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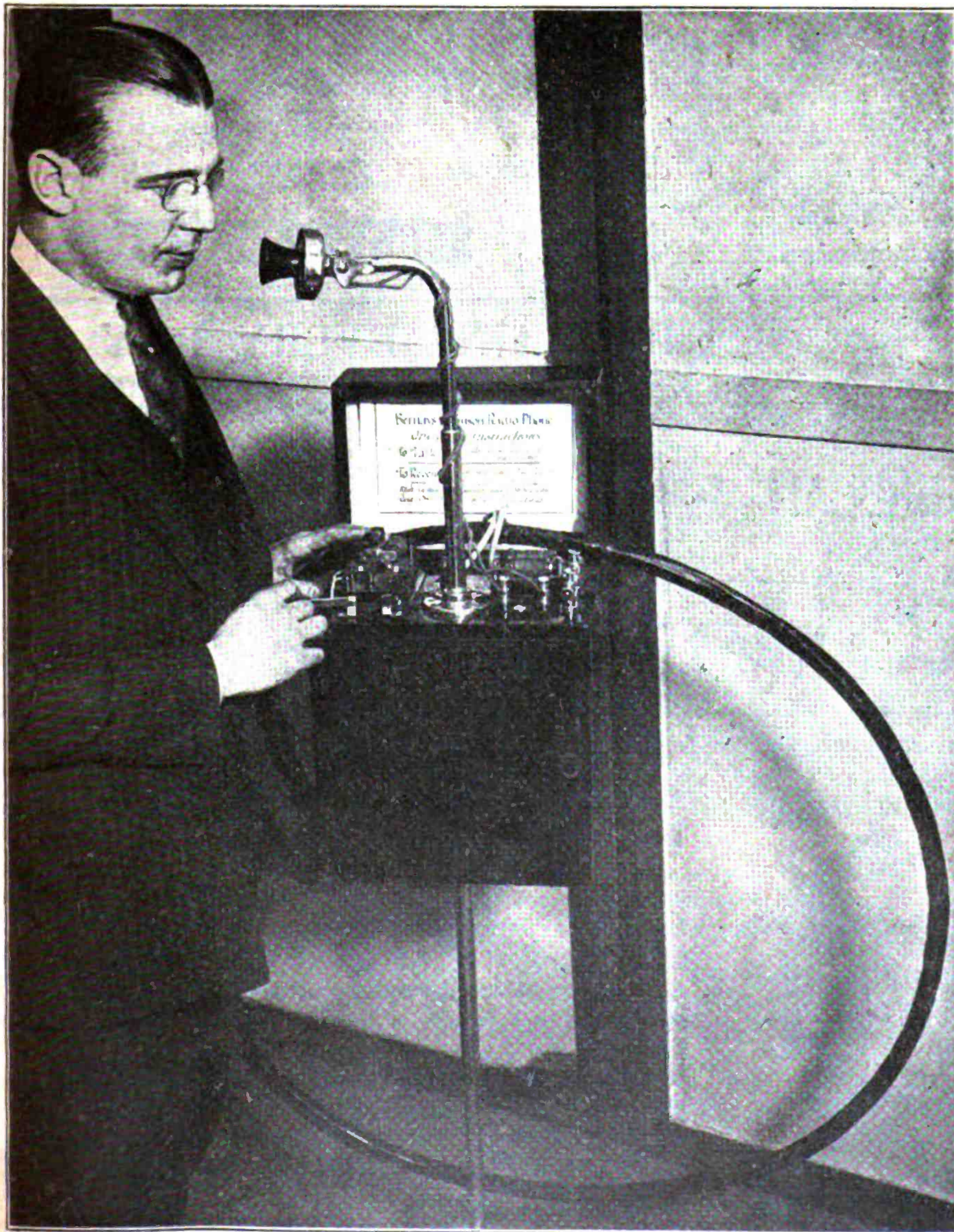
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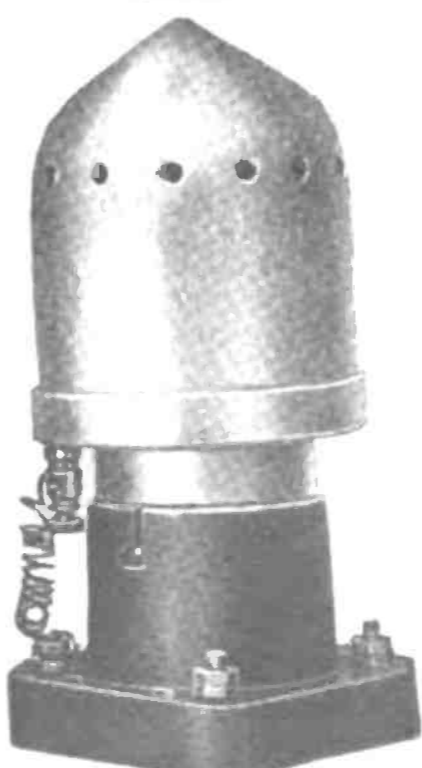
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VOLUME TWO OF
RADIO WORLD

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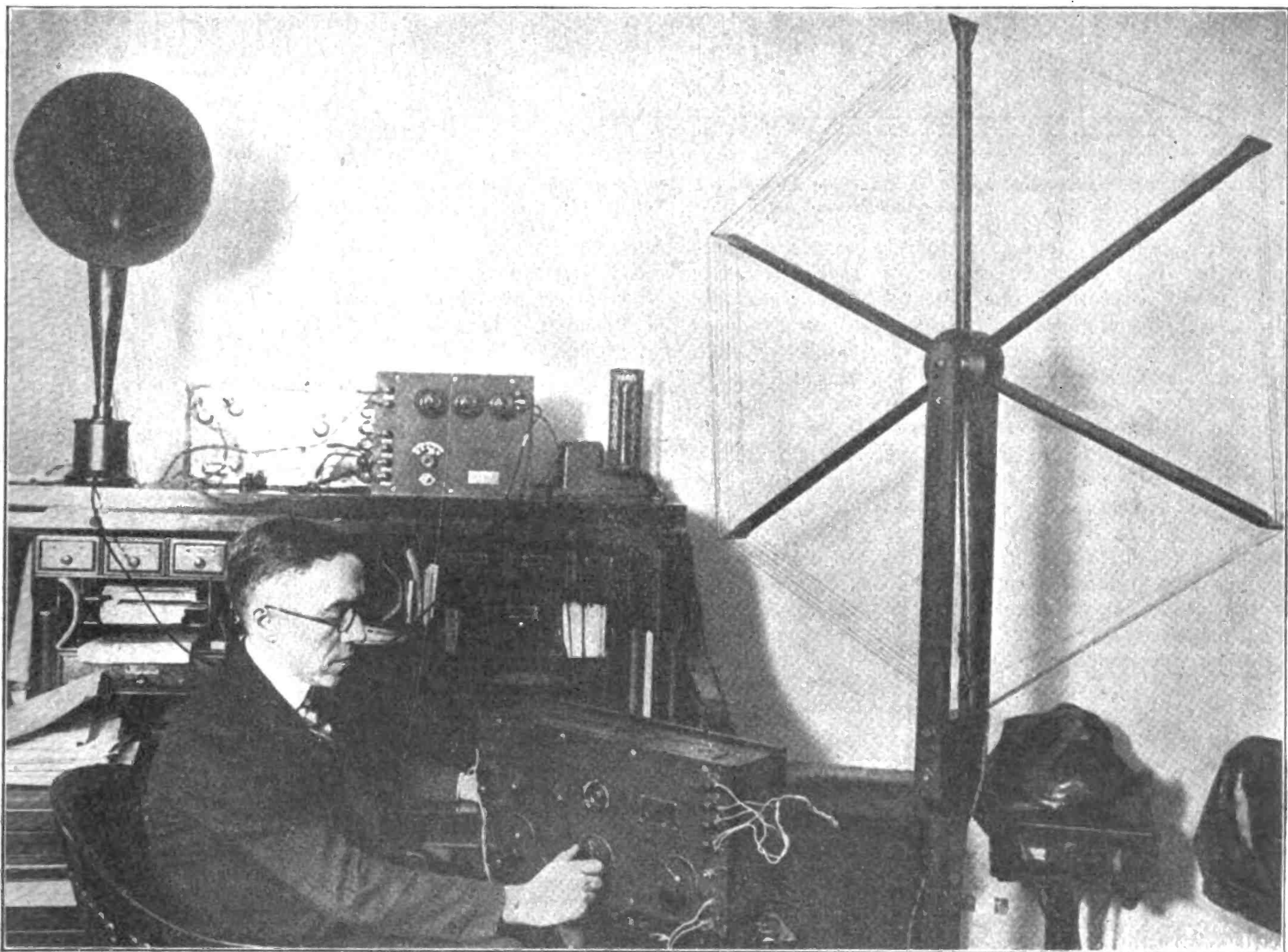
Vol. II, No. 16. Whole No. 42

January 13, 1923

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New Government Radio Set Has Valuable Hints for Amateurs

By Harold Day



(C. Wide World Photos)

A fitting illustration that radio is commanding an important place in governmental circles of the United States. The loop used in the set photographed was probably modeled after Mahatma Ghandi's spinning wheel, at least that is what it suggested to Mr. Day when he first examined the photograph. But by using an hexagonal loop, more wire may actually be strung on the loop than by the use of a square. This may give Radio World readers some new ideas in designing of loop aeriels. The illustration also shows that radio-frequency as used with indoor aeriels is becoming more and more common. It is only a matter of time when, probably, the only sets using outside aeriels will be the transmitting and the long-wave stations. If you study the photograph closely, you will notice that a resistance is used hooked into the regular lighting-current with an additional device to eliminate the commutator ripple from the circuit. This, also, is an idea that is coming into use more and more.

SOMETHING to cheer the amateurs' hearts. The accompanying photograph shows Congressman V. M. Brennan, of Michigan, listening in on the proceedings of the House of Representatives by radio. Mr. Brennan has introduced a bill to

proceedings and debates in both branches of Congress. In Mr. Brennan the American amateur has a staunch friend and an enthusiastic radio fan. The set shown in the photograph is a radio-frequency layout using a loop. A power amplifier and horn may be

considers the radio set as important in his office as a dictaphone or a stenographer because it keeps him in constant touch with everything of importance that takes place. With three steps of radio-frequency and a power amplifier it is possible to hear every

Constructing a Simple Reflex-Amplifier

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

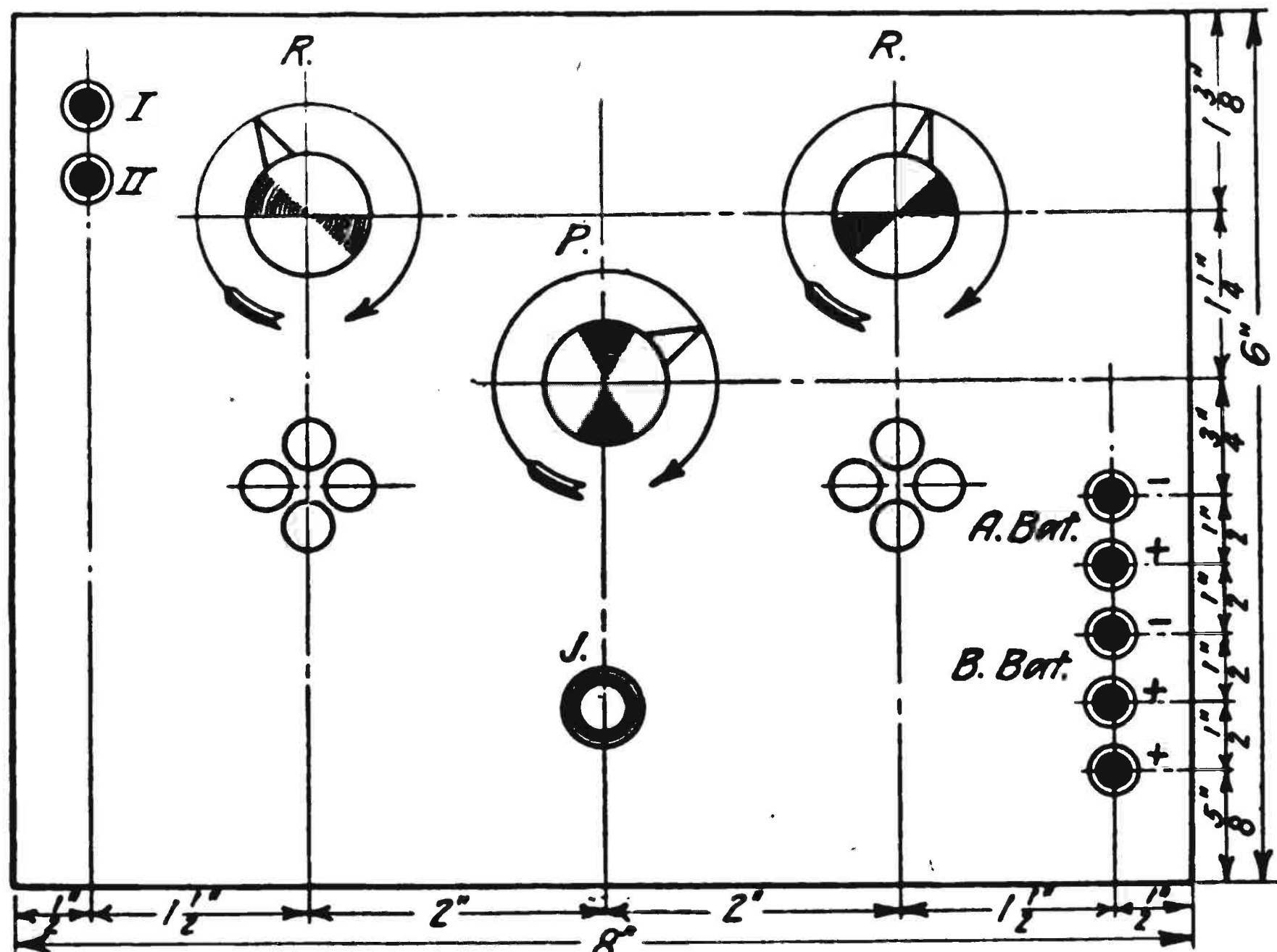


Figure 1—Diagrammatic front view of the panel layout with full dimensions for drilling and setting the various holes.

THE so-called reflex circuit is just the device that radio fans using a vacuum-tube detector and one-step amplifier have been seeking. It is a circuit in which one or more amplifier tubes are made to function in two separate and different operations. Those tubes are so connected that the incoming signals are both amplified before and after detection has taken place. It is well known that amplification before detection is commonly known as radio-frequency amplification; and amplification after detection is known as audio-frequency amplification.

I have experimented with this circuit for some time and recommend it as efficient and practical; but it does not tune as sharply as the usual regenerative or radio-frequency amplifier circuit. It will give satisfactory results and will be sure to please the most exacting fans. It can be made up at a very little cost. It is compact and efficient in operation. The tuning is not very critical. Any fan should be able to operate it and obtain results.

This set will do the work of three radio vacuum-tubes by using only two radio vacuum tubes. This is possible by the new method of hooking-in the different instruments required. The operations are as follows: The incoming signal is amplified before it is detected through radio-frequency amplification which brings in long distances and smooths out all distortion and interference. The signal then passes to the detector tube, or cir-

cuit, for detection and through the amplifier tube by the audio-frequency amplifier transformer to be amplified in volume and signal strength. As will be noted, the single amplifier-tube does the work of two tubes. It acts as a radio- and an audio-frequency amplifier.

I have used this outfit in conjunction with a vario-coupler and an outdoor antenna. I have not tried it with a loop antenna; therefore, I am not in a position to state just what results may be obtained with this device. But if any fan or amateur who happens to have a loop antenna should try it, I would be pleased to have him write me regarding the results.

The necessary parts and their respective cost are as follows:

1 Radiotron vacuum-tube detector, U-V 200	\$5.00
1 Radiotron vacuum-tube amplifier, U-V 201	6.50
2 Filament rheostats, at \$1.25	2.50
1 200-ohm. potentiometer	2.00
2 Vacuum-tube sockets, at \$1.	2.00
1 Audio-frequency amplifying transformer	6.00
1 Radio-frequency amplifying transformer, 150 to 500 meters	6.00
1 Jack	1.00
1 Plug	1.25
7 Binding posts, at 15 cents	1.05
1 Formica panel, 8x6x1/4, at 3 cents per sq. in.	1.44
1 Base of soft wood, 8x5x1/2 inches ..	.50
1 Grid condenser, CI, .0002535
2 Fixed condensers, at 35 cents each, .001 mfd.70
Wire, screws, tubing, and accessories	2.00
Total	\$38.29

The above figures may be a little

more or less one way or the other. However, the fact remains that the cost is very low for a set of this kind.

Figure 1 shows the front view of the panel and the method of mounting the various apparatus. It also shows the symbols and proper dimensions for drilling the holes.

Figure 2 is a back view of the panel mounted on a base. It also shows the method of mounting the vacuum tube, vacuum-tube sockets, the jack, and the radio- and audio-frequency amplifying transformers; also the method of mounting the binding posts.

Figure 3 is an end view of the set. It shows the method of mounting the radio- and audio-frequency amplifying transformers along with the vacuum-tube sockets, vacuum tubes, binding posts, and rheostats.

Figure 4 shows the method of the internal and external hook-up. It shows also the method of connecting the vario-coupler, and the antenna and ground connections.

Great care must be taken in connecting up this set as the least mistake in connecting the wires at their proper and various places will cause it to function poorly, if at all.

Granted that the prospective builder has secured all the necessary parts, he should first take his panel and give it a high polish with some good grade of machine oil and then sandpaper it with No. 0 sandpaper until he has a very high polish. He should then mark off for the drilling of the holes. After this has been done, he should perform actual drilling.

Next mount the rheostats, potentiometer, jack, and binding posts on the panel, as illustrated in Figure 1. When this has been done give the soft-wood base several coats of some good insulating compound.

When dry, mount the panel on the base by the following method: Mount the panel by placing one of its long edges, or sides, against one of the long edges, or sides, of the soft-wood base.

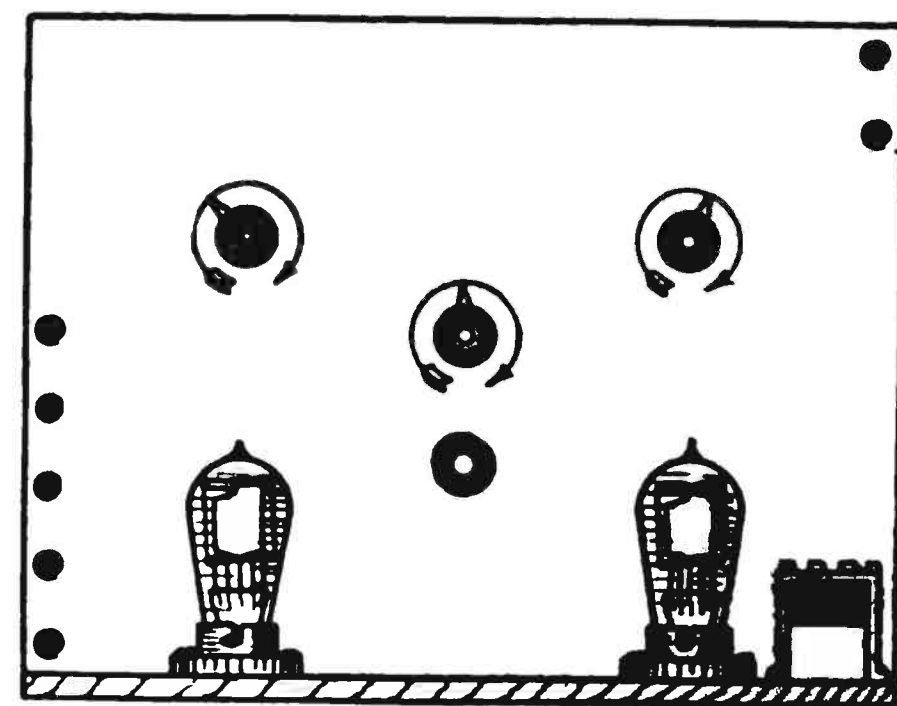


Figure 2—Diagrammatic back view of panel, showing bulbs and transformers.

(Continued from preceding page)

Secure them firmly by means of three brass wood-screws which go through the panel from the front into the soft-wood base. Tighten them firmly, holding the panel rigid against the base. Mount the vacuum-tube sockets and the radio- and audio-frequency amplifying transformers on the base. When purchasing the radio- and audio-frequency amplifying transformers, be sure to secure those having the proper mounting symbols at the binding posts, so as to tell where the proper wire connections are to be made. This method will reduce the chances of making a mistake. In the internal wiring of the set, note that the writer has marked these connections on the amplifying transformers in Figure 4.

When all this is completed, the three fixed condensers are then mounted on the base in true relation to their respective connections. We are now ready for the internal hook-up, or connecting up, of this set. But before this is done, the figure, or diagram, illustrated in Figure 4 should be studied carefully as the most trifling mistake in the wiring will cause trouble.

There is a wire which connects with the negative side of the A-battery binding-post which, in turn, connects with one of the filament sides of each of the vacuum tubes, and which, also, connects with one of the connections on the potentiometer. There is another wire which connects with the positive binding of the A-battery which, in turn, connects with one side of each of the two rheostats. The remaining side of each of the rheostats connected with the remaining post on each of the vacuum tubes of the filament. This wire also connects with the other side of the potentiometer.

The remaining, slider connection, of the potentiometer connects with the secondary of the audio-frequency amplifying transformers on the filament side. The opposite side of the audio-frequency transformer, marked G, connect with the binding post marked 2.

The primary connections of the audio-frequency amplifying transformer are as follows: P connects

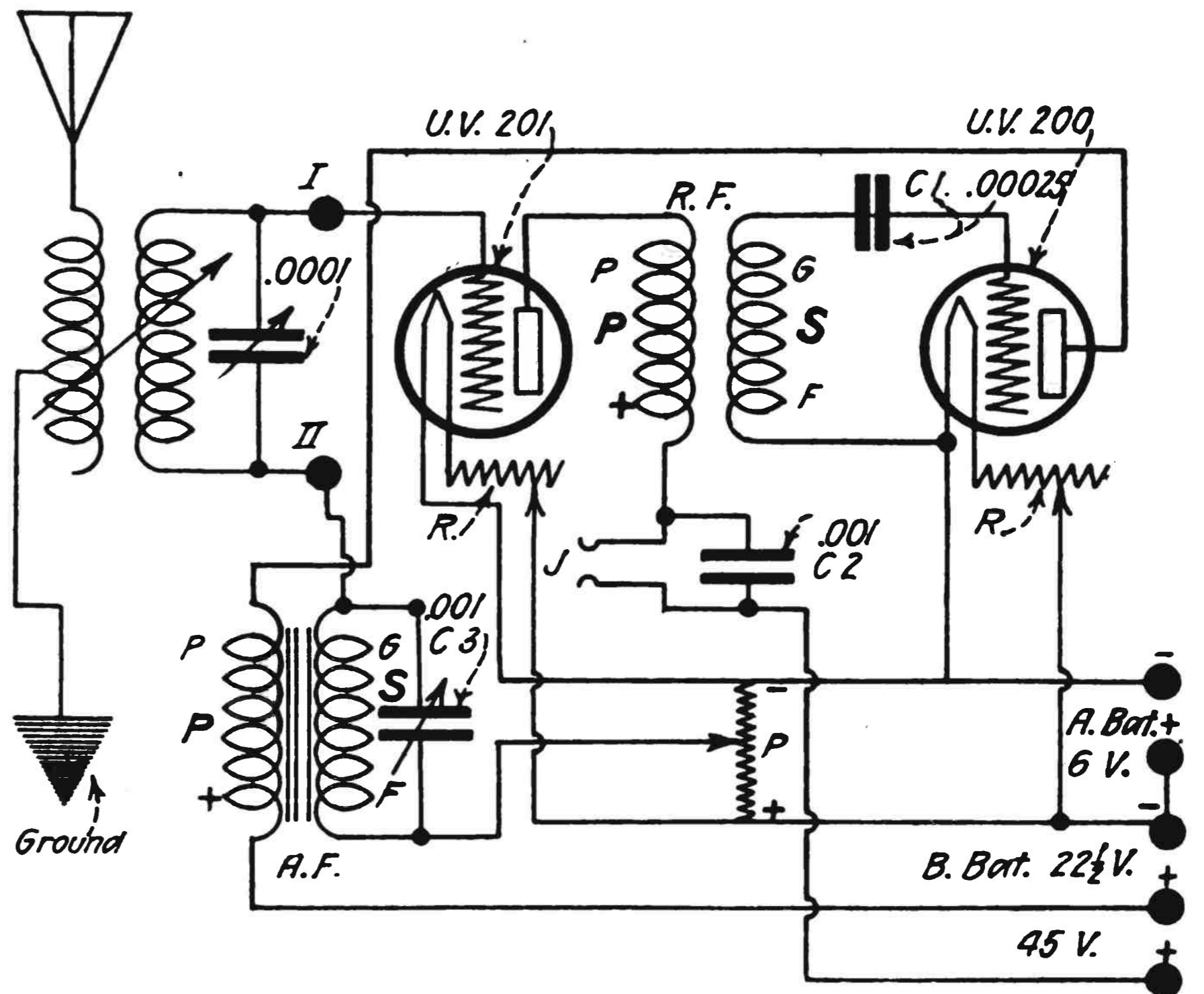


Figure 4—Schematic diagram of the hook-up of the apparatus. Note that the secondary of the audio-frequency transformer is hooked back to the end of the tuner.

with the plate of the detector tube. Positive connects with the 22½-volt positive binding post of the B battery. The fixed condenser, which is connecting across the secondary of the audio-frequency amplifying transformer is of .001 mfd., capacity. It is employed to allow the radio-frequency currents to pass. This applies to the fixed condenser which is shunted across the phones. There is a wire which connects with the lower blade of the jack which, in turn, connects with the positive binding-posts of the 45-volt B-battery connections. The upper blade of the jack connects with

the positive post on the radio-frequency amplifying transformers. The P, or plate, side of the radio-frequency transformer connects with the plate of the first tube, or the amplifying tube.

The secondary connections of the radio-frequency transformer are as follows: The G, or grid, connects with one side of the grid condenser. The other side connects with the grid of the second, or detector, vacuum tube.

The F, or filament, connects with one side of the filament of the second, or detector, vacuum tube. The grid of the first, or amplifying vacuum-tube connects with the binding post marked 1.

All connections are now made. The wiring should be of No. 14 bare copper-wire covered with varnished tubing. It should be rigid and straight.

The vario-coupler is connected in as shown in Figure 4. As in radio-frequency, the potentiometer is used to control the circuit. Its adjustment is rather critical. If the slider is carried over too far on the negative side, a loud howl is the result. Ordinarily the carrier waves of the broadcasting station are not heard because this set will not oscillate so as to make it possible to produce beat notes, which frequently happens in regular regenerative sets.

The principal advantage in using a set of this kind is the saving in vacuum tubes. Only two tubes are used, whereas all other sets use three tubes to get the same results.

The writer will gladly answer any questions regarding this set that do not require research or experimental work, if accompanied by a self-addressed, stamped envelope.

Radio Amateur Backbone of Country

Department of Commerce and Labor Pays High Compliment to American Operators.

THE increase in amateur activities so far as the radio amateur is concerned is being heard throughout the country. Recent reports issued by the Department of Commerce and Labor place no less than that of 17,000 licensed radio amateur operators on the fast-growing list.

This figure has taken practically the government officials into camp, and they now acclaim the radio amateur the backbone of the entire country. They say that these young men constitute a reserve of trained operators, some of whom have already done their bit in the recent World War. They proved themselves to be far superior to the average commercial operator when in communication in their line of work.

With this increased amount of amateur stations, and with the tendency of the growing demand for more licenses, one can imagine what the air must sound like, especially when on 200 meters, the wave allotted to them for their own operating use.

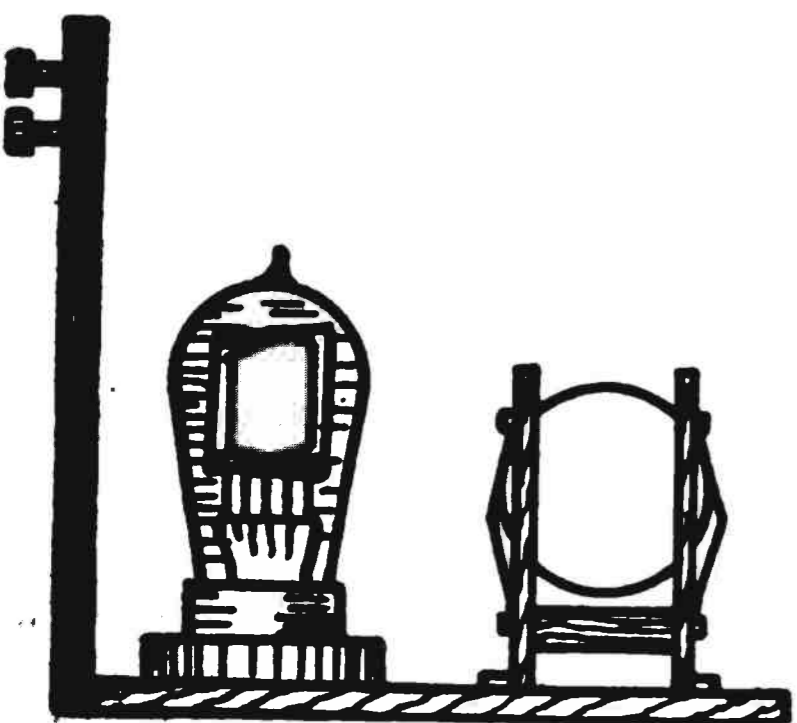


Figure 3—Diagrammatic side view of the set. The transformers should be mounted as far from the bulb as space will permit.

To the Radio Amateur with Little Money to Spend

By C. White, Consulting Engineer

NOTWITHSTANDING the fact that, during the past year, the progress and market for amateur radio-material enormously increased, development was quite logical and not so wild as most people imagined. When radio started on its way to greater popularity, due to the establishment of large broadcasting centers, many of my friends said it would not last since it was only one of those public fancies which, in the course of time, simply die a natural death. Such has not been the case, and, to the contrary, conditions in sales and service of radio supplies have multiplied.

By careful practice of economy it is not a very hard task to keep within the bounds of our money supply, or budget, for radio purposes. I shall endeavor to briefly outline several economies that may be practiced by various classes of novices. For simplicity of treatment, let us divide the general classification of novices as follows: first, the novice who has very little to invest in a radio outfit and does not wish to spend much on keeping the set in working condition; second, the novice who wants a small and highly efficient receiver without going to the trouble and expense of a storage A battery; third, the novice who wants a highly efficient type of outfit that will bring in distant stations with volume and great clarity.

For the first class of novice I would recommend a good crystal detector hook-up, provided he lives within twenty-five miles of a large broadcasting station. He should not purchase a type of crystal detector receiver which will have to be almost completely junked when he desires to expand his radio receiver for longer ranges. For ordinary broadcast and short-wave reception, he would do well to purchase a variometer as the tuning element, a .0005 mfd., mica condenser as a tuning condenser to be placed in series with the variometer, and a .001 mfd., mica condenser to be used as a by-pass condenser to be placed across the phone terminals; and, of course, a good crystal detector in a substantial mounting. When he wishes to expand this circuit to a single-circuit regenerative, all that he will have to do is to purchase a variable condenser, another variom-

eter, and the necessary accessories to go with the vacuum tube. As a crystal-set owner he will practically have no cost of operation since dry cells and other types of batteries will not be necessary.

Getting Down the Costs

For the second class of novice I recommend any type of receiver that employs a detector tube and any number of stages of audio-frequency amplification he thinks it advisable to purchase; but I would not consider any more than three stages with a regenerative detecting and tuning unit. The type of tube to be used is the new W-D 11 dry cell tube. The tube requires an average plate voltage of 40, but takes only $\frac{1}{4}$ ampere at $1\frac{1}{2}$ volts to light the filament. To economically operate a single tube, a No. 6 dry cell will serve the purpose very well, lasting, under normal conditions of employment, from two to four weeks. Now, since the life of a B battery ranges from six months to a year, and, under certain conditions, even longer, it is easy to see the cost of operating a two- or three-tube outfit will be around \$1.50 a month; that is, allowing an ample sum to be set aside each month for the purchase of a new B battery when the time comes. Quite a bit of B battery expense may be reduced if the amateur will purchase unassembled cells and solder the connections himself. With the money that is saved by the elimination of a storage A battery and its attendant expense, the novice may purchase one or more stages of audio-frequency amplification. Although the W-D 11 tube has all the above characteristics, it has two rather serious faults: first, it cannot be used for radio-frequency amplification; second, when used in the ordinary type of mounting in a receiver, it gives out a loud microphone sound every time the cabinet is jarred, even in the slightest manner.

The first fault is not very serious, since there are quite a number of amateurs who do not wish to delve into radio-frequency amplification, and the second can be cured by designing the tube mounting especially for a W-D 11 tube. The method is very simple. It consists in allowing the tube socket to remain loose

and not firmly attached to the framework, or the cabinet, as is customary. The leads running to the socket should be made of flexible wire in order not to transmit any metallic microphone wave to the socket. To keep the tube and the socket in its place, the socket should be attached to a piece of $\frac{3}{4}$ -inch felt, which is, in turn, attached, or glued, to the supporting framework. With the tube socket supporting-system modified to meet the above specifications, there will be no annoying hum no matter how hard the cabinet is tapped with the finger or otherwise jarred. Remember, in addition, that the W-D 11 tube is a hard tube and will not efficiently function as a detector with less than 40 volts on the plate, and that it has a very fine oxide filament that will stand little or no punishment from over-voltage before it is permanently damaged; do not impress more than 1.5 volts across the filament.

For the third class of novice I would recommend a three-tube superregenerative receiver or a reflex receiver using three or more tubes. If the novice is well informed regarding the tuning operation of a superregenerator, he will do well to get one, otherwise he would take a chance. But with reflex, or superregenerative, circuits the cost of operation for home use is apt to be very high unless strict economy is followed to cut down expenses. With such sets, a storage B battery is really the only thing to use since the plate current will be rather high, especially when a number of power tubes are employed. The A battery should be of the radio type of storage battery. The radio type is more desirable because it is so designed that it holds constant voltage on longer periods of continuous discharge than the ordinary automobile starter type. Naturally the amateur with such batteries to supply filament and plate power must have an ample and good way to recharge the same. It is most likely that a motor-generator of some sort, depending upon the initial power supply, would prove far more economical in the end than a tube rectifier. The amateur will do well to investigate the various types for A and B battery recharging apparatus now obtainable.

My New Noninterfering Detector

By *Harold P. Donle*

Chief Engineer Connecticut Telephone and Electric Co., Meriden, Conn.

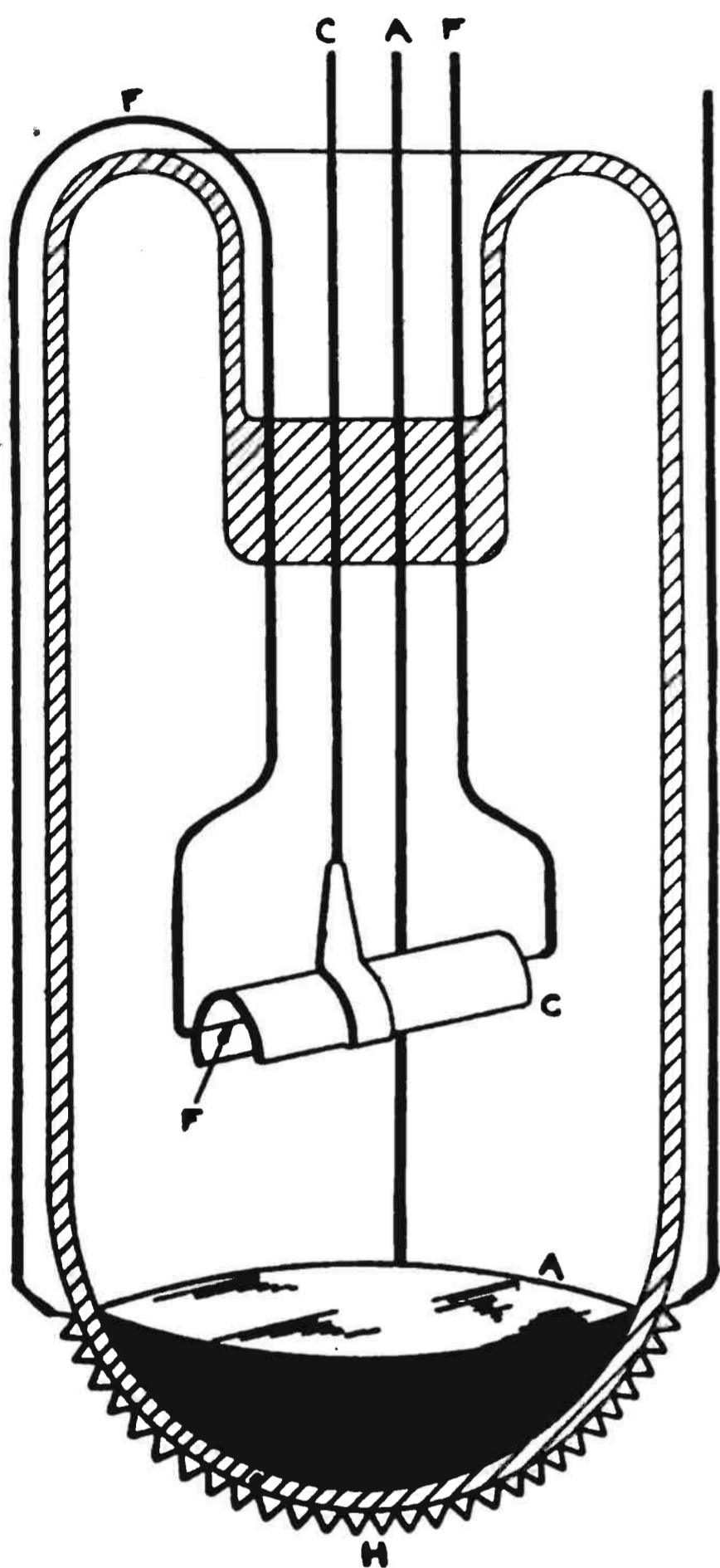


Figure 1. Diagrammatic illustration of the construction of the Donle noninterfering detector tube. In this illustration, (F) is the filament, which after passing through the tube, is cemented to the outside of the glass, where it acts as a heater (H), for the anode (A) which is metallic sodium. This heater's purpose is to maintain a proper operating temperature for the anode. (C) is the collector electrode, made of metal and located directly above the filament (F).

The photograph at the right shows the inventor, Mr. Donle, and his new tube, which, because of its inability to produce oscillation, is known as the "noninterfering detector." One of the peculiarities connected with the operation of this tube is that if the telephones are placed in the collector electrode-circuit instead of the anode circuit, the signals will be received with practically the same intensity.

ONE of the least efficient elements of modern radio is, despite the large amount of development since coherer days, the detecting system. Our best detectors are insensitive things when compared to galvanometers or telephones, and there appears room for considerable advance in increasing detector effectiveness.

The ordinary three-element tube as a simple detector is not nearly sensitive enough to satisfy the present demands. Many attempts have been

made to increase this sensitivity by including within the tube a gaseous atmosphere and while extremely effective detectors have been thus produced, they have required very delicate adjustment and in the majority of cases were not stable and required constant attention. Furthermore, it has been found practically impossible to reproduce in quantity tubes of uniformly maximum sensitivity.

The three-element electron tube and regenerative circuit is largely used at present for reception of radio signals. While it gives excellent results and certainly far exceeds in response any other method disclosed to date, nevertheless it has certain disadvantages and its widespread use has created a situation which is bound to retard the popular use of radio.

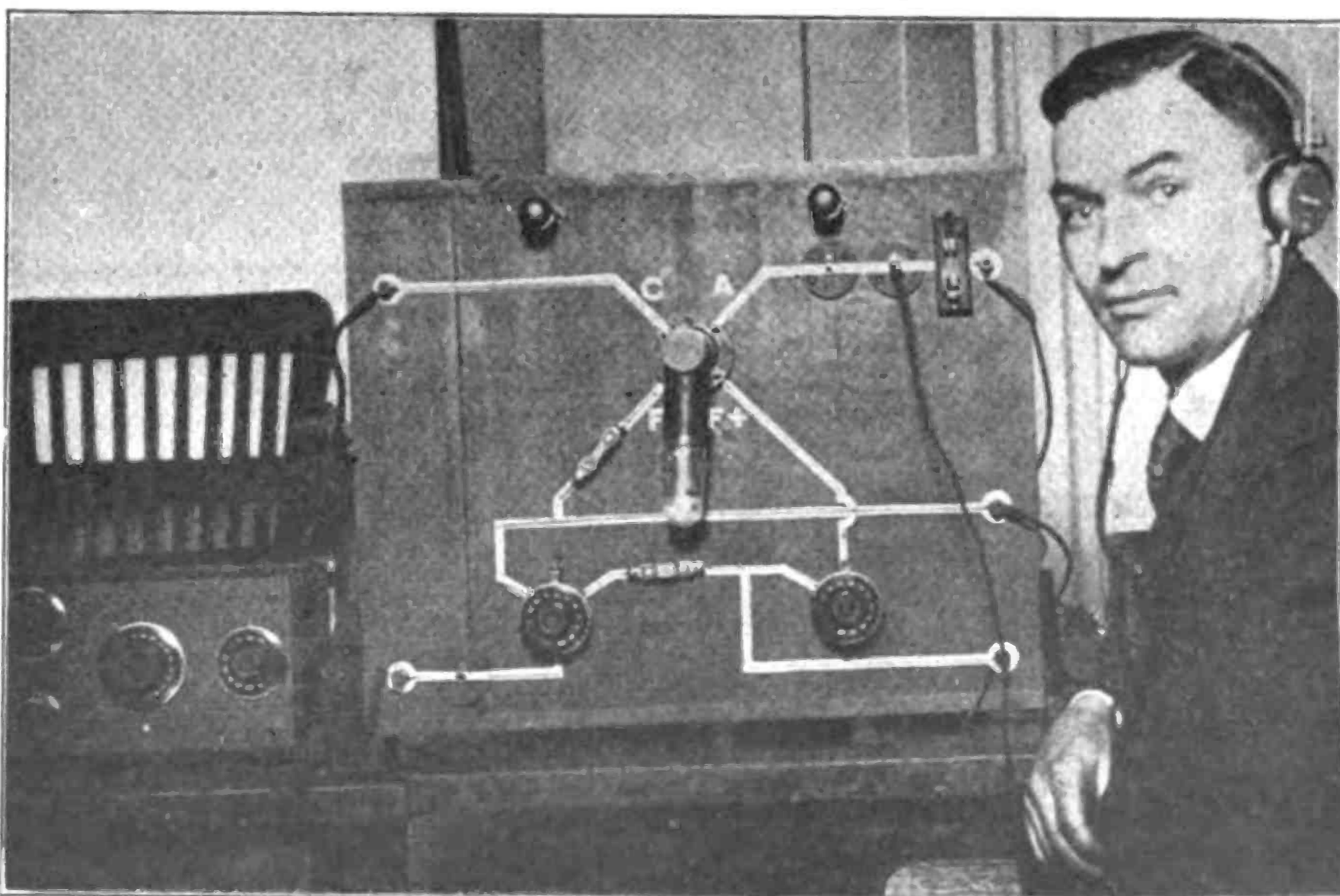
By using the three-element detector in a regenerative circuit greatly increased sensitivity is secured, but if regeneration is carried far enough to give worth-while response, there is produced considerable signal distortion. Furthermore, adjustments are critical, the slightest variation in capacity destroying the operating adjustment. What is still more important, the radiation from many regenerative circuits, particularly in the hands of inexperienced operators, creates an alarming amount of interference which if continued will seriously hamper reception of the present broadcasting programs.

There seems to be a definite need for a receiving tube which under no condition can radiate any energy from the

antenna to produce interference, which can be easily adjusted, which is not affected by the body capacity while the circuit is being tuned, and yet which secures all this at no sacrifice of sensitivity and loudness of response.

For several years we have conducted experiments on many different forms of detectors, and particularly upon detectors employing ionization of metallic atoms. This was a most promising field of development since such ionization was found to be readily controlled and stable. As one of the results of this work we have developed the present tube which is the logical result of experimental work which we have done along these lines. This new tube has none of the disadvantages of regenerative and gaseous detector systems above mentioned. Its method of operation seems to involve many interesting phenomena, which are radically different from those occurring in other tubes.

The construction of one form of this tube is illustrated diagrammatically in Figure 1 where F is the filament, A is the anode, which may be of metallic sodium in the bottom of the tube, and H is the heater, which is a short length of resistance wire cemented to the outside of the glass directly underneath the anode. This heater maintains the anode at proper operating temperature. C is the "collector" electrode of sheet metal bent into a "U" and positioned above the filament with its open side toward the anode.



(C. Photonews)

Harold P. Donle and his noninterfering detector.

Next! The Set that Works without an Operator

By R. L. Dougherty

THE automatic tape-recorder is a device that promises to play an important part in radiotelegraphy. The boast that is being made for it is that it will not make mistakes—and making mistakes is one of the faults that the human being cannot overcome. The tape-recorder not only will transmit and receive messages automatically, but at a rate of speed that cannot be distinguished by the human ear.

The recorder is a cousin to the recorder now in use in cable offices. It is known as a "syphon recorder." It was developed by Lord Kelvin in the first days of transatlantic cable telegraphy.

In this new recorder a very light coil is placed over the core of a very powerful electro magnet. This magnet is connected to the amplifying side of a receiver in the same way as telephones in every-day use. When an electrical impulse surges through the large magnet the small light coil moves in a vertical field. This actuates a very light arm, which is also attached to the smaller coil by means of a light link. At the other end of the arm is a pen, which rests lightly on a moving

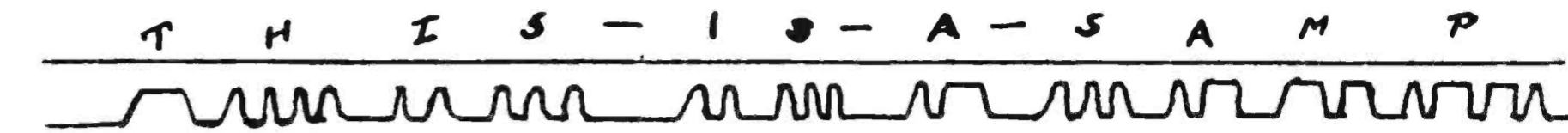


Illustration showing the manner in which a message is received. The long lines above center are dashes; the short ones, dots.

strip of paper. It easily may be seen that when the coil is pulled down the pen-arm will move up, causing the pen to make a vertical mark. So long as any current from the amplifier is flowing through the larger magnet the pen will stay up, but the moment the current ceases the pen-arm falls. Due to the fact that signals are sent automatically the dots and dashes are always of the same length in respect to each other; that is, a dash is approximately three times as long as a dot; and, therefore, it depends on both the speed of the moving tape at the receiving end and the speed at which the signals are being transmitted just how long a mark the pen-arm shall make.

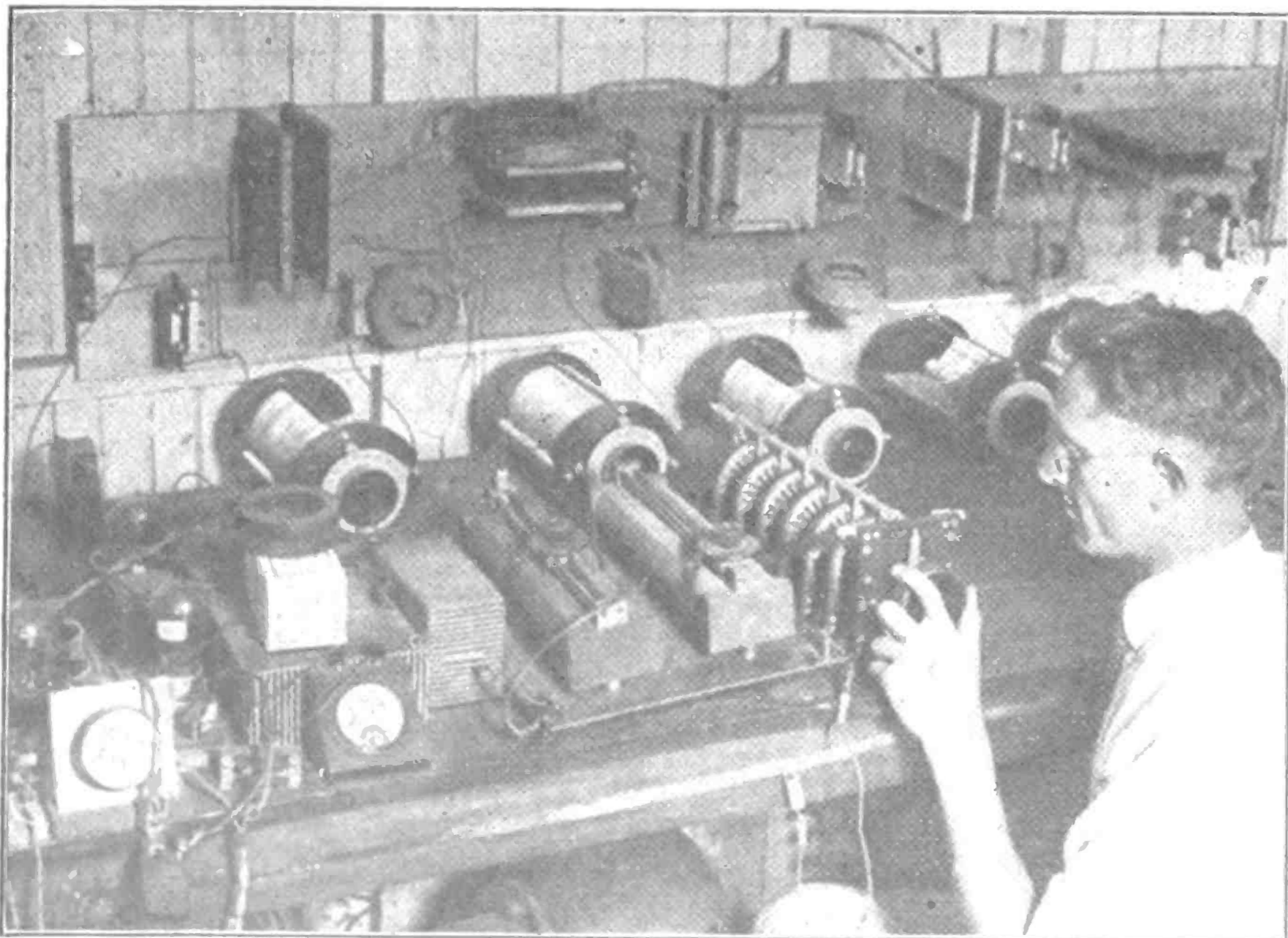
This device, which at present is being used in the reception and transmission of high-speed messages on very long wave-lengths, has proved an innovation. A man sits at a typewriter, and as the tape passes before

him he transcribes it in much the same manner as a stenographer transcribes her shorthand notes. Therefore, the messages may be sent at the high speed of 80 or 100 words a minute and transcribed at the receiving operator's leisure. This little machine is said to be infallible. Any one who has sat for hours with a pair of phones over his ears, listening to faint flute-like signals flashing through space and copying, copying all the time, will appreciate what this means to an operator who is obliged to work at high tension.

At the transmitting end there is a special typewriter, which perforates a moving tape. The keys of the typewriter, instead of being type-face, are punches. The tape passes through a machine in which short and long dots are made the agency for the generation of the waves, which flash across limitless space at the speed of light—186,000 miles a second!

Multicontact Switch Tunes 6 Circuits

By Donald Macgregor



(C. Kadel & Herbert)

This highly selective circuit is, in reality, six circuits in one. To tune it requires the multicontact switch shown in this photograph. This circuit is used for transoceanic radiotelephony.

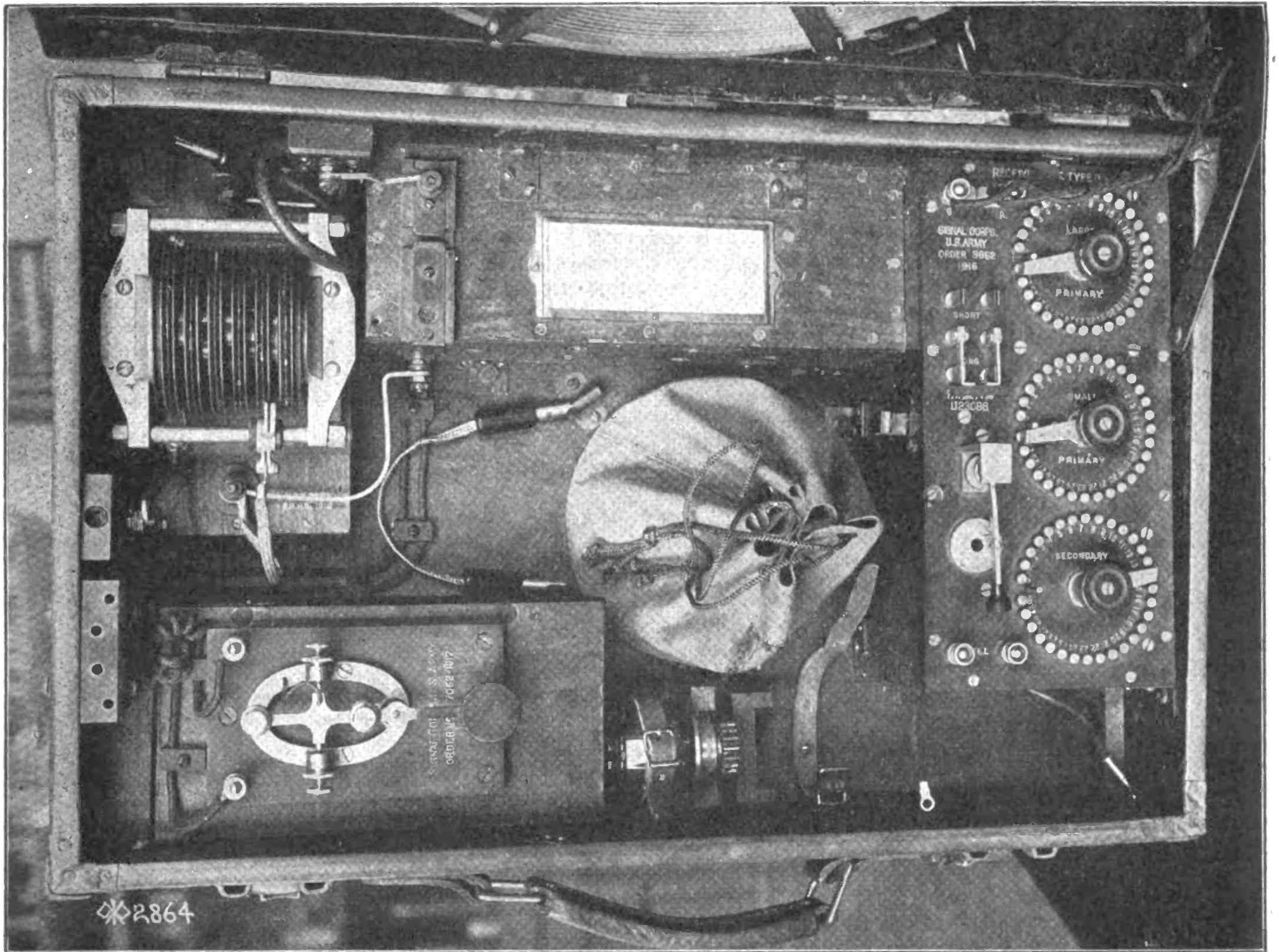
WHILE most amateurs have discovered that the single circuit is the easiest to handle and is very selective in tuning, experimenters are not satisfied. The accompanying photograph shows a "selector switch" by which it is possible to tune in six circuits at the same time. It is used for transoceanic radiotelephony, and is highly selective.

While the photograph shows the circuit in the experimental stage in one of the large research laboratories of the country, it has been discovered that, by the use of the selector switch, which permits any one of six circuits to be used, stations which cannot be tuned in with one circuit respond very readily to another. This opens a field of intensely interesting experimentation.

Imagine being able to tune six circuits at the same time with one switch! It seems impossible, but nothing is impossible in radio or anything else these days.

Use of the "Quenched Gap" in Radio

By S. R. Winters



Looking down at a portable, quench-gap radiotelegraph transmitting outfit used by the Signal Corps of the United States Army.

THE term "quenched gap" owes its derivation to the principle in electricity that a short electric-spark between cool electrodes is quenched instantly. Air becomes a nonconductor of electricity almost immediately after the electric spark is broken down, or as soon thereafter as the current is reduced to a low value. Such behavior is more orderly and positive if the sparking chamber is airtight.

The conventional form of quenched gap shown in the accompanying photograph of a portable radiotelegraph transmitting outfit used by the Signal Corps of the United States Army, comprises a series of flat copper or silver discs, the surfaces of which range from seven to ten centimeters in diameter at the sparking point. The faces of these discs are about two-tenths of a millimeter apart.

High electric voltage-charging involves the use of a number of small quenched gaps in series, thus providing the requisite length of gap or "electric bridge." The electric spark

jumps, or hurdles, all of these gaps, one after the other. The copper or silver discs are separated by rings of mica, or paper. A motor-driven blower cools these discs. The latter are commonly provided with projecting fins, fishlike, as a means of radiating electric heat. One commercial design of quenched gap is provided with air spaces between the pairs of discs, these serving as successive gaps. The amount of voltage used is the determining factor as to the required number of gaps, the ratio being about 1,200 volts for each quenched gap.

Only within recent years has this form of electric energy been employed on a supply frequency as low as sixty cycles a second. Recent experimental data indicate that it is feasible to use quenched gaps with 60-cycle supply. The results are evenness of tones and satisfactory communication by the use of a variable series resistance in the primary electric circuit of the transformer. It is likewise adaptable when employing a transformer of the resonance design with an uncom-

monly high secondary voltage. When varying the series resistance, the spark rate may be accordingly changed, as needs may dictate, to 60, 120, or 240 cycles a second. Such adjustment is beset with difficulties if line voltage variations are encountered.

Radio engineers consider the outstanding advantage of the quenched gap compared to the rotary gap to be its serenity of operation. The extremely short gaps and the imprisonment of the electric spark are conditions which obviate the noisy characteristic of the obstreperous rotary gap. The Radio Communication Section of the Bureau of Standards and the Signal Corps of the United States Army indicate that when employing a 500-cycle supply with a quenched gap, it is conventional to so adjust the voltage and the number of gaps that there is one discharge to the half cycle or 1,000 sparks each second. All in all, government wireless experts are of the opinion that the quenched gap will continue to function satisfactorily under close coupling.

The Radio Primer

*For Thousands of Beginners Who
Are Coming into Radio Circles*

Weekly A B C of Radio Facts and Principles Fully and Tersely Explained

By Lynn Brooks

WHAT is the meaning of the normal rate of discharge as applied to a storage cell?

This is the number of amperes that may be safely drawn from the cell without injury to the plates. This value may be found by dividing the ampere-hour capacity by the hour rating of the cells.

* * *

What is sulphating?

Sulphation, as applied to storage cells, is a snow-white deposit which forms on the plates. It is due to letting the cells stand idle too long on a discharge, or from too much overcharge. The sulphation of a cell means its complete ruination, as the active element is destroyed.

* * *

Name the precautions necessary when placing a battery "on charge?"

1. Open the vent caps in order to allow the gas generated in the formation of the charging of the plates to escape freely.

2. See that the electrolyte thoroughly covers the plates.

3. Make sure that you have the correct polarities.

4. Make sure your resistances are in the circuit. (Generally, a battery of lamps.)

5. Never allow the battery to heat up. If it is evident that heat is being generated, disconnect and allow to cool before resuming charging.

* * *

What is a lightning arrester?

An arrester generally consists of a very small air gap enclosed in a glass tube in which there is a very high vacuum.

* * *

Why is a lightning arrester safe?

Lightning has the property of always taking the shortest path to the ground. Therefore, owing to the fact that the coils in the circuit have considerably more resistance than the resistance across the minute air-gap, it will naturally take the path of least resistance—across the vacuum gap.

* * *

Why do they exhaust the air in such a gap?

As air has a high resistance to electricity, the less air in a vessel of such an article the lower the interval resistance.

Which is safer, a lightning switch or a vacuum arrester?

A lightning arrester is the safer because it is automatic. As the average human being is not infallible, he frequently forgets to throw the switch, leaving the set connected with the aerial. This cannot happen in the case of the arrester as it functions automatically.

* * *

Why must the positive (+) of the B batteries always be connected to the plate of the tube.

As the filament of a tube gives off negative electrons, we must put a

positive charge on the plate. This is due to the fact that, unlike poles, have a close affinity and attract strongly. Had we put a negative charge on the plate we would have a like charge on the two elements and they would repel each other. Likes repel; unlikes attract.

* * *

How is it possible to determine an amplifying tube from a detector?

Place the tube in the socket, put from 45 to 55 volts on the plate, and turn on the filament current. If, when the filament has become heated, the bulb turns blue around the plate switch off the current. This blueing denotes a soft or gaseous tube, and a detector. If it does not blue up when 55 volts are placed on the plate you have an amplifying tube (hard tube).

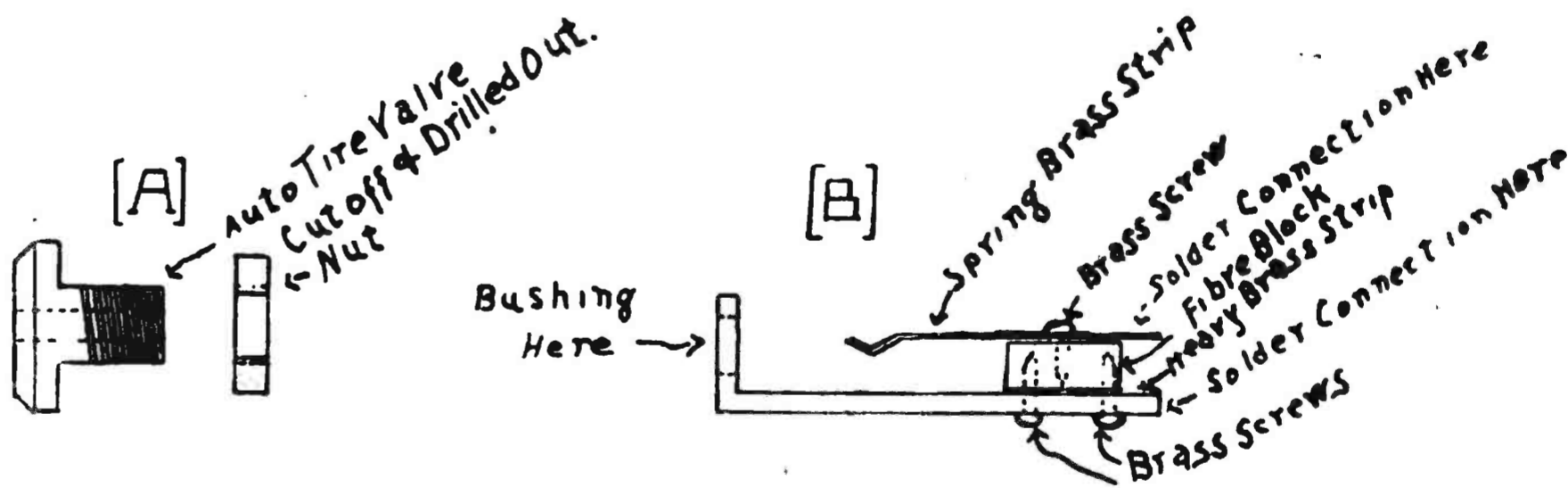
* * *

Why is a grid leak necessary in the circuit?

The grid leak is a little safety valve which allows the negative electrons stored up in the grid condenser to escape after a train of oscillation have charged the condenser to its capacity.

Easy Way to Make Switch-lever Bushings and Single-circuit Jacks

By Lester C. Doerr

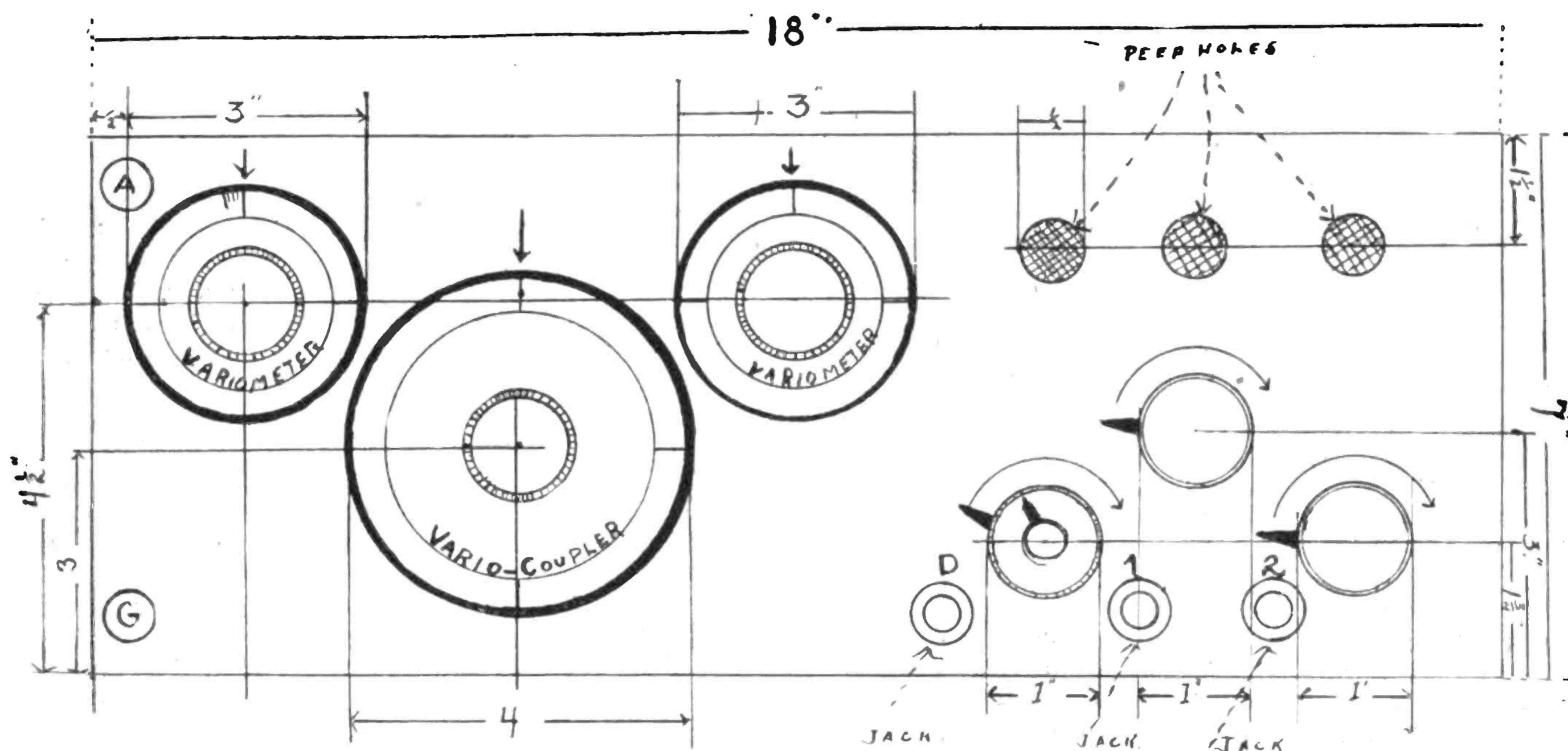


Details to follow in making switch-lever bushings and single-circuit jacks described by Mr. Doerr in the accompanying article. (A) is the bushing. (B) is the jack.

HERE is a little hint which may be of value to the radio experimenter. Old valves from automobile or motor-cycle inner tubes, usually found around the workshop, provide a source of neat and inexpensive switch-lever bushings. To make a switch-lever bushing, take a valve of the smaller size and cut it off to proper length with a hack saw. It should be just long enough to allow the nut to be screwed on after it is inserted in the panel. Then smooth off the rough end with a file so the nut will screw on easily. After this, drill out the hole large enough to take the bolt, or rod, to be used. These valves are of brass and nickel-plated, so a little polishing is all that is necessary to make a very presentable article.

The larger valves may be used to make telephone jacks, especially of the single-circuit type. They are easily made. The accompanying drawings show the construction of both switch-lever bushings and single-circuit jacks. If the experimenter desires to do so, other types may be made with a little more work.

Another wrinkle is the use of .22-caliber cartridges for switch points. Holes should be drilled in the panel just large enough to make a tight fit. Connections may be made either by wedging the wire into the hole beside the cartridge, or, preferably, by soldering. They are more attractive if polished. If the experimenter owns a rifle, they will cost him nothing but the trouble of saving them.



Panel layout for a regenerative set, embodying two variometers, vario-coupler, detector, and two steps of audio-frequency. Suggested by Cranby Meyers. Drawn by R. L. Dougherty.

How I Planned My Regenerative Receiver-Panel

By Cranby Meyers

THE three-unit regenerative circuit has come into popular use, and a number of amateurs may wish to build their own. The obstacle that stumps many of them is how to arrange all the instruments on the panel in order to conserve space and at the same time have a panel that looks at least half way snappy and workable.

Here is a layout I have worked out on my own set. I have given it to several other amateurs who built their own sets and they were so well satisfied that I thought other build-your-own fans would be interested.

I was limited, in the first place, to a panel 7 by 18 inches owing to the fact that my desk had just that much space in it; and, as I was desirous of putting it in the desk, I drew my plans accordingly. I think I have made the plans so clear that everything is fully explained in the drawing. However, if a large dial is used it will give the panel a better balance and finish because all the rheostats are at the other end of the panel.

It will be noted that, on the detector, I am using a vernier rheostat. I found that this is just as necessary in fine

tuning as is the variometer because I am using the W-D 11 tubes. At the same time they will amplify a signal very much better if the rheostat is turned down just a little bit.

I hope that this will help some of the fellows who are building their own and are stumped at the idea of efficiently laying out a panel that has a balanced appearance. A few hours spent in carefully drilling the holes and paying close attention that everything is laid on neatly will repay the builder a thousand times, and he will have a perfect piece of apparatus.

Every DX Night Owl Will Want This Article!

"DX Work With a W-D 11," by Ortherus Gordon, with Full-Size Diagrams for Building, in Next Week's RADIO WORLD, No. 43, Dated January 20—A Most Important Contribution to DX Work. Mr. Gordon, writing to the Editor of RADIO WORLD, says of his article:

I WANT to say that, if you wished, you could print an unqualified guarantee that a radio receiver built along the lines shown and connected up as shown, will meet the demands of the most fastidious amateurs. Night after night, I do things with this little set which would put the complaints of the ordinary DX night owl to shame. I am feeling now, more so than when I prepared the article for you, that it is my outstanding contribution to amateur progress during the past year.

Last night, on an 80-foot aerial, 35 feet high, single wire, I tuned out WMAN at Round Hill, South Dartmouth, Massachusetts, and brought in WDAJ at College Park, Georgia, which is considerable distance for a peanut tube with no amplification. Tuning out Round

Hill is a feat in itself, for this station is only twenty miles away and comes in like the prodigal son—all at once and all over the place. Bringing in a station which is nearly a thousand miles distant on a dry-cell tube is genuine DX work.

I should be glad to hear from any amateur who makes this W-D 11 set and to compare work done with it. I've been a radio bug for a long time now, but I've got bitten all over again with this W-D 11 outfit, and my brow is as feverish as ever.

Yours very truly,

ORTHERUS GORDON.

87 Smith Street, Fall River, Mass., December 31, 1922.

Battleship to Fire on Radio-Controlled "Iowa" in War Game

WASHINGTON, D. C.—Indirect firing of 14-inch guns by one battleship at another under way, but out of sight over the horizon, will be undertaken for the first time early in March at the Naval maneuvers in Panama Bay. The target will be the radio-controlled "Iowa" of Spanish War fame, unmanned and unarmed, but operated by an officer on the "Shawmut," several miles away.

Radio will bear two very important parts in the battle practice of the combined United States fleet, this year: the maneuvered target ship will be sent out to sea under radio direction. When she is out of sight, indirect fire at her will be undertaken by the aid of radio observation and spotting furnished by airplanes.

The "Iowa" is a twenty-five-year-old warship. She has more than served her time. For the past two years, she has been known as Coast Battleship No. 4, honored here and abroad as the first radio-controlled ship of war. Her actual bombardment with heavy gunfire from the "Mississippi," designated as the attacking vessel, has occasioned considerable interest not alone in the Navy but in Congress. Secretary Denby's invitation to the members of the Senate and House Naval Affairs Committee to witness the tests, has brought a flood of requests for transportation to Panama Bay, in March, for the scheduled bout. A program of several varieties of battle practice gives promise of an unusual spectacle seldom witnessed except in actual warfare and then only by officers and men in the engagement. The Navy is not thinking of the spectacular side, however, but seeks to determine whether its present methods of range finding and fire-control, and the instruments used are efficient, and this is the first time an opportunity has been afforded. The effect of gunfire on armored vessels is well known as other battleships have been anchored and blown to pieces by our expert gun pointers and trainers.

Literally the "Iowa" is a modern, steam "Flying Dutchman," without skipper or crew. Some time ago, far-sighted radio engineers of the Navy developed a special method of radio-telegraph control for the "Iowa" based on the inventions of John Hays Hammond, jr., and aided by engineers of the General Electric Company. Today it works perfectly—her water and oil tanks are filled, her oil-burning boilers and engines are started by a crew of caretakers. Her con-

By Carl H. Butman

trol ship takes her over, and the crew abandons ship. By means of radio, her engines are speeded up and slowed down, her rudder is thrown to port or starboard, or maintained at a desired angle, and she performs within a fraction of a second at the will of the "master mind" aboard the control ship which may be ten miles distant. A special feature of her equipment prevents her running away, stopping her if the control is broken, or the aerials are shot away. If no radio-control signal reaches her "electric-mechanical brain" for so long as fifteen minutes, the fires are extinguished, the engines stopped and everything shut down. This enables the crew to again board her, repair defects and start her on another "flying dutchman" cruise.

Five basic problems of gunfire will be undertaken with the old "Iowa" as a moving target, in an effort to simulate as nearly as possible wartime conditions. Towing a target for gunfire restricts the angle of fire somewhat to avoid hitting the towing vessel. With the "Iowa" under radio control and the "Shawmut" a safe distance away, this objection is obviated.

In the first practice only, the secondary batteries—the 5-inch rifles—of the "Mississippi," will be used. The purpose is to determine whether a rapid rate of change of range can be covered by our present fire-control system. The "Iowa" will be run at varying speeds while under fire; thus observers will learn whether fire control apparatus can meet the requirements.

The second test will be for the 14-inch turret guns of the "Mississippi" and will represent maneuvers which might be expected when two ships are engaged, where frequent changes of course are made by both vessels. The idea is to test out whether or not the "Mississippi" can keep hitting the enemy ship undisturbed by the shifts of course and whether the instruments now employed are adequate for such firing.

Turret guns will also be used in the third practice, where a ship, engaged by another, makes a decided turn to right or left. The effect on the accuracy of fire is sought and it is also desired to learn whether it would be possible to discern such a movement quickly enough to correct the training of the guns without affecting the accuracy or rapidity of fire.

Night Attack and Indirect Fire

The fourth event scheduled will simulate a night attack. It will be the most spectacular, probably, as it includes the use of searchlights, star shells, and other artificial means of illuminating the moving target-ship. Here, again, only the 5-inch rifles will be employed.

In the fifth and final gunnery exercise, a test of the use of 14-inch guns for indirect fire is planned. It will be the first time an effort to study the desirability and practicability of this method of fire has been tried by ships at sea. In clear weather this would mean a range of over 25,000 yards, but in hazy weather or over a smoke screen, this method might be used at a range of about 15,000 yards. In this maneuver, aircraft will be used for observation and spotting, radioing constantly to the "Mississippi." It is understood that no aircraft will take an offensive part—that is, no bombs will be dropped as was the case a year and a half ago in the maneuvers off the Virginia Capes.

As it is not desired to sink the "Iowa," special projectiles will be used. They will have very thin walls and supersensitive fuses. These shells will be filled with high-explosive charges. It is expected that when direct hits are made they will all explode on the armor plate of the vessel and break up rather than penetrate her. Since the World War the "Iowa" has not been kept in the same condition as a vessel in active service. She is far from the last word in warships and her armour and water tight compartments are not modern. It is possible, therefore, that if she is hit many times at weak points, she may sink.

The Boy's Radio

By C. A. Boulton

THE boy sat in his room one night
Just listening with all his might.
His mother called, but he would not go
Because he loved his radio.

He gets the stations far and near;
And everything comes loud and clear
Except the warning voice below—
Which does not come by radio.

His mother goes up to his room
And incidentally takes the broom.
But here's one thing she didn't know:
It's dad who has the radio.

An hour goes by. The lunch is cold,
And yet we don't hear mother scold,
For she has let the luncheon go
To listen to the radio.

Chief Characteristics of the W-D 11

By John Kent

WHEN a man has dabbled in radio a certain time, he wants to "roll his own." One of the great stumbling blocks is whether he will use the regular 6-volt tube or the new 1½-volt (W-D 11) tube. This little tube, through the agency of being a wonderful detector and a stable amplifier, is rapidly claiming the attention of the entire radio world. Due to the fact that the filament is oxide coated and of low temperature, it only glows a dull red when in use.

But owing to the fact that the base is entirely different from that in current make of tubes, it requires either

an entirely different socket or an adapter.

The characteristics of W-D 11 were compiled by the experts of the Radio Corporation of America and are as authentic and correct so far as it is possible for such things to be. They are as follows:

Filament—Oxide coated. Low temperature. Current consumption, 0.20 ampere. Terminal voltage, 1.1 volts. Source of voltage, standard 1.5-volt dry cell.

Plate—Voltage for detector, 22.5 volts. Voltage for amplifier, 22½ to 45 volts.

Grid—Condenser capacity, .00025 leak, 2 megohms.

Output impedance—20,000 ohms at 40 volts plate-voltage.

This little tube is very stable in action and, probably, one of its greatest recommendations is its absolute freedom from noises common to other tubes. Another recommendation—one that is very necessary in these days of regenerative circuits—is its absolute stability of oscillation. It is one of the finest little oscillators on the market. Owing to the fact that they are standardized they may be used either as detector or amplifier.

Radio Develops Chicks

EXPERIMENTS conducted by John T. Thomas in an incubator hatchery at Columbus Grove, Ohio, have demonstrated that radio has a beneficial effect in stimulating the growth and development of young chickens and produces strong and sturdy fowls. The discovery was accidental but confirmation of such results was proved by a series of tests and experiments covering a period of several months. Mr. Thomas hatches approximately 3,000 chicks a week, requiring his personal attention almost hourly day and night. With a view to relieving the monotony of the long hours of vigil he installed a wireless outfit, over which he received broadcastings for his own entertainment, consisting largely of musical concerts.

It was not long after Mr. Thomas sought this diversion that he noticed that the radio programs were having the effect of lulling his little chicks to sleep. Without the music they were restless and nervous, but as soon as the instrument was tuned they became quiet, and soon were asleep. The result of the abundance of sleep and relaxation was more rapid growth, better health and physical condition and stronger development.

(Continued from preceding page)

but the Navy Department desires that the five tests be made without any such mishap. Her radio-control apparatus is of considerable value, being the first remote-control system for a full-sized seagoing vessel in the world. Then too, future radio-control development in the Navy will undoubtedly be based upon this, the first radio warship.

The "Iowa," now at Norfolk, will be towed to Guantanamo, Cuba, by the "Prometheus," and from Guantanamo will be towed to Panama Bay on the Pacific Side of the Canal.

Captain W. D. Leahy, commanding the "Shawmut," will virtually control the "Iowa" during the maneuvers, with Lieutenant-Commander R. F. McConnell in charge of radio installations. Ensign Hertz will also assist in radio-control work.

576 Broadcasters Started the New Year

On January 1, 1922, There Were About 5 in Existence. Class-B Stations on 400 Meters Now Total 25

By Washington R. Service

TOTAL broadcasters on January 1 numbered 576, according to the records of the Radio Section of the Department of Commerce. A year ago there were but four or five such stations. The growth has been phenomenal and still continues, although in a less rapid degree than during the first seven months of 1922.

During the month of December, 31 broadcasting stations were licensed, and 20 dropped out for one reason or another, showing a gain of 11.

Of the total broadcasters today 25 are in the B class, transmitting on 400 meters, a privilege granted only to the best stations which apply for this means of getting out of the regular broadcasting band.

The future of radio as a popular pastime depends to a large extent on the pending bill in Congress, especially as to the re-allocation of wave-lengths. It is of interest to all fans as by this means the ether will be cleared of much interference. But the future also depends upon broadcasters and the great radio public of "listeners-in." What they want will probably be granted. If radio broadcasting is to become a public utility, as is predicted, the public must back it up and insist on necessary laws, regulations, and authority for the Secretary of Commerce to work out.

Eight new broadcasters were licensed during the last week of December. Seven were licensed on 360 meters. The new stations are the following:

WRAM—Robert E. Compton, and Carthage College, Carthage, Illinois.

WQAC—E. B. Gish, Amarillo, Texas.

WPAW—Radio Installation Co., Inc., Wilmington, Delaware.

KFCM—Richmond Radio Shop, Richmond, California.

WPAX—S-W Radio Co., J. R. Shumate, Jr., Thomasville, Georgia.

WPAV—Paul Tinetti & Sons, Laurium, Michigan.

KFAZ—C. H. Weatherell, Reddley, California.

The eighth station, class B, on 400 meters, is:

WCAE—Kaufmann & Baer Co., Pittsburgh, Pennsylvania.

Broadcasters Deleted from Commerce Lists

In December the following 20 broadcasters were dropped from the rolls of the radio lists:

WLAD—Arvanette Radio Supply Co., Hastings, Nebraska.

WAAV—Athens Radio Co., Athens, Ohio.

KFBJ—Boise Radio Supply Co., Boise, Idaho.

WKAM—Adam Breed, Hastings "Daily Tribune," Hastings, Nebraska.

WJAH—Central Park Amusement Co., Rockford, Illinois.

WMC—Columbia Radio Co., Youngstown, Ohio.

WCAZ—Robert E. Compton, Carthage, Illinois (new license and call, WRAM, December 29).

WAAG—Elliot Electric Co., Shreveport, Louisiana.

WCJ—The A. C. Gilbert Co., New Haven, Connecticut.

WDAN—Glenwood Radio Corporation, Shreveport, Louisiana.

WAAR—Groves-Thornton Hardware Co., Huntington, West Virginia.

WFAR—Hall & Stubbs, Sanford, Maine.

KDYR—Pasadena Star-News Publishing Co., Pasadena, California.

WPAN—Levy Bros. Dry Goods Store, Houston, Texas.

KGF—Pomona Fixture & Wiring Co., Pomona, California.

WAAO—Radio Service Co., Charleston, West Virginia.

KEBA—Ramey & Bryant Radio Co., Lewiston, Idaho.

WJAC—The Redell Co., Joplin, Missouri.

KYF—Thearle Music Co., San Diego, California.

Radiograms

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

GREETINGS from Vice-President Calvin Coolidge broadcast from WGY, in Schenectady, by use of the pallophotophone, were heard in England, according to a cablegram received from Arthur Brooke, 69 Renshaw Street, Liverpool. Mr. Renshaw's cable reads: "Using an indoor aerial forty feet long, heard your program broadcast both December 23 and 24. Christmas Eve I used loud-speaker and five tubes and was able to pick up your entire program."

Charles B. Cochran of London, sent holiday greetings by wireless to friends in New York. To insure as prompt delivery as possible through the general holiday closing, the Radio Corporation of America, on receipt of the messages, phoned them to the office or home address of the recipient.

Newark's WOR broadcasting station announces the reading of the new Roosevelt Boxing Rules by James J. Corbett for the benefit of boxing fans.

According to Secretary Denby, the United States Navy will fight vigorously any attempt to bring its radio operators under commercial license. This was the Secretary's declaration following the statement of Secretary of Commerce Hoover before the House Merchant Marine Committee, urging that all radio operators, including those of the Navy, be compelled to take out licenses from the Department of Commerce under the proposed Radio bill. Secretary Hoover declared that inasmuch as the Navy Department was accepting commercial business it

should not be an "outlaw" among other broadcasting agencies. That broadcasting of Sunday night sermons should not have priority over amateur transmitting stations was contended by Andrew E. McNaughty, president of the Wireless Association of Pennsylvania.

An interesting weekly feature of WGI is the broadcast every Saturday evening at 6:30 on the condition of highways in Massachusetts and bordering States furnished by the Automobile Legal Association. This broadcast gives the motorist information on the condition of the trunk lines highways over which he is liable to drive during the coming week, and is of great assistance in saving time and temper over detours and poor roads.

Gene E. Witham, a Brooklyn lad, succeeded in picking up the weak signals from a French amateur station, located in Nice, southern France. A Reinartz tuner, equipped with a single vacuum tube, was the only apparatus used. The CW signals were heard for nearly twenty minutes.

Lester Drummond Payne, an old-time radio operator and a brother of the managing editor of the London "Daily Mail," was found dead in his shack on board the Norwegian steamer "Louise Nielson."

It is estimated that there are close to two million radio receiving sets tapping the ether lanes in the United States at the close of 1922, and that this number will increase to at least three million by the end of 1923.

Each Friday afternoon, at 1:30 o'clock, you will hear from WLW, Cincinnati, a lesson on the guitar. These lessons will be given by J. F. Roach and will be in the exact form of phonograph records made by Mr. Roach for students. After the lesson Mr. Roach will play two solos accompanied by Mrs. Roach, pianist.

Additional weather forecasts and warnings will be broadcast from NAT, the Naval Radio Station at New Orleans. These broadcasts, on a wave of 1,832 meters, are for the district included in Louisiana, Arkansas, Oklahoma, and Texas and comprise weather forecasts, river conditions, and a summary of the conditions over the United States twice daily. The scheduled calls for a broadcast at 10:30 A. M. and 10:00 P. M. at 75th meridian time.

Where the aerial on vessels at sea has been damaged good results have been obtained by operators throwing winding wire in spiral fashion around the operator's body and using that in the place of the aerial.

Play-by-play radio reports of the Penn State-University of Southern California game on New Year's Day were handled by KDKA from Pittsburgh. The movements of the players were described over the telegraph from the gridiron at Pasadena, California, and translated by an announcer at the Pittsburgh broadcasting station.

KDYS recently received fifty-four telephone calls, asking for an encore of one of its program numbers.

In an effort to improve the programs of the various broadcasting stations, the Pacific Radio Trade Association and the broadcasters have agreed to omit mechanical music between 8 and 10 in the evening and to cut out all broadcasting between 7:30 and 8 o'clock so that fans may have an opportunity to listen in on long-distance stations.

England received radio messages of twenty-three American amateurs in one day recently.

Radio has a children's hour. From 5 to 5:30 P. M., every day except Saturdays, has been set aside at WGI specially to entertain children. On Monday, there are hero and adventure stories for boys; on Tuesday there are fairy tales for the little ones; on Wednesday there are animal stories; on Thursday stories of the world we live in are told, taking themes from land and sea that answer many questions in the minds of growing boys and girls; Friday evening is for the girls around the Girl Scout age; Sunday afternoon will find Bible stories and various myths and legends on the program.

My Set and How I Made It

By Donald W. Kleitsch

2121 East Fourth Street, Duluth, Minnesota



Donald W. Kleitsch at his set.

MY set is a single-circuit tuner with a detector and one step of audio-frequency. I use a graphite-pressure rheostat, to control the detector filament, and find that it gives very much finer tuning. I also use a wire rheostat for the amplifier filament, 200-radiotron tubes, and 201 for detector and amplifier. The body capacity, when tuning the condenser, gave me a lot of trouble, so I shielded it with aluminum and connected the rotary plates to the aerial. After doing this, I practically eliminated capacity effects. A phone condenser is placed across the De Forest amplifying transformer. I use a 43-plate condenser in the aerial circuit and a 2500-thousandths fixed-condenser in the grid circuit. This set has a range of about 150 to 650 meters. The cost—without tubes, batteries, or phones—was about \$34. I have received Schenectady and Lockport, New York; Pittsburgh; Fort Worth and Dallas, Texas; Denver, Colorado; San Francisco; Atlanta, Georgia, and many others.

Radio and the Woman

What the Great Game of Radio Brings to a Woman Who Has a Set in Her Home

By Crystal D. Tector

EVER since Friend Husband and I learned code, we have taken a great deal of interest in C-W fans on the 200-meter wave. You'd be surprised what distance you can cover on the lower wave-length. I used to think that it was great to tune in Davenport on one tube; but on nights when programs are not so interesting, we always tune in around 200 meters and listen to the "sixes and sevens" trying to get the messages through and their "hooks cleared," as they call it. We have become quite expert in the code. It is really a lot of fun.

THE other night, when Friend Husband went to his lodge, I called in Mrs. K—, my neighbor, to listen in with me and otherwise pass the time. We sat there listening in, and as my friend doesn't know code, I had to keep up on from 360 to 400 meters. About 11 o'clock, we happened to get Havana. PWX had several wonderful tenors and baritones singing some extremely sentimental Spanish music. Mrs. K. and I just sat there and listened—and listened! Suddenly, the door opened with a rush and F. H. hurried in. "Say, you're a fine one!" he exclaimed, looking straight at me. "Mr. K. came home from the lodge with me and has been worrying about Mrs. K. And here I find you both listening in—and it's two-thirty in the morning."

Perhaps I was really thoughtless; but, even at that, you don't hear PWX every night in the week.

I WONDER when I will cease to be taken as a radio expert by the woman readers of this column. This week, I received over thirty-five letters from various women, all asking me to give them advice. I think I will have to apply for a R. E., pretty soon.

NOW I know that I'll never get any rest. Since F. H. has put up that loud-talker with the power amplifier and the Vincent Lopez orchestra is transmitting from WJZ, all my friends want to do is come over and dance.

"I WISH you all a Very Happy New Year!" These were the very words, with a pleasant southern drawl, that issued through the loud-speaker in my radio room. We were having a radio New Year's party and there were a number of friends present who have sets at home.

"Oh, I wonder who is announcing from WHN tonight! He seems to be a Southerner!" exclaimed one of my friends who prides herself on the fact that she has such a wonderful set for DX work.

The announcer had said: "This is station WGM, the Atlanta 'Constitution.' We will now continue with our program."

"Oh! that can't be possible," continued my friend. "Why, I can barely hear him with the phones on. And here he is, loud and clear! Oh, my dear, how do you do it?"

And the evening was spoilt, so far as my friend was concerned. Of course, I didn't tell her that Friend Husband had just put in a Power amplifier along with three steps of radio-frequency; but I don't like to start the New Year off wrong, so I'm going to tell everybody else and then maybe somebody will tell my astonished friend.

I RECEIVED a letter from a young girl in the Middle West

While what she says is unusual, it is the old story told in a slightly different way. She says that she had an appointment to broadcast a little talk on social science from one of the large stations. She was a total stranger in the town. When she had finished the announcer, of course, told the listeners that any one who wished to communicate with the talker could reach her care of the station. The next morning she received a letter from a young man in a neighboring town, requesting a meeting if it could be arranged. She, being a stranger and lonesome, thought it could, and asked the station operators if any of their acquaintances could formally introduce them. The introduction was arranged and—well, this happened about four months ago. Along with the letter she sent me an announcement of her engagement. Friend Husband became unduly hilarious when he read the letter. "That should teach a lot of young fellows not to meddle around with broadcasters," he remarked in his best "I-am-a-lawyer" tone of voice.

But say I: "Cupid will not be discouraged even if he has to turn to radio for help."

* * *

A YOUNG man writes me that his sister insists he shall install a loud-speaker in the parlor so that music from the local station may be heard when she is entertaining her beau. The young man wants to know if this is possible.

Surely; but it has this drawback: If my correspondent is of the type not satisfied to listen to one station for any length of time his sister probably will be greatly disappointed, and may have a great deal to say after the "show is over."

* * *

FRIEND HUSBAND came home the other night emitting an odor that resembled a popular beauty shop. His nails were manicured almost to distraction and his hair was bright and glossy. After cross-questioning him the truth escaped. He visited a barber shop in New York City, and he said: "They had a radio set and the program was so interesting I simply had to hear it all; and, as it wasn't a public lounging-room, I had to have some valid excuse, besides being shaved and having my hair cut, to stay and listen to it all; so I had everything done except a permanent wave."

My Picture for This Week

By Crystal D. Tector

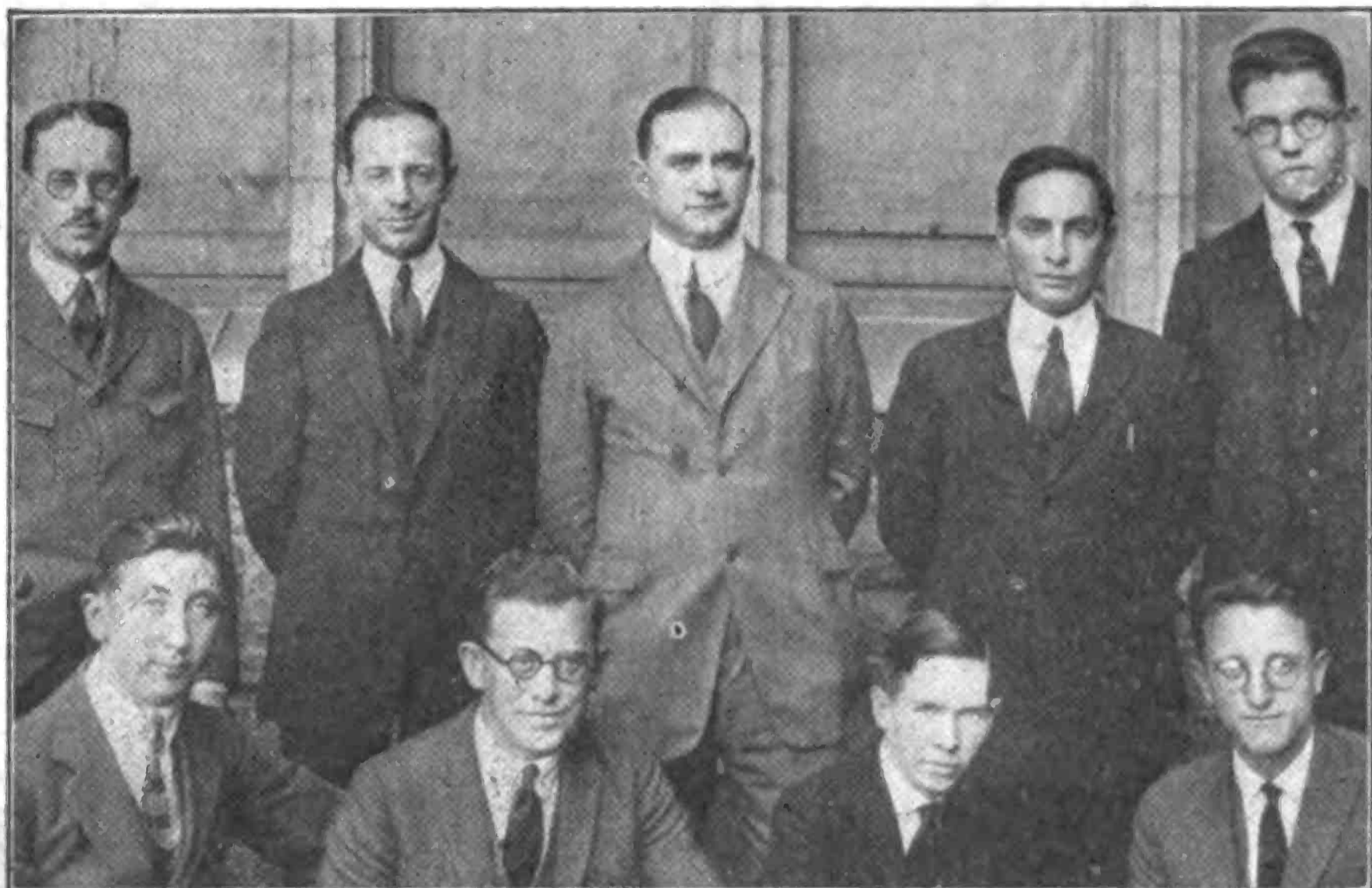


(C. Kadel & Herbert)

YOU will remember that, in last week's RADIO WORLD I mentioned the fact that there was a set at the American Radio Exposition made in ivory and gold. I have just received a letter asking me if I thought everybody "was as ignorant as that." It "got my dander," so that I went on the warpath and told Friend Husband that if he expected to live in peace with me this year, he would have to secure a photograph of this set so that I could convince the skeptics that sometimes when it glitters, it really is gold. Here is the photograph!

The little wires and knobs in the upper left-hand corner are miniature jacks and plugs of solid gold, by which any combination of instruments may be connected without the trouble of rehooking the set from the back of the panel. This, of course, is a very great improvement as it allows any number of circuits to be tried out. The panel is of ivory.

Radio's First D as These P



(C. Kadel & Herbert)
(Above) A group of the engineering specialists of the research department of the Radio Corporation of America. Upper row (left to right), Messrs. Van Dyck, Weinberger, Dr. A. N. Goldsmith, director, Shapiro, Rarson. Bottom row (left to right), Messrs. Rooker, Miller, Dickey, Ringel.



(C. Underwood & Underwood, N. Y.)

Captions by John Kent



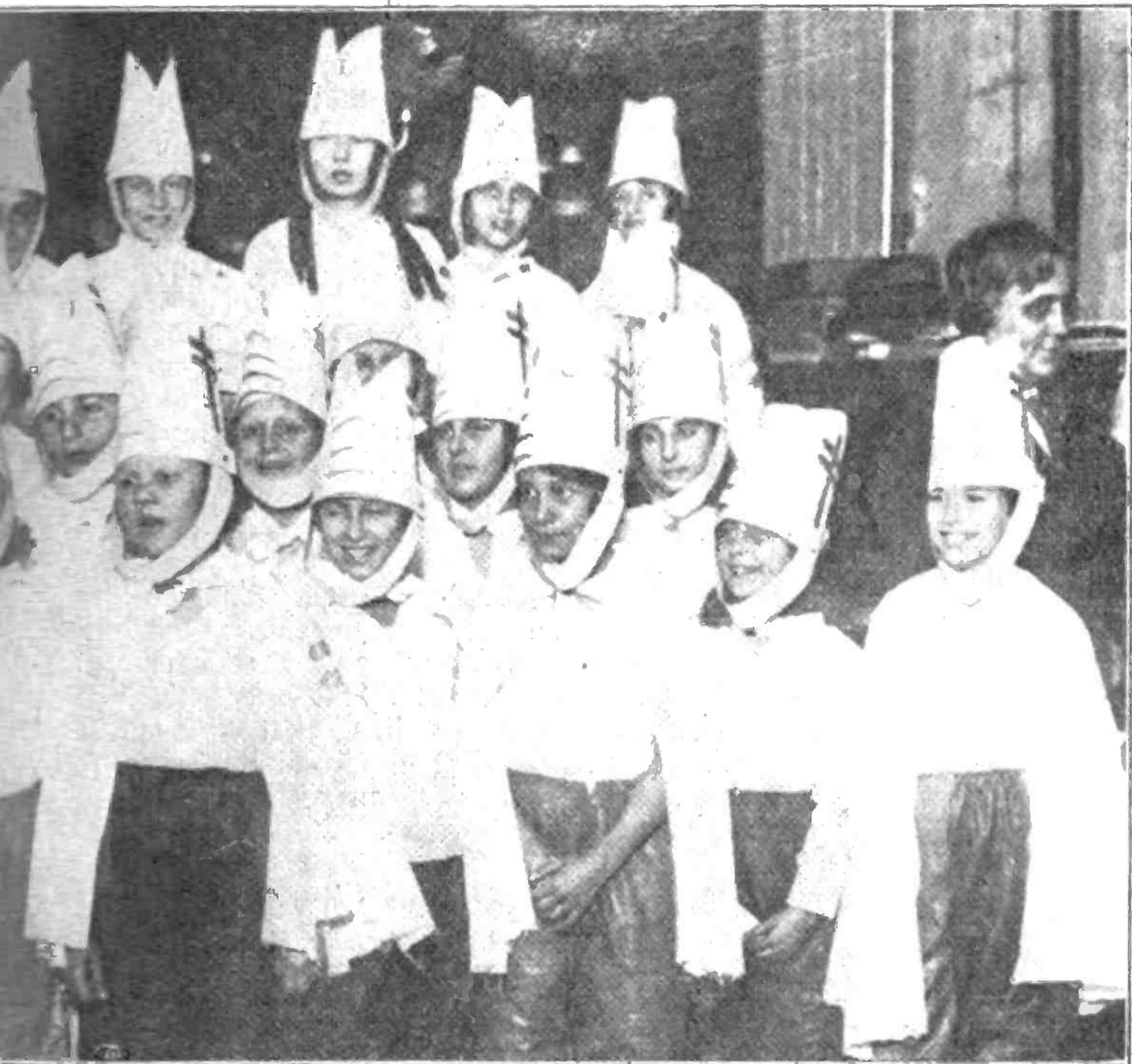
(Left) American amateur radio operators, members of the American Radio Relay League, failed in their attempt to receive messages from amateur stations in France and England, owing to the low power of the transmitting in those countries. That the results were unsuccessful is due also to the fact that a number of American amateurs neglected to keep an absolutely "quiet air" during the tests. Here are three of the men who looked after the American end of the test at the Relay League station at Hartford, Conn. Left to right, are Hiram Percy Maxim, president of the League; F. H. Schnell, traffic manager, and Kenneth B. Warner, secretary of the League.

(International News Reel)



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Days of 1923 Are Busy Photographs Show



(Left) Pupils of the Dennison School, Washington, D. C., who make a specialty of singing health songs in order to make the public purchase tuberculosis seals to increase the fund for the prevention of that dread disease.



(Photos)
... of the steamer "Minnekahda," who established a radio communication between ship and shore. Their radio was heard 4,000 miles (left to right) C. B. Delahunt, G. H. Harvey, T. J. Nunan.

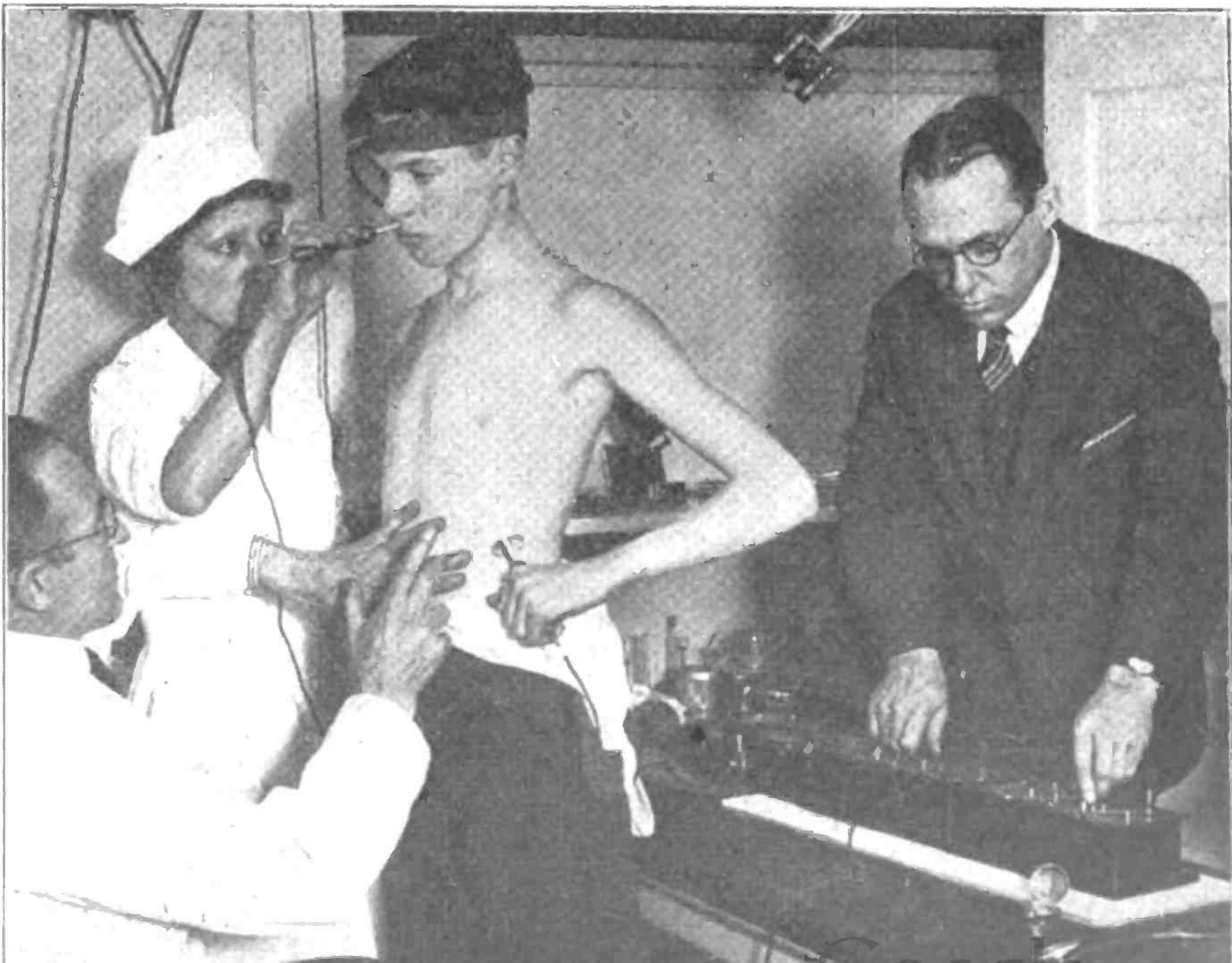
... powered radio transmitting-set was installed on the Overland from San Francisco to Chicago and concerts were broadcast a distance of 1,600 miles. Miss Eleanor Whittemore, violinist, is playing a Kreisler composition.

... method used for locating disease on the subject (not the patient). ... of the patient's blood is obtained he may leave, as all the ... conducted on a healthy subject. The theory is that the radio ... acting through the brain centers causes nervous reflectus ... "subject," producing dull sounding areas in the abdomen corre- ... disease sought for. Every disease has a certain known vibratory ... V. Hillman (on extreme right) is tuning in on the disease sus- ... The nurse is applying an electrode to part of subject where ... indicated, this indication being determined by Dr. Clarke Francis ... who is shown tapping the subject's abdomen. The subject ... face the geographic West when the tests are being made.



(C. Kadel & Herbert)

(Above) Many radio experimenters have constructed diminutive sets, but it was always necessary to add a head-piece. B. S. Lewellen of Minneapolis has constructed an entire radio outfit in a one-piece head-set, crystal detector and tuning coil. The circumference of the instrument is that of an ordinary telephone receiver and it is three inches in length. This picture shows the set hooked up to a waste basket as an aerial. Concerts can be heard for a distance of 12 miles.



With the DX Nite Owls

Fine Record from Oregon

From Arthur Chapelle and Charles Seively, Woodburn, Oregon

I READ with interest the Atlantic Coast amateur's DX records, also those from the middle and western states, in your highly valued RADIO WORLD. I do not see where they have anything on us even with their advantage in time, whereby they can listen to western 10 o'clock programs at midnight, while we have to listen to eastern 10 o'clock doings early in evening, when every 2 by 4 station is on the air, a dozen ships along the coast are reporting position on 350 (but so broad it can be heard anywhere from 200 to 500), and a few B stations are trying to monopolize the air just to make it interesting.

As static hibernates, records grow better, so this will be a "has-been" before you read it. Still we wish to submit it for the Night Owls to hoot at.

Honeycomb coils, home-made set, two tubes, no radio-frequency. One hundred and twenty-five phone stations in 24 states and 5 provinces heard in two months. The following, all over 1,000 miles away, include:

WAAL, Minneapolis, 1,460 miles; WAAP, Wichita, 1,400 miles; WBAP, Fort Worth, 1,585 miles; WCAS, Minneapolis, 1,460 miles; WCX, Detroit, 2,000 miles; WDAF, Kansas City, 1,510 miles; WEAY, Houston, 1,800 miles; WFAA, Dallas, 1,610 miles; WGM, Atlanta, 2,150 miles; WGY, Schenectady, 2,400 miles; WHA, Madison, 1,650 miles; WHAS, Louisville, 1,965 miles; WHB, Kansas City, 1,510 miles; WJZ, Newark, 2,425 miles; WLAG, Minneapolis, 1,460 miles; WLW, Cincinnati, 1,990 miles; WOAI, San Antonio, 1,695 miles; WOC, Davenport, 1,600 miles; WOI, Ames, 1,460 miles; WOQ, Kansas City, 1,510 miles; WPE, Kansas City, 1,510 miles; WSB, Atlanta, 2,150 miles; WTG, Manhattan, 1,380 miles; WWJ, Detroit, 2,000 miles; KSD, St. Louis, 1,700 miles; KYW, Chicago, 1,700 miles; CJCG, Winnipeg, 1,250 miles; CHCB, Toronto, 2,125 miles; DM4, San Antonio, 1,700 miles; KOB, Roswell, 1,250 miles; KNJ, Roswell, 1,250 miles; KFAD, Phenix, 1,010 miles; KDYW, Phenix, 1,010 miles; KDZA, Tucson, 1,100 miles.

Thirty-four stations, totaling 55,000 miles!

Most of this has not been spasmodic, but quite consistent. For instance, WSB was heard eight successive evenings, and the Night Hawks at WDAF are steady diet, while we get our energy from Schenectady quite regularly. Next!

Covered a Radius of 1,700 Miles

From G. W. Perkins, Thomson, New York.

I AM a constant reader of your excellent weekly and would not be without it. Recently I have seen lists of stations heard by many radio fans and hope you can find space for the list below. All of these stations have been heard by the writer. Mine is a home-made speaker, consisting of an old Victor horn with Stromberg-Carlson phones attached. These stations come in loud enough to be heard in a room 20 feet by 30 feet. The set is single-circuit, detector and two stages of audio: WGY, WGI, WHK, WOR, WJX, WWJ, WRK, WLK, WOH, WGL, WMH, WHQ, WRL, WBZ, WJZ, KYW, NOF, WOQ, WNO, WPB, WWZ, WNJ, WGR, WFI, WCX, WSB, WOO, WHB, KSD, WWL, WWI, WOC, WAH, WBD, WLW, WRP, WIP, KDKA, WHAZ, WFAA, WBAY, WAAM, WHAB, WHAS, WFAF, WNAZ, WOAI, WDAF, WDAK, WDAW, WMAQ, WQAA, WFAA, WJAX,

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

Send hook-ups of your sets provided they contain anything unusual. Send, also, the names of the various makes of apparatus you are using.

Make your letters brief and informative. Write on one side of the paper only.

The letters and hook-ups will be published in the earliest possible numbers of RADIO WORLD.

WDAF,, WDAJ, WCAE, WMAF, PWX, WCAD, KOP, WCAE, WRW, WCAL, CFCA, WAAP, 3XD—nearly all verified, covering a radius of over 1,700 miles.

DX Depends on Apparatus

From Frank S. Myers, Box 194, Berkeley, California.

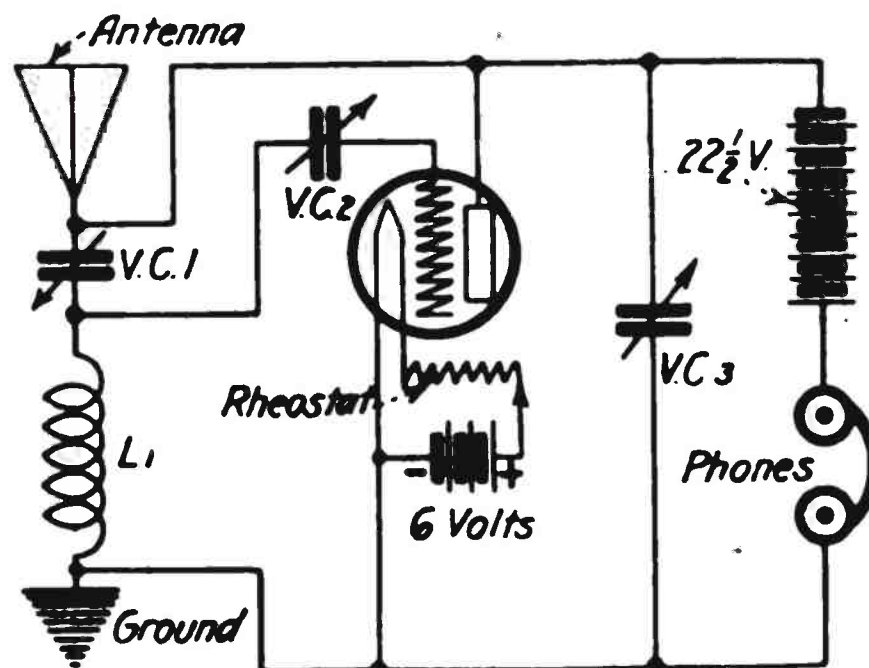


FIGURE 1

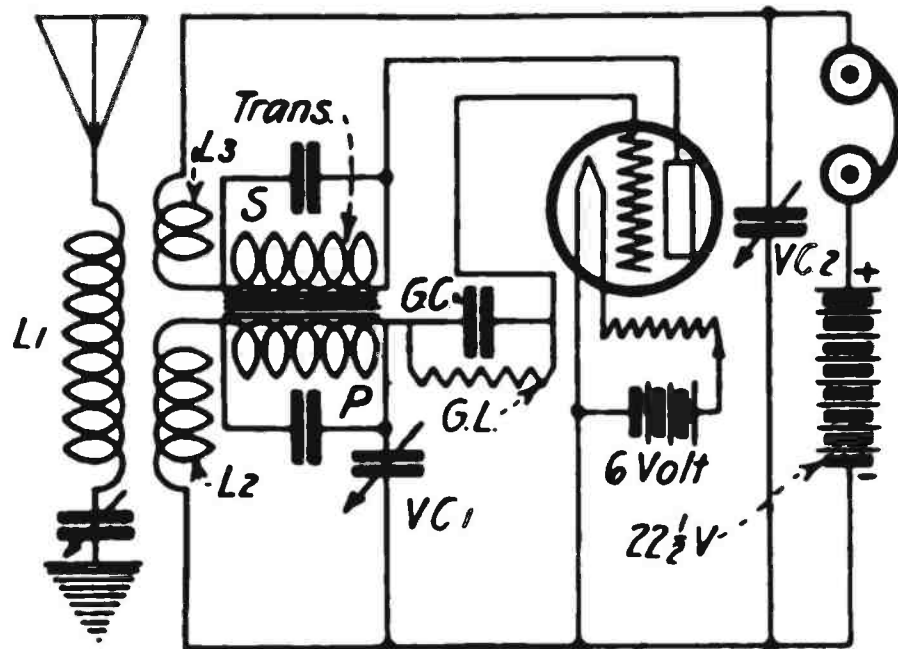


FIGURE 2

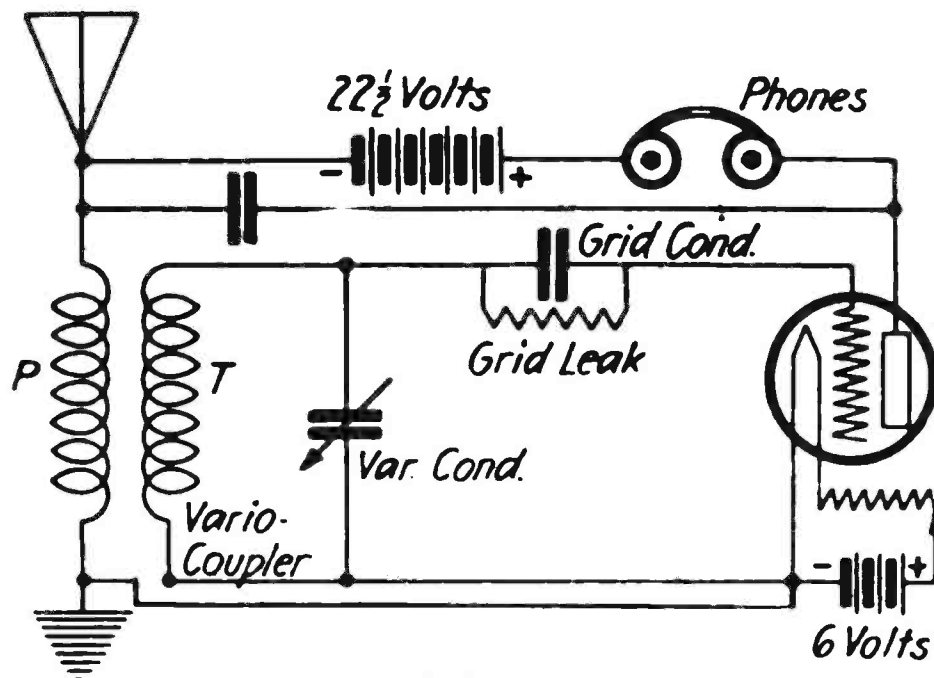


FIGURE 3

Schematic designs of the three hook-ups described by Mr. Myers in his interesting letter and showing the advantage of using only first-class apparatus.

I HAVE been a reader of RADIO WORLD since Vol I, No. 1, and your DX page interests me most. Continue it. I wish the claimers of DX records would send in their hook-ups and, also, name the instruments used in them. DX records do not depend so much on the hook-up necessarily, but on

the apparatus used. Any old condenser or phone will not do.

I am sending you three hook-ups out of the hundreds that I have, which include the hook-up of Mr. W. Miller in various forms.

The following are used in No. 1: Remler-Giblin coils; Thordaison condensers, .001 mfd.; U-V 201 or RAC., 3 tubes; also W D 11-A. I use an automatic filament-current adjuster known as the Amperite. It eliminates all rheostats. I also use variable B battery and Baldwin phones and radio-duct wire. A. C. H. Sharp Tuner Dials are used on all condensers. They give a one-thousandth part of an inch turn. No hand-operated condenser and vernier combined will give such fine adjustment.

The same apparatus is used in No. 2 and No. 3, except No. 2 has a triple coil mounting, three Remler-Giblin coils, and an audio-frequency transformer. I used an Amer-Tran transformer. They go fine with radiotrons.

In No. 3 a vario-coupler is used. The secondary is used on the plate circuit. Only first class instruments will give first class results. Remember that! The only dials that should be used are those that give a "hair line adjustment." The second hook-up will, I am sure, prove very interesting. Let us hear from you radio fans.

On a One-Slider Crystal

From George L. Markel, 528 Beverly Road, Milwaukee, Wis.

I HAVE a one-slider crystal set, and I think it is working fine. Here are my stations. I only have a chance when the four local stations are silent: WAAR, WCAY, WHAP, WIAO, WOC, KYW, WGY, WHB, WWJ, WDAP, WBAP, KSD, WLK, WLW, ZXY, WCX, WMAK, WGM, WAAF, WBU, 9-CIW, WSV. Also "The Star, Kansas City (WDAF), and the Horlowa Radio Co., Rock Island, Ill. (not listed). Any one wishing my diagram please write.

Antenna in Attic

From Ralph E. Taylor, 913 East Huron, Ann Arbor, Mich.

I HAVE been greatly interested in the results the "radiophono" has obtained and published in RADIO WORLD. I have a set of my own construction. I use the standard honeycomb hook-up. The coils are tapped, and, consequently, home-made. I employ one tube. I have heard stations from over the entire country—from Texas, Oklahoma, California, Massachusetts, and about twenty-one other states. I get PWX, Havana, Cuba, frequently; also several Canadians.

The above record is quite common on an ordinary amateur antenna. My antenna, however, is situated in the attic, which is covered by a tin roof. The antenna consists of 4 strands of No. 12 copper, 30 feet long.

Using neither antenna nor ground, I receive WWJ and WCX quite audibly; also WGY and KDKA very faintly. Several times I have hooked onto the springs in a bed for an antenna. This made a very good substitute, gathering in music from WGM, WDAF, and several others. If the fans cannot tune in to this please tell them to continue to send in their results.

With Straight Regenerative Circuit

From J. J. Cannon, Mauch Chunk, Pa.

HAVING read with interest the letters of the broadcasting fans published in your valuable paper—and some of them

With the DX Nite Owls

(Continued from preceding page)

have me beaten for long-distance reception—I am sending you my list. Local stations: WWZ, WBAY, WEA, WJX, WGAC, New York; WOO, WIP, WNAT, WCAU, Philadelphia; WRW, WGY, WHAM, WMAC, WHN, WHAZ, WRP, 3-XW, WBAK, WBAG, KDKA, KOV, WJZ, WOR, WBZ, WNAC, WGI, WHK, WLW, WWJ, WWI, WGR, WMAK, WBAF, WVP, 2-XKA, WSZ, WMAF, WBAK, KOP, WJAX, WPI.

Long-distance stations: WOH, WLK, Indianapolis; WCA, WAAK, WIAO, Milwaukee; KYW, WMAQ, WJAZ, WDAP, Chicago; WLAG, Minneapolis; WHY, Martinsville, Illinois; WMAT, Duluth; WCAP, Decatur, Illinois; WOC, Davenport, Iowa; WHB, Kansas City; WEY, Wichita, Kansas; WCK, St. Louis.

WEY is longest distance from here—1,400 miles.

I am using the straight regenerative-circuit with .001 mfd. condenser on ground lead. Aerial is 100 feet long with a 50-foot lead-in.

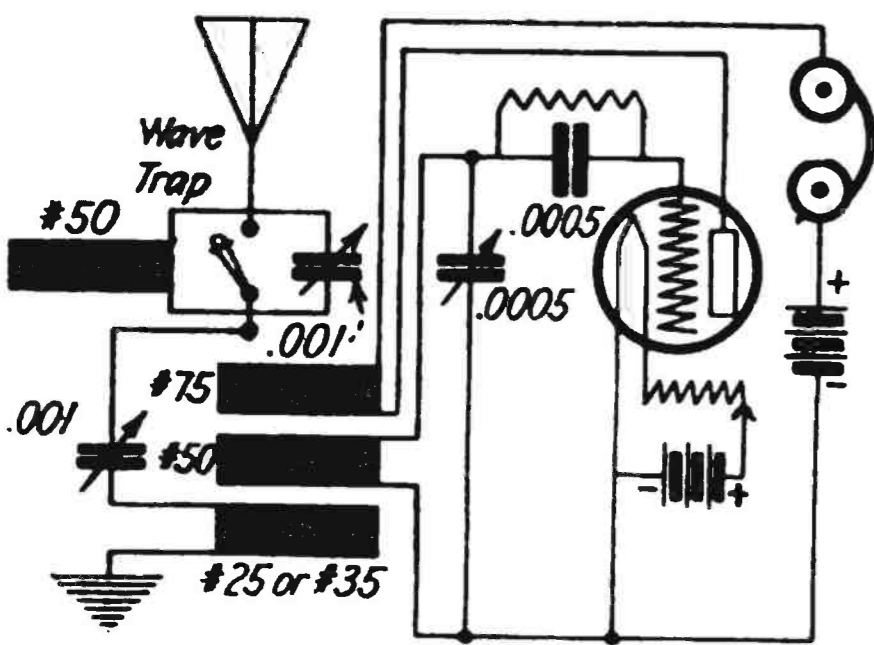
Using two steps of audio-amplification, WMAQ, Chicago, on Christmas Eve, was heard very distinctly on a loud-speaker, which, by the way, is only a Baldwin phone with Lily horn attached.

Uses a Wave-Trap

From W. D. Ready, 4283 Holmes Street, Kansas City, Mo.

I HAVE accomplished no great distances, but this list of stations I have heard since December 1, and most of them consistently, with a honeycomb regenerative set and two stages of amplification:

WBAP, WSB, WPO, WAAE, KYW, WCX, KSD, WJAX, WAAJ, WDAB, WFAA, WGM, WDAJ, WLAG, WAAF, KFAF, WBL, WDAP, WDAW, WNAV, WJAR, WAAP, 9-YQ, 19-DKO, WPA, WHAS, WNAD, WPAC, WJAZ, WOC,



Schematic design of hook-up by Mr. Ready. Its principal feature is the No. 50 coil and .001 condenser used as a "wave-trap" to eliminate any station not wanted.

WWJ, WOAI, WAAC, KYI, WCS, WJAT, WMH, WMAB, KDKA, WDAO, 9-ZAY, WKY, WFAS, WGY, WEA, KOP, 9-ZAF, WIAO, WGAQ, WMAP, WIAC, WGF, WLK, WJAP, WFAV.

All of these came in sufficiently strong to be heard all over the first floor of my home. There are very few of these I have not heard several times.

I am also using an apparatus called the wave-trap, used to eliminate stations I do not care to hear—a hook-up without amplification.

Disconnected Aerial and Ground

From Clarence Milano, Englewood, N. J.

I AM pleased to tell about my set, which I constructed a few months ago. It consists of a triple-gear De Forest type

with a 2-variable condenser, series-parallel switch and 2 stages of amplification. Having obtained good results, I disconnected my aerial and ground and am still copying WJZ, WOR, WEA, and others. I know code—Morse and Continental—and have copied POZ, MPD, MUU, and up to 18,000 meters, using 1,000 and 1,200 duo-lateral for the high-wave stations. I also copied WHN without an aerial.

Another Challenge for Mr. Lindstrom

From Mike Podhorn (Old Timer), Box 89, Wood River, Ill.

IN RADIO WORLD, No. 37, dated December 9, 1922, I noticed that Arthur Lindstrom (Baraboo, Wisconsin) heard from coast to coast and from border to border with his equipment of a one-step amplifier with 45 volts on plate, using Cunningham tubes and a Thordarson transformer. His record of receiving long distance takes the prize. I have quite an expensive set and, although I heard dots and dash from half of the states in the Union, I have not heard any music from any western station. If Mr. Lindstrom's record is correct and true I would advise him to obtain a patent on his set and put it on the market. I believe it would reap him quite a fortune. I for one would like to obtain a diagram of his set as I would like to put one up and try my hand at long-distance receiving. I have been in the game nearly three years; and, although I do not claim to know it from A to Z, what I do know is a great help to me in putting up radio sets for my friends. Come on, radio bugs, and let's hear what you have to say in regard to Mr. Lindstrom's record of long-distance receiving! Best 73s.

Consistent Long-Range Work

From G. W. Goode, Thornton, Washington

I HAVE a home-made regenerative set with two stages of audio-frequency. Have heard WGY, WEA, WIP, KDKA, WSB and WGM—each three or more times during the last two weeks—also numerous stations in the Mississippi Valley.

There are three sets in this town, all alike, that have accomplished this. The others have received some eastern stations that I have not.

We get Fort Worth, St. Louis, Kansas City, Davenport, Minneapolis and Winnipeg—some of them every night.

If any one can show a set that will give more consistent long-range work than this tell us about it.

Seattle Sends In One

From E. L. Gerry, 3644 Densmore, Seattle, Washington

I HAVE a long-distance receiving record to report. On December 11, 1922, at 11 p. m., I heard 6-XB, the Mercantile Trust Company, San Francisco, California, music and speech QSA. My set consists of one U-V 201 tube, single circuit, honeycomb coils, 40-volt plate, 3½-volt filament potential, ground connection, no aerial, series and parallel primary-condensers.

Simple Set Works Well

From Thomas F. Cortese, 319 West Liberty Street, Louisville, Kentucky.

HAVING read other records send in, I will send mine. On an aerial 4 feet above a tin roof, and 100 feet long, with a 15-foot lead-in and 20 feet high, I have received the following stations: KDYX, (Continued on page 27)

MAGNAVOX Pioneers in the Radio field

IT was in 1913 that the Magnavox electro-dynamic receiver made its first public demonstration, when telephone communication was held between Denver and New York—a revolutionary advance.

The rise of radio broadcasting found Magnavox apparatus already perfected and in successful use.



R-2 Magnavox Radio with 18-inch horn



THIS instrument is intended for those who wish the utmost in amplifying power: for large audiences, dance halls, etc., but requires only .6 of an ampere for the field.

Price, \$85.00

R-3 Magnavox Radio with 14-inch horn

SAME in principle and construction throughout as Type R-2. Is ideal for use in homes, offices, amateur stations, etc.

Requires one ampere field current from your filament battery.

Price, \$45.00



Magnavox Power Amplifier—Model C

CAN be used with any "B" Battery voltage which the power tube may require for best amplification.

AC-2-C, 2-Stage \$80.00
AC-3-C, 3-Stage \$110.00

The facilities and experience back of each piece of equipment bearing the Magnavox trade mark are unrivalled anywhere in the world.

Magnavox products may be had of good dealers everywhere.

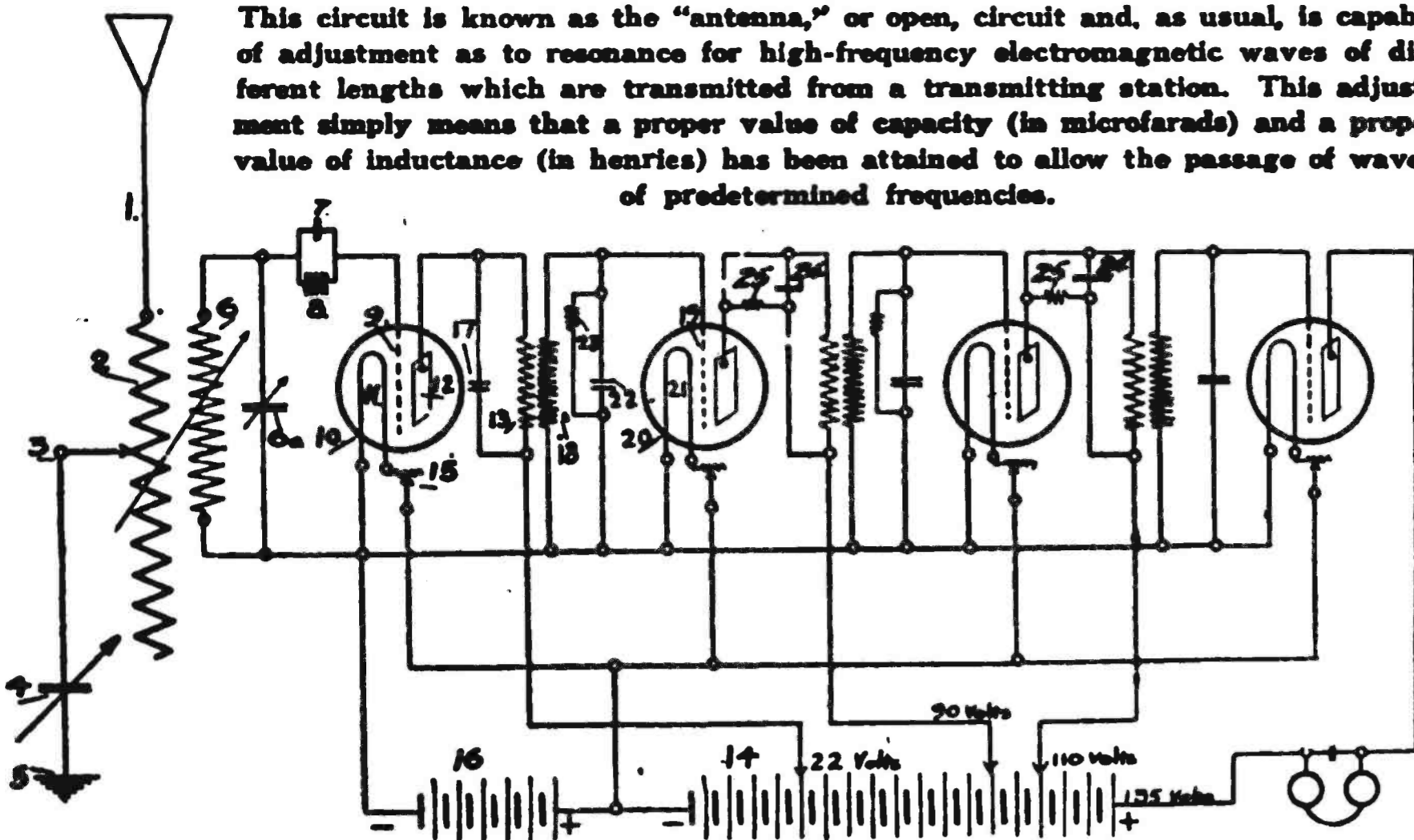
Write to us for illustrated booklet

The Magnavox Company
Oakland, California

New York Office: 370 Seventh Ave.

Latest Radio Patents

This circuit is known as the "antenna," or open, circuit and, as usual, is capable of adjustment as to resonance for high-frequency electromagnetic waves of different lengths which are transmitted from a transmitting station. This adjustment simply means that a proper value of capacity (in microfarads) and a proper value of inductance (in henries) has been attained to allow the passage of waves of predetermined frequencies.



Another Static Killer

No. 1,439,485. Patented December 19, 1922. Patentee: Henry M. Williamson, Chicago

IN his specifications Mr. Williamson claims an apparatus having an audio-frequency amplifier, or a cascade of such amplifiers, employing a method for isolating

and excluding static interference from any source. It is also claimed that it will prevent oscillations in a thermionic amplifier. It is also claimed that it will provide a means, located between the detector and the receiver, which will completely filter out static.

New System of Modulating

No. 1,439,134. Patented December 19, 1922. Patentee: Leon J. Sivian, East Orange, N. J.

MR. SIVIAN'S is an invention to provide a high-impedance control-element associated with the oscillatory circuit of an electronic oscillator in order to prevent variations in the frequency of the oscillations produced; also to produce an arrangement whereby the electromotive force impressed on the input circuit of a thermionic device used as an oscillator is directly under the control of a transmitting device.

A large class of thermionic oscillators contain an electron-discharge device having

three elements—a cathode, an anode, and a grid, or other impedance-controlling element—associated with an oscillatory circuit in such a manner that a portion of the oscillatory circuit supplies a variable electromotive force to the input, or grid-cathode circuit, of the electron-discharge device, and the cathode-anode, or space-current circuit, of the discharge device in turn impresses a variable electromotive force on the oscillatory circuit. It is quite common to connect the input circuit of the electron-discharge device, or tube, to the terminals of a condenser in the oscillatory circuit, or across part or all of an inductance in the oscillatory circuit. Moreover, the oscillatory circuit may be closed or open, as in the case of an ordinary-tuned antenna—the antenna conductors and earth acting together as a capacity element. The electromotive force impressed by the oscillatory circuit on the input circuit of the tube is that which normally exists between the points in the oscillatory circuit to which the grid and cathode are connected.

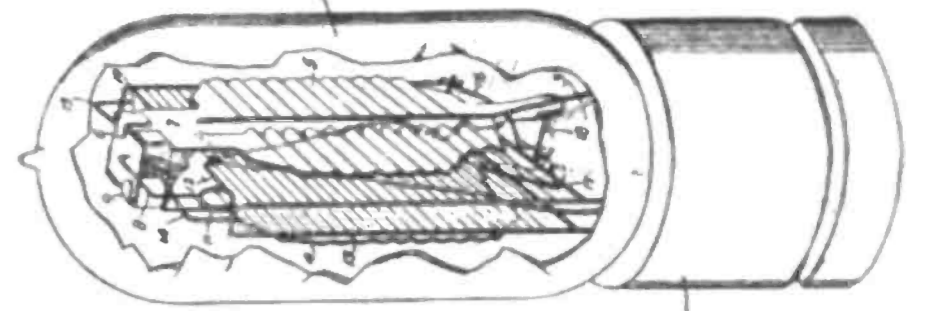
According to Mr. Sivian's invention a variable coupling is employed between the oscillatory circuit and the input circuit of the electron-discharge device. A high-impedance shunt-path is connected to the two points in the oscillatory circuit, to which the input circuit-elements are ordinarily connected, and the input circuit elements are connected to two points in this impedance shunt-path. The relative values of the portion of the impedance between the points of connection of the input circuit and the portion outside of these points can be varied by control elements, varying the fraction of the electromotive force.

A New Vacuum Tube

No. 1,438,909. Patented December 19, 1922. Patentee: Lawrence B. Spengeman, Jersey City, N. J.

THE object of Mr. Spengeman's invention is to provide a filament support which, in addition to supporting the filament, will apply sufficient tension to prevent vibration, and will also maintain the proper space relation of the filament with any other parts of the lamp which may be positioned therein. It is particularly applicable to vacuum tubes in which a filament is used

and a grid, the space relations between which must be maintained constant in order that the proper operation of the device will result. The invention comprises an insulating block positioned near the upper end of



The large free curve of the supporting wire affords greater resiliency and more ready adjustments.

the lamp, from which extends a spring wire in a curve to a point beneath the block where the spring is connected to the filament. Between the point of the block from which the spring wire extends and the point of connection with the filament the spring wire is given one or more turns in the form of a pigtail twist to produce elasticity.

To Avoid Large Inductance

No. 1,438,200. Patented December 12, 1922. Patentee: William E. Beakes, New Orleans, Louisiana

IT is well known that in order to receive signals of a given wave length the antenna of the receiving station must be tuned so that its natural wave-length corresponds more or less closely with the wave length of the incoming signals, and likewise, since the wave length of the outgoing signals at a transmitting station depends on the natural period of the antenna, the antenna is made adjustable in such a manner as to vary its natural period in accordance with the wave length to be transmitted.

Heretofore it has been common practice to tune the antenna so as to give it a desired

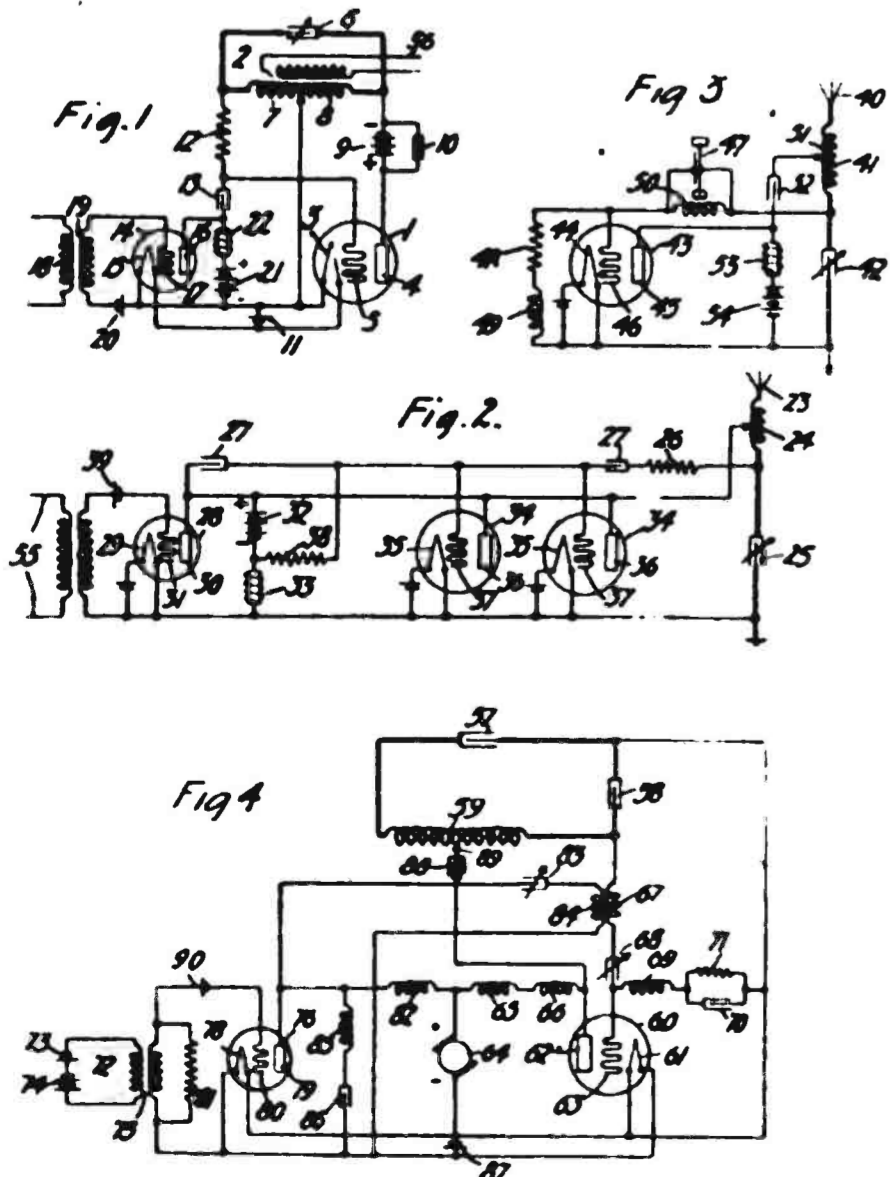
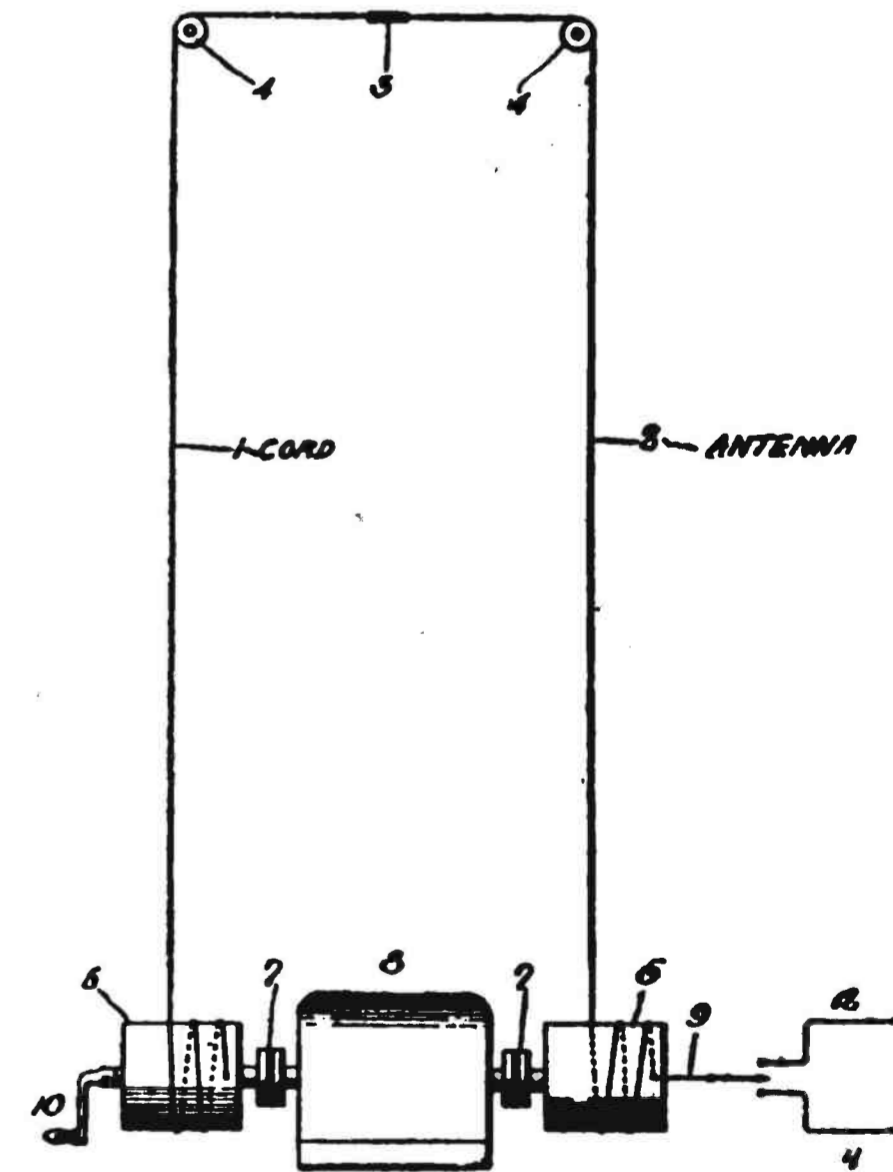


Figure 1 illustrates diagrammatically signaling system in which an oscillator produces oscillations of an amplitude determined by the value of thermionic impedance, and supplies oscillating energy to a transmission circuit. Figure 2 illustrates a modification of the oscillator arrangement of Figure 1 applied to a radio system. Figure 3 illustrates a modification of the circuits of Figure 2, in which the thermionic control impedance is replaced by a condenser transmitter. Figure 4 illustrates another modification in which the



Diagrammatic design, illustrating Mr. Beakes' invention.

natural period; or wave length, by varying the factors of inductance or capacity. The object of Mr. Beakes' invention is to avoid the necessity of using a large inductance, or capacity, in the antenna for the purpose of adjusting it to desired wave lengths, and, thereby, to increase the efficiency of the antenna both when the apparatus is used in a transmitting or receiving system. The adjustment of the antenna to a given length is effected in part or in whole by increasing, or decreasing, its operative length, or the length of its conducting parts. By this means the radioist is enabled to do away with the use of large inductance, or capacity, in the antenna circuit. By adjusting the antenna to the desired wave length in this manner, Mr. Beakes claims, a much stronger signal is received or transmitted than would be the case if the adjustment were provided

Secrecy in Radiotelephony Seems Assured

Combination of Radio and Land Telephone Is New Wonder. Experiment Made on High-Tension Wires Carrying 70,000 Volts Proves Successful

BALTIMORE—The successful transmission of voice over electric power lines carrying 70,000 volts by means of carrier current, a new development of radio, is announced here by the General Electric Company.

The tests were made over the high-tension lines connecting the Highlandtown sub-station of the Pennsylvania Water and Power Company here, with its hydroelectric plant at Holtwood on the Susquehanna River, a distance of forty miles. Conversations were carried on under every possible condition that might occur on a power transmission line, such as short circuits, grounding and broken wires.

The apparatus by which the transmission of voice is made is similar to a radio outfit, having vacuum tubes, batteries and other appliances. Instead of radiating waves through spaces in all directions as from a broadcasting station the voice waves are kept concentrated about the electric power lines, thus insuring privacy and direction of signals.

Quality of Speech Much Better Than By Land Phones

For power companies the carrying current system has many advantages over the land telephone, for so long as there is a single transmission line in operation communication can be carried on. Ordinary telephone wires, which are many times smaller than the high-power electric lines, are generally the first to suffer during a storm, whereas transmission lines are seldom affected by even the most violent storms.

In the tests made here the quality of speech was much better than that obtained by a land telephone over the same route. The conversation was free from hum and other noises which are usually experienced when a telephone line parallels a high-power electric system.

Carrier current, in addition to insuring privacy in communication, has other advantages over radio. Static, fading of signals, and interference from other stations are entirely eliminated. Government broadcasting licenses are not required, and it does not require a licensed radio operator.

A small switch connected with an ordinary telephone instrument does all the work. By moving this switch upward a bell is rung at the other end of the line. The switch then automatically returns to neutral or listening position, and conversation begins. The apparatus is in operation only when a conversation is in progress, the telephone hook holding the receiver acting as a switch for the set.

Equipment Consists of Detector and Two Amplifier Tubes

When the receiver is raised a small motor generator is started, supplying 1,000 volts direct current. This is put through two 50-watt vacuum tubes and converted into high frequency alternating current of 15,000

cycles. This voltage carries the voice signals from the telephone into a wire 1,000 feet long, leading from the station and parallel to the transmission lines.

Traveling at the speed of light, or 186,000 miles per second, the voice is received at the other end much the same as radio broadcast signals. The equipment consists of a detector and two amplifier tubes. Tubing is not necessary as the wave-length and other characteristics are always the same. Since carrier current travels on a wave-length of 15,000 meters it is removed from any possibility of interference from radio broadcasting stations.

A Real Task

IT is apparent that the task of the radio broadcasting director is to find music and speech of a character that will bring real information and pleasure to the greatest number who listen in. But when the program you get doesn't quite meet with your approval always remember the many problems that the poor director has to overcome. Next to running a grand opera the running of a broadcasting station is the best test of the mental stamina of humankind.

When a man tells his wife, who is holding supper for him, that he wants to "listen-in" just one more minute he is usually picking a minute half an hour away.

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New York, December 29th, 1922.

Gentlemen:—In starting our business as a retail distributor of radio goods, the writer had placed some advertisements in RADIO WORLD, while connected with another company, and was so impressed with your pulling power as an advertising medium that the suggestion was made that we advertise only in RADIO WORLD.

Our plan has been, as you know, to take a column one week, giving an itemized list of our offerings with prices, and on the following week to take but three- or four-inch space, mentioning but one or possibly two special items.

Although our store has not a particularly good location, our advertising has not only proved highly profitable but has resulted in sufficient mail order business alone to give us a handsome profit from our advertising in RADIO WORLD. Therefore, we take pleasure in telling you that we have found RADIO WORLD to be a most profitable advertising medium.

Very truly yours,
RADIO DISTRIBUTING & AUTO SUPPLY CO.
B. K. OWEN.

Heard at the Radio Counter A Conversation between Customer and Radio Clerk

Part X

HELLO, O. M.! Did you get to the American Radio Exposition, last week?"

"I most surely did. I wouldn't have missed it for a new storage battery!"

"Say, speaking of storage batteries, is there any advantage in the storage B batteries I saw advertised there?"

"Well, I should say so. Have you ever had a perfectly good message lost just because there was a terrible lot of tube noises that sounded like static?"

"That very thing occurred to me only the other night. I was listening in to WOX. Suddenly there was a terrible noise. I blamed it on static; but I thought, later, that this time of the year is kind of late for Old Man Static to be so noticeable."

"Well, if you had of analyzed the trouble, you would have found, probably, that due to chemical action, there was a heavy battle of electrons in your B-battery circuit. Now, if you had used a storage battery of the same voltage, you wouldn't have lost that concert."

"That sounds interesting. Do you happen to have any in stock?"

"We just received a fresh stock, this morning, all ready for use. All you have to do is pour in the electrolyte and connect it up. You will need a rectifier, also, if you have alternating current at your house."

"Doesn't it cost a lot to charge such a high-voltage battery?"

"Certainly not! You can charge your battery about every other month or so at a cost of about from three to five cents."

"I feel that I had better purchase one of those batteries."

"Here it is, O. M. The electrolyte is in a separate bottle. Do you want the rectifier also?"

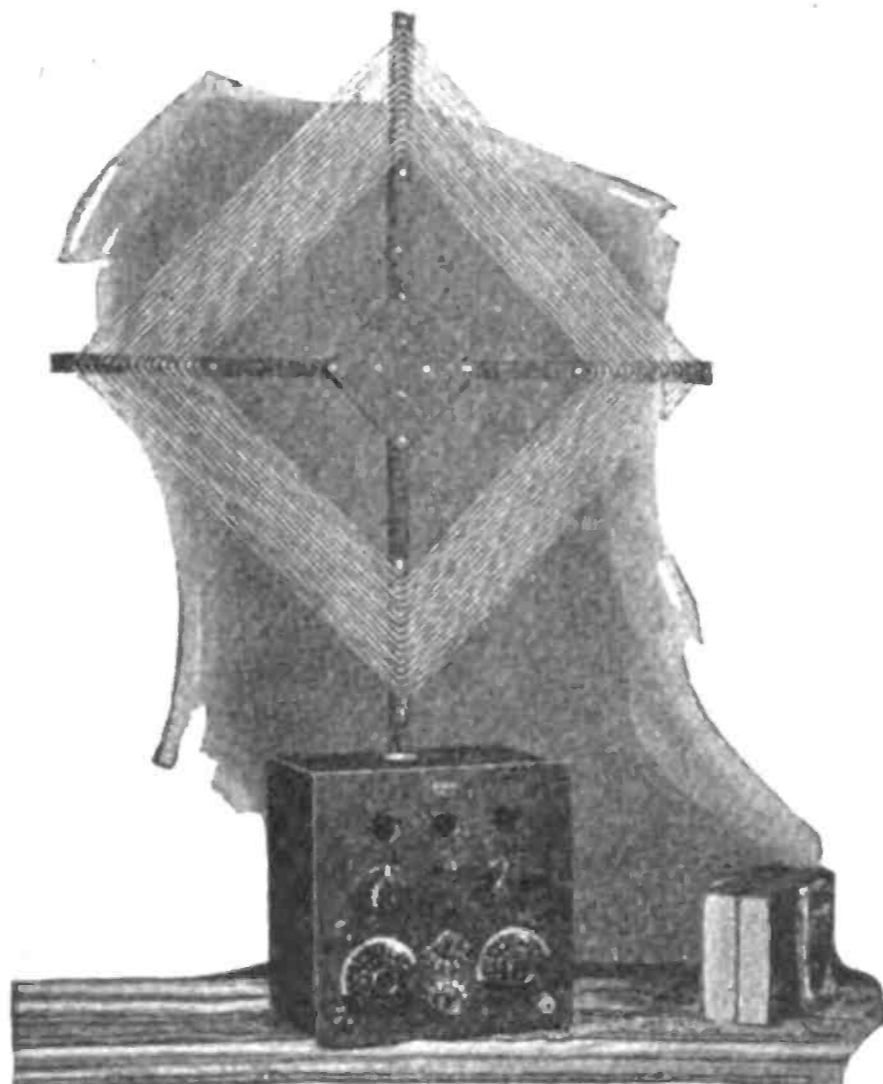
"Surely."

(To be continued)

New De Forest Reflex Set

THE new D-7 Reflex Set of the De Forest Radio Telephone and Telegraph Co. is shown in the accompanying illustration. This set, we are told by one of their eastern distributors, Radio Stores Corp., was recently perfected. It permits long distance reception on an inside loop through the agency of three steps of radio-frequency and two steps of audio-frequency, on only three tubes, and fills a want in circles where such a circuit is needed, but where the old type of circuit, using six tubes, is impossible on account of upkeep and cost.

The signals are rectified (detected) through the agency of a jar-proof crystal detector, which is one of the features of the set. Although primar-



Photograph of the new De Forest Reflex set showing the collapsible loop. Signals are rectified by a jar-proof crystal detector.

ily developed for loop reception, it can just as easily be used with antenna and ground. This is accomplished by having the loop on a jack. Thus when the loop is plugged in through the agency of a double-circuit jack, the antenna and coupler is disconnected and the loop is tuned with the condenser which tunes the secondary circuit when the set is used with the antenna.

The loop is collapsible, and the entire set may be put in operation at any time and place by simply connecting the necessary batteries and inserting into the loop. The fact that it is freely operated on either loop or aerial make it possible to use it in a district where there are many phone and spark stations, because of the fact that it tunes very sharply.

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.

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 Firms and Corporations

(The firms and corporations mentioned in these columns can be reached by communicating with the attorneys, whose addresses are given whenever possible.)

Linquest Electric Co., Jamestown, N. Y., has increased its capital stock from \$15,000 to \$75,000. Commonwealth Mica Corporation, Wilmington, Del., mining, \$1,000,000. (Colonial Charter Co.) United Radio Publicity Corporation, \$500,000; Herald G. Wilson, Frank C. Mooney, Camden, N. J.; Charles C. Mooney, Philadelphia. (Corporation Guarantee & Trust Co.)

New Loud-Speaker

ONE of the best indications that radio is becoming more and more popularized is the fact that more and more loud-speakers are being put on the market. The entire family now wants to listen in. The Atlantic & Pacific Radio Company, of New York, has just recently brought out a loud-speaker made of a special alloy of their own. The company also claims that the instrument owes its unusual qualities of clarity and tone to the peculiar acoustic properties of its design.

Radio Now a National Problem

SECRETARY HOOVER declares the tremendous growth of radio in recent months has made it a national problem. He estimates there are now 21,065 sending stations in this country, the major portion of them—16,898—being amateur. In addition there are 2,762 on ships. Of broadcasting stations there are 576 of Class A and 25 of Class B.

Interference, he says, is largely in the broadcasting stations that send out news dispatches and entertainments of various character. While the total of these is around 569, it is variously estimated that the receiving stations number 1,500,000 to 2,500,000.

The interference, he states, runs largely in "the 600 to 1,600 wave-length field, which is reserved for the army and navy." This reserve of wave-lengths should be open to the public, Mr. Hoover added.

Club Notes

THE Mt. Pleasant Radio Club is located at 3215 East 118th street, Cleveland, Ohio. The officers are: E. Sherring, president; D. Bluffstein, secretary; H. Abrams, treasurer.

The Marconi Radio Club is in active operation at 125 North 6th street, Monmouth, Illinois. Lloyd Sandy, president; Charles Bisher, vice-president; Lawrence McVey, secretary-treasurer. Meetings are held at high school every Wednesday night at 7 o'clock.

DEALERS

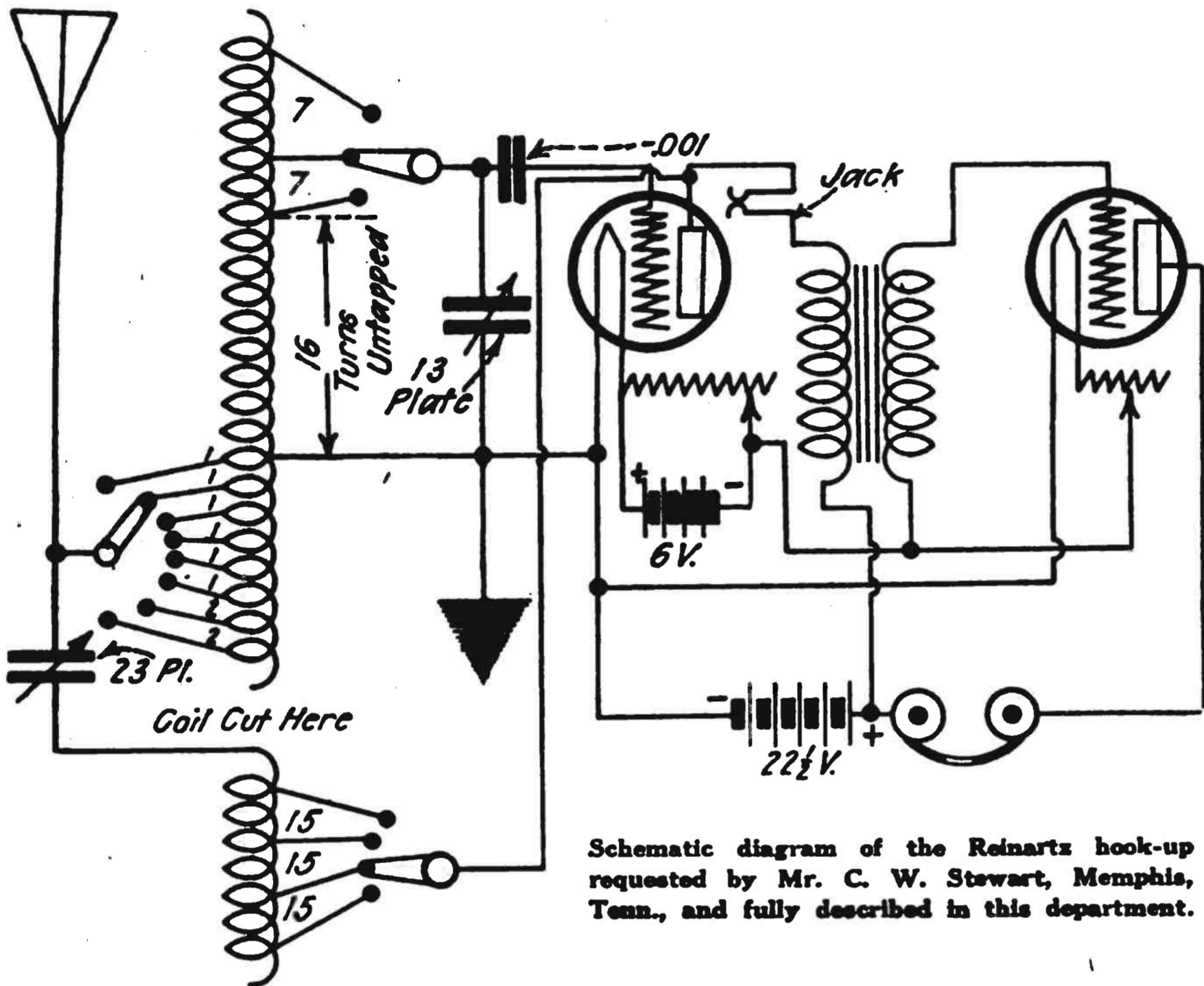
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Answers to Readers



Schematic diagram of the Reinartz hook-up requested by Mr. C. W. Stewart, Memphis, Tenn., and fully described in this department.

Is it possible to use the 1½-volt dry-cell tube in the hook-up published in RADIO WORLD, No. 30, dated October 21, by Harold Day in his article, "One-Tube Regenerator Hook-Up for Loud-Signals"? I have a crystal set, but wish to construct a more powerful receiver.—W. G. Miller, Ballston Spa, New York.

Yes. This tube may be used in this circuit with very good results.

Advise me if there is a circuit using radio-frequency in a regenerative set, but used before the tuner. By that I mean using it between the aerial and the tuner instead of between the tuner and detector.—James E. MacDonald, Boston.

We know of no such circuit. We do not understand why you desire to use such a circuit as no advantage can be attained.

I contemplate building a radio set and would like a little information regarding a set capable of receiving over 500 miles. Just what parts are necessary to build such a set? How many tubes may I use with such a set?—William, O. Philips, "Sun," West Virginia.

We refer you to the sets described in this number. All of these sets are fully described, and have been tested and found O. K. The number of tubes used depends on how many stages of amplification you wish to utilize. If you are using only audio-frequency it is not advisable to use more than two or three stages at the most as the tube noises in sets using more than that completely overbalance the advantages.

Publish a diagram of a set using 3 tubes similar to those being used to give 2 stages of radio-frequency, detector and 2 stages of audio-frequency.—Walter D. Kampton, Santa Barbara, California.

We understand that you want a hook-up using 3 tubes in place of the usual tube-circuit using 5 or 6. See the article on page 4 of this issue of RADIO WORLD by Frederick J. Rumford.

Publish the original hook-up of the Reinartz circuit, also constructional data on the inductance itself.—C. W. Stewart, Memphis, Tennessee.

The diagram you request accompanies your answer herewith.

The tuner consists of a spider-web inductance of 85 turns of No. 26 S. C. C. wire. The spider web has 9 spokes, and the core of the coil is 2½ inches in diameter. The complete coil, when wound, is 5 inches in diameter. Wind 45 turns on the form and then cut the wire. This is the plate winding and should be tapped at 15, 30, and 45, as shown in the diagram. Then start the antenna winding directly on top of the first and tap at the 2nd, 4th, 5th, 6th, 7th, 8th, and 9th turns and bring out the 10th tap for the ground and condenser tap. Then the winding is continued and taps are taken off for the grid coil at the 26th, 33rd and 40 turns. This coil, if carefully wound, and not shallacked will work very efficiently from 150 to 370 meters, which is sufficient for most all the work you want to cover. This tuner was designed primarily to cover C-W work on short waves, but will work on phone.

1. Publish the panel layout for a 3-circuit regenerative receiver with detector and two stages of audio-frequency amplification.

2. Does a U-V201 function as well as a detector as a U-V200 if properly hooked up?

3. Are variable condensers absolutely necessary in such a circuit?—Kenneth H. H. Jones, London Mills, Ill.

1. A suitable panel layout is published in this issue of RADIO WORLD. See the article by Mr. Cranby Meyers.

2. A U-V201 will not work properly as a detector. It is primarily a hard tube, and is intended for amplification. You had better use a regular U-V200 and save yourself trouble.

3. Due to the fact that you use variometers, variable condensers are not absolutely necessary in this circuit. It has been found to function better in long-distance work with

the least necessary capacity. It is better to tune your set with inductance than capacity.

1. Is it possible to use the Western Electric V-T1 and V-T2 in a receiving set, using the V-T1 for detector and the V-T2 for amplifiers?

2. Will they give as good results on a three-honeycomb-coil unit as the regular tubes?

3. Can they be used for radio-frequency amplification? My radio-frequency embodies two variometers and a variocoupler.

4. Will a 6-volt A battery operate these tubes efficiently?—Ernest Chartier, Montreal.

1. Yes. These tubes function extremely well as detector and amplifiers.

2. Yes. They will give as good results as the regular tubes. Besides, the V-T1 are not critical and operate on low-plate voltages. Sometimes it is not necessary to supply more than sixteen volts for their efficient operation as detectors.

3 and 4. They may be used for radio-frequency amplification and may be operated on the regular 6-volt storage battery. The filament of these tubes being oxide-coated, they will not light up bright. They generally operate at their best when the filament is just a deep cherry-red. Do not make the mistake of trying to burn these bulbs too high.

1. Is it possible to use the W-D11 1½-volt tube, using 40 to 45 volts on the plate, as a detector or amplifier in the regenerative set described in RADIO WORLD No. 29, dated October 14?

2. Will they also work with the circuit I am enclosing?

3. Is any rheostat O. K. for their proper filament adjustment?—R. L. Hilton, Waterville, Me.

1 and 2. The W-D11 is a good amplifier and detector and will work admirably in any circuit. It is not a very efficient radio-frequency amplifier, but, in both circuits you mention, will work efficiently. It is only necessary to put 22½ volts on the plate of the detector, but the amplifier needs 45.

3. While any rheostat will do, we advise the vernier type for fine adjustment in tuning in the DX boys.

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Double Circuit New W. D. 11-Tube Set, with A & B Batteries, Inside 12x7. Golden Oak Cabinet. Complete with tube and phone.

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- 1 W. D. 11 Tube
- 1 Grid Leak Condenser
- 1 "B" Battery, 22½ volts
- 1 "A" Battery, dry cell
- 1 Variocoupler
- 1 "23" Plate Condenser
- Wire for Hook Up Free
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- Complete.....

\$10.90

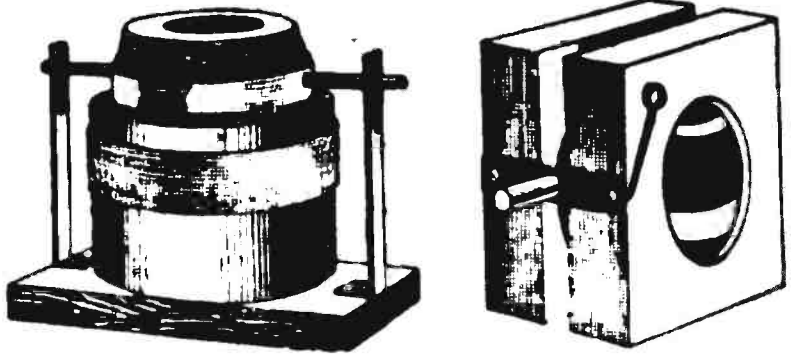
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OVER four hundred attended the first general meeting of the Radio Trade Association, composed of manufacturers, jobbers and dealers in the industry, at the Grand Central Palace, during the American Radio Exposition Week.

The Radio Trade Association is national in scope and looks toward the development of the radio industry through the standardization of radio products, the control of

broadcasting to eliminate interference, and the education of the public to the immense opportunities for education and amusement provided by the new art and science.

That contributions to churches are on the increase because of radio was the assertion made by Major J. Andrew White. Major White gave as an instance the experience of St. Thomas's Church on Fifth avenue, from which an entire Sunday service was recently broadcasted for a thousand miles.

Before this church broadcasted any of its services, Major White said, the collection plate usually brought in but little returns because the church is a rich one and does not rely for support on the passing of the plate. But after the recent broadcasting contributions flowed in by mail from radio distance of the church.

Among the other speakers at the meeting of the Radio Trade Association were Paul Godley, internationally known amateur, and Dr. Lee de Forest, a pioneer in the development of radio. Mr. Godley asserted that the instrument that would ultimately meet with the favor of radio fans would be one somewhat more complex than the one in average use today.

Dr. de Forest spoke on the radio industry in the country. "The farmer is the foundation of civilization," he said, "and agriculture is still the largest single industry in the country. People in the cities still look upon country people, however, as not having progressed in the last twenty-five years." He said that they did not realize that slowly a transformation has taken place on the countryside, brought about by greater facilities in communication. "No one art or industry," he added, "will do more to complete the evolution of the country than the receiving set."

Henry M. Shaw, manufacturer of Newark, New Jersey, elected president of the association, presided. In opening the meeting Mr. Shaw said that, in his experience of forty years as a manufacturer, he had witnessed the beginnings of the electrical and automobile businesses. He did not, therefore, worry at the present "growing pains" of the radio industry, for it seemed that every young industry had to grow through certain periods corresponding to the measles and the mumps of childhood.

The meeting was an enthusiastic one. Laurence A. Nixon, secretary, was kept busy registering new members.

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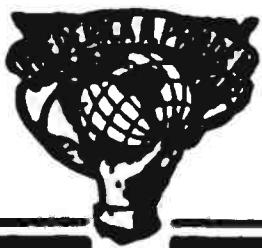
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There appeared in RADIO WORLD, dated April 1, 15, and 29, the following articles:

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. Ross. 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.

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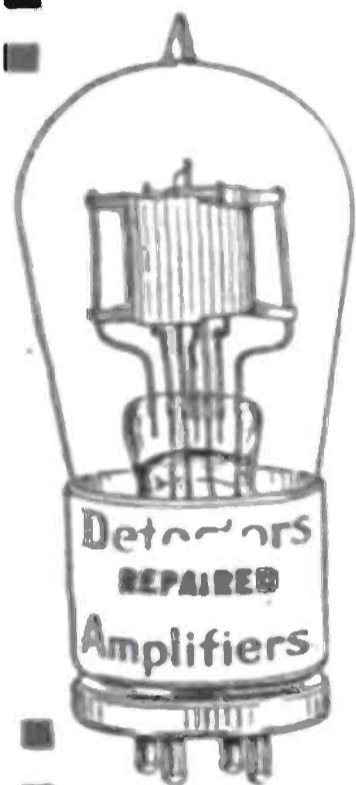
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Talks Through Steel Walls

Description of the Invention of Mr. Bernays Johnson Shown in the Photographs on Our Front Cover.

ON the front cover of this issue of RADIO WORLD may be seen photographs of one of the most startling recent improvements in radiotelephony. This apparatus, which its inventor, Mr. Bernays Johnson, demonstrated at the American Radio Exposition, will allow the person operating it to throw his voice into the air without the use of the necessary bulbs and transmitters. In his demonstration, Mr. Johnson demonstrated that his invention is directional to a remarkable degree, so much so, in fact, that he claims he can direct his voice to within five degrees on either side of a station and tune it out. The large photograph shows the transmitting apparatus which used neither bulbs nor arcs to produce the necessary wave-trains. The chief operating principles of the invention are a secret as yet; but the inventor claims that a 6-volt battery is all that is necessary to produce efficient operation.

The receiver comprises a loop of wire similar to the one on the transmitter, as shown in the smaller photograph, and a small square box with two binding posts. The contents of the box are a secret. They comprise the main points of the invention, which is one that may revolutionize entirely the reception of radio signals.

Mr. Johnson's invention has worked successfully in distance of over fifty miles, using railroad rails as carriers of the waves, and with no actual connection between the receiving station and the transmitter.

In order to make a thorough test this invention was placed over two hundred feet in the interior of a coal mine. The man on the surface had no trouble "picking up" and talking to the man in the mine below. Another test was as follows: Mr. Johnson and his apparatus were locked in a large steel vault, the walls of which are two feet thick and solid all the way through. Mr. Johnson and the mystified spectators outside the vault conversed in ordinary tones and heard one another as clearly as if they were in a haunted graveyard at midnight.

Have You a Little CQ'r in Your Neighborhood?

EDITOR, RADIO WORLD—I suppose that everyone owning a radio set capable of receiving C-W signals has heard this pest and wondered what particular bit of the devil had cut loose. He is the chap who repeats "CQ, CQ, CQ," about fifty times and then signs his call as many times. Before anybody can answer him, he has started all over again.

He don't seem to realize that while he is wasting all that precious juice the fellows who may be hearing him have tired of waiting for him to sign off and tune around for some one else to talk to.

I have one of those pests in my neighborhood. He is so clear that, when he starts, I get his carrier wave all over my primary and he knocks out everything else that is on. The other night, I called him on the telephone and asked him why he called "CQ" so many times when the government distinctly says that you are to call three times, sign, and wait for five minutes; then, at the end of that time, repeat. He said that he didn't think he was going out very strong so he wanted to make sure that the fellows wouldn't miss him. I told him that if he didn't stop his stunt, everybody in the neighborhood would wish he was some place where he would not be missed.

Buck up, fellows! Call 3, then sign! You'll get there quicker, because we'll pay more attention to you if you're businesslike!—Frank Maier, New York, N. Y.

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Below Are 70 Reasons For Buying at D-X

D-X-Radio Built on "Foundations of Lowest Prices and Towers of Highest Quality"

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	List Price	Our Price
Bulldog Grip, round telephone.....	\$1.50	\$0.75
Freed-Eisemann	1.00	.50
Torpedo	1.25	.50
Flat	1.25	.50

POTENTIOMETERS

Amaco	1.25	.50
RCA, for "A" Battery.....	2.00	1.50

RHEOSTATS

Amaco	1.25	.50
Bradleystat	1.25	1.50
Cutler-Hammer Co.	1.00	.75
Fada Type	1.00	.50
Plunger	1.25	.50

SOCKETS

Bakelite	1.50	.50
China50	.25
F. E.	1.75	.50
Moulded	1.25	.50
W. D. II.....	1.00	.50

TELEPHONE HEAD-SETS

Brandes, Superior 2000-Ohm.....	2.00	2.50
Federal, 2200-Ohm.....	2.75	3.25
Turney, 3070-Ohm.....	6.50	2.75
Stromberg-Carlson, 2000-Ohm.....	10.00	5.00
Dr. Seibt	12.00	6.00

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3-ft. lengths50	.50
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Acme Type A-25	5.00	2.50
Murad Radio Frequency.....	6.00	2.50
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UV-712, RCA, Amplifying	7.00	5.00
UV-1714, RCA, Amplifying	6.50	4.50

CONDENSERS

Morehouse Tested .0025-.0005-.001.....	.50	.50
Morehouse Tested .012.....	.50	.50
Morehouse Tested .006.....	.50	.50

SOLDER

Solderall, easy to use, tube 2-oz.....	.25	.50
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VARIABLE CONDENSERS

J Plate	1.25	.50
A. B. C. 23 Plate.....	3.00	2.00
A. B. C. 43 Plate.....	4.00	2.00

CRYSTAL DETECTORS

Glass Enclosed, dust proof.....	1.75	.50
Glass Enclosed, dust proof.....	1.50	.50

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Composition, 3 in.50	.50
Composition, 3 in.50	.50
2 in., for Rheostat75	.50
4 in., with knob, 180 Degrees.....	1.75	.50

SAFE-T GRID LEAKS

Tubular enclosed in glass 1/4, 1/2, 1, 2, 3, 4, and 5 Megohm.....	.65	.50
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Federal, double	1.00	.75
Federal, single25	.50
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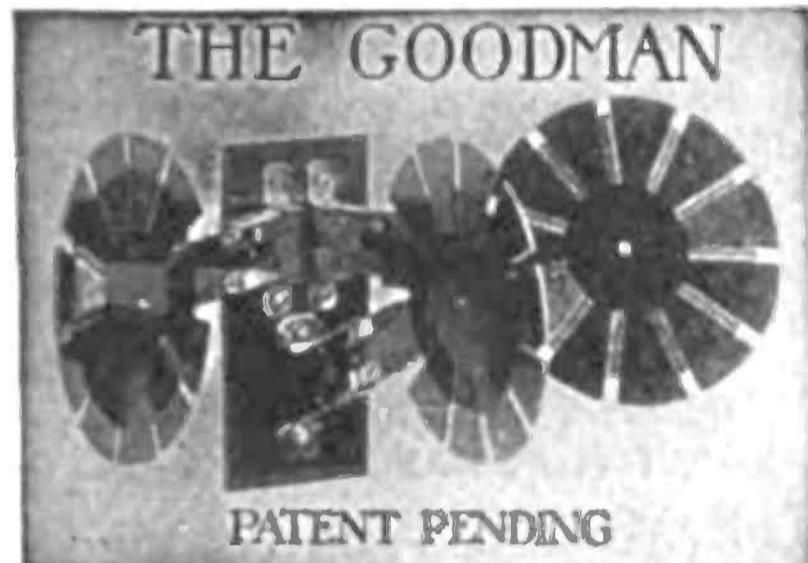
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7x10	1.75	1.50
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L. W. GOODMAN
DREXEL HILL, PA.

Doctor _____, Norristown, Pa., writes: Listening in recently with my GOODMAN, heard a voice, "We are now 90 miles out from San Francisco." Then DENVER came in and sunk the ship.

AT LAST

A Real Loud Speaker at a Reasonable Price

The A & P Loud Speaker gives double or triple the volume of your phone. And at the same time it clarifies the tone. It is clearer and sweeter than the most expensive speaker on the market to-day. Its price is only

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Note: The A & P Loud Speaker owes its quality to the Special Alloy used and to the peculiar Acoustic Properties of its design.

Atlantic & Pacific Radio Co.

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We also have a complete line of standard parts at reduced prices.

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RADIO WORLD, 1483 Broadway, New York City

Regulating Wireless Telegraphy

THROUGHOUT the country, with its radio sharps in the remotest settlement, from the small urchin to the oldest inhabitant, there is great interest in the Kellogg-White Federal Radio Control Bill, says *The Times*, New York. The original act of August 13, 1912, is regarded as obsolete. It was the work of legislators who could not perceive even dimly the rapid growth of the giant which they were asked to hold in leading strings. In November Justice Wendell P. Stafford, of the District of Columbia Supreme Court, directed Secretary Hoover, of the Department of Commerce, to issue a license to the Intercity Radio Company of New York. It was operating a high-powered station that put many important wireless plants out of commission when it was working. Among the complainants in the case were the United States Navy, the Coast Guard and Customs Service, the Post Office Department and the Radio Corporation of America. Judge Stafford had to issue the mandamus asked for because the act of 1912 did not give the Secretary of Commerce discretionary power to refuse a license to the Intercity Radio Company. Judge William G. Lamb, solicitor for the department, said of the statute that it tied the hands of the Federal Government:

We are unable to control the situation. Not only will the administration of the Government be hindered, but ships at sea which may have occasion to send an S O S call must wait their turn if the Intercity plant is working when a disaster occurs.

The wave-length of this wireless station

was 3,900 meters. "We find," said Judge Lamb, "that it is both physically and mechanically impossible to devise or arrange a wave-length at which this plant can operate without interfering with others." Radio regulation moves slowly. The Kellogg-White bill was introduced in the Senate as long ago as June. It may be pleaded for Congress that wireless telegraphy is comprehensible only to the experts, and that they are not in accord about its restriction. Secretary Hoover told the Merchant Marine Committee of the House recently that control must be established over "the bedlam filling the air from 21,000 radio transmitting stations." It is the regulators who will be in bedlam if something practicable is not soon done to harness and guide the monster.

By the terms of the bill the Commerce Department is to have charge of all radio communication, licensing operators, assigning wave-lengths, passing on apparatus. Day and night the air is full of band music, concert singing, vaudeville dialogues, speeches about everything that interests the American people; sermons, crop and weather reports, prizefighting by rounds, football battles by plays, not to speak of the business of the army and navy and post office. There is discord even between the departments. Secretary Hoover, for instance, would have the Navy Department attend strictly to its professional concerns and not stray into fields of entertainment to keep the service cheerful. It has been said that under the provisions of the bill Secretary Hoover would have power "to break up the 'Big Four' or any other civilian radio combination." Broadcasting stations are to be limited in number. The attempt cannot be made to control the myriad of receiving stations. The cost would be prohibitive even if regulation were possible. Fees, however, might be imposed, and few could escape them. The Kellogg-White bill will call for a great deal of discussion before it is put on passage. At the best it will be tentative legislation.

The Motion Was Carried

AT a meeting of a certain radio club in a large city in the east, there was a discussion on the relative merits of the superheterodyne as compared with straight regenerative radio-frequency. It started off all right, the Big Boy of the club talking in flowery language about "superimposed" and things of that sort. Suddenly a small voice spoke up and said, "Say, you can talk all right, but I noticed that when I was up to your house, that you couldn't get that bunch of junk of yours to even work. Suppose you talk from experience, don't you?"

The B. B. turned and, giving the youngster a mean look, said, "Mr. Secretary, I propose that when a speaker has the floor any member interrupting him be fined a month's dues."

When order was finally restored, the youngster had the platform. "Say, fellows, I move that hereafter, when anyone gets up here and starts talking about Mr. Armstrong's pet circuit, that he bring the results of his experiments along and demonstrate them!"

"Second the motion!" yelled a half dozen voices.

The motion was carried.

Margie—And he had radio eyes!

Sue—What do you mean—radio eyes?

Margie—Oh, just eyes with a broad cast!

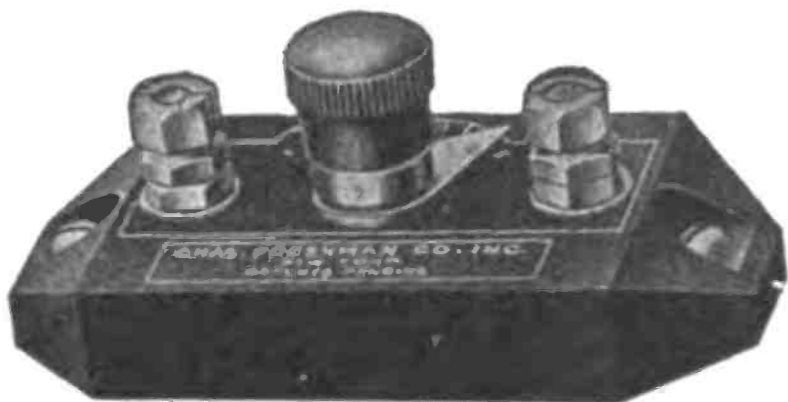
—Crosley, *Radio Weekly*.

London report says that wireless photographs have proved successful, which is more than can be said of many of them you

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Unbroken range—zero to 5 Megohms; all intermediate points. Fixed capacity, .00025 M. F.

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132.50 Westinghouse R. C.....	90.00	36.90 De Forest Detector Set.....	21.00
112.00 De Forest M. R. 6.....	84.00	35.00 De Forest 2-Stage Amplifier.....	21.00
25.00 Federal J. Set, complete with phones	12.50	125.00 General Electric 2-Stage Amplifier.....	99.00

TUBES

Tubes—U. V. 200.....	\$4.00	Navy V. T. 2.....	\$7.50
U. V. 201.....	5.00	W. D. 11.....	5.50
Navy V. T. 1.....	5.50	U. V. 202.....	7.00

PHONES

Baldwin Type C.....	\$10.00
Baldwin, single.....	5.00
Helzer, Cabinet.....	5.50
Murdock 3000 ohm.....	4.50
Braden.....	6.00
Federal 2200 ohm.....	5.50
Federal 3000 ohm.....	7.50
Western Electric.....	7.50
French Brunett, 4000 ohm.....	7.75

VARIABLE CONDENSERS

.0015 Balanced DeForest.....	\$5.00
.0005 Balanced DeForest.....	4.50
.001 Balanced DeForest.....	4.75
23 Plate Moulded Ends.....	1.25
23 Plate Plain.....	1.00

VARIOCOUPERS

Baldwin.....	\$4.50
All Wave, 150 to 3000 Meters.....	7.50
Atwater-Kent.....	6.00
Emco.....	4.75
Tucka.....	5.50

BATTERY CHARGERS

Westinghouse 2 Amp.....	\$15.00
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Radio Corp.....	2.40
Romler.....	.75
Star.....	.90
Curtler Hammer.....	.80
Murdock.....	.75
Paragon.....	1.20

POTENTIOMETERS

Radio Corp.....	\$1.50
Paragon.....	1.50
Graphite.....	1.20
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LOUD SPEAKERS

Magnavox.....	\$21.00
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Baldwin Clariphones.....	17.50

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Pathe.....	\$3.50
Emco.....	5.25
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Amco.....	3.75

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Federal.....	5.25
Paragon.....	4.00
Meyers Cell.....	3.00
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Radio Service.....	4.75
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Amco.....	4.00

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4-in. Pathe.....	.75
3-in. Radion.....	.50
3-in. Pathe.....	.50

SOCKETS

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Turkey.....	.30
DeForest.....	.60
Triple.....	1.50
W. D. 11.....	.60

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Federal.....	\$0.75
Sun Grip.....	.00
Firth, single.....	.35
Firth, double.....	.50

Space will not permit us to list all our special values, therefore we will gladly quote special prices on any Radio parts or sets you may want.

Reliable merchandise first, then price. We will refund, at any time, for Radio material purchased from us which is not up to standard and as represented.

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RADIO WORLD, 1401 Broadway, New York City

With the DX Nite Owls

(Continued from page 19)

Honolulu; KDYR, Pasadena; WHAS, Louisville; WLAP, Louisville; WDAK, Frankfort; WEAN, Providence; WGY, Schenectady; WSB, Atlanta; WBAP, Fort Worth; PWX, Havana; WOC, Davenport; KSD, St. Louis; KFBV, Colorado Springs; WCAC, Phoenix; CFCA, KDYQ, and others too numerous to mention. I use one step of radio-frequency and detector only.

* * *

Set Cost Just \$101

From George Franz, 288 South Clarkson St., Denver, Colorado.

I HAVE written you before about my set, but recently I added two steps of radio-frequency. I am sending you the stations which I have received, most of them with my old set; but they now come in much stronger and more clearly. I still have no connections soldered; I did not have in my other set. My set, complete with storage battery, B batteries, phones, and the five tubes, cost me \$101. This, I think, is very reasonable considering what the sets sell for at a retail store. I am using Radiotron Tubes.

Following is a list of the stations I have received with this set, everyone coming in very loud and clear: WOC, WBAP, WHB, KZN, KWH, WBL, KHJ, KFI, KFBB, KFAA, WOI, WDAF, CFAC, CJSC, CJCG, CJCD, 6XB, CSCN, KSD, KDKA.

Testing out the set the other evening, I found that I could unhook the aerial and ground and still hear local stations very clearly. Testing it out further, I disconnected the tuner from the rest and using no ground or aerial I still heard local stations. Attaching the aerial to the input on the radio-frequency and using no tuner, I heard the local stations very loud and clear.

* * *

A Vario-Coupler Record

From Lambert Jones, P. O. Box 164, Benton, Ill.

I AM sending my receiving record of the last two months. My receiver is a vario-coupler with detector only. The aerial is 30 feet high and 200 feet long. I haven't as yet seen any vario-coupler records. The following stations come in very clear and strong: KHJ, Los Angeles; PWX, Havana; CJCG, Winnipeg, Canada; 5-ZA, Roswell, New Mexico; WMAS, Southampton, Massachusetts; WBZ, Springfield, Massachusetts; DN4, KLZ and KFAF, Denver; WFAA, Dallas; WPA, Fort Worth; WOAI, San Antonio; WEAY, Houston; WHAM, Rochester; WEAJ, New York City; WGR, Buffalo; WGY, Schenectady; WAAC, New Orleans; KSDS, 75 miles from Denver. WHB, Kansas City, Missouri, comes in so loud that often music may be heard all over the room.

* * *

Can Eliminate Static

From C. G. Frank, Oriental Hotel, Galveston, Texas.

I READ RADIO WORLD as fast as you get it down here. My set is a single-tube hook-up that will bring in WWJ, KSD, WOC, WSB, WGM, WBAP, and all the central-time stations. I am no radio engineer, just a radio bug. There are ten sets like mine in Galveston, all getting the best of results, and sometimes when the weather is cold. I can get WEAY over fifty miles away without any aerial or ground. I get the Sweeney School (Kansas City, Missouri) on a loop. When static is bad, I change and put the ground wire on the antenna side of the set and the antenna on the ground side. This is not a joke, as I believe that is the best way to get rid of static.



The Supreme Set Uses Radio Stores Variable Condenser

also acknowledged supreme in its class,

DeForest, after competitive tests, chose the Radio Stores Variable condenser, in accordance with their policy to use nothing but the very best.

- It has the following features:
- Concealed Counterweight Under Dial.
- Brass Studs Through Aluminum Plates, and Die Cast.
- Shaft Held in True Center Through Brass Bushings.
- No Insulating Material Tapped—Metal Inserts Throughout.
- Precision Workmanship—Best Engineering Design.

LIST

- 23 Plate .0005 mfd., Capacity Ratio \$4.25
- 28 to 1
- 43 Plate .001 mfd., Capacity Ratio \$4.75
- 46 to 1

Complete with Knob, Dial and Counterweight. Packed in Individual Carton.

The Radio Stores Torpedo Plug, \$1.25

is a truly worthy companion to the Dictograph and DeForest products. It makes a perfect connection with both jack and cord tips. It is unbreakable and is especially desirable for the following reasons:

- All Conductive Parts of Heavy Machined Brass. Insulated Throughout. Screw Binding Post Terminals. Separate Anchor for Tail of Cord. Designed to insure Rigidity, Durability, Strength and Lightness. Packed in Individual Carton.

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The Set Without An Equal

RADIO STORES CORP.



The DeForest Reflex

Generally acknowledged the supreme achievement in radio receiving sets. It combines three steps of radio and two of audio on only three tubes, and can be used either with inside loop aerial or outside antenna; has single knob control; is super-sensitive, with unusual range. Operating in New York it has received Louisville, Chicago, Atlanta, Pittsburgh, Boston, Detroit and Havana.

The set is only 10x10x8 inches. Complete with loop "A" Battery (Eveready 90 Amp. Hr. storage), 2 "B" Batteries (Eveready 90 volts), Dictograph Headset, Loud Speaker, 2 Radio Stores Torpedo Plugs.

All Complete \$175.00

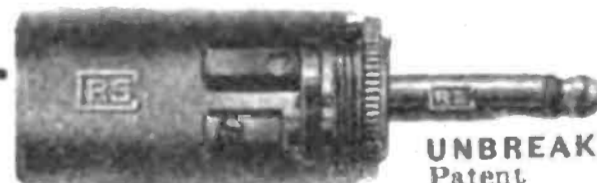
Dictograph Loud Speaker



The Dictograph Loud Speaker combined with the DeForest Reflex provides the utmost in Radio reception.

The Dictograph Products Company has been known for many years as one of the world's foremost designers and constructors of Acoustic appliances. Thus the Dictograph Loud Speaker, the newest addition to their famous line, is the product of their many years of experience.

Dull gold horn
Black Japanned stand and 5 foot silk cord..... \$20
Loud and clear in tone—No distortion or howling.



UNBREAKABLE! Patent Pending

Message to Dealers—

Just drop us a card to get your name on our mailing list, to receive advance information on money-making opportunities and new inventions. We are manufacturers and also distributors for DeForest and Dictograph products. Large stocks for immediate deliveries.

amplification on this set as it kills the signals.

I can produce witnesses as to how this set works. My distance record is 2,000 miles air-line, but there is one State I cannot get—California. I am just three squares from the Gulf of Mexico, and have a one-wire aerial 100 feet long with a ground for a water pipe.

The apparatus I use is one 23-plate condenser, one 3-plate vernier, one vario-coupler, G.-E. detector No. 200, pencil-mark grid leak, Fixed Phone condenser and a Ford battery for my A battery.

* * *

Good One-Tube Record

From Melbourne Renken, Box 113, Cole Camp, Missouri

I HAVE seen letters in RADIO WORLD from

tube and a home-made regenerative set and have received over a hundred stations. I have received as high as thirty in one night.

Some of my "distance" is PWX, Havana; KWH and KHJ, Los Angeles; CRCR, Regina, Canada; CFCD, Toronto, Canada; CJCG, Winnipeg, Canada. MJZ, WGY, WOR, WFFD, KDKA, WGR, eastern stations; WWJ, WWI, WSB, WDAJ, Atlanta; WAAC, New Orleans; KZN, Salt Lake City; WFAA and WDAO, Dallas; WCM, Austin; WBAP and WPA, Fort Worth; WLG, KFAF, KDZO, Denver; WDAP, WGAL, WMAQ, KYN, Chicago; WOC, WRL, WJAP, WLAG and WLAJ.

I think that this is pretty good on one tube—don't you?

When the girls get to sending their kisses

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First one to sell
on ten day trial
Money back
Guarantee

Retail Price
\$21.00

Includes
Loud Speaker

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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Radio Slang Worries Professor

PAGE the orthodox grammarian! There is danger that even the modern slang of conversation will be revolutionized and given added stimulus toward lower depths of abbreviated phraseology, says "The Globe," New York, if radio messages become common means of communication, according to students and professors of Ohio State University. Professor Charles A. Wright, of the department of electrical engineering at the university, raises the question, if amateur radio operators increase in numbers, will their abbreviations slip into common usage and thus become a part of the American vocabulary?

As an example of what might be thrown at a person during informal conversation with one of these fellows cards received at Robinson Laboratory broadcasting station on the campus are submitted as evidence. One from San Juan, Porto Rico, reads: "U wr wkg 2 EL. Am I rite? Would like to hr fm u. Congratulations OM." By way of interpretation the following may be noted: OM means "old man"; wkg, "working"; wr, "were"; U, "you"; hr, "hear"; rite, "right."

Another card from an operator in Fort Worth, Texas, says: "Ur C. W. steady. Called u but N. D. Hv u ever hrd me?"

QSA is the international abbreviation for "loud." ND means "nothing doing." Otherwise the message is very convincing to the average reader, is it not?

A Radio Serenade

SWEETHEART, alas, I cannot sing.
My voice to song is not adjusted.
I sound—comparison to bring—
Like buzz-saw biting nail that's rusted,
If 'tis like anything.

But thanks be to the radio
(To Friday's program I refer you).
A proxy serenade I'll throw
Upon the evening air to stir you,
While I with passion glow.

Hook up your wave-lengths, pet, to hear
From KPX at eight precisely.
The barytone who'll thrill your ear
Will summarize my feelings nicely.
The Bedouin Love Song, dear.

And then, you'll note, I give a choice
(Beneath your ledge in spirit straying),
There's GKV with Heart, Rejoice,
Or APJ with Let's Be Maying.
My views, if not my voice.

One word of caution let me say.
Do not, I pray thee, feel offended
If Weather Forecast for Today
Should interrupt my song extended;
It sometimes works that way.

And there's another thing, my dear;
It can't be helped, and more's the pity—
The static in the atmosphere
With shrieks may mar the sweetest ditty.
Believe not all you hear.

Drink to Me Only with Thine Eyes
(Quartet; YZ) will end my rapture;
Four proxy swains as one will rise
And sing for me, thy love to capture.
Sweetheart, some enterprise!

—ARTHUR H. FOLWELL,
in *The Ladies' Home Journal*.

His Definition of Radio

AN engineer gives as a definition of radio "a system of communication whereby intelligence is transmitted with the speed of light in all directions, for any desired distance, without the aid of any artificial medium, by the propagation and detection of electrical disturbances in

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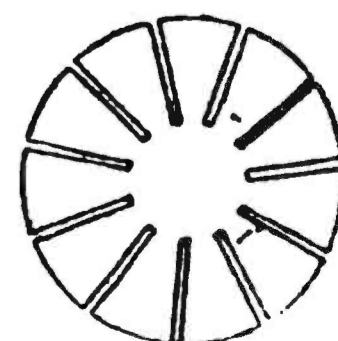
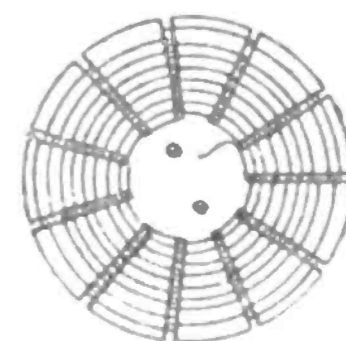
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BROADCASTING MAP

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

BACK NO. RADIO WORLD WANTED—The publisher wants copies of Radio World of April 22. Mail us copies and current issues will be sent you in return. RADIO WORLD, 1493 Broadway, New York City.

Broadcast Bill's Radiolays

By William E. Douglass

HEZEKIAH SINGLETREE'S a "Wireless Bug" fer fair; he sez that he kin pick up stuff frum almost everywhere. No matter where I meet him, he will hand me out a line about how good his set is—sez it's just as good as mine. Now he made his with balin' wire an' cans frum "Father's Oats"; of course they ain't no more alike than pigs an' billy goats. But that don't stop him

them stations in, no matter, far er near. So puttin' on the earmuffs I tried hard to tune 'em in, an' once I heard a feller playin' on the violin. I told Hez what I'd heard but he sed, "That's my daughter Claire a practicin' her lesson, that ain't music frum the air." I tried again but all I got wuz squeals an' that there static; I sez, "If this here set wuz mine, I'd store it in the attic." When I took off the headset I could see that Hez wuz sore or sorter puzzled like at least, I couldn't see what for, 'cause I wuz only kiddin' him, but I found out today, when I wuz down to get the mail, why he had looked that way. Now folks I'll bet you couldn't guess what it wuz all about, but Hez an' me are friends again, we've straightened it all out. It seems that it wuz this way, while I set there by the set with rubber earmuffs clamped on tight a tryin' to get some far off distant station, north er south er on the coast, most any place so Hez could say that he'd made good his boast, he'd asked me if I'd like to have some of the "cup that cheers," "some real old stuff" aged in the wood, that he had kept fer years. With earmuffs on I didn't hear a single word he'd said an' fer some unknown reason I must of shook my head. But it's like Doctor Coué sez (correct right to the letter)

"For day by day in every way its getting better and better."

Copyright, 1922, Westinghouse Electric & Manufacturing Company.

Crystal Detector Not Recent Invention

MANY authorities now state that old patents, magazines, and other scientific literature show that the crystal devices claimed to have been "patented" were described in these magazines and patents many years before the present holders' "patents" were applied for. There is a great volume of this literature, it is said, in French, German and Dutch languages, as well as in English, clearly explaining the crystal detector, no one ever having bothered to file patent applications on them until comparatively recent times.

No Free List

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.



"Now, Folks, I'll Bet You Couldn't Guess What It Wuz All About."

talkin' cause he'll argue all day long, beginnin' after breakfast 'long 'bout noon he's goin' strong. To please him I went over to his house the other night (I'd rather stayed at home where I could hear the concert right). But nothin' else would do because he wanted me to hear how he could bring

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.

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Radio-Frequency Amplification and Regeneration, by Frank Armstrong.
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New Frequency Amplifier Brings Faintest Waves in Strong, by G. W. May.

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The Principles of Radiotelegraphy, by Walter J. Howell.
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Making Signals Louder with Two-Stage Amplifier, by George W. May.

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The Cost of a Single-Circuit Receiver, by Howell W. Miller.
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New V T Hook-up Worth Testing Out, by P. F. Metzler.
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The Radio Primer, by Edward Linwood.
Complete Method for Building an Electron-Tube Detector Unit, by Experts of the United States Bureau of Standards.

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Big Impression Gained at the American Radio Exposition

AN observer at the recent American Radio Exposition, the first of any national importance, must have been greatly impressed by the absence of great changes in radio receiving sets. As has been predicted by leaders in the industry, the sets for 1923 will be only slightly changed from those of the past year. Refinements rather than startling innovations will be the order of the day.

If there is any one item that shows the advance of radio it is the increasing use of radio-frequency units. This is but a natural outcome of the desire on the part of owners for sets that will cover distance.

Of freak sets but few were to be seen. One exhibitor showed a complete set in the pedestal and globe of a floor lamp, but otherwise than this the manufacturers have settled down to the more commonplace outfits.

Few crystal sets were observed. Those that were comprised permanent detectors which do not depend on the fussy manipulation of a hairlike wire.

Loud-speakers have been improved, but no radical changes in design could be observed. Rumors are circulated of laboratory tests on remarkable speakers, but evidently the developmental work had not progressed to a point where the mechanism could be exhibited.

To Rebroadcast American Radio in Canada

AN experiment which may change the broadcasting plans of the country will soon be tried in the station of a large Montreal daily. To technical men, the new plan is known as retransmission, and although it has been tried many times in an experimental way, this will be the first time that it has been given a practical test in rendering public service.

The radio broadcasting station of a Montreal daily paper will be used to rebroadcast entertainment of the New York stations. The New York programmes will be picked up in Montreal with a sensitive receiver and highly amplified. The output of the receiver will then be fed into the broadcasting equipment and the very entertainment that is being sent forth from the New York stations will be enjoyed by the "listeners-in" in Montreal at practically the same instant.

High hopes are held out for the success of the experiment since it will mean a great deal to broadcasting if practical. Working on this principle it will be possible to operate two or three big central broadcasting stations with the smaller stations in the outlying districts used only for retransmission. In this way, two or three stations could blanket the entire United States and the money that is now being spent on the entertainment for several hundred broadcasting stations could be concentrated on a few.

Attention, Newsdealers

You should keep a good supply of back numbers of RADIO WORLD on hand all the time. It has been the experience of many dealers that a purchaser of RADIO WORLD for the first time will almost immediately want the back numbers, some of which are already out of print and some of which are difficult to get. THE PUBLISHER WILL FURNISH BACK NUMBERS TO DEALERS DIRECT OR THROUGH THE AMERICAN NEWS CO. AND ITS BRANCHES. Dealers should hold their unsold copies for a reasonable length of time. RADIO WORLD of October 28 contained a full page of contents of back numbers to that date. 15 cents per copy; any seven numbers for \$1.00. RADIO WORLD, 1493 Broadway, New York.

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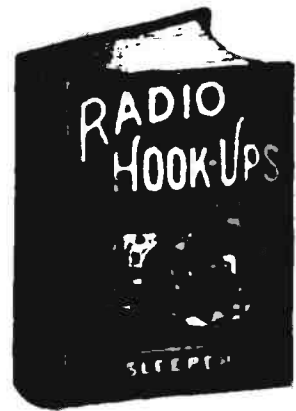
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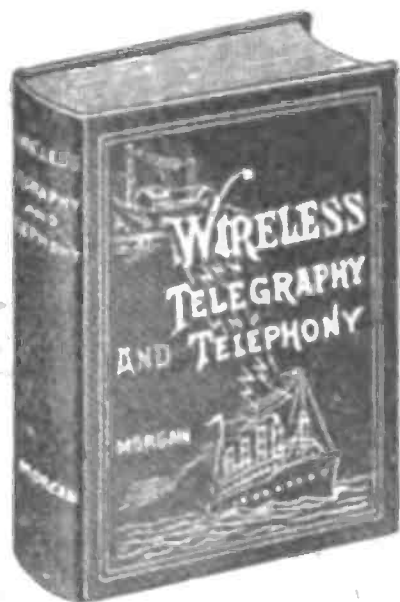
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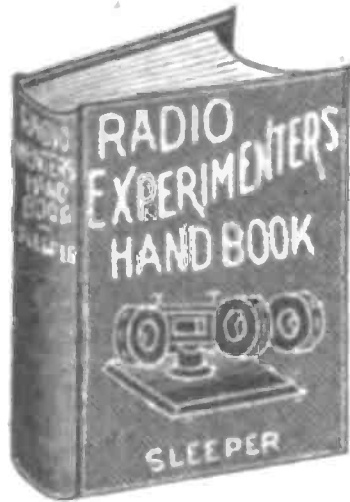
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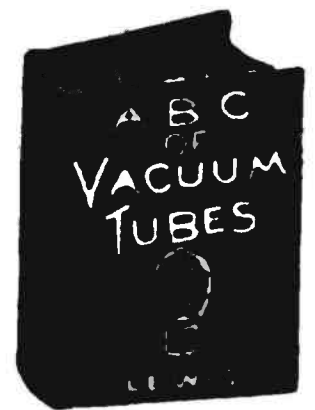
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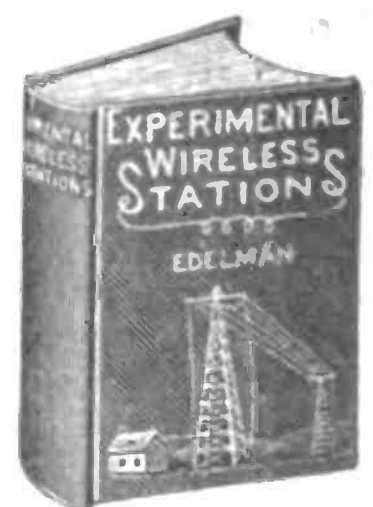
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