

VOLUME TWO OF
RADIO WORLD

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H. B. Thayer Who Telephoned by Radio from America to England

By Harold Day



(C. Fotograms, N. Y.)

Mr. H. B. Thayer, president of the American Telephone and Telegraph Company, talking from New York to England, by radiotelephone. For two hours the ether over the Atlantic Ocean carried the human voice from New York to a group of distinguished officials, scientists, and engineers at New Southgate, England. The apparatus, which worked very successfully, was a result of co-operation between the American Telephone and Telegraph Company and the Radio Corporation of America. Mr. Thayer was heard by thousands of Englishmen,

THE first transatlantic transmission of the human voice by radio is now on record as a fact. H. B. Thayer, president of the American Telephone and Telegraph Company, 195 Broadway, New York City, and General John J. Carty, vice-president, in charge of development and research, have telephoned to a number of electrical engineers and radio experts at New Southgate, England.

The perfected instruments are not only commercially practical for transatlantic radio, but will be developed in the near future to the point of radio communication half way round the earth.

The device which makes possible international communication across the oceans is a water-cooled vacuum tube, which increases the force of the radio transmitter from 1 kilowatt in the old apparatus to 100 kilowatts in the new.

After Mr. Thayer had been speaking eleven minutes into an ordinary telephone transmitter, from which it was flashed to New Southgate, a cable came back, which read: "Thayer got through to all." Since the new vacuum-tube had not been sent to England return conversation was impossible, but the British officials, engineers and press representatives replied with extended cables of congratulation,

attesting the complete success of the perfected instrument.

Major T. F. Purves, engineer in chief of the British post office, after the first few messages had been sent, cabled:

"I have listened with great interest and pleasure to the far-flung voices of Mr. Thayer and Mr. Carty. Of Mr. Thayer's message I recognized every word. I missed a little of Mr. Carty's, but recognized absolutely his well-known intonations. Send best respects and warmest good wishes to our friends in the A. T. and T. and the W. E. Co.—Purves." They talked into an ordinary telephone transmitter,

The Single Circuit Regenerative Receiver

Since the Release of the W-D11 Tube, Many Amateurs Now Using Crystals Will Be Interested in Building a Single-Circuit Regenerative Receiver. This Article Was Specially Written for Those Considering Such a Set

By C. White, Consulting Engineer

A FRIEND approached me recently concerning the purchase of a radio outfit for his home. At the time I was at work on a five-tube reflex circuit to be used in some special test work; but the question, "What set is best for my use and will be capable of producing good results?" made me stop and think whether the circuit I was working on was best for him, or a simple single-circuit regenerative outfit. The decision was almost immediately in favor of the simple circuit; and I truly think that, for perhaps ninety per cent. of radio-phoners and code amateurs who are just beginning their radio work, this answer will fit their case. Do not imagine that the single-circuit receiver is not capable of sharp tuning. The ability of any circuit to tune sharply depends greatly on the care and scientific precision with which it is built and assembled. While it is true that the tuning characteristics of certain circuits are far better from the theoretical standpoint than others, still, if care in the purchase of good material and apparatus is taken, it is possible to get wonders out of the single-circuit regenerative circuit. I shall endeavor to discuss some of the points that will enable any one to build a simple regenerative-receiver that will not only work easily after built, but will bring in results that will make the owner proud.

In Figure 1 is illustrated the standard connections for a single-circuit regenerative tuner and detector. From the appearance of the wiring connections this diagram is no different than any other for a single-circuit regenerative; but by choosing the correct apparatus and the proper methods of construction we can make it different from hundreds of other similarly connected outfits. The condenser, C, should have not more than 13 plates. This allows a closer adjustment of the capacity in sharp tuning. The general tendency in the past has been to use

too large condensers in the main tuning-circuits. The panel immediately surrounding the condenser should be well shielded with copper foil, which is connected to the ground terminal of the set. While shielding is generally very good, still the use of too much shielding greatly detracts from the strength of the received signal. For this reason many manufacturers prefer to wire up their sets so as to minimize body-capacity effect instead of employing complete shielding. But it is absolutely essential to shield the panel in the immediate vicinity of the condenser. The main tuning-inductance, E, is the stator of a good molded vario-coupler. The tickler coil, F, is the rotor of the vario-coupler. I have found that the molded type of vario-coupler works a little better in a cir-

cuit of this general nature. The grid leak and grid-leak condenser appear rather small in an illustration, but in reality they play a large part in the efficiency of the receiver. There is not only one correct value of grid-leak resistance and capacity for every type of vacuum tube, but there is one correct value for every particular tube. It is up to the amateur to discover this value for his tube by trial.

A recent issue of RADIO WORLD contained a very good article on the manufacture of a reliable and variable grid leak. It would be well for the amateur to make one and place it inside his cabinet. It is also advantageous to try out various sizes of mica grid-leak condensers. I specify mica because the capacity of mica condensers for grid work are sensibly constant, and thus work is sensibly constant, and thus free from noise. Start your testing with a .00025 mfd. mica condenser for the grid, then vary the grid-leak resistance until the best point is found. This should be repeated for another capacity of grid condenser, but for the average type of tube a .00025 mfd. will render the best results. A W-D 11 tube, with a dry cell for an A battery and at least 40 volts for a B battery, functions very well in a circuit of this nature. Next to a vernier condenser comes a vernier filament-rheostat. Do not fail to incorporate a vernier filament-rheostat in your set. The final tuning in of distant stations is invariably easier to accomplish with the filament-rheostat than with any other control in the whole outfit. The operation of tuning in a station is extremely simple: Light the tube filament to the correct brilliancy, set the

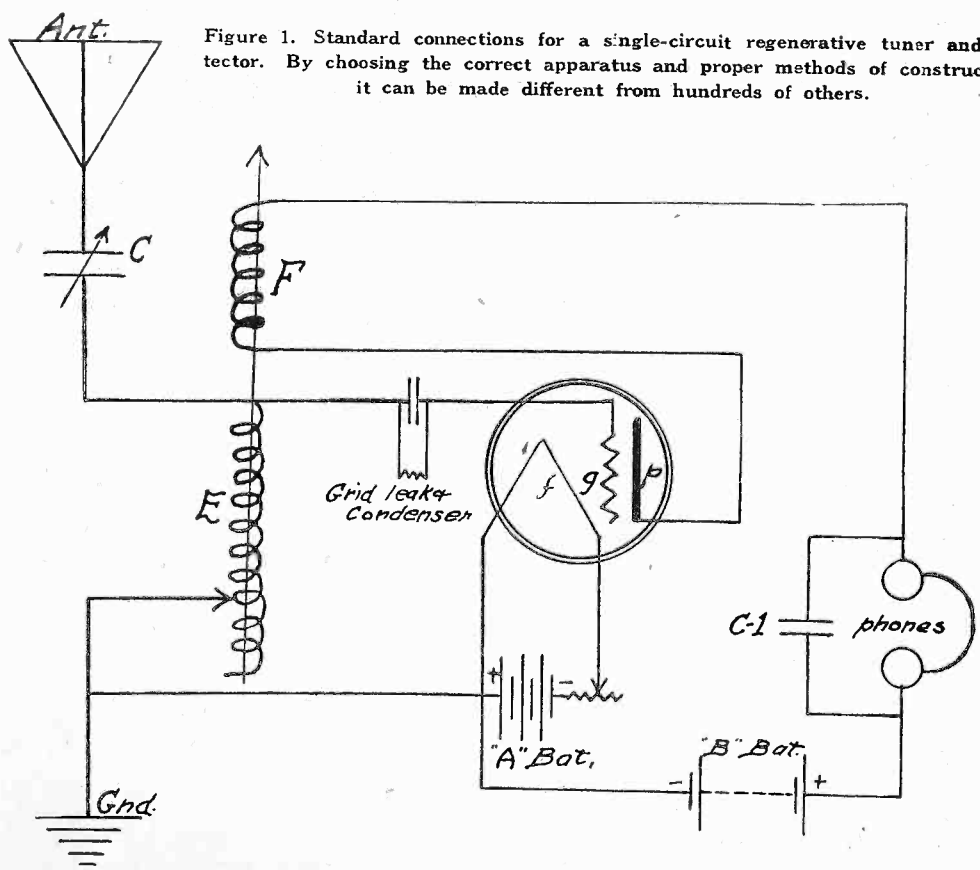


Figure 1. Standard connections for a single-circuit regenerative tuner and detector. By choosing the correct apparatus and proper methods of construction, it can be made different from hundreds of others.

How to Make a 2-Tube DX Set

By John Kent

ACCORDING to the law of averages, by which everything is judged, after a man has been interested in radio for some time he itches, so to speak, to make his own receiver. If he happens to belong to the great army of radioists who have only recently become interested in radio, due to broadcasting, no doubt he will consider this something of a problem. "What circuit shall I use?" "What apparatus will I need?" "How can I do it?" are the principal questions confronting him.

I shall attempt to answer these questions in such a manner as will make it plain to everybody interested just how it can be done.

I advocate that beginners use single-circuits in constructing their apparatus. And this not only applies to beginners, but to old-timers as well. The sketch accompanying this article illustrates the hook-up of instruments. It is a single-circuit, using a variometer as the tuning unit. This not only makes the tuning much simpler, but gives a definite wave-length.

A list of apparatus necessary for the construction follows. The cost,

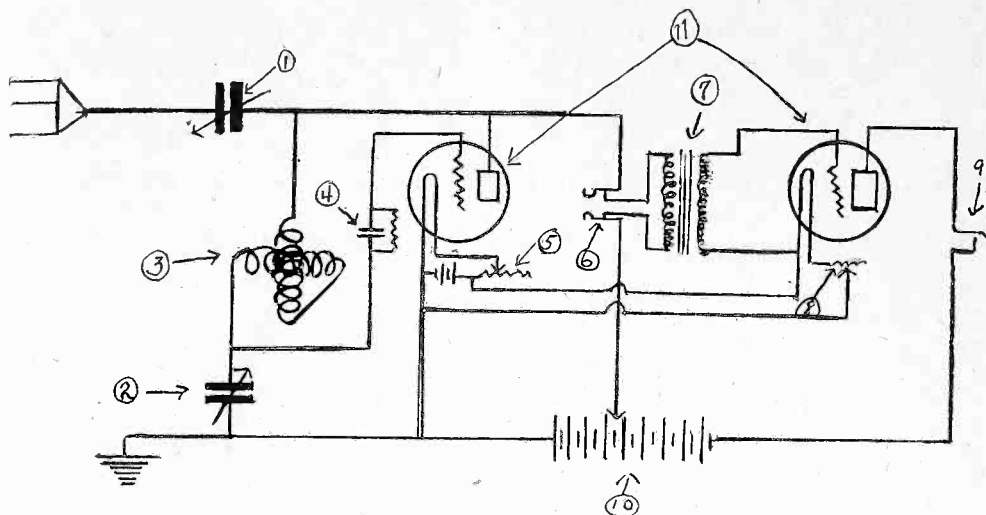


Figure 1. Diagrammatic hook-up of the set described in the accompanying article, with instruments numbered. 1. Vernier condenser, 23-plate. 2. 43-plate variable condenser. 3. Variometer, 4. Grid condenser and grid leak, preferably variable. 5. Vernier filament-control rheostat. 6. Double-circuit jack. 7. Audio-frequency transformer. 8. Rheostat. 9. Single-circuit jack. 10. B battery, 45-volt with 22½-volt tap. 11. W-D 11 tubes. This circuit is a modification of one worked out by Mr. George May in RADIO WORLD No. 35, dated November 25. The vernier condenser in the aerial lead has been found necessary in order to make the circuit oscillate more freely, at lower filament-temperature. A lot of fine tuning may be accomplished with the vernier of the condenser on close wave-work. The variable grid leak is almost a necessity in this circuit, using W-D 11 tubes.

of course, varies a few cents either way; but the complete cost is estimated at \$35:

1 variometer	\$4.00
1 23-plate vernier condenser	3.50
1 43-plate straight condenser	2.00
2 W-D 11 vacuum tubes @ \$5.	10.00
1 vernier rheostat	1.25
1 straight rheostat	1.00
2 sockets @ 75 cents	1.50
1 amplifying transformer	3.00
1 panel, 7x18 inches	1.50
1 cabinet	3.00
2 jacks @ \$1.	2.00
1 B battery (45-volt)	2.25
	<hr/>
	\$35.00

With everything necessary purchased give the panel a thorough sandpapering. Then apply a little oil; rub it in thoroughly and wipe off. This gives the panel a dull finish, which is much more commercial looking than one that is shiny. Next, on the reverse side, lay out the instruments in order to find out how much room is necessary for each. Carefully mark and drill the holes. In doing this be sure you are accurate, as one hole incorrectly drilled will make more trouble than if you had spent an extra half-hour planning it. If the drilling is carefully done and the instruments symmetrically laid out on the panel the finished article will be one you can point to with pride.

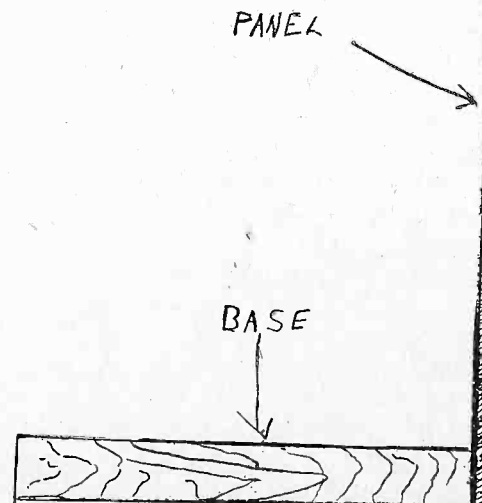
When all holes are drilled mount the panel on a piece of 1-inch wood, as shown in the sketch. This piece should be two inches shorter than the panel and about one inch narrower than the depth of the cabinet. This will permit the amateur to mount his sockets

and transformer and hook them up on the outside of the cabinet. This gives much more freedom in the soldering.

Follow your connections with bus bar or No. 12 or No. 14 hard-drawn copper. Be careful not to let any of them touch. All battery, aerial and ground connections are brought to binding-posts on the front of the panel.

The hook-up used in this article has been thoroughly tested out by the writer and found to give excellent results. Because of its extremely sharp tuning it is a little hard for the beginner to get used to it.

Figure 2. How the panel should be mounted on the baseboard. By doing this you obtain greater freedom in hooking up your instruments as you do not have to work inside the cabinet, and your space, therefore, is not restricted. Be careful to allow sufficient space when making the board to allow for the ferrule that runs around the edge of the cabinet.



(Continued from preceding page)
switch-arm at a tap on the stator, adjust C until the station is heard, then adjust the coupling of the rotor, F, to get the maximum signal strength. Finally, raise or lower the filament brilliancy to get the desired quality.

A good pair of phones with a .001 mfd. (C-1) bypass condenser is just as essential as any part of the receiver. Poor phones will cause more dissatisfaction than any other cause. I cannot too strongly advise the amateur, and particularly the novice, to buy good standard apparatus that has stood the test. If you are only planning on using one tube, and, perhaps, one tube for a detector and one for an amplifier in a one-stage audio-frequency amplifier, I think the W-D 11 is the most economical. With the money saved from the purchase of a storage A battery the novice can purchase another stage of amplification. But, if the W-D 11 is used, do not forget to mount the tube socket on ¾ of an inch of felt and connect up to the socket with flexible stranded wire so as to avoid the tube being noisy from jars and vibrations. For the average amateur the single-circuit regenerative receiver without, or with, one or two stages of audio-frequency amplification is still the best buy.

First Story of Bureau of Standards Conference on Radio Standardization

A BROAD program of radio standardization was agreed upon at a meeting of representatives of forty radio-trade associations and national engineering and scientific societies, held in New York City, beginning January 12. The meeting was held in the Engineering Societies Building, New York City, at the call of the United States Bureau of Standards in co-operation with the American Engineering Standards Committee. Dr. F. C. Brown, acting director of the Bureau of Standards, presided.

After full discussion the conference adopted resolutions providing:

(1) That standards for radio apparatus and service should be formulated:

(2) That a broadly representative national committee on radio standardization should be formed under the leadership of the Institute of Radio Engineers and the American Institute of Electrical Engineers, under the procedure of the American Engineering Standards Committee.

Specifications for quality and performance of receiving apparatus, no-

menclature, and methods of testing and of rating apparatus are to be included in the program.

Dr. J. H. Dellinger, chief of the Radio Laboratory of the Bureau of Standards, showed how the widespread interest in radio had brought with it an increasing demand for uniformity and dependability in radio service and apparatus. The lack of any such standardization has been brought to the attention of the Bureau of Standards by producer, distributor, and consumer. There has not previously been a concerted movement to introduce standardization by joint action of all radio interests.

Dr. A. N. Goldsmith, secretary of the Institute of Radio Engineers, said:

"As every new field of industry passes out of the childhood stage, the need for standardization becomes evident. The main difficulties which at once arise, and which emphasize the necessity for cautious procedure are the dangers of stagnation in an only partly developed art, a possible excessive monotony in the resulting product, and a diversion of the best brains from such a field.

"On the other hand, it is only by a reasonable amount of standardization along wise directions that gross abuses of public confidence can be avoided. As a typical instance, consider the objectionable nature of some of the so-called 'information' appearing on nameplates and in the advertisements of radio apparatus. We have seen 'static eliminators,' 'thousand-mile receivers,' 'twenty-plate condensers,' and a score of other vague or misleading designations. The purchaser of radio sets and the dealers who handle them are all entitled to protection against this sort of loose description. And thus we are brought face to face with the necessity for sane standardization."

The following advisory committee was appointed to assist in the organization of the national committee and the necessary technical subcommittees: Major L. B. Bender, Dr. J. H. Dellinger, W. A. Fitzgerald, Dr. A. N. Goldsmith, J. V. L. Hogan, Commander S. C. Hooper, George H. Lewis, Max Lowenthal, Donald McNicol, L. T. Robinson, M. C. Rypinski, E. B. Warner and L. E. Whittemore.

Radio Entertainment in the Home

By Patrick Nichols

WITHIN the near future madam, while at dinner, will instruct the butler, to push button No. 3 and ask Friend Husband if he prefers the opera to the jazz. He will probably reply that he likes a little jazz, but prefers news bulletins while he is smoking his after-dinner cigar.

Over in the corner of the dining-room stands a neat mahogany cabinet. It resembles a small victrola, with a single cord running to a plug in the base board. From this box come, alternately, as buttons 1, 2 and 3 are pressed, opera, jazz, or news—perhaps other forms of entertainment. There is no aerial lead, no inside antenna coil; there are no dials visible, and the many ugly details of our sets today are absent. No tuning is needed; only the pushing of the buttons is necessary to select the form of entertainment desired. The three waves are constant and the service is on a regular schedule.

All the above is not only practical, but probable. Line-wire broadcasting on electric-lighting systems, predicted and demonstrated as feasible by Major-

General George O. Squier, Chief Signal Officer of the United States Army, last March, has come true.

At the Bureau of Standards recently R. D. Duncan, radio engineer for the North American Company, gave a practical exposition of "wired-wireless" broadcasting over the system of the Potomac Electric Light and Power Company. At a distant sub-station in Georgetown an assistant "put on" informal entertainment through on ordinary broadcasting set over the 2,500-volt alternating circuit. Through the maize of underground and overhead wires and cables the radio messages came into the Signal Corps Radio Laboratory at the Bureau from an electric light plug. The voice of the spokesman was picked up by a tube set coupled in with condensers. A 5,000-meter wave was used, and the transmitting current was .05 ampere. There was no radiation. No other radio fans knew what was going on; but, if they had, they could not have picked it up from the air—it wasn't in the air. Secretary Hoover will never have complaints of interference on this

broadcasting scheme, as, being confined to the electric wires, it leaves the air clear for long-distance broadcasting; it needs no wave assignment, and neither the station nor operator will have to secure a license.

General Squier's patents for directed radio have been purchased by the North American Company, New York, which owns and operates electric-lighting utilities in Cleveland, Milwaukee, St. Louis, and several other cities. This company plans to furnish its subscribers with wired-wireless entertainment in the near future. Mr. Duncan is completing the details of a standard installation, and predicts the early use of the system in several cities. All that the subscribers will have to do is to consult their lighting companies, secure a good long-wave tube set, a condenser, or special plug, to protect their sets from the high-potential circuit, and plug in just as they do with common electrical appliances.

General Squier's demonstration on a private lighting circuit of 110 volts direct current, nine months ago, has been applied to a city-lighting system.

My Rejector, or Filter, Circuit

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

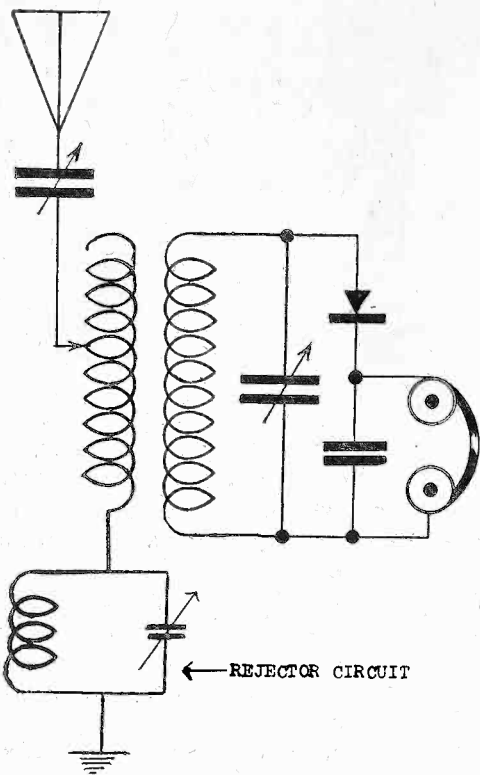


Figure 1. Showing the method of connecting in the rejector circuit of the receiving set. The rejector circuit is tuned until interference of the undesired station is decreased to a minimum.

RADIO fans who have suffered interference in reception due to living in a locality infested with numerous transmitting stations and other sources of QRM, will find the hook-up described herewith, a superior patience saver. It is known as rejector circuit, radio-frequency trap, and absorption circuit. All have the same meaning. Many fans have worn their patience threadbare trying to get some long-distance station, but little spark stations have hammered in and destroyed all DX chances.

The rejector circuit has proved very efficient, but I advise the prospective builder to experiment first to find the proper number of turns of wire, the correct size of wire, also the proper capacity to be used for his individual needs. A coil wound with from 20 to 50 turns of either No. 20 or No. 22 wire will do to start with. The condensers used should be of the common dielectric type.

In many instances, fans living close to A-C power lines experience difficulty in receiving due to interference from these power lines. To them the rejector circuit will prove of value and will decrease interference to a minimum.

Figure 1 shows the method of connecting in the rejector circuit of the receiving set. The rejector cir-

cuit is tuned until interference of the undesired station is decreased to a minimum. Then the receiving circuit is tuned until the desired station is heard with maximum clearness and loudness.

Registering for Radio



(C. Wide World Photos)

MYSTERY, DOUBT, JOY!
 "Bull" Montana, former wrestler and partner of Douglas Fairbanks in the movies, now recognized as a leading motion-picture actor, has been bitten by the radio bug. This composite picture of Mr. Montana illustrates exactly the same emotions that any other human would experience, and humanly correct. At first Mr. Montana is mystified on picking up the earpieces; secondly, he has a few doubts as to its practicability; finally, on tuning in right, he enjoys some "bedtime stories."

This circuit is very simple to operate; but one fact must be kept in mind: The rejector circuit should not be placed in any inductive relation to any part of the receiving circuit. If that is done, the rejector circuit will function poorly, if at all.

It will be noted that the oscillating circuit of this rejector circuit is connected directly, or conductively, with the ground lead of the receiving circuit. If the radioist should attempt reception on the same wave-length as the interfering source, it is obvious that here is no means of separating the signals. But satisfactory results have been

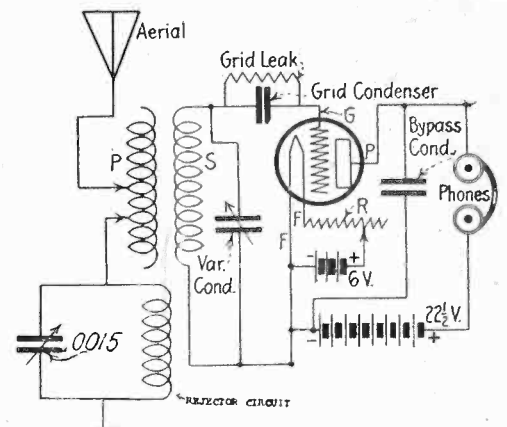


Figure 2.—Rejector circuit used in the usual audion vacuum tube.

obtained on the rejector circuit when the signals were only a few meters apart in wave length. In a case where the signals from the station causing interference are very strong and the waves broadly tuned, and with no sharp defined resonant point on your receiving set, it generally is entirely impossible to entirely eliminate interruption, but the intensity of interfering signals may be greatly reduced.

It has been found that in some instances, it was possible to use a standard wave-meter in a rejector circuit which has an oscillating circuit similar in every respect to the oscillating circuit of a rejector or trap.

Those fortunate enough to own a wave meter and find it convenient to use, should employ it in the rejector circuit. It has its advantage for all standard wave-meters are calibrated for reading directly the wave length of any adjustment.

Figure 1 also shows the rejector, or trap, in function with the usual crystal rectifier.

Figure 2 shows the rejector circuit used in the usual audion vacuum-tube which is used also as a rectifier. This hook-up has also been tried and has proved efficient.

The Art of Proper Tuning

By *Kenneth M. Swezey*

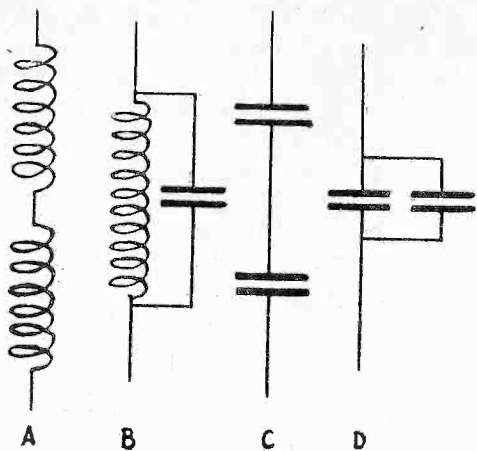


Figure 1A—Connecting coil in series to increase wave-length valves

BEFORE considering the actual mechanical operation of tuning it is quite necessary to understand the fundamental principles, otherwise this important radio process would have to be done in haphazard fashion. Dials would be turned and sliders moved without definite order.

For instance, take the harp. The first thing we notice in that musical instrument is the difference in the thickness and the length of its strings. By plucking the various strings we find that they produce different notes—the long, thick strings giving out deep bass tones, and the short, thin strings the higher soprano tones. In reality these notes, or tones, are vibrations in the air of varying rapidity.

We generally associate slow things with low tones, and large things are relatively considered slow. Speed suggests highness and shrillness, also smallness. Just so with sound waves: The long, thick strings of the harp vibrate slowly and give a low tone, whereas the short, thin strings vibrate more rapidly and give out a higher tone.

The tension of the strings also affects their tone. Tight strings give out higher tones than slack strings.

If we arrange another harp in the same room as the first—both harps having strings of equal thickness, length and tension—and pluck a string of one of them the corresponding string of the other harp will vibrate in unison and in a most uncanny fashion. When this phenomenon occurs the two vibrating strings are said to be “in tune.”

What has really happened? When one string was plucked it began to vibrate at a rate, or frequency, as it is called, depending on its length and tension. The air surrounding the

string was disturbed and little waves were sent out into the room, one for each complete vibration of the string. It is these waves that reach our ears in the form of sound. They are actual mechanical movements of the air; so, when they come in contact with the other string, they push it and pull it and cause it to vibrate at the same rate as themselves. Other bodies are pushed and pulled by the sound waves, but the effect on them is not nearly so great as it is upon bodies that are “in tune.”

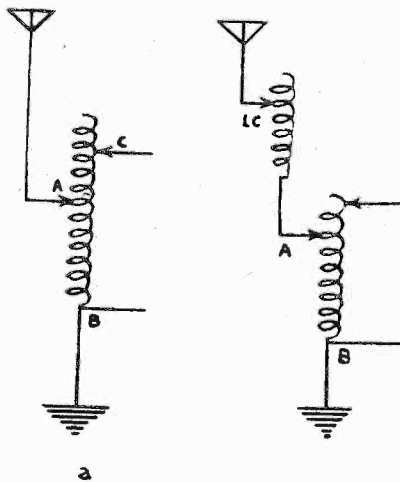


Figure 2A—The simplest, practical tuning arrangement

In radio work we also have waves to deal with, but instead of traveling through the air they travel through a thinner medium, called “ether,” and they are much larger than sound waves. But, however, they must be tuned the same as their companion air-waves. The transmitting station may be considered as one harp and the receiving station the other. The different transmitting stations send out waves of varying lengths. In order to receive them the receiving station must be properly tuned.

Instead of tuning with length and tension, as in the preceding case, we have two factors called inductance and capacity. In a general sense we may consider our coils of wire as inductors

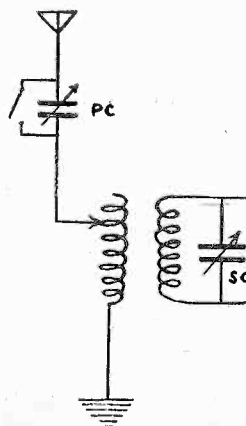


Figure 3—The two-circuit set which is quite popular and, as a rule, more selective than the single-circuit type

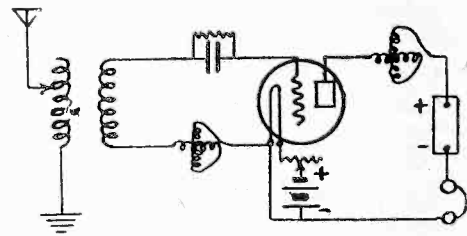


Figure 4—The most popular single-tube andion set. It is known as the two-variometer type regenerative set

or as possessing inductance in concentration, and our condensers as possessing concentrated capacity. The aerial system possesses both inductance and capacity, but in this case the values are distributed.

The frequency of radio waves is highest when the values of inductance and capacity are small; and, as frequency is the reciprocal of wave-length, a high frequency means a low wave-length. Therefore, short waves do not require as much inductance and capacity as do long waves.

By connecting coils in series you increase the wave-length value. (See Figure 1A.) This result may be accomplished also by connecting a condenser in parallel to a coil. (See Figure 1B.) Condensers in series result in a reduced capacity, and, hence, a reduced wave-length. (See 1C.) Condensers in parallel give an increased capacity. (See 1D.)

Let us now look at the different sets in common use and decide the best method of tuning. With a single-slider crystal set there is no option. Tuning must be accomplished by moving that lone slider back and forth until the loudest signals are obtained. Figure 2A shows the simplest tuning arrangement that is practical and fairly selective. It is the two-slide tuning coil. The turns between A and B may be considered as the primary, or aerial circuit; and the turns between B and C as the secondary, or closed circuit.

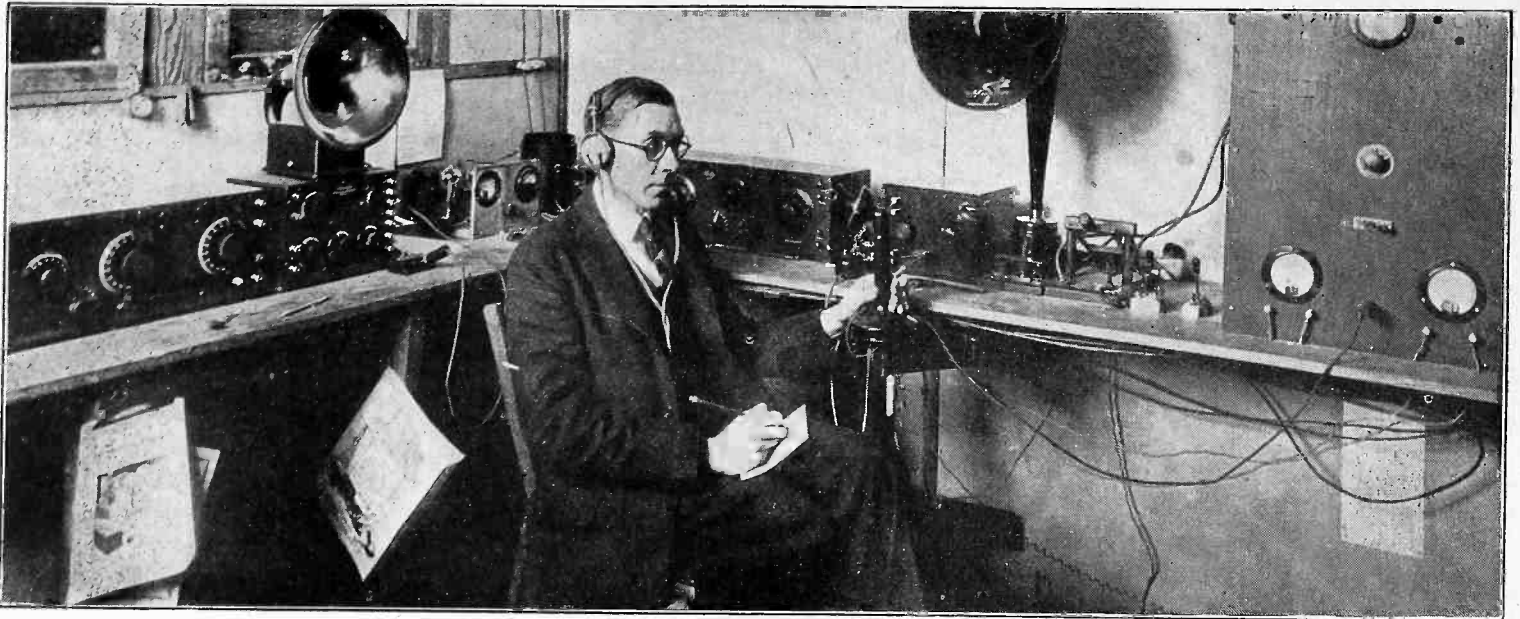
The method of tuning is as follows: Place slider C at some arbitrary point on the coil. Now move slider A until signals are heard. An adjustment of slider C will now bring the signals in louder.

With such a set interference may be minimized by connecting in a loading coil, LC. When a station cannot be tuned out otherwise the effective coupling may be reduced by adding more turns in the loading coil and cutting out turns between slider A and B.

The two-circuit set, shown in Figure 3, is quite popular, and is generally

8 CYB, Heard in Manchester, England

By Peter Gray



(C. Wide World Photos)

The transmitting apparatus of Station 8 CYB, Washington Court House, Ohio, recently heard in Manchester, England

THE amateur broadcasting station 8 CYB is owned by H. E. Daugherty, the nephew of Attorney-General Daugherty. Mr. Daugherty, whose station is located at Washington Court House, Ohio, recently transmitted to Manchester, Eng-

land, by means of C-W signals, using the 200-watt transmitter, seen in the upper right-hand corner of the photograph. The man in the chair is the owner and operator. Mr. Daugherty has found it more interesting to experiment in radio than to enter politics.

In the extreme left-hand corner of the photograph may be seen one of the receivers used in the station. It is a Paragon regenerative, with two steps of amplification. The amplifier is directly under the small loud-speaking horn. Next to it and directly back of Mr. Daugherty may be seen the small transmitter used for local work. This is an advantage. When it is desired to talk short distances only there isn't the disturbance and interference caused if he had used the large 200-watt set. Near the operator may be seen a Grebe regenerative receiver with amplifier and Magnavox loud-speaker. This station is an example of a well-equipped and well-handled amateur station. It illustrates the fact that the amateurs are right up to the minute in everything on the boards. It is not to be wondered at that the American amateur is so far ahead of his foreign cousin in radio when such a wide interest is taken in radio.

(Continued from preceding page)

more selective than the single-circuit type. The variable condenser, PC, shortens the natural wave-length of the primary circuit, and may or may not be used. The secondary coil, S, is shunted with a variable condenser, SC. This condenser increases its wave-length.

To tune: Set the secondary condenser at a low value. Set the primary condenser at about the half-way point. Move the primary slider, or switch, until signals are heard. Now adjust SC until you get maximum response. If you do not experience any interference the coupling between the primary and the secondary coils may be tightened, with a further increase in signal strength. A slight adjustment of PC and SC might now help. If interference is experienced the coupling should be loosened.

The most popular single-tube audion set seems to be that shown in the circuit Figure 4. This is called the two-variometer type regenerative set. The method for adjusting this is as follows: Have fairly tight coupling between the coils in the loose coupler or variocoupler. Set both variometers at zero. Adjust the primary slider until signals are heard. Adjust the secondary variometer for maximum response. Next you must carefully adjust the

plate variometer. By moving it toward maximum you will come to a point where a little squealing noise is heard; moving farther you will come to a spot where there is another squealing noise. The proper spot is between these two squeals. Do not try to regenerate too much as this action will result in greatly distorted signals.

Another type of regenerative set employs a tickler coil for the feedback coupling. This set is adjusted in the same manner as the ordinary two-circuit set with the exception that the coupling of the tickler coil must be adjusted after the regular tuning is accomplished.

For very close tuning with any of these circuits instruments known as verniers may be used. These are condensers, or coils, of very small capacity that are used in connection with large condensers, coils, or variometers, affording tuning qualities between turns or between the points on a scale.

Large coils and large condensers afford a great wave-length, and an increase in either will result in an increase in wave-length. Short wave-lengths require a reduced number of turns in your coil and a smaller capacity in your condenser. A condenser in series with the aerial circuit will decrease its wave-length. Sharpest tuning is obtained with loose coupling.

New V. T. for Radio

A NEW and improved vacuum-tube for radio—to be known as UV-201-A—which uses but one-fourth the filament current of the present type radiotrons, has been perfected by the General Electric Company. This tube may be used either as a detector or an amplifier, and is interchangeable in all receiving sets now using radiotrons UV-200 or UV-201 tubes.

According to W. C. White who developed this new tube, its outstanding features are:

1. The filament current is but one-fourth that required for the UV-201, which means the storage battery will last four times as long without recharging.
2. Quieter operation; no tube noises.
3. Greater amplification due to greater filament and plate area.
4. Greater electron emission—about five times that of the present type tubes. Much less distortion of received signals

Government's New Broadcaster, NAA, Has a Hard Time Winning Fans from NOF

NOF has passed—the government's principal broadcasting station is no more. NAA, its big brother, has taken its place; but many fans were disappointed to see the Navy's Anacostia Station return to research work. Some find it difficult to get accustomed to NAA at Arlington and tune it in on 710 meters, the new wave assigned for government broadcasting from Washington.

A hurried survey of the neighboring radio-population indicates how well they liked NOF; but it shows, also, that some must secure better sets or add a coil to old ones and learn to tune in on longer wave-lengths. Out of 83 replies, 61 who have picked up the station since January 3, like the transfer and receive the music of the Marine and Navy Bands well enough. Of those who object, 22 prefer NOF and the old 430 meter-wave.

Favorable replies to an inquiry were received at NAA from New York City; Manchester, New Hampshire; Worcester and Malden, Massachusetts; Wilmington, Delaware, and Pittston, Pennsylvania. Some neighboring fans claimed the broadcasting was too loud; others too weak. Fort Humphreys,

By W. R. Service

Virginia, an Army station, approves the service as "fine." It is doubtful if the wave could be changed to a shorter one, due to the fact that short waves interfere with the regular waves used on other sets at NAA for handling official traffic for the government. But some consolation is found in the fact that the bands are playing at the Marine Barracks in Washington, two or three miles away, and a single land-line is used for the transmission to the radio station. This will be improved by the installation of a special line, it is expected. Now the musicians play Wednesday and Friday nights in a barn-like room too large for the purpose and uncurtained. A sort of transmitting tent is being made, however, which will tend to restrain and concentrate the music for transmission over the line to Arlington, which is certain to improve the concerts.

Some rather frank expressions as to the preference for the concerts was expressed by listeners-in, who declared that some of the official talks broadcast were a bore. Others complain of

a hum and fading, and say NOF was perfect.

Other returns have come to the Public Health Service, which sought to learn how its broadcasts from NAA were received by the radio public. Out of 100 replies over half declared they could not get NAA on the scheduled nights, while 31 stated they got the broadcasts "O. K." The usual short-wave sets were found difficult to tune in on 710, but the sets built for longer wave-lengths gave less trouble. Generally the health fans prefer NOF. Sixty out of 80 declared that, of four large stations heard regularly, they got NOF best. It is regretted by the Navy that NOF had to be closed, but the work there was experimental, and other work must be undertaken. NAA is hardly "shaken down" as yet.

One of the first duties of the Advisory Committee on Radio will probably be to relocate wave-bands for all classes of service, including broadcasting, and it may be necessary to put some broadcasting up as high as 1,500 meters, which will make it necessary to add additional inductance to increase the range of wave-lengths of receiving sets.

White Radio Bill May Soon Be a Law

By Carl H. Butman

THE amended White Radio Bill has been reported out on the floor of the House by Chairman Green of the Merchant Marine Committee. As predicted, minor controversies were adjusted, ambiguities corrected, and the bill was printed Saturday. No opposition is expected in the House, where the bill will probably be taken up within two weeks, it is said, by members of the committee.

Secretary Hoover and Secretary Denby and their advisors have agreed to a compromise, and the bill now carries a clause that Army and Naval Stations shall not require commercial licenses, that their wave-lengths will be assigned by the President; but that, when commercial traffic is handled, rules and regulations designed to prevent interference with other radio stations will be observed. In other words, governmental stations, when transmitting other than official matter, will use

commercial wave lengths and comply with all regulations set down by the Secretary of Commerce.

One feature of the bill increases the membership of the Secretary of Commerce's advisory committee from twelve to fifteen, including a represen-

tative of the Treasury Department, another from the Shipping Board, and an additional member who is not a governmental official.

The only cost to the applicant for an operator's license in the past has been the cost of an affidavit; the government did not charge for examination or permit, neither did it charge for station licenses. The new bill, as some may have forgotten, provides for a schedule of fees for station licenses ranging downward from \$300 for a transoceanic station license to \$2.50 for amateur transmitting stations. Operators' licenses will cost from \$2.50 for commercial extra first-class operator's license to \$1 for amateurs, with small additional charges for examinations. These fees, it is planned, will aid in the payment of the Government expenses in handling licenses, inspecting stations and giving examinations.

No Storage Battery Required

A NEW type radio-receiving set with loud-speaker which operates entirely by dry cells and has an equal or better reception range than the average two stage set using storage batteries for the filament current has been perfected by the General Electric Company. It uses three of the new type GE tubes which consume sixty milliamperes filament-current per tube. The A battery, which is the storage battery in ordinary receiving sets, consists of three dry-cells such as used for door bells. These supply the filament current at 4½ volts. The B battery consists of four 22½-volt units which supply ninety volts to the plate of the tubes. There is also a C battery, consisting of a small three-celle flashlight dry battery.

In the Radio Interior of an Atlantic Liner

By Charles J. Taaffe



(C. Wide World Photos)

The heart of the "America's" radio transmitting and receiving apparatus—one of the most complete in deep-sea service.

IT will be remembered that the Atlantic liner "America" holds the distinction of being the first of the gigantic passenger steamers to talk from mid-Atlantic to shore by radiophone. This was the radio sensation of the spring of 1922. It was the first time in the history of radio that telephoning by radio over a long distance was successfully tried. To-day is just another example of the tremendous strides that have taken place in radio during its first year. But what was considered as a miracle last spring is common-

place now. Stations like KDKA and WDAP have been heard over 5,000 miles. Dr. E. E. Wood, of the "America," is seen in the illustration diagnosing a case of toothache on another ship and giving instructions as to the treatment. This phase of radio, alone, is one that is never without human interest. Because of it, a sick man on a ship hundreds of miles away may receive expert medical treatment. More than once, a man's life has been saved by the agency of radio. Although radiotelephony has taken great strides in

a year, radiotelegraphy plays an equally important part. This is made evident by the panel directly in back of Dr. Wood. The complete radiotelephone equipment is seen on the extreme right of the picture, directly in front of the operator. By use of the intercommunication service now installed aboard ships, it is possible for the captain of one ship to talk directly, from the bridge, to the captain of another ship scores of miles away and as easily as if he were at home and with less trouble than "central" would give him.

In Radio World No. 45, dated February 3

Various Filament Resistances and How to Make Them

By MARIUS THOUVAIS

General Secretary of the Radio Club of Colonge

With sixteen working diagrams to guide the radio amateur in construction.
One of the many big features of next week's Radio World

RADIOGRAMS

The Latest Important Radio News, from the World Over, Briefly Told for the Growing Army of Radio Fans

FRENCH authors are urging a radio copyright on books that are broadcast. The latest problem in the copyrighting of literary works, especially of fiction, concerns the rights of the author when his books are broadcast to the public by radio. Today there are the book rights, the serial rights, the rights of translation, the rights of dramatization, and the moving-picture rights. To these must now be added, France's literary men declare, the radio-broadcasting rights. The matter has been brought to the attention of the Society of Men of Letters by M. Joseph Renaud, who urged on his colleagues the necessity of authors reserving and protecting the broadcasting rights in contracts with publishers, particularly in the United States and other countries which are "up to date" in the use of radio.

With an Armstrong superregenerative set Benedict Goldman, of 330 East Eightieth Street, New York City, believes that he heard a French amateur station during the amateur tests recently concluded. The message, which was received on a wave-length of 150 meters, was, "French amateur testing. Hello, U. S. A.," and was signed "8XD." Mr. Goldman is an experienced operator, having been in charge of the radio installation on board the *Slav City* during the World War, and was also stationed at the Brooklyn Navy Yard. In his spare moments he directs the activities of the Federation Settlement Radio Club, at 106th Street, near Lexington Avenue.

Radio broadcasting in the United States is now heard in all parts of Mexico. Even stations on the Atlantic Coast are clearly heard. President Obregon is an enthusiastic radio fan, a set now being installed in Chapultepec Castle. Secretary de la Huerta has ordered a set installed in his home near the lake in Chapultepec Park.

Officials of the General Electric Company have just announced the successful conclusion of their carrier current experiments in telephone communication, which appear to be something like the wired-wireless system. According to an

announcement the G-E engineers have communicated over a 70,000-volt transmission line for a distance of forty miles, using apparatus similar to a radio outfit. For power companies, it is said to have many advantages over ordinary land-telephone lines for communication purposes. Carrier current, it is claimed, insures greater permanency and privacy, eliminates static, interference and fading, and does not require a radio operator.

The operating department of the Radio Relay League, from final figures just compiled, reports the following amateur stations, located in the extreme Western States, heard by amateurs in Europe during the transatlantic amateur radio tests just completed:

Arizona: 6ZZ—H. L. Gooding, Douglas.

California: 6AV—P. T. Nesbit, 625 Fitch Street, Healdsburg. 6ADG—F. Noel, 301 West Avenue Forty-three, Los Angeles. 6KA—F. E. Nikirk, 1050 West Eighty-ninth Street, Los Angeles.

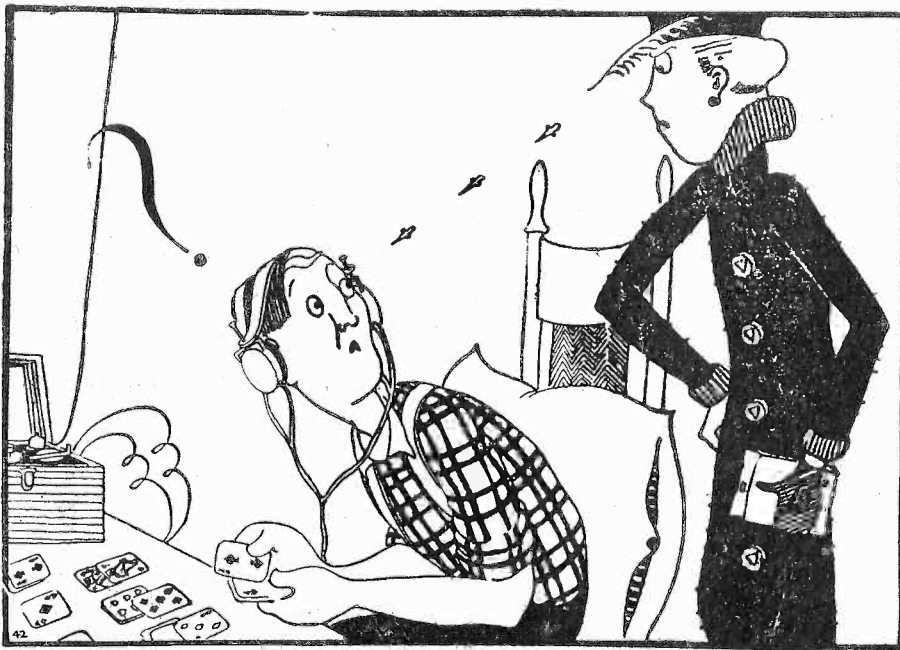
Utah: 6ZA—Ira J. Kaar, Salt Lake City.

For the first time in South America a demonstration of point-to-point radio communication has been made, according to a cablegram received by G. E. Pingree, vice-president of the International Western Electric Company, from Colonel N. H. Slaughter, one of this company's chief radio-engineers, now at Rio de Janeiro. Point communication is distinguished from radio broadcasting in that two-way conversations are carried on between two stations equipped with both transmitting and receiving apparatus.

Several scenes from the performance of "The Old Soak" at the Plymouth Theater, New York, were broadcast by radio from WJZ. The question of whether a dramatic performance would be benefited or injured by broadcasting was answered on the following morning at the Plymouth, according to box-office men. It was declared that, up to 11 o'clock a. m., four patrons had bought tickets, declaring that they had been actuated by the radio record of the night before; inspired by the applause which registered through the receiving apparatus. The transmitting device was hung over the proscenium arch.

Broadcast Bill's Radiolays

By William E. Douglas



When it comes to home-made sermons, Sweet Minerva ain't so worse

IN these chilly winter ev'nin's, 'fore it's time to go to bed, how I like to sit and listen, rubber ear-muffs on my head, to the singin' and the speakin' comin' in by radio; weather don't make any difference—let 'er sleet, er hail, er snow. While I'm list'nin'

there so peaceful to the music from the air I kin also get enjoyment in a game of solitaire. I like most a game of canfield; there are others I kin play, but I never knew it had a name until the other day, when a drummer down at Perkin's store explained

how it wuz done in those classy gamblin' joints where they don't play jest fer fun. You hand out yer fifty dollars, or I guess it's fifty-two, then a gent gives you a deck of cards, an' after you are through fer each card up in the ace now he will hand you back five beans. Gosh! I like the game much better, now I've found out what it means. So when wifey goes out callin', leavin' me at home alone, I get out a deck of cards an' play there by my radi'phone. It combines my fav'rite pastime, an' the times goes by so fast that the clock soon strikes nine-thirty, an' I know my bedtime's past. So I play another hand er two while waitin' fer the time that they broadcast out from Arlington before I start my climb. Sweet Minerva, that's my better half, religiously inclined, hasn't took so very kindly to my habits, so I find just because on Sunday ev'nin when she went in town to church I said I'd stay at home an' listen—kinda left her in the lurch. That wuz not the only reason, fer while workin' Saturday I had sprained my back most awful loadin' up some bales of hay. So she went to church with Willie—I stayed home to listen in an' I reckon she'd fergive'd me if it only hadn't been. I'd fergot that it wuz Sunday an' wuz playing solitaire as I listened to the choir, an' the sermon from the air. Min came home an' caught me playin'—I kin tell the Universe when it comes to home-made sermons Sweet Minerva ain't so worse. Now I'll sit these winter ev'nin's 'fore it's time to go to bed an' do nothin' else but listen since Minerva's say is sed.

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Radio and the Woman

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

By Crystal D. Tector

IT is surprising how many young folks have taken to radio. The younger son of a very dear friend of mine had become addicted to loafing about town in various places. His mother worried, fearing that his associates were not having a very good influence on him. For his birthday, the boy received a complete radio-receiving outfit. Since then, he has become so interested in it that he has never so much as asked to join his old associates. Instead, he has joined a radio club and even holds meetings up in his "radio shack," as he calls it.

FRIEND Husband came home very excited the other evening — was so wrought up that I really couldn't make any sense out of the erratic convolutions of his speech. Finally, when he had worked off some of his extra excitement, he was able to make me understand that his "boss" is about to install a large receiving set *right in his office!* "Geel that will be something like it!" exclaimed F. H. "I have been pestering him for the past two months. I guess having him up here for supper last Sunday wasn't such a bad idea, after all—was it?"

Well, I see where I can go back to pre-radio days and wait for him to come home to supper again—but at least I'll know where he is.

IT is the easiest thing in the world for one who doesn't know anything about the construction of radio apparatus to absolutely ruin a set in five minutes trying to "fix something."

It took an expert probably seven or eight hours to assemble and test everything in the set and put it in working order. Why try to adjust it further when you do not understand it? Save money and time by having some one "fix it" who understands.

This little stunt was firmly imbedded on the writer's mind the other evening: I had been visiting a man who had just become interested in radio. We went into the parlor to talk with his family. When I left the room the set was working perfectly; but, due to the fact that his B battery was failing, it was not steady—the set was noisy. All of a sudden there came a disgruntled yell from the region of the house where the set was located. Going up I found the owner of a "once-was-good" set with a large screwdriver in his hand and a surprised look on his face contemplating the wreck. He had tried to tighten "something" and had received a slight shock, which caused him to remove his hand suddenly—also the glass of the bulb and half a dozen connecting wires.

Moral: If you don't understand what you are doing leave it alone until somebody who does can fix it.

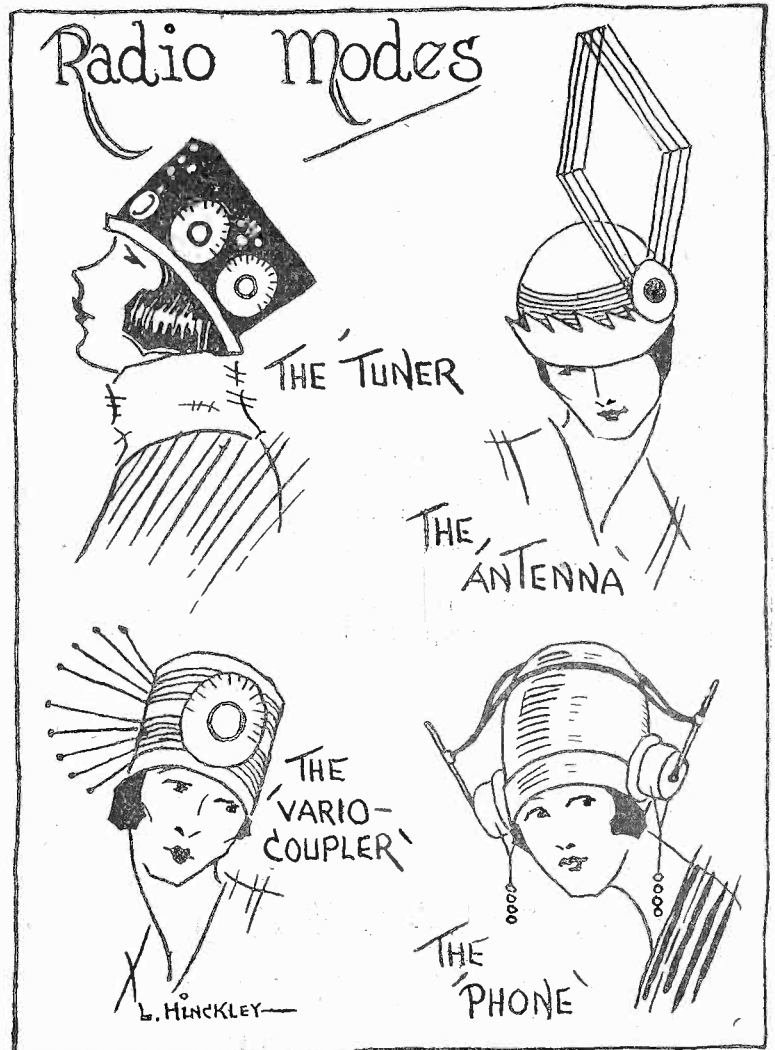
MR. and Mrs. Tector have received an invitation to the "First Radio Ball in the Country." It states that the affair is to be a "Bal Masque," with costumes representing some piece of radio apparatus. He was highly insulted when I told him to dress up as a vario-coupler because he is so "changeable." He retorted that I had better dress up as an amplifying set because I always try to make the most of things; but I will fool him and go as a crystal detector.

THE Ladies' Society of our town has inaugurated a radio club, with a class for those who do not understand the principles of radio. Lectures are to be given by the physics and science professor of the high school. All my friends are attending, and have nominated me president. I really do not know how I am going to spend all my spare time, what with radio clubs, radio classes, and a hundred other things, besides looking after Friend Husband and the house. I really will have so much time to myself that I will have to feed F. H. on bacon and eggs three times a week.

NOW that the radio clan is sharply divided between radio-frequency and audio-frequency Friend Husband and I have some wonderful arguments as to the efficacy of both. He staunchly defends radio-frequency because he can always get it working better than I can; but it is too complicated for me. I stick to the old audio-frequency. It's simpler to handle and fix.

THERE have been several occasions while in the city when I noticed that, more and more, things are becoming adapted to radio in general. Only the other day I noticed that the car of a certain party well known in theatrical circles had a complete working radio set installed, and the concert from WJZ was coming

You Must Be in Style!



Cartoon by Lawrence B. Hinckley

through the window of the car. Seems as if we will soon be able to keep in touch with radio even while we are traveling under the city in the subways.

I HEARD the other night, over the radio, that the station at Atlanta, Georgia, is giving a box of candy to the first person in every state who hears the station and reports. Too bad I didn't know that when they first started. I like candy.

A LITTLE girl met me on the street the other evening about half-past bedtime, crying her eyes out. I stopped her and asked her what the trouble was. Sobbing her little heart out she said: "I-I-I tried to f-f-fi-ind the p-p-o-poor l-l-little b-bunny t-t-that got l-l-lost in the w-w-w-woods by Unc-Unc-Uncle W-W-Wig-Wiglies hou-house, and I-I-I'-m-m l-l-lost. I-I want m-m-my m-m-mama!"

Poor little bunny was lost, and so was the little girl who was looking for him. So I took her to my house, called up one of my friends, who has a local broadcasting station, and asked him if he would be kind enough to announce the facts over the radio.

Inside of a half an hour the mother and father appeared and told me that they didn't even know that she was out of the house; that she had been told to go to bed about an hour and a half ago; and, as she generally goes to bed herself, they didn't notice that she had gone out. They thanked me a million times; but I think that they had better thank radio.

Monster Radio Tower Installed

WORK has just been completed on the first of the two 100-foot 12-ton steel towers on the roof of Aeolian Hall, one of the big skyscrapers on 42nd Street, just west of 5th Avenue, New York City. These masts will be used for the most powerful broadcasting station in the United States—WJZ. When the other tower—one similar to that used to illustrate this article—is completed, which will be about March 1, this new station of the Radio Corporation of America will begin to broadcast the concerts given in the building, for Aeolian Hall is a home of music. Recitals are given almost twice daily. It is then seen how easy it will be for the station to broadcast all the famous artists' concerts, symphony orchestras that take place in Aeolian Hall.

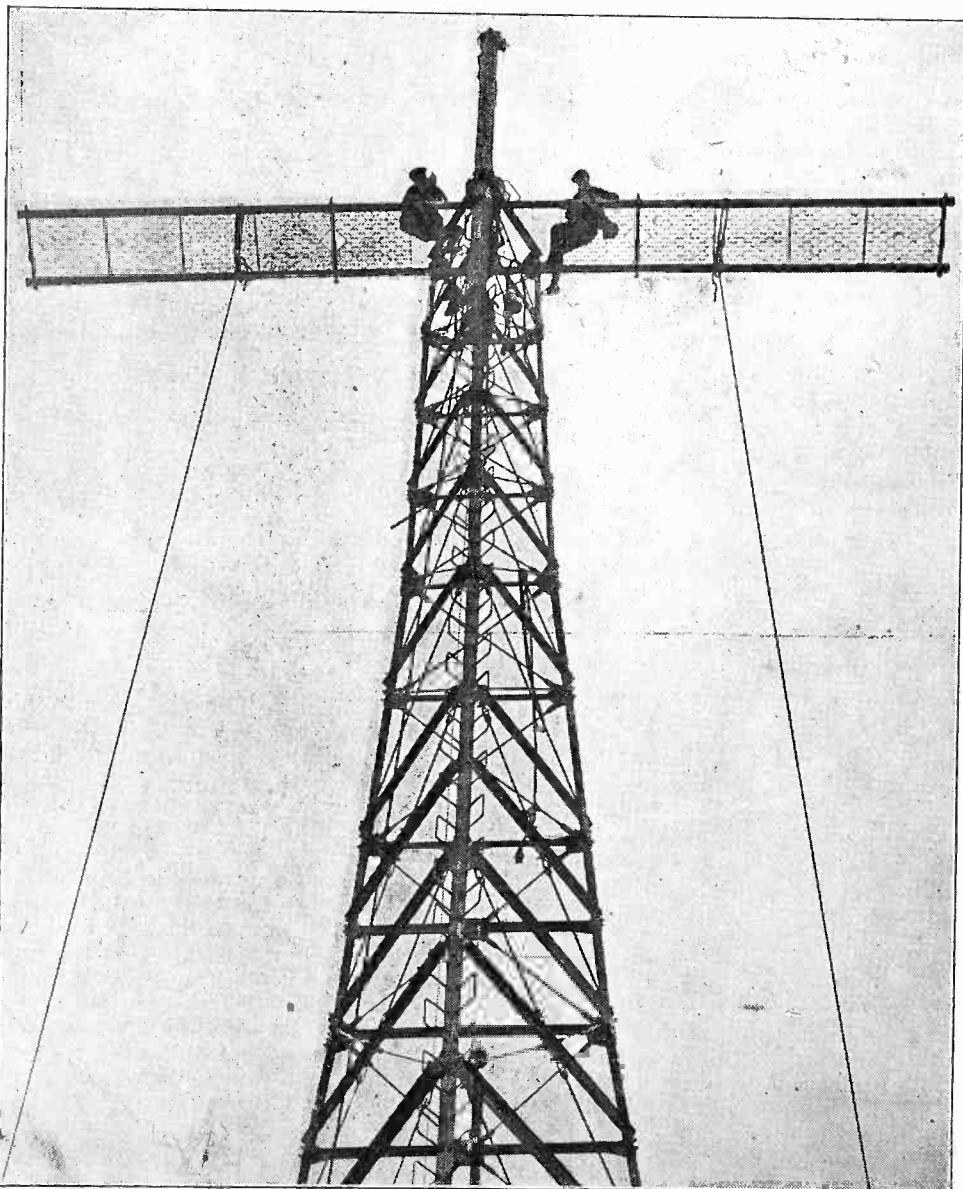
On the sixth floor of Aeolian Hall there has been constructed a special room for the regular radio-concerts. The walls of this room are packed over two inches thick with felt and other "noise killers." The floors are of a special rubber and cork composition laid on felt to deaden all exterior vibration, and all corners are rounded, to insure perfect acoustics. The broadcasting room was designed by an acoustician and will be the most perfect broadcasting room in the world.

There is a strong possibility that this station will operate on two different wave-lengths, sending out chamber music, and orchestral selections on one wave, and popular music on the other, simultaneously. It may replace WJZ altogether.

Because of the great weight of these immense towers and the fact that this particular section of the city is honey-

The Country's Biggest Broadcasting Station on the Roof of Aeolian Hall, 42nd Street Between 5th and 6th Avenues, New York City, Is Nearing Completion. One 12 Ton Steel Tower is Completed.

combed with subways, it took months to perfect some way to relieve the weight of the structure from the immediate building. This was finally accomplished by the use of a special steel-foundation attached directly to the steel framework of the building. The weight of these towers is distributed in such a way that the sides of the buildings bear most of the weight, but not so much that the building has any chance of being endangered. This construction is the first of its kind to be attempted—and not without considerable danger. The building itself, after the manner of all tall buildings, has a "give." By this it is meant that the structural work is not firmly rigid. If such were the case, the first strong wind of any high velocity, or the first shock, such as a strong blast, would endanger the building. The building is constructed so it will sway, or give. This presented a serious problem to the builders of the station, one which had to be overcome in such a way as would make the



The photograph at the left shows two of the workers putting the finishing touches on the massive towers of the Radio Corporation of America's new station, on the roof of Aeolian Hall. Imagine working in the bitter cold, over 350 feet above ground, and over 100 feet above the roof—working on a slim iron framework, which, on these cold, snowy days, become ice coated and slippery. It is not the most pleasant job in the world, and it certainly takes a lot of nerve. But the manner in which the steeplejacks and steel workers climbed about gave the writer the impression that they did not mind the height any more than if they were walking on the ground. The photographer who snapped this was invited to roam around the top crosspiece, and he remarked after the experience, "Never again!"

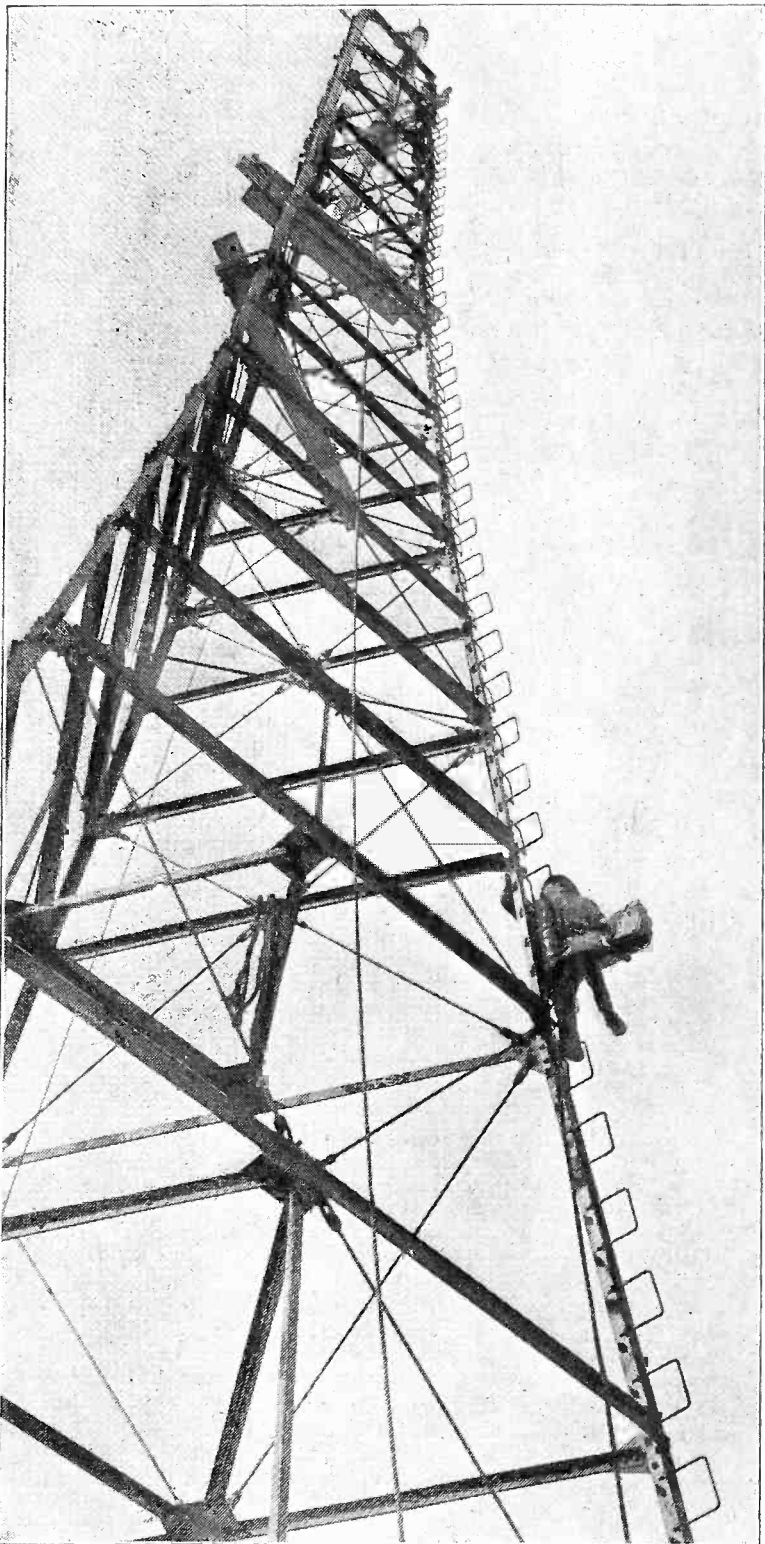
As may be seen, the towers are constructed to form an equilateral triangle with the point of the triangle facing the direction of the greatest strain, namely towards the second mast. This is done to relieve any possibility of either mast buckling, as the strongest part of a triangle, when there is a pull on it, is at the peak. There will be utilized, also, a heavy wooden pole, to act as a mast for the lowering and raising of the wires.

on Roof of New York Skyscraper

By Robert L. Dougherty

tower absolutely safe. While the base of the tower is much wider than the top, the entire tower would be endangered if it were not properly designed to take the "give" of the entire building. In case it were too rigid, there would be great danger of it breaking in two or ripping up at the base. This gives an idea of the situation the builders were compelled to face in order to insure absolute safety.

In order to get an idea of the monstrous size of the tower, compare the man crawling up the side of the ladder with the width of the tower itself. This tower can be seen from New Jersey when the air is not cloudy. It looks like a monstrous finger pointing into the heavens. From the street below, the men working on the tower look like flies crawling about a gigantic web.



(C. Kadel & Herbert)

One of the hundred-foot towers. A photograph taken from the base of the massive structure



(C. Kadel & Herbert)

Aeolian Hall is twenty-four stories high. Situated in the heart of the busiest section of the world, it is ideal as a location for a broadcasting station. The building, one of the highest in the locality, will give the aerials of the new broadcaster a clear and open range without any obstruction. From the mechanical side of broadcasting, so to speak, the location is ideal; but the public will be benefited because New York, being the mecca for so many who can add their gifts to broadcasting programs, will not be inconvenienced by a trip to another city.

The building of this station marks an epoch in radio. There has never been much importance attached to radio, in the mind of the layman, but this venture, the first of its kind, attests the wonderful thing radio has become in the past few years. Had anyone predicted five years ago, that millions of dollars would be spent on radio and stations such as the one pictured on this page would be made possible, he would have been considered a madman. But the impossible is being accomplished.

How long before cities will be dotted with masts and stations like the one pictured herewith—each capable of talking to stations ten thousand miles away? It is only a matter of time.

The location of this station makes it particularly adaptable for long-distance work. Being in a section of high buildings—the massive aerials topping them all, with the possible exception being the Woolworth Building, five miles away—suggest possibilities of remarkable DX accomplishments.

With the DX Nite Owls

Similar to E. A. Wright's Hook-up

From Fred Morton, President, Flathead Radio Association, Kalispell, Montana

WE wish to submit a report of the results we have obtained using a hook-up very similar to the one described by Mr. Earl A. Wright in RADIO WORLD, No. 39, dated December 23, 1922. We receive many western stations, and going farther we hear St. Louis, Chicago, Dallas, Fort Worth, Houston, Atlanta, Duluth, and a number of other high-power stations. We once heard KDKA; once WEAJ, New York City; three times KDYX, Honolulu, and once WGAD, Porto Rico. This is by no means a complete list of even the high-power distant stations. After reading the article by Mr. Wright, one of the club members tuned in fifteen stations in thirty minutes.

The hook-up we use is essentially the same as that used by Mr. Wright with these modifications:

1. We find that a variable phone-condenser, rather than a fixed condenser aids greatly in tuning.
2. We use a grid leak.
3. We use a *variometer*, connected as a vario-coupler. The variometer is wound with No. 20 wire, the stator is used as the primary, and the rotor as the tickler.
4. Negative A and negative B are connected, instead of positive A and negative B.
5. The primary condenser has a capacity of .001 instead of .0005.
6. The grid condenser has a capacity of .00025.

As Mr. Wright has explained, the tuning is done with the tickler half way between minimum and maximum, the rough tuning is done by means of the primary condenser, the fine tuning by means of the phone condenser, and, finally, by means of the filament rheostat.

Using this hook-up, we have received signals as loud and, in many cases, louder than either the Paragon or Grebe sets with one-step of amplification. We can also tune in many more stations in an evening and with very little trouble.

Using 3 power-tubes for audio-frequency amplification, with 45 volts on the plates of all tubes, and with a Baldwin Type-C unit as the loud-speaker, we receive music and phone so loudly that it can be understood 800 yards from the apparatus, near the center of the city. We shall be glad to receive letters from other clubs or "bugs."

The Flathead Radio Association, Kalispell, Montana, is the Radio Club of the Flathead County High School. We are entirely surrounded by high mountains.

Good Radio Work

From R. Diamond, 413 Royal Street, New Orleans, La.

I HAVE written to you before regarding the stations I have heard; but since then I have added fifteen more to the list. All have been heard on a single-tube regenerative set. The stations and the miles by air-line are:

KHD, Colorado Springs, 1,000; KHJ, Los Angeles, 1,650; KLZ, Denver, 1,050; KSD, St. Louis, 600; KUO, San Francisco, 1,875; KPO, San Francisco, 1,875; KYW, Chicago, 850; PWX, Havana, 1,000; WBL, Anthony, Kansas, 700; WEY, Wichita, Kansas, 700; WGM, Atlanta, 450; WGY, Schenectady, 1,050; WHB, Kansas City, Missouri, 700 (received best); WJZ, Newark, 1,150; WKY, Oklahoma City, 400; WLK, Indianapolis, 750; WOK, Pine Bluff, Arkansas, 300; WOS, Jefferson City, Missouri, 600;

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

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

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

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

WPA, Fort Worth, 500; WPM, Washington, D. C., 1,000; WRR, Dallas, 450; WSB, Atlanta, 450; WWJ, Detroit, 1,000; KDKA, Pittsburgh, 1,000; WAAD, Cincinnati, 750; WLW, Cincinnati, 750; WBAP, Fort Worth, 500; WCAE, Pittsburgh, 1,000; WDAG, Amarillo, Texas, 800; WDAJ, College Park, Texas, 450; WDAL, Jacksonville, Florida, 500; WDAP, Chicago, 850; WEAJ, Columbus, 810; WFAA, Dallas, 450; WEAJ, New York, 1,200; WFAV, Lincoln, 875; WHAS, Louisville, 650; WKAL, Orange, Texas, 225; WLAC, Raleigh, North Carolina, 800; WLAH, Syracuse, 1,180; WLAJ, Waco, Texas, 430; WMAC, Cazenovia, New York, 1,200; WMAQ, Chicago, 850; WMAT, Duluth, 1,200; WLAG, Minneapolis, 1,100; NSF, Anacostia, D. C., 1,000; WFAT, Sioux City, South Dakota, 1,025; WOC, Davenport, Iowa, 825; WEAB, Fort Dodge, Iowa, 900; WOI, Ames, Iowa, 900; Portland, Oregon, 2,215.

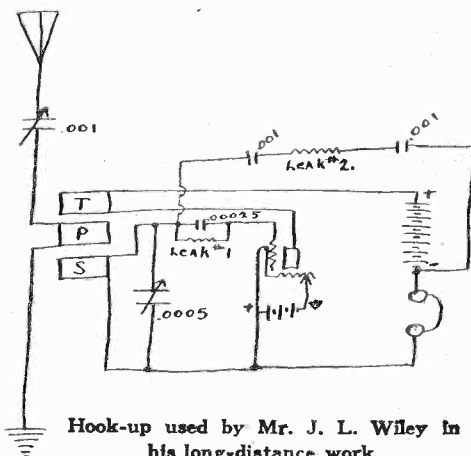
These stations come in pretty regularly.

* * *

An Unusual Circuit

From J. L. Wiley, Jr., Stuttgart, Arkansas.

I HAVE been reading the DX records in your fine magazine; and as I have been doing some DX work lately, some of the DX owls may be interested in my record and hook-up. I think my hook-up is a very useful one. I have never seen another like it.



My long-distance records are KHJ, Los Angeles; PWX, Havana; WGY, Schenectady; CHBC, Canada; KDKA, Pittsburgh; WDAY, Fargo, North Dakota; WFAU, Boston; KFAF, Denver; WLW, Cincinnati; KDN, San Francisco; WOAI, San Antonio, Texas; WOR, Newark; WLAG, Minneapolis; KDYL, Salt Lake City; KLZ, Denver. These are just a few of the stations I have heard, not only once but several times.

I am enclosing hook-up which I use in this set. You will find that it resembles

the Flewelling in that both of the grid leaks are very particular. I use a piece of cardboard with pencil marks on its, as a leak. It took me about an hour to get leak No. 2 to work; but when it did, it was worth all the trouble.

To make the set work: First hook-up coils in regular manner shown, but leave out leak No. 2 and two .001 fixed condensers. Next hook up condenser and leak. When first hooked up they will not make any difference in the working of the set, but careful adjusting of the two leaks will soon enable one to advance rheostat and burn the filament brighter without making tube oscillate as rapidly as before. Condensers are not critical. Primary, 35 turns; secondary, 50 turns; tickler, 75 turns. After getting set to work with condensers in circuit, most of the turning may be done with secondary condenser which should have a vernier. Use very close coupling and most of capacity in primary condenser. Use a V-T one tube with 25 volts on plate; a U-V 200 with 18 volts, or a U-V 201 with 60 volts. U-V 201 will give best results as grid leaks will not be so particular.

* * *

My Six Months' Record

From Russell Sheehy, Newfields, New Hampshire

THE following stations were received during the past six months on a home-made, single-circuit set. KHJ, Los Angeles, comes in on one tube:

California (2), South Dakota (2), North Dakota (1), Colorado (1), Oklahoma (3), Texas (8), Louisiana (2), Florida (2), Wisconsin (4), Utah (1), Kansas (1), Georgia (3), Nebraska (1), Illinois (4), Michigan (4), Missouri (3), Indiana (2), Ohio (7), South Carolina (1), North Carolina (1), Minnesota (4), Iowa (3), Alabama (1), Tennessee (2), Maryland (1), Virginia (2), District of Columbia (4), Delaware (1), Pennsylvania (15), New Jersey (11), New York (16), Connecticut (4), Rhode Island (4), Massachusetts (9), Maine (2), Vermont (2), New Hampshire (1), Cuba (1), Porto Rico (2), Canada (4).

This makes a total of 144 stations in 38 states and territories.

* * *

Need a Life Belt?

From Perkins Bennegan, 637 Poplar Ave., Fresno, California.

I WISH to add to my record, published in RADIO WORLD. Using but one tube, I have heard the following stations: QSA, WGY, PWX, WSB, WGM, WDAJ, WWJ, WCX, WDAP, KYW, KSD, WX, WMAT, WLAG, WOI, WHB, WDAF, WFAA, WBAP, WFAT, WKY, CFCN, KFBB. The only stations on the list which I have not heard at least twice are PWX, WMAT, WFAT and KFBB.

There are 22 of them, fans, and all over 1,000 miles. Seven are 2,000 miles or more. The nearest is KFBB, 1,025 miles; the furthest, WGY, 2,500 miles. Let's see if you can beat this record, DX owls!

Mr. Smith, I sell first-class life belts for only \$5.95!

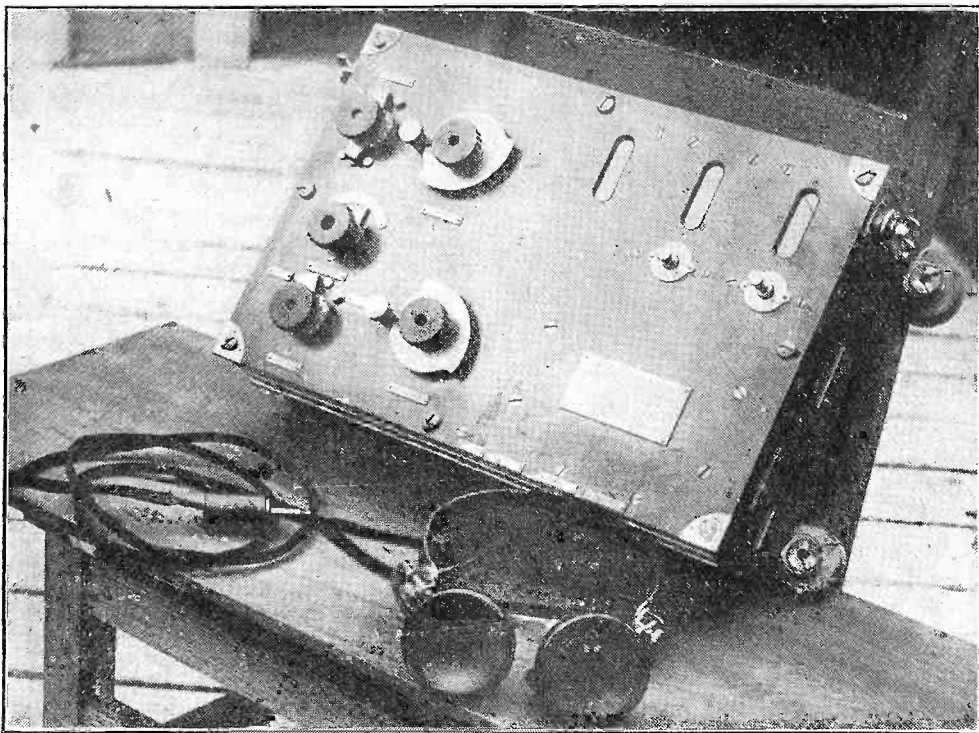
* * *

Adds 2-Stage Amplifier

From G. C. Neely, Box 263, Manor, Pennsylvania.

I AM using a three honeycomb-coil hook-up. I am about twelve miles from KDKA and get their concerts loud enough to be heard all over the house with a Baldwin type "C" phone and one U-V 200 tube. The .0005 variable condenser, shunted around the phones, provides a good smoothing-out

Radio Receiving Set of U. S. Army



The type SC R 75 Receiver at present used by the United States Army in its airplane service throughout the country. A close inspection of this photograph indicates that several novel features are incorporated in this receiver that might be successfully utilized by the progressive amateur who constructs his own apparatus. One of the most important is the switch—the second from the right. By means of this switch, all jacks and plugs are eliminated. It is evident that you can leave your phones connected into the set and by the mere push or pull of a small switch, automatically the amplifying circuits are connected into the circuit. This will call the inventive genius of the constructor into play. Note that the receiver is constructed as to be rigidly fastened to the framework of the cockpit where it is used. In order that no more vibration than is absolutely necessary is produced, there are heavy gum-rubber washers, and gaskets fastened to the sides and back where it is to be fastened. Take particular note of the method of keeping the corner of the front panel-screws securely fastened by means of little pointed springs.

With the DX Nite Owls

(Continued from preceding page)

effect. I sometimes add a two-stage amplifier which brings in long-distance stations, loud and clear, through the loud-speaker.

I get the best results with three 50-turn honeycomb coils. It requires a good ground. I could not get sharp tuning with a water-pipe ground; but by burying a copper wire of several feet, directly beneath the antenna and combining the two, I can tune very sharply.

* * *

Nova Scotia Seems Ideal

By Owen C. Frame, Gay's River, Nova Scotia.

WITH a simple single-valve hook-up, I have heard the following stations: WJZ, WBZ, WGY, WOR, NOF, NSF, 2XI, WOO, WIP, KDKA, WIK, WAAM, CHAC, WGL, WRP, WHAY, WHAM, CFCA, Toronto; WBAP, WGM, WSB, WBU, WHB, WBAM, CFCF, CKAC, WLW, WGR, WBAN, WBY, WFI, WEAM, WWJ, WBF, WBAK, WNAC, WWZ, WEA, WHAZ, WMAK, PWX, WKAQ, WDAF, WZAE, WLKA, WMAF, WAAF, WMAC, WLW, WHAS, WHB, KFAF, and WBAP.

I do not claim this as a record as other amateurs nearby are doing practically as well. This district, thirty-five miles north of Halifax, seems to be an ideal location for receiving. During the warm weather in August, I heard WJZ and WGY, consistently using a crystal receiver. Since the cold weather, WGY, WJZ, WBZ, WTP, WOO, WOR are heard easily with crystal, and on one occasion NOF and KDKA.

With a "Peanut" Tube

From Frank Gruver, Arvada, Colorado

I WOULD like to send in my record so other fans can see they haven't all the good sets. I am using Earl A. Wright's hook-up published in RADIO WORLD, No. 39, dated December 23, 1922, but I am using a "peanut" tube instead of a regular 6-volt tube. I have had my set only a week and have heard the following stations clearly: WBAP, WDAF, KHJ, WOC, WHAI, WFAA, WHD, KZN, KSD, WOS. I have also tuned in CJCD, Winnipeg, Canada.

Kindly publish a one-step amplifier to this set.

If you will turn to RADIO WORLD, No. 23, dated September 2, page 18, you will find the hook-up you are seeking, in response to the query of Mr. H. S. Houston.

* * *

Uses W-D 11 Tube

From Alfred L. Ohnhaus, 272 Kingston Ave., Brooklyn, N. Y.

SPEAKING of DX work, here's mine. On W-D 11 detector tube, coupler, and condenser; aerial plus lead-in, 100 feet:

Locals—WJZ, WOR, WAAM, WEA, WHN.

DX—KDKA, WWJ, WGY, WBZ, WHAZ, WOC, WDAF, WPAC (longest reach, 1,600 miles); WSB, WBT.

I wish the Navy Yard or Bush Terminal would get over the habit of "butting in" just when the distant announcer tells the call letters. I don't know how many DX stations I've lost that way.

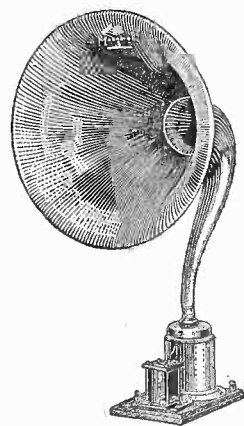
MAGNAVOX Pioneers in the Radio field

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

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



R-2 Magnavox Radio with 18-inch horn



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

Price, \$85.00

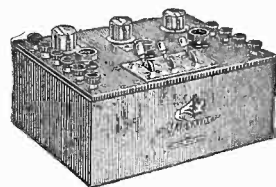
R-3 Magnavox Radio with 14-inch horn

SAME in principle and construction throughout as Type R-2.

Is ideal for use in homes, offices, amateur stations, etc.

Requires one ampere field current from your filament battery.

Price, \$45.00



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

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

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Write to us for illustrated booklet

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New York Office: 370 Seventh Ave.

Answers to Readers

1. *WHAT parts are necessary to construct a crystal set to receive from 30 to 60 miles? What will they cost?*

2. *Would an aerial 135 feet long be too large for use with this apparatus?*

3. *What is the difference between crystal and bulb sets?*

4. *Could I get a greater range with a bulb set?*

5. *Crystal sets are advertised for 30 miles. Pittsburgh is 32 miles. Can I get him with a crystal set?—Henry White, 451 Deer Lane St., Rochester, Pa.*

1. The parts necessary are a tuning coil (2-slide or 3-slide), a pair of phones, a phone condenser, and a crystal detector. You can use a variable condenser in the circuit to make it slightly more selective. They should not cost over \$12.

2. Your antenna is quite correct.

3. This question requires more space for an answer than we can give here. The main point of difference is the extreme sensitiveness of the bulb detector as compared with a crystal. Your range with a bulb set is from 10 to 20 times the range of a crystal set, depending on the circuit.

4. They claim that a crystal set is good for 30 miles; but reception on crystal sets has been covered over a range of 100 miles.

5. See hook-up in this issue illustrating the article by Frederick J. Rumford.

Give me correct hook-up of the De Forest reflex set. Where may the necessary parts be purchased?—Henry Beck, 1098 Woodypress Avenue, the Bronx, New York.

This particular hook-up is patented and cannot be published. We refer you to RADIO WORLD, No. 42, dated January 13, 1923. On page 4 you will find an article, Frederick J. Rumford, describing all constructional data on a two-tube reflex receiver-circuit. This may serve your purpose.

What size variable condenser should be used in the primary circuit of a radio frequency transformer?—Thomas Cortese.

.00025 mfd. should serve the purpose.

Publish a hook-up, or refer me to a back number of RADIO WORLD, that contains a hook-up embodying the following apparatus: Two variometers, one variocoupler, detector phones, etc. The rotors of my variometers are 2 inches in diameter and the stators are 2½ inches in diameter, wound with 60 turns of enameled wire. The coupler has 40 turns on the primary; the secondary has 30.—C. W. Goddard, Tekoa, Washington.

We refer you to RADIO WORLD No. 29, dated October 14, 1922, for the hook-up you require as well as the necessary data on its construction and operation. This is fully described therein, in an article by Mr. George W. May, "Using the Vario-coupler in a Short-wave Regenerative Set," page 4.

I have constructed a set using the enclosed hook-up. I get satisfactory results tuning in long distances, but there is a whistling in the phones when I remove my hand from the proximity of the panel. This whistling stops when I again put my hand on the panel. What is my trouble? How can I remedy it? Is the hook-up correct? Would a vario-coupler and two variometers give me better results?—Theo. Van Dongen, 2454 Meldrum Avenue, Detroit, Mich.

The trouble you are experiencing is common. It is known as "body capacity." This may be remedied by shielding the back of your panel with tin or copper foil. Care should be taken not to let the shielding touch any of the instruments. This will remove the whistling noise. Your hook-up is quite

correct. The distances you are making, according to your letter, indicate that you are doing very well. We advise you not to rebuild your set until you have tried the shielding and noticed the difference.

Must I change my circuit a sketch of which is enclosed? I intend using the new W-D 11 tubes. I am at present using the U-V 200 and 201. What changes will be necessary.—L. W. Ferguson, Killarney, W. Va.

You need not make any changes in the battery circuits. Your sketch is correct. You will find that if you use a variable grid leak, you will get much better results with these tubes as the grid-leak capacity is somewhat critical in these tubes.

Publish or refer me to a back number of RADIO WORLD containing a diagram of a crystal-detector set using vario-coupler, variable condenser, and fixed condenser. What should be the range of such a set using an aerial 75 feet long?—Olaf Peterson, 2098 Fainfield Ave., Bridgeport, Conn.

See RADIO WORLD No. 37, dated December 9. You will find a diagram on page 6, under "Efficient Crystal Sets at Small Cost," by Charles H. Plath.

What is the effect of putting a small condenser across the phone terminals?—E. B.

By putting a condenser across the phone terminals, sounds are made clearer due to the effect that the electrical impulses charge the condenser and the condenser discharges suddenly allowing a clearer sound in the telephones.

I am located 50 miles from New York City. Kindly let me know what set you consider the best for receiving from Pittsburgh, Kansas City, Atlanta, and other distance points. I know nothing about radio. I have heard it said that the 3-circuit receiver is better than the other and vice versa.—William Ash, Kings Park, New York.

It is impossible for us to discuss the relative merits of competitive apparatus in these columns, but we will give a few of the more popular makes of instruments on the market and you can inquire as to their relative merits through friends owning sets or



Trying to tune in Europe. A hard job. (Cartoon by Marcus in "The Times," New York.)

through the literature of the companies making same: De Forest (D-7); Westinghouse (Senior with amplifier); Radio Corporation (RCA and Radiola IV and V); Sleeper, Grebe, and Western Electric.

You mention the 3-circuit and "the other," but you do not mention what other. There are hundreds of circuits on the market. Each has its own district advantage. The 3-circuit regenerative is very popular and extremely satisfactory when you understand how to manipulate it.

Give me the hook-up necessary for a "Calgary fan" to receive such distances as Regina, Seattle, Portland and Vancouver. Is audio- or radio-frequency necessary with the hook-up? I am using an outside aerial. What apparatus is necessary?—R. H. Williams, Calgary, Alberta, Canada.

We refer you to an article in RADIO WORLD, No. 43, dated January 20, by Ortherus Gordon, entitled, "DX Work With a W-D 11." This article fully describes the necessary apparatus and contains as well a full-size plan for the panel layout. Very fine work has been accomplished with this set. You will make no mistake in building it. You may add two steps of audio-frequency if you desire.

1. *How long will a dry cell (1½ volt) last for radio work?*

2. *Are the tubes advertised as the 1½-volt tube any better than the regular 6-volt tube?*

3. *Will any dry cell be sufficient? Is a special cell manufactured?—W. H. Cook, Ogden, Iowa.*

1. When used with the 1½-volt tube, you can get approximately 100 hours use out of it. It is rather hard to give the exact life of such cells, as they vary; also, the heat or cold of a room affects them.

2. We cannot discuss the relative merits of the various competitive makes of tubes.

3. Any dry cell will give satisfaction.

Are a pair of 6000-ohm phones any better than the regular Western Electric 2200-ohm phones? Herbert & Huesgen have advertised N & K phones which have that ohmage.—William F. Grimes, 21 Hammond Street, East Gloucester, Massachusetts.

When buying phones, it is wrong to consider them in terms of ohms. It is better to consider the number of ampere turns wound on the magnet spools. You can get the desired ohmage by winding resistance wire on the spools, but the magnets will not function. The phones you refer to are a German phone. They are slightly larger than the regular phone, due to the increased size of magnets. They are good phones.

What should be the range of a receiver built according to the diagram published in RADIO WORLD No. 14, dated July 1, 1922, page 13. I am using molded Tuska variometers and couplers? What aerial should I use with the above set?—Fred A. Kurtzborn, Jr., St. Louis.

There is no specified range to any receiver. The range depends partly on local conditions and partly on the strength of the transmitter. Sets using the hook-up you mention have been successful in receiving over 1,500 miles. You should have no trouble in doing similar work with one additional stage of audio-frequency amplification. A one-wire aerial from 100 to 150 feet long is sufficient.

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Fifty Millions May Hear at Once, by Radio

A RECENT achievement in telephony indicates that it may soon be possible to radio a message into the ears of 50,000,000 Americans at the same time, says "The World," New York.

A. H. Griswold, Assistant Vice-President of the American Telephone and Telegraph, was an invited guest at the annual dinner of the Massachusetts Bankers' Association at the Copley-Plaza Hotel in Boston. Mr. Griswold connected by wire a studio at No. 24 Walker Street, New York, where several artists were performing a radio program for the local radio district.

The New York program was played in Boston through the apparatus of a department store. Then, by wire, it was conducted to the banquet hall of the Copley-Plaza. Mr. Griswold put on a loud speaker and the New York program was transmitted to the thousand or more diners with the utmost distinctness.

It was the first time that a radio program in one district had been given simultaneously in another district. The New York station was WEAT, and that in Boston WNAC.

Telephone officials and scientists were enthusiastic over the prospect opened by the simultaneous broadcasting of a program from two radio stations more than 200 miles apart.

"Get the picture," said one. "If it is possible and practicable to transmit the speaking or singing voice from New York to Boston at a single point, why cannot the same speaking voice be transmitted to thousands of points at the same time?"

"There are thirteen millions of telephones in America—more, of course, than in any country in the world. It would take a lot of money—millions of dollars—to transmit a program given in one district to, say, forty districts. But if the necessary connections were made, as they were from Boston to New York, with forty other centers up and down the continent from the same point, the entire country could be supplied with the radio program coming from a single studio.

"That would mean that at least fifty million persons in America could hear the same song or the same speech at the same time."

* * *

When Sick at Sea

A DH-Medice Radiogram Brings Professional Help from Nearest Source

NEXT to SOS messages, DH-Medice radiograms are given right of way at sea. DH-Medice signifies advice radioed by medical officers to ships requesting assistance in a professional way for ill or injured men. The United States Public Health Service announced last February, that arrangements had been made with the Radio Corporation of America, whereby the Public Health Service would furnish free medical advice to ships at sea through coastal station of the Corporation at Chatham and Siasconset, Massachusetts; Bush Terminal, New York City; Cape May, New Jersey, and San Francisco. It was expected that request for advice would, in most instances, be made by vessels not carrying physicians, although consultations might be requested in some instances by ships' doctors.

An officer of the Public Health Service, on receipt of a request for medical advice, furnishes promptly whatever advice seems

Radio World, 52 issues, \$6.00.

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indicated, couched in language intelligible to a layman.

While the Panama Canal was not included in the original scheme, several requests for medical advice have been received there from ships at sea, which have been given prompt attention.

The United Fruit Company has now established a similar system of free medical advice in the Caribbean and the Gulf of Mexico. A message from a ship's captain to any of the company's radio stations in Central America or Colombia giving the details of a case of illness or accident on his vessel,

will be answered by the company's physicians without charge.

The United Fruit Company requires that radiograms requesting medical advice be signed by the captain of the ship and state briefly, but clearly, the symptoms of the person afflicted. Such radiograms should be addressed "Unifruitco" and may be sent to any of the following United Fruit Company hospitals:

Santa Marta, Colombia; Port Limon, Costa Rica; Almirante, Panama; Tela, Honduras; Puerto Castilla, Honduras, and Puerto Barrios, Guatemala.

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denser	2.35	Deforest-Detector and 2-stage	
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Klosner Vernier Rheostat.....	.79	180° Variocoupler, silk wound, 2.15	
Cutler Hammer Vernier Rheo-		and a complete line of standard Radio	
stat	1.20	apparatus at reduced prices.	

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Four new hook-ups, including a new reflex circuit furnished without charge with each transformer.

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Dealers and jobbers: Write for our attractive sales proposition, backed by national advertising.

Manufactured by

THE RADIO CENTRE, 2 W. Broadway, N.Y., N.Y.

Attention! Fans and Amateurs!

Have you built your own receiver?
Are you experimenting with any particular hook-up?
Are you improving your set?
Are you doing any interesting constructive work in radio?

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

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

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

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

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

Address Technical Editor

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

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As Told by the Annual Balance Sheet of the Radio Corporation of America

Assets	
PLANT AND EQUIPMENT:	
Comprising High-Power Stations in Operation with the necessary equipment thereto, together with ship stations and sundry machinery, tools and furniture	
	\$12,702,086.84
PATENTS, PATENT RIGHTS, CONTRACTS, GOODWILL, ETC.	
	16,584,845.50
STOCKS OF SUBSIDIARY AND ASSOCIATED COMPANIES	
	598,000.00
CURRENT ASSETS:	
Cash on Hand and at Call.....	\$550,455.74
Accounts Receivable	2,967,497.66
Merchandise Inventories	895,232.80
Investments at Cost (Market Value December 31, 1921, \$494,039.90)	497,737.42
	4,910,923.62
DEFERRED CHARGES:	
Including Organization Expenses and part of the cost of re-establishment of the transoceanic business.....	
	916,228.58
	\$35,712,084.54
Liabilities and Capital	
CAPITAL STOCK:	
3,955,974 shares 7% Preferred, \$5 par.....	\$19,779,870.00
5,732,000 shares Common (no par value).....	12,039,607.88
	\$31,819,477.88
CURRENT LIABILITIES	
	954,471.07
DEFERRED LIABILITY	
	620,000.00
RESERVES:	
For Depreciation of Patents—Balance.....	\$964,284.12
Add: Amount Transferred from 1921 Earnings.....	426,799.59
	\$1,391,083.71
For Depreciation and Obsolescence of Plant.....	818,329.42
Other Reserves	108,722.46
	2,318,135.59
	\$35,712,084.54
GROSS INCOME FROM OPERATIONS:	
From Transoceanic Communications.....	\$2,138,625.86
Gross Sales	1,468,919.95
From Marine Service.....	553,298.71
	\$4,160,844.52
Deduct: General Operating and Administration Expenses, Depreciation of Plant and Cost of Sales.....	
	3,762,231.48
	\$398,613.04
OTHER INCOME	28,186.55
	\$426,799.59

Business Always Good Somewhere

BUSINESS," says Roger W. Babson, the eminent economist, in "Forbes Magazine," New York, "is always good somewhere. The business cycle is continually in progress, but it travels gradually across the country north and south or east and west. The sun rises and sets once in every twenty-four hours, but it rises at a different time in the East than in the West. The sun of prosperity is always shining somewhere. The

student of fundamental conditions will always know where that bright spot is and there he will be selling his wares.

"The selling of goods is very much bound up with the tastes, customs, and fashions of the people. These, likewise, are changing constantly in accordance with definite economic laws. We criticize women as being the slaves of taste, custom and fashion, but can they help it? If they cannot help it, it is due to the fact that taste, custom, and fashion are governed by fundamental laws. If this is so, it is entirely possible to forecast the changes."

Coming Events

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

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

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

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

SOUTH JERSEY'S FIRST RADIO-ELECTRICAL SHOW, Third Regiment Armory, Camden, N. J., February 5 to 10, inclusive.

New Firms and Corporations

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

Capital Increases

Paceant Electric Co., Manhattan, \$50,000 to \$150,000.

Redhead Mfg. Co., Manhattan, make tools, \$20,000; H. H. Silverman, B. Rosen. (Attorney, M. E. Levin, 299 Broadway, New York.)

Stenzel Mica Corp., Wilmington, Delaware, mining, \$250,000. (Corporation Service Co.)

Radio Co. of Philadelphia, purchasing agents, \$300,000. (Corporation Guarantee and Trust Co.)

New Representative

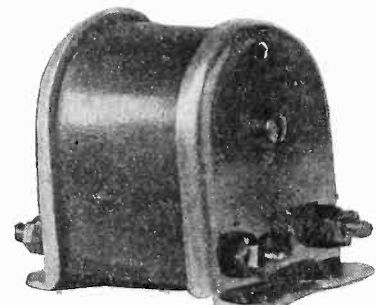
Multiple Storage Battery Corp., Delaware; new representative, N. D. Sturgess, Jamaica.

Claims for the Vac Shield

ONE of the latest radio devices on the market was developed by the Orange Research Laboratories, East Orange, New Jersey. It is known as the Vac-Shield. This is the invention of Ed. H. Lerchen, well known in the electrical industry. The purpose of this nonmagnetic shield is to prevent interstage coupling and electrostatic effects between detector and amplifying tubes, which overcomes stray capacities which cause unnecessary noises and which make it so difficult to tune in distant stations. The Vac-Shield also acts as a guard against breakage of the tube. It is particularly valuable where radio-frequency is used or wherever the distance between the vacuum tubes is less than 8 inches. They are so constructed as to be readily attached to the tubes in a few minutes without trouble, and are made to fit all standard makes of vacuum tubes. On account of their efficiency they are becoming very popular among radio fans.

A New Transformer

AN audio-frequency transformer of unusual design has been placed on the market by the Radio Supply Company, Hornell, New York. It is of the closed-core type, and is also shielded. Due to a unique winding a large core was found



New closed-core type transformer.

to be unnecessary. It is especially recommended to radio enthusiasts living great distances from broadcasting stations. Three stages of audio-amplification may be used with practical results.

License to Broadcast Issued

Official Document Permitting Radio Stations to Broadcast Copyrighted Music Issued—Fee to Be Yearly and Payable in Advance

THE efforts of the American Society of Composers, Authors and Publishers to collect license fees from radio broadcasting stations seems to be taking definite shape. The official license agreements whereby the radio interests are given permission to broadcast the copyrighted music owned by members of the society have been issued. A stipulated sum as an annual license fee is payable in advance. This amount varies upwards from a minimum of \$5.00.

As a matter of fact, it is the intention of the society to issue the license, not so much for the fee, but for fees that it will be necessary to collect in the future when radio broadcasting has reached a stage when it will seriously affect the society's members' revenue from other sources. The contracts now being made are more in the nature of a safeguard of the rights of the composer and others for a later period.

The "License to Broadcast" has been drawn up as simple and as concise as possible. The text of the agreement being entered into between the American Society of Composers, Authors and Publishers follows in full:

LICENSE TO BROADCAST

AGREEMENT made this No. day of, 1923, between the AMERICAN SOCIETY OF COMPOSERS, AUTHORS AND PUBLISHERS, hereinafter designated as the "Society," and, hereinafter designated as the "Licensee," as follows:

1. The Society grants to the "Licensee" the license to broadcast by radio (as hereinafter limited in Article 3) the musical numbers in the repertory of the Society from the Licensee's broadcasting station, located at, City of, State of

2. The Licensee accepts such license, and agrees to pay to the Society the sum of \$..... annually, payable in advance.

3. This license is not transferable; is strictly limited to broadcasting from the station hereinabove mentioned; and is further strictly limited to broadcasting non-dramatic renditions, vocally and/or instrumentally (with an organ, phonograph, piano, orchestra or band).

4. The Licensee agrees to make the following announcement upon the commencement of each program in which musical numbers from the repertory of the Society are broadcasted:

"By special arrangement with the American Society of Composers, Authors and Publishers musical numbers contained in the Society's repertory will be included in this program."

5. If required by the Society the Licensee agrees to furnish to it (upon forms to be supplied) a list of the musical numbers contained in the Society's repertory used in each program.

6. In case the Licensee shall make default in the payment of the annual license fee, or shall violate any of the other terms or conditions of this license, the Society may, at any time after such default or violation, without previous notice to the Licensee, terminate this agreement; and, upon such termination, this license and the rights and privileges herein granted to the Licensee shall immediately cease and terminate.

7. The Society reserves the right, at any time, to revoke the privilege of the Licensee to broadcast by radio any of the numbers in its repertory, and upon such revocation

the Licensee shall have the right to terminate this agreement forthwith, by written notice, mailed to the Society at its usual place of business; and, in the event of such termination, a pro rata amount of the license fee, paid in advance, shall be refunded to the Licensee.

8. The parties hereto hereby agree that this contract shall be deemed to be, and shall be, extended and renewed from year to year unless either party, on or before thirty days next preceding the termination of any year, shall give notice to the other of, intention to cancel the same, such notice to be given in writing by Registered Mail.

IN WITNESS WHEREOF, this agreement has been duly subscribed and sealed by the Society and Licensee.

AMERICAN SOCIETY OF COMPOSERS,
AUTHORS AND PUBLISHERS.

By
By (L. S.)

Who Is to Pay for Broadcasting

From an Address by General James G. Harbord, President of the Radio Corporation of America, Before the Illinois Manufacturers' Association

TO-DAY we have newspapers, automobile schools, electrical manufacturing companies, and chiropractic schools doing broadcasting. Can these various agencies continue when it costs from \$25,000 to \$50,000 a year to put on continuously a generally satisfactory program? If not, who is to do the broadcasting? Theoretically, the 600 stations scattered throughout this broad country are operating on two wave lengths, one of 360 meters and the other of 400 meters. The result is man-made interference and confusion. One of two things happen—either good programmes suffer from this interference, or stations capable of serving many thousands are asked to give up time on a specific wave length to a

smaller station, which can at best serve only small communities and a limited number of people with inadequate programmes.

It is popularly believed that radio communications being carried on through the air may be operated to an unlimited extent. That, unfortunately, is not true. The spaces in what scientists call the ether, through which communications may be carried on, are very limited. They are like a definite number of paths, or a city street upon which only so many soldiers can march shoulder to shoulder. The government can assign additional wave lengths, but there are not available in the ether 600 wave lengths which can be allocated to telephone broadcasting.

Who is going to pay for broadcasting? I cannot answer that question, but if we have a national service, organized and administered with the ideal "the greatest good to the greatest number" as the watchword, it will no doubt be possible to devise some means of obtaining compensation for the cost of service either from distributors of apparatus, suitable contribution from listeners, or by the public-spirited endowment of a Carnegie or a Rockefeller.

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

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Claims the "Radio Golf" Record

Robert H. Anthony Makes a Grand Total of 39,345 Miles in 14 Hours and 20 Minutes

OVER 3,576 miles an hour is the radio distance covered by Robert H. Anthony, 18 Cleveland Road, Needham, Massachusetts. This speed was maintained December 30 and 31, over a period of 6 hours and 20 minutes. Among the cities "visited by radio" were San Francisco and Long Beach, California; Roswell, New Mexico; Colorado Springs, Colorado; Dallas and Fort Worth, Texas; Havana, Cuba; not to mention such nearby communities as Milwaukee, Chicago, St. Louis, Atlanta and Birmingham.

The broadcasting of all these cities and many more, totalling 45 in all, was received during 14 hours and 20 minutes operating time on the evenings of December 24, 25 and 30, and the early morning of December 31. The total number of miles covered during this time was 39,345, which establishes Mr. Anthony's claim to being a radio golfer of high rank.

Higher radio golf-cards may have been turned in, but this is believed a record, considering the time of play. "Radio Golf" is a new game invented by Frank Jones, of Tuinucu, Cuba. It is a gentleman's game. Everyone keeps his own score. A record is kept of all broadcasting stations heard. A broadcasting station may be computed only once. The mileage between the broadcasting station and the radio-receiving set is computed from the map and the various distances added up.

Mr. Anthony is New England manager for R. Thomas Sons Co. The equipment

with which he made this phenomenal record was a standard Amrad-radio-frequency receiver employing one stage of radio-frequency and two stages of audio-frequency amplification. San Francisco was heard clearly through a loud-speaking horn.

Below is Mr. Anthony's score card:

December 24. 3 hours' play

Station	Miles
WAAK—Milwaukee	920
WIP—Philadelphia	290
WOC—Davenport, Ia.	1035
WGY—Schenectady	87
WRR—Dallas	1610
WDAC—Springfield, Ill.	1006
WHK—Cleveland	575
WHB—Kansas City, Mo.	1294
WQAA—Parkersburg, Pa.	317
WJZ—Newark	201
WHD—Morgantown, W. Va.	544
WAH—Eldorado, Kansas	1438
Local stations	15
Total	9332

December 25. 5 hours' play.

WJZ—Newark	201
KYW—Chicago	892
WHD—Morgantown	544
WJAX—Cleveland	575
WGY—Schenectady	87
WWJ—Detroit	633
CFCF—Montreal	259
WBZ—Springfield, Mass.	66
KSD—St. Louis	1092
WOO—Philadelphia	290
WYJ—Los Angeles	2712
Local stations	10
Total	7361

December 30-31. 6 hours, 20 minutes' Play

WEAF—New York City	201
WGM—Atlanta	978
WIP—Philadelphia	290
KDKA—Pittsburgh	489
WFI—Philadelphia	290
PWX—Havana	1571
WAAK—Milwaukee	920
KSD—St. Louis	1064
WRR—Dallas	1610
WKM—Memphis	1179
WPA—Fort Worth, Texas	1639
WDAC—Chicago	892
KHD—Colorado Springs	1869
WMAF—South Dartmouth	64
KNJ—Roswell, New Mexico	1984
KSS—Long Beach, Calif.	2703
WSB—Atlanta	978
KDN—San Francisco	2818
WSY—Birmingham, Ala.	1093
Local stations	20
Total	22652

Grand total: 39,345 miles in 14 hours and 20 minutes.

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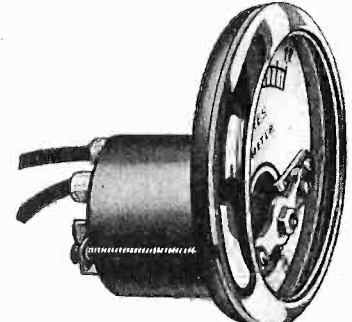
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Club News

THE Amateur Operators' Club of Brenton, Washington, announces the following officers: Walter R. Wood (7ABV) chief operator, president; Eugene Bailey (7 ABW), first operator; Ed. Flodquist (7NG), second operator and traffic manager.
* * *

The Lorain Radio Association, Lorain, Ohio, has elected the following officers: Charles S. Smith, president; O. S. Ellison, vice-president; R. R. Ward, secretary; P. J. Stephen, treasurer.
* * *

The Wireless Society of London has changed its name to the Radio Society of Great Britain.

Look Out for Radio Stock Fakirs

WARNINGS are being sent out again regarding offerings of bogus radio company stock. One concern uses a name so similar to one of the successful companies that people are buying its stock believing they are investing in the older corporation.

Slower Than Radio

A DELIVERY wagon was seen at 43rd Street and 8th Avenue, New York City bearing the following sign: "RADIO MARKET. We deliver your purchases anywhere in New York, same day as bought. Try us."
This statement seems a little far-fetched when compared to radio. If the butcher had stated that he delivers at a rate of 186,000 orders per second, he might have some claim to his boast.

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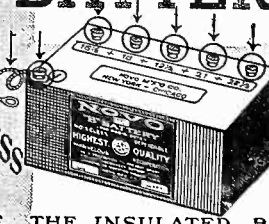
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Direct Radio Communica- tion with China

SAN FRANCISCO.—Announcement of a new pioneering step in radio is made by the Federal Telegraph Company. This concern, which established the first radio commercial communication with the Hawaiian Islands, now has established the first direct private radio communication with China. While this latter service is not on a commercial basis as yet, pending completion of the first of five large stations the company is erecting in China, all its own communication is being carried on over it.

The Federal's Hawaiian service was opened in 1912 between stations at South San Francisco and Heeia, island of Oahu, which virtually are duplicate installations. They since have been sold to the government. Until 1914 communication was carried on only at night, but the service was adequate to supply the island newspapers with their first metropolitan press service and to exchange a number of commercial messages.

The new communication channel with China is from the Federal company's Hillsboro station, near Portland, Oregon, where one of the arc sending-sets used regularly in its Portland-San Francisco service has been diverted temporarily to send to a temporary station located in the Astor House, Shanghai, China. Communication is on a wave-length of 8,400 meters, and has been carried on thus far with a power input of only 30 kilowatts, less than half the capacity for which the arc was designed.

"This Is Mr. Thayer"

WHEN the telegraph was completed the first long-distance message successfully transmitted consisted of the words "What hath God wrought!" The telephone was first used for the prosaic command: "Mr. Watson, come up here. I want you." To these historic utterances, says "The Globe," New York, must now be added "This is Mr. Thayer." Last night H. B. Thayer, president of the American Telegraph and Telephone Company, sat in his office at 195 Broadway and, introducing himself with the words quoted, talked across 3,400 miles of tumbling black Atlantic water to a group of men in New Southgate, near London. His words, carried by the magic of wireless telephony, were transmitted almost perfectly; those of his hearers in England who knew him recognized his tones. Mr. Thayer and several other speakers were heard to the extent of thousands of words, and so distinctly that the jovial British listeners were able to register a humorous complaint of the American accent.

This achievement does not come upon us unawares. Radio telephony from Arlington to Paris was successfully experimented with as long ago as 1915, and only last month a woman singing in Newark was heard in Croydon, England. The demon-

stration last night, however (for which the credit must be shared by Mr. Thayer's organization and the Radio Corporation of America), is vivid and dramatic proof of the giant strides in the progress of the art. Practical use of wireless telephony in transatlantic communication is still some distance away, for the number of wave-lengths available is still so limited that not more than four or five such conversations are simultaneously possible. But no one can doubt, in view of the record of the recent past, that these difficulties will be overcome.

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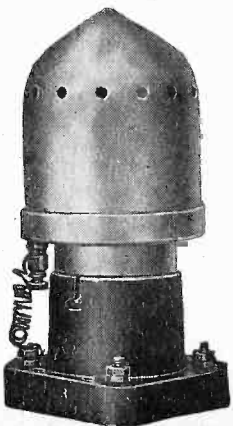
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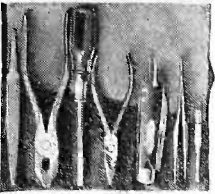
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Radio May Be a Common Telephone

First Successful Demonstration of Carrier Current Communication Shows Amazing Versatility of New Science

PITTSBURG — Before representatives of all the larger light and power companies of the United States, an amazing new use of radio was brought to light when it was demonstrated that voice conversations could be carried on by means of radio waves over high-tension power lines, without the use of switches, similar to the ordinary telephone connection.

The test was conducted between experimental stations located in the Colfax and Burnets Island power stations of the Duquesne Light Company—points located about thirty miles apart—by engineers of the Westinghouse Electric & Manufacturing Company and the power company. It was also demonstrated that this system could be used for remote control of all manner of apparatus.

For a long time, the Westinghouse Company has been working on a method of carrier-current control for use in central-power stations and electric railways, or other points using high-tension electrical lines. The idea behind the whole scheme is to superimpose radio waves on the power lines and thus make use of radio transmitting and receiving for both voice communication and control of remote switches.

The new system was demonstrated over a 66,000-volt line and is unique inasmuch as does the ordinary telephone. When the telephone receiver is unhooked, the transmitting station automatically starts up, allowing talk in both directions without any switching. This feature is entirely new in radio, as all other transmitting and receiving must be done by switching back and forth, because a station, transmitting, will not receive messages. The transmitting apparatus must first be switched off and the receiving circuit switched in. However, all this is done away with in the newest of systems.

The calling or ringing of numbers is selective and operated by special selector keys which cause the bell to ring only at the station desired. This eliminates the distracting code ringing and allows station operators to keep their minds on their work.

The system developed by the Westinghouse Company has been carefully worked out by C. A. Boddie, radio engineer of the company, and the technical and economic features are now being analyzed by Mr. Boddie, assisted by M. W. Cooke of the Duquesne Light Company.

Church Aids Drive by Radio

United Hospital Fund Trustees Thank Dr. Ernest M. Stires of St. Thomas

THE receipt of nearly a hundred checks for the United Hospital Fund by the Rev. Dr. Ernest M. Stires in response to his radio appeal broadcast from the pulpit of St. Thomas' Church, of which he is rector, was announced at a meeting of the trustees of the fund, at which William Fellowes Morgan was elected president.

No Free List

RADIO WORLD has no free list. The only copies sent out by the publishers are to fill the ever-increasing orders of the American News Company, the large numbers of subscription orders received at the office of publication, and one voucher copy to each advertiser and advertising agent represented in current issues.

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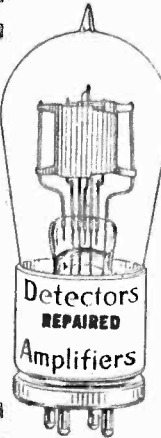
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Broadcasting map, 15c. That is, a complete broadcasting map appeared in RADIO WORLD, No. 8, dated May 20. Mailed on receipt of 15c. Radio World Company, 1493 Broadway, N. Y. C.

Uncle Sam Needs Radio Workers

United States Civil Service Examination for Radio Inspector to Be Held March 7

THE United States Civil Service Commission announces an open competitive examination for radio inspector on March 7. Vacancies in the positions of

radio inspector and assistant radio inspector in the Bureau of Navigation, Department of Commerce, at \$1,800 to \$2,200 a year (plus "bonus," see below), and in positions requiring similar qualifications at these or higher or lower salaries, will be filled from this examination, unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion.

Range in salary.—The entrance salary within the range stated will depend upon the qualifications of the appointee as shown in the examination and the duty to which assigned.

Bonus.—Appointees whose services are satisfactory may be allowed the increase granted by Congress of \$20 a month.

Citizenship and sex.—All citizens of the United States who meet the requirements, both men and women, may enter this examination; appointing officers, however, have the legal right to specify the sex desired in requesting certification of eligibles. For these positions in the Bureau of Navigation men are desired.

Duties.—The duties of radio inspectors will be primarily to inspect the radio apparatus on steamships, to insure its compliance with the law, and to inspect shore stations. The inspectors may also be called upon to examine radio operators. The duties of radio inspectors require some office experience, therefore competitors should outline fully in their applications any office experience they may have had.


The duties of assistant radio inspectors will be primarily the assisting of radio inspectors in the enforcement of the wireless communication laws. Assistant radio inspectors will be required to inspect the radio equipment on board vessels and in land stations, which involves the carrying of 30 or 40 pounds of testing and measuring instruments. The inspection work requires a knowledge of the installation and operation of the several types of radio installations, including the adjustment and tuning of transmitters and receivers.

Subjects and weights.—Competitors will be examined in the following subjects, which will have the relative weights indicated:

- | | |
|---|-----|
| 1. Theoretical and practical questions in the construction, use, and adjustment of radio apparatus and auxiliaries (eligible rating required) | 50 |
| 2. Education and experience in the line of the required duties..... | 50 |
| Total | 100 |

Applicants must attain an eligible rating in the first subject.

Education and experience.—Applicants must have received a bachelor of science degree from a school of recognized standing, such educational training to have in-



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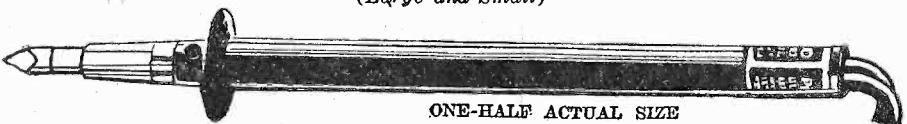
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cluded a special course in radio or kindred sciences, or show that they are senior students in such institutions; or have had the equivalent of a high-school education and at least two years' experience in special radio work, such as the manufacture, installation, or adjustment of commercial or governmental wireless apparatus. It is essential that applicants be wireless telegraph operators.

Statements as to education and experience are accepted subject to verification.

Age.—Applicants must have reached their twenty-first but not their fiftieth birthday on the date of examination. These age limits do not apply to persons entitled to preference because of military or naval service, but such applicants must not have reached the retirement age.

Retirement.—Classified employees who have reached the retirement age and have served fifteen years are entitled to retirement with an annuity. The retirement age for railway mail clerks is 62 years, for mechanics and post office clerks and carriers 65 years, and for others 70 years. A deduction of 2½ per cent. is made from the monthly salary to provide for this annuity, which will be returned to persons leaving the service before retirement with 4 per cent. interest compounded annually.

Photographs.—Applicants must submit to the examiner on the day of the examination their photographs, taken within two years, securely pasted in the space provided on the admission cards sent them after their applications are filed. Proofs or group photographs will not be accepted. Photographs will not be returned to applicants.

(Continued on next page)

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(Continued from preceding page)

Residence and domicile.—Applicants may be examined at any place at which this examination is held, regardless of their place of residence; but only those who have been actually domiciled in the State or Territory in which they reside for at least one year previous to the examination, and who have the county officer's certificate in the application form executed, may become eligible for permanent appointment to the apportioned service in Washington, D. C.

Oral examination.—Applicants may be required to report either in Washington, D. C., or elsewhere, for oral examination to determine their personal characteristics and address, tact, judgment, adaptability, and general fitness for the performance of the duties of the position. An applicant who fails to pass the oral examination will not be eligible for appointment. Applicants will be notified of the date and place of the oral examination.

Applications.—Applicants should at once apply for Form 1312, stating the title of the examination desired, to the Civil Service Commission, Washington, D. C., or to the Secretary of the United States Civil Service Board at any place listed hereon. Applications should be properly executed, *excluding both vouchers and the medical certificate*, and filed with the Commission at Washington in time to arrange for the examination at the place selected by the applicant.

Radio Jokes

A PAIR of fones snapped good and tight, The Radiotron burning just right, He tunes 'em in right through the night That's him!—"The Radio Log."

"Friends, Romans, countrymen, lend me your ears!" cried the orator. "Evidently he wants to listen in!" we cried.—"New York Herald."

Jimmy—You take this wireless receiver I just finished makin', and go down stairs in the cellar; hold it close to your ear and listen.

Freddy (after waiting in suspense for several moments in the cellar)—Aw, it's a fake. I didn't hear a thing.

Jimmy—Good! That shows it's workin' right. I didn't say anything yet.—"New York Mail."

J. G. Hibben, president of Princeton University, in an address recently, stated that by means of crude apparatus a wireless message was sent some 250 feet at Princeton, in 1832.

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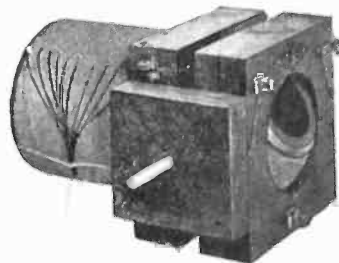
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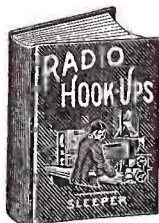
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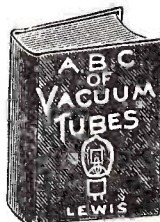


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