How to Make a Variable Grid-Leak. See Page 4

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1923.

RADIO WORLD

(Trade Mark Serial No. 164, 249)

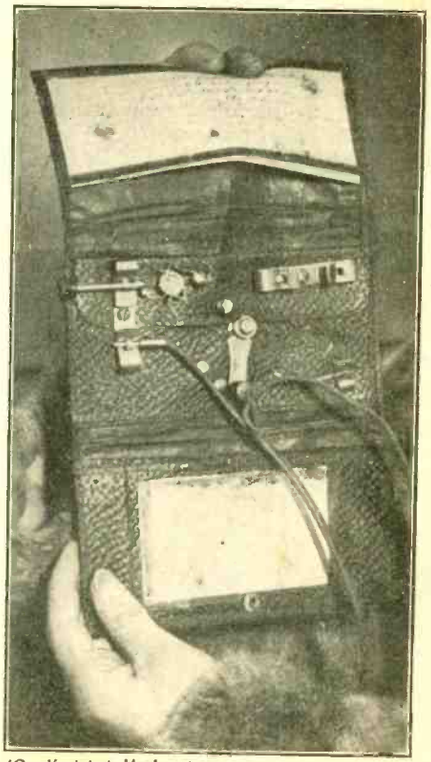
ILLUSTRATED WEEKLY

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

New Wonders Seen at the American Radio Exposition

See pages 16, 17 and 18 for story and other photographs.

This radio set was built by Eugene Weiss, of New York, for 15 cents. It fits in a bill folder. It receives messages 30 miles away. At left, Jack Watson testing set. At right, "close-up" of set.

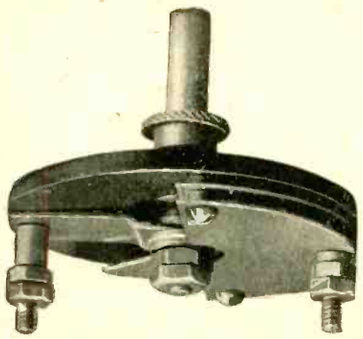


(C. Kadel & Herbert)

Some of the Most Remarkable DX Records Ever Published—See Page 18

Pruden Reliable Radio Specialties

for Good Results!



"Best" Variable Condensers require one hole only in panel. This feature is absolutely unique with "Best"; all other makes requiring three or more holes.

The plates are made of pure aluminum specially prepared to insure straightness, and soldered in slotted tubing, assuring uniform spacing and eliminating use of washers.

"Best" Vernier		List	$1.50
5 Plate	.000125 MFD.	List	3.00
11 Plate	.00025 MFD.	List	3.00
23 Plate	.0005 MFD.	List	3.50
43 Plate	.001 MFD.	List	4.50

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.

FREDERICK H. PRUDEN
INCORPORATED

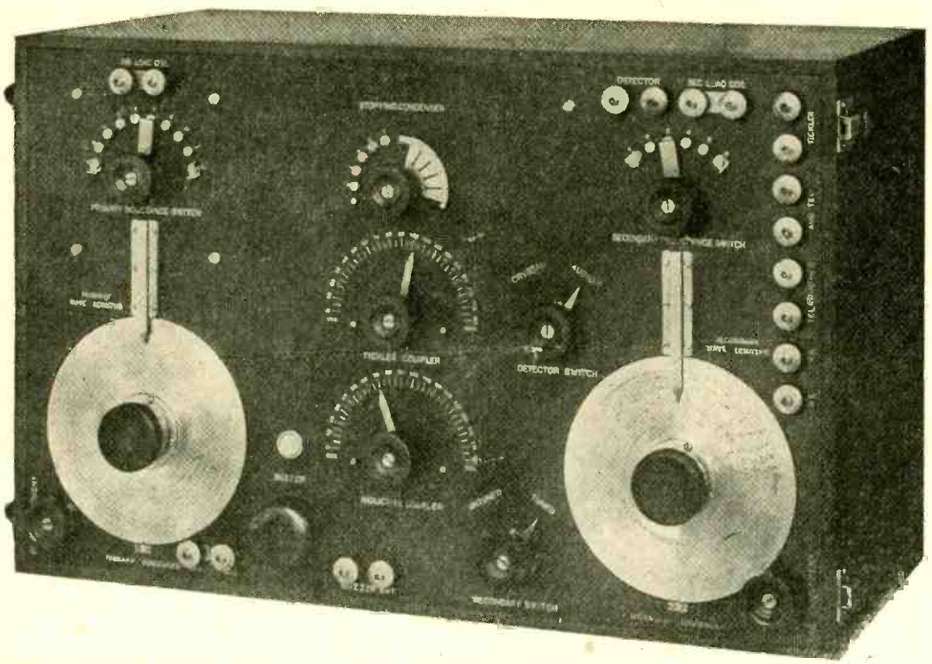
993 Bergen Ave. Jersey City, N. J.

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 broadcasted music more clearly than vacuum tube detector, and requires no amplification where the incoming signal has sufficient strength to actuate the sensitive phones. Ideal for use in regenerative circuits. Handsome, substantial, suitable for assembly in the finest radio equipment. Guaranteed against imperfection or faulty operation. List each **$3.50**

The De Luxe U. S. Navy Type Radio Receiver

List $595.00 **FOR IMMEDIATE DELIVERY**



Best of its type—must not be confused with instruments selling for from $200 to $300. Highly selective. Will pick up messages, music, lectures, etc., that lower priced instruments will not hear. This receiver is equipped with binding posts which are normally short circuited for 300 to 6,800 meters by which wave lengths up to 23,000 meters may be received by the attachment of loading coils. Capacities of proper loading coils for above are: Primary 50; Secondary 50; Tickler 30 millihenries. While the receiver is provided with a "standby" or untuned circuit, it also has an unusual degree of selectivity. Although primarily designed for the more advanced fields of Radio work, or the laboratory, the simplicity of arrangement and beauty of finish make it unusually desirable for the radio club or for the individual who desires the finest equipment obtainable for his home or office. In the receiver, Bakelite tubes, threaded, provide the forms on which inductance coils of high frequency cable are bank-wound. After assembling, the coils are impregnated with an insulating compound, in vacuum, and thoroughly baked. The inductance switch controls a mechanism whereby the different sections may be connected, completely disconnected and opened, or completely disconnected and individually short circuited. This arrangement is important for, by it, each coil has a natural period when connected which is less than the shortest wave length in the receiver's range. The reception of parasitic signals is overcome, the absorption of desired signals by the coils is minimized, more energy is forced to the detector and on all wave lengths the interference is reduced.

CHARLES R. ABLETT CO.

199 Fulton St., NEW YORK CITY

VOLUME TWO OF

RADIO WORLD

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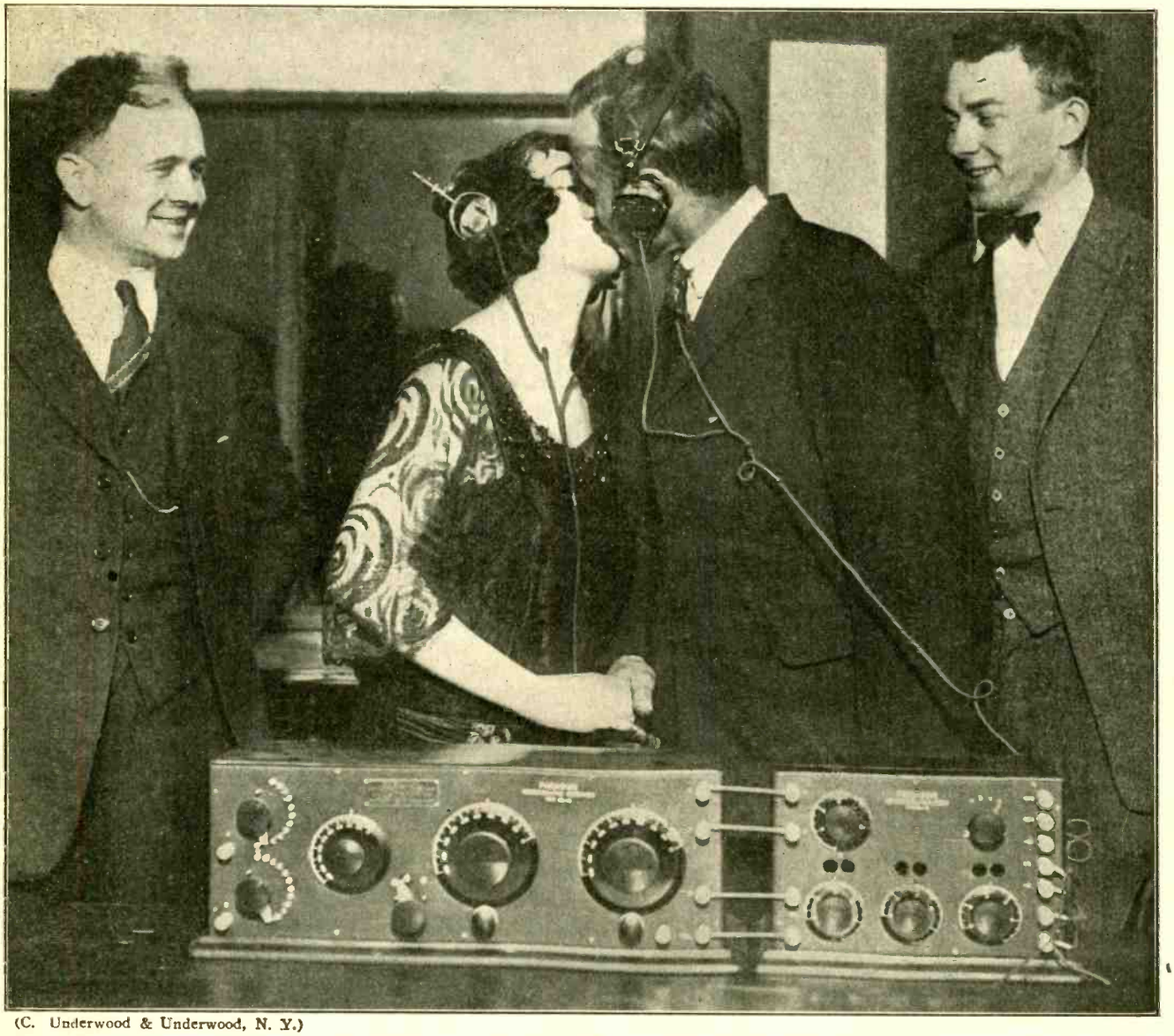
But You Can't Throw Rice at the Set!



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

Yes, millions heard this wedding kiss! The ceremony was performed at the American Radio Exposition. Dr. Saxon, the officiating minister, at the extreme left. Next Miss Girstner, the bride; Mr. Woorm, the happy groom, and his best man.

THE marriage by radio of Miss Margaret Girstner and Joseph Woorm, of New York City, at the American Radio Exposition, held at the Grand Central Palace, was an event that will make radio history. The ceremony, at which Rev. B. F. Saxon officiated, was heard by many thousands of "listeners-in." One of the large exhibitors of the exposition presented the happy couple with a complete receiving set. The management gave them a wedding breakfast and a gift of money. It is estimated that over half the population of the radio world was "present" at this novel wedding through the courtesy of station WEAF. The happy couple stood on the balcony facing the crowds below, and every word uttered was amplified through the special power speech-amplifier so that every person in the exposition could hear. From the exposition these words were transmitted over land wires to WEAF and broadcast over the world. The bride's family, who live out of town, were listening in when the ceremony was performed, which is just as good as being present.

How to Make a Variable Grid-Leak

By Ortherus Gordon

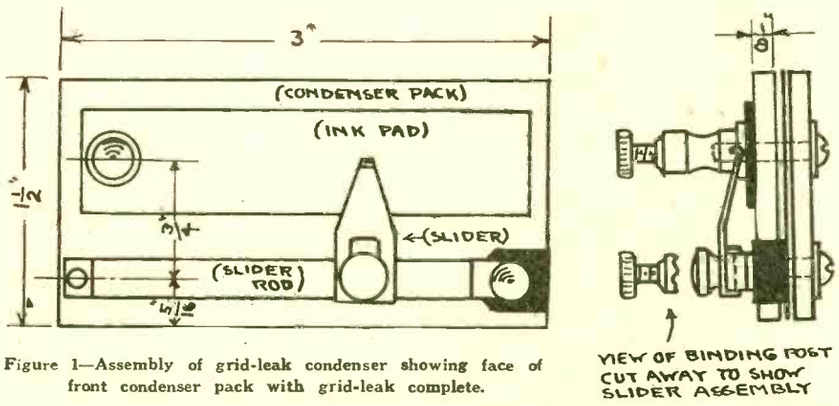


Figure 1—Assembly of grid-leak condenser showing face of front condenser pack with grid-leak complete.

UNLESS an article on construction really helps an amateur by showing him, in at least one way, how to improve his apparatus, it fails in its purpose. Scientists and experimenters are finding new faults with present-day radio apparatus and are constructing more efficient instruments to replace those found wanting. The craze seems to be in getting all the elements of radio reception under variable control. But such a craze is madness in the right direction. Radio sets are like children: no two are alike and no two respond to the same treatment. Each requires individual attention and instruments are being manufactured with this idea of "personal service" in view.

The latest improvement along this line is a variable grid leak, plans for which accompany this article. Grid leaks were formerly considered an unimportant part of the vacuum-tube receiving set; but not now. Considering the duty of grid leaks and the confusion that results when they fail in their duty, it is a wonder that more attention has not been paid to ways and means of improving them.

What is a grid leak, anyway? What is it for?

When a vacuum tube is operating at top-notch speed, there piles up on its grid an unwilling swarm of negative electrons. If given the chance, every single electron in this swarm would beat a hasty retreat, leaving the grid empty and the vacuum tube "dead." On the other hand, if no avenue of escape is opened to those electrons which exceed the number properly needed by the grid, the "extras" would "choke" the set and play havoc with decent reception of signals. If a door is opened, everybody goes home; if the door remains closed, there's a riot.

There is, however, a way of maintaining the golden average, which, as you already know, is by connecting a grid leak to the grid of the vacuum tube. A grid leak is nothing more than a barrier of very high resistance, only broken down when the negative electrons amount to such numbers as to successfully charge and cross it.

In other words, the resistance of the grid leak should be high enough to keep back just the amount of electrons needed by the grid. Every grid has different requirements—and a resistance that is "jake"—for one will be too high for another and too low for still a third. Moreover, it has been found that the same grid has various demands when working under a variety of conditions. For this reason, a variable grid leak is an essential to maximum efficiency.

The workshop plans for such an instrument, illustrating this article, have been proved by actual construction. If followed, the result will be as good a grid leak as can be bought anywhere. The instrument is good-looking, may be mounted on a panel in an upright position, or laid down flat on the baseboard; and, what is more to the point, it may be built by any amateur for a few cents.

Because a condenser invariably goes with the grid leak, and the combination termed a "grid-leak condenser," the plans are extended to include a condenser as well. The capacity of such will be about .00025 mfds., while the resistance of the grid leak will range from practically zero to about four megohms.

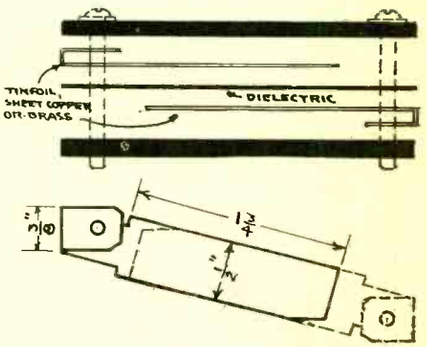


Figure 3—Diagrammatic details of the condenser.

"Condenser packs" is the name I have given the two bakelite, or hard-rubber rectangles, used as blocks about which to construct the grid leak. They are 3 inches long by 1½ inches wide and of any thickness over ⅛ of an inch. Wood is hardly recommended unless it is a very hard wood such as ash, oak, or maple soaked in melted wax or some other insulating composition. Even then, it will not be as satisfactory as hard rubber, bakelite, or any other composition panel material.

The condenser is a departure, in shape at least, from the ordinary strips of metal or metal foil. The detailed drawing (Figure 3) calls for tin foil, sheet brass, or copper, cut in the shape and dimensions shown. The plates are on an angle so they will go from one binding post to the other in a diagonal line. The extensions are brought out and

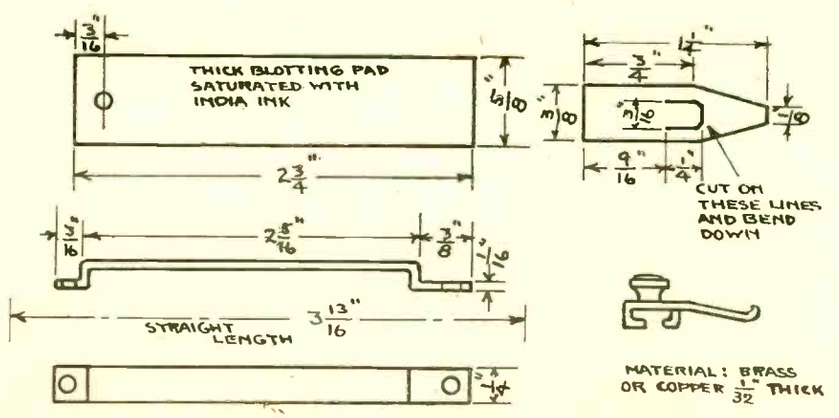


Figure 2—Diagrammatic details of the grid-leak.

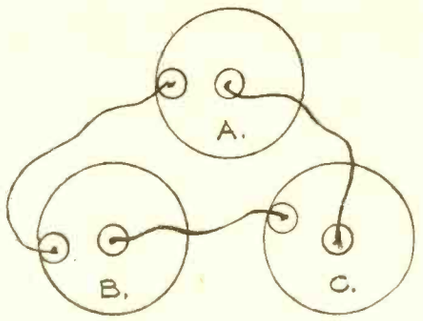
To Reclaim Dry Cells

By C. C. Huntington, Mauch Chunk, Pa.

NOW that the 1½-volt tube is so popular conservation of dry cells is worth considering. Old cells which have outlived their usefulness for ignition purposes, may be reclaimed without trouble or expense and without the use of sloppy mixtures. The reclamation is genuine, not makeshift.

Connect three old cells: A, B, and C, as shown in the accompanying drawing, and let stand over night. In the morning, cell A will show approximately the combined amperage of the three before connecting.

It would be well to select for reclamation the cell showing highest amperage. The beauty of this is that it works. Try it.



Schematic diagram of the three cells as described by Mr. Huntington.

(*Continued from preceding page*)

bent around the condenser packs; one in front to the lower binding-post and the other behind to the upper binding-post.

The dielectric, or the insulation intervening between the two condenser plates, is a rectangular piece of mica or heavily waxed paper cut to the same dimensions as the condenser packs. When the dielectric is made, the condenser unit is assembled as shown in Figure 3; and, when ready, the two holes are drilled through everything at the same time. Then the bolts from the binding posts are inserted and the condenser packs temporarily tightened to await completion of the variable grid leak.

As shown in Figure 1, the grid leak is mounted on the face of the front condenser pack. The details are given in Figure 2. They comprise a piece of thick blotting paper soaked with India ink, a slider-rod, and a thin brass slider. The blotting paper is, of course, the grid leak itself, while the slider-rod and slider only serve to vary its resistance. The India ink mentioned is known as drawing ink. It may be obtained from an amateur friend who has a drawing-outfit, or at any stationery store. In soaking the blotter, it is better to use a large piece and then cut it to size. Tack or pin the paper down to a thin piece of metal so that all the ink poured on it will be absorbed by the blotter. Then let it dry and cut out a rectangle 2¾ inches long by ⅝ of an inch wide. Punch a hole in it to correspond with the upper binding post and then stick it, with glue, in the position shown.

For this operation, paste will not do. Use glue or household cement.

The slider-rod is a piece of brass or copper rod 3 13/16 inches long by ¼ of an inch wide. Have it thick enough so that the rod will not bend. About 1/16 of an inch should be about right. Bend the rod and drill it as shown; but before putting it in final position on the condenser pack, make the slider.

Take a thin piece of spring brass and cut it according to the detail in Figure 2. A sharp chisel will cut out the lug to perfection, so that it can be bent down to clip on the rod. Then bend the whole slider in the shape indicated, put on a knob of some kind, and fasten it to the rod. Then put the rod in place, tighten up the bolts, and the job is done.

The result is a neat and efficient grid leak condenser, which should drag in those weak signals which are now on the outer edge of your receiving range. When the slider is well to the left, the resistance is very low, but it increases as the slider is moved slowly to the right.

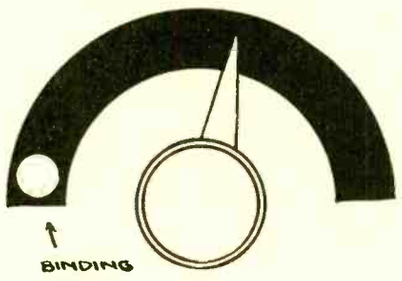


Figure 4—Alternate suggestion which may appeal to some amateurs who want to make a grid-leak without a condenser.

One side of the grid leak is connected to the grid, while the other side is connected to the secondary of the tuning device. The positive pole of the A battery is also connected to the other end of the secondary, so that the positive side of the battery attracts the negative charge of the grid, drawing it in some degree through the grid leak. Some hook-ups cut out the secondary from this circuit and show the grid leak connected directly between the positive pole of the A battery and the grid of the tube.

Figure 4 suggests an alternate shape of variable grid leak. The blotter is cut into a semicircular form, and a knob and pointer used instead of a slider. Some amateurs may prefer this plan over the other, but it does not lend itself very readily to a combination of both grid leak and condenser.

Worth Knowing

You Can't—

RECEIVE signals if you forget to throw the lightning switch.

Expect a tube to work right after letting it fall on a concrete or hardwood floor.

Get the filament of your tube to last if you connect your B battery to it. It will light up brightly for a short space of time, but it doesn't last long enough to produce satisfaction. Besides, you wouldn't be able to get the B-battery connections right.

Expect to get Cuba regularly on a crystal set.

Hear church services over the radio and get satisfaction. You are generally too comfortable when sitting at your set.

* * *

Let us look at radio in connection with the question of isolation. Think of the condition of most country roads at this time of the year; snow-covered and practically impassable. Think of what radio means to the folks imprisoned in the midst of snow-covered fields. Think of what a force this will be in keeping the young folks on the farm, a problem now causing the government much worry. Radio will not only entertain the farm folks, but it will help to overcome the fundamental cause of the desertion of rural communities. In connection with isolation, let us not forget the men in the lumber and mining camps and in the lighthouse service. Take the latter, whose lives are dedicated to the safety of travelers. In many cases, radio has relieved the tedium of life on the "lights." For the first time in history, these men can keep in touch with the world that used to pass them by.

* * *

It sometimes happens that you won't get any results when you hook up a tickler-circuit regenerative set. If this happens, try switching your tickler leads, changing the connections, thereby changing the direction of the current through the circuit. The easiest way to tell whether your tickler is connected is by the rushing sound heard in the phones when the circuit is brought into resonance. If you don't hear this sound, switch your leads.

* * *

Crystal detectors, no matter how sensitive, cannot be depended on for broadcast reception over a distance of more than 25 miles, although greater distances may be covered under favorable conditions. Code messages may be received over long distances.

Get Radio Goods That Stand the Test

By C. White, Consulting Engineer

LACK of knowledge, or, perhaps, neglect of certain fundamental points is frequently a source of multifold trouble. It is a shame that any results are obtainable with poorly constructed apparatus. If such were the case, only the better grade of goods would be placed on the market. But, nevertheless, the great educational work that radio journals are carrying on is sure to result in the eventual blacklisting of all manufacturers who refuse to let quality be their standard. The radio manufacturer is just like the rest of us; he is human, subject to error, and by no means infallible in judgment. Hence, we must not be too severe and must consider that the vast majority are in the radio game to stay and are doing the best to improve the field. What is really needed is constructive, not *destructive*, criticism. It is only by the general getting together of amateurs, professionals, and manufacturers that standardization and many other desired improvements will be forth coming. National Radio Week is just the thing to bring such facts to light.

As an example of neglect, let me first bring to light the phones used in radio reception. There has been, perhaps, no other article of the radio trade that has suffered so much as the telephones. The fact that they are outwardly easy to make has attracted many although their knowledge is rather limited. The principle of the radio, or, in fact, any telephone receiver is that of the electromagnet. The feeble signal-current passing through the coils of wire in the phones causes the diaphram to be moved backward and forward in rapid succession, thereby translating electrical impulses of the received current into corresponding sound waves. The volume of the sound emitted depends on the strength of the electromagnets. Fundamental electrical engineering tells us that the strength of any electromagnet is a direct function of the number of turns of wire on the magnet and the current flowing through these turns—in technical language, the number of ampere-turns (the ampere being the measure of electrical current).

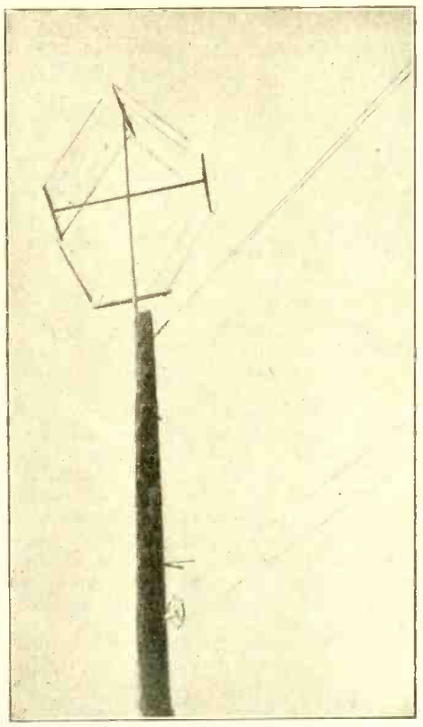
Since in a radio or telephone circuit the actual current flowing is exceedingly small, hence to get a fairly strong magnet we must place a larger number of turns than would be necessary if the current were greater in value. To do this and still keep the size of the coil within the limits of the space available within the receiver piece, we must resort to the use of extremely fine wire. Now, since the number of turns is many and the size small, we have grown accustomed to rate a receiver in terms of the resistance of the coils instead of the ampere turns, which would have been the logical and more scientific thing to have done. But, so long as we kept to one kind of wire, (copper), we were strictly safe in so doing because the resistance was a measure of the relative ampere turns. Naturally, a pair of phones rated at 3,000 ohms was looked on as superior in every way to a pair rated at 1,500.

This was O. K. until some dishonest manufacturers deliberately wound German silver wire on their phones in order to raise their ohmic resistance. Since German silver has more resistance per unit length of the same cross-sectional area than copper, it was perfectly true that a few turns of it would give a resistance many times greater than many turns of the same size of copper wire. But how about the number of ampere turns? The manufacturer was either ignorant of the fact that the basic fact underlying good phone-design was ampere turns and not the indirect measure of ampere turns, resistance, that is desirable; or, he was trying to rely on the fact that the average radioman thinks of phones in terms of their resistance. Such deception can not last long, especially when amateurs are learning to ask for the better make of apparatus. Some, no doubt, are aware of the fact that certain makes of phones are better than certain other makes regardless of the resistance ratings.

While the number of ampere turns is the fundamental determining factor in phone design, there are other minor considerations which play a large part in the value of the instrument. A pair of phones used for radiophone reception should have a resonant point at about 870 cycles. This is much desired because telephone engineers have proved that the average electrical value of the human voice is 870 cycles, although the range of human sound vibrations varies from 200 to 2,200 cycles. Extensive experiments have so definitely verified this fact, that telephone receivers are all made to have, or give, the maximum response at about 870 cycles. A radio receiver made for voice reception should not only give the maximum response at that frequency, but, also, be capable of reproducing the higher-voice frequencies with the minimum amount of distortion. In addition, a good pair of phones must use good steel in its magnetic circuit in order to keep the magnetic energy losses as low as possible.

Regarding the basic facts that amateurs commonly abuse: Vacuum tubes are delicate, scientific instruments and their behavior, or characteristics, vary greatly according to the type of the tube—and the manufacturer. We may list tubes, first, according to hardness; and, second, according to make. A care-

Aerial Atop Clothesline Pole



Novel aerial erected by J. O. Walsh, Bayonne, New Jersey.

IN response to RADIO WORLD's call to amateurs and fans to send in for publication any radio stunt, experiment, or hook-up they may have found useful and which they would like to share with others, J. O. Walsh, 10 West 16th Street, Bayonne, New Jersey, contributes a photograph of his loop aerial set on top of a clothesline pole. Mr. Walsh states that he is "getting good work" from WEAF, WJZ and WOR on a small outfit which cost only $12.

Too Much Tuning

By Jack Turner

Radio Editor, "The Age-Herald," Birmingham, Ala.

MANY who listen in on the broadcast programs have a habit of changing from one station to another. The following is about the way it comes out of the loud-speaker when the "tuning hound" is "at the wheel":

"This is WWJ, the radiophone broadcasting station of the," —"Island where Robinson Crusoe and his good man, Friday, stayed."—"The first selection from the Fort Worth Star-Telegram,"—"located in Cincinnati, Ohio,"—"will be a vocal solo,"—"played by Paul Whiteman and his orchestra."—"The radiophone broadcasting station of the Sweeney"—"School of Chiropractic,"—"Jefferson City, Missouri,"—"will next entertain the little listeners with a bedtime story. Now all you little boys, and all you little girls, too. To-night, I am going to tell you about,"—"Senoras y caballeros. Fatima dietes malachrino portina ramases La Entrado nurica. Este es Habana, Cuba."—"Absolutely, Mr. Gallagher; positively, Mr. Shean!"—"The whole congregation will now please stand and sing Hymn No. 294,"—"Kiss Mamma, Kiss Papa."—"The service will be continued by reading the scripture,"—"McNoot is groggy. The battle won't last much longer at this rate. He goes down for the count! One-two-three-four-five-six-seven-eight-nine,"—"Ten o'clock, Central Standard time."—"The final results are,"—"lost and any reports on this car will be greatly appreciated."—"As it is now,"—"Three o'clock in the morning,"—"We will relay the Arlington time signal."—"We take pleasure in introducing to our unseen audience Mr. Bluelaw. He will speak representing the Anti-Dance League. Mr. Bluelaw, ladies and gentlemen—"—"The next number by The Jelly Jazz Hounds' Orchestra will be, 'Nobody Lied.'"—"The market reports as given us by the,"—"Woman's Aid Society of this city, are as follows,"—"Shelby County. A still was captured here to-day, after a hard battle between the,"—"Ministers here."—"The next number from the Milwaukee station will be a solo, 'Drink to Me Only With Thine Eyes.'"—"Dah Dee Dah Dee, Dah Dah Dee Dah."—"As the professor has promised to make a speech,"—"We will sign off."—"Good Night!"

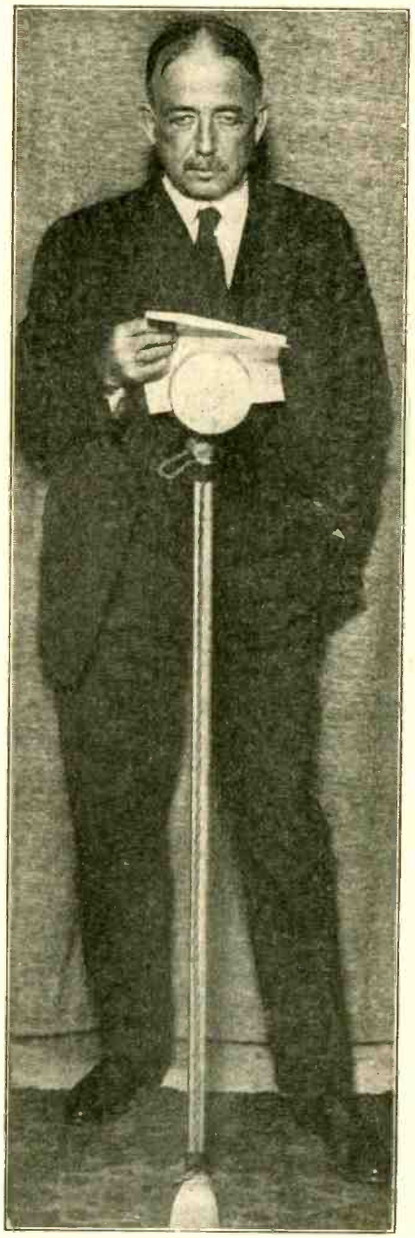
(*Continued from preceding page*)

fully designed radio-circuit may function wonderfully with a Radiotron of the U-V 200 type and still the performance of the same circuit with another make of tube might be very disappointing. You can not take a circuit that is designed for a hard tube and expect it to function perfectly with a soft tube even of the same manufacture. Amateurs in general think that a vacuum tube is a vacuum tube and that classification is unnecessary. Some, no doubt, go a step further and class them as soft, medium, and hard; but, few take the trouble to actually differentiate between the relative advantages and disadvantages of certain makes in various circuits.

The recent release of the WD-11 tube for general amateur work will cause many manufacturers to use it in circuits where it cannot be advantageously applied. The fact that it is lighted from a small dry cell is a most advantageous asset; but there are other points to be considered before its application. From recent laboratory reports it does not function very well in radio-frequency and superregenerative circuits, but it is very satisfactory in the average simple, or regenerative, receiver. Before using any tube in your circuit be sure that is the most efficient for that type of circuit. Many mediocre results obtained are blamed on sets and circuits, where the real blame should be placed on the employment of the wrong type of vacuum bulb.

It is a good plan to be logical, scientific, and consistent. One of the most inconsistent practices is the use of heavy insulators on the antennae supports, but the lead-in wire is allowed to rub, or touch, the roof and the sides of the house without any insulation. Another bad practice is that of poorly grounding a set on a radiator. A good ground is often more essential to reception than an aerial. Another mistake is the belief that a double-wire aerial 50 feet long is equal to a single-wire aerial 100 feet long. The latter is far more efficient. It is well for the novice to try out aerials of different lengths. Sometimes very startling results may be obtained by lengthening and shortening an aerial. With a short aerial, it is generally much more difficult to tune. You will soon find that by experimenting that many items that you had hitherto regarded as very commonplace mean an efficient outfit.

Radio Plays Leading Part in Municipal Work



(C. World Wide Photos)

Bird S. Coler, photographed above, Commissioner of Public Welfare of New York City, found it necessary to raise funds for the needy of the metropolis. The "drive" had to be made quickly. Methods used in previous years were not only antiquated but did not promise satisfactory results. So Mr. Coler turned to radio. He broadcast his appeal from WHN, Ridgewood, Borough of Brooklyn. Mr. Coler is speaking into the microphone. Mr. Coler illustrates the proper method of talking into a radio microphone. Stand in a perfectly natural position and speak at the device; not directly into it, as if telephoning.

Urges Enactment of Radio Bill

Secretary Hoover, After Working Out Many National Problems, Starts in Earnest to Clear the Ether of Radio Interference

By Carl H. Butman

WASHINGTON, D. C.—Herbert R. Hoover, Secretary of Commerce, is ready to start serious consideration by Congress of the pending radio legislation. Literally, the final passage of the White Bill, seeking to relocate radio waves, minimize interference and provide for the adequate regulation of national radio transmission, will be acclaimed by every amateur.

The bills presented in both the Senate and House last June lay dormant at the Capitol until Secretary Hoover returned from a protracted trip to the West Coast where he was busy with another national project. Immediately upon his return, he took up the question of the desired radio legislation with Representative W. H. White, Jr., of Maine, the House champion of radio, and author of the White Bill, with the result that it has been announced that hearings will start before the House Merchant Marine and Fisheries Committee without further delay.

Public Hearings on White Bill

Action is confined to the White Bill, designated as HR-11,964. Hearings will be presided over by Representative W. S. Greene of Massachusetts, chairman of the committee, assisted by Mr. White, who is chairman of the subcommittee on radio. The general public is invited to the hearing, and representatives of amateurs, manufacturers, commercial companies, broadcasters and even listeners-in are invited to appear with recommendations or objections to the proposed law. Secretary Hoover will be present, accompanied by his radio aides, and some Naval experts also plan to attend. The principal recommendations of the radio conference are incorporated in the present bill, but the public is now given an opportunity for a last word.

Bill Aims to Aid Radio Development

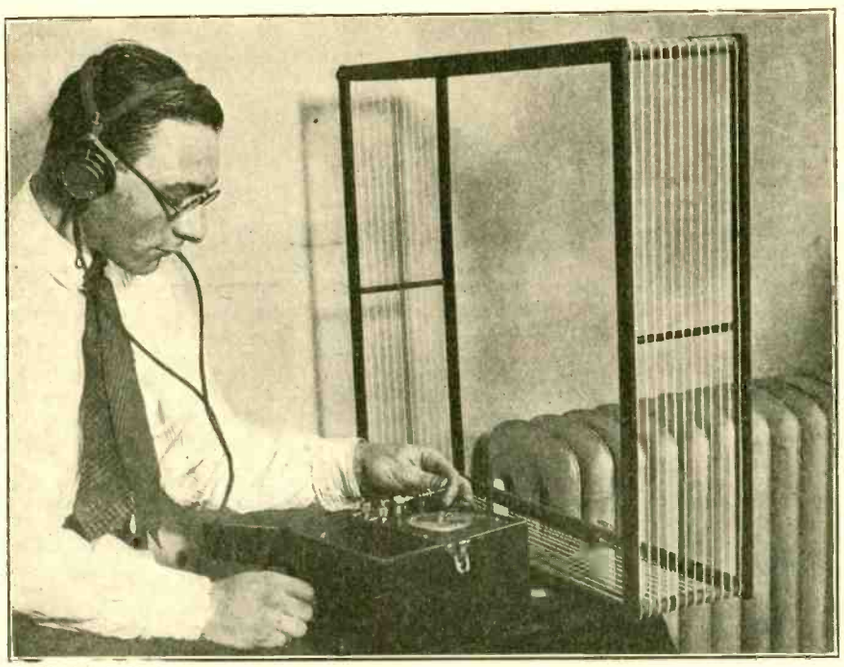
In general, the bill is intended to make for the future development of radio in this country on a purely American basis. It is planned also to clothe the Secretary of Commerce with sufficient authority that he may control the expansion, operation, licensing, and revocation of licenses. A redistribution of wave bands is scheduled in an effort to clear the radio "atmosphere" of unnecessary interference. Among the provisions of the bill is the granting of authority to the Secretary of Commerce to classify transmission stations, designate the service, and assign wave bands.

More definite regulatory powers for the Secretary of Commerce are also sought, especially with regard to decreasing interference. Whether or not licenses must be issued regardless of that officer's discretion is also to be decided. The existing law of 1912 is silent on many phases of the duties developing upon the Department of Commerce to-day, with thousands of stations in operation; neither are time limits for the duration of licenses specified. Governmental authority is doubtful where the revocation of licenses is concerned but the new bill grants such power to the Secretary.

Legislation Does Not Affect Receiving

No regulations are planned for receiving stations, the whole bill being devoted to the transmission of all radio messages and broadcasts. The status of the amateur and the listener-in established by the present law is left unchanged, except that the rights of the amateur are extended and additional wave lengths are assigned for his use. Much is left to the discretion of the head of the Commerce Department, as it is believed that radio has a future which may be jeopardized if too stringent and detailed regulations are enacted into a law. Regulations believed just and necessary to-day, under some circumstances, might prove a handicap to the natural development of radio within a space of a few months and hence broad powers are planned for the Secretary of Commerce and his advisory committee of twelve members.

Hears Pittsburgh and Schenectady on Crystal Set Using a Loop Aerial



(C. Kadel & Herbert)

Doesn't it make you sad when, after paying a big price for a radio set, you find that you can hear only the local stations? Then you hear of a radio fan with a cheap crystal set who picks up the distant stations. It sure does! But when you hear that this same fan gets these results on his crystal set with a loop aerial, you get a real thrill! Maurice Wald tried a loop aerial on his crystal just to see what would happen, and found that he could pick up Pittsburgh and Schenectady. The fact that his home is located on one of the highest pieces of ground on Manhattan Island probably accounts for his unusual results. The photograph shows Maurice Wald with his crystal set and loop aerial.

New and Unusual Circuit for Radio Experimenters

By C. White, Consulting Engineer

IT is a general belief that we must have some very definite means of coupling to make a vacuum tube oscillate; but such is not always the case. In the strict theoretical sense of the word, "coupling," we must have some method of accomplishing this; but so far as the physical aspect of the circuit is concerned, we can make a tube oscillate with apparently no method of coupling. This trick in the circuit illustrated herewith lies in the fact that, at a casual glance, the eye is deceived in observing that quite a new idea is presented. For those of my readers who are quite experimentally inclined, I heartily recommend this circuit for testing purposes; for, no doubt, they will be very much surprised at the ease with which it will oscillate once the correct value of grid leak and grid-leak condenser is found.

The correct constants for the grid leak and its condenser, naturally, are solely dependent on the characteristics of the tube used. With a soft tube more trouble will be encountered than with a hard tube, owing to the fact that the former is frequently quite erratic when used in a circuit of this nature.

Analyze this circuit in detail and see wherein it differs from the ordinary. So far as the tuning element is concerned, it is nothing more than a single-circuit tuner, consisting of a honeycomb coil whose size depends upon the desired wave-length reception, and common 23-plate air variable-condenser. The detecting circuit is, however, rather different from the ordinary circuit used with the single-circuit tuner in that the grid and filament of the tube are placed across the condenser instead of the tuning inductance. But this is perfectly permissible since there is a voltage across both when the signal current of the incoming wave is passing in the antennae ground-circuit. It will be noted that the grid leak is not shunted around the grid-leak condenser as usual, but is placed directly from grid to filament. The reason for this is that since we are taking our voltage across the 23-plate condenser instead of the honeycomb coil, the resistance of the condenser is very large in comparison to that of the leak, hence the total resistance of the actual

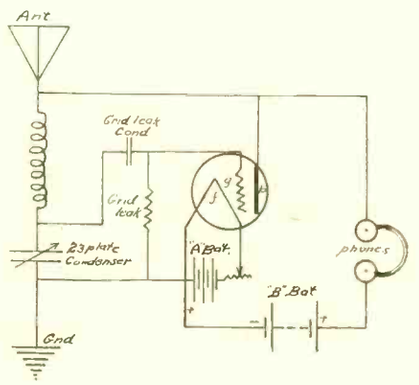


Figure 1—Hook-up of the circuit described by Mr. C. White in the accompanying article.

path from the grid to the filament would be many times that of the leak resistance inserted. By placing the leak, as shown, the resistance of the leak path is just about the same as that of the leak used provided perfect condensers are employed—that is, condensers that have a very high leakage resistance.

The phone circuit is in no way different from the ordinary nonregenerative plate-filament circuit. Up to this point, there is really no radical departure from that of an ordinary simple single nonregenerative receiver; but the connection from the plate to the top inductance terminal is quite out of the usual. This connection affords a by-pass for current to the grid and the filament; and by the choice of the right size capacity for the grid leak, the coupling between the grid and the plate may be adjusted, electrostatically, to the correct value to make the tube oscillate within the desired range. Although this circuit, on first sight, seems to have no method of coupling, on careful analysis it obtains its coupling by the employment of the tuning inductance for a double purpose.

When carefully made and adjusted, this circuit represents one of the most inexpensive single circuits, using a vacuum tube, that can be constructed. Since it will oscillate with ease over its entire scale when once adjusted, it is a very efficient receiver for C-W work. But, owing to the nature of the adjustments that must be first made, I do not recommend this circuit to the novice with little or no experience in constructing oscillatory circuits. For the radio experimenter, this hook-up will prove to be very interesting. A good method of finding the right size grid-leak condenser is to insert a number of small mica condensers in parallel until the right amount of capacity is obtained. The grid leak resistance may be found by drawing a few lines with lead pencil over a strip of paper between the two terminal points or by employing any other of the well-known modifications of this method. Perhaps with a little care and experimenting, a very efficient circuit may be developed readily from this one.

Seven New Broadcasters

DURING the past week, the Department of Commerce licensed seven radio stations for broadcasting on 360 meters. The new stations are:

WPAS—J. & M. Electric Co., Amsterdam, N. Y.

WPAP—Theodore D. Phillips, Winchester, Ky.

WPAQ—General Sales & Engineering Co., Frostburg, Md.

WPAU—Concordia College, Moorhead, Minn.

WWAD—Wright & Wright, Inc., Philadelphia.

KFEP—Radio Equipment Co., Denver, Colo.

KFHJ—Fallon Co., Santa Barbara, Calif.

"Courier-Journal" Returns to 360 Meters

ONE big broadcasting station after trying out the Class-B license on 400 meters for a short time, has returned to the 360-wave. The Department of Commerce has just relicensed WHAS, "The Courier-Journal," Louisville, Kentucky, on 360 meters. This publication believes the 360-meter wave is better suited for its broadcasting, and more popular with the fans.

Radio Gives Mariners Aid

THE Mexican Government inaugurated a new broadcasting service for mariners on November 1. The service comprises the picking up and rebroadcasting of notices to mariners emanating from radio stations in America, Cuba, and vessels within their zone, by six Mexican stations on both the Pacific and Gulf Coasts.

Scheveningen Radio Station

THE Government of the Netherlands is enlarging the present radio station at Scheveningen, which soon will be ready for operation. It is designed to communicate with all parts of Europe.

Radiograms

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

THE inauguration of an ocean radio-letter service on United States Shipping Board vessels is announced. Messages from a ship bound in one direction are to be transmitted by radio to a ship bound in another direction, for mailing, when the receiving ship arrives at her destination. The rate for this service will be $1.20 for twenty words, including registration. Each additional word will cost four cents. Messages are limited to 100 words

* * *

Radio has ended the isolation of one of the most lonely, if most beautiful, spots on earth. Pitcairn Island, storied spot in the South Sea islands, whose residents have been forced to depend on news brought by occasional ships, has a complete radio plant. Visitors to the island, it is reported, brought a set with them, sold it to the natives, and taught a number of the young islanders radio reception and the Morse Code.

* * *

Beginning December 20 weather broadcasts now transmitted from the United States naval radio station at Miami, Fla., were transferred to the naval station at Jupiter, Fla. (NAQ). The weather will be broadcasted at 11:30 a. m. and 6 p. m. (seventy-fifth meridian time). Hurricane warnings will be broadcasted when issued and repeated at two-hour intervals until midnight. The transmission will be by spark on a wave length of 1,688 meters.

* * *

David Lloyd George, former Prime Minister of Great Britain, recently journeyed to Algeciras, Morocco, for a rest. Be that as it may, his first request was for a powerful radio-receiving set so he could keep in touch with European capitals.

* * *

Call letters KFOG have been assigned to all ice patrol vessels of the North Atlantic International Ice Patrol. Any vessel desiring to communicate with the vessel on patrol regarding conditions in the ice fields should use the above-mentioned signal.

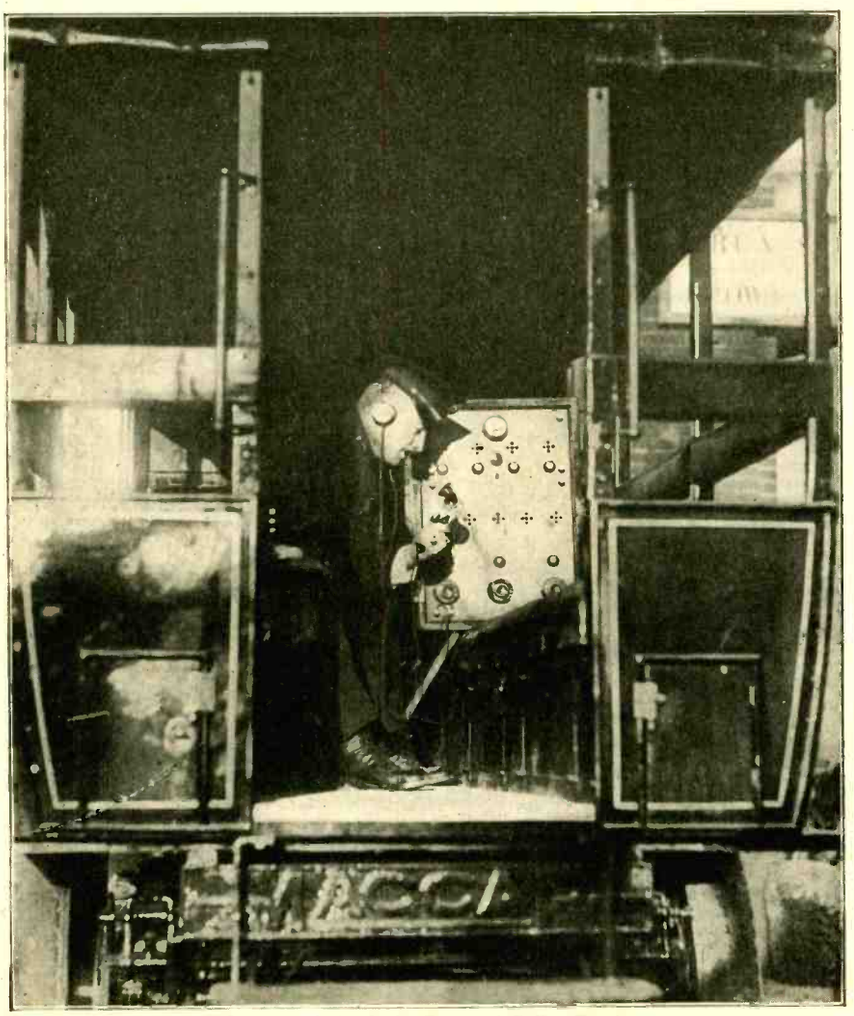
* * *

Experimental stations should, as far as possible, avoid using a radiating antenna for testing while other stations in the vicinity, including broadcasting stations, are operating. The early morning hours are probably best suited for testing.

* * *

The amateur radio station operated by Leon Deloy, at Nice, France, has been heard by Gene E. Witham, of Brooklyn. This is the first French amateur station heard by American amateurs. Gene E. Witham, of 126 Eigthy-sixth street, Brooklyn, said that he was listening in on his wireless about 9:30 December 27 when he heard the word "test" repeated several times. It came in faintly in the Morse Code. There followed several French words which he could not understand. The sender then signed off with "8AB." Realizing that this was the signature of the night operator at Nice, France, Witham immediately sent a night letter to the American Radio Relay League at Hartford, telling of his experience. Witham is sixteen years old, and is a student at the Stuyvesant High School. He has a single-bulb detector instrument.

Radio Installed Patrol Wagon of Philadelphia Police



(C. P. & A. Photos) **Interior of the Radio-Equipped Police Truck**

THE Philadelphia Police Department patrol-wagons keep in constant touch with headquarters by radio. Some time ago, this idea was tried out in the City of Brotherly Love, and it was such a success that now all the patrol wagons are equipped with sets. By referring to the photograph the actual installation may be seen. It is both a transmitter and receiver. Lieutenant Harry Edwards is photographed at the set. The set is operated on a loop installed on the top.

This opens an entirely new field for radio, and it is only a matter of time when all police trucks in the large cities will be equipped with radio sets as shown in the photo. Owing to the fact that the sets are worked from a loop antenna, it is claimed that they are extremely directional and several incidents have been cited where people operating transmitters without licenses have been detected and, after considerable maneuvering, located. One may well ask how a set such as this manages to get sufficient current to operate a transmitter on a loop and which must, of necessity, have a very low wave-length and, necessarily, low power. But when it is remembered that the receiving station on each, as well as that at the central station, are extremely sensitive, it does not take very much to convince even the most sceptical that this is a most practical device.

Radio and the Woman

Crystal D. Tector Gives Her Views on the Exposition and Adds a Few Words About Radio's First Year

WELL, will wonders never cease? I was never so surprised in all my life as the other day. I was shopping and decided that I needed a new pair of shoes. Imagine my surprise when the salesman asked me if I had seen the "Radio Boot."

"My goodness! Have they shoes with radio sets in them now," I murmured.

"Oh, no!" replied the salesman. "That just signifies that it goes on and off in a flash, and right over your other shoes. You see, they're overshoes."

I wonder when they will cease to call every new thing that they bring out on the market "Radio." It is trying to think of other things when they are always flaunting the name "Radio" before your eyes.

* * *

EVEN in this age of enlightenment and daily newspapers some people never catch up with the times. A friend of mine was city-bound one day last week, and, as I had a slight headache, I asked her if she would get me a bulb, not thinking for a moment that she didn't know. Later in the afternoon she stopped in—— And imagine what she brought me—a Chinese water-lily bulb.

* * *

FRIEND HUSBAND gave me the most delightful two-step amplifier for Christmas, and I gave him six of the loveliest lace "hankies." Nothing like husband and wife knowing what to give each other for presents, is there?

* * *

A YEAR ago, when radio first started to boom, there were certain people that said, "Oh, it's just another fad! It will soon die out, and then a lot of people will be out a lot of money spent on expensive apparatus.

Instead of that, radio turned from a popular fad into a public service. It is going all the time—and unless you have the apparatus to receive it you will never know that it exists.

A great many prominent people have expensive radio sets installed in their homes, on their yachts, in their hunting lodges, in fact, any place where they want to keep in constant touch with the world. Many big business men have even gone so far as to have sets installed in their offices and employ expert operators to keep them in touch with the latest news.

How long before various branches of large business will carry on communication from city to city by radio is only a matter of time. Then will radio be one of the most important factors in business as well as private life.

Think of the many invalids whose lives are brightened through the agency of radio. Also the many men and women who are isolated on lighthouses and fire-stations throughout the land, who suffered for want of something to keep their minds active, but now are kept in touch with the outside world.

* * *

DID it ever occur to some of you when listening in that the man doing relay work with a spark set is doing it for your benefit? Many a man who, years ago, used to carry groceries after school to earn money to buy some new apparatus for his set, now writes R.E., or E.E., after his name. A number of them hold responsible executive positions with radio corporations. If one of these men interferes with you when you are litsening in to a radio concert, see if you can't get your set to tune sharper before laying the blame on him.

* * *

LIKE a dutiful radio fan, Friend Husband took me to the American Radio Exposition. Those who didn't go will never know what they missed. The show was simply marvelous. The only unpleasantness I encountered was that F. H. was tired and impatient. Even the fact that they had a set of ivory and gold couldn't remove the grouch that had encompassed him.

I never saw such a wonderful display of simply marvelous apparatus. There were sets and sets and sets. And one was more wonderful than the other, until you wondered where they would stop. There was a set so large that it would fill an entire room, and there was a set so small that you could carry it around in your vest pocket. There were sets that needed no aerial or ground—not even a loop.

I mustn't forget the wonderful program they broadcast there from WEAF. I haven't ceased wondering yet how it was possible to fill that entire hall with music. Just think of all the power amplifiers that were necessary. You could even hear the announcer's breath. It sounded like the north wind soughing through the trees. And when he spoke—well, his voice just filled every corner of that wonderful building.

AND not only that, girls, but you should have seen the styles at the exposition. Friend Husband made the remark that he thought they had combined a fashion show in radio along with a fashion show for women; but, even at that, all the fashions in the world couldn't keep me any busier than I was looking at the different sets. One manufacturer, seeing me standing outside his gate, kindly invited me in and explained in detail just why all the people owning radio sets should use storage B batteries. I never met a more pleasant man in all my life, but F. H. says that he took me for a "hick" and wanted to sell me something.

* * *

ONE little incident that I carried away with me will remain in my memory for a long, long time. There was a little, thin youngster, who had worked his way through the crowd surrounding the large motor-truck that housed the speech-amplifying apparatus, which made it possible to broadcast the program from the exposition. He was looking up at the man working the instrument with longing eyes, and trying to keep his place in the eager, pushing, milling crowd. The operator looked down and, noticing that mite of a boy in the crowd, so interested that he did not seem to give attention to anything but the operator, called the youngster up to the truck platform.

"Whatcha want? I ain't done nuthin!" said the youngster, starting to back away.

"No, come on up here and I'll let you see how it works," the operator explained.

The youngster beamed like the sun, and walked up the ladder as if in a trance. The operator explained to him that this apparatus made it possible for this little boy to hear the speakers over the wireless. The delight written all over that boy's face will remain in my memory for many a day.

My Picture for This Week

By Crystal D. Tector

(C. International News)

I CHOSE this picture to illustrate my page this week, for two reasons: First because it is so extremely true to life; and, secondly, because it is the little daughter of a very dear friend of mine. The expression of rapt interest on the child's face is alluring, because, when photographed, she was so interested in the bedtime stories that she did not notice the camera. The set that is used is one of the newest things in radio. It operates on a small inside loop-aerial. My friend discarded his old set in favor of the new one because of that fact and, also, because the tuning is so simplified that his little daughter can easily handle it. It seems to me that loop sets are coming more and more into vogue. To my mind it is only a question of a short time when the outside antenna will be entirely discarded in favor of the loop which has proved so much easier to install and handle.

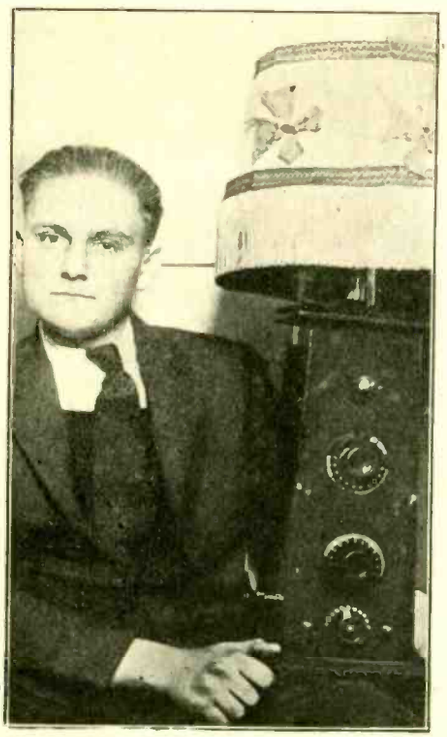
American Radio Exposition

IN a recent address before the New York Electrical Society, David Saranoff, vice-president and general manager of the Radio Corporation of America, made the following pertinent statements:

"Commercially speaking, radio is but some two years old, but in this brief span of time it has earned for itself, and properly so, the right to be termed an industry."

"Radio in its primary phase was a means of communication through technically trained men—radio operators Then radio entered the home through wireless telephony, serving the entire family with entertainment, cultural, and other information. Its next application, I believe, will be to the individual."

These are the utterances of a man who knows radio. And they were exemplified to the last degree in the American Radio Exposition which closed its first successful event at the Grand Central Palace,



(C. Photonews, N. Y.)

William Johnson, fourteen-year-old radioist, and his "radio lamp," which was one of the attractions of the exposition.

New York, at midnight on December 30. The old year went out in a blaze of hilarity, good feeling, and prolonged wishes for the success of the world's husky baby industry.

The show was a grand success. That fact was established soon after the doors opened to receive the thousands of interested spectators, many of whom had traveled from distant cities to see the latest and best in radio development.

The many new things were alluring. Craned necks and bulging eyes attested their attractiveness. It is hard for a writer whose space is limited to describe everything as fully as he wishes. For instance, there was a demonstration of the "talking movies," that marvel for which all "movie" fans are waiting. This film, which shows the operation of the vacuum tube, was accompanied by a talk explaining the tube's action recorded on a phonograph record. The reproduction of the record is kept in step with the picture on the screen by a very ingenious synchronizing device.

The talk was prepared by a Western Electric Company engineer and delivered into a high-quality transmitter, or microphone, while the film was being shown. The speaker's voice was amplified by vacuum tubes before being recorded. This resulted in the voice being reproduced in the fullest detail. The sensation on the hearer is thrilling. The voice reproduction is so natural that many people refused to believe that the demonstrator himself was not doing the talking.

Paul F. Godley, was an interesting figure when he talked on "The Present Outlook for Radio Art." He was personally introduced to the audience by Major Edwin E. Armstrong, inventor of the Armstrong regenerative and super-regenerative receivers. These two famous radiosts created as much enthusiasm as if they had been the President and Vice-President of the country.

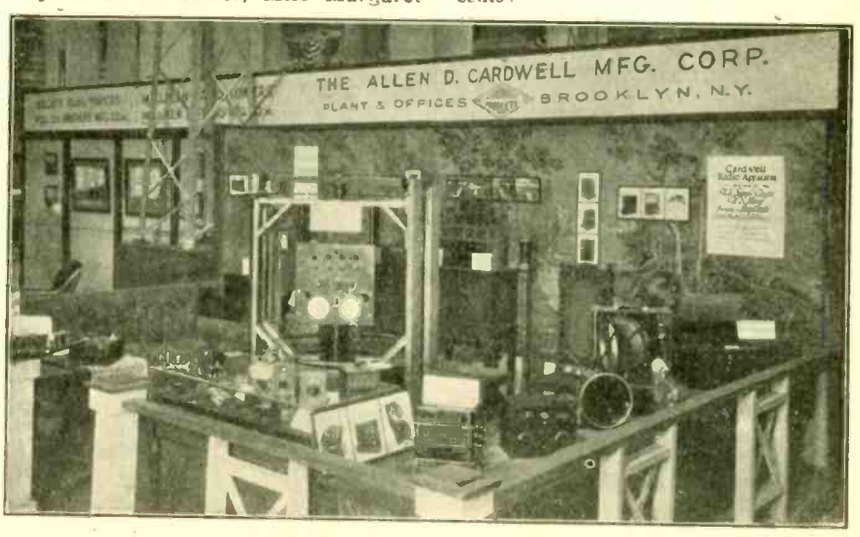
The feature of the second day was a double marriage, broadcast over the United States and Canada. The ceremony took place on the mezzanine floor. Miss Helen Koller became the bride of Mr. John Brunchuezler, Miss Margaret Girstner was married to Joseph Woorn. Rev. B. F. Saxon, pastor of the Sixty-first Street Methodist Church, officiated. Both couples received a present of $100 from the management and a wedding breakfast from the management of the exposition. One of the large exhibitors of the show made a present of the receiving set to each couple. A gentleman who asked to have his name withheld gave each bride a check in a sealed envelope.

Rudolph Valentino, the moving-picture actor, gave an interesting talk on "What Is the Matter with the Movies."

Among the many novelties were receiving sets that may be worked without operators and transmitters of high-speed messages which may be deciphered at will by the operator at the receiving end. Imagine the faint impulses of signals from France, Germany, Russia, England and Spain being put down on paper so that anyone with a knowledge of code may transcribe them! This caused people to gasp with wonder.

The amateurs had an attractive corner. Here were shown sets of amateur construction embodying ingenuity and workmanship. Imagine a complete crystal set in an ordinary bill-fold! Imagine a set being built at a total cost of 31 cents!

The photograph at the right illustrates one of the interesting amateur exhibits at the American Radio Exposition. The entire set is self-contained in an ordinary watchcase. The inductance is variable, as is shown in the photograph, by a 15-point switch. The inductance is wound on a piece of fiber fitted inside the watch, and has a wave range of 1500 meters. A range of 75 miles is claimed with this small set, using an outside antenna. This illustrates the ingenuity of various amateurs all over the country. The builder wanted a set that could be carried any place without the inconvenience that usually accompanies a larger set, so, as he says, "I just went ahead and made one out of my Ingersoll." An ordinary pair of headphones actually dwarf the set to insignificance.



An example of one of the exhibits. Note the radio direction-finder in the center.

Gay With Radio Surprises

(*Continued from preceding page*)

Some of the amateur work was remarkable in construction and design. There were lamps made into radio sets with the bulbs under the shade. Radio sets in watch cases. Radio sets in cigar boxes. Radio sets in suitcases. In short, anything that seemed possible of holding a radio set was utilized in the most workmanlike fashion.

The show was in many ways, a manufacturers exhibit. Its main purpose was to put before the public the latest products and to show what first-class apparatus really is and the care taken in its manufacture. There was sets so large that one had to mount a stepladder in order to reach the controls. There were manufacturers of parts whose exhibits were chiefly to acquaint the man who constructs his own apparatus with the fact that it pays in the end to buy the best apparatus.

The Radio Mica Products Company reports the exposition a success from the point of view of consumer interests as well as dealer buying. The Micaphone mica diaphragms for radio head-sets are still among the biggest sellers in radio accessories and the new micaphone kode killer already has found popular recognition with radio amateurs. While this apparatus involves principles formerly used in commercial radio, this is the first practical embodiment of a radio-frequency wave-trap made to eliminate code when broadcast concerts are being received. Its simplicity and effectiveness appeal to both amateur and expert. On the mezzanine floor there is a standard 500 watt broadcasting set exhibited by the Western Electric Company. This particular piece of apparatus enabled visitors who had listened to programs from similar sets to have an opportunity to inspect it in detail.

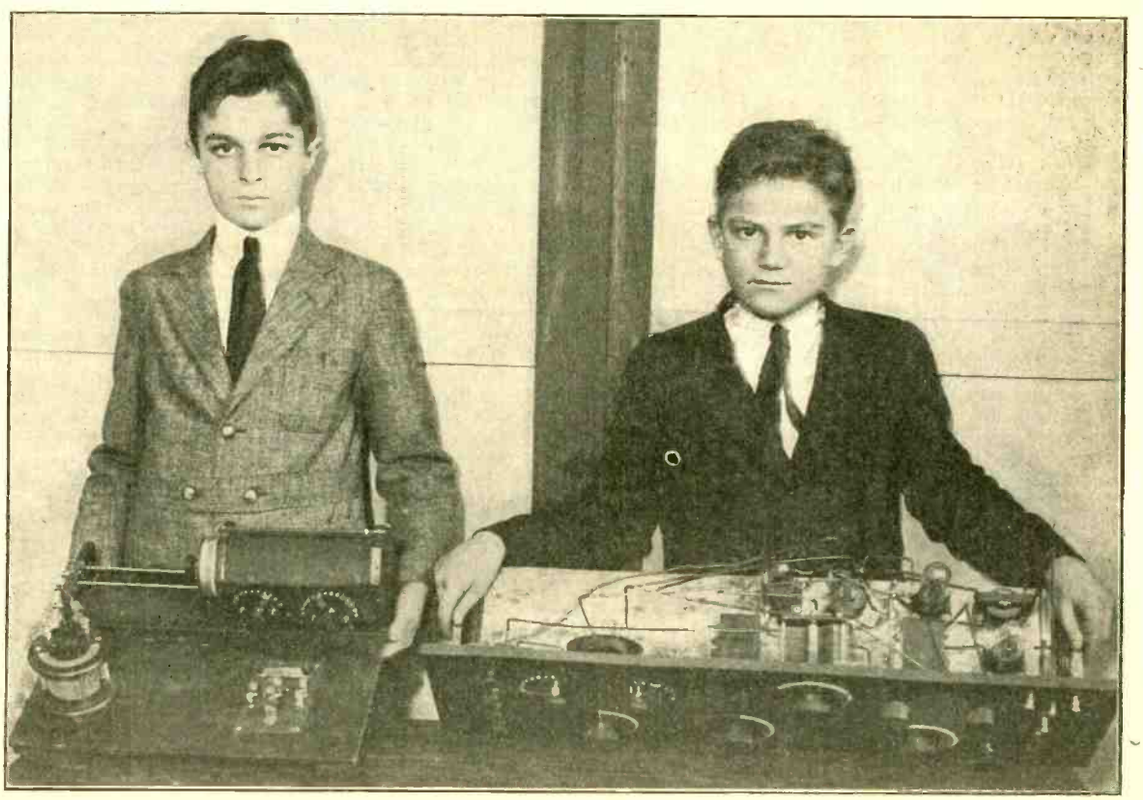
Among the home-made sets were a large number built by middle-aged business and professional men.

(C. Kadel & Herbert)

When Miss Florence Boes tuned in with this huge set, she had to stand on a stepladder. An ordinary-sized set is shown at the bottom of the photograph.

The booth that housed the automatic transmitting and receiving apparatus of the Radio Corporation of America, to receive and transmit high-speed messages across the Atlantic, was always certain to draw a crowd. The messages transmitted were typed on a special machine which perforated a paper tape. This tape was then run through the automatic sender which controlled the transmitting station. Messages were received on a machine somewhat resembling a stock ticker, repeating the dots and dashes at the receiving end in the form of an irregular line, which was transcribed by the receiving operator on a typewriter, much the same as a stenographer transcribed shorthand. This machine made it possible to transmit messages at a speed of over 250 words a minute, to be transcribed at the leisure of the operator. If the station is tuned in, the operator could leave the set, confident that any-

(*Continued on following page*)



Radio sets made by boys were featured at the exposition. The two sets shown in the photograph at the right were made by the boys holding them. The set on the left is a loose-coupler type made by Aaron de Hess, aged fifteen. The set on the right is a three-circuit regenerative affair made by Richard Powers, aged thirteen. Both of these sets were entered in the prize competition. They are a fair sample of the many sets entered by boys and show a high standard of workmanship and assembling. Radio World wishes that it had space for photographs of all the wonderful sets made by boys and shown at the exposition. Many of them are truly marvelous and indicate that the younger generation is still increasing the ranks of enthusiastic radioists.

(C. Kadel & Herbert)

Answers to Readers

I RECENTLY received a list of the official abbreviations from the Government Printing Office. There are two lists. One is in the form of questions and the other in the form of statements. How may they be distinguished? — Harry Cahn, New York City.

If a question there will be an interrogation point after it, as "QRM?" which will mean, "Are you being interfered with?" If the interrogation point is not used it means, "I am being interfered with."

* * *

What is the official wave length on which the government station NAA transmits time signals? I can hear it from the local broadcasting station, but wish to get it direct.—B. F. Mason, Tenafly, N. J.

The wave length on which NAA transmits time and weather forecasts is 2,500 meters.

* * *

I am enclosing a hook-up of my circuit—a single vario-coupler circuit with a variometer in the plate circuit. It does not regenerate unless I put in series with it a coil composed of a 1½-inch tube wound with No. 24 wire. Please explain my trouble.—Maurice P. Ward, Montreal.

Your circuit would function better if you inserted another variometer in the grid circuit. You can put the variometer you are using in your grid circuit and get better results. It should be placed before the grid condenser and leak.

* * *

Give me a good hook-up using the V-T 1 with one stage of amplification.—T. Peterson, 1507 North 4th street, Superior, Wis.

A hook-up suitable for your purpose was published in RADIO WORLD, No. 30, dated October 21; page 12.

* * *

1. *Can a crystal set be made regenerative without the use of bulbs?*
2. *Is it possible to increase the range of a receiving set by using two crystal detectors instead of one?*
3. *Will a wire hung inside of a well make a good ground?—Stanley Hughes. Astoria, N. Y.*

1. A crystal set cannot be made regenerative. This term is only applied to bulb or tube circuits.
2. No. No advantage will be attained by the use of two crystal detectors. As a matter of fact, it is hardly possible that two crystal detectors in the same circuit at the same time could be made to respond at all.
3. Yes. If the wire is hung in the water of the well you will have a very good ground.

* * *

In order to use my loud-speaker (Baldwin phone attached to phonograph) I have to run a wire about 35 feet down the hall. Is that the cause of my second step howling when WJZ is on? I don't get the howl except then.—Dx, New Rochelle, N. Y.

If you don't get the howl when other stations are on, it indicates that the length of the cord has nothing to do with the howl. Try turning down a little your detector and amplifier filament-current when he is on.

* * *

I am not able to erect an aerial on account of the landlord living in the house. Is there any other way that signals may be received than on an outside aerial?—James Diamond, New York.

If you have electricity in your house, you may use your lighting system by attaching a plug that you can buy in any of the radio stores. Caution! Don't use any ordinary plug. Buy one that is meant for the reception of radio signals through the agency of the lighting wires in the house.

Publish a hook-up of a variable condenser, 1 variometer, vario-coupler, detector tube, grid leak, condenser and A and B batteries.—Frank Oliveria, Manayka, N. Y.

This hook-up appeared in RADIO WORLD, No. 35, dated November 25.

* * *

Is there any stated range to a crystal receiving set? Is there any special crystal that is more sensitive to distance?—August Perle, East Lynwood, Pennsylvania.

A crystal receiving-set will generally receive broadcast signals from stations within a radius from 25 to 30 miles, and spark signals from 75 to 100 miles, depending on the transmitting station. For general amateur use galena is considered about the best crystal.

* * *

In RADIO WORLD, No. 30, dated October 21, you published a diagram of a set by Harold Day. 1. Will a Hart & Hegaman vario-coupler with the following windings be all right to use in this circuit? Primary: 6 taps of 1 turn each, 4 taps of 10 turns each. Secondary: 40 turns. The primary is 4 inches in diameter.

2. Would a variable condenser with a series-parallel switch improve this set?

3. What is the capacity of the grid-leak condenser?

4. What distance should the variometers and coupler be from each other?—J. A. Corriveau, 39 York street, Hartford, Conn.

1. Your vario-coupler will do nicely.
2. It is not necessary to have a condenser in series with this set as your single-turn switch takes care of the fine tuning.
3. The grid condenser should be .00025 mfd.
4. They should be separated not less than one inch apart.

Latest Foreign Radio News

FAROE ISLANDS, Denmark. — The charge for interior radio-telegraph messages within these islands will be 10 centimes per word; minimum, 1 franc for ordinary telegrams; and 30 centimes per word minimum, 3 francs for urgent radiotelegrams.

Portugal.—The coast station of Porto is now open for radio service.

Belgium.—The legal time was reestablished on October 8, last.

Denmark.—Beginning November 1, this year, the Danish interior charge will be 10 centimes per word; minimum, 1 franc.

Spain.—The coast station Vigo is provisionally closed for public service.

France.—The legal time was reestablished on October 8, last.

Norway.—Beginning November 1, this year, the interior charge on radiotelegrams originating in or destined to Norway will be 10 centimes per word, with a minimum of 1 franc for ordinary radiograms; and 30 centimes per word, with a minimum of 3 francs for urgent radiograms.

The Netherlands.—The government is preparing to enlarge the present radio station at Scheveningen. The station, which will be ready for operation in the early part of 1923, is designed to communicate with all parts of the continent of Europe and will be equipped also for wireless telephone broadcasting.

Samoa Islands.—Apia radio station, call letters VMB, wave 600 meters (spark), transmits daily, at 7:30 p. m. (Greenwich mean time), a weather bulletin containing a brief review of the local meteorological conditions, including barometric pressure, temperature, and the direction and force of the wind.

Broadcast Bill's Radiolays

By William E. Douglass

RING out the old, ring in the new!"—that's what we sung last night. I'll start at the beginning so you'll get the story right. Last week we had two foot of snow on top of rain an' sleet — since then the road's been opened an' sleighin' can't be beat. The weather's pretty frosty, but I though it would be great to have a bobsled party New Year's Eve an' celebrate. So I made all arrangements with Ol' Obediah Brown, who runs the Elite Board an' liv'ry stables here in town, to fix us up a bobsled, packed with straw to keep us warm an' several extra blankets we could use in case of storm. Startin' out from our place we drove south to Farmington, an' west from there to Goose Grease Creek like we have always done. We set there tucked in warm as toast till we reached Walnut Hill, when Lem sed, "All gents out an' push, an' that includes you, Bill!" They're always pokin' fun at me, but I don't mind it much. I always hand a good one back an' let it go as such. The hotel down at Goose Grease Creek is called a "Road House" now—I

"When we drove up, I jumped out first."

s'pose to make it sound more up to date—but, anyhow, they sure know how to feed you an' I guess that counts the most, from soup to nuts, includin' chicken a la king on toast. Min makes a dern good hostess, she had called 'em on the phone so they had fixed things swell fer us with lots of class an' tone. While we may live in Brussells Sprouts, in what you call the "sticks," don't ever get the idee in yer mind that we are "hicks." We dance to New York music bless my soul—I most fergot to tell you 'bout the most important feature of the lot. When we drove up I jumped out first an' run in the hotel so when the rest come strollin' in they sez, "My ain't this swell! An orchestra an' everything." *I'd brought my set along.* I 'lowed fer such a classy stunt we could at least have "song." The Supper Clubs big orchestra played all the time we ate an' fer our dancin' afterwards. Now I would like to state that while you may "ring out the old" us folks "ring in the new." I'll "sign off" now an' wish you all a Happy New Year, too.

Radio and the Drama

ALAN EDWARDS, of "The Gingham Girl," now running at the Earl Carroll Theatre, New York City, is a radio fan and has a set in his dressing room. Between acts, the other evening, he called Bertee Beaumont into his room to listen to a lecture that was being broadcast.

"Listen to this, Bertee." said Edwards, enthusiastically, "Dr. Copeland is giving a talk on appendicitis."

"No, thanks," replied Miss Beaumont, I'm tired of these organ recitals."

* * *

"R. U. R." is soon to be produced in Paris by Firmin Gemier, and now that the radio is reaching England's shores the review of this clever play sent out from WJZ will undoubtedly hasten the scheduled appearance of the Robots in London.

* *

What is claimed to be the first record of an act having been booked for an important engagement by radio, took place in the case of Kitty Doner, who, with sister Rose and brother Ted, appeared at the Palace Theatre, New York. Miss Doner closed in England after a successful, though brief, season, and caught a boat for home. When one day out she sent a radio to her agent, Harry Weber, stating that the act would be available for New York bookings the week of December 3. Weber immediately got in touch with George Gottlieb, who books the Palace, and he offered the Palace for one week. Weber sent Miss Doner a radio on Wednesday morning, November 29, when the Aquitania, on which she was returning, was in mid-ocean. On the afternoon of the same day he received her confirmation and opened the following Monday.

Marriages by Radio

THE use of the radio for matrimonial ceremonies has been ruled illegal. It is held that mistakes enough are being made under the old-fashioned system.

Marriages over the radio have aroused agitation in several states, but it has remained for the attorney general of New York to issue a formal ban. The bride and groom in the case involved contended that there was no difference between broadcasting marriages and broadcasting the other fight news.

The attorney general was firm, however, and thus disappear all chances of husbands getting divorces on the ground they got the wrong wife due to static conditions.

Likewise, all prospects of wives winning separations on contentions that they got husbands from WJK when they expected them from KDW.

In fact, several serious errors of the sort have been reported already. A Newark (N. J.) druggist thought he was being married by radio to a prominent Detroit society girl a few weeks ago. He discovered two nights later that, owing to "static," he had married the author of the Uncle Piggly-Wiggly stories.

In Chicago, a well-known roofing manufacturer perfected all arrangements to take as his mate by radio the prettiest girl in Cos Cob, Conn. Through broadcasting errors he was united in wedlock to the "Rutgers College Glee Club in Songs and Instrumental Music, 8:45 P. M."

As a matter of fact, inquiry revealed he had a very close call from being married to "Sousa's Band in New and Novel Programme, 9:10 P .M."

And what happened to the Cos Cob beauty? You'll never guess, Dudley. She found she had become the wife of both the Bison City Four and the keeper of the Arlington official time.

A New York woman who had divorced four husbands tried a radio marriage to a fifth and discovered she had become wedded to "the Fenwood Beach Firemen's Fife and Drum Corps in Patriotic Melodies."

And then there is the matter of confusion in broadcasting the wedding ritual:

Minister: "Do you snap-snap-click-click-snap Beatrice Marmalade take this eggs closed firm to be your Oil Can preferred, bid 34; asked 36 lawfully wedded woodchuck and chipmunk fable by Thornton Burgess?"

Answer: "Nothing could be finer than to be in Carolina, etc."

Minister: "Do you, George buzz-buzz take this muskrat story by Dr. Arthur Oat to be your lawfully wedded-oompah-oompah-ta-ra-ra-ta, tum?"

Answer: "I love the name of Nelly."

Minister: "I pronounce you symphony concert and bedtime story."—H. I. Phillips, in "The Globe," New York.

Small Crystal Sets Hold Their Own

Less Expense in Cost and Maintenance, Give Excellent Results for Short Range

WITH hundreds of broadcasting stations, either installed or about to be erected in the United States, there is a movement, particularly in large centers of population, toward the use of crystal sets in preference to vacuum tube sets. In the case of the vacuum-tube set, radio fans are familiar with all the difficulties encountered. When either the A battery or the B battery runs down, there is trouble; and the trouble is not so easy for the amateur to find. When tubes burn out, there is additional expense; and just before they burn out, there is a great deal of distortion, which prevents the hearer from receiving a perfect rendition of what is going on at the broadcasting station.

In the case of the crystal set however, the buyer makes his purchase for $15 or $25, strings up his aerial, connects his ground lead, adjusts the crystal and immediately is able to "listen in." While it is true that greater distance than 25 to 50 miles is not obtainable, nevertheless that which is heard over the crystal set is an absolutely faithful and actual rendition of the voice or music at the broadcasting station. There is no oscillation, squeaking or squealing, which is so characteristic of regenerative tube-sets.

Many radio enthusiasts have several types of sets in their homes and it is often a fact that when an important speech or symphony concert is being broadcasted from a station 25 to 50 miles from the operator's home, the operator connects up his crystal set rather than the vacuum-tube set. With a good pair of telephones to his ears and with a good make of crystal set, the operator can hear with perfect exactness the tone quality of music with all its beautiful shadings, or he can hear the voice intonations and enunciation of the speaker in a manner quite unobtainable with tube reception.

All this costs not over $25.00 for a complete outfit, including antenna equipment and telephones. There are no replacements; nothing to wear out; no batteries to recharge; no tubes to be bought and if he is satisfied with receiving the nearby stations, his set should cost him practically nothing for upkeep.

On the subject of crystal sets, it should be noted that there are on the market crystal sets with a wave-length range from 180 to 3,000 meters. Most of the old-type sets have a wave-length range of 150 to only 800 meters and some even as low as 500 meters. As soon as Congress passes the new law recommended by the radio board, broadcasting will be done on much higher wave lengths and several stations can be operated in the same locality at the same time, so that a good crystal set should have a wave length range at least going up to 2000 meters and will be able to receive the broadcast material which will undoubtedly be sent on higher wave-lengths than the 360-meter wave length, to which they were formerly restricted.

Most crystal sets do not have a variable condenser and this should be compensated for by having two binding posts on the crystal set, one for long antenna and one for short antenna. The former should have an antenna condenser connected in series with the aerial lead. In fact, a variable condenser does not give maximum efficiency in a crystal set.

Tapped coils are usually preferable to sliding tuners, as sliding tuners frequently wear out or become circuited. A tapped coil set is a life long investment. With two binding posts, one for long antenna and one for short antenna, the operator will be able to accommodate his set to the conditions possibly limited and to which his antenna can be erected.

Brooklyn has a radio club in one of its high schools, organized in 1910. Its success is reported as meteoric.

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

Detroit "News" Music Heard in Hawaii

Orchestra's Playing Carried Through Ether 4,400 Miles in One-fiftieth of a Second

A DISTANCE record for the reception of a complete program of radio entertainment was established between the Detroit "News" broadcasting station, WWJ, and A. F. Costa, postmaster at Wailuku, Hawaii, November 23.

On that midnight, the Detroit "News" orchestra played "Three o'Clock in the Morning" in the studio in the News Building and was heard "clearly and distinctly" in the Hawaiian Islands at about 6:30 p. m. The sun moves that slowly between the two points. The distance is figured at ,approximately, 4,400 miles. It would take the discharge of a cannon five hours and forty-one minutes to travel from Detroit to Hawaii without the aid of electricity—if that were possible.

But the notes of music on the wings of radio arrived on the beach at Wailuku in about *one-fiftieth of a second* after leaving the antenna of "The News." Thus radio contested the flight of time and the extent of space.

The letter received by "The News" from the Hawaiian postmaster states: "It sure was some sweet music!" There were substantiating witnesses. The report from the postmaster tallies with the station log. Mr. Costa heard the whole program of the orchestra without interruption.

The distance record for a single number of an entertainment program is claimed by WGY, owned by the General Electric Company, at Schenectady, New York, on a report received from Hilo, Hawaii, about 4,951 miles from Schenectady, when the distance is calculated on the globe. The distance estimated by WGY on the map was 5,200, but this is subject to correction.

London, England, has heard WJZ, Newark, New Jersey. A ship in the harbor at Cherbourg, France, has heard WGY. These distances are about 3,100 miles.

The Detroit "News" frequently hears from ships in the Pacific Ocean, particularly the "Easterner," which reports that between Australia and Panama, on October 13, it heard a WWJ concert and "greatly appreciated" it at a distance of 3,500 nautical miles, about 4,030 ordinary miles.

A letter from the operator aboard the "Easterner" tells of hearing "The News" complete concerts three successive nights, October 11, 12, and 13, while en route from New York to Australia. On the last night the ship was 2,500 nautical miles southwest of Panama, latitude 9 degrees, south; longitude, 112 degrees, west, and a calculated great circle distance of 3,500 miles from Detroit.

The Bed Spring Helped Out

EDITOR, RADIO WORLD: The other day my aerial blew down and I couldn't listen in. I had heard a lot about using the bedspring as an aerial, so I decided to give mine a try. You can imagine my surprise when, after WJZ had stopped, I tuned around and was able to pick up WRW, Tarrytown, New York, and WGY, Schenectady, New York. This was all done on one W-D 11 using the circuit described by George W. May in RADIO WORLD No. 35, dated November 25, using a variometer and condenser. The broadcasting was easily understood. I have done some wonderful work with this set, including WGM and WDAP with a regular aerial. I think that this wins the "Fur-Trimmed Safety Razor."—L. Donoheld, New York City, N. Y.

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Knowing the Broadcaster

THE beginner who listens in over his radio set sometimes hears a strange conglomeration of noises, says "The Globe," New York, whose identity he is unable to place. To his mind there is only one kind of a transmitting station—a broadcasting station—and even then he is at a loss to know just what apparatus is used in that particular station. A few notes on the different types of transmitting stations might be a clue that will lead to their identification.

First of all, there is the broadcasting station, as you know it. The generators of the high-frequency radio currents in all present-day broadcasting stations are of the vacuum tube type. These tubes have been found to be the most satisfactory where continuous waves of fairly low power are necessary. The power used in a broadcasting station usually ranges from a few watts to one kilowatt.

Sometimes, however, in commercial work, other types of high frequency undamped wave generators are used for the transmission of voice. One of these types is the arc, and another the high frequency alternator. The latter can be used much more successfully than the former, because it is steadier. Both of these are used more for continuous-wave telegraph transmission, in the large transoceanic stations, than they are used for telephone transmission. In fact, they have only been used experimentally for the last named purpose. Many ship stations have adopted the arc in place of the spark transmitter, because of the sharper wave that it gives. Most of the medium and low-power telegraph transmission is still carried on by means of the familiar spark transmitter.

Wants Name of Station Heard

From E. M. Pace, 423 Farmer Street, Vicksburg, Mississippi

ON December 16 and 17, between 11:30 p. m. and 12:30 a. m., I was listening in with my set and heard some station broadcasting Harry Lauder's songs, including "Roaming in the Gloaming." I have every reason to believe that this was a Pacific Coast station. To satisfy my mind, I will thank you to publish this letter. Someone who reads it may tell me the name of the broadcasting station in question, and may take the trouble to drop me a card or letter. He will certainly confer a great favor on me. I was using at the time a single and practically "dead" 22½-volt B battery, therefore I could not keep the set tuned in long enough to get the station's call letters. I am anxious to find out who it was.

We Want Your Name

on a postal card. We would like to get the name of every RADIO WORLD reader, as we expect to send out a special message to our readers. It will interest you. Be sure to send us your name on a postal card and address it GIFT DEPT., RADIO WORLD, 1493 Broadway, N. Y.

That Armstrong Circuit

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

Subscribe direct or through your news dealer. $6.00 a year, $3.00 six months, $1.50 three months. Radio World, 1493 Broadway, N. Y. C.

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CLOSING OUT—Westinghouse RC set, $104.00; Grebe CR-9 Receiver, $104.00; Grebe RORK amplifier, $42; Oard Phantom Receptor (no aerial-no ground), $135.00, regular price $175.00; Crosley No. VI, $23.00; Aeriola Senior, $53.00; Sterling Rectifier, $10.00; Brandes Phones, $6.85; Dictograph Headset, $6.85; Workrite Variocouplers, $2.95. All new apparatus. Big discounts. Send stamp for complete list. N. E. RISTEY, Spring Grove, Minn.

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

VENTRILOQUISM taught almost anyone at home. Small cost. Send 2c. stamp today for particulars and proof. Geo. W. Smith, Room M-643, 125 N. Jefferson Ave., Peoria, Ill.

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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.

CASH FOR OLD GOLD, Platinum, Silver, Diamonds, Liberty Bonds. War, Thrift, Unused Postage Stamps, False Teeth, Magneto Points, Jobs, Any Valuables. Mail in today. Cash sent, seturn mail. Goods returned in ten days if you're not satisfied. OHIO SMELTING CO., 337 Hippodrome Bldg., Cleveland, Ohio.

BROADCASTING MAP

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

RADIO WORLD, 1493 Broadway, New York

Attention! Fans and Amateurs!

Have you built your own receiver?

Are you experimenting with any particular hook-up?

Are you improving your set?

Are you doing any interesting constructive work in radio?

Why not share this knowledge with your thousands of brother fans who read RADIO WORLD every week?

We want pictures of receiving sets with descriptions of how you overcame some difficulty, or of any additional part or unit that you have added to obtain better results. These are the things that, probably, the other fellow is looking for. Send in your information; pictures or whatever you have done to improve the art.

Remember the beginner is looking for them.

We intend to print in this paper, each week, pictured information and description of value to radio amateurs. If you have found a newer or better way of doing anything, don't keep the secret but tell it to your thousands of brother fans.

Send in a photograph of your set with or without accompanying diagrams and measurement. State whether you figure in the picture yourself, or not, and without any expense whatsoever to you we will make an engraving and publish it. Be sure to write your name and address plainly on photograph.

Send in your picture at once, or if you have not made a set or done anything else in making radio material, tell the boy next door all about this offer.

Address Technical Editor

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Used Bird-Cage for Aerial!

From Charles Seymour, 140 North Sixty-first Street, Philadelphia

A COMMON bird-cage for an aerial! Maybe this is interesting and again someone may have "beat me to it" and written previously of this sort of "stuff."

While working in the cellar I noticed our discarded canary-cage and the thought struck me that it should produce results if my four-foot loop did. Anyhow, for the fun of it, I dismantled it so that I had only the top and side-wire section. I soldered a six-foot lead to it, set it on the dining-room floor, connected it to my three-tube set and in came 360-meter station, WNAT, and later WCAU (360 meters) with the efficiency of my roof antenna, except for selectivity. It also works well as a counterpoise ground and improves my set very much if I use this in conjunction with my water-pipe ground—of course using then the roof antenna. It did still better when I hung it on a clothes line.

A 400-meter station, WFI, on that same day, did not come in well, nor has any other class-B station in Philadelphia.

How Radio Waves Carry On

IT is a puzzle to many radio listeners, says "The Times," New York, why the radio waves of a musical concert, after striking one antenna, continue on through space for many miles, giving the same entertainment to thousands of others. It is true that each time the radio wave comes in contact with an object which will absorb some of its strength, such as an antenna or steel structure, a portion of the energy is absorbed. It has been estimated that the energy absorbed by a receiving antenna is about one-millionth of an ampere. The radio waves in striking the antenna leave enough energy for the listener to enjoy the concert and then pass along to the next antenna as if nothing had happened. The Hertzian waves strike the antenna wire in much the same way as a wave strikes a person bathing in the surf.

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 issue, and you will then have a complete file for ready and contant reference. RADIO WORLD, 1493 Broadway, New York.

Tony The Barber on "Da Rad-I-O-U"

(Registered U. S. Patent Office)

By Ed Callow

HELLO Peepla! Deesa time I speaka to you about wan greata machine.

It is calla Rad-I-O-U.

Grabba da speecha—da song from da fresh air.

De Rad-I-O-U was firsta invent by greata Italian man—Signor Marconi.

Wan million peepla try to improva da work of Signor Marconi.

I buy Rad-I-O-U for da shop—pay fiva dol' down—feefta centa week.

Getta da louda-speak for da shop—use—a da softa speak for da wife.

Da customer in barber shop talka too much—da barb no can do da work.

Da Rad-I-O-U maka da customer leesen in—no speaka out.

Da barb now can make da clean shave—no cutta da ear—da chin—da lip.

Firsta time I mak' lessen in some butcha shop geeva da price of da sheep—da roasta beef.

Wan time da doc in Public Health, Unita State, geeva talk.

He tella you how to sit in da chair an' resta da feet.

Wen you talla da barb how to sit an resta da feet, he go craze in da head.

Wan time wan wise guy, Bureau Standard, Washeenton, D. C., geeva da talk on impure shaveeng soap.

He try to steala da customer from da barb.

Try to make da biz for da safa-raze politish.

Wan day lady from Bosta, Massachusa, Lydia Peenk, geeva talk on how to make da apple sauce. Wat we care for apple sauce?

All we want is Rad-I-O-U talk on new sauce for spaghett.

I lika da grand op'. Deesa come from capital New York State.

Leetla town calla Schnect'. You gat best Italian op' wen you connect weeth Schnect.' Greata stuff!

Da speech on how to maka da incoma tax maka me sick.

Wat we need is some wan to tal how to make da mon to pay incoma tax.

Herba Da Hoove first breenga Rad-I-O-U to Unita State.

He theenk we need more wave on da land.

If he come into shop of Tony Da Barb he gat acquaint weeth evra kinda wave—marcella wave—plain water wave—electric wave—wava da flag.

Herba Da Hoove mak' greata mistak—he try to gat congressaman to passa da bill to controlla da wave.

We tal Herba Da Hoove to lay offa Rad-I-O-U wave control.

Coma to barber shop gat nice—a marcella wave on da dome.

Resta da hand an feet—hear Congressaman broadcuss hot air into da fresh air.

Life Would Be Ideal If—

RADIO tubes grew on trees—and the trees blossomed three times a year in any climate?

It didn't cost a young fortune to make up a 6-tube radio-audio-frequency set?

Some great philanthropist started a factory and made sets to present free to all the amateurs in the country?

We all could have gone to the American Radio Exposition?

You could transmit without making bad friends of all of the broadcast listeners in the vicinity?

Tubes didn't need B batteries?

The radio shops would run "Penny Sales?" "Buy one—and for an extra cent you can have two?"

When you have company they wouldn't ask a lot of questions you can't explain?

Anyone could work an Armstrong superheterodyne?

The folks wouldn't kick when you went to listen in to the DX boys and have to stay up late to do it?

Somebody would invent a battery that didn't run down or need charging?