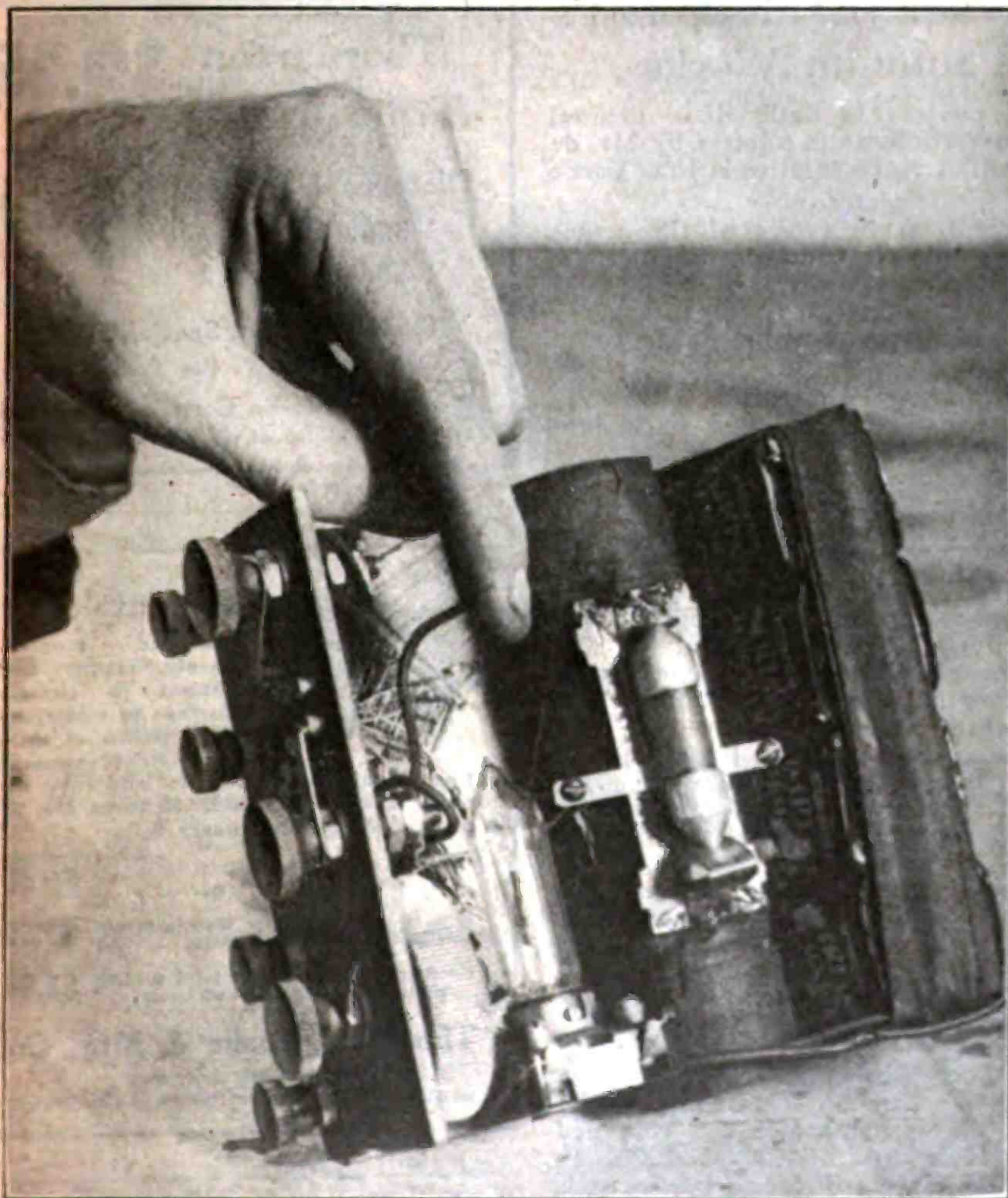


RADIO WORLD

(Trade Mark)

ILLUSTRATED. WEEKLY

Miniature Radio Transmitter Fits Kodak Case



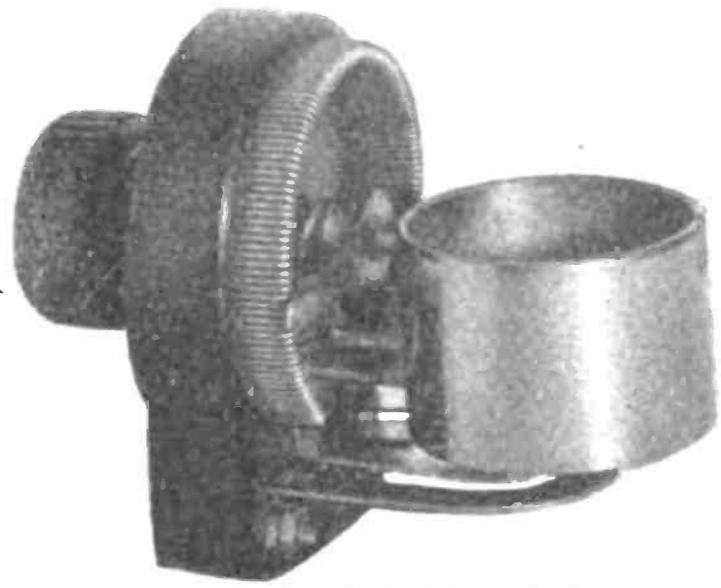
AN unusually interesting miniature transmitter is shown in the accompanying photograph. It was built and designed by Sterling G. Sears, and will give satisfactory service to the novice who is satisfied with comparatively short range. The set shown has a transmitting range of about three-quarters of a mile and a receiving range of about seventy-five miles. The apparatus is mounted so that it fits into the interior of a kodak-camera case. Note the neat appearance and arrangement of the coils, batteries, and the miniature vacuum-tube. For B batteries, in this particular case, flashlight batteries are used exclusively. The reason for this is that they take up little space and afford the necessary plate voltages for the vacuum tube. The filament may be lit by the ordinary battery. As a means of inductance a spider-web coil is used as a means of controlling the wave length. The taps are shown on the front of the panel. The rheostat, with the miniature vacuum tube, is also shown. At the rear of this is the spider-web inductance coil with its taps, while the grid leak and condenser are mounted on the center coil. The batteries are at the extreme back of panel. The wiring is extremely simple. With a limited knowledge of radio, the operator should find this set efficient. It is a practical transmitter and may also be used as a receiver.

(C. Kadel & Herbert)

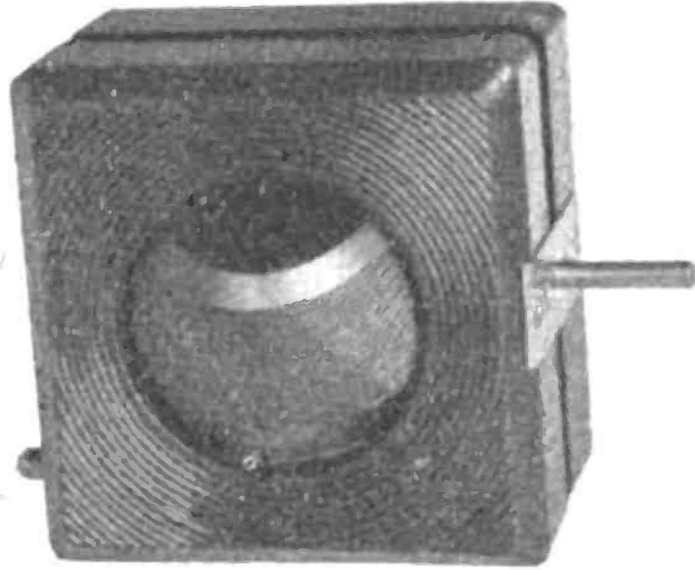
More Records by the DX Night Owls! Send Yours In!
CHRISTMAS NUMBER OUT NEXT WEEK!

Pruden Reliable Radio Specialties

For Good Results!



Ajax Socket Rheostat
A device for which amateurs and professionals have long been waiting. Eliminates wiring between socket and rheostat. List..... **\$2.00**



Keystone Moulded Variometer
Made of a special composition—extremely light in weight and durable. Wave length ranges from 150 to 580 Meters. Terminals conveniently arranged to afford easy connections and avoid crossing terminal wires. Rotor and Stator windings guaranteed not to loosen. Brush type contacts. List each. **\$5.00**

THE name "Pruden" back of standard Radio Equipment is a guarantee of mechanical excellence, perfection of workmanship and scientific correctness of design.

Now, more than ever, when the market is flooded with inferior goods, it pays to buy standard trade marked products.

You can pin your faith to "Pruden." Money-back unconditionally if you do not get complete satisfaction.

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

Dealers write today for our interesting proposition.

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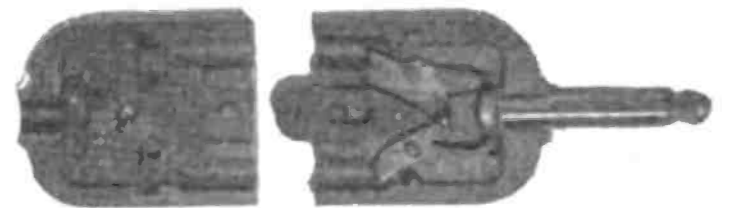
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Phono-Phane Permanent Radio Detector

The only fixed radio detector requiring no adjustment. Used in place of crystal or vacuum tube detector. Gives excellent quality of sound without distortion, battery or tube noises. Detects telegraph signals at several thousand miles. Detects broadcast music more clearly than vacuum tube detector, and requires no amplification where the incoming signal has sufficient strength to actuate the sensitive phones.

Ideal for use in regenerative circuits. Handsome, substantial, suitable for assembly in the finest radio equipment. Guaranteed against imperfection or faulty operation. List each.. **\$3.50**



Saturn Automatic Plug

The only perfect automatic plug, no need to take apart to make connections. First insert the terminals into the "Saturn" and a perfect connection is made. So constructed that pulling of the cords makes the connection more positive. List each..... **\$1.50**

The best SOCKET for the DRY CELL TUBE

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LINCOLN RADIO CORPORATION,
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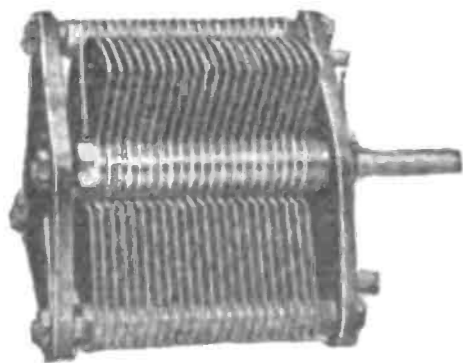
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Take the middleman's profit and selling costs for yourself. We sell you direct. These extremely accurate instruments made by experienced condenser people are minus the decorative frills that add to cost. Price reduced to rock bottom without sacrificing quality in the least. Satisfaction or your money back. Write today for very interesting circular.



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No checks or money orders needed. Pay postman. Send the order TODAY, enclosing 5 two-cent stamps to cover mailing cost and receive your condenser in a day or two.

MANUFACTURERS' RADIO ASSOCIATION

90 East Kinney St. Newark, N. J.

How Dr. Lee de Forest's Photofilm Works

THE process is outlined in general terms as follows in a letter by Mr. de Forest to his representative in New York:

"Taking the picture:

"1. Sound waves (voice of the actor) translated into electrical waves.

"2. Electrical waves translated into light waves.

"3. Light waves recorded on the edge of the film.

"Reproducing the picture:

"1. Light waves translated back into electrical waves.

"2. Electrical waves translated back into sound waves.

"3. Sound waves amplified with loudspeakers placed near the screen for the audience."

The stumbling block which has impeded other efforts to perfect the talking film has been the difficulty in exactly synchronizing the voice and the picture. This is important, since sound travels at 1,090 feet a second and light at 186,000 miles a second. Unless the word and action correspond exactly in time, as rendered by the talking-picture machine, the effect is spoiled. With the picture and the sound-wave on the same film, the time unity is preserved to the thousandth part of a second.

Canadian Radio Directory

CANADA published its first issue of the "Official List of Radio Stations in Canada." This list, which was compiled through the efforts of Commander C. P. Edwards, director of the radiotelegraph service under the Department of Marine and Fisheries, contains a complete roll of every amateur, commercial, military, and broadcasting station in the Dominion, and is corrected to August 1, 1922.

Thordarson Transformers \$3.25

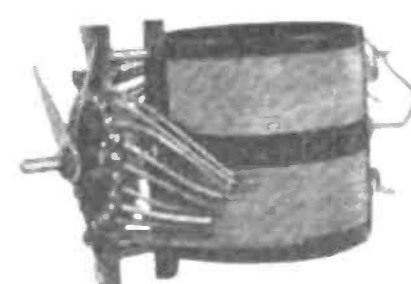
Dictograph Phones, \$6.50

3000 Ohms, \$8.00 Value

Special \$30.00 Tube Set, Special, \$15.00

Amateurs:—We Pay Postage.

Perfection Radio Corp. of America
140 West 23d Street New York City



A Completely

connected coupler. Simply mount and connect in circuit. No taps to solder, no extra switch at side, no electrical connection to any shaft. Compact and rotor always in center of field. 90 turns No. 22 green silk wire on primary.

Complete with indicator arm..... **\$6.50**

Same coupler with rotor toward one end without special connections..... **\$3.50**

Kneekdown coupler with printed winding directions, complete, less wire..... **\$1.50**

The W. J. Radio & Mfg. Co.

3020 Fourth Ave., So.
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GREAT ADVERTISING MEDIUM
RADIO WORLD's special issue, "Holiday Radio Gifts Number," issued on December 9. Copy received up to November 29. RADIO WORLD, 1493 Broadway, New York.

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

VOLUME TWO OF RADIO WORLD

[Entered as second-class matter, March 28, 1922, at the Post Office at New York, N. Y., under the act of March 3, 1879.]

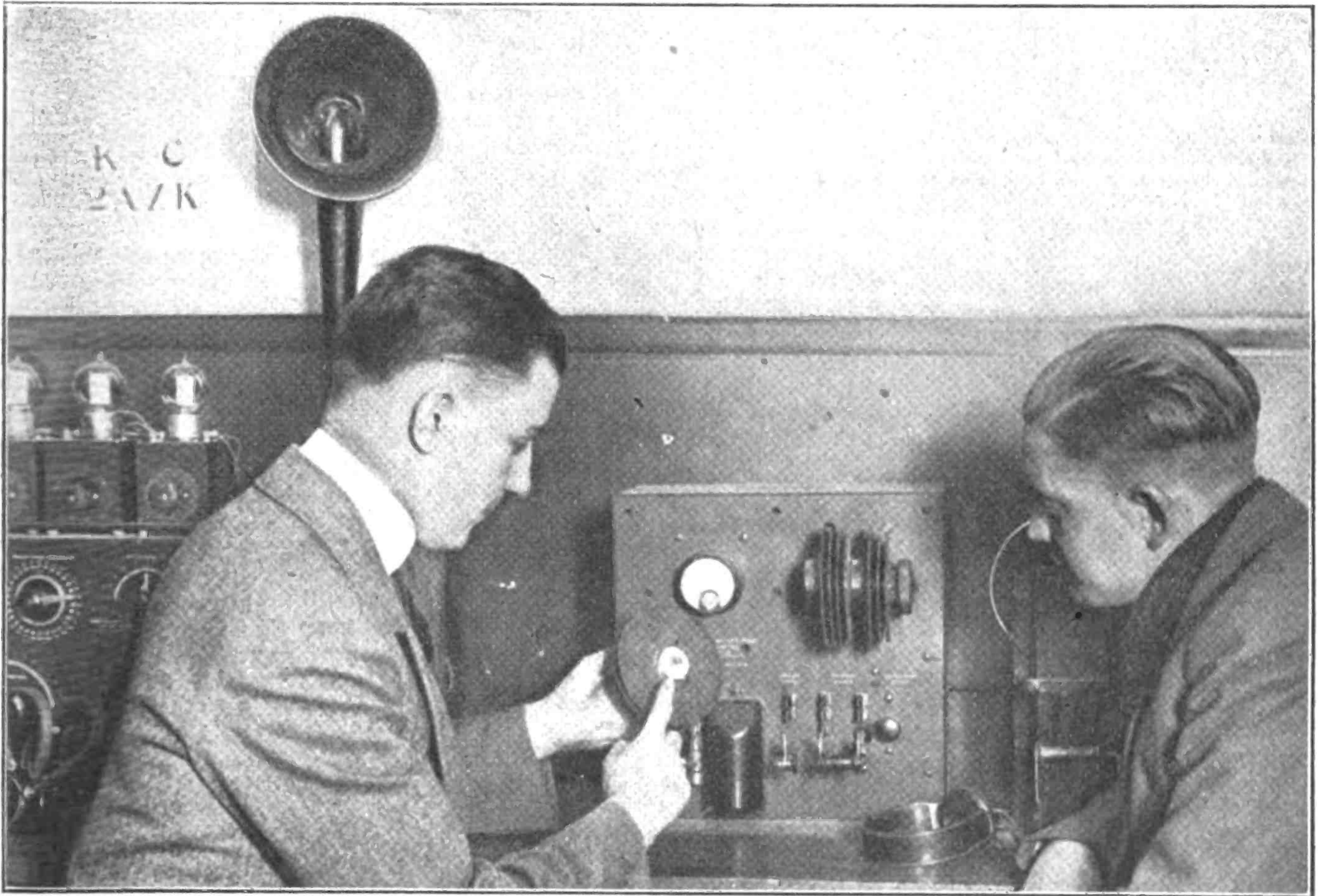
A Weekly Journal, Published Every Wednesday and Dated Saturday, by Hennessy Radio Publications Corporation from Publication Office, 1493 Broadway, New York, N. Y. Telephone: Bryant 4796.

Vol. II, No. 10. Whole No. 36

December 2, 1922

15c. per copy, \$6.00 a year

K. of C. Leads in Radio Instruction for Veterans of World War



(Both photos C. Kadel & Herbert)

Instructing a World War veteran in one of the radio schools of the K. of C., station ZAZK.

THE Knights of Columbus are conducting radio schools for the purpose of instructing veterans of the World War. Already nearly 20,000 veterans are receiving instruction in these schools. The large photograph on this page shows Instructor Thomas A. Berinati, at the left. He is instructing Ernest Vehstedt, a hero of the Argonne, in the workings of a half-kilowatt spark-gap transmitter. The spark-gap is the heart of the transmitter, and in this case, this particular gap makes it possible to secure what is termed a "pure, sharp wave." It is of the utmost importance that the student be familiar with the "how and why" of this gap as it is vital



for a governmental radio license.

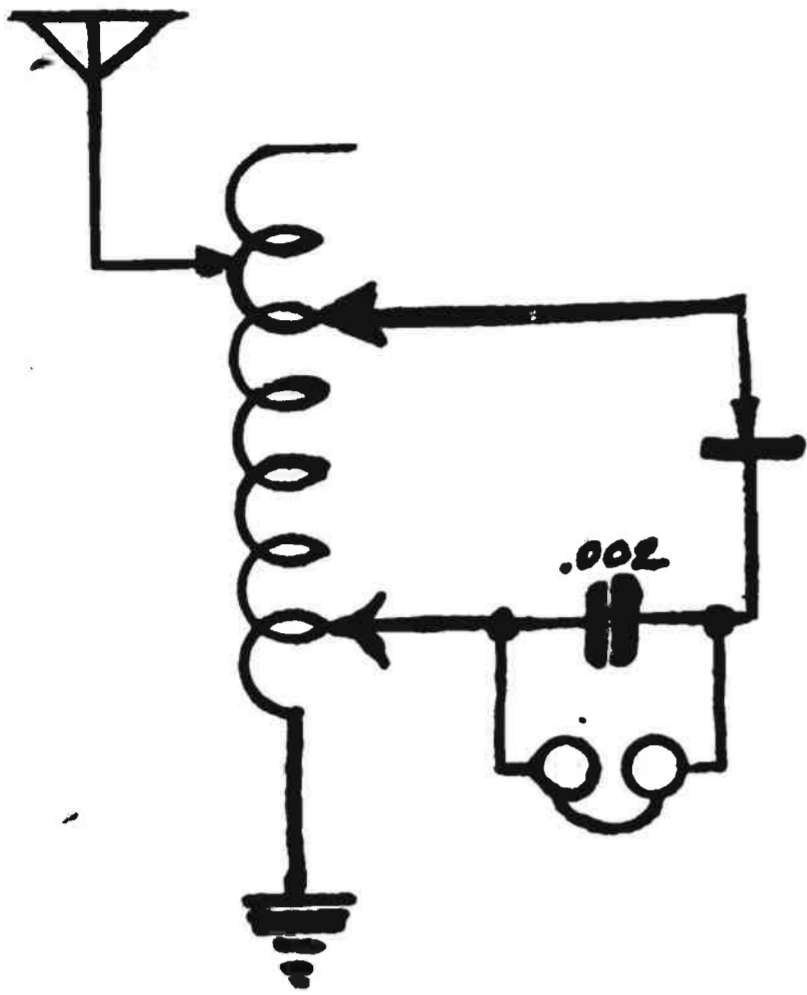
To the left of Mr. Berinati is the receiving instrument with its necessary array of vacuum tubes for high amplification. All of these instruments are of vital importance to the student who expects to be an expert operator.

The small photograph shows the rear of a receiver of the Marconi 106-B type of tuner. This tuner has for its inductance and coupling the loose coupler as shown in the picture. A wire is being soldered by Mr. Berinati.

Once the student receives a license, he has an opportunity to travel, and, if he is alert and makes the most of his eyes, camera, and notebook, he can

Getting Results Out of Your Receiver

By Charles H. Plath



Schematic diagram of a slide tuning coil. By sliding the two sliders on the coil inductance the wave-length is changed. Drawn by Charles H. Plath.

WHY is it necessary to have an outdoor aerial in order that a radiophone concert may be received? This is a question that is being asked frequently, particularly in view of the development of Armstrong superregeneration, radio-frequency amplification and other systems, which will function provided the loop aerial is applied to them. This loop aerial does away with the outdoor aerial and makes it possible for most anyone to hear the broadcast.

The answer to the question is important, because the success of the receiver absolutely depends on the aerial.

In order to illustrate the operation of an aerial, it is, perhaps, best to take the hydraulic analogy that has been developed by radio engineers as a means of describing an aerial. In reality, it must be understood that the ground and aerial act as a condenser—the aerial being one plate, the other being the ground. The tuner which, after all, is a variable inductance, is merely an arrangement that will permit one to increase the length of the aerial itself.

If one looks upon the aerial circuit as a large trough of water he will understand its functioning a little more clearly. Only recently articles have appeared regarding the aerial problem; but I am assured that there are still many who would like a simple picture of just how it takes its action.

If we picture a water trough and place a paddle wheel in it, we can then see the action or wave motion.

If we commence a steady disturbance in this trough by aid of the water-wheel, the water will be set into wave motion and will oscillate between the two ends of the trough according to the length of the trough; in other words, the natural frequency of the trough.

If this paddle is moved back and forth at a correct rate of speed equal to the natural period of the trough it will set up waves of maximum height which, in time, will pour over the sides of the tub. If, however, the rate of movement is too fast or too slow, the maximum wave-motion will not be attained. If we study the wave motion in the trough we will find that the maximum height of the wave is reached at either end of the trough, and that, as the water flows back and forth in an oscillatory manner, the greatest height is reached at each end of the trough.

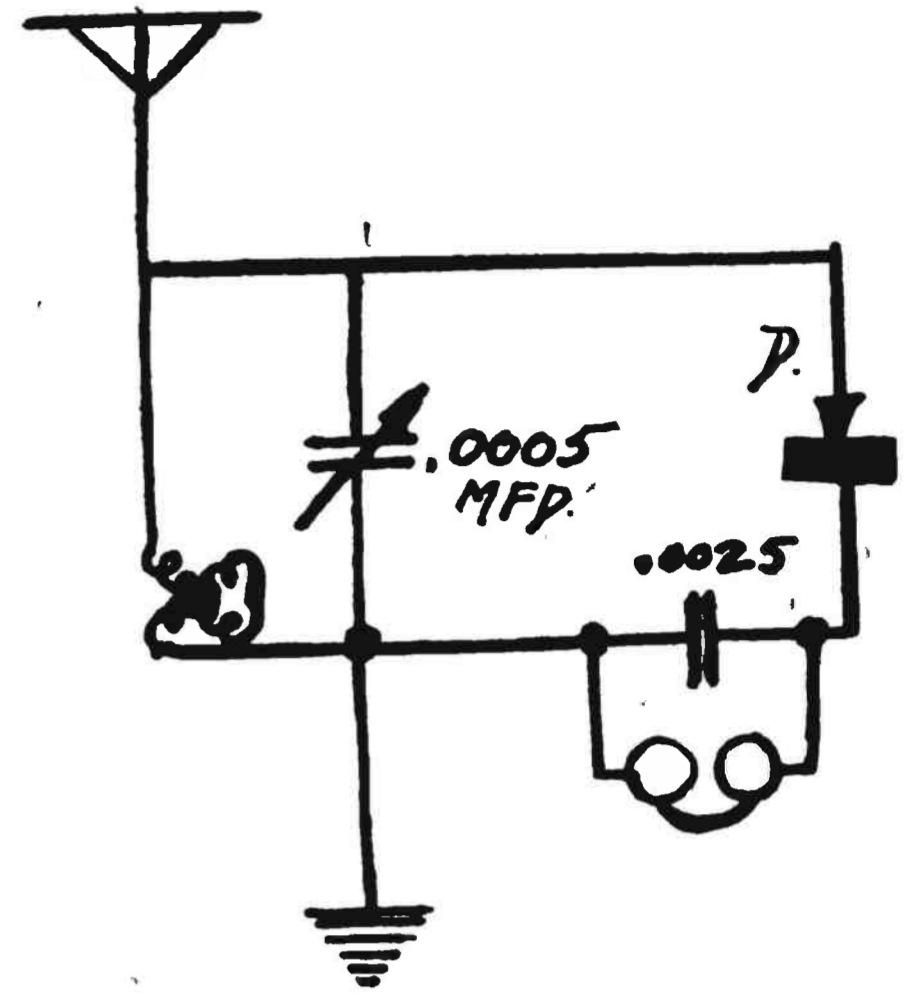
In our aerial circuit this action is reproduced when the incoming wave sets up an oscillatory current in the aerial circuit. It will be found that the highest voltage is at either end of the aerial wire, and it is necessary therefore, that these two ends be thoroughly and completely insulated in order to prevent losses.

Now, we have exactly the same condition in the aerial circuit as we have described in the trough. If the incoming wave-length is too small it will not set up an oscillatory current in the aerial circuit. If it is too large, the same results will be obtained.

With the incoming wave close to the natural frequency of the aerial, we can make up for any small difference by means of an inductance that is connected in series to it. It is for this reason, therefore, that it is necessary to have a well-constructed aerial, free and clear of all objects where the ordinary normal circuit is used in order to get best results.

Radio Crop Service

A WORLD radio-crop service has been established by the United States Department of Agriculture. The Department has representatives in many important European cities, who send reports of crop conditions to Washington. The information is then broadcast over the United States. A recent message from the Berlin representative was received in Washington and relayed throughout the country in less than five minutes from the time the news left Germany.



Schematic diagram of a variometer which gives continuous variation of inductance. The secondary variable condenser is necessary for good results. Drawn by Charles H. Plath.

The inductance in the circuit will enable the amateur to increase the range of his set so far as the wave length is concerned, which is equivalent to varying the trough in the analogy. The addition of a condenser in series with the aerial will have a tendency to reduce the wave-length range of the receiver within certain limits.

The condenser in series with the aerial can be used for more flexible tuning purposes in the aerial. There is a very important point, however, that should be taken into consideration in conjunction with a series condenser in the antenna. In the first place, it is a fundamental fact in electricity that condensers placed in series with each other reduce the total capacity of the circuit and that is exactly just what happens when you place the tuning condenser in series with the aerial, because the latter is also a condenser.

In this connection, there is a very peculiar situation; if the detector circuit is connected to the aerial circuit in such a way that this condenser is included, a great stress will be placed on the detector. Consequently the efficiency of the receiver will be materially reduced.

It is necessary to connect the detector circuit around the aerial tuning-inductance only. Whether this aerial tuning-inductance consists of a straight tuning coil, a honeycomb coil, or any other form of coil does not make any difference. The detector circuit should be connected around it in such a way that the series condenser in the aerial is not included.

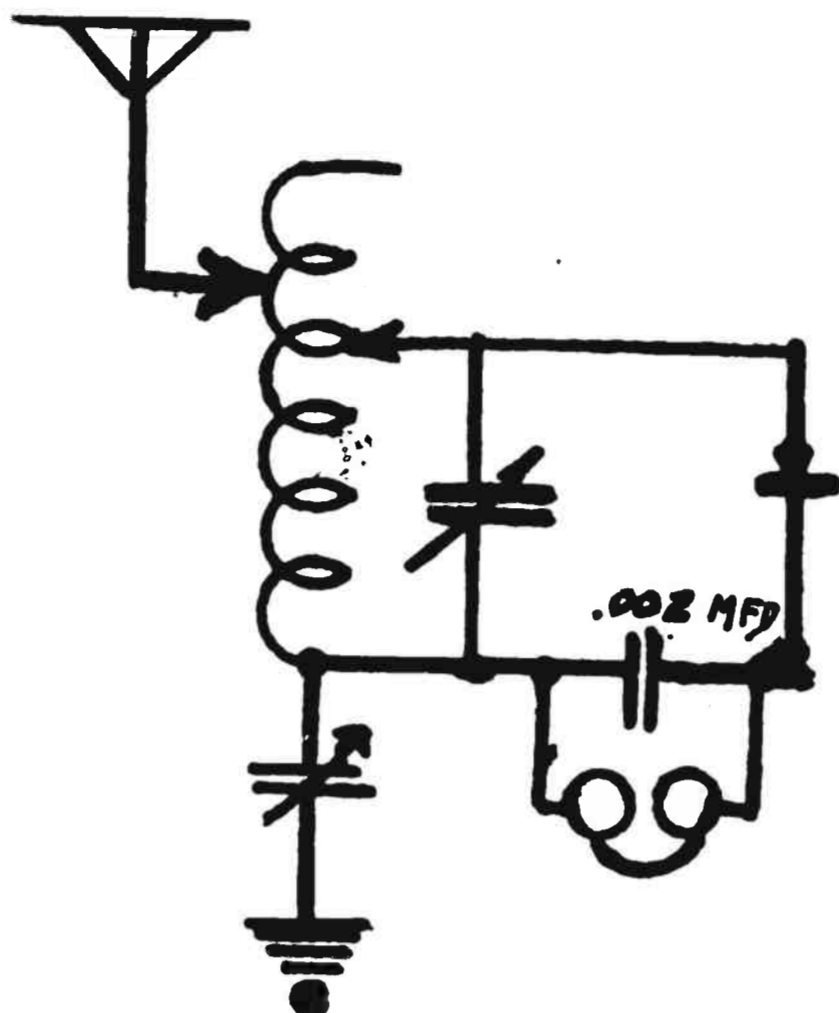
Sharp Tuning Will Help to Eliminate Interference

MANY sets made are almost impossible to tune sharply; but whatever sort of an outfit you have, an understanding of its tuning qualities will bring better results both in reduction of interference and signal strength. Interference is one of the greatest studies in the science of radio. With a crystal set using a single-slide tuner as the sole method of tuning, there is no choice in adjusting. Simply move the slider until the greatest sound is obtained. Interference from other stations may have to be tolerated. With this set, it may be impossible to prevent it due to the fact that a direct-coupler receiver is used.

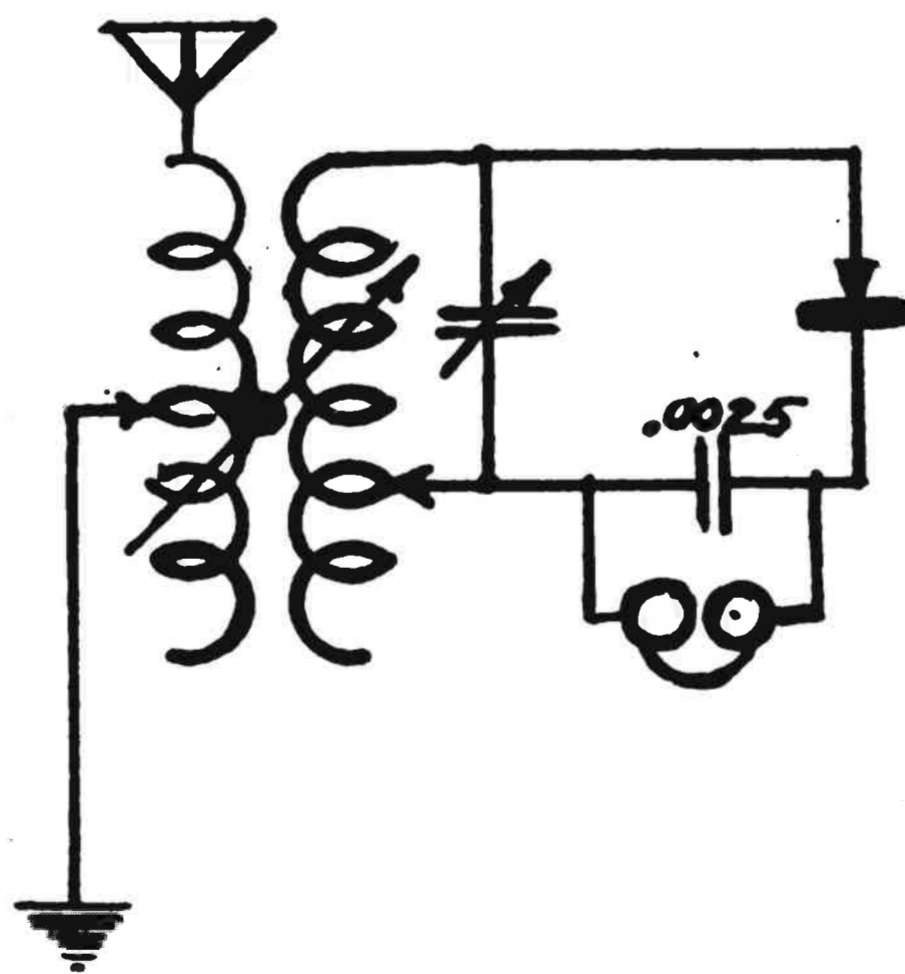
A two-slide tuning coil offers a greater latitude of adjustment and, therefore, greater selectivity. It acts somewhat in the manner of a two-circuit, or loose-coupler receiver, with close coupling. The aerial slider should first be adjusted until signals are heard. The movement should be in the activity of the active end of the coil, or the end connected to the ground. When signals are heard, move the other slider until they are brought in loudest.

The loose-coupler set, which is the inductive type receiver, is the most efficient type for use with a crystal detector. In tuning such a set use close coupling—that is, have the secondary coil inside the primary coil. Set the secondary coil at some rather low value of inductance and adjust the primary by means of slider, or switch. The circuits are brought into resonance after the signals are heard by adjusting the secondary switch. Louder signals may be obtained sometimes by readjusting the primary. Interfering signals may be reduced by lessening the degree of coupling. For short-wave sets using vacuum tubes as detec-

By Arthur O. Curtis



The schematic diagram (above) shows a tuning coil with a variable condenser across the secondary. This makes the tuning sharp and helps to keep down interference from other stations. This tuning coil is of the single-circuit type. The schematic diagram (below) shows the inductive type of coupler. It has a primary and secondary. Again the variable condenser which is of .0025 mfd. capacity, helps to eliminate interference. This is known as a vario-coupler and is far more advantageous in radio work than the tuning coil. Drawn by Arthur O. Curtis.



tors, the regenerative hook-up has proved the best. The tuning elements in such a circuit consist of a vario-coupler, a grid variometer, a plate variometer and, sometimes, a series variable-condenser in the aerial circuit.

Tight coupling should be used in this vario-coupler. Adjust the primary switch; next, rotate the knob on the grid variometer until a howl or squeal is heard. Another squeal will be heard just past this point. Between these two points will be found a point of resonance at which the incoming signals will be heard. The plate variometer should next be adjusted until signals are loudest. It will be found that coupling variation will make a slight difference in the tuning, or in the strength, of signals.

It will be seen that the loose coupler has its limitations but it is far better than the tuning coil. It is more selective. It has two coils. It is of the inductive-type receiver—that is, one may select the station he wants among others that are transmitting at the same time. It is easier to receive with a loose coupler as it acts as a filter which passes the signals that are tuned in and rejects the undesired signals. This is true to a certain point, for it is not always that a very pure wave comes from a transmitting station.

If the transmitting station is very near the receiving station, it also will be hard to tune out. Thus it will be seen that the loose coupler is much more advantageous than the tuning coil.

The loose coupler probably is the most common tuning device used with a crystal detector. The lower diagram is a simple crystal detector, utilizing a loose coupler, also a fixed condenser across the head phones.

Nine More Broadcasters

Gimbel Brothers, Philadelphia, Licensed to Carry on 400 Meters

THE following Limited Commercial or Broadcasting Stations issued by the Department of Commerce, for the week ending November 17, carry on 360 meters:

KFAV—Abbot-Kinney Co., Venice, Calif.

WPAM—Awerbach & Guettel, Topeka, Kans.

WHAL—"Capitol News," Lansing, Mich.

WLAT—Radio and Specialty Co., Burlington, Iowa.

KFFA—Dr. R. C. Shelton, San Diego, Calif.

WNAY—Shipowners Radio Service, Baltimore, Md.

WPAD—Wieboldt & Co., Chicago, Ill. Two new Limited Commercial Class-B Stations on 400 meters are:

WIP—Gimbel Brothers, Philadelphia.

KHJ—Times Mirror Co., Los Angeles.

Belgium's Rulers Become Radio Fans

THE king and queen of the Belgians have become radio fans. According to recent dispatches they listened in to a test concert of the Maline Cathedral chimes, broadcast from the tower by radio.

The suggestion of broadcasting by radio

the carillon of Maline Cathedral, the seat of His Eminence, Cardinal Mercier, resulted directly from the successful broadcasting of chime music, on April 27 last, by WGY, radio broadcasting station of the General Electric Company. On that date, the McKim Memorial bells, now in the lofty tower of Epiphany Church, Washington, D. C., were played in the Old Meneely Bell Foundry at Water-vliet, New York. The foundry was connected to the transmitting equipment, sixteen miles away, by a telephone line. Colonel William Gorham Rice, of Albany, an international authority on carillon, heard of the success of the WGY concert. Since the World War, Colonel Rice has been devoting himself to the rebuilding of war-torn Belgium.

Inventors! Here Are Some Things Sorely Needed in Radio

By C. White, Consulting Engineer

THERE are, perhaps, thousands of radio amateurs and novices with practical ideas concerning radio improvements that, probably would net them modest fortunes if they had the courage to get behind their ideas and give them the necessary scientific backing. That a man is not a technical expert in no way renders him disqualified to perfect a new radio idea; in fact, many inventions come from men who had very little technical training prior to their conception of the lucky idea. If an amateur does not possess the right amount of scientific skill to perfect an invention, he should either take steps to acquire that skill or hire someone with the skill to supply the information and help him over the rough spots. I have personally known of many practical inventions along scientific lines that have proved profitable for the men who had sufficient foresight to seek the right kind of aid.

Radio as a field for inventions is exceedingly fertile, and the wise amateur is the one who fully realizes this and carefully sets his mind to work to accomplish some greatly desired improvement. Consider the radio receiver. We know that the art of transmission is far in advance of the art of reception, mainly because we have spent more time for the development and research of more powerful methods of sending; yet the receiver has been given very little attention until recently. The fact that radio reception has long been neglected is quite obvious when one stops to consider that some deep-sea vessels are still using the old magnetic type of detector, which is much inferior to the ordinary crystal that many novices have in their small sets. Another proof that reception has been neglected is the fact the radio-frequency had to wait so long in the experimental stage before completion; and, in some respects, it is still in that stage. If we resort to the tuned plate-circuit for radio-frequency amplification the tuning of the circuit becomes too critical for an ordinary case of adjustment and manipulation, while it is next to impossible to keep tuned if more than one stage is used. Then, again, if we employ many of the transformers for radio-frequency amplification, we cover the desired increase in range, but the band of

wave-lengths amplified greatly cuts down the desired selectivity which is quite paramount for long-distance work. There is, no doubt, some compromise between the two which will give perfectly satisfactory results and still give us selective amplification; so it is up to radio fans to find that combination and have it duly developed. It can be done, and if some one will only take the time to think up a possible scheme and then try it out with the aid of some reliable manufacturer, or technician, reward for his efforts will follow.

We need better types of tuning coils—coils that are relatively free from distributed capacity and have a very low effective resistance at radio-frequencies. In a recent test of some coils used in radio work, I actually found them not only to be extremely high in resistance loss but also extremely high in effective or distributed capacity. Now, since distributed capacity is a variable with frequency, it was actually found at high frequencies that the condensive action of the coil was greater than the inductive. This meant that the coil was nothing more than a condenser from the electrical standpoint. While it is true that the spider-web, and the honeycomb types of inductance are marked developments in the right direction, I think that there remains an ample field for further progress along that line. Specially stranded wire has aided to a certain extent,

to cut down high-frequency skin-effect, but, as we all know, there is still more room for improvement. We are just beginning to realize what may be done. In fact, the foremost technicians and radio-research engineers are so swamped with prospects of development along so many lines that they are forced to set aside many promising ideas that need careful consideration.

In the field of the short-wave, Mr. Marconi has asserted that we have entirely neglected the vast possibilities to be obtained from carefully planned study along this line. It hardly seems possible that we should plug away so many years on the development of the long wave for transmission of radio signals and completely—and for no good reason—ignore the realm of the short wave. Perhaps millions of dollars have been spent in the development of high-frequency alternators and different types of Poulsen arcs for generating long-wave undamped signals; yet the development of short waves has been generally overlooked. Amateur C-W stations have proved that with relatively small amounts of power they can send signals further than some commercial stations using many times as much power. I personally know of one amateur station, situated in New England, that has been heard at rather frequent intervals in Honolulu and England. This station uses only four 50-watt tubes. The amateur transatlantic tests that are to be held this month will show us how short-wave signals will carry with a relatively small amount of power.

I have given only a few suggestions of the needs in radio, but there are many more that are just as much needed as those I have outlined. For instance, there is still wanting, a simple yet effective means of filtering out static interference. Inventions for increasing the selectivity of a receiver are favorable from the scientific point of view. Methods of obtaining distortionless detection and amplification of radiophone signals are badly needed. Thousands of design improvements in every phase of radio-apparatus construction are awaiting solution. If you have an idea don't let it go to waste simply because you have not the means available for skilful perfection and development.

The Grid Condenser and Leak

THE sensitiveness of a receiver is greatly increased by inserting a grid condenser and leak in the grid circuit in series with the grid of the tube. This usually consists of a small fixed condenser of about .00025 mfd., in shunt, or parallel, with the grid leak of about .5 megohms (500,000 ohms), though these values are not fixed value but should be adapted to the correct tube used. Simply defined, the grid leak is an instrument that will allow extremely small currents to "trickle" through. Grid leaks are generally supplied in complete units and are frequently encased in glass tubes for protection.

Radio Facts

IRON, steel, or galvanized wire is never used for aerials, because they have too low a resistance. Copper is generally used, simply because it is a better conductor of electricity than any of the other conductors mentioned.

* * *

If your ground is poor, signals from broadcasting stations cannot be expected to be heard at any great signal strength. Signals may be so weak at times that it will be impossible to hear anything at all. This is very discouraging. When making a ground connection, don't wrap the wire around the pipe or radiator.

* * *

Body or hand capacity effects may be eliminated if the back of the panel is shielded with thin copper and grounded to the ground binding-post. Copper sheeting may be placed also between the various variometers, care being taken that the sheeting does not come in contact with any of the wires. The variometers should be spaced about 4 inches apart.

* * *

Electrically, the cage antenna handles a given amount of energy with less rise in voltage than any other aerial, and, therefore, has less tendency to leak to the ground. This advantage comes especially into play when this type antenna is used for C-W work in transmission.

* * *

When high-frequency currents flow in a circuit, they travel on the surface of the conductor and are known as "skin effect." For this reason Litz wire and stranded wire are generally used in radio work where high-frequency currents are to be carried.

Cost of Installing a Set

A SIMPLE receiving-set which will copy commercial stations from a distance of 500 miles or more, is quite small. If all necessary instruments are purchased, the cost should be under \$50. When made by the experimenter himself, the cost of material is less. Experimenters who are really interested in "What it does and how it does it," find most satisfaction in mastering the details and operation of each instrument as they add to their stations. That is the way of the logical mind and, under cover of providing for real indoor sport, radio work offers to the younger minds valuable development in logical and analytical thinking—more effective than school-book methods since it is accomplished by real entertainment.

Radio-Wire Tables

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

No. 3—Double Cotton-Covered Wire

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

APPENDED is the third of a series of five tables which the radio amateur will find useful for many purposes. The succeeding tables—"Single Silk-Covered Wire" and "Double Silk-Covered Wire"—will be published in early numbers of RADIO WORLD

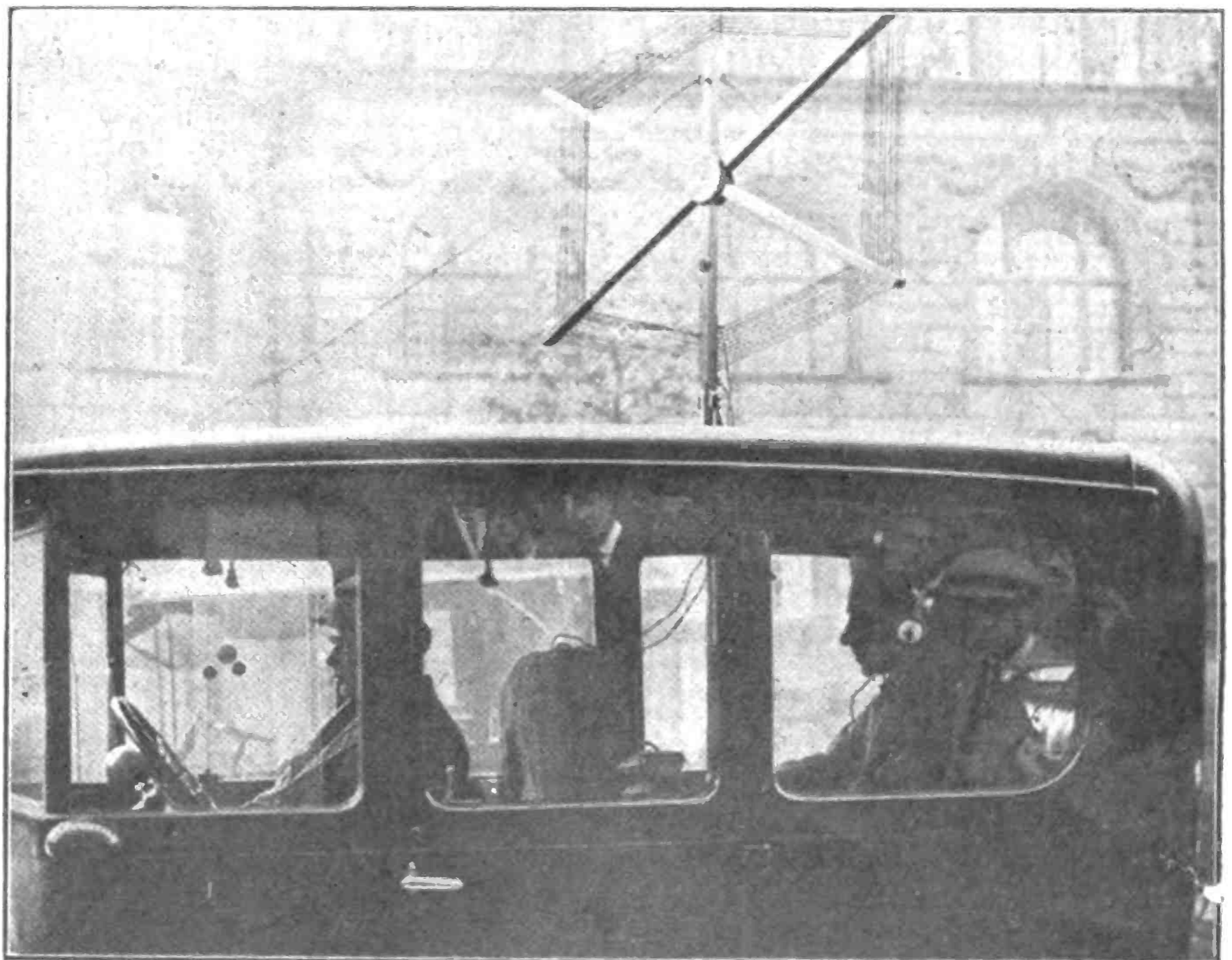
Size	1/8 lb.	1/4 lb.	1/2 lb.	3/4 lb.	1 lb.
20	37	74	148	222	290
21	46	92	184	276	370
22	57	114	228	342	461
23	73	146	292	438	584
24	93	186	372	558	745
25	112	224	448	672	903
26	139	278	556	834	1118
27	177	354	708	1062	1422
28	219	438	876	1314	1759
29	275	550	1100	1650	2207
30	316	632	1264	1896	2534
31	346	692	1384	2076	2768
32	382	764	1528	2292	3137
33	587	1174	2348	3522	4697
34	771	1542	3084	4626	6168
35	842	1684	3368	5052	6737
36	984	1968	3936	5904	7877
37	1163	2328	4642	6968	9309
38	1333	2666	5332	7998	10666
39	1488	2976	5952	8928	11907
40	1777	3554	7108	10662	14222

The following tables have already been published:

No. 1—Enameled Magnet Wire, RADIO WORLD, No. 34, dated November 18.

No. 2—Single Cotton-Covered Wire, RADIO WORLD, No. 35, dated November 25.

Motor Car Receives Radio Messages



(C. Central News)

The above photograph shows a loop aerial erected on the roof of a motor-car. It was an important experiment conducted by the Marconi Wireless Telegraph Company of London. The set was installed in the center of the car in order that the lead-in wires from the loop might be brought to the set. Results were obtained thirty miles from a broadcasting station. Note this peculiar loop aerial. It can be rotated from the interior of the car, making it possible to manipulate the direction of the loop while receiving electromagnetic waves from a broadcasting station. Loop aeriels are being used by many radio amateurs. When the loop is employed, radio-frequency amplification or the well-known Armstrong superregenerative receiver must be used in order to get results. This loop has the distinction of eliminating interference, a marked advantage over the outside aerial.

Arlington to Be Government's Radio Broadcasting Center

By Carl H. Butman

WASHINGTON, D. C.—With 573 private broadcasting stations offering daily programs, the radio public is apt to lose sight of the fact that the United States is also broadcasting information on many subjects. Six departments are scheduled for daily or semi-weekly programs and forty-two Naval radio stations are carrying news of one sort or another.

Requests for permission to broadcast have become so numerous that the co-ordination of all government broadcasting has become necessary. A committee of twelve officials, representing as many branches of the government at Washington, is endeavoring to supervise matter submitted for public broadcasting over radiotelephone circuits furnished through the courtesy of the Navy Department. In order that the listeners-in may receive the maximum service with a minimum of interference and without duplication, this committee was appointed last spring at the suggestion of Herbert R. Hoover, Secretary of Commerce. It is known as the Interdepartmental Advisory Committee on Radio Broadcasting. Although the committee meets biweekly, its subcommittees are busy almost continually with this work.

Scope of Interdepartmental Work

Demands for broadcasting of telegraph matter, as well as telephone, are constantly increasing and the scope of the committee's work is gradually growing greater. Recently the question of broader activities and supervision has arisen, due to the frequent requests for investigation and advice on matters other than telephone broadcasting, originally the committee's sole function. Extension of activities is understood to have been generally approved by the different departments so as to cover the subject of radio communications, and the matter is now before the Secretary of Commerce for further action. It is quite probable that this committee will eventually become the statutory advisory committee provided for in the radio bills sponsored by Senator Kellogg and Congressman White.

Activities of the committee to date have made possible the broadcasting of several interesting programs from NOF, the Naval radio station at Anacostia, which is primarily the experimental radio station of the Navy's Bureau of En-

gineering. The Anacostia station, however, cannot carry the load and does not operate on Saturday afternoons, due to other official duties. As soon as arrangements are completed, all radiotelephone broadcasting for the government will be transferred to the big Arlington station.

Origin of Interdepartmental Committee

Last spring, when the popular demand for broadcasting reached its height, so many official and semi-official requests to use NOF were made of the Naval Communications Service that Secretary Denby could not grant them all; in fact, he finally ruled that only official messages could be transmitted. At one time, NOF was closed to all except the highest governmental officials. Suggestions that an interdepartmental committee be appointed to pass on broadcasting and supervise its operation, made by Secretary Hoover, therefore, were welcomed by the Navy Department. The committee began to function on June 1. Matter submitted for broadcasting is inspected and methods of operation arranged by subcommittees which attend to all details, determining the value and demand for particular broadcasts.

Applications for broadcasting by the Interior, Agriculture, Labor, Treasury, Commerce, and War Departments have been approved by the committee and fixed schedules, giving each applicant a maximum service of three fifteen-minute periods each week, have been put in operation. Many listeners-in throughout the country have undoubtedly heard the evening lectures and band music over the NOF phone on 412 meters.

The Government's Schedules

On Monday, Tuesday, and Thursday evenings, the Treasury Department broadcasts deal with the activities of the Public Health, Internal Revenue, and Savings Bureaus. The Commerce Department's schedule on Tuesday and Thursday evenings includes information on foreign and domestic markets, trade news, and fisheries. Talks on immigration, women's activities and child welfare are made on Monday, Tuesday, and Thursday evenings by officials of the Labor Department. The Interior

Department furnishes lectures on education and mining on Monday and Thursday evenings and Tuesday afternoons. Information pertaining to crops and weather is transmitted every Monday, Tuesday, and Thursday evening by the Department of Agriculture. Officers of the Department of War will shortly broadcast a series of talks on military activities and recruiting on Monday evenings. Sometimes special broadcasts are arranged for national associations, such, for example, as the series of speeches on Naval Activities by officers of the Navy, requested by the American Marine Association during its exposition in New York. The evening programs are so grouped as to make a compact schedule and not interfere with private broadcasting. Each week the programs will be announced by the Navy Department.

Arlington Chief Broadcasting Station on Two Waves

The opening of NAA, Arlington, as the official government broadcasting station, has been delayed due to difficulty experienced in operating on the lower governmental wave-band designated for telephone broadcasting. Very soon the Arlington station will open two telephone broadcasting circuits. It is a very busy station and it is necessary to operate several circuits simultaneously without interference. NAA's new broadcasting telephone set of 750 watts, recently installed, operates very successfully on the 2050-meter wave telephone circuit, using the main antenna, but does not give good results on the government's 490 wave due to reactions between other sets when in use. For this reason, the subcommittee on technical matters has been requested to consider the use of a wave length of 430 meters in this work. If it is approved, special permission will be requested of the Department of Commerce for its use, since it lies in the band assigned to private and toll broadcasting. The lower wavelength is believed necessary so that the service will be available to the people who do not own sets capable of picking up the long 2050-meter wave.

Code Broadcasting Extensive

Telephone broadcasting for the departments is not the only work handled by the Naval Radio stations; many messages are broadcast also in telegraph code. NAA car-

Transmitter That Slips Over the Head

By S. R. Winters

THE multitude of instruments in the cockpit of a modern airplane is graphically pictured in a recent diagram indicating that the pilot must manipulate or watch forty units of apparatus. The use of radiotelephony and radiotelegraphy in aerial navigation has enlarged the mass of instruments and controls, this communication service including a radiotelephone transmitter, radioreceiving tuner, wireless amplifying switch, radio-tuning condenser, wireless transmit-receive switch, radio-receiving helmet, telegraph key, and radio direction finder.

Obviously, then, the hands of the pilot are never off duty. Since the control levers for the actual manipulation of the air-going machine are likely to monopolize his hands, the use of the radiotelephone is possible while the pilot fingers with the throttle of the engine or other mass of instruments of the aircraft proper. Once the telephone receiver is placed directly over the ear canals, and the telephone transmitter is ad-

justed in front of the mouth, both the transmission and reception of communications may be negotiated while the thumbs and fingers are engaged in controlling the fortunes of the airplane. The accompanying photograph herewith shown illustrates a type of radiotelephone transmitter and receiver which snugly fits over the head of the pilot.

Contrary to the common system of transmitting wireless messages from ground stations, the hands are absolutely relieved from holding the telephone and they may be employed in making adjustments of the wireless apparatus proper or in manipulating the control levers of the flying machine. The helmet is made to

order; that is, each unit is designed for an individual wearer and the owner is cautioned not to loan it to others. The telephone receiver is adjusted directly over the ear canals and is fitted thereon snugly as a means of excluding vibrations of the airplane engine and other noises foreign to the incoming wireless signals.

The telephone transmitter is so adjusted in front of the mouth that the wearer can use it without causing him to bend his head. Close inspection of the photograph illustrating this type of telephone-transmitting device shows that it is not far removed from the lips of the operator. Voice tests have indicated that indistinct transmission of speech is produced when the pilot wears the transmitter too far from his lips.

This design of telephone transmitter may be conveniently employed for intercommunication between two airplanes, or a squadron of flying machines, or between aircraft and wireless stations on the ground. When used in connection with the transmitting circuit of SCR-68, a popular radiotelephone set of the Signal Corps of the United States Army, it operates thusly:

If no voice vibrations are impinged on this transmitter, the potential of the modulator tube grid remains constant. Consequently, there is no fluctuation in the electric currents of the plates of the two electron-tubes. However, when the pilot impresses his "gift of gab" on this telephone transmitter, a pulsating electric current is caused to flow in the primary circuit of the input transformer. This is the resultant action of the transmitter, which impinges on the grid of the modulator electron-tube an alternating or varying potential electric current following the modulation of the voice. Such variations cause corresponding changes in the electric current permitted to get into action in the plate circuit of the modulator electron-tube, and, therefore, in the plate current of the oscillator-audion bulb. Finally, these variations find their way into the amplitude of the oscillations in the circuit of the antenna. Consequently, the electro-magnetic waves radiated by this telephone-transmitting outfit, instead of being of constant amplitude, have an envelope reproducing the pulsations of electric current in the telephone-transmitter circuit. The electric waves are modulated to the speech.



The above photograph illustrates a type of radiophone head gear, consisting of a microphone and a set of ear pieces, which fit snugly over the head. This is a marked improvement in radio for operators who work aboard airplanes. It is possible for the operator to manipulate the controls, dials, direction finder, and key without holding a microphone, which had to be done prior to the use of this device. The microphone is so adjusted before the speaker's mouth that he can use it without bending his head. Close inspection shows that it is not far from the lips of the operator. Voice tests have indicated that indistinct transmission of speech is produced when the operator wears the transmitter too far from his lips.

(Continued from preceding page)
ries ten telegraph broadcasting schedules daily, totaling thirty hours each week and comprising, chiefly, quotations on foodstuffs for the Department of Agriculture approximating 35 per cent of its day's work. NAT, the Naval station at New Orleans, broadcasts two schedules a day, aggregating four hours a week; the Great Lakes station, NAJ, carries eighteen daily schedules, constituting thirty-six hours a week.

In addition to this matter, twelve Naval stations broadcast two time-signals daily; twenty carry hydrographic information; thirty-seven transmit weather forecasts; and six broadcast press matter. Sandwiched between these many schedules, the Navy carries on its own official communications, as well as many for the State Department, to ships and foreign stations, and is busy with experiments.

A glance at the operating schedule of any governmental radio station will explain why the government requires the service of the Interdepartmental Committee in an effort to simplify and standardize government broadcasting. Uncle Sam is not only generous with his information but he is also generous in his means for transmitting it to the country at large.

Broadcasting God's Word to Millions

By Peter Gray

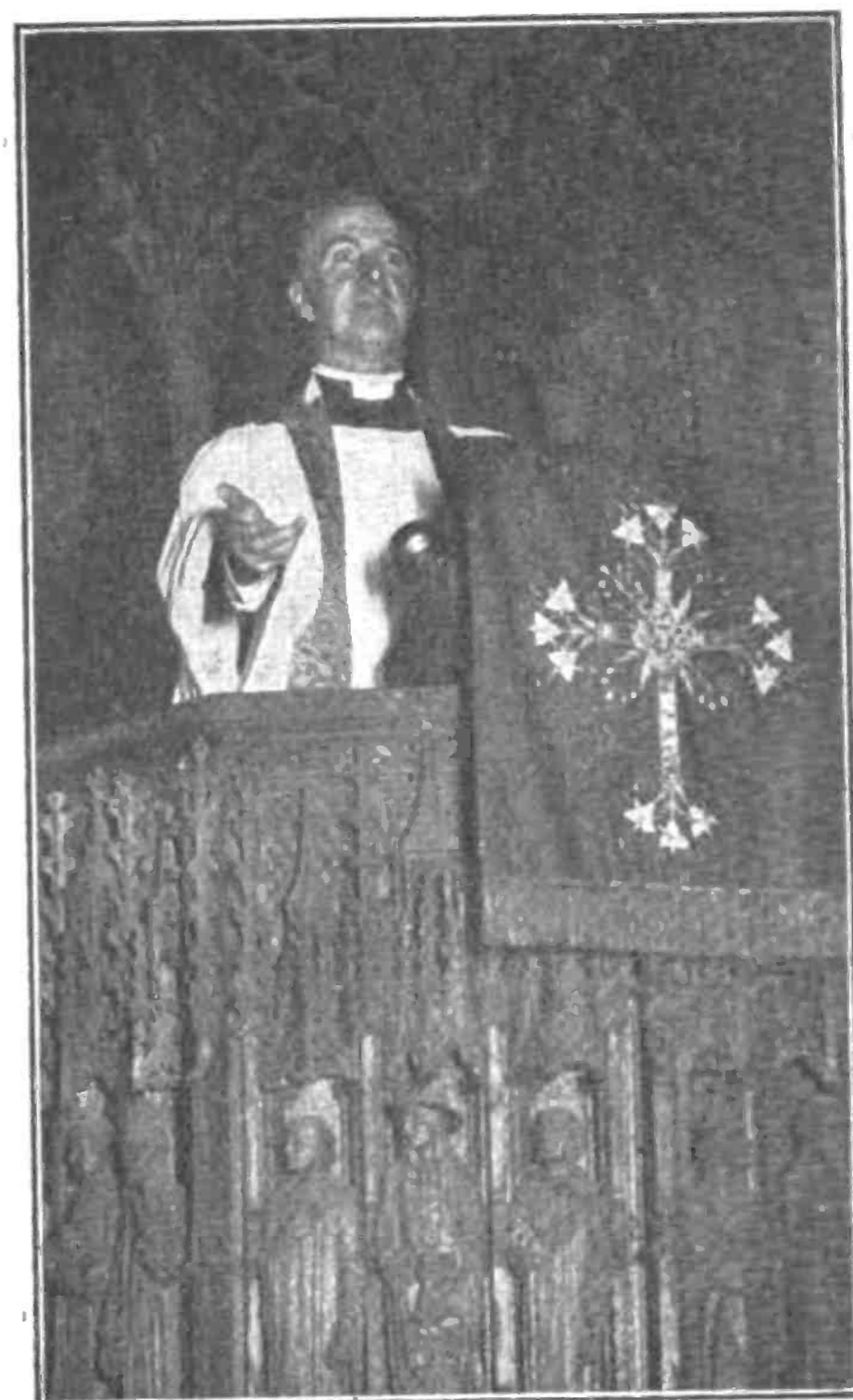
IN the Beginning God," the first four words in The Holy Bible, was the text chosen by Reverend Ernest M. Stires, D.D., for twenty-one years rector of the Saint Thomas Episcopal Church, Fifth Avenue, New York, for his sermon, "The Inevitable Faith," which was the vital part of the first church service to be broadcast from a church edifice in Greater New York.

Dr. Stires became a radio enthusiast last winter after conducting a radio chapel service in WJZ's broadcasting studio in Newark. Various members of the Saint Thomas's parish who were out of town, as well as others, telegraphed, telephoned or wrote about the helpfulness of the service and the clear reception. The request was then made by the Westinghouse officials that they would like to broadcast services from the Saint Thomas Church. The suggestion was favorably received by Dr. Stires as he was overwhelmed by the immediate response of the invisible audience.

The Saint Thomas Church is con-

sidered by architects to be the finest example of Gothic architecture of very recent construction. The interior of the church with its wonderful pillars, beautiful pulpit, and exquisite altar and reredos is almost beyond description. A sound-proof brick ceiling makes the acoustics of the Saint Thomas Church almost perfect. The microphones are hidden so as not to detract from the church services. One is on the pulpit, near the Bible, for broadcasting the sermon, one at the lectern for the reading lesson, two on the chancel for prayers and solos, two at the altar for prayers, one on the balcony for the organ and choir, one in the hall for the processional and opening prayer and one for WJZ's announcer.

Dr. Stires in an introductory way in the second service to be broadcast said the Saint Thomas Church is much pleased and benefited by the instant expression of apprecia-



(C. Kadel & Herbert)

Dr. Ernest M. Stires in the pulpit of St. Thomas, New York, delivering a sermon by radio. Note the microphones on the lectern.



(C. Kadel & Herbert)

Part of the radio equipment of St. Thomas Church, New York. Note at right ordinary telephone transmitter with special microphones.

tion of the great world outside of the parish and that if any opposition had existed (there was none by the parish), it would have been dispelled by reading the letters piled upon his desk—some came from those who were ill for years and never expect to leave their homes, who said they were benefited and helped and were grateful; a group around a receiving set took up a collection and sent \$11.25 to help defray the church expenses.

A suburban resident, who used to attend church regularly, was working on his auto and, grease besmirched, listened in during the wonderful service, and did not feel free to break the silence of his home during the Communion any more than he would in church. Others stated that it was their habit to spend Sunday morning playing poker with friends. Now when 11 o'clock comes around, the cards are cast aside and the radio receiver set to work. And so with pipes alight they follow the service. Two instances of lazy ways to go to church but far better than not going at all.

It was not many months ago when there was a great diversity of opinion in religious circles about the propriety of broadcasting church services as it seemed almost sacrilege to broadcast prayers and hymns. That was before the first experiment was made, in the history of radiotelephony.

National Radio Week Is Gripping the Entire Country

WHAT it IS—NATIONAL RADIO WEEK is a movement to popularize radio, to double the number of broadcast listeners, to show the progress made thus far in broadcasting, to reveal new possibilities, to kindle the spirit of radio in as yet unresponsive breasts.

What it is NOT—It is NOT a movement by any one organization. It is NOT a manufacturers' drive. It is NOT intended to be anything but a thoroughly unselfish, co-operative effort, national in scope, exhaustive in material.

When it is to be held—December 23 to 30 (inclusive) this year.

The campaign is being directed by an executive committee, of which J. Andrew White, editor of "The Wireless Age," is chairman. Others on the committee are: H. Gernsback, editor "Radio News"; Arthur H. Halloran, editor "Radio"; Roland B. Hennessy, editor RADIO WORLD; Laurence Nixon, editor "The Radio Dealer"; and Arthur H. Lynch, treasurer, editor "Radio Broadcast."

Headquarters—NATIONAL RADIO WEEK headquarters are at 326 Broadway, New York City, N. Y.

What is to be accomplished—Every listener will endeavor to interest one person into a radio fan. This will double the number of broadcast listeners. Programs from every station in the country, specially prepared to fit the holiday season and the spirit of the week, will be sent out on the air. Sporting events, operas, jazz bands, speeches, and other particularly interesting programs will fill the air. Nation-wide broadcasts of a single event to be heard in every section of the country at once will be made.

* * *

Country-Wide Words of Praise

The following additional acceptances of places on the general committee, and expressions of approval for the campaign, have been received:

"Radio Journal," 113 Stimson Building, Los Angeles, says:

We are glad to put our shoulder behind National Radio Week. Our new editor, K. P. Frederick, is lining up local newspapers. Our general manager, Hugh Harlan, is getting support from local dealers. Mr. Frederick accepts the honor of being on your committee.

* * *

"Radio Topics," Oak Park, Illinois, says: We shall be glad to co-operate with you,

and in our December issue there appears a timely editorial. Our January issue, which will be out December 10, will also carry publicity of assistance to the movement. We should be very glad to have you include our name on the active press members.

* * *

"QST," Hartford, Connecticut, K. B. Warner, editor, says:

Our December magazine contains an editorial in which we have pointed out to our members the idea of doing what we can to boost radio during National Radio Week. I will accept a place on your general committee as the editor of QST.

* * *

Mr. H. Lewis, "Radio News," Toronto, Canada, says:

I will be only too pleased to co-operate with your committee in putting across a "Radio Christmas." I have been playing up this idea. I should be glad to accept a membership on your committee.

* * *

J. B. Taltavall, publisher of "Telegraph and Telephone Age," 253 Broadway, New York, says:

You are at liberty to add my name to your general committee.

* * *

Frederick A. Smith, editor, "Radio Age," Chicago, wires:

Pleased to accept membership on National Radio Week Committee. Will lend hearty co-operation through magazine. The idea is good.

* * *

Telegram from "Radio Digest," 123 West Madison Street, Chicago, Charles F. Smisor, editor:

Count me in!

* * *

S. Gernsback, editor of "Radio News," says in the December issue of his magazine:

December 23 to December 30, inclusive, is to be the first National Radio Week, suggested originally by Mr. Roland B. Hennessy of New York City. During that week every radio enthusiast should try to think, talk, dream and shout nothing else but Radio.

The object is to acquaint the public at large with Radio.

"Radio News" has prepared a beautiful colored post card which we shall be glad to send to every one who asks, in any reasonable quantities. This postal card, the picture of which will be published in the next issue of "Radio News," is to be sent to all your friends who are as yet

not interested in Radio, inviting them to come and see your station, or any first-class station of which you know.

This is a preliminary announcement, and we shall have more to say about National Radio Week in the January issue.

* * *

"The Evening Journal," New York, says:

The great part which radio communication has taken in the dissemination of education and entertainment and its service as a means of interchanging information is to be demonstrated by a co-ordinated program of the radio interests, in a country-wide undertaking to establish a National Radio Week as an annual event.

The effort to establish National Radio Week as an annual institution is backed by co-operative effort on the part of the newspapers, the radio press, manufacturers, dealers, amateurs and the great army of broadcast listeners.

The tentative program is arranged for the week December 23 to 30, inclusive. It is a most comprehensive plan to popularize radio with the public, and while only a general outline of the plan is so far available, it is known that it embraces programs of national, State and local character in which the 550 or more radiophone broadcasting stations of the country will take an active and important part.

Special programs to include the leaders among public officers, statesmen, educators and the musical and entertainment world in general are being arranged, all with the main idea of introducing radio to the uninitiated and firmly establishing it in its proper place as a recognized agency of bringing radio instruction and entertainment into the homes.

* * *

Under the heading "Hail National Radio Week and Help Put it Over Big," the "Radio Retailer and Jobber" says:

The idea was first announced at a luncheon of radio paper editors held at the Bankers Club, in the Equitable Building, 120 Broadway, New York City, early on a Tuesday afternoon in October last.

The innovation was seized upon with alacrity by all present and provision was made for a very formidable and well-balanced committee to sponsor the institution and make of it a crowning success.

The broadcasting stations were called upon to transmit the announcement that Radio Week was scheduled soon to come; thus saving a huge outlay in postage, though extensive circularizing has been provided for.

The broadcasting stations have also been urged to commemorate National Radio Week by particularly notable programs which would prompt listeners-in to look forward to Radio Week as an annual institution.

Every effort will be made to make Radio Week a national and not a localized innovation.

So one and all from coast to coast, and from the lakes to the gulf, with Canada thrown in, let us root for National Radio Week, and let us put it over with a great blare of trumpets, so that it may be a national institution, an annual visitor and a great stimulator of activity in the radio trade for many years.

**Send in your Ideas for the
Success of
National Radio Week**

**Help to Make It the Big
Christmas Event**

**Be a National Radio Week
Booster**

Progress in Radio Devices

Approximately 3500 Patents Already Granted, 400 of Which Are Held by Fessenden, De Forest, and Stone

By B. R. Cummings

Radio Engineer, General Electric Company

THE fundamental phenomenon which is utilized in radiotelegraphy and radiotelephony was first demonstrated by Heinrich Hertz, the German electrician, in 1888, thirty-four years ago. Hertz, at that time, showed that it was possible to radiate energy through free space. He was not interested in accomplishing results over great distances, apparently not having conceived the idea that this phenomenon could be utilized as a method of communication, and his tests were carried on only over distances up to approximately 300 feet.

In fact, Hertz deliberately avoided using an earth connection in his apparatus, which would have immediately increased the distances over which he worked, believing that this would detract from his demonstration of the transfer of energy through space and that it would appear that the energy was being transferred by the conductivity of the earth. He was interested only in a pure demonstration in physics.

It is of interest to note, in comparing Hertz's equipment with modern radio apparatus, that his receiver consisted only of a single loop of wire which included a minute spark gap, and that his indication of the transfer of energy through space was the spark which jumped this gap when the so-called "Hertzian Oscillator" was in operation. His receiver, or "indicator," therefore, was extremely crude as compared with modern radio-receiving.

The Hertzian oscillator remained a laboratory instrument for a number of years, and was used only in connection with experiments in physics.

In 1894, Marconi, who was a wealthy young man with a scientific training, saw in the Hertzian oscillator a possibility of developing a new method of communication which would permit communication being carried on over areas previously considered impassable. Instead of avoiding the earth connection, as Hertz had done, he used it both as the transmitting and receiving stations and was immediately able to secure an indication of the transfer of energy over much greater distances than had been realized by Hertz.

The years immediately following 1894 were marked with intensive development on the part of Marconi, both of transmitting and receiving equipment, with gradually increasing ranges, until, on December 12, 1901, he succeeded in transmitting the letter S across the Atlantic from England to Newfoundland.

While Marconi, since that time, has contributed greatly to the advancement of the radio art, his greatest work may be said to have been completed at that time, for he had shown that the Hertzian oscillator, which had previously been considered only as an interesting laboratory experiment, could be used in establishing communication over great distances, and that the widespread use of this system depended only upon the further perfection of the apparatus utilized.

This accomplishment attracted the attention of scientists in all parts of the world toward "wireless," as it was then called. In the years immediately following, tremendous strides were made in improving the sensitivity of receiving equipments and in increasing the power radiated at the transmitting station.

The individual accomplishments in radio from this point on are somewhat hard to define, although several of the outstanding contributions to the art can be touched upon.

In 1884, Edison, and several years later, Fleming, discovered that it is possible to pass an electric current from a hot body to a cold body in a vacuum. This phenomenon was investigated by Fleming for a number of years. After he discovered that such a device would pass current in one direction only, and was, therefore, a rectifier, he secured a patent on it in 1905, the device being known as the "Fleming Valve." This valve was utilized in radio-receiving circuits as a detector and was a tremendous improvement over previous forms of detectors.

Shortly thereafter, Dr. Lee de Forest obtained a patent on a device which he called the "audion" and which was essentially the Fleming valve with a third electrode by means of which it was possible to control the current flowing in the tube.

Strangely enough, in spite of the

progress made in these devices, which are grouped under the heading of "vacuum tubes," comparatively little was known of exactly what takes place in them. A number of years elapsed before their functioning had been analyzed.

In 1915, Armstrong made known what has since come to be called the "feed-back" circuit, by means of which the detection and amplification of received signals, by a single tube, was made possible, and also by means of which the three-element vacuum tube could be made to function as a generator of alternating current, making possible the modern vacuum-tube transmitter.

Although radio broadcasting is a recent development, radiotelephony was first accomplished as far back as 1905, and the broadcasting of music was successfully carried on by de Forest as early as 1914. Practically no interest was shown by the general public in broadcasting at that time, and his concerts were discontinued. Broadcasting has also been carried on, although in the Continental code, by the Navy Department station at Arlington, Virginia, which, since 1915, has been transmitting time signals, weather forecasts and news events each night after 10 o'clock. It has been from Arlington's transmission that ships at sea have been able to print daily newspapers.

To indicate the great number of devices and circuits which have been developed for radio communication, approximately 3500 radio patents have been granted up to the present time. Naturally, some means have been much more prolific in this respect than others; and three men who were most active in the early days of radio, Fessenden, de Forest, and Stone, hold among them a total of nearly 400 patents.

And yet, the tremendous amount of research and development work which has been done in advancing the radio art has only served to indicate fields and applications for this method of communication which have as yet been unexplored. It seems assured that radio will eventually find its place as a public utility and be utilized to an extent far surpassing any of the other existing methods of communication.

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

I*S all electricity made up of electrons?*

All electricity is made up of electrons. You will get a correct idea of electricity if you try to visualize it as being made up of electrons. Everything contains electricity; in other words, everything contains electrons.

* * *

What are electrons?

An electron is a minute negative charge—it is but the smallest fraction of an atom. A negatively charged body has more than its usual number of electrons. A positively charged body has less than the usual number of electrons.

* * *

How do these electrons flow?

Electrons flow along a conductor when that conductor connects objects, or points, which do not have the same share of electricity, not the same amount of electricity. One body may have a greater amount of electricity than another and yet have the same share in the same way as if a grown man and a two-year-old child were sharing food. The man would have a greater amount of food than the child, and yet he would have shared it with the child. In electricity the size, shape, and other elements of a body determine what the share should be.

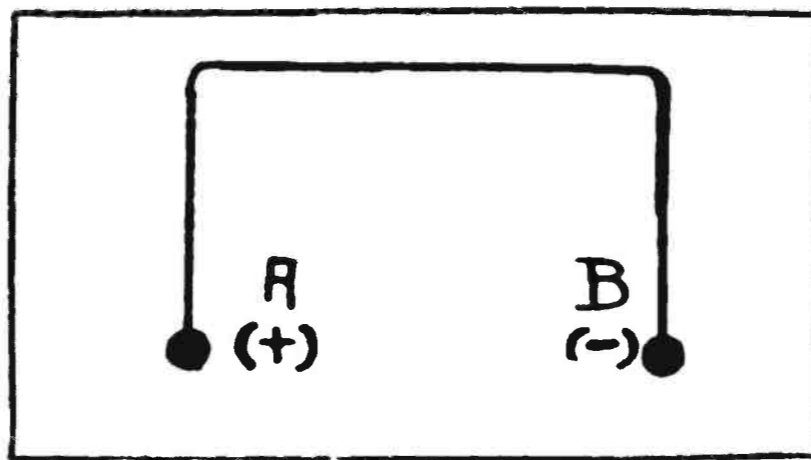
* * *

How many ways are there in which an object may have a different share of electricity?

There are five ways in which an object may have a different share of electricity. One object may have more than its usual number of electrons and another object less than the usual number. Electrons will travel until both have the same share. Still there are four more ways in which an object may have a different share of electricity. Years ago, before much was known about electricity, it was understood that something "flowed" along a wire. The men studying electricity then agreed to say that it "flowed." They had an even chance of being right, but they made the wrong guess. The word has not been changed. To do so now would only create confusion. In a similar sense, we state that the sun rises. It is a stationary body. The earth moves. However, electricity "flows" along a wire from one end to another. The force of this is called "voltage."

What is voltage?

Voltage between two points measures the effort which the electrons make to move from one point to another. The effort which electrons make to move from one point to another depends on the difference in the proper share of electrons in excess of the other. The greater the difference in the share of electrons, the greater the voltage. However, we do not measure voltage by saying that one point has a certain number of electrons in excess of the other. It is measured in volts. This is somewhat



Schematic diagram of a conductor across a plus, or positive line, and the minus, or negative, side. Its duty in radio is to carry the electrons from pole to pole. In radio work this is termed a short circuit. Drawn by Lynn Brooks.

similar to the fact that we do not buy beans by ordering a certain number—we buy them by the quart. When you speak of voltage you must have two points in mind. Voltage is an expression of the effort made by electricity to get from one point to the other. It is measured in volts.

* * *

How do the electrons travel?

Electrons travel, or try to travel, from the point which has the greater share of electrons to the other point. As the point which has the greater share of electrons is negative (—) and the other point usually positive (+), the electrons travel, or try to travel, from negative to positive. The current is said to flow in the opposite direction—that is, from positive (+) to negative (—).

* * *

What is necessary to produce an electric current?

If we can keep a point so that it will always have more than its usual number of electrons (—), and another point that will always have less than its usual number of electrons (+); and if we connect both points by a conductor, we will have the condition necessary to produce an electric current.

How to Determine a Detector Vacuum Tube

TO determine a detector tube from an amplifier can be accomplished only by experiment. Place the detector tube in the amplifying socket and use from 45 to 60 volts of plate potential. Turn on the filament current and pay close attention to the results. If the tube should happen to turn blue, turn off the current at once. This test will show that this tube is a soft tube and should be used as a detector and for detecting purposes only. In case the blue glow is not present, it is a sure sign that this tube is an amplifier of the hard-tube class.

What Is Meant by Coupling

THE object of loose coupling is to eliminate the effect of interference by loosening the coupling between the two coils, the primary and secondary. It has been found in practice that when the primary and secondary circuits are in resonance with each other, the primary and secondary coils may be separated quite a distance and signals still be recorded in the telephone receivers; whereas signals that are not in resonance with the circuits will be eliminated by widening the coupling between the primary and secondary.

The Tickler Coil's Use

THE tickler coil is a coil of wire placed in inductive relation to the primary and secondary circuits of a receiving set. The tickler itself is in the plate circuit of the vacuum tube and affords a feed-back system that produces regeneration. The function of the tickler is best explained by describing what happens if you take the telephone receiver from the hook when the bell is ringing and then place the receiver to the transmitter. The result will be a continued "howling." This is regeneration. In a radio circuit, the tickler coil produces regeneration.

The Radio Primer has been published regularly in RADIO WORLD since issue No. 1, and will be a regular department in order to instruct and aid the many thousands of amateurs who are joining the ranks of radio enthusiasts every week.

Radiograms

Latest Important News of Radio Garnered from the World Over, and Reduced to Short Wave-Lengths for the Busy Reader.

MAJOR GENERAL JAMES G. HARBORD, deputy chief of staff of the United States Army, on his retirement will become president of the Radio Corporation of America. General Harbord was elected head of the Radio Corporation at a recent meeting in New York. His retirement from the Army will be effective December 29, Secretary Weeks announces, and he will assume his new duties on January 1, 1923. Edward J. Nally, president of the Radio Corporation, it is announced, has been elected to a new office—that of managing director of International Relations, with headquarters in Paris.

* * *

The Mexican Government is about to receive four powerful radiotelegraph sets, which are to be presented to the republics of Guatemala, Honduras, Costa Rica, and Nicaragua in accordance with the decision of the president of the Republic.

* * *

The London Free Press of London, Canada, recently opened its broadcasting station. Its call letters are CJGC and its wave is 430 meters. At present its power is derived from two 50-watt oscillators.

* * *

Probably no other broadcasting station in the country can claim the distinction recently achieved by station KSD, San Francisco. A concert was sent out from this station, which was heard in every State in the Union.

* * *

A radio message, picked up at the Santiago Station of the Naval Wireless System and relayed from San Francisco, purporting to come from Hilo, Territory of Hawaii, told of an earthquake and tidal wave there. Efforts to communicate with the Hilo Radio Station, operated by a private concern, later were unsuccessful, but radio men declared it was not usual for that station to communicate direct with mainland stations.

* * *

The completion of the new radio station at La Prairie, Canada, will connect Sydney, Australia, and London.

* * *

The United Fruit Company has announced the inauguration of a free medical radio service from its hospitals in the various countries of Central America and from its passenger steamships to all ships at sea. This service is to be available without charge to ships of all nationalities through the following radio stations operated by the United Fruit Company and the Tropical Radio Telegraph Company: New Orleans, WNU; Burwood, Louisiana, WBW; Fort Morgan, Alabama, WIO; Swan Island, US; Tela, Honduras, UC; Puerto Castilla, Honduras, UA; Tegueigalpa, UG; Port Limon, Costa Rica, UX; Almirante, UB, and Santa Marta, Colombia, UJ.

* * *

To London and back, by radio, in 45 seconds! To Berlin and back, by radio, in 2 minutes and 40 seconds! These were the records made at the Engineering Societies Building, 26 West 39th Street, New York City, on Wednesday evening, November 22, during a discussion on radio by David Saranoff, vice-president of the Radio Corporation of America. "How's the weather?" was the query flashed across the Atlantic. Within three minutes the members of the society heard the dot and dash replies hurled back through the night from three countries of Europe. Within forty-five seconds London's answer came

in: "Raining, mild." Ten seconds later came the reply from Norway: "Overcast, mild." France was third with: "Lovely weather," and Germany came last, two minutes and forty seconds after the question. She answered, "Gloomy, cold," and then added, "Greetings." A new development in radio, which Mr. Saranoff predicted would come soon, he described as the "wrist-watch wireless set or radiolet." "Such a set could be carried easily on the person," said Mr. Saranoff, "and signals could be received from stations twelve or fifteen miles distant, thus a man could receive in his vest pocket market reports, weather reports and details of championship games."

* * *

Amateur long-distance radio records were shattered at the radio station of Hiram P. Maxim, president of the American Radio Relay League, when a radiogram was sent to Clifford Dow, Waikiki, Hawaiian Islands, and the answer was received in 4 minutes and 18 seconds. The radiogram was relayed at Sleepy Eye, Minnesota, by Lloyd V. Berkmer. The distance from Hartford to Sleepy Eye by air line is about 1,200 miles, and thence to Wailuku 4,000 miles.

* * *

Cavalry Church, Pittsburgh is using radio-receiving sets as an extension work.—"Our parish is now doing organized work by wireless," said Dr. E. J. Van Etten, the rector. "We now have receiving sets. On certain nights, the Church Home is hearing our service through one of them. Two invalids are hearing these services through smaller sets in the hands of the new Calvary Radio Club. We send greetings of others who every Sunday night hear these sermons."

* * *

For the first time symphony music by a large orchestra has been broadcast by radio direct from the theatre.—That distinction falls to the Capitol Grand Orchestra, New York, whose performance of Richard Strauss's symphonic poem "Fun Heldenleben" was broadcast recently. The American Telephone and Telegraph Company, which perfected the sending, pronounced the achievement successful in every respect. The music was heard over a radius of 1,000 miles and over 600,000 radio sets caught the concert. The feat was accomplished by a highly sensitized microphone suspended from the roof, by which the sounds of the music were amplified and carried over equalized telephone wires to station WEAJ and then sent.

* * *

Radio communication is successfully used on airplanes to communicate to military bases from the air or enemy territory. The apparatus comprises a small sending and receiving station of light weight. Remarkable success has been attained over long ranges with radiotelephone, radiotelegraph, and direction-finding equipment. The receivers are provided with sound protectors, but receiving is less successful than sending because of the propeller noise. This defect has been overcome to some extent by using sound insulated telephone-headpieces. The aerial is generally, mounted on the planes and a counterpoise or additional aerial is used instead of a ground.

* * *

The first dress rehearsal of a theatrical performance to be broadcast by radio is also reported.—"This Little Kangaroo," the new musical comedy with James T. Powers, has been arranged was sent out by WJZ from the Morosco Theatre, New York. This important radio event took place at 5:30 p. m., November 22.

Getting Ready for the Big Show

S. H. FAIRBANKS, who managed the recent successful Radio Show in Boston, has been retained as advisory director by the management of the American Radio Exposition. This apportionment will be held in Grand Central Palace, New York, December 21 to 30, inclusive, and from present indications will far surpass any radio display of the past. Mr. Fairbanks will take charge of exhibits, the appointment of space, and other details of staging the show. L. S. Byers, executive secretary of the committee in charge of the show, will continue with the program of organization. A series of novel and sensational features are be-

ing worked out at present to make the exposition unusually interesting to the general public, as well as the fans and those unfamiliar with radio.

A number of new exhibitors contracted for space during the past few days. These include the Electric Storage Battery Co., A. H. Grebe & Co., Jewett Manufacturing Co., Newark, N. J., and the Burgess Battery Co. Exhibits are promised by the Western Electric Co., Inc., The Radio Corporation of America, and the National Carbon Co.

For economical reasons, practically all industries holding yearly expositions have learned that the East will support only one exposition a season, with perhaps one in the Middle West and one in New England. In view of the importance

of the metropolis as an industrial and export center, the numerous manufacturers exhibiting are talking co-operation in one big annual New York event, staged in a manner that will mean profit to manufacturers and dealers alike, and attractive to the public.

Held in Radio Stock Deal

MRS. MYRON CLEVELAND HARRIET SIMS, a stock broker, alleged to have sold stock in a radio company under misrepresentations to women investors, was held in \$7,500 bail for the Grand Jury when arraigned before Magistrate Joseph E. Corrigan in West Side Court, New York. Mrs. Sims denied the charges.

Radio and the Woman

By
Crystal D. Tector

ONE of the leading doctors of New York City took me through his hospital for children the other day. He is the head physician and guiding spirit of this institution; and he has decided to put a radio set in every room—not one set in the building, but, actually a set in every room! He said that he had read so much about radio being such a wonderful source of entertainment that he decided to see if the reports were true. He visited several institutions where radio is used as a means of entertaining the inmates, and came to the conclusion that the reports were in no wise exaggerated.

* * *

I was called in because he really knew no one else who might give him some advice. Immediately he decided that radio was a necessary element of his institution. He rushed to a newsstand, he says, and purchased a copy of RADIO WORLD. He opened the paper to my page, and, he continued, "as a matter of luck, I sent for you."

* * *

I gave him the names and addresses of several experts who will fit him out—who will install in each of the sixty rooms of his hospital just what he needs in the way of radio reception. But this fact is neither here nor there. It is a purely commercial matter in which I am not interested. I am only thinking of the big, human, charitable idea back of it all. I am extolling this man for thinking of someone else—of his willingness to go to any expense, as he told me, that the little sufferers in his care might have some entertainment to relieve their hours of convalescence.

* * *

Children—and grown-ups, too,—have suffered from the beginning of time; and as the world has progressed, and, little by little, efforts have been made to relieve their suffering. Here, in the midst of the first lustrum of this benighted century, comes the happiest method of all—the bringing to little bedsides where patient sufferers lie, the wonderful and fascinating things that come over the ether. I think that the success of this doctor's experiment will urge other institutions to follow suit. I make the prediction that it won't be long before every hospital in this country is installed with radio—and that radio will be as necessary to it as the doctors themselves.

* * *

And as the gladsome time of the year approaches, what can be of greater satisfaction to this man of medicine, this eminent diagnostician, than the fact that he is not purchasing a few trinkets and toys that will be cast aside as soon as they are broken—that he is not doing something that will please only his little patients of today, but that he is building, for all time, for the unfortunate children of the future who will come into his care. And as radio is improved and its scope becomes wider, there will be special broadcasts for hospitals—stories, and songs, and messages of cheer, and church services for all—young and old—who are temporarily incapacitated.

* * *

More power to this good doctor.

* * *

In reply to several correspondents: It is not difficult—or, it should not be difficult—to start the nominating for the offices of a National Radio Week committee. You say that when it comes to nominating a chairman, no one seems inclined to start the ball rolling. Why not all speak at once? Now, I don't mean to be funny; I am just trying to be practical. Out of this method, some one is bound to be heard and the temporary chairman, if she has any pep, is bound to recognize one of the speakers.

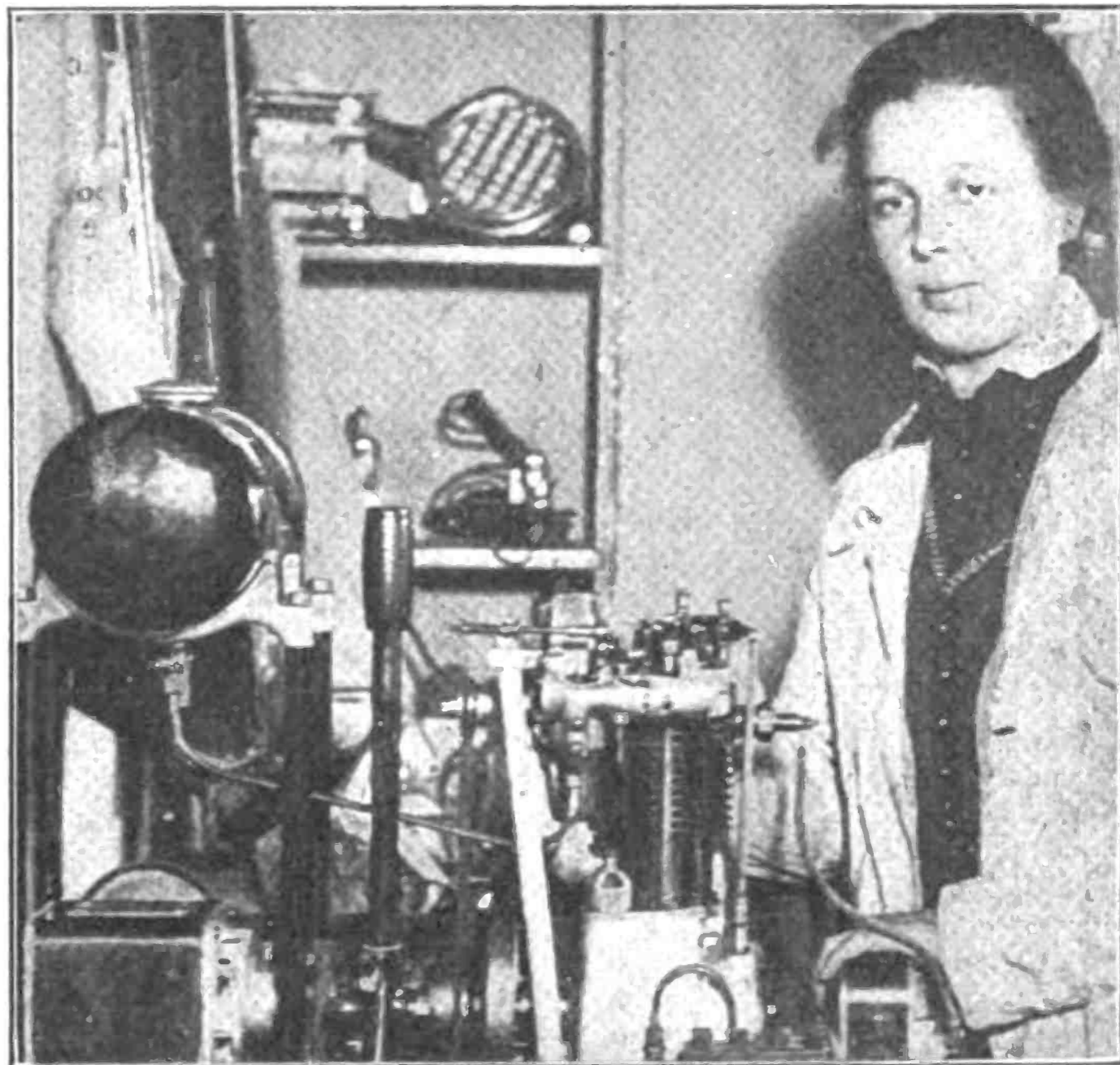
* * *

Mrs. A. H. L., Walla Walla, Washington—By all means give your husband a radio set for his Christmas. I assure you that radio is not "wholly a man's field," as you write. I cannot praise it enough as a source of entertainment for women as well. And as for the children—well, if your boy "has not taken to it as yet, and seems wholly uninterested," all I can say is that something is wrong somewhere. You get the set and, about a month later, write me what effect it has had on the family.

* * *

Miss Hattie Kane, Harrisburg, Pennsylvania—Your idea of a red-white-and-blue ribbon with the letters N. R. W. thereon, to be worn during the big week is splendid. But why not the word

Woman Electrical Engineer Constructs Own Radio Sets



(C. Kadel & Herbert)

Miss Elizabeth Martroge, of Exeter, England, is one of the few women electrical engineers in the world. Aside from this distinction, she is the inventor of a number of electrical appliances, and, to-day, is undertaking the installing of electrical lighting sets in country houses. However, since radio came into prominence in her country, she has "fitted up," as they term it on the other side of the Atlantic, a number of radio sets for "listeners in." Miss Martroge is, perhaps, the pioneer woman radioist of Great Britain. She believes in it heartily and has done much to promote interest in the new science and to give valuable advice in order to help the British Government in its broadcasting problems. Miss Martroge is shown in the photograph with her petrol-lighting set—petrol, or gasoline, being used there for heating country houses.

"RADIO"? You say that the ribbons are to be worn by women. Now, we want radio week to be the means of bringing thousands of fans into the fold and there are many so totally uninitiated that they might think N. R. W. stood for New Republic of Women, or something like that. With but the one word—"RADIO"—pinned jauntily to each feminine breast, the big idea is at once indelibly stamped and no time is wasted making explanations.

* * *

Vast possibilities of radio broadcasting are demonstrating themselves every day. In fact, every hour brings forth some new achievement for the great invention. For instance the postman delivered, several days ago, the following letter, which was addressed to the studio manager of WLW, the broadcasting station being operated by the Crosley Manufacturing Company:

Studio Manager, WLW

Dear Sir:

I am sick in bed, and my mother has moved my radio set into my bedroom so I can listen in. I enjoy this very much and sure get WLW very loud and clear. My collie dog likes to listen in, too.

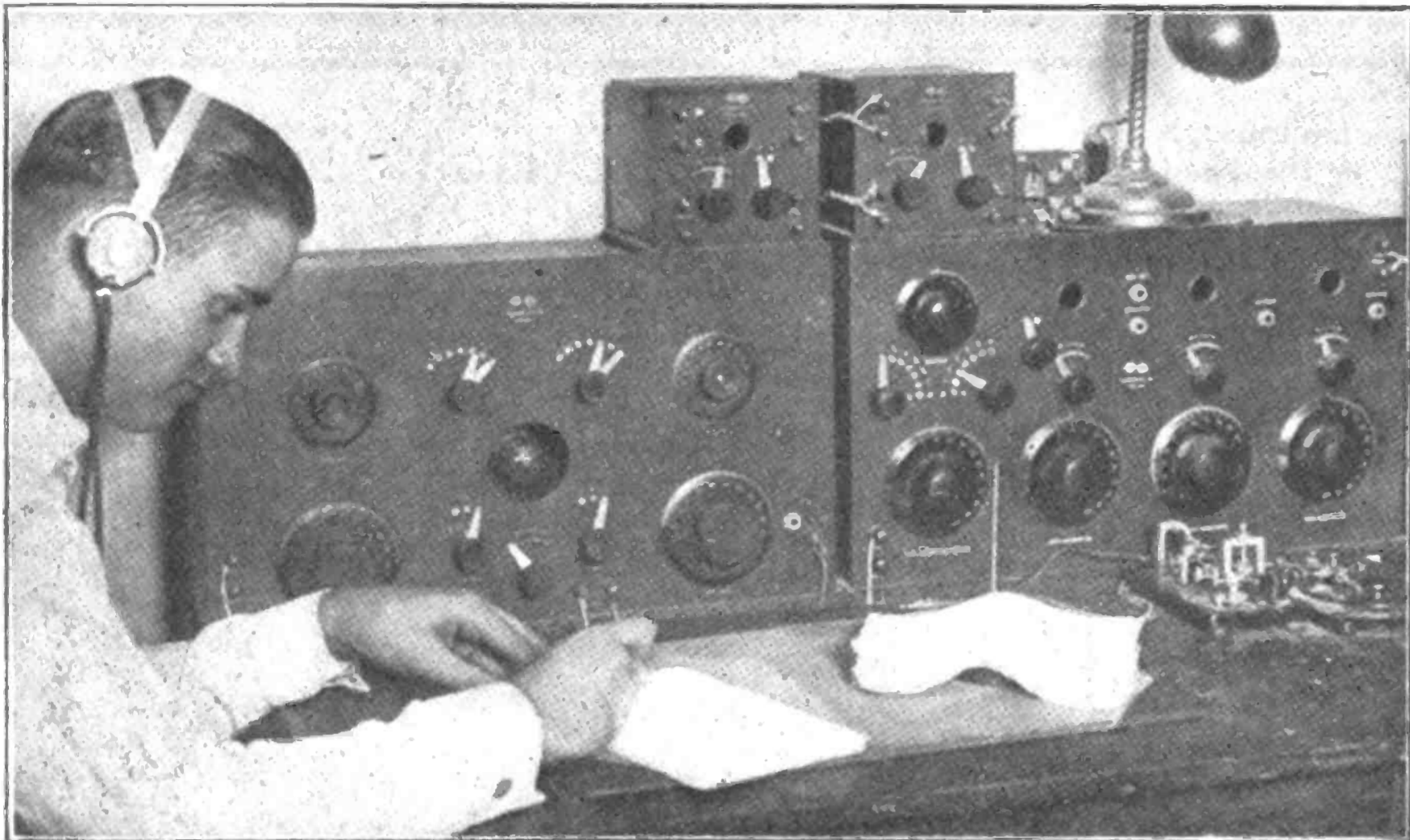
Yours sincerely,

J. CLYDE FOX.

2640 West Sixth Street, Cincinnati, Ohio.

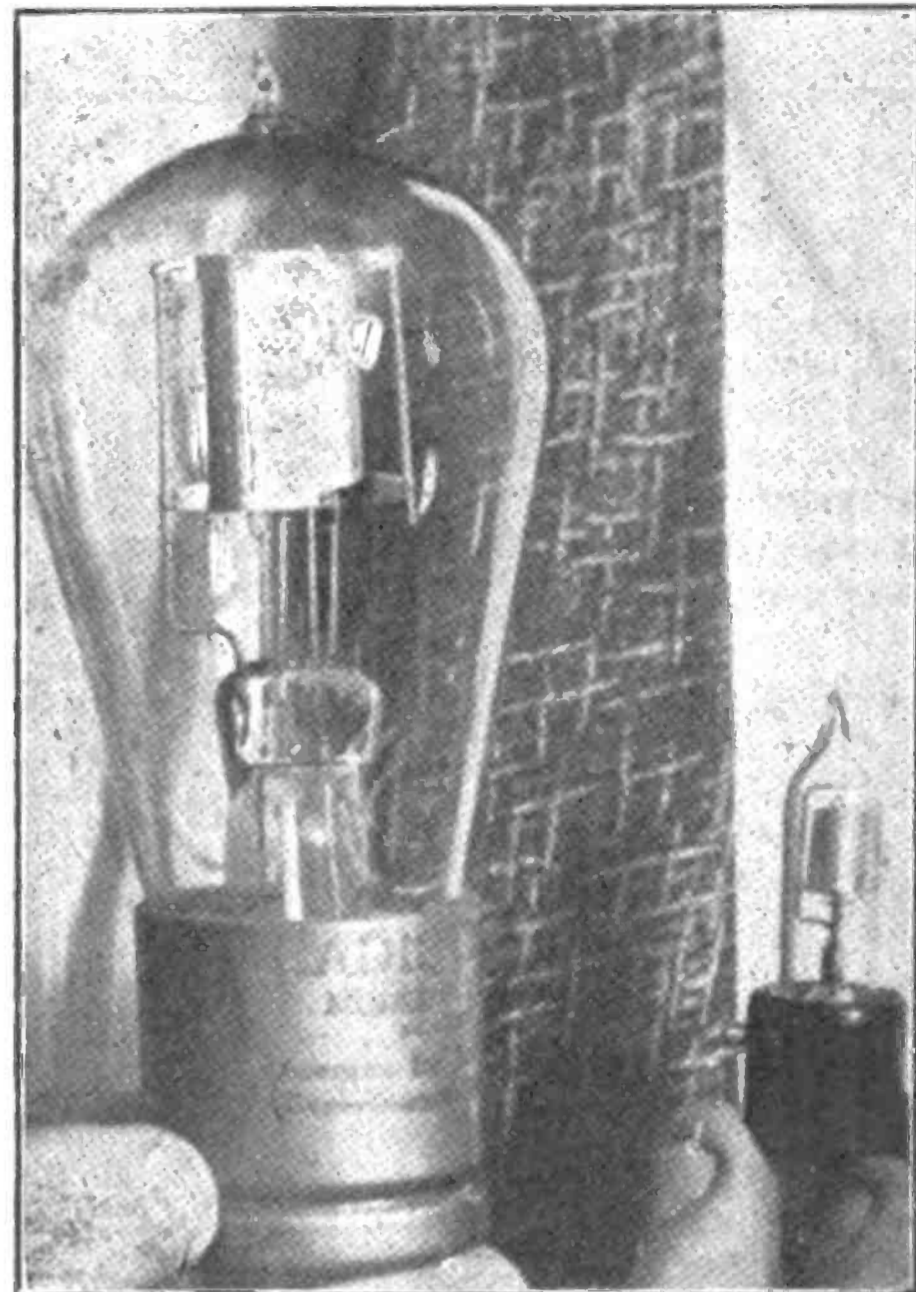
You who are in good health and enjoy listening to concerts, close your eyes a moment and picture this boy who, we have learned, is but 14 years old, lying in bed fighting off an attack of diphtheria and still reaping the harvests of pleasure that WLW is sowing. Also picture this boy's dog beside him, with head phones at his ears, and sharing the enjoyment of his little master.

Latest Radio Equipment Plays an Imp



(C. Kadel & Herbert)

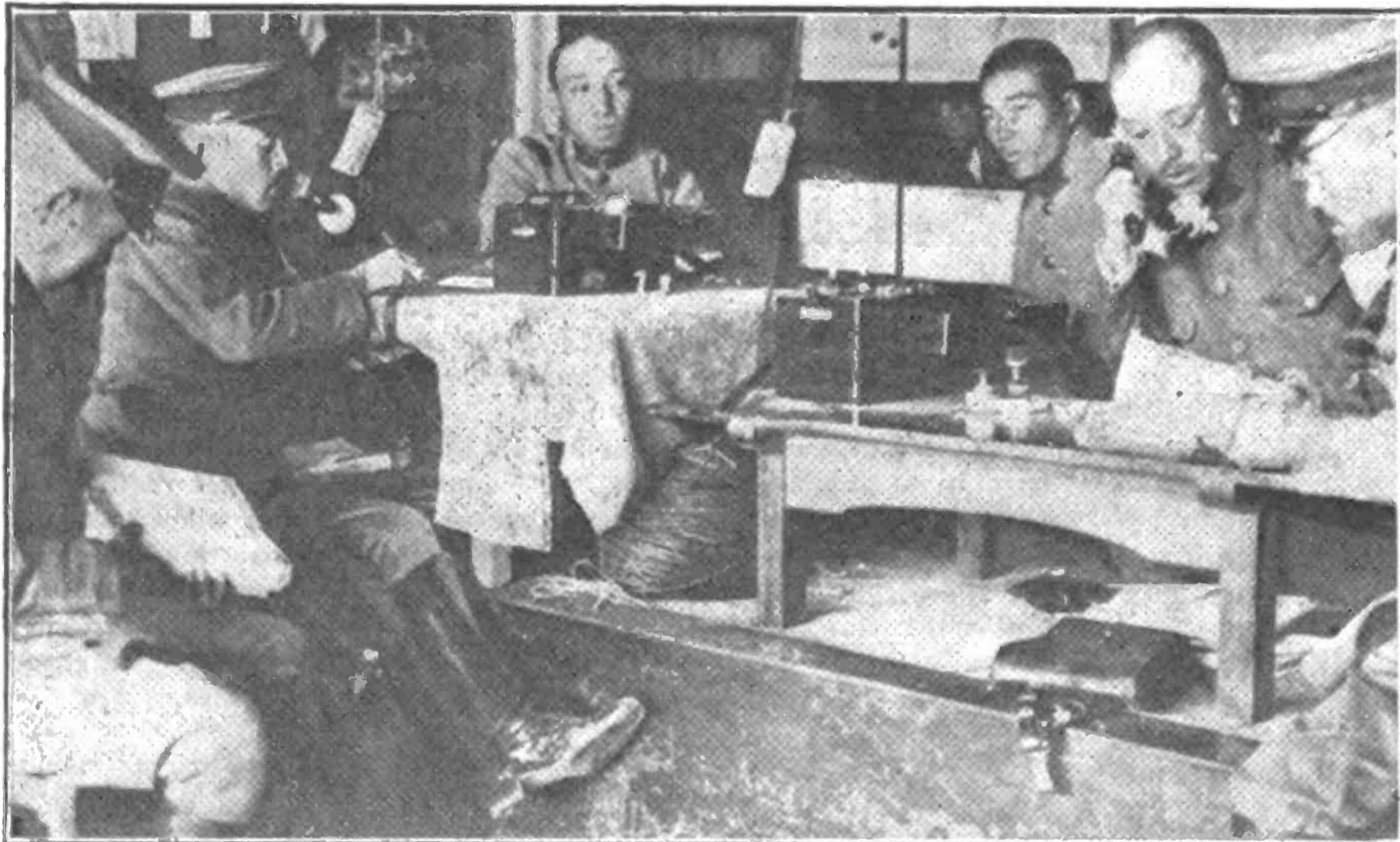
(Above) W. F. Bingham, Manhattan manager of the Radio Relay League, who has charge of all radio-message traffic in the Second District. To carry on this important work successfully, a perfect receiving station is essential. On the left of the photograph may be seen Mr. Bingham's long-wave receiver. On the right is the short-wave receiver and part of the transmitting apparatus.



(C. Kadel & Herbert)

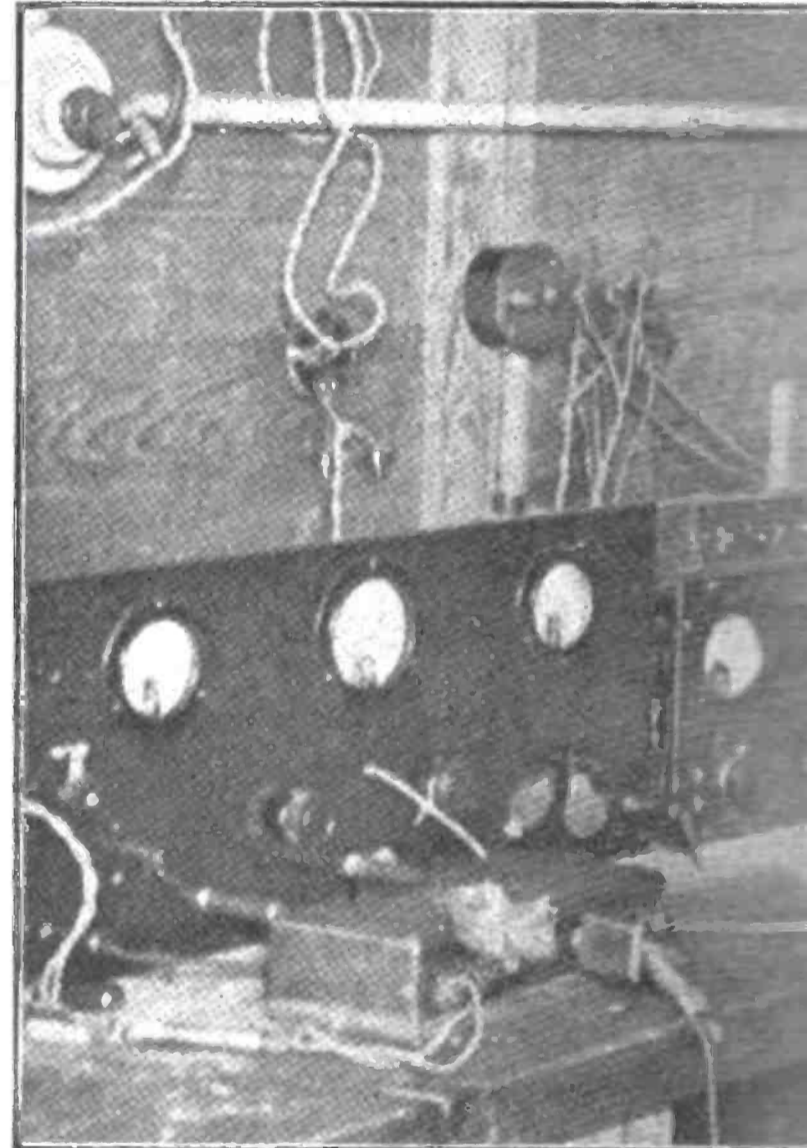
(Left) claimed well-known three cell. It made b connect in a pri it w

(Right) carried slung o a trans of about used w case w also in part of



(C. Underwood & Underwood)

(Above) Interior of GHQ, the radio-receiving and transmitting station of the Imperial Army of Japan. This station is situated at the base of the picturesque and storied mountain, Fujiyama.



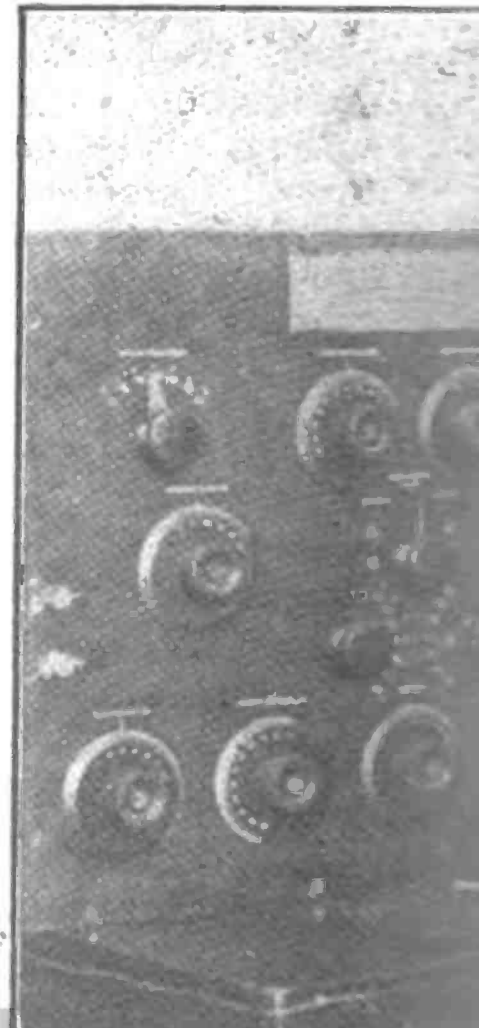
(C. Keystone View Co.)

What is believed to be the first municipal station on the roof of the Chicago City Hall as a station, with the call letters 9 XAM. For messages, but in March, 1922, it was entered



(Left) Newspaper men reporting the Dartmouth-Cornell football game by radio. How times have changed! Up to a year ago, we had to wait until the papers came out next day before we could tell about the plays of each big game.

(Right) Professor John Hassett Vegessy, of Fordham University, at the receiving set of that institution. The radio students at Fordham are fortunate in having some very fine radio equipment. This photograph shows their receiving station. On the left is a very interesting regenerative set of the "composite" type that covers a wave-length range from 150 to 16,000 meters. There are three distinct sets in this cabinet, the first being used for 150 to 550 meters, the second for 550 to 5,000 meters, and the third (using honeycomb coils) for 5,000 to 16,000 meters. Most of the large foreign stations, including



Important Part in the Service of the World

...ture vacuum-tube shown in this photograph, it is the smallest ever made. It is less than half the size of the "pentode tube," invented by Dr. Irving Langmuir. It has a grid, and filament. It operates on a small dry-battery and is designed that it will bring in signals loud and clear. It was built by a New York radio amateur solely for experimental purposes in a miniature pocket vacuum-receiver which he is entering in a contest. An idea of its small size may be gained by comparing it with the larger radiotron tube shown in the same photograph.

...another wonderful miniature radio set—one that may be carried in a case. It will fit into a small kodak case and may be carried by the owner on his travels. It has a range of about three-fourths of a mile and a receiving range of about three-quarters of a mile and a receiving range of about three-quarters of a mile. Note particularly the miniature tube and the microphone. The dry batteries may be carried in the camera of the set. Mr. Sterling G. Sears, who built the set, is shown in the photograph. He is talking into the small microphone that is shown in the photograph. This is another view of the receiving set shown on our front cover.



(C. Kadel & Herbert)

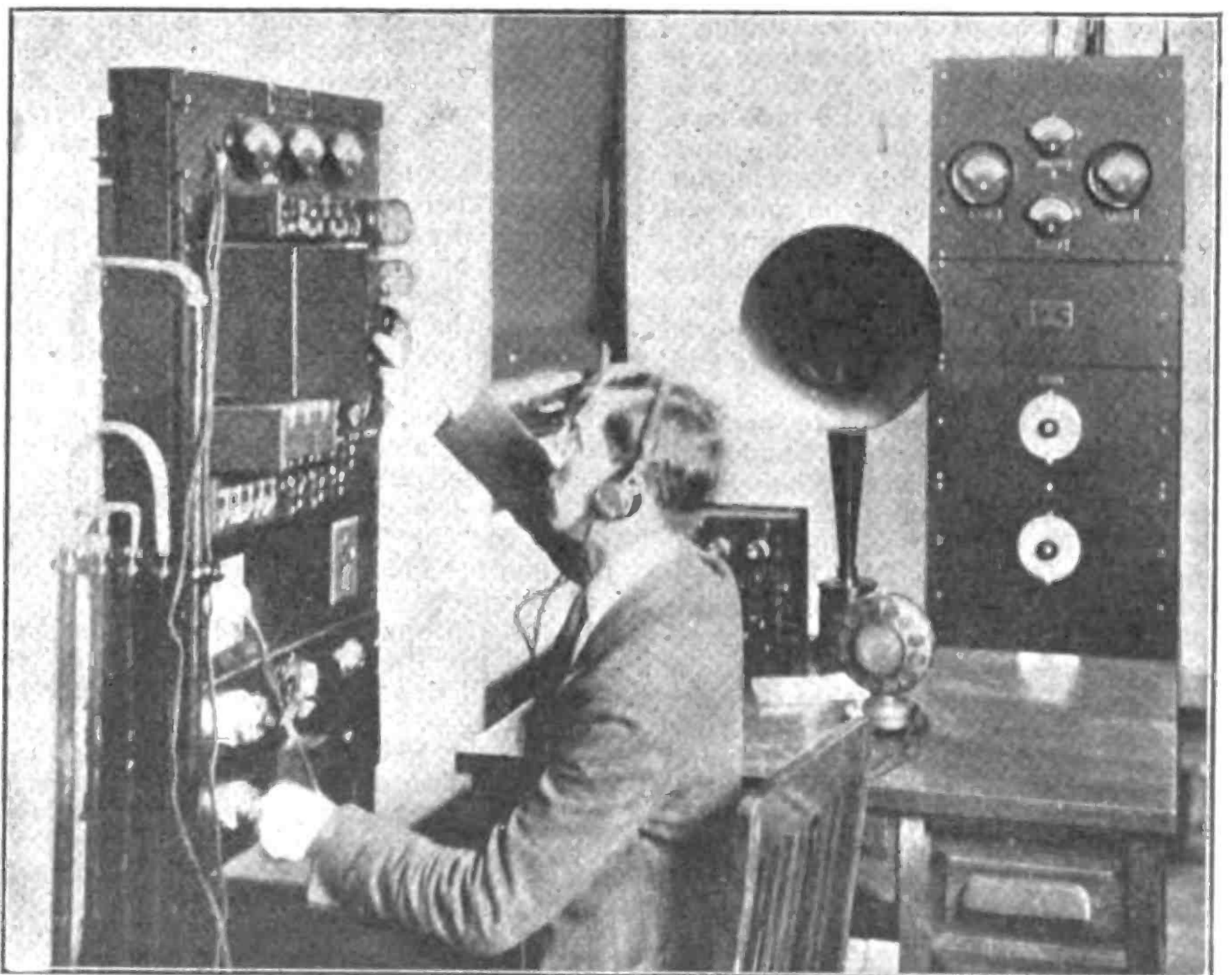


(Right) The Prince of Wales, now an ardent radio fan, is broadcasting a message to 60,000 boy scouts in his country. He is photographed speaking into a field telephone, his words being carried by wire to Marconi, London, and from there broadcast over Great Britain.

(C. Keystone View Co.)



...ion in the United States, was established in 1921, and operated as an experimental station. The station was used merely for local broadcasts of national stations. Its call is WBV.



(C. International News Reel)

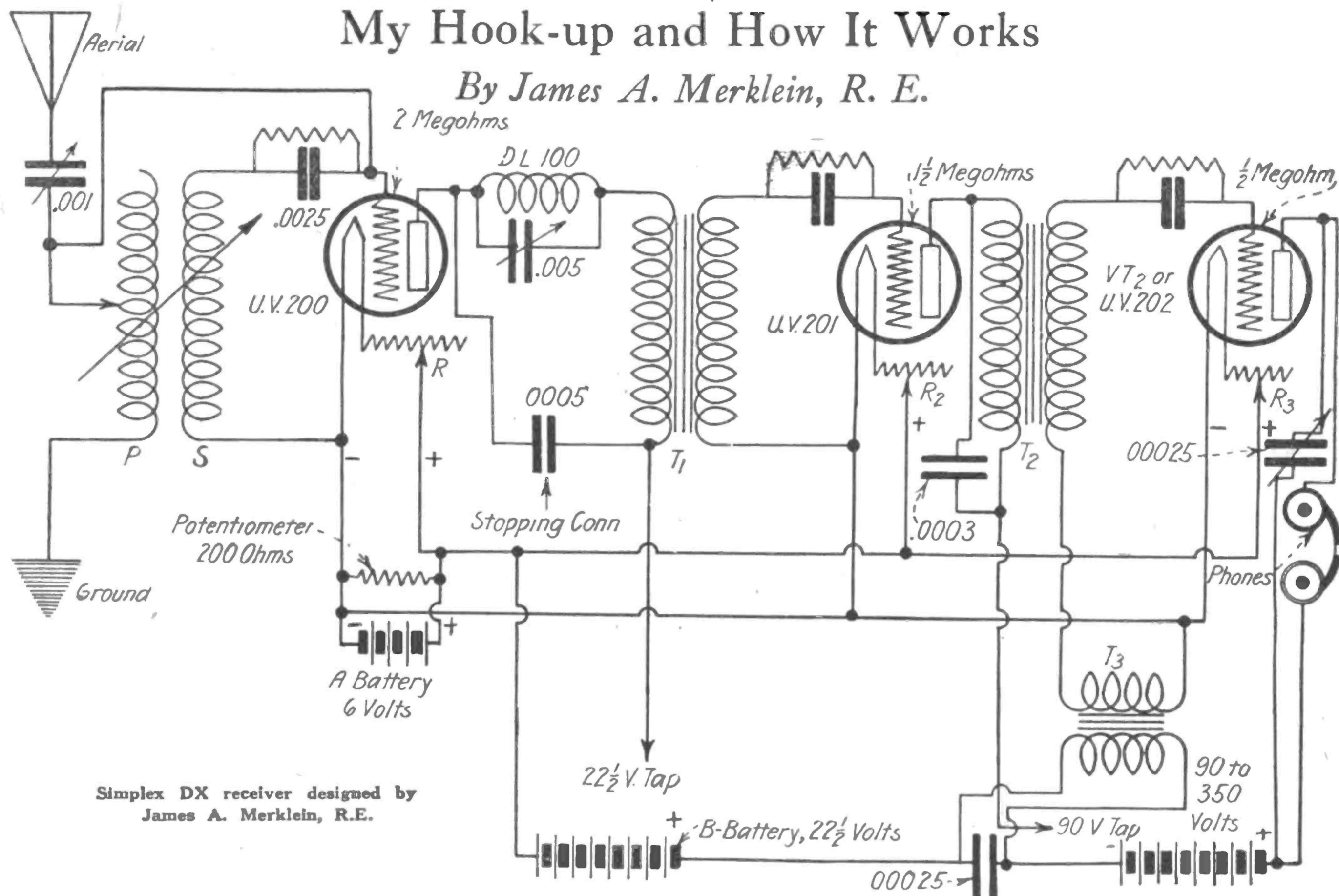
(Above) The transmitting room of station WWZ, Wanamaker's, New York City. This station which works on a 300 meter wave-length is equipped with a vacuum-tube transmitter of the Western Electric type. The operator is shown here adjusting the transmitter to maximum signal strength. On the table is the power amplifier and loud speaker. This station also uses a power voice-amplifier. Without this device success in broadcasting would be questionable; but this new device is able to convey, without losing even the fraction of a sound, music and the human voice—from any place where they may be produced—to the broadcasting



With the DX Night Owls

My Hook-up and How It Works

By James A. Merklein, R. E.



Simplex DX receiver designed by James A. Merklein, R.E.

IN the aerial I have, in series, a .001 or 43-plate variable condenser. Next is the coupler, and this must be made by the fan. Take a piece of Formica tubing 4 inches in diameter and 5 inches long, and wind on this 54 turns of No. 20 DCC wire and tap at every 6 turns until 9 taps have been taken off. Very loose coupling must be employed when winding the coupler. Start to wind $1\frac{1}{2}$ inches from one end to allow sufficient space for fastening the brass strips which are about $5\frac{1}{2}$ inches long and $\frac{1}{2}$ an inch wide, of 1-16 inch stock brass. A $\frac{1}{4}$ -inch hole is then bored through each piece, $\frac{1}{8}$ inch from one end, to fit the shafting of the rotor.

The next step is the stator or secondary of coupler. A $3\frac{1}{2}$ -inch wood ball must be used. On this wind 30 turns of the same size wire, placing 15 turns on each half of the rotor.

In the plate circuit is a D-L 100 honeycomb coil, shunted with a .0005 variable condenser, and must have the vernier attachment plates. This will have to be played with, as I have found that this size coil will not work as it should. I have found some coils not rated as they should be. In other words, the proper amount of inductance should be between three and six milhenries. Across this is shunted another .0005 condenser of the fixed type. This must be used, as the oscillations from the amplifier tubes are so great that something must be placed before these tubes in order to stop the detector from becoming choked. Therefore, this acts as the stopping condenser.

T-1 is and must be a U-V 712, Radio Corporation transformer, due to its high ratio which is $\frac{9}{1}$ the secondary; or S-2, which is usually marked "G." is in series with a .00025 Dubilier grid condenser, type 601, with grid leak mounting. The same size is also required for the de-

detector. Without the grid mount, use type 600. Across the secondary leads is shunted with a 1-megohm tubular grid leak, (A 2 meg. is shunted across the secondary of the coupler. See diagram), T-2 and T-3 are the usual type 4/1 ratio transformer, but of the standard type. The grid leak on the last step must not be more than $\frac{1}{2}$ megohms.

T-3 transformer and T-2- are coupled. That is, the filament side S-1- is tapped onto S-2 or grid side of T-3-; S-2 of T-1 is run to the grid condenser—00025—and then to the grid. S-1- of T-3- is then connected to the negative side of the filament. The primary side of T-3 is connected to the B battery, as will be seen in the diagram, and must be shunt with a .0005 fixed condenser.

Across the phones is a .00025 variable condenser or 11 plate with vernier attachment. This will give a very fine and exact tuning.

A potentiometer is to be shunted, according to the diagram. Much of the result will depend on this for proper adjustment.

I will be glad to hear from any radio fan regarding the results obtained with this hook-up. Any questions concerning this set will be cheerfully answered.

The total amount of the B battery is 350 volts, having a $22\frac{1}{2}$ -volt tap and a 90-volt tap, the 350 tap for the last tube.

Use a U V 10 in the detector, U V-201 in first step, and a power tube, V-T-202, or U V-202 in the last step.

Mr. Merklein QSL's

EDITOR, RADIO WORLD—In RADIO WORLD No. 34, dated November 18, I note that Mr. Walter George McKinley claims that he has me snowed in, but I believe

that this letter will find him to be somewhat in need of a rowboat. Another thing, WDAP was working on half power. I also would like to impress on him, also, that I am no newly found radio fan, but an amateur wireless-operator who has been ticking the key for the last six years; therefore, broadcast music is nothing to me, only an aid in my DX experiments.

I don't claim any records, and my reason for the "rite" up that time was to find out what the other fellow is doing. This we need in order to keep radio moving; so let's all get together and make radio a bigger success.

The following list of stations were received QSA through QRN. These tests were made between the hours of 9 P. M. and 3 A. M., from November 3 to November 18: WLAY, Fairbanks, Canada; PWX, Cuba (concert in Spanish); KSD, St. Louis; KFU, Gridly, California (faint); CFCA, Toronto, Canada; KDKX, Honolulu.

Please QSL your results on this tuner.
—James A. Merklein, Brooklyn, N. Y., I. R. E., Member of the Radio League of America and the American Radio Relay League.

Call Set "Freak"; but It Delivers the Goods

EDITOR, RADIO WORLD:—After reading the results made with some sets, I feel as if I will not be taking too much of your time in telling you of my success. I am using a home-made set of one tube built for short- and long-wave receiving. I also have a crystal mounted on panel for code. My inductance consists of a primary of 360 turns, No. 24, wound on a tube 5 inches in diameter,

(Continued from preceding page)

also 90 turns wound on the same tube at 1 and taped every 15th turn for tickler inductance, a 4 $\frac{7}{8}$ -inch rotor, wound with 90 turns of No. 24 on the same end, and in plate circuit on other end of the coil. I have a sliding secondary 4 $\frac{7}{8}$ inches in diameter wound with 320 turns of No. 24 enameled wire. The switches are provided to use either loose coupler, vario-coupler, or both. I have a 23-plate condenser in aerial circuit, and a small fixed condenser across phones. My aerial is a 3-wire, 86 feet long and 38 feet high. I have heard KSC, San Jose, California; KQA, Denver; the Fort Worth, Texas, "Journal"; WHB, Kansas City, Missouri; CJCE, Vancouver, B. C., and WGY, KDKA, WSB, WOC, and KSD regularly. Some say that my set is a freak; but it delivers the goods and is always under control.—J. T. Cavanaugh, 1024 Leahy Street, Muskegon Heights, Mich.

83 Stations, His Record

EDITOR, RADIO WORLD:—From 5 o'clock until 11 o'clock p. m., I average from 15 to 18 stations. Last election night, from 5 p. m. to 3 a. m., I caught 30 stations giving election returns. I keep a map and log. My record to date is 83 stations outside of the State of Georgia, including Canada and Cuba. The words and music come in clearly. I operate a one-tube home-made short-wave regenerative set with vario-coupler and two variometers, mounted on back of panel, and a variable condenser. I also use a 6-wire cage-aerial, 80 feet long, 50 feet high, north and south direction. The diameter of the cage is 12 feet. My lead-in, which is a 6-wire cage, is 50 feet. My counterpoise is a 3-wire, 80-foot, mounted 8 feet from the ground. I invite anyone to write me about my hook-up.—James L. Fischer, 72 Spring Street, Newman, Georgia.

Claims the Record

EDITOR, RADIO WORLD:—I have read with interest the letters from Mr. Merklein, Mr. McKinley and Mr. Miller, each giving their receiving records on one tube. I think I can beat their records. Using a two-variometer type set, one detector tube and 48 volts, I receive the following loud and very clear: WGY, Schenectady, New York; WDAP, WJAZ, and KYW, Chicago; WOC, Davenport, Iowa; WNB, Kansas City, Missouri; WGM and WSB, Atlanta, Georgia; NOF, Anacostia, D. C.; WJZ, KDKA, WBZ, WOR, WIP, WEF, WBAY, WHAZ, WWJ, WNAC, WQAA and others in New York State and other States. These are all heard on a 4-wire inverted-L aerial 40 feet long and 35 feet high, 15 feet above a tin roof.

With the same set and tube not lit to extreme brilliancy, with no aerial connection, only ground connection, I have heard WGM, WSB, WOE, KYW, WDAP, WGY, WJZ, WBAY, EEF, KFAF and 2X1 very plainly. I think this record can surpass any of those RADIO WORLD has published.—E. Sherow, Box 365, Millbrook, New York.

Takes His Set with Him

EDITOR, RADIO WORLD:—I have been reading in RADIO WORLD of the excellent results accomplished by other "radio-phans." Messrs. Merklein, Brooklyn, New York; W. G. McKinley, Bayonne, New Jersey, and E. L. Miller, Chappaqua, New York, seem to be doing very well, indeed.

I am a resident of Brooklyn, down here on business, and have my set with me.

It consists of the conventional vario-coupler, variable condenser, variometer, detector and one stage of a. f. I only use 22 $\frac{1}{2}$ volts for the detector and 45 on the amplifier. Why waste the power?

I am surrounded by high hills. My aerial is a single wire, 115 feet long and only 14 feet above ground. A 440-volt lighting line passes 5 feet above it, and a 5500-volt power line is less than 50 feet away. The aerial also passes close to the roof of an electrically operated printing plant, and is parallel to a 220-volt light line and a couple of telephone lines. In spite of these handicaps, my set "does its stuff right niftik" every day and night.

I have received concerts from more than 45 stations in 17 different States and Canada. These stations are from 59 to 1169 miles distant (accurately measured air-line). My best reception is from stations upwards of 560 miles. On the night of November 9, I received music from 18 stations in 13 States from Massachusetts to Minnesota, and from the Mississippi Valley to Texas.

Here are some of the fellows I hear every time we are on the air together:

KDKA, Pittsburgh; WOO and WIP, Philadelphia; KSD, St. Louis; WOS, Jefferson City, Missouri; WDAF and WHB, Kansas City, Missouri; WWJ, Detroit; KYW, WDAP, and WMAQ, Chicago; WBAP, Fort Worth, Texas; WLAG, Minneapolis; WFAC, Superior, Wisconsin; WKN, Memphis, Tennessee; WSB, WGM and WDAJ, Atlanta, Georgia; WOC, Davenport, Iowa; WGY, Schenectady, New York; WGI, Medford Hillside, Massachusetts; WBZ, Springfield, Massachusetts; WNAC, Boston; also WJZ, WEF and WOR, the ones I hear most while at home in Brooklyn.

I can easily tune out KDKA which is only about 59 miles away and very powerful.

Frequently I use a small funnel for a megaphone loud-speaker while receiving WWJ and WHB.

My set is home made (by myself) and I have not yet soldered the connections. Some nice cold evening I hope to hear something from the Pacific Coast! Until them.—John S. Frampton, Spangler, Pennsylvania.

Good Detector-Tube Reception

EDITOR, RADIO WORLD:—I get KHJ (Los Angeles, Cal.) regularly, having had them five evenings this week; DNA of Denver, also Winnipeg, Canada, and Havana, Cuba. I receive many other stations at 1,000 miles and over. All this is being accomplished while experimenting on a detector tube without amplification. I don't just get them and hear the call, but I get as much of the broadcasting as I care to hear. Without amplification, I think this record is pretty good for detector-tube reception.—H. S. Rahiser, Box 43, Crafton Station, Pittsburgh, Pa.

Harlem Club Wants Members

THE Radio Club of East Harlem was organized September 20, 1922, the following officers being elected: Harold Itzel, president; John N. Itzel, secretary; John D. McEvily, treasurer; William Bogdel, instructor. The main object of the club is to bring together radio amateurs living in the district from 125th Street to 96th Street, east of Fifth Avenue.

The present total membership of the club is fifteen, and as the membership is limited to thirty-five, there is room for twenty more members. Write the secretary, John N. Itzel, 175 East 111th Street, New York City.

No Wireless Receiving set complete without it

Make it the **GREATER Radio Christmas**

THIS year the message of Christmas will flash one inspiration over all lands and to all peoples — no frontier can turn back the swift messenger, Radio, whose steed keeps pace with light.

The gift of all gifts is Magnavox Radio, the Reproducer Supreme: the gift that will mean most to every member of the family, old and young.

Let Magnavox bring you daily the world's news and entertainment — the greatest victory of science, the greatest opportunity of art!



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. \$85.00

R-3 Magnavox Radio with 14-inch horn: the ideal instrument for use in homes, offices, amateur stations, etc. \$45.00

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

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

When you purchase a Magnavox product you possess an instrument of the highest quality and service.

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The Reproducer Supreme

Answers to Readers

PUBLISH a hook-up for a short-wave regenerative receiver consisting of a vario-coupler and two variometers to a one-step of radio-frequency amplification; also a detector and two-stage amplifier of the audio type. I intend to use filament-control jacks. I would like to use this set for long distance. I have a V-T 1 and 3 V-T 2 vacuum tubes.—George Buser, Springfield, Mass.

Radio-frequency cannot be employed with the variometer type of receiver. Radio-frequency is a different principle. In RADIO WORLD, No. 19, dated August 5, also in No. 24, dated September 9, are some very interesting diagrams of radio-frequency amplifiers. These hook-ups for one tube, two tube, and three-tube radio-frequency amplification.

Give me a hook-up for a receiving set using Myers tubes and vario-coupler, grid variometer, plate variometer, and detector.—W. A. Lewis, Ashtabula, Ohio.

See above reply to Mr. George Buser.

I have just bought a crystal receiver. I would like to know if there is any chance of increasing the mileage of this set so I can

hear stations of greater distance?—Carl Righter, Jr., Davenport, Iowa.

You may increase the range by adding a two-stage amplifier to your crystal set. Get a vacuum-tube detector and make your set regenerative.

Can a tickler coil be used with a crystal set? How many plate-variable condensers should be used with a double-slide tuner set? With a loose coupler?—Paul Moller, Schenectady, N. Y.

A tickler coil cannot be used with a crystal set. The number of plates that the variable condenser should have depends on how you intend it for. A condenser having 43 plates, or one rated as having a capacity of .001 microfarads, will give quite a range of wave lengths. It is best not to use a condenser of very large capacity across the secondary of a loose-coupler when a crystal detector is used. More than .0005 mfd., is not advisable for this purpose.

I have a set consisting of loose-coupler and a crystal detector with variable and fixed condensers which I intend changing into a vacuum-tube receiver. Is it better to discon-

nect the loose coupler entirely and construct the set with a tickler coil; or would you advise adding a variometer and variable condenser to the loose coupler?—Harold Johnson, Milwaukee, Wis.

This depends entirely on the range of wave-lengths on which you desire to work. If you want a set covering all wave lengths, the honeycomb coils or spider webs will be best. But if you want a set solely for short waves, the loose-coupler set might be better.

I am using a two-stage hook-up. I would like to substitute a 1½-volt detector tube for a U-V 200 and still use the U-V 201 as amplifiers, also to add variometers to grid and plate circuits.—Michael Baschia, Coney Island, N. Y.

It will be all right for you to use the 1½-volt tubes in your set provided you use separate battery circuits entirely for the detector and amplifying sections. Use the dry battery to light the tube of the detector and a separate B battery. The input to this section can be led from the place where the telephones are in the detector-circuit unit. You can add the variometers in the usual manner.

The radio set I purchased last month was going along all right until something happened and I didn't get a peep out of it. Looked it over—but cannot find any loose connections. The batteries are still new. I have some German condensers with a 2,000-adjustable clearance space between plates.—Maurice Kaplan, N. Y.

It may be possible that your condensers are short circuited at certain points, due to metallic dust between the plates. This sometimes happens, especially in condensers where the clearance is so small. Test them by joining them in series with the wire connected to the buzzer, then varying the condenser. Should the buzzer work, it will indicate that the condensers are short circuited. Clean the plates carefully or ascertain just where the shorting takes place. Your connections are all right.

With my home-made detector, I hear most of the local stations. Sometimes I hear WGY faintly. Enclosed find my diagram and aerial. Is there anything I can add to increase the range of my set? Possibly I may add something that will help me to tune better.—Alvin Jones, Syracuse, N. Y.

Your results are very good for a 4-wire aerial, 50 feet long. Your location must be high and unobstructed. You might try the .001 mfd., variable condenser in series with the tuning coil and then use more inductance to get the same wave length.

Is it possible to hookup regenerative circuit with honeycomb coils or D-L coils instead of variometers or vario-couplers? Can I use two WD-11 tubes in the above circuit and hook it up as one step of radio-frequency and one stage of audio-frequency?—L. C. Edgar, Detroit, Mich.

It is possible to hoop up a regenerative circuit with either of the honeycomb coils or the duo-lateral coils. Using the WD-11 tubes as radio-frequency amplifiers is impossible. They will not stand up for radio-frequency amplification.

Please publish a schematic diagram for a two-step audio-frequency amplifier using spider webs—primary, secondary, and tickler—one 43-plate condenser and one 23-plate condenser.—Wendell Weiss, Cranford, N. J.

This circuit was published in RADIO WORLD, No. 24, dated September 9.

One circuit I never found in any radio magazine is the superheterodyne. I would appreciate an article and hook-up of this set.—J. F. Swan, Seneca Falls, N. Y.

An illustrated article showing the panel, front, and back view of this set with a complete hookup was published in RADIO WORLD, No. 28, dated October 7.

In the Good Old Winter Time



(Cartoon by Harry J. Stillman)

Too Late!



From "The Chronicle," San Francisco, Cal.

What Radio Now Offers

SIX months ago any discussion of broadcasting brought up the subject of the quality of the programs which to some seemed below the average. Today the same general subject is widely discussed, but the particular phase on which emphasis is placed is the interference between good programs. Without a doubt the broadcasting stations are putting on features without a parallel in the worlds of art, literature, and sport, says "The Globe," New York.

With the broadcasting of the Chicago opera season called a great success both by listeners-in and the management of the opera, and with the recent broadcasting of the New York Metropolitan stars in the opera "Aida," the American stay-at-home public is being supplied with the finest operatic art in this country, and, perhaps the world. Between the areas covered by the two stations through which the Chicago and New York operas were broadcasted the most famous operas have been made available to two-thirds of the people of the United States and Canada.

From operas to sporting events is a long jump but no feature of broadcasting has been followed by so many fans as the successful broadcasting of the world's series baseball games and the football contests between the big colleges. When a big corporation decides it worth while to tie up two 900-mile long distance telephone lines for three hours while play by play reports of a football game are sent over the wires to a broadcasting station, the radio fans should begin to realize the immense sums of money being expended for their entertainment, and given to them without charge.

As for entertainment and general educational material, practically every program every day will be found to contain more text on subjects near to the home than any two home magazines. Moreover the facts are freshly gathered and as a rule are presented in a manner that cannot be approached by cold type and lifeless illustrations.

If the people of this country could be made to realize what they are missing during these fall days and nights, radio manufacturers would be forced to overtime work to fill the demand for better class receiving sets.

52 Weeks for \$6.00

Complete Your File of RADIO WORLD
Copies of Radio World No. 1

If you did not get a copy of Radio World No. 1, send us \$6.00 and we will send you this paper for one year, and start it with our first issue, which will be mailed you as soon as possible after receipt of order.

RADIO WORLD

TELEPHONE, BRYANT 4796
PUBLISHED EVERY WEDNESDAY (Dated SATURDAY OF SAME WEEK)
FROM PUBLICATION OFFICE,
1493 BROADWAY, NEW YORK, N. Y.
BY HENNESSY RADIO PUBLICATIONS CORPORATION
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FRED S. CLARK, Secretary and Manager
1493 BROADWAY, NEW YORK, N. Y.

ASSOCIATE EDITORS

Robert Mackay Fred. Chas. Ehler

SUBSCRIPTION RATES:

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Add \$1.00 a year extra for postage to Canada and foreign countries.

Receipt by new subscribers of the first copy of RADIO WORLD mailed to them after sending in their order, is automatic acknowledgment of their proportional rates.

Advertising rates on request.

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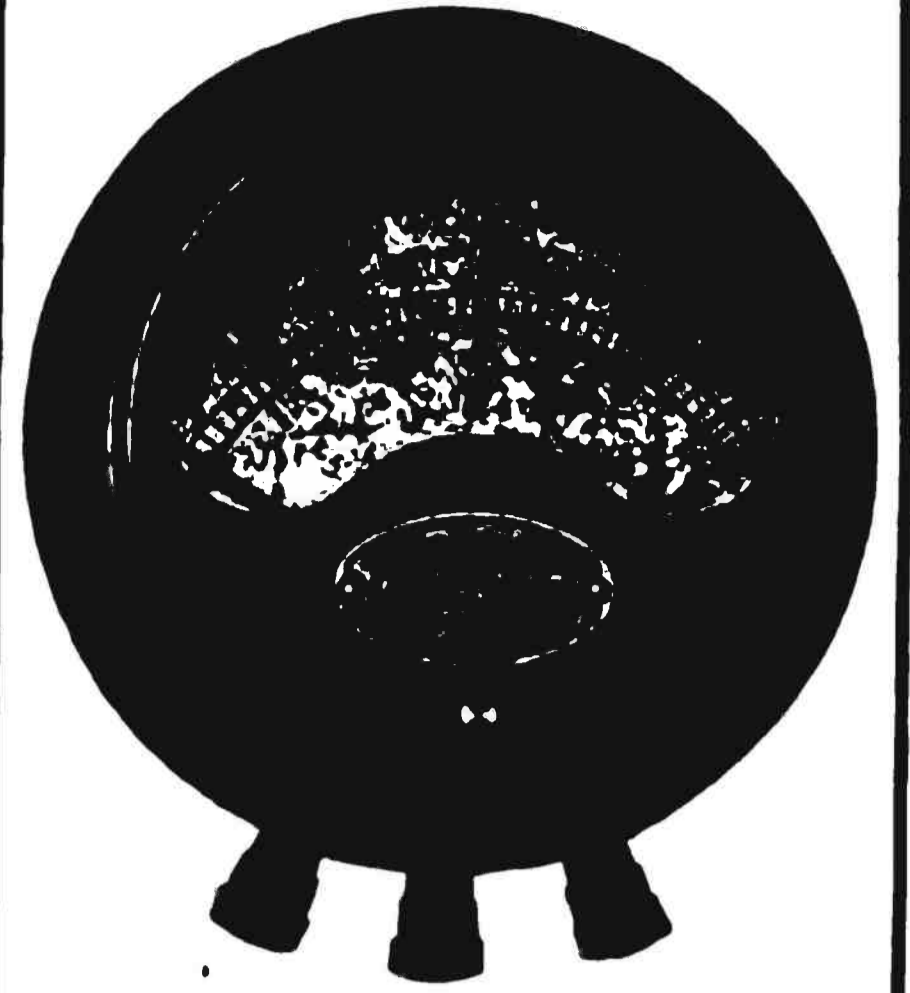
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Five cents per word. Minimum, 10 words. Discount of 10% on 4 consecutive issues—15% on thirteen consecutive issues. Cash with order.

Entered as second-class matter, March 28, 1922, at the Post Office at New York, New York, under the act of March 3, 1879.

IMPORTANT NOTICE:

While every possible care is taken to state correctly matters of fact and opinion in technical and general writings covering the radio field, and every line printed is gone over with a scrupulous regard for the facts, the publisher disclaims any responsibility for statements regarding questions of patents, priority of claims, the proper working out of technical problems, or other matters that may be printed in good faith and on information furnished by those supposed to be trustworthy. This statement is made in good faith and to save time and controversy in matters over which the publisher cannot possibly have control.



Pignolet RADIO VOLT-METER ONE INSTRUMENT MAKES ALL TESTS

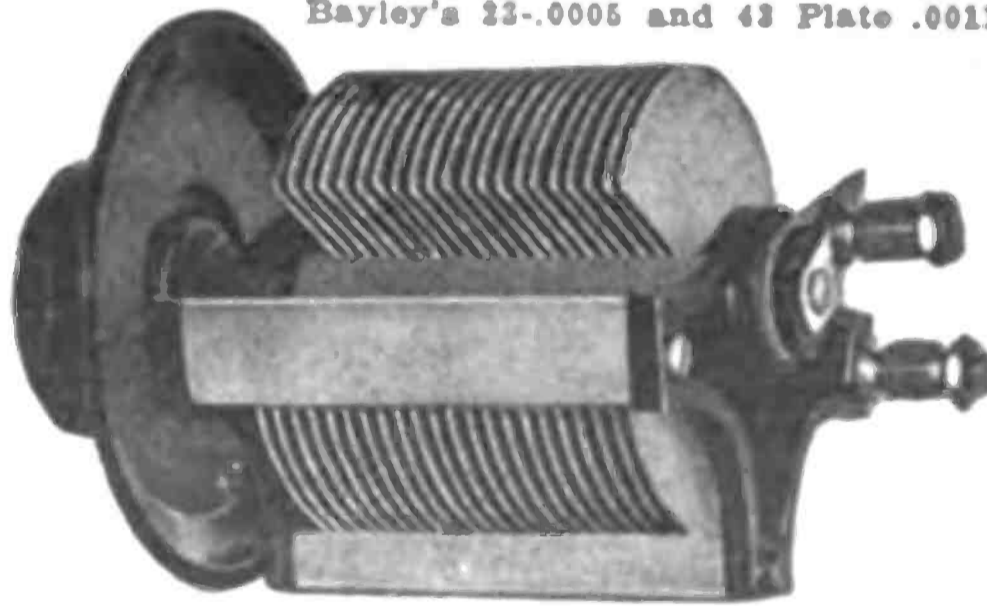
Write for booklet with suggestions for testing and adjusting Radio Sets.
Thousands now in use give absolute satisfaction.

Pignolet Instrument Co., Inc.
114 Liberty Street, New York, N. Y.

Radio World, 52 issues, \$6.00
Subscribe for RADIO WORLD. \$6.00 a year, \$3.00 six months, \$1.50 three months.

RADIO FINDS A BETTER CONDENSER

Bayley's 23-.0005 and 43 Plate .0011.



Its plates spaced close give it the finest tuning qualities.
It is a die-cast product; the stationary plates are cast solid, accurately and permanently spaced, on three upright supports, while the movable plates are cast on the center revolving spindle. Plates cannot loosen, which eliminates shorting.
Each condenser has our money-back guarantee.

Price, 23 Plates \$2.25 each
43 Plates \$3.75 each

TO JOBBERS AND DEALERS
A SPLENDID PROPOSITION
Bayley Condenser Co.
105-109 Vanderveer St., Brooklyn, N. Y.

FILL OUT AND MAIL NOW
SUBSCRIPTION BLANK

RADIO WORLD

RADIO WORLD

1493 Broadway, New York City.

Please send me RADIO WORLD for months, for which

please find enclosed \$

SUBSCRIPTION RATES:

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Let Radio World Test Your Goods

MANUFACTURERS, send a sample of your goods to our Technical Editor, Fred Charles Ehlert, 9006 Pleasant Street, Queens, Long Island, New York. It will be carefully tested. If your goods satisfy our experts, RADIO WORLD'S endorsement will be published in our merchandise department without charge or obligation of any kind on your part. When the radio purchaser sees a published test in RADIO WORLD with the seal accompanying this editorial attached, he will know that the product stands for perfection and has the guarantee of RADIO WORLD. RADIO WORLD is rendering a service through its testing department that is prompt, accurate and produces results. All goods will be returned to manufacturers, after testing, provided stamps are sent for that purpose.



Heard at Radio Counter

A Conversation Between Customer and Radio Clerk

(Part VI)

IN building a radio-frequency amplifier, should the panel be shielded for body-capacity effects?"

"In either radio-frequency or audio-frequency amplification, body-capacity effects will be eliminated if the panel is shielded."

"Then you really believe that in an unsheathed receiver using radio frequency, there is a loss due to the set being improperly constructed?"

"Absolutely. In every case, shield your panel."

"Can I connect my output from the three-stage radio-frequency amplifier to the input of the audio two-stage amplifier with a detector?"

"Yes. This can be done very nicely and easily with a little patience. Watch carefully each connection you make, taking care of the proper plate-voltages. Another thing: don't forget to use all amplifying vacuum-tubes outside the detector. In this case, of course, we have to use the soft tube, better known to the layman as the detector tube. This, then, will give five amplifying tubes and one detector tube."

"Will my outside antenna work best with such a set; or must I employ a loop aerial?"

"Employ the loop aerial by all means and avoid using the outdoor aerial. The reason for the loop aerial is elimination of interference from stations, making the loop a practical compass-loop and cutting down static as well as interference."

(To Be Continued)

Coming Events

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

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

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

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

SOUTHEASTERN RADIO EXPOSITION, Auditorium Armory, Atlanta, Georgia, December 4 to 9, inclusive. Co-operative Radio Sales Assn., 206 Peachtree St.

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

Selling Radio to Farmers

IT is said that the farmers did a great deal toward making Henry Ford. They purchased automobiles because the automobile was a convenience that brought the city to their back door, says "The Mail," New York.

Who in radio is going to sell the farmer radio receivers? It is high time that such a campaign started. The rural territory is a potential one. Some business genius is going to hit upon the right plan for selling the farmers, and when he does he is going to make a fortune in a very short time.

Radio can be made indispensable to the farmer. This was proven by a recent case in Pennsylvania. A peculiar form of worm found its way into the corn fields. It was bringing about great destruction in certain localities. Experts of the Department of Agriculture got on the job and used the broadcasting stations of that State to tell the farmers how to effectively eliminate this pest. Great speed was essential; a delay of a day or two would wreck a large crop. The farmers who had receiving sets were out in their fields the next morning, applying the remedy that had been broadcast.

Broadcasting can be made so important to the farmer that the business angle of it should be handled by the various States working through the Department of Agriculture. A State owned and operated broadcasting station used to disseminate not only the information regarding market conditions, but practical talks on scientific farming would be a very good investment, costing only a small amount and bringing a large return. If a farmer loses a crop it may cost him anywhere from seven to eight thousand dollars. The State loses a certain amount of income, not only through tax but through general financial welfare.

RADIO GOODS AS GIFTS

Be sure to be represented in "Holiday Radio Gifts Number," out December 9. Copy for this issue accepted up to November 30, RADIO WORLD, 149 Broadway, New York.

A Valuable Book

THE third edition of the "Amateur Radio Call Book" has been issued by the publishers, Radio Directory & Publishing Company, 42 Vesey Street, New York City. It contains a complete list of all amateur, special amateur, and telephone broadcasting stations of the United States and Canada, also a large map in two colors showing the location of every broadcasting station. In addition, it contains valuable information on the construction and operation of a honeycomb-coil set, detector and two-stage amplifier. The book is divided into districts in the United States and Canada. The editor and compiler is Walter B. Spiegel, member of A. R. R. L., and H. R. C.

Every fan and amateur, particularly the DX night owls, will find this a valuable book. It contains just the information such radioists are constantly seeking. Price \$1, complete.

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.)

A. Schochet, Bronx, phonographs and radio sets, \$40,000; A. Schochet, A. Mintz, D. Lerman. (Attorney, P. Lerman, 110 West 42d St., New York, N. Y.)

CAPITAL INCREASE

The Orange and Rockland Electric Co. has increased its capital from \$1,000,000 to \$6,000,000.

FANS, AMATEURS, DEALERS, BROADCASTERS, MANUFACTURERS, AND THE GENERAL PUBLIC

Are Looking Forward to

NATIONAL RADIO WEEK
DECEMBER 23 TO 30, INCLUSIVE

All Interested in Radio Should Help to Make This Event a Smashing Success.

If you want to know more about it address:

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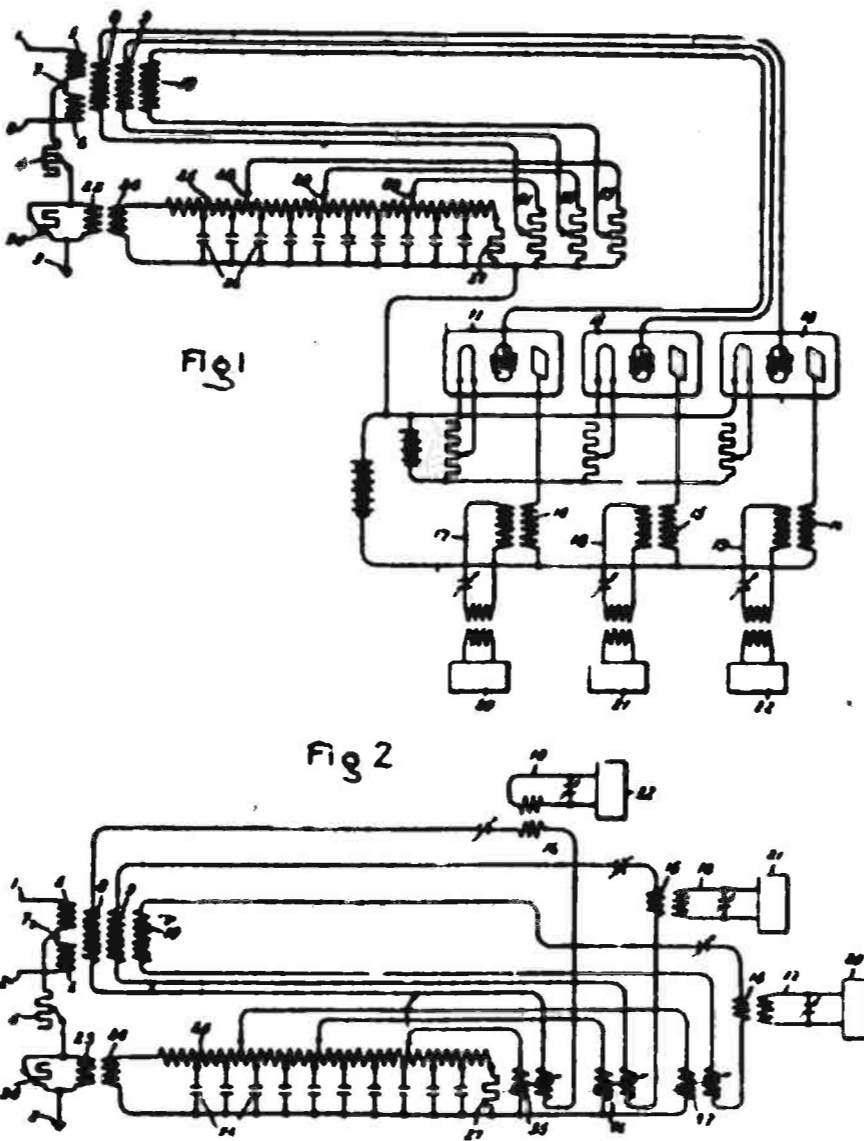
Latest Radio Patents

To Receive a Plurality of Signals

No. 1,435,000. Patented, November 7, 1922. Patentees: Edward W. Kellogg and Chester W. Rice, Schenectady, N. Y.

MESSRS. KELLOGG and Rice have been granted letters patent on a device to provide a method of and means for utilizing an antenna for the simultaneous reception of a plurality of signals of different wave lengths. With a long receiving-antenna extending in the general direction of transmission of the signaling waves to be received, signaling currents produced in the antenna by waves coming from any particular transmitting station will be strongest at the end of the antenna farthest from the transmitting station, while currents produced by waves coming from the opposite direction will be a minimum at that point. The antenna is preferably aperiodic, so that the strength of the signaling currents produced therein is substantially independent of the wave length.

In carrying out their invention, Messrs. Kellogg and Rice utilize an antenna of this type and impress from the antenna upon the input circuits of a plurality of electron-discharge amplifiers potentials produced in the antenna at a selected point. In order to improve the recep-



Schematic design of the Kellogg-Rice receiver.

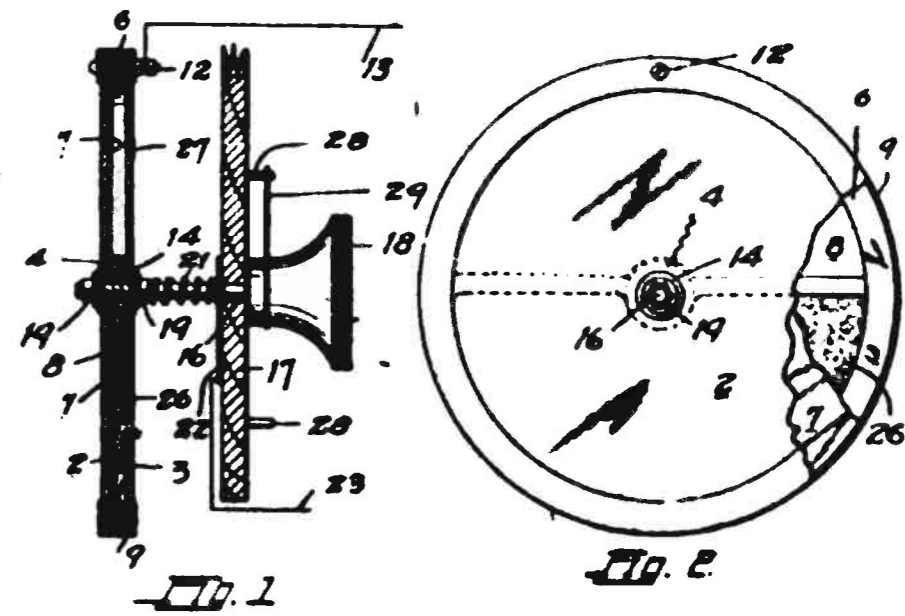
tion, they also provide means for impressing on each of these input circuits a current selected from another point in the antenna which will be of the proper intensity and phase to neutralize in each

receiving set, disturbing currents produced therein either by interference from undesired waves or by strays. Each of the output circuits of the amplifiers employs a resonant circuit which is tuned to the frequency of one of the desired signaling waves, and these resonant circuits are associated with receiving sets.

Low-Priced Condenser

No. 1,443,244. Patented, October 24, 1922. Patentee: John Parkin, Jr., San Rafael, California.

OWING to the number of persons at present experimenting in radio signaling, there is a great demand for a variable condenser of simple construction and capable of being made and sold at a low price. Mr.



Vertical section and rear elevation.

Parkin's invention is to provide a variable condenser to supply this demand, and in which the elements are reduced to the least possible number and are of the greatest possible simplicity.

The Truth Will Bear Repeating

CHAS. FRESHMAN COMPANY

Incorporated

97 Beekman Street
New York City

November 7th, 1922.

Radio World,
1493 Broadway, New York, N. Y.

Gentlemen:—We wish to thank you for your successful effort in getting additional advertising copy on our Variable Grid Leak and Micon Condenser in your publication to appear in the issue of Saturday, November 11th, 1922.

The reason that we sent you the copy at such a late date was that it has been our policy to advertise only one of our various products in each magazine, and we had an advertisement running on our Noiseless Tested Micon Condenser for your coming issue.

The results that we obtained from our first advertisement of the Variable Grid Leak and Micon Condenser combined were so great that we did not want to miss the opportunity of having it re-appear in the current issue.

It might interest you to know that outside of the general publicity that our Variable Grid Leak and Micon Condenser combined received from the first advertisement in your publication that we have received hundreds of direct orders from individuals and payments enclosed mentioning the fact that they saw the advertisement in RADIO WORLD. These inquiries came from all sections of the country.

We wish to congratulate you on the exceptional distribution of your publication.

Yours very truly,

CHAS. FRESHMAN COMPANY, INC.

(Signed) Myron Goldsoll

Vice-President in Charge of Sales

MG:JJ

Out Next Week!

On Sale Wednesday, December 6—Dated December 9

Remember "This Is a Radio Christmas"

and that millions of dollars will be spent during the holiday time for radio gifts.

Be sure to get your share of this business by advertising in the issue of RADIO WORLD of December 9, which will be

RADIO WORLD'S CHRISTMAS NUMBER

Thru this medium you can reach thousands of readers, who are not only interested in radio themselves, and want new equipment, but who also will give presents to others whom they wish to make radio fans.

ADVERTISING RATES:

Regular advertising rates in force for RADIO WORLD'S HOLIDAY RADIO GIFT (CHRISTMAS) NUMBER, as follows: \$150 a page, \$5 an inch. Discount, 10% four times, 15% thirteen times. Last form closes November 30, A. M.

Take advantage not only of RADIO WORLD'S circulation, but also its cash-thru-the-mail pulling power.

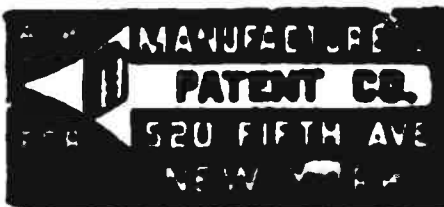
Be represented in RADIO WORLD'S Holiday Radio Gift Number, and reach the many thousands who actually want your goods and are ready and willing to pay for them.

Preferred Positions Must Be Booked Immediately.

Copy for run-of-paper position will be received up to November 30, A. M.

RADIO WORLD, 1493 Broadway, New York

PATENT
Your Radio Ideas.
Call or Write
FREE ADVICE



INSU-LITE
PANELS
1/8" —.01 per sq. in.
3/16" —.015 per sq. in.
1/4" —.02 per sq. in.
DEALERS: Write for Discour. In.
General Merchandise Co.
140 Market Street, Newark, N. J.

CRYSTAL SET \$4
"THE LITTLE WONDER"
\$2.99 UNMOUNTED
Wonder in name and a wonder in performance. Cannot be equalled for the price. Catches distinctly everything broadcasted within 30 miles.
Send for **FREE** catalog, describing our "Little Wonder" set and listing radio supplies.
GUARANTEED, TESTED CRYSTALS
Galena and Radiocite... **20c.**
Rad-O-Plate Panels. All class out to order.
Holloway Electric Supply Co., Inc.
28 Third Avenue New York City

GOODMAN
PATENT PENDING
The Niftiest Short Wave Tuner on the Market
Only \$6.00 & PP on 1 lb. Send for pamphlet.
L. W. GOODMAN
DREXEL HILL, PA.
Major _____, Halifax, N. S., writes: Delighted. Received Schenostady clearly on one tube first time I tried the GOODMAN. Would have saved trouble and money by buying months ago.

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BATTERIES FOR RADIO
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424-438 W. 33rd ST. NEW YORK
531 SO. DEARBORN ST. CHICAGO.

issues for \$6.00. Sub. De-lio World, 1493 Broadway,

Erecting SPC, Brazil

On the Summit of Mt. Corcovado, It Is the Highest in the World

By Patriak Nichols

ENTERING the beautiful city of Rio de Janeiro the most impressive sight is the exquisite mountainous background of the city, and particularly Corcovado, an almost perpendicular mountain, with its summit over 2,000 feet above sea level. "Why erect radio masts when such a mountain is so near by?" queried the Westinghouse engineers who journeyed there to erect broadcasting station SPC. "Can we get the location?"

This question was answered in the affirmative by F. A. Huntress, General Manager of the Tramway Light & Power Company, who own the cog-wheel railway that climbs Corcovado. He also stated, "We can supply 120-volt or 220-volt, 50 cycles alternating current on the mountain top for the radio outfit."

The party set out to explore the mountain crest. The first 2,000 feet of ascent, or five mile ride from Rio de Janeiro, was made in 30 minutes, and the final climb of 125 feet by following the foot path to the circular observation tower on the top.

A quick survey of the available space on the crest disclosed a narrow path about 120 feet long, leading to a concrete parapet on the edge of the precipice.

The crest of Corcovado had always been used as an observation point, but the radio-telephone engineers saw more than mere scenery—they had a view of the prospective invisible radio audience.

Two 125-foot masts were erected on the verge of the precipice on which are stretched a 153-foot six-wire antenna between two 26-foot spreaders. The counterpoise consists of two sections of five wires each, mounted on two 26-foot spreaders which are balanced on the ends of the 70-foot horizontal pole bolted fast to the mast on the summit. The counterpoise wires are stretched clear of the mountain sides, down about 100 feet to the tops of two poles located near the terminal building of the railway where the wires converging symmetrically form a 10-wire cage which leads into the radio telephone operating room. The hum of the 220-volt alternating-current motor was eliminated by a filter system made up of microfoid condensers and large choke coils.

A single-wire antenna was strung from the mountain top to the operating room about 125 feet below, for receiving messages. A speech amplifier is located in the operating room.

The call letters, SPC, were assigned. SPC has a unique position in the radio-telephony broadcasting field. At various times the station and antennae are in or above the clouds. Rio de Janeiro is practically on the boundary line between the Temperate and Torrid Zones. The climate is varied by the mountain range Serra do Mar which runs along the coast. The dry season will soon change to the warm and wet season and its subsequent tropical storms. Precautions are being taken to prevent electrical interference.

The observances and records of SPC will, therefore, assist in studying the peculiarities of the air as far as radio-telephony is concerned. The experiences of this station in penetrating the Equator and the Torrid Zone, when correlated with the data being compiled by other stations and close students of the new science, will no doubt result in listing peculiarities of the atmosphere unknown to science to-day.

"HOLIDAY RADIO GIFTS NUMBER" of RADIO WORLD will be issued December 9. Last copy will be accepted on this number up to November 30. RADIO WORLD, 1493 Broadway, New York.

Did you see our ad in RADIO WORLD of Nov. 18, Page 27?

Watch for future announcements.



RADIO EQUIPMENT MFG. CO
Dept. "B," 1663 JEROME AVE.
NEW YORK, N. Y.

MICROSTAT
Vernier Rheostat
The Rheostat with a 1000 Filament Variations.
At your dealer or post-paid, **\$1.40**
DEALERS write for full information and trade discounts.
MICROSTAT COMPANY
WILLIAMSPORT, PA.

Do Your Buying At
PERMANENT RADIO FAIR
Hotel Imperial
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New York City
Buyers — Dealers — Radio Department Managers, Demonstrations of Any of the Products of the Exhibitors. Only Products of Representative Manufacturers Are on Display.
Nearly 100 Manufacturers
Now Exhibiting

FRS
ALL MOLDED UNIVERSAL COMBINATIONS
5 Units in 8
F. R. S. Molded Variometers..... \$4.00
F. R. S. Molded Variocouplers..... \$5.00
F. R. S. Molded Bank Windings... \$4.00
Bank Windings are interchangeable for direct mounting on either Variometer or Variocoupler.
Universal—Accurate—Interchangeable
A Complete
Two-Stage Long Range Receiver

Set includes two Federal Transformers, Condenser, two-molded variometers, molded variocoupler, three V. T. sockets, filament rheostats, dials. Read 'Em binding posts, switch points; in attractive cabinet and drilled panel: complete, ready to hook up. **\$40**
A \$125 Radio for.....
F. R. S. Radio Corporation
409-D East Fort St. Detroit, Mich.

DICTOGRAPH Radio HEADSET

Was \$12.00 **NOW** →

A sweeping cut of \$4.00 in the price of the Dictograph Radio Headset! The tremendous endorsement of radio enthusiasts has made possible this sensational reduction. To meet the demand, production has been planned on a new, gigantic scale. Great manufacturing economies establish the new price—only \$8.00.

A wonderful bargain! And above all, a wonderful headset—the world's standard of supreme quality for super-sensitive and accurate sound-transmission.

The same quality, the same guarantee, the same supreme Dictograph headset that has always sold for \$12.00, in every respect but the price. Type R-1, 3,000 ohms, for all types of receiving sets.



THE STANDARD OF THE WORLD

List Price
\$20

DICTOGRAPH Radio LOUD SPEAKER

The Perfect Loud Speaker for the Home

Public demand has made possible the Dictograph Loud Speaker at the low price of only \$20.00, complete with 5 ft. flexible cord. A handsome instrument that reproduces every sound in crystal-clear, natural tones, full volume, and free from distortion or noise. Ask for demonstration at reliable radio dealers. Get world-famous DICTOGRAPH quality and still save money.

Dealers: Order through your jobber or write direct for names of authorized distributors.

DICTOGRAPH PRODUCTS CORPORATION

220 West 42d Street (Branches in all principal cities) New York, N. Y.

Note: Plans are now under way for the production of the new 4,000 ohms Dictograph SUPER-TONE Headset, the most perfect radio headset that can be made. For the most delicate work, the most exacting requirements, a new standard of super-sensitive-ness: List price, \$12.00.



Variometers with dial, \$2.38

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PHANTOM-CIRCUIT

BUILD YOUR OWN. This marvel of mystery, using no aerial, no loop, no ground, brings in music instead of static showers. We consistently hear concerts on Magnavox, from stations 550 miles distant, audible 100 feet from horn. The simplicity of this set will surprise you. No radio frequency. Complete instructions with photo of circuit sent prepaid for 60c.

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INCREASE YOUR CRYSTAL RANGE BY USING A "PT" ULTRA-SENSITIVE CONTACT IN YOUR CRYSTAL DETECTOR

1. It adjusts in a second.
2. Secures more sensitive results.
3. Is almost impossible to jar out.

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RADIO STORES CORP.

VARIABLE CONDENSERS—

PLUGS—RESISTANCE UNITS, ETC.

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

222 West 34th Street, New York

Radio Rates from Italy

OFFICIAL reports of new lines of radio communication between Italy and the United States, following the recent suspension of direct radio communication and pending the completion of a new high-power station at Rome, have been made to Washington by Commercial Attache MacLean, at Rome.

Radio traffic from Italy for the Western Hemisphere is now being handled by the high-power stations of Germany, France, and England, according to statements of the Ministry of Posts and Telegraphs at Rome. Full-rate and deferred messages, and press telegrams may be sent by Nauen Transradio and Radio-France, and full-rate and deferred messages by London Marconi.

Messages sent by Nauen are transmitted by radio from Rome and relayed at Nauen. Traffic handled by France or England is sent by land wires from Italy and thence by radio. Messages by France or Germany will carry a rate of twenty centimes, gold, less than the cable rate, in the case of full-rate telegrams. By London, the same messages would be ten centimes, gold, less than the cable rate. Deferred dispatches will be charged half the above rates. Press reports may be sent by France or Germany at the same rate as deferred messages, but will not be handled by London.

Two Danish Radio Clubs

TWO radio clubs, organized and supported by some of the most prominent figures in the Danish field of communications, have recently been formed to promote interest in radiotelegraphy and radiotelephony throughout Denmark. The aim of these clubs is to spread knowledge and create interest in wireless communication through lectures, demonstrations, and other means.

RADIO MAILING LISTS

9270 Retail Radio Dealers, United States	per M.	\$7.50
1134 Radio Manufacturers	per list.	10.00
1330 Radio Supply Jobbers	per list.	12.50
257 Radio manufacturers of complete sets	per list.	4.00
260 Radio Stations	per list.	4.00
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Quality, Design + Workmanship + Material = RELIABILITY



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A compact portable Recharging unit that will fully charge a 100 AH battery overnight for 5c. to 10c.

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

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

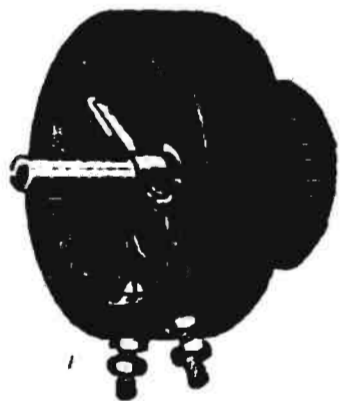
A Big Christmas Surprise

Send for our bulletin A21 and see what SANTA has to offer you, in RADIO SETS COMPLETE. Also in parts, "A" and "B" Batteries. We handle the best money can buy in Radio, and we are giving you a wonderful Christmas treat so all can enjoy Radio this year.

These offers last till December 25th. Drop us a card and receive this Surprise.

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

Broadcasting in Brazil

Centennial Celebration Stirred Up Interest and Promising Market for Receiving Sets Is Predicted

CONSUL General Alphonse Gaulin, Rio de Janeiro, reports to the Department of Commerce that preliminary steps have been taken for the introducing of radio broadcasting in Brazil, that indications point to a promising future market for receiving apparatus. Until recently radio broadcasting was practically unknown, but the Centennial Celebration being held at Rio de Janeiro has served to stimulate interest in radio and various concerns in Brazil have been active in taking it up.

The Rio de Janeiro Light and Power Company has recently finished a broadcasting station on the heights of Corcovada, using a wave length of 483. Music from the Municipal Theatre is sent to Corcovada summit by telephone and after amplification is sent out by radio. A studio near the summit also furnishes concerts and other entertainments which are heard locally. Additional broadcasting stations are now located at Monroe Palace (Congressional Building) and at the offices of the Marconi Wireless Telegraph Company. A number of receiving sets have been installed in the exposition buildings.

Imports of wireless apparatus have been received both from the United States and Germany for sale during the exposition. The requirements of the Brazilian law, however, make it obligatory for any person wishing to install a receiving set to secure a special permit from the Department of Transportation and Public Works. Only such receiving sets as have been approved may be sold by importers especially licensed to make such sales. The restriction and that limiting the sale to persons who have received a license to install and use wireless apparatus have hindered the exploitation of this important product. It is hoped, however, that by the beginning of the year a more definite policy will be established by the Brazilian Government and the markets for radio apparatus thrown open to importers.

A Broadcasting Problem

Should Manufacturers Contribute to Stations Sending Out Programs? Asks Bel Canto Corporation

EDITOR, RADIO WORLD:—Broadcasting has been under discussion for some time and much has been said pro and con; but I have something to say which I think is of paramount importance.

The Radio Corporation of America was the pioneer in broadcasting radio concerts and has not only kept up the fine quality of these concerts but has improved on them from time to time, giving radio fans the best quality of talent procurable. Without this broadcasting, there would be practically no market for radio parts

and it is my opinion that each and every manufacturer of radio parts—whether it be a loud-speaker, a complete set, a hundred feet of antenna wire, or any of the other numerous parts that go into the making of a complete set—should be willing to contribute a certain portion of his net profits towards the maintenance of such a station.

Each and every manufacturer of radio parts is indebted to the broadcasting stations. Without them the manufacturer might just as well put the key in the door and hang up a sign, "TO LET." Why should a corporation, such as the Radio Corporation of America, spending millions of dollars to make radio a permanent, sound and healthy institution, which in time is destined to become one of the greatest industries of the world; or, in fact, any other organization maintaining broadcasting stations throughout the United States, bear the entire expense of maintaining these stations?

A certain percentage of the net profits of all the manufacturers, in my opinion, should be set aside to be paid over to the proper organizations conducting broadcasting stations throughout the United States, and that all unnecessary broadcasting of concerts, lectures, etc., should be abandoned. There is no necessity of having numerous broadcasting stations in one vicinity, for it only causes interference, which the average radio fan cannot tune out.

Proper broadcasting is the only thing that can make radio a real success; and I say again that each and every manufacturer who is now conducting a profitable business owes every cent of profit he is making to broadcasting. We are willing, ourselves, to set aside a certain portion of our profits for the purpose above mentioned. We feel that all other manufacturers will be in accord when they give it due consideration.—Duryea Bense, secretary-treasurer, Bel-Canto Corporation, 417 East 34th Street, New York, N. Y.

STANDARD HEADSET

2,500 OHM

Guaranteed to be equal to any phone on the market listing at \$8.00 **\$5.75**

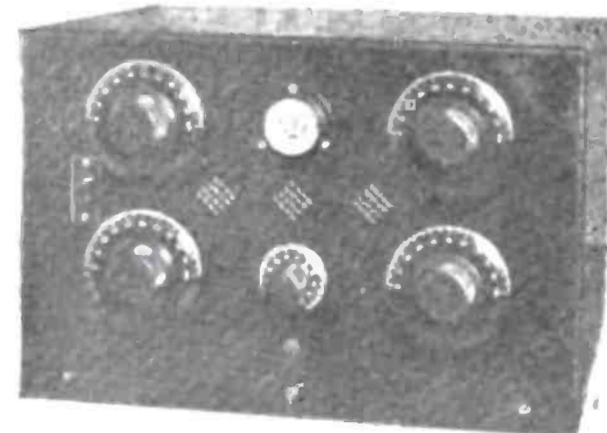
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This "Acme of Perfection" radiophone set has been proven better than the best! We have received innumerable compliments and have become convinced that there is none better. This set has an exceptionally long distance range; has the loudest tone of any set on the market; eliminates all distortion; reproduces the human voice and other sounds perfectly; and is operated simply and easily. We furnish artistically designed cabinets for it on demand. We can show customer testimonials on the wonderful performance of this set. All our sets are sold on Money-Back Guarantee.

Write for "Acme of Perfection" Folder on Sets from \$45 Up

We Carry Everything in Supplies

ATLANTIC & PACIFIC RADIO COMPANY

Show Rooms, 131 W. 37th St., N. Y.

Broadcast Bill's Radiolays

By William E. Douglass

THERE ain't no use in talkin', I've had troubles of my own, an' lately they've been pilin' in, they never come alone. First off I lost my chickens, dern near all died with the pip, an' then my dog keeled over without lettin' out a yip. The bay mare's got a collar-sore from plowin' here this fall; the other one is spavin'd—luck's deserted me, that's all. On Sunday I got all dolled up to take



Min in to church, an' when I cranked our Lizzy, she just up an' gives a lurch, an' knocks me down, blacks both my eyes an' tears my Sunday pants. Sometimes a flivver's pesky if you give 'em half a chance. I called old Lizzy some hard names, not knowin' why or which; to even up, on our way in, she runs off in the ditch. We got to church in time to hear our friend the parson say, "—give thanks for the blessings Providence may send your way." When old misfor-

tune comes my way, she does the thing up brown, but all the same it takes a heap to keep my spirits down. I've noticed too, most every cloud that dims our path so bright, has got a silver lining an' most things work out all right. Just last week, for example, Min got out my winter suit, an' found that it was stained a bit with plums and other fruit. She worked with it for quite a while an' got it good an' clean, I guess she must have used about two quarts of gasoline. Then in the kitchen by the stove, she hung it up to dry—the "Hook and Ladder" boys will tell you now I'm one suit shy. Likewise the house where I was born ain't what it used to be, we're shy about eight rooms or so, as far as I can see. We saved 'bout all the furniture an' grandma's feather bed, the only thing she thought of, though, was that there fancy spread that won first prize four years ago down at the Country Fair, an' after she had got it out she didn't seem to care a rap about the other stuff. But, like I said before, though trials and tribulations congregate about my door, there's bound to be a rosy side. My trouble's I'll forget, because I rescued first of all my good ol' wireless set.

—Copyright, 1922, Westinghouse Electric & Manufacturing Company.

Radio Don'ts

- D**ON'T transmit without a government license. Don't be careless about your set.
- Don't let the aerial wires touch roofs, buildings, or trees.
- Don't purchase cheap apparatus and expect long-distance results.
- Don't place too many wires in your aerial.
- Don't forget that just as much tuning is required in the secondary as in the primary.
- Don't blame the set on poor reception. Sometimes it is improper tuning due to your own fault.
- Don't light the filaments to exceptional brilliancy and expect loud signals.
- Don't monkey with the works of your set if something goes wrong. Take it to an expert radio-dealer.
- Don't keep on changing connections if signals have been heard at their best. Leave well enough alone.

RADIO BOOKS FOR XMAS

The Most Acceptable Gift
Prices to Suit All

- "Design and Data For Radio Transmitters and Receivers"—Paper cover55c
- "Radio Hook-ups"—Same type cover as above. Never sold less than 75c. Sale price.....55c
- "Radio For Everybody"—The famous book. Heavy cloth bound. Sale price.....\$1.00
- "Radio Phone Receivers"—A practical book for everybody. Cloth bound. Sale price....\$1.00
- "Radio Experimenter's Handbook"—A book to answer the practical problems of beginners of Radio Experimental Work. Heavy cloth bound. Sale price.....90c
- "Practical Wireless Telegraphy"—Heavy cloth bound. Sale price\$1.60
- "How to Conduct a Radio Club"—Plenty of desired information. Sale price.....55c
- "Practical Wireless Stations"—This tells you how and why. Sale price.....55c
- "A Complete Wireless Course"—Heavy cloth bound. Sale price.....90c
- "How to Make Wireless Receiving Apparatus"—Paper cover. Sale price.....25c
- "Wireless Construction and Installation For Beginners"—Paper cover. Sale price....25c
- "Experimental Wireless Construction"—Paper cover. Sale price25c
- "Complete Radio Receiver"—How to make your own. Paper cover. Sale price.....20c
- "Armstrong's Super-Regenerative Circuit"—A book complete in its line. Sale price...70c

DIAGRAMS

- Detector and Two Stage—Complete with instructions. Sale price35c
- Short-Wave Regenerative Receiver—Wonderful opportunities with this circuit. Sale price—35c
- Armstrong Super-Regenerative—With full instructions. Sale price.....35c

BLUE PRINTS

- Armstrong Super-Regenerative Hook-up—With list of material needed. Sale price.....25c

We have any and all the PARTS to make the best apparatus at a very low price, and invite your inquiries and trade. The books listed as paper covered or the diagrams will be given FREE with purchases of parts for any set.

We have in stock the new Spider Web Inductance for Rheinharts Tuner—A wonderful new idea, sure to prove satisfactory, full instructions\$2.40

Tubular Glass Grid Leak Resistances at the special low price of 35c; elsewhere 75c.

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- DL-25, 35 and 50...35c
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- DL-25065c
- DL-1250\$1.35
- DL-1500\$1.48

Jones Licensed Regenerative Receiver...\$58.00
Detector and two stage amplification included with above outfit. Bulbs and batteries extra. This set has a wave length range of 150-2500 metres.

All sales prices in November issues of RADIO WORLD are good until Xmas. Postage must be included with order. Checks must include 10c exchange and please have them certified. All goods are shipped P. P. insured.

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\$135.00 Grebe C. R. 9—150 to 3000 meters	\$99.00	\$40.00 Turney Detector Set.....	\$20.00
132.00 Westinghouse R. C.....	87.00	36.00 De Forest Detector Set, complete with tubes and battery	25.00
Paragon R. A. 10.....	60.00	35.00 De Forest 2-Stage Amplifier.....	18.00
112.00 De Forest M. R. 6.....	84.00	125.00 General Electric 2-Stage Amplifer.	90.00
25.00 Federal J. Set—complete with phone	12.50	40.00 Clapp Eastham Tuner and Detector	29.00
35.00 Tuska Detector Set.....	25.00		

TUBES	
Tubes—U. V. 200.....	\$3.90
U. V. 201.....	4.90
Navy V. T. I.....	5.00
Navy V. T. 2.....	\$7.00
W. D. 11.....	4.98
U. V. 202.....	6.80

PHONES		STORAGE & BATTERIES	
Baldwin Type C.....	\$11.50	60-Hour Exide.....	\$17.00
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Murdock 3000 ohm, single.....	2.00	45 V. France Variable.....	3.50
Murdock 2000 ohm.....	3.50	22 1/2 Burges Var.....	2.25
Murdock 2000 ohm, single.....	1.50	80-Hour Westinghouse.....	14.00
Brandes.....	6.00	BATTERY CHARGERS	
Federal 2200 ohm.....	4.95	Homechargers.....	\$13.50
Federal 3000 ohm.....	7.50	Westinghouse.....	14.40
Western Electric.....	7.50	Westinghouse (large).....	22.00
French Brunett, 4000 ohm.....	7.75	RHEOSTATS	
VARIABLE CONDENSERS		Radio Corp.....	\$2.40
23-Plate Verrier.....	\$5.25	Rembler.....	.60
43-Plate Verrier.....	5.75	Star.....	.60
.001 Balanced De Forest.....	4.75	Cutler Hammer.....	.80
23-Plate, moulded ends.....	1.25	Murdock.....	.75
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VARIOCOUPERS		Kloesner.....	.55
Baldwin.....	*\$4.50	POTENTIOMETERS	
All Range.....	6.00	Radio Corp.....	\$1.50
All Wave.....	7.50	Paragon.....	1.50
Atwater-Kent.....	6.40	Graphite.....	1.20
Emco.....	4.75	Amseo.....	1.03
Tusca.....	3.50	LOUD SPEAKERS	
Prices Good for December, 1922. Orders Must Include Postage and Money Order.		Magnavox.....	\$32.50
		Federal Horn.....	9.00
		King Horn.....	5.50
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		Western Electric.....	112.50
		Baldwin Clacophone.....	16.25
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		Pathe.....	\$3.50
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		Atwater-Kent.....	6.40
		TRANSFORMERS	
		Jefferson.....	\$3.00
		U. V. 712.....	5.50
		Aemo.....	3.75
		Atwater-Kent.....	4.50
		Federal.....	5.25
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		U. V. 1716.....	\$7.60
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		Radio Service.....	4.75
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		Aemo.....	4.00

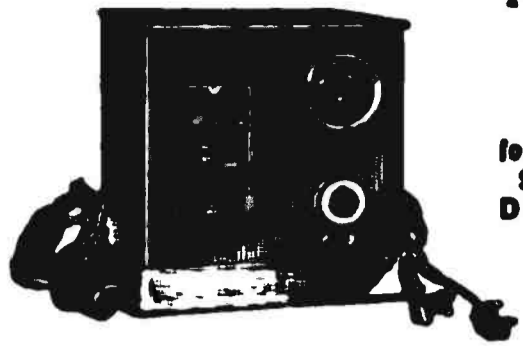
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If your dealer does not know,
send direct to us.

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Tubes returned P.P., C.O.D.

GITHENS TRUTONE RADIO HORN—LOUD SPEAKER

First one to sell
on ten day trial
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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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That Armstrong Circuit

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

YOUR NEWSDEALER

will send RADIO WORLD to your home. In order to be sure of getting RADIO WORLD regularly, and to receive a single issue, we suggest that you either subscribe direct or through your newsdealer. (52 issues), \$3.00 six months, and \$1.50 three months. Or instruct your newsdealer to send RADIO WORLD regularly to your home each week. Dealers will take standing orders and send whenever requested. Radio World, 1493 Broadway, New York.

Talk by Radio from Coal- Mine Depths

British Colliery Tests Prove Successful
and Valuable Data Are Obtained

INTERESTING results were obtained by experimenters at the Baggeridge Colliery in Birmingham, England, a few days ago, says "Wireless World." Efforts were made to transmit messages from a depth of 700 yards to the surface. A three-tube set was used. The aerial was erected by slinging a wire from a steel hoisting gear 100 feet high to a girder of a railway bridge.

The ground wire was clamped to the lower part of a railroad rail. At first the transmitter and its aerial were installed in the steel cage, but considerable screening effect was experienced.

Tests were made at various distances down the shaft, and reception was found to be clearer when transmission was made at the lower points. This was thought to be due to presence of structural steel-work, which might have caused screening higher up.

Another experiment was made by taking the transmitter along the workings and groundings were effected by bringing a length of cable along the floor. The aerial was slung between pit props. Signals were clearly received at the pit mouth, although, owing to limited power of the transmitter, telephony was weak. It was suggested that the carbon in suspension in the air was having an absorbing effect on the signals.

Likes Mr. Miller's Set

Result of Trying Out Hook-Up in Radio
World, No. 30, dated October 21

EDITOR, RADIO WORLD:—We have been trying out Mr. Miller's H-C hook-up the last few nights and using a U-V-200, but only have been able to get, in less than an hour's time, 2X1, WGY, WSB, and WDAP.

We find, however, that the tuning is extremely sharp and can be materially helped by using an .0008 variable with vernier and a vernier rheostat.

Last night (November 17), we tried out with two stages of amplification and a Western Electric power-amplifier with horn, with excellent results.

It's just about the simplest hook-up we have tried and, while critical, anyone should be able to work it.

In receiving code, however, we do not seem to get the proper increase of signal from amplification when using large coils for high-wave length.

We regard this hook-up as a good winter-time one; that is, for good radio weather, but doubt if it would be as satisfactory in summer time or poor radio weather. This would apply only to long-distance phone broadcasting.

It will also be noted that this hook-up treads on the toes of Major Armstrong.—Smith Novotoy Electric, Inc., Charlotte, North Carolina.

Air Service Radio School

A NEW Army radio school for training Air Service radio operators and electricians has been established at Chanute Field, Illinois. The school was recently removed from Post Field, Oklahoma, and new classes for radio instruction are being formed. Enlistments for training in radio for the Army Air Service are now being accepted at Chanute Field, where a six months' course will soon be started.

IS YOUR TELEPHONE HEAD SET WEAK?

Let me remagnetize it. Guaranteed, in one day good as new. **\$1.50**

Per Set

1 rewind for higher ohmage. All radio telephone repairing at moderate prices. Mail orders attended to. Dealers write.

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COMPLETE REGENERATIVE VACUUM TUBE SET	Our Price	Others
Panel—Bakelite—7"x13" drilled	\$1.05	\$2.40
Cabinet of 3-ply wood to fit panel	1.50	2.50
Two dial—each \$50.	.70	1.40
Sixteen switch points with nut		
Each 1c.	.10	.40
Four switch steps with nut. Each 1c.	.04	.12
Night binding posts. Nickel plated		
2c.	.24	.40
Two switch levers @ 35c.	.50	.90
1 filament rheostat. Highest grade.	.85	1.10
1 vario coupler. Fourteen taps.	2.25	4.00
1 23 plate variable condenser.	1.85	3.50
1 tube socket—Moulded.	.45	.85
1 grid condenser and leak.	.10	.25
1 phone condenser.	.10	.25
1 tube socket support.	.15	.25
12 feet spaghetti tubing @ 4c.	.48	.84
15 feet tinned copper connecting wire.	.80	.45
Blueprints showing details to assemble.	.18	.25

\$11.32 \$20.02

Other articles taken at random from our late price list are—

Detector tubes—Cunningham—NOT rebuilt	\$3.55	\$5.00
Crystal detector of closed type.	.80	1.00
Transformer—Audio frequency.	2.95	4.50
Double slide tuner—knocked down.		
Coil wound	2.50
Loose coupler—knocked down. Coils wound	3.75
Loose coupler—assembled.	7.50	12.50
Variometer—Hardwood stators 4%". Assembled	2.25	4.00
Frost Fone—2000 ohms.	5.95	5.00
Kellogg—2400 ohms.	8.75	12.00
Western Electric 2200 ohms.	6.25	12.00
Blueprints giving detail of 2 step amplifier.	.10	.25
Two step amplifier—knocked down. Panel drilled	12.85	23.50
Two step amplifier assembled. In cabinet	18.95	35.00
Vacuum tube set in cabinet 7"x13". Wired	17.05	35.00

Send for list today or order direct from above. Goods sold subject to return for rebate or exchange. YOU MUST BE PLEASED.

Radio Parts Manufacturing Co.
15 Park Place West Detroit, Mich.

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By Radio Across the Atlantic

How the New Langmuir Tubes Will Send the Human Voice in Both Directions

SENDING radio messages across the ocean by means of the tubes presented a contrast of apparatus. The Alexander alternators almost fill the center of the Rocky Point, Long Island, plant, whereas the tubes to be used, invented by Dr. Irving Langmuir, of the General Electric Company, Schenectady, New York, could be put in a suit case.

This does not mean that the alternators will be immediately superseded, because the tubes' superiority has not yet been sufficiently demonstrated to permit the scrapping of the larger machines, although the eventual adoption of the tubes is considered inevitable. Their value, says "The Times," New York, will be even greater to wireless telephone development, than to telegraph efficiency, as they were evolved by application of the same principle that has made the audion tube the most important achievement of those working on the wireless telephone.

The human voice already has been carried across the Atlantic by wireless, but only in one direction. By means of these electron tubes it is expected that the voice may be sent both ways without difficulty, so that extended conversations may be carried on. This is not exactly the same as two voices talking at once, as wireless communication is made at the speed of light and a word would reach Paris from New York so quickly that there would be no interference with the word coming back.

Plans for the development of the new electron tube experimental set were completed in December, 1921, by representatives of the research and engineering departments of the General Electric Company and the Radio Corporation, and the manufacturing of this highly delicate and specialized set was immediately started in Schenectady, New York. So fast did the work progress that in May of this year the temporary installation of the set was started at Radio Central, the Rocky Point station, and when Marconi visited the station in July preliminary tests were in progress under the direction of W. R. C. Baker of the General Electric and C. W. Hansell of the Radio Corporation.

The set at present consists of three fifty-kilowatt, 15,000-volt, water-cooled, metal vacuum tubes, known in the engineering world as kenetrons, and used as rectifiers; and six 15,000-volt, twenty-kilowatt, water-cooled metal pliotrons, used as high-frequency converters. For the experiment with the tube set one of the new mile-and-a-half-long antennae, suspended from six towers, 420 feet high, was used, and the tube set succeeded in developing and sustaining in the antenna a current of the strength of 350 amperes. About 600 amperes has been used with the Alexander alternators, but it has been found that with the development of wireless apparatus a lower amperage may be used.

The most interesting feature about the experiment to the engineers conducting it was that the receivers and senders did not know that the change from alternators to tubes had taken place. There is little difference in the tone, the tube tone having a sort of companion wave sound, a kind of wireless echo, which, however, proved to

be almost indistinguishable until it was pointed out to the receiver. The switch from alternators to tubes was made without notifying the senders or receivers at 64 Broad Street, and although the man receiving messages from abroad sits on the other side of a table from the man sending, the receiver did not notice the change in the New York plant signals.

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Executive Office, 30 E. 23d St., New York, N. Y.
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AT HALF THE USUAL PRICE
REAL CABINET TYPE—not just an enclosed horn.
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We make a complete line of the highest class construction throughout, with fine hand-rubbed finishes. All SPIROLAS are sold under absolute money-back guarantee to equal in volume and far surpass in beauty and tone any other of twice their price.

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Satin black finish all over, nickel-plated fittings (DB)
SPIROLA SIMPLEX—for use with a Baldwin or other unit. Oak (SO), mahogany (SM) and black (SB) finishes, same prices as SPIROLA DUPLEX.

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(FLAT AND BANK WOUND) Wave Length, 150 to 3,000 meters.

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

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

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

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

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

GUARANTEED WITH AN ABSOLUTE MONEY-BACK GUARANTEE

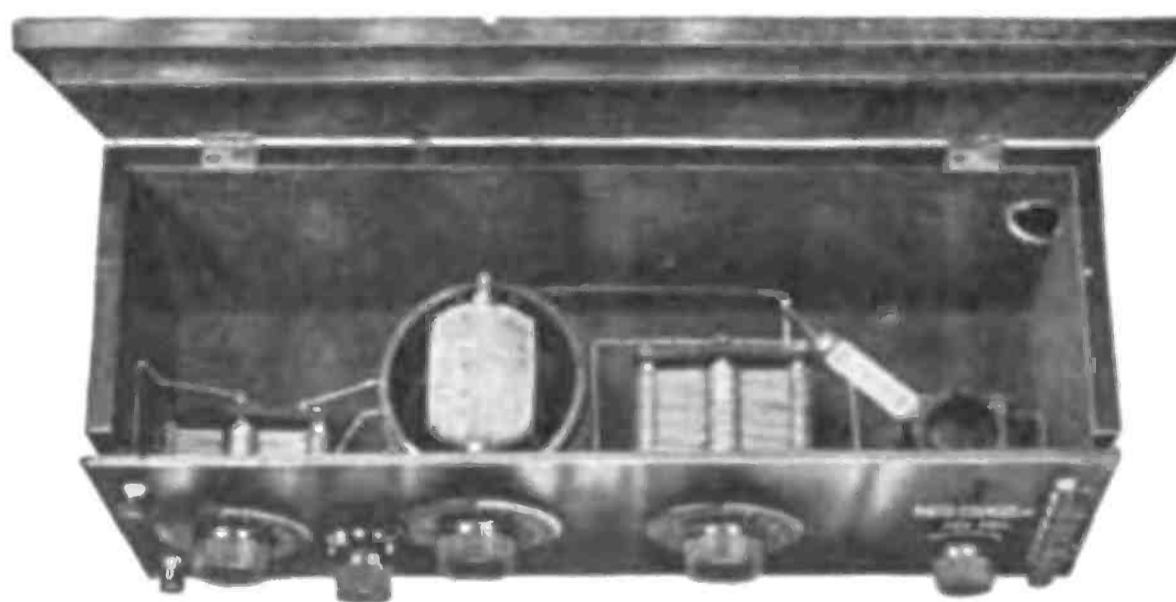


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A high-grade tube set that costs less than price of parts used. Super-sharp tuning through double circuit and Litz-wound rotor.

All the fun of assembling—but correct assembling made absolutely certain and simple by means of concise and easily understood instructions.

The set is supplied with the 7-inch x 18-inch hard rubber panel, drilled and engraved and fastened to the handsome mahogany-finished cabinet; all parts are packed in the cabinet and include all connecting wires cut, bent, and turned ready for soldering; instructions for assembling are supplied. Securely packed in shipping carton.

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If you did not get a copy of Radio World No. 1, send us \$6.00 and we will send you this paper for one year, and start it with our first issue, which will be mailed you as soon as possible after receipt of order.

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DEPARTMENT AT 5¢ A WORD

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This department is intended for everybody who wants quick action on short announcements covering the buying, selling, exchanging or general merchandising in the radio field. Readers of RADIO WORLD will find that it pays to read these columns every week. Advertisers will get a two-day discount for 4 consecutive insertions, 15% for 13 consecutive insertions (3 months). Changes will be made in standing classified advs., if copy is received at this office ten days before publication, RADIO WORLD CO., 1493 Broadway, N. Y. C. (Phone, Bryant 4794.)

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AT LAST! Your chance to learn to fly and get into aviation. Write to Varney Aircraft Co., Peoria, Ill., for particulars of this great opportunity.

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

WE PASS samples or circulars, 1c. each, to houses direct. Lady Canvassers. We mail your circulars, 25c. a hundred. Guaranteed names of our mail order customers. 75,000 up-to-date lists, \$2.00 thousand; 7,000, \$10.00. C. H. Davis & Son News Agency and Mail Order Distributors, 614 W. Jefferson, Greenfield, Ohio.

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MILLER AUDIO FREQUENCY transformer eliminates howling. Entirely satisfactory on three stages. Price \$5.00 postpaid anywhere in U. S. RADIO SALES CO., Box 1144, Bethlehem, Pa.

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MAKE LONG RANGE INDOOR AERIAL. Instructions with small working model, fifty cents. RADIO SPECIALTIES CO., Box 34, Medford Hillside, Mass.

HAVE YOU SEEN IT? My unusual, fully illustrated radio catalog is complete. Saves you money. N. E. Ristey, Spring Grove, Minn.

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ATTENTION! You invent it. Let us make it. Models, dies, manufacturing. Sheldon Tool Co., Rosedale Station, Kansas City.

SALESMEN that have been or are calling on electric or radio trade, see Mr. Rice, 6311 N. Clark St., Chicago.

EXCHANGE letters with new friends everywhere. Pleasant pastime. Information for stamp. Smith, Box 3125-M, Portland, Ore.

ISSUES OF RADIO WORLD from April 1 to Oct. 7 (27 numbers) for 15¢ a copy, or the whole lot for \$3.15. Or send us \$6.00 for one year and start with the first number. RADIO WORLD, 1493 Broadway, New York.

EDISON B. BATTERY UNITS—One positive and one negative plate for 10c. 18 sets will make a 24-volt battery. Wilkinsburg Wireless Shop, 711 Penn Avenue, Wilkinsburg, Pa.

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HELP WANTED—MALE

EARN \$110 to \$250 Monthly, expenses paid, as Railway Traffic Inspector. Position guaranteed after 3 months' spare time study or money refunded. Excellent opportunities. Write for Free Booklet G-151. Stand. Business Training Inst., Buffalo, N. Y.

DIALS, 3-inch, genuine hard rubber, raised or depressed scale, white or gilt lettering. Drilled for ¼ and ⅜ inch shafts. 60c. each. 3 for \$1.50, postpaid. No stamps. RADIO SALES CO., Box 1144, Bethlehem, Pa.

OLD MONEY WANTED—\$2.00 to \$500.00 EACH paid for hundreds of Old and Odd Coins. Keep all old money. Send 10 cents for New Illustrated Coin Value Book, 4x6. You may have valuable coins. Get posted. We pay CASH. Clarke Coin Company, Ave. 83, Le Roy, N. Y.

ACT QUICK SALE. Oak Cabinet, 6x6½x18, with genuine 3/16 Celoron panel, \$3.75. Haupt Radio Supply Co., 2332 Ogden Ave., Chicago, Ill.

MEN WANTED for detective work. Experience unnecessary. Write for details explaining guaranteed position. J. GANOR, former Gov't Detective, St. Louis, Mo.

PARAGON, RA-10 receiving set for sale with three steps of amplification, in a neat cabinet; three power tubes, three amplifying tubes, six volt Everready storage battery, four 22½ Burgess B batteries, brand new 3000-ohm phones, three dollar lightning switch, microphone and a complete charging outfit. Will sacrifice at \$300. Write Edward Hoffman, 1719 E. Washington, Ft. Wayne, Indiana.

Manufacturers of Rogers Radio Receivers and Rogers Receiving Radiometers. Rogers Radio Company, 5133 Woodworth Street, Pittsburgh, Pa.

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Exchange jolly interesting letters through our Club! Stamp appreciated. Betty Lee, Inc., 4254 Broadway, New York City.

LOUD SPEAKER FOR ANY CRYSTAL SET. Hear music over entire house. Easily constructed by amateurs. Eliminates Battery. Instructions complete. 25c. Catalogue Free. Representatives wanted. STEINMETZ WIRELESS MFG. CO., EASTEND, PITTSBURGH, PA.

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

WE NEED RADIO WORLD, dated April 23 and August 5. If you have copies you don't require, mail to this office and current issues will be sent you for them. RADIO WORLD, 1493 Broadway, New York.

Are you familiar with all the radio symbols used in the various book-ups published in Radio World? If not, secure a copy of Radio World No. 26, dated Sept. 23. In this issue was a complete table of all important symbols used in radio construction and testing. Send 15 cents for a copy, or \$6.00 per year, and have subscription start with that issue. RADIO WORLD, 1493 Broadway, New York City, N. Y.

No More "Distant" Places Even to the Remote Lumber Camps, Radio Brings Tidings of the Busy World.

RAUDIO may be helpful in many ways to the city-dweller, but it can never have for him the real meaning that attaches to radio in the wilderness, says Henry Smith Williams in "The American," New York.

Imagine yourself spending the winter in a lumber camp a hundred miles or so from any permanent habitation. Better yet, imagine yourself a lumberjack working month in and month out in a northern logging camp, which you leave

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.

at most twice in the year—on Christmas and on the Fourth of July. For months together you are shut out from all physical contact with what we ordinarily speak of as "the world." No newspapers, no letters, no rumors even of what is going on a hundred miles away.

And then imagine that someone installs a radio outfit, so that you can listen nightly to the news of what is happening all over the world, and to concerts and lectures. You are no longer isolated. You are up to the minute in your knowledge of affairs.

This is just what has happened in many lumber communities. Away out in the forests of the Coast Range in Oregon and Washington, the Hammond Lumber Company has installed powerful receiving sets in more than twenty of the logging camps. The lumberjacks listen in on San Francisco and Portland and Seattle, and never lack for entertainment.

A highly interesting feature of the installation of these radio-receiving sets is the preparation of a pair of poles to support the antenna wire. Trees about 300 feet high and, perhaps, six or seven feet in diameter are selected. The lumberjack, with the aid of a rope and a pair of climbing irons, runs up one of these trees like a squirrel, lopping off the

a telegraph pole. Then a wire, perhaps a thousand feet long, is strung between two trees at a great elevation. A lead-in wire connects with the radio apparatus in tent or cabin; and after tuning difficulties are overcome, everything is in readiness to receive messages.

At Your Service!

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

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

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

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

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

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RADIO FREQUENCY SET
 175 to 500 Meters
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 All on 4 Tubes
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\$225.00 Wireless Specialty—Crystal and Audion, 150 to 3,000 meters. Our Price Today\$60.00
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New Device Stops Static
Functions on an Antenna at Any Wave-Length, Declares the Inventor,
Dr. B. G. McCaa.

PREVENTION of static interference in radio reception has been solved, according to Dr. B. G. McCaa, of Ephrata, Pennsylvania. Dr. McCaa, who has been working on static problems for over four years, is not a doctor of radio or any other science, but a "simple M. D.," he says. He took up X-ray and high-frequency work in medicine and became a radio "bug" ten years ago. In a communication to RADIO WORLD, he describes his invention for the killing of static as follows:

"The antistatic work was taken up early in 1918, and, in the course of four and a half years of search and testing, three systems only, out of many studied, have shown any merit. Let us designate them as A, B, and C.

"During July of this year, tests were made of systems A and B, in combination, on the commercial-telegraph channels of the Federal Telegraph Company in California. Repeated observations made by many engineers showed signal to static ratios of 200 to 1. Static of 3,000 to 6,000 times audibility was reduced to audibilities of 10 to 50, and signals 200 to 250 times the strength of the static received at the same time.

"System A reduced static to a one-to-one ratio, and system B improved the ratio as given above.

"From the practical result, i. e., readability of signals, operators could take solid copy on 'stuff' that could not be copied on standard receivers.

"System C is a more recent development and replaces system A, as it has proven far superior to A in many respects. Combining C and B, absolutely static free signals have been obtained in the presence of nearby electrical storms.

"All the systems are designed to function on an antenna and do not depend for their operation on the vagaries of directional propagation or some mysterious 'origin' of static. They may be used on closed coil or loop reception as well as on ground or water wires.

"Systems A and B in combination are adapted solely to radiotelegraphy and may be used at any wave-length.

"System C operates at any wave-length and possesses the decided advantage of being applicable to radiophone work at any wave-length. It has been proved to function at 360 meters. The device is simple; it has but one adjustment, which, when made, remains fixed for all time like any other tuning adjustment."

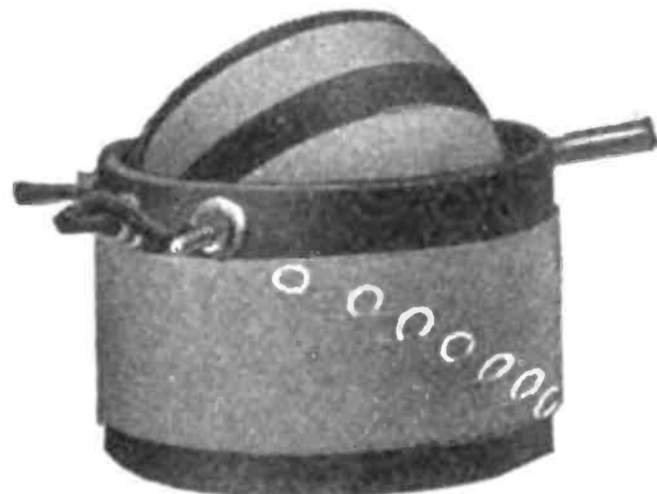
Radio Goods Active

HOLIDAY business is taking on more life in electrical goods and some cities report shortages of certain stocks of heaters and ironers. "Electrical World" will say tomorrow: "Central station activity in making line extensions is taking much high tension equipment. Motors in all sizes are moving well."

Radio jobbers report better sales, saying that a lot of the business is going to parts and head sets. Vacuum cleaners are also in demand and washers are more active. The mild weather and improvement in the coal situation has slowed down the sales of heaters but purchases are frequent.—"The World."

Do You Like Clear Tone—Sharp and Distinct? If so try
MARSH'S
Vernier Variable Condenser
AT LAST
 Made in Three Styles. Dial Knob and Screws Complete. Fully Guaranteed.
 27-Plate \$5.50
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 Mail orders promptly filled.
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NEW HAVEN, CONN.

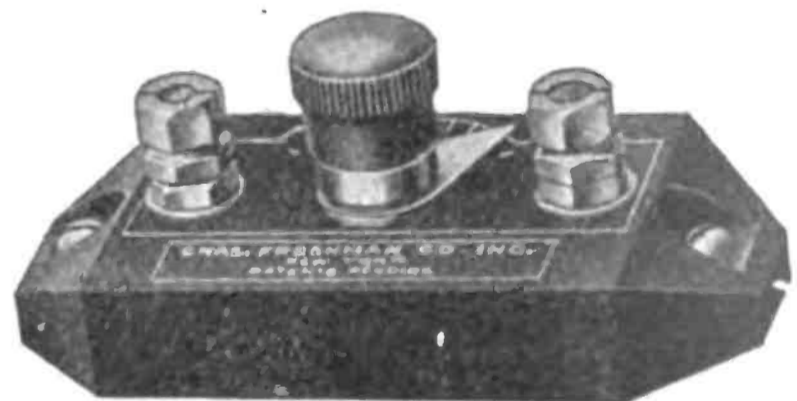
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\$1.25
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We also make 6 other styles That List \$2.50 up
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Variable Grid Leak and Micon Condenser (Combined)

Obtainable in an unbroken range from zero to 5 megohms—all intermediate points. Fixed capacity—.00025 M. F. Improves your set wonderfully by

Clarifying Signals
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SEND US THE NAME
OF YOUR RADIO CLUB

Also the names of your president and other officers. We want to add these to a list of radio clubs and officers we are preparing for publication in an early issue. RADIO WORLD, 1493 Broadway, New York.

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**"Famous for the Perfect
Straight Line Test"**

Laboratory and Service Work Prove the
Superiority of the

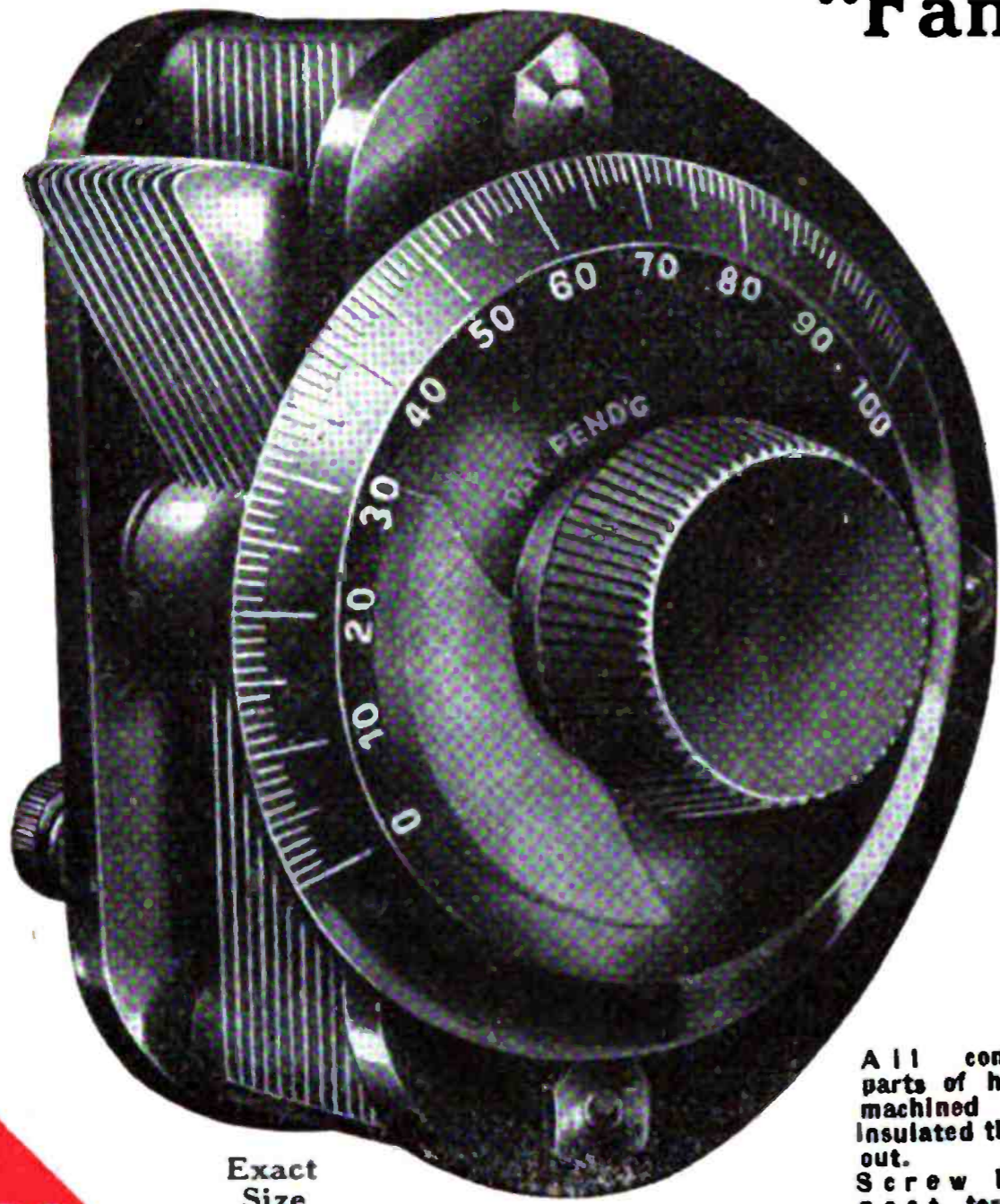
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Brass Studs Through Aluminum Plates and Die Cast
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In No Instance Is Insulating Material Tapped—Metal Inserts Throughout
Precision Workmanship—Best Engineering Design

23 Plate, .0005 Mfd. Max. to Min. Cap. Ratio 28-1 **\$4.25** | **43** Plate, .001 Mfd. Max. to Min. Cap. Ratio 46-1 **\$4.75**

RADIO STORES TORPEDO PLUG ALWAYS DEPENDABLE!



Exact
Size

**\$1.25
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All conductive parts of heavy machined brass. Insulated throughout. Screw binding post terminals, with separate anchor for tail of cord. Designed to insure rigidity, durability, strength and lightness.



The Radio Stores Torpedo Plug is one of the series of their products, designed and constructed to meet the requirements of the critical user, at the right price.

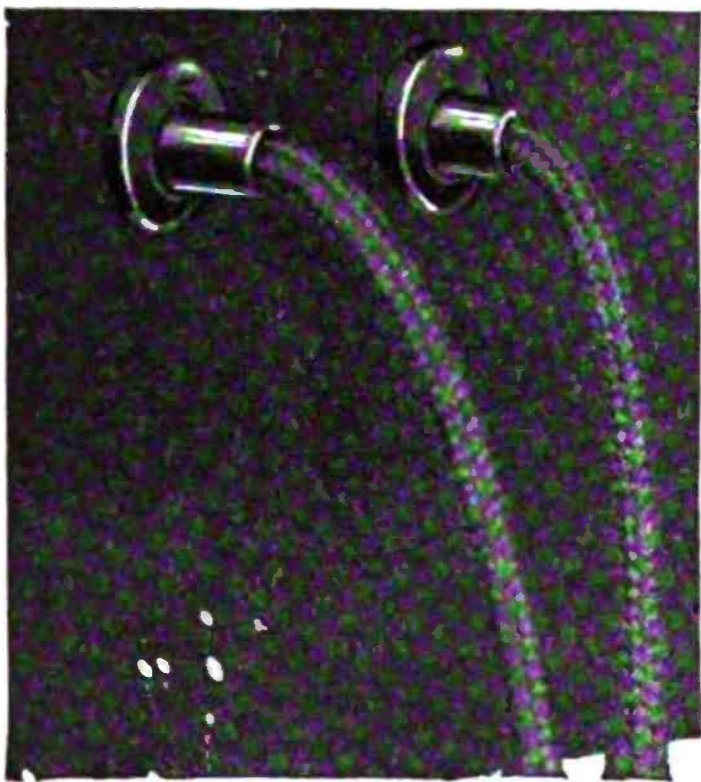
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**UNION-RADIO
PHONE TIP JACKS**

(Patent Applied For)



FRONT (Outside) VIEW

7/64 drill, insert the bushing, and screw on the lock nut which holds the combination tension spring and soldering lug in place.

The tip when inserted is firmly held. And a good electrical connection is assured at all times. These Jacks eliminate the buying of an expensive telephone plug and Jack.

Ideal for experimental circuits or in any part of a set where quick changes are needed. They accommodate wire up to the thickness of telephone tips.

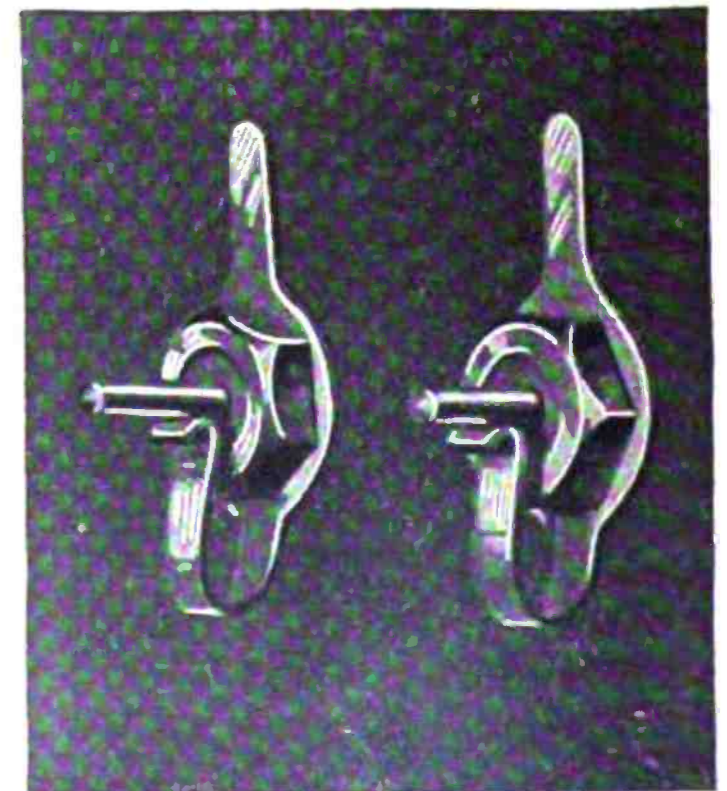
25c. A PAIR

We also manufacture complete receiving sets, 2 step amplifiers, variable condensers, receiving vacuum tube receptacles, condensite dials, etc. Our catalog M, "Radio Apparatus," sent on request.

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REAR (Inside) VIEW