that it pays to read these columns every week. Advertisers will get a ten-day service here—that is, copy received for this department will appear in RADIO WORLD on the news-stands ten days after copy reaches us.

The rate for this RADIO WORLD QUICK-ACTION CLASSIFIED AD. DEPT. is 5c. per word (minimum of 10 words, including address), 10% discount for 4 consecutive insertions, 15% for 13 consecutive insertions (3 months). Changes will be made in standing classified ads. if copy is received at this office ten days before publication. RADIO WORLD CO., 1493 Broadway, N. Y. C. (Phone, Bryant 4796).

VACUUM TUBES repaired reasonably. Satisfaction guaranteed or cost nothing. Vacuum Elect., 103, 1621 Derr, Toledo, O.

SILVER MIRRORS—PLATING OUTFITS FURNISHED—Stop daily grind. Plans free. Established 1886. CLARENCE SPRINKLE, Dept. 9, Marion, Indiana.

EXCHANGE JOLLY, INTERESTING LETTERS through our club. Stamp appreciated. Betty Lee, Inc., 4254 Broadway, New York City.

PATENTS—Electrical cases a specialty. Pre-war charges. B. P. Fishburne, Registered Patent Lawyer, 386 McGill Bldg., Washington, D. C.

FOR SALE—No. A-1 Gorton Engraving Machine and set of Radio letters, in good condition. Will sell cheap or trade for radio supplies. L. S. Ritter, 414 Deaderick St., Nashville, Tenn.

RADIO FANS: Have you read of the wonderful new all-wave Radio Frequency Amplifier invented by Doctor Miller of the Naval Radio Research Laboratory, Bureau of Standards, Washington, D. C.? We manufacture this device under license. May be added to your present set, giving wonderful results on distant stations, or may be made up into loop receiver sets with extreme range and beautifully clear reception, for home or automobile use. Besides being the best amplifier on the market, the Miller covers all waves at equal efficiency. Price, \$6.50 per unit. Details free. Coast Radio, Inc., El Monte, Los Angeles, Calif.

FREE APPARATUS FOR SECURING SUBSCRIPTIONS FOR "RADIO." Write today for complete list of premiums and our special subscription offer. "RADIO," Pacific Bldg., San Francisco, Cal.

WE WANT YOUR NAME—On a postal card. We would like to get the name of every RADIO WORLD reader, as we expect to send out a special message that will interest you. Be sure to send us your name on a postal card and address it, GIFT DEPT., RADIO WORLD, 1493 Broadway, New York.

NEWS AND GOSSIP OF THE STAGE—Send 10c. for specimen copy of NEW YORK STAR, the great illustrated theatrical weekly. \$4.00 year. \$2.00 six months, \$1.00 three months. New York Star Co., 1493 Broadway, N. Y.

DID YOU GET THE XMAS RADIO WORLD? This was our attractive issue of December 9. Mailed on receipt of 15c., stamps or coin—or subscribe and have your subscription begin with XMAS number. RADIO WORLD, 1493 Broadway, New York.

WE NEED RADIO WORLD, dated April 22 and August 5. If you have copies you don't require, mail to this office and current issues will be sent you for them. RADIO WORLD, 1493 Broadway, New York.

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USED RADIO APPARATUS bought, sold and exchanged. Write, if interested. Roy McConnell, Ravenna, Nebr.

BROADCASTING MAP of the United States appeared in RADIO WORLD No. 8. Sent on receipt of 15c. coin or stamps; or start your subscription from that number (\$6.00 for 52 issues). RADIO WORLD, 1493 Broadway, New York

BUY "BILTRITE" PRODUCTS DIRECT FROM MANUFACTURER. Save 35%. Variometers, mahogany, green silk wire, special machined hardware, \$3.50; Variocouplers to match, \$2.85; Condensers, 23 aluminum plate, \$1.65; 43, \$2.15; Double Circuit Jacks, 45c; \$1.25 Plugs, 65c; etc. Literature. WAGNER NOVELTY CO., DELPHOS, OHIO.

LIGHT—Make a flash-light without the use of batteries or bulbs. Instructions for making, 25c. H & M Specialty Co., Box 66, Brighton, Mass.

LATEST—BUILD a curiosity clock for the home. Instructions, 25c. H & M Specialty Co., Box 66, Brighton, Mass.

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Have You a Friend Who Is Interested in Radio as an Amateur or a Fan?

IF so, you must know that such a friend would welcome a yearly subscription for RADIO WORLD from you. Send us \$6.00 and we will place the name of your friend on our mailing list for the coming year, and also we will send a special notification to your friend to the effect that RADIO WORLD will be sent for 52 weeks to his address with your compliments. Send in a yearly order, so that the first copy and our acknowledgment of your courtesy to your friend will be received before Christmas.

Address: Subscription Department, RADIO WORLD, 1493 Broadway, New York, N. Y.

Holiday Gift Subscription Blank

RADIO WORLD,
1493 Broadway, New York, N. Y.

Enclosed find \$6.00 for which send Radio World (52 numbers) for the coming year, 1923, to the following address:

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City and State

My Name

Address

City and State

Send notification to the name given that RADIO WORLD will be sent with my compliments for the coming year.

If you wish to send more than one subscription, write additional names and addresses on a separate paper and add \$6.00 for each additional subscription.

Radio Club News

THE Radio Experimenters League announces on its letter heads that it is "Run for amateurs by amateurs." If interested write William Guild, Secretary, 68 Glen Ridge Avenue, Glen Ridge, New Jersey.

The Princeton Radio Club announces that messages will be transmitted free for undergraduates to any part of the United States or Canada. Its members have agreements with other amateur radio outfits for the relaying of messages for points beyond the range of its 50-watt set. With this set, however, the Princeton operators managed to get in touch with amateurs in England three weeks ago, establishing a record for sets of that power, it is believed. The club has twenty-five members.

The Eighth Ward Radio Club, which meets every Tuesday at the Christodora House, 147 Avenue B, New York City, at 7:45 p. m. sharp, has room for new members, with a little knowledge of radio. The club members have donated two buzzer-sets for code practice. The members are making progress under the leadership of Manuel Smith, of Plainfield, New Jersey. It is desired to have only boys who reside in the neighborhood of Tompkins Square, between Fifth and Fourteenth streets. Applications for membership may be filed with Martin Remnek, secretary, Eighth Ward Radio Club, 250 Avenue B, New York.

The Young Men's Hebrew Association, 92nd Street and Lexington Avenue, New York City, has installed a large radio receiving-set which will be used for a number of purposes. The educational department will give a course in radiophone operation and construction which will be open to members of the association. The entertainments which are held from time to time will get the benefit of the concerts and other numbers which are broadcast.

Answers to Readers

1—Is it possible to use 110-V A C with a step-down transformer and potentiometer to light filaments?

2—Where may they be purchased?

3—Can W D 11 tubes be used for amplifying as well as for detection?

4—Would several turns of insulated wire strung around the room be of any use as an aerial for a powerful regenerative set?

5—Are the W D 11 tubes as good as the regular tubes using 6 volts—L. L. Hamilton, Topsham, Maine.

1—While this can be done, you will be troubled with a constant 60-cycle hum in your set. This is especially noticeable with the regenerative circuit. A filter circuit may be built for this use, but it is less trouble to use the regular A battery, and better results will be obtained.

2—Potentiometers may be purchased in any stores handling radio goods.

3—These tubes have been used successfully both as detector and amplifier.

4—You would probably be successful in doing this if you used about 150 feet of wire, but an outside aerial is advisable wherever possible.

5—It is impossible to discuss the merits of various competitive radio tubes in these columns.

* * *

I am constructing a 2-slide tuner according to enclosed sketch. Give me a hook-up for this.—George Cole, Sandusky, O.

If you will look in RADIO WORLD, No. 11, dated June 10, you will find an article and several hook-ups, "How to Construct One- and Two-slide Tuners," by George W. May. You mention using a flat board for your winding core. This is all right, but why not stick to the standard way and wind it on a round tube or core?

* * *

What size windings should be used in the regenerative set described by Harold Day in RADIO WORLD, No. 30, dated October 21.—Scott Weakby, Kansas City, Kansas.

You should use No. 20 wire wound in the following manner: eight turns with taps taken off every turn, then seven groups of eight turns apiece. This will permit you to get what is known as single-turn tuning. The rotor should be wound full with the same size wire.

* * *

Can a step-down transformer be used to light bulbs? We have D-C current.—John Spigler, New York City.

A step-down transformer cannot be used on D C. It will only work on A C.

* * *

Enclosed find diagram of superheterodyne with 5 tubes. When hooked up, as shown in diagram, I get nothing but howls. What is the matter?—William Charلمان, Pottsville, Pa.

Your diagram is correct. A superheterodyne is a very hard circuit to manipulate. We suggest that you consult anyone of the following back numbers of RADIO WORLD in order to learn the correct manipulation of this circuit: June 24, July 8, July 15, August 5, September 16. If you are not familiar with working sets of this type, it is better to construct a simpler set as this is an extremely hard set to work unless you understand it thoroughly, which very few people do.

* * *

I recently purchased a Paragon regenerative set and have had wonderful results. Kindly explain why stations at a distance, like Atlanta and Chicago, seem to go in and out. I sometimes lose them entirely.—Robert Steinger, Rockaway Park, N. Y.

The trouble you are experiencing is com-

mon and is known as "fading." This cannot be helped. It is not the fault of your set.

* * *

1—Can I use a radiator pipe for a ground?

2—Is an outside aerial necessary?

3—Can I use more than one set of phones with a crystal set?

4—If so, will I have to use two condensers across them.—Inquirer, Youngstown, Pa.

1—Yes. A radiator pipe is all right for a ground. A cold-water pipe is better.

2—No. Reception can be accomplished with wire strung around the room, but it will not function as well as an outside aerial.

3—Yes. It will cut down the strength of the signals, but not enough to trouble you.

4—No. One condenser across the phones is all that is necessary.

B C M BROADCAST RADIO RECEIVER

Many people live in locations where an aerial is impossible. Others object to their premises being disfigured by poles and wires, and many doubt their ability to operate sets with such complications. Eliminate these features by using B C M Radio Frequency Broadcast receivers and inside aerial.

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VARIABLE CONDENSERS—

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If your dealer doesn't carry, address Dept. D.

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TRADE
"VAC-SHIELD"
MARK



"VAC-SHIELDS" bring in DX.

This new invention enables you to eliminate any possibility of linking up the magnetic field between tubes and does away with inter-stage coupling and unnecessary noises, thus overcoming stray capacity effects that are always so troublesome and make it so difficult to tune in distant stations.

Make reception worth while. Your set should have them.

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Wave Length, 150 to 3,000 Meters

Eliminates the use of all Variometers, Variocouplers and Loading Coils, inasmuch as it performs in one compact unit the functions of all of these devices combined.

For the Novice—The six efficient hook-ups given free with each "All Wave" Coupler enables the greenest novice to attain the same results attained by the expert in building the simplest, most compact and most efficient radio receiving set possible.

Be Prepared—For the higher wave lengths that have been and will be allotted to broadcasting stations because of their ever-increasing number. BUILD a set that cannot become obsolete.

Unusual Results Attained—Individual users of the "All Wave" Coupler have written us that in Rhode Island it is nothing unusual to bring in stations as far south as Havana, Cuba; while in Mobile, Alabama, Newark, N. J., is brought in daily.

Beware of Imitations—of the "All Wave" Coupler, which is guaranteed with a money back to operate as advertised. Look for the trademark, "All Wave," on the rotor, also the six efficient hook-ups in the box.

\$9.00 Six efficient Hook-ups sent upon receipt of 10c. stamps or Free with each "All Wave" Coupler

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THOUSANDS OF SATISFIED USERS

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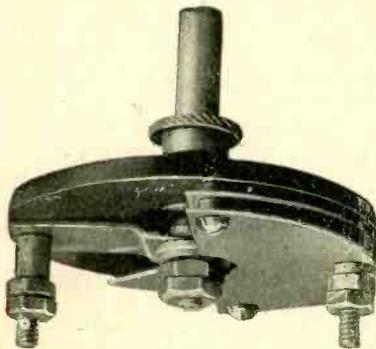
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| Bestone Vernier..... | List \$1.50 |
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Now, more than ever, when the market is flooded with inferior goods, it pays to buy standard trade marked products.

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Just a few leaders of Pruden Reliable Products shown here that will give you better radio results at no greater cost.

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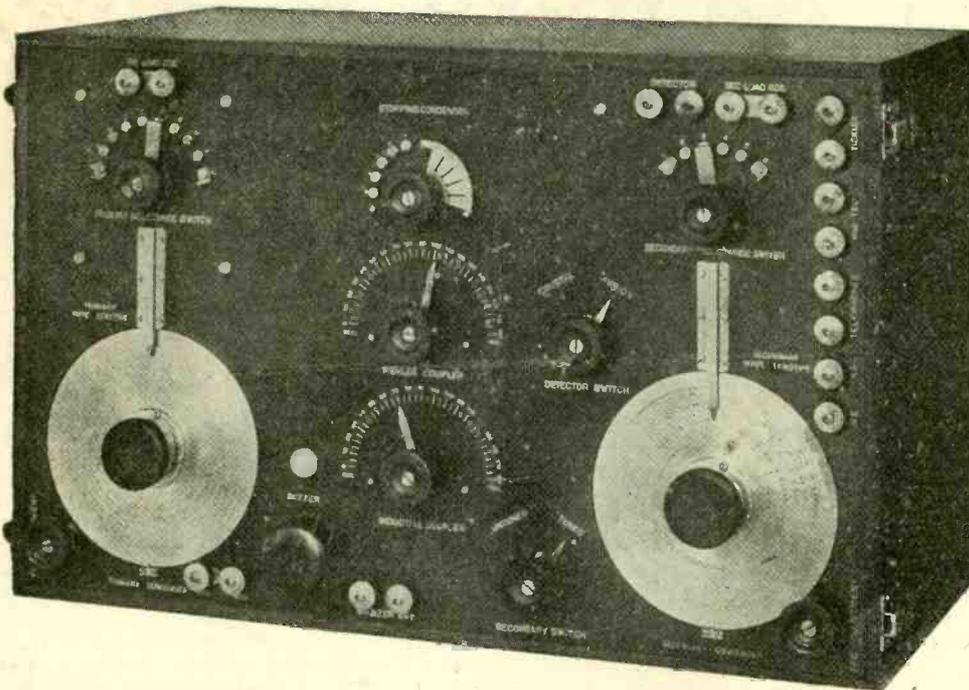
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The only fixed radio detector requiring no adjustment. Used in place of crystal or vacuum tube detector. Gives excellent quality of sound without distortion, battery or tube noises. Detects telegraph signals at several thousand miles. Detects broadcasted music more clearly than vacuum tube detector, and requires no amplification where the incoming signal has sufficient strength to actuate the sensitive phones. Ideal for use in regenerative circuits. Handsome, substantial, suitable for assembly in the finest radio equipment. Guaranteed against imperfection or faulty operation. List each **\$3.50**

The De Luxe U. S. Navy Type Radio Receiver

List \$595.00

FOR IMMEDIATE DELIVERY



Best of its type—must not be confused with instruments selling for from \$200 to \$300. Highly selective. Will pick up messages, music, lectures, etc., that lower priced instruments will not hear. This receiver is equipped with binding posts which are normally short circuited for 300 to 6,800 meters by which wave lengths up to 23,000 meters may be received by the attachment of loading coils. Capacities of proper loading coils for above are: Primary 50; Secondary 50; Tickler 20 millihenries. While the receiver is provided with a "standby" or un-tuned circuit, it also has an unusual degree of selectivity. Although primarily designed for the more advanced fields of Radio work, or the laboratory, the simplicity of arrangement and beauty of finish make it unusually desirable for the radio club or for the individual who desires the finest equipment obtainable for his home or office. In the receiver, Bakelite tubes, threaded, provide the forms on which inductance coils of high frequency cable are bank-wound. After assembling, the coils are impregnated with an insulating compound, in vacuum, and thoroughly baked. The inductance switch controls a mechanism whereby the different sections may be connected completely disconnected and opened, or completely disconnected and individually short circuited. This arrangement is important for, by it, each coil has a natural period when connected which is less than the shortest wave length in the receiver's range. The reception of parasitic signals is overcome, the absorption of desired signals by the coils is minimized, more energy is forced to the detector and on all wave lengths the interference is reduced.

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