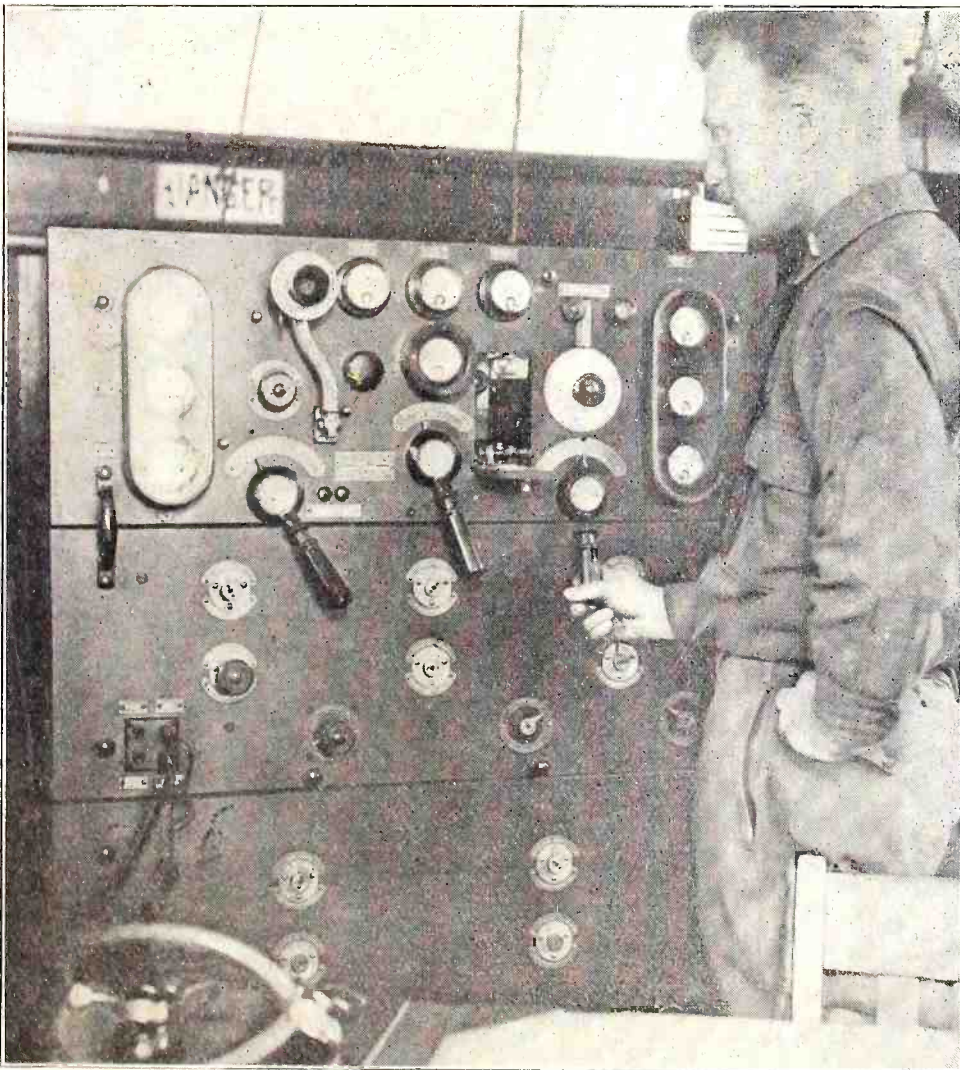


RADIO WORLD

Entered as second-class matter, March 28, 1922, at the post office at New York, New York, under the act of March 3, 1879

I L L U S T R A T E D

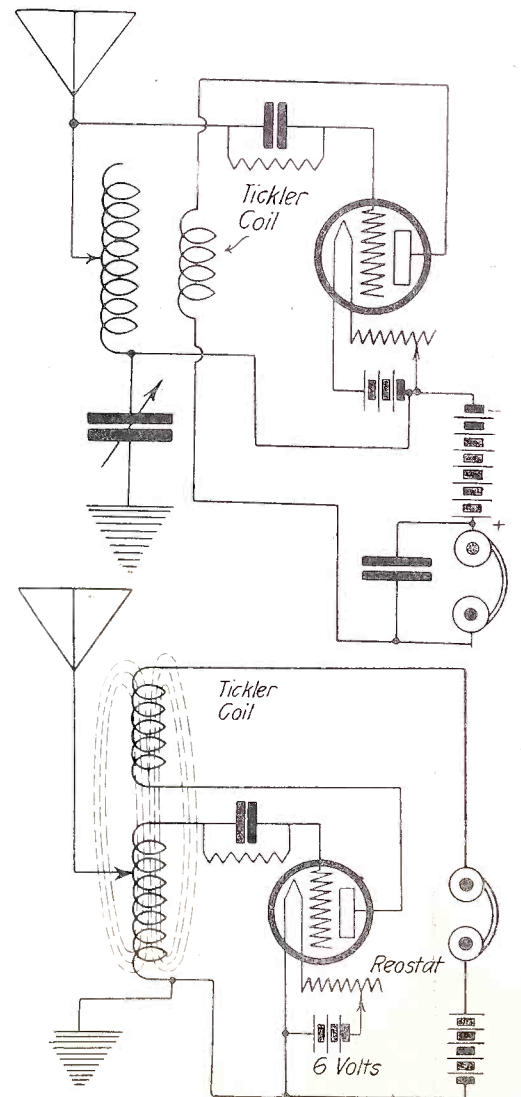
Where Uncle Sam Radios to His Millions



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

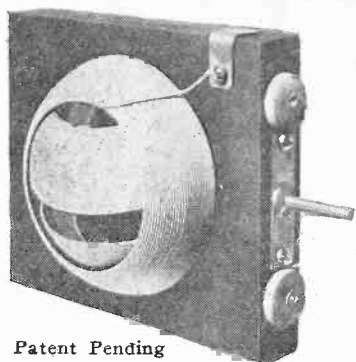
The radio transmitter that hurls forth the radio waves generated by the vacuum tubes in the big United States broadcasting station, WVP, Fort Wood, Bedloe's Island, New York. This station operates on a wave-length of 1,450 meters, and covers one of the widest ranges of territory in America.

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Here are two simple regenerative hook-ups you will want to test out. See article on page 13.

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(Cartoon by L. B. Hinckley)



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of Radio Manufacturers, Jobbers and Dealers in the United States and Canada. Issued Quarterly—January, April, July and October. October, 1922, issue corrected to September 15th, 1922. Classified under three different headings—Manufacturers, Jobbers and Dealers—and alphabetically arranged by states, cities and towns and names of firms. Containing approximately 15,000 names and addresses.

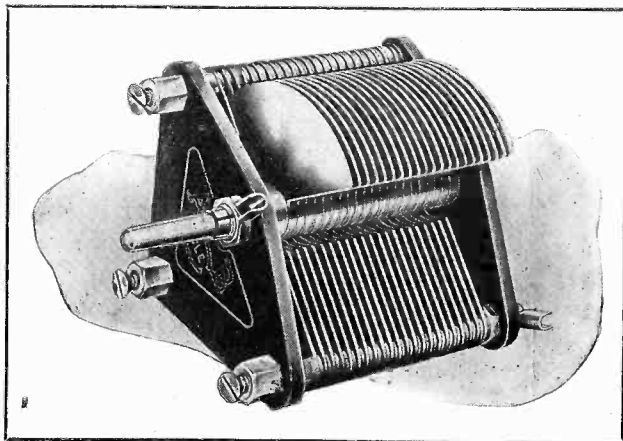
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on request

Good Morning, Mrs. Casey

"G O O D mornin', Mrs. Casey,
'Tis a fine state of affairs—
I come home from my washin'
An' stumble down th' stairs.
In tryin' to find th' reason,
Sure, what d'you think I found?
'Twas nothin' but a copper wire
A runnin' to the ground.
I followed up this copper wire
An' faith, 'twas pretty soon,
It led me to the attic floor,
Where Jimmy has his room.

"I thought that Jimmy was in school,
Instead, what did I see?
Th' lad had ear muffs on his head,
On his face a look of glee.
'Oh, mom,' he said, 'Come over here
And listen in on this—
I'm getting everything so clear,
Without a single hiss.'
I don't know what you're gettin',
But I know what's comin' soon,
Says I to th' young one.
When your father's home this noon.

"Aw, gee! mom, don't tell father
I stayed home from my class.'
The boy said to me with a look,
That'd, melt a heart of glass.
'I've learned more here this mornin',
Than I learn on any day.
I didn't play hookey from my school
To roam the streets and play.
I doped my own lil' hook-up
And it's workin' at its best.
I'll put it up against them all,
For it's different from th' rest.'

"An', what do you think he was doin'?
Mrs. Casey, you couldn't tell.
Oh! You think you've heard th' lingo,
But can't place it very well.
Now listen, how he told it
With me standin' o'er his head,
Not knowin' just what minute
I would send him into bed.
'Mother, I hear news and music,
And I make it come and go,
'Tis th' latest of all wonders
And it's just called radio.'
—Jewell Williams in "The Globe," New York.

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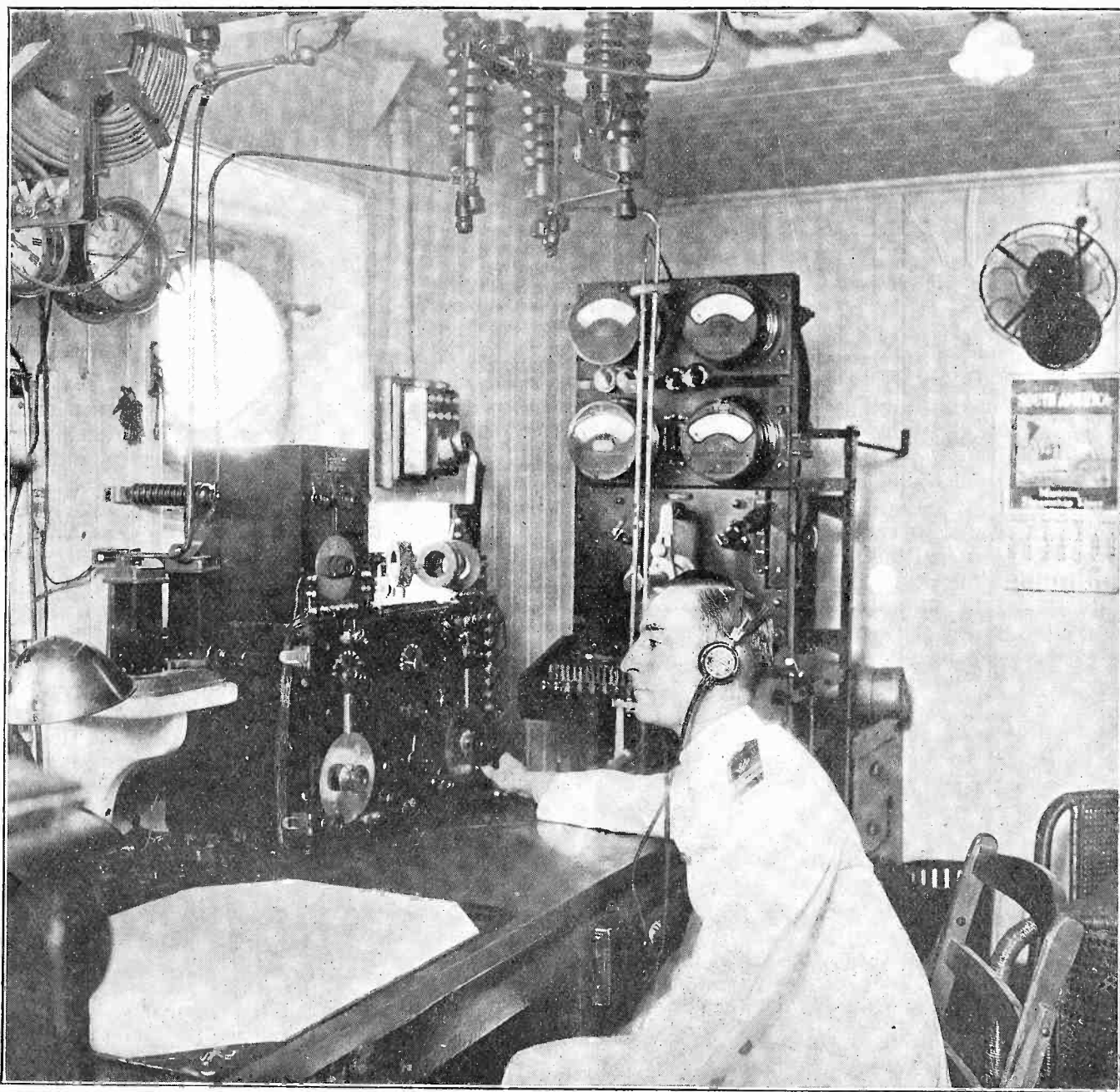
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Vol. 1, No. 25

September 16, 1922

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Powerful Radio Set Kept Secretary Hughes in Touch with Washington



Wireless operating room on the steamship "Pan America," of the Munson Steamship Line, which recently carried Secretary of State Hughes to the Brazilian Centennial Exposition at Rio Janeiro. Chief Operator W. K. Meriweather is photographed at the receiver

THE most powerful radio-receiving outfit ever installed on a merchant vessel is that on the steamship "Pan America," operated for the United States Shipping Board between New York and South American ports. The mechanism was installed for the benefit of Charles E. Hughes, Secretary of State, on his trip to Rio Janeiro as the United States representative to the opening of the Brazilian Centennial Exposition.

The apparatus of the "Pan America" is so powerful that during the entire trip to the Brazilian capital Secretary Hughes was able to keep in touch with official Washington. Communication between Washington and the ship was held through the powerful wireless station at Arlington, Virginia.

Vessels equipped with the vacuum-tube receiving outfit can receive messages up to 4,000 miles, but the set on the "Pan America" was specially de-

veloped by the Bureau of Steam Engineering, Washington, D. C.

The equipment consists of a special radio audio-frequency amplifier, consisting of three stages of radio frequency, a rectifier, and two stages of audio-frequency amplification with a wave-length range from 150 to 30,000 meters. The vacuum tubes used in this amplifier are the Western Electric "peanut" type recently developed for the United States government.

How to Make a Two-Tube Superregenerator

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

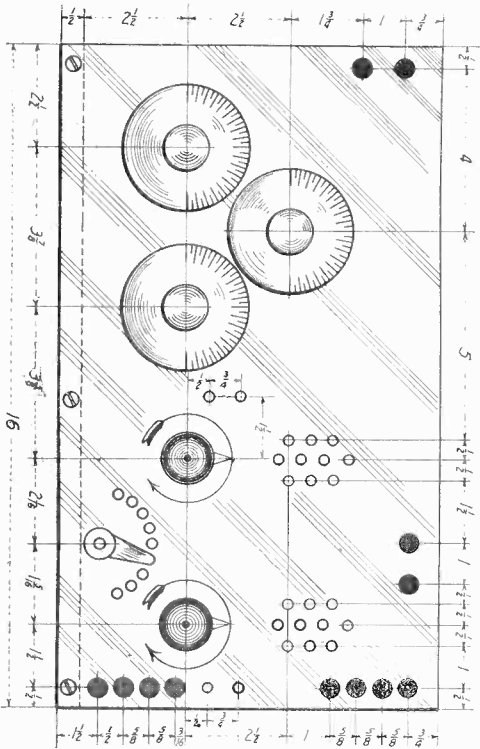


Figure 1—Front view of the set with proper dimensions and correct placing of the various instruments. Suggested by Frederick J. Rumford. Drawn by S. Newman.

WHEN Major Edwin H. Armstrong announced his new invention to the radio world, he certainly "started something," for everyone from the radio engineer to the beginner has been experimenting with Armstrong hook-ups. Being a dyed-in-the-wool experimenter, I followed suit. It is one of the most wonderful radio receptors of modern times. In this article I will describe, in as non-technical manner as possible, the construction of one of Major Armstrong's first hook-ups, using only two vacuum tubes. Most experimenters have become perplexed because of the many and various hook-ups of this particular instrument. The possibilities of this hook-up are wonderful—in fact, almost unbelievable. I have tried three tubes. However, I will confine this article to the two-tube set. The advantages of this set are as follows: It eliminates the necessity of an outdoor antenna and decreases the static and other interferences to a minimum. It also decreases the necessary number of vacuum tubes, two tubes doing the work which formerly took three and four tubes.

I secured excellent results with this outfit, using a loop antenna of ten turns of No. 16 bell wire on a

wooden frame of 40 inches. I heard KDKA, WJZ, and other stations several hundred miles distant. As for the local stations such as WGI, WAAJ, WAUF, Shepards and others, I heard them distinctly in a big room, with a piece of copper-wire screening about a foot square for a loop. Anyone thinking of building this set should study very carefully the different drawings before starting its construction. If the diagram is faithfully followed, the builder should have no trouble in operating it and should get the same satisfactory results.

Figure 1 shows the front view of the set with its proper dimensions, also the placings of the various instruments.

Figure 2 shows the back view of the panel and the method of mounting the vacuum tubes, condensers, vario-coupler and duo-lateral honeycomb coils of which there are two.

Figure 3 shows the proper hook-up for this particular set. This hook-up should be studied very carefully before the internal wiring is done, as it is very easy to make a mistake in wiring this set. If such a mistake should happen, it probably would take a considerable amount of time to discover the trouble.

The symbols on the diagram of Figure 3 are as follows: G, grid; P, plate; F, filament; P, primary of the vario-coupler; S, secondary of the vario-coupler; R, rheostats for the purpose of controlling the filaments of the vacuum tubes; P, phones. In

this particular instance the phones used were of 2,000 ohms resistance; C, a variable condenser of .001 mfd. capacity; C1, a variable condenser of .001 mfd. capacity; C2, a fixed condenser of .001 mfd. capacity or a phone condenser; L1, a 1,250-turn duo-lateral honeycomb coil; L2, a 1,500-turn duo-lateral honeycomb coil; 201 are the radiotron vacuum-tubes used in this circuit. A Bat., the usual 6-volt, 80-amperes filament battery; B Bat., a plate battery of 90 volts; B2, are, each, a small flashlight battery of 4½ volts each. These batteries are better known as the biasing batteries.

The parts necessary will cost:

2 radiotron vacuum-tubes UV-201,	\$6.50 each	\$13.00
2 vacuum-tube sockets,	\$1 each	2.00
2 rheostats,	\$1.50 each	3.00
2 variable condensers, .001 mfd.,	\$4.50 each	9.00
1 vario-coupler complete		6.00
12 binding posts, 10c. each		1.20
1 formica panel (16 x 9 x ¼), 3c. per sq. in.		4.32
1 duo-lateral coil, 1,250 turns, about		2.75
1 duo-lateral coil, 1,500 turns, about		3.50
1 switch assembly complete		1.50
1 soft wood base (16 x 11 x ½)		.50
1 bracket and shelf assembly		1.00
Screws and wire and accessories		1.00

\$48.77

These figures are as nearly correct as possible, but there may be a little change in them.

If the builder should desire, he may use, in place of the radiotron vacuum tubes, two Western Electric type L-tubes. Major Armstrong, in his actual experiments, used the Western Electric tubes. In all circumstances the tubes used must be of the hard amplifying type.

First, the builder must take his panel, mark off and drill for all necessary holes. After this is done, he should then give the panel a good rubbing with oil and any No. 0 sandpaper. If he so desires, he may

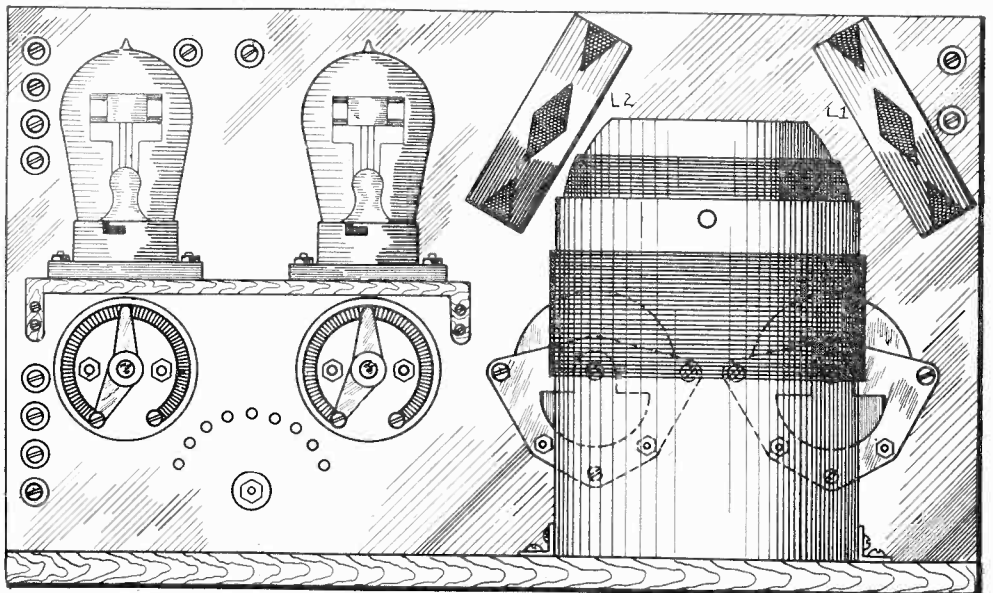


Figure 2—Rear view of the panel, showing the method of mounting the vacuum tubes, vario-coupler, and inductance or honeycomb coils. Suggested by Frederick J. Rumford. Drawn by S. Newman.

(Continued from preceding page)

leave the panel with the finish it had when it was purchased. After this, he is ready to mount the rheostats, switch, assembly, and binding posts. Mount the variable condensers on the back of the panel very carefully. The base is now taken and given a couple of good coats of shellac. After this is dry the panel is placed at one of its long edges and fastened there firmly by means of several brass wood screws. The bracket assembly for the shelf for the vacuum tubes is now ready to be made by means of a plain piece of wood of sufficient size to hold two vacuum-tubes. This, in turn, is fastened on the back of the panel by means of two small angle iron or brass brackets. These brackets are held firmly to the panel by means of four small brass machine-screws with nuts fastened on the back of the panel. After this bracket assembly has been mounted, the vacuum-tube sockets should be mounted upon the bracket assembly proper, we will proceed to mount the different parts and instruments on the base. The vario-coupler is mounted and the fixed phone-condenser is also mounted.

We will return to the panel. On the back of the panel, there must be mounted—as shown in Figures 2 and 3, the two duo-lateral honeycomb coils, as follows: L1 to the right of the vario-coupler exactly as shown in Figure 2, and L2 to the left of the vario-coupler exactly as shown in Figures 2 and 3. These coils are mounted by means of screws passing through the panel and fastened to the mounting on the coil proper. The reader will note that Figure 3 shows the method of mounting the vario-coupler 4½ inches from the panel on the base. The reason for doing this is that if the vario-coupler should be mounted any nearer it would interfere with the function and the rotation or motion of the two variable condensers which are mounted lower down on the panel, one on each side of the vario-coupler.

The vario-coupler used in this set I described in an article in Radio World, No. 5, dated April 29. The leads from the vario-coupler may have to be lengthened, as will be noted in Figure 1. The contacts connecting the different taps of the vario-coupler were placed between the two rheostats lower down on the panel. The reason for doing this was that there was not sufficient room to place them at the exact front of the vario-coupler. It will be necessary also to withdraw the shaft of the vario-coupler and replace it with a longer one. The vario-coupler is fastened on the base by two little angle-irons with

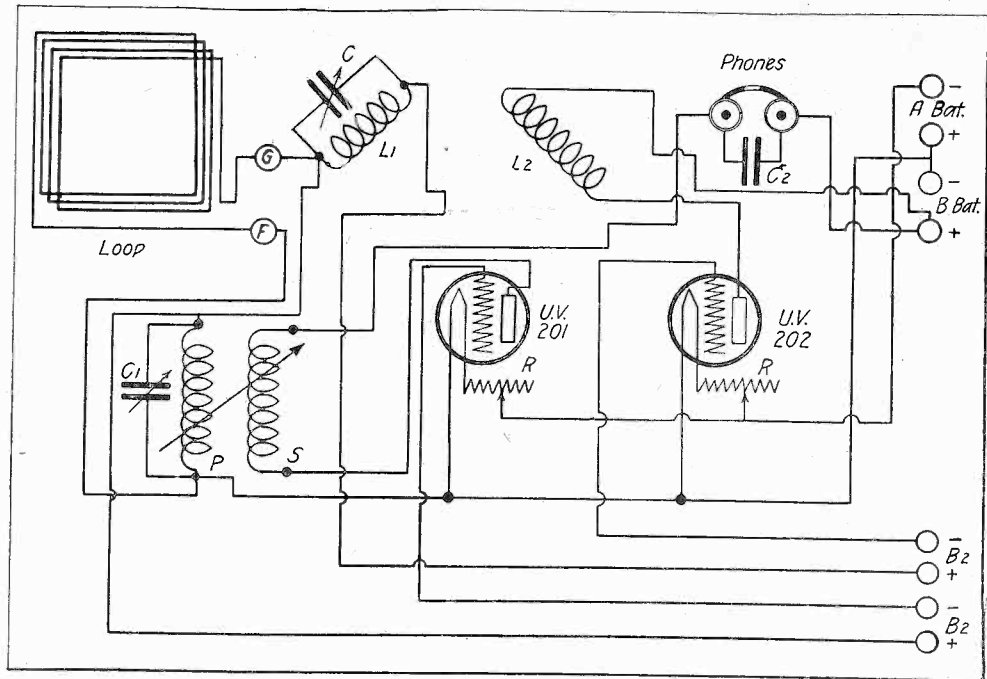


Figure 3—Schematic diagram of the proper hook-up for the set described in this article. Suggested by Frederick J. Rumford. Drawn by S. Newman.

screws which, in turn, fasten to the vario-coupler form and to the wood base respectively. When this is done, the three-inch dials are then mounted at the front of the panel, one each for the condensers and one for the vario-coupler.

Next, everything must be gone over thoroughly to make sure that the different instruments and parts are in their proper places. When this is done the builder is ready to go on; but he should study the internal wiring-diagram (see Figure 4) thoroughly before he even thinks of starting the wiring of this set, as the least mistake may mean a setback of considerable time to discover the mistake which will be very hard to find in an outfit of this kind.

After this has been done, the internal wiring should follow, with No. 18 or 20 bell wire, rubber covered. A wire will run from the negative side of the A battery, or filament battery, and connect respectively with each of the rheostats which, in turn, connect with one side of each of the two vacuum-tube filaments. There is a short piece of wire used as a jumper wire from the positive of the A battery to the negative of the B battery. From the positive side of the A battery, or from the jumper wire in question, there is a wire which connects with each of the remaining sides of the filaments of the two vacuum tubes and a wire, in turn, connects with the positive side of the first vacuum-tube to the lower connection of the primary of the vario-coupler. There is, also, another wire which connects with the lower side of the primary of the vario-coupler which, in turn, connects with the binding post marked F.

Then the upper connection of the primary of the vario-coupler con-

nects, respectively, as follows: One wire to the positive side of the lower biasing-battery and another wire to one side of the duo-lateral honeycomb coil, L1, which, in turn, connects with the binding post marked G. The remaining side of the duo-lateral coil, L1, is connected to the positive side of the upper biasing-battery. The condenser on the left or the one marked C, is connected across the posts of the duo-lateral coil, L1. This condenser is designated by the letter C. The condenser, C1, is connected across the vario-coupler primary posts. The lower side of the vario-coupler secondary is connected direct with the first vacuum-tubes plate. The upper connections are made to one side of the phones and the other side connects with the positive of the B battery. The phones have a fixed condenser of .001 mfd. capacity shunted across its posts. There is a connection from the duo-lateral honeycomb coil, L2, direct with the plate of the second vacuum tube and the remaining side is connected with the positive side of the B battery. There is a connection from the grid of the first vacuum-tube to the negative side of the lower biasing-battery. There is, also, a connection from the grid of the second vacuum-tube to the negative side of the upper biasing-battery. This completes the internal wiring.

It will be necessary only to connect in the batteries, phones, and the loop antenna for the reception of signals. It will be necessary also to have the coils of the vario-coupler placed in inductive relation to each other, and the manipulation of the various condensers and rheostats for the proper reception of signals. The writer feels sure that if his instructions are carried out faithfully, the builder should have no difficulty in making his set operate.

World-Wide Radio Reports Indicate Great Progress

THE need for radio apparatus in foreign countries, stretching practically around the world, and the advance of this modern phase of communication in both commercial and amateur lines is, perhaps, best recorded in the many radiograms, cables, and letters received by the United States Department of Commerce. A steady stream of communications, informative and interrogative, pours into the department from many government officials stationed in foreign lands where radio is beginning to have a status not unlike its vogue in this country.

Recently considerable interest has been manifest in reports from England, France, Italy, Sweden, Japan, China, India, Mexico and the West Indies. Through all of the communications run indications of further expansion and development in some instances indicating great possibilities for the American radio manufacturers and exporters of radio apparatus and equipment, although foreign-made sets are practically taboo in some countries. American exports in radio are growing constantly, however; an analysis of the June shipments shows that apparatus was shipped to twenty-eight countries and totaled approximately a million pounds in bulk.

England Licenses Receiving Stations

In England the fan is apparently badly handicapped, especially when the regulations are compared to the practice in this country. Amateur licenses for transmitting stations are not granted, but licenses for receiving sets are necessary. The latter are granted only to British subjects for bona fide experimental purposes at a charge of ten shillings for nine months. The postmaster-general has charge of radio licensing and his restrictions and requirements would be considered unnecessarily severe in this country. No boys or girls under twenty-one are permitted to take out licenses to receive, receiving stations must pass inspection, tubes capable of transmitting cannot be used for receiving and special applications certified to by responsible citizens must be filed before licenses are issued. Certain exceptions are made in cases of well-known foreign scientists, but their apparatus will probably be limited in range of reception and restricted to those of British make.

French Radio Weather Service

France is planning a nation-wide system of informing farmers of approaching weather conditions by radio, according to a recent report. Fore-

By Carl H. Butman

casts of the probable atmospheric changes and weather variations for the ensuing eighteen hours will be broadcast three times a day from the Eiffel Tower to communities within a radius of 300 miles. By the use of regional radio stations it is also planned to relay meteorological data. It is also planned to install simple radio receiving sets in designated public or private buildings.

Japanese Radio and Cable Operations

Japan proposes to come to an agreement with the Chinese government in regard to the disposition of the radio stations at Tsingtau and Tsinan and to arrange for the continued operation of the submarine cables between Tsingtau and Sasebo, which were part of the communication system developed and administered by the Germans but taken over by the Japanese during the war.

The proposed changes in operation of cables and radio will be in accordance with the provision of the recent treaty, which covered the restoration of Chinese communications to the Chinese government in a large measure. That government is disposed to cooperate with private foreign capital in the development of the cable and radio systems in China, but the sense of the treaty provision is to prohibit the handling of commercial telegraph business by any means from China through the agencies of foreign governments. The American radio stations at Peking and Shanghai will eventually be closed to commercial traffic, although permitted to handle American and Chinese government messages. Plans are under way for the establishment of a high-power commercial radio station by an American company.

Wireless Telephony for Kobe Harbor

In order to connect the City of Kobe, Japan, with ships by means of the ordinary existing telephone and the wireless apparatus provided on board the large steamers, a company has been formed at Kobe, with a capital of about \$75,000. An exchange office will be established, and it is expected that smaller vessels will be able to enjoy the benefits of this new system as rapidly as they can provide themselves with wireless apparatus.

Mexican Lighthouses to Have Wireless

The installation of small wireless outfits in all lighthouses of the Mexican Department of Communications is reported in the local press. Two sets are being supplied on trial, after which, if they prove satisfactory, all lighthouses

will be similarly equipped, Charge d'Affaires George T. Summerlin, Mexico City, reports.

Radio Advancing in Sweden

Owing to government regulations in Sweden, nothing has been done so far to stimulate popular interest in amateur radiotelephony, according to William L. Peck of the American consulate, Stockholm. The use of radio apparatus is controlled by the Royal Telegraph Board. Private firms may use it under license, but they have not availed themselves of this right.

The single Swedish firm manufacturing radio apparatus and parts has supplied considerable quantities to the Swedish government. The factory is comparatively small, but arrangements have been made for its expansion should circumstances warrant.

The apparatus imported into Sweden is mostly of German make.

Radio Helps Troops in India

The Madras government, India, has just ordered seven radio sets from the Marconi Company of London for use in the Malabar area of the presidency, according to Vice-Consul H. A. Doolittle.

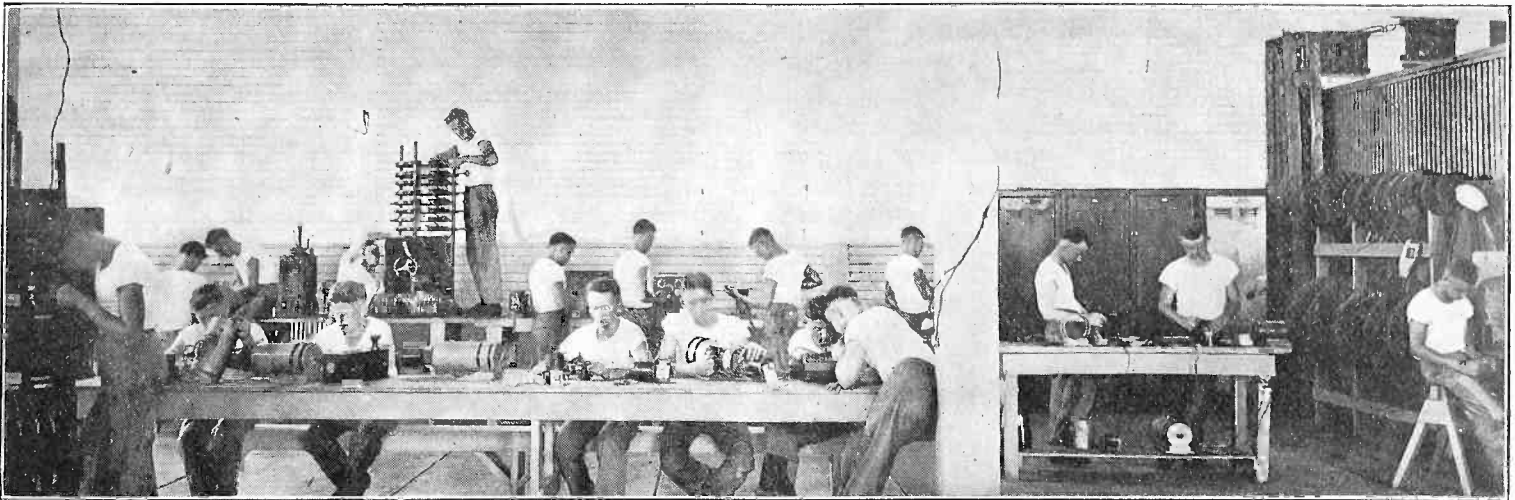
This comes about logically as an outgrowth of the Moplah rebellion in that region, lasting from August to December, 1921, in its main phase. The Malabar section, heavily wooded and hilly, even mountainous, is traversed only by footpaths and a few post roads. The work of the troops was greatly hindered by the destruction of all means of communication, telegraphic and postal, by the rebels, a number of whom were trained soldiers who knew the value of such hampering tactics. When the lines were promptly repaired they were again torn down. No amount of watching prevented their being destroyed by the rebels as fast as repaired.

Six armed camps, constructed at various strategic points, each with a company of police, have been provided with duplex-telephone installation sets. A charging plant is also being imported to be installed under the supervision of one of Marconi's experts. The aerial system employed will consist of two masts 30 feet high, 200 feet apart, made from local material. An effective range, depending on conditions, from 30 to 50 miles, is hoped for; sufficient for communication between the camps.

In an effort to push the employment of stations throughout India, the Marconi Company is arranging for a series of demonstrations among the various native states in the near future.

Aircraft Radiomen in the Making

By Washington R. Service



The United States Navy's Aircraft School of Instruction

WASHINGTON, D. C.—A new type of radio expert has just been designated. "Aircraft Radiomen" are now being developed by the Naval Bureau of Aeronautics at Pensacola, Florida, and the Army Air Service at Rantoul, Illinois.

During the past year, about sixty radio operators for aviation work were trained by the Naval Air Service at Pensacola, and assigned to active flying duty where they are doing excellent work as aerial radio operators.

Promising students in radio are selected from the classes at the Naval Great Lakes Training Station and transferred to the Aircraft Radio School at the Naval Air Station, Pensacola, Florida. On arrival, these students are put into classes varying from twelve to forty for instruction in ground schoolwork where they learn the same elemental principles of radio and aviation taught to the student aviators under the same instructors.

With the ground work of their aerial and radio education completed, they are sent to the radio laboratory for special communication instruction and practical work in overhauling and testing of different types of radio apparatus. Under the direction of competent instructors, they learn how to "shoot trouble," disassemble, repair and assemble receivers and transmitters, rewind armatures and transformers, and test the finished radio apparatus. Later the students are assigned to radio compass stations for instruction in the use and maintenance of direction finders as well as in the methods of taking bearings. Finally, a week is spent in the radio station for experience and practice in procedure and standing watch. During the last three weeks of the twelve-week instruction course they are assigned to one of the operating air squadrons for practical instruc-

tion and experience in the installation, upkeep and operation of aircraft radio sets in all available types of seaplanes.

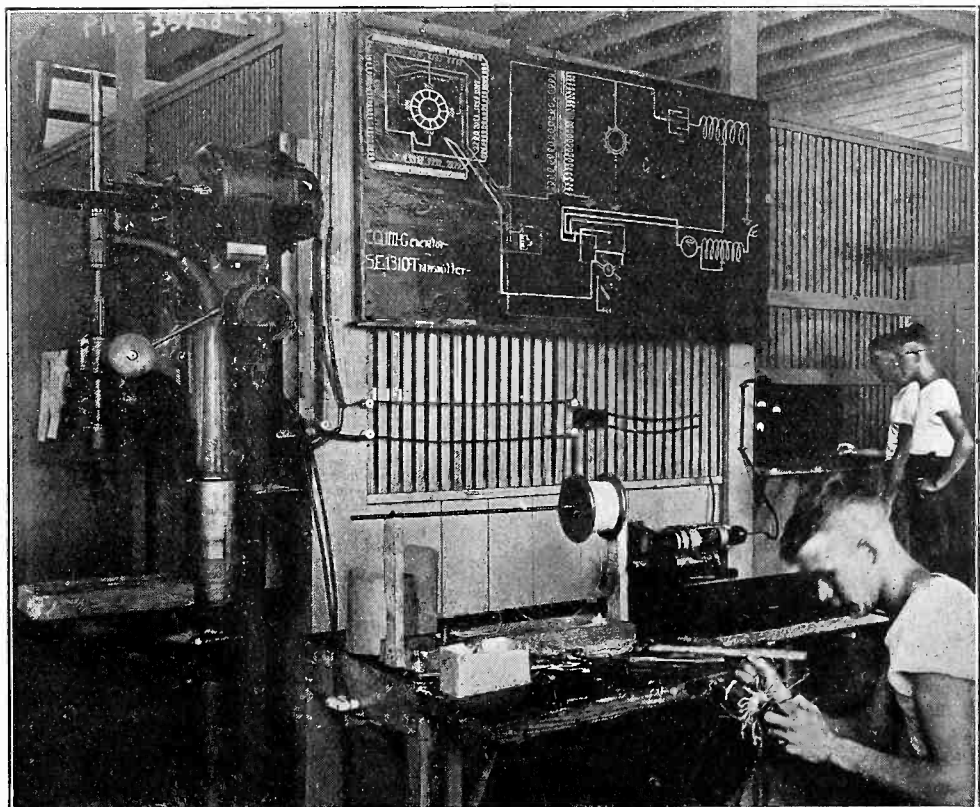
Following twelve weeks of rigid training and instruction, the radioman is ready for transfer to an operating air station, or squadron of airplanes, where he finds that he fits into the scheme of things very handily, although he is a newcomer in naval aviation.

The policy of the school prevents the turning out of a great number of radiomen, it being determined to graduate only as many qualified radiomen suited for aircraft work as possible. For this reason about 37 per cent. of the men reporting for instruction at the station were returned to the general naval service as not qualified for air-

craft radio work before the course is completed, but 63 per cent. have qualified and gone to stations.

The Naval School schedule is as follows:

Week	Subjects Pursued
1	Code, aircraft nomenclature, radio regulations and procedure.
2	Code, theory of transmitter.
3	Code, theory of receiver.
4	Types and uses of aircraft apparatus.
5	Interphones, sizes and types of wire used.
6	Spark transmitter and all aircraft types.
7	Tube transmitter and all aircraft types.
8	Aircraft receivers, all types.
9	Radio compass, taking 100 practice bearings.
10 to 12	Seaplane installation and operations. Practical station work.



Laboratory and Instruments Used in the Study of Applying Radio to Airplanes

Methods of Amplifying Radio Signals

By B. Bradbury, R. E.

WHEN receiving very weak radio signals from distant stations, amplification of the audible tones as heard in the telephone receivers is of little or no benefit since the strength of tube noises, static, or other interference is increased in greater proportion, than the signal strength. Under these conditions, the most satisfactory signals frequently will be obtained directly in the output from the detector without additional amplification, since the signal, although weaker, is much more distinct in the telephones than when amplified.

To secure a louder signal with good quality, or to receive more distant stations, some other means of amplification must be adopted. This other means is the amplification of the signal frequency as it is received on the antenna, before it reaches the detector. Detector efficiency decreases with a decrease in the energy received, so that if we can increase this energy before it reaches the detector, better efficiency will certainly follow.

One of the most common methods of obtaining radio-frequency amplification is the utilization of regeneration in the detector tube itself. Since perfect rectification does not take place in the

detector, a certain amount of radio frequency flows in its plate circuit, so that by coupling this circuit back to the grid, or input of the tube, the amplified signal-frequency is made to reenergize the grid and cause a still greater change in the variations of the plate current.

Regeneration may be accomplished by means of capacitive or inductive back-coupling, or a combination of both. Short wave receivers are often constructed with a variable inductance in the plate circuit which can be tuned to the signal frequency. Sufficient voltage is thus built up across the plate circuit to feed a small amount of energy back to the grid through the capacity between the grid and plate within the tube itself. For long wave-lengths the tube capacity becomes insufficient for good regeneration, and some additional means must be provided, such as inductive coupling between the grid and plate circuits. This consists of placing a coil of wire in the plate circuit and coupling it back to the input or grid circuit of the tube.

Another method of obtaining radio-frequency amplification is to use one or more vacuum tubes ahead of the detector tube with suitable coupling between them to transfer the energy from one tube to the next at the signal fre-

quency. As with audio-frequency, the coupling between tubes may be resistances, inductances or transformers, but they cannot have the same values as in audio-frequency coupling. Just as it is somewhat of a problem to build a transformer which will transfer signal voltages uniformly over a wide range of audio tones, so is it difficult to build transformers which will operate well over a broad range of radio frequencies. Since there is such a great difference in the frequencies of the various wave-lengths in use, it is necessary to change transformers to receive all of the different classes of communication.

At short wave-lengths, amplification is accompanied by more or less regeneration through the grid and plate capacities of the tubes, as mentioned in connection with detector regeneration. For some wave-lengths the back coupling is sufficient to cause oscillations in the amplifier tubes, and to overcome this tendency some special means must be provided, such as an adjustable grid voltage which may be made positive and thus secure stable operation.

Resistance coupling has the disadvantage of letting through tube noises and other audible frequencies, so that it is sometimes difficult to use it with advantage in addition to the regular audio stages following the detector. It has, however, the advantage of being effective over a wide range of frequencies and therefore, will give uniform amplification over a broader wave-length band than inductive coupling.

Inductive or transformer coupling, as previously mentioned, will transfer energy at a limited range of frequencies. For this reason, inductances and transformers made for use in the amplification of the high frequencies of short wave-lengths will not transfer tube noises or disturbances which are limited to audible frequencies. Several stages may thus be connected in cascade to amplify the signal without distortion before it reaches the detector. Audio amplification may then be added as desired to obtain whatever volume of sound is found necessary.

Three or four stages of radio-frequency amplification make it possible to use a loop antenna with good results. For receiving broadcast signals, a loop made by winding ten turns of wire, spaced three-eighths of an inch apart on a frame three feet square, is about the right size to use. There are transformers on the market which will give good signals in conjunction with a loop and the construction of such a set will produce very gratifying results.

WJZ Announcer in His Specially Equipped Room



(C. Kadel & Herbert News Service.)

Behold! The voice that is familiar to thousands of listeners who tune in for WJZ, Newark, N. J. This is a photograph of Mr. T. H. Cowan, whose pleasing tones daily announce, "the next selection"—in his specially equipped radio room at the popular Westinghouse station. To the right of Mr. Cowan is the transmitter, mounted on its pedestal, through which instrumental music, or the human voice is received, or transmitted, through the powerful tube-transmitter installed in another room of this station.

Voice Distortion in Vacuum-Tube Receivers

By W. A. Dickson

VOICE distortion is encountered by most every experimenter who designs his own receiving apparatus, and although perfect reproduction cannot be made possible with present-day equipment, a great deal of unnecessary distortion may be eliminated by getting down to the fundamental causes and applying the proper remedy. The most common causes may be remedied usually without much difficulty.

Where cascade amplification is employed, it is necessary to have each tube operating on the proper point of its characteristic curve. This part of the curve is usually the flat portion; and to make sure that the tube is operating here, it is necessary to always maintain a sufficiently large negative potential on the grid. This may be accomplished by employing the correct values of filament current and plate voltage. An A battery potentiometer, or a small negative grid battery, provides two sure methods of obtaining the normal grid-potential.

In using a regenerative receiver, distortion is often caused by employing too much regeneration; that is, operating the set above the point where oscillations begin. This causes a mushy reproduction. By sacrificing audibility, distortion may be eliminated greatly.

Another of the most frequent causes of distortion in amplifying circuits is a poorly designed transformer. It may be plainly seen that there is but one remedy for this cause—a correctly designed transformer.

Distortion might be caused by using a plate voltage larger than that for which the tube is designed. A good plan is to use transmitting tubes in place of the ordinary amplifying tubes. This would allow large plate-voltages to be employed without danger of overloading. A greater ratio of amplification may be secured by this plan. It also cuts down the number of stages necessary for the desired volume, as more than two stages of audio-frequency amplification is inadvisable.

Trouble is often encountered with telephone receivers, but it is up to the operator to select a pair that is correctly designed. Where a loud-speaker is employed, using an ordinary receiver attached to a horn, only a certain degree of audibility may be expected. Beyond this, the receiver jams owing to the large amount of current.

Reproduction from such a type of loud-speaker is inherently prone to cause a certain amount of distortion. This is due to the resonance effects in

the diaphragm or in the horn itself. Where large volume is desired with as little distortion as possible, practically the only method is to use a receiver of the electrodynamic type.

Although not classed exactly under voice distortion, "howling" is equally disastrous to a radiophone receiver. Care must be taken in designing the

receiver and amplifier, to eliminate as much as possible by having the connecting wires running parallel or close to one another. The grid lead to the detector tube is, probably, the most sensitive and should always be as short as possible. In mounting the transformers, place them at right angles to each other. If their magnetic fields are both in the same direction, an undesired feed-back will follow and the result will be a continuous howl.

In Washington, D. C., Stolen Motor-Cars Are Located by Radio



(C. International Newsreel Photo.)

Radio amateurs who have just broken the ice and purchased a radio receiving set do not realize the excitement they have missed during the past two years. No doubt, many of the old-timers who have pushed the old "stone crushers," know the secret which may divulge how some motor-car thieves were apprehended. During the night, while the world is sleeping, a little one-half kilowatt radio-spark set was started up in a room at Police Headquarters, New York, about 8PX pronto. In an hour this "little old set" told more secrets regarding police affairs than any newspaper ever hoped to print. Here is the dope: Every amateur who had a receiving set could "get in," provided he could copy at a speed of ten words a minute. Of course, this was not sufficiently fast for anyone but fast enough to indicate that some code experience is necessary. At first, the motor number is sent, then the make of the car, and, finally, the plate license number. Every amateur within a radius of two hundred miles, who may copy this report, will report it to his nearest police station. Then the fun begins! Every policeman within this circular range has a list of the stolen cars, along with important information regarding other crimes. A net is formed, and at once the net begins to close in. It isn't long before fifty per cent. of the stolen cars are recovered. To-day, this same method of apprehension is in operation in Washington, D. C. The above photograph shows Clifford Grant, chief of detectives, of Washington, D. C., sending, by radio, the report of a stolen car. Instead of using code, he talks clearly and slowly, and every word he utters registers indelibly.

Radio World's Hall of Fame



(C. Kadel and Herbert)

Professor J. A. Fleming

Professor Fleming is the leading radiotrician of Great Britain. He helped to make the generating apparatus for transmission more powerful and reliable. He furnished a more perfect-working, sensitive detector for high-frequency radio currents. He is the inventor of the Fleming valve, the forerunner of the vacuum tube. In perfecting this, Professor Fleming used some Edison bulbs having the extra electrode inside, and when working with Senator Marconi he got the idea of using this effect to permit the detection of high-frequency currents in a receiving aerial. Using a coil for a transmitter, and another for receiver, he utilized one of these bulbs with a direct-current galvanometer in series to see if the direct current instrument would indicate. His first tests were successful and greatly added to his fame as a radio experimenter. The likeness of Professor Fleming published on this page is an enlargement of a snap-shot made in his laboratory in London.

The Radio Primer

A Weekly A. B. C. of Radio for the Beginner, in which Elementary Facts and Principles Are Fully and Tersely Explained and all Words and Terms Used by Amateurs and Experts Defined

The Beginner's Catechism

HOW should a set be tuned that has a loose-coupler and a crystal?

To tune a set that has a loose-coupler as a means of inductance and tuning device, set the coupling as tight as possible, tune in the desired signal with the primary, or outside, inductance, and then tune in with the secondary, or inner, inductance until you have the greatest strength of signals. Now, loosen the coupling between these two inductances until the signals are just audible. Start to retune the set with the primary coil until the strongest signals are obtained at the present setting of the coupling. At the end, tighten coupling gradually until you get maximum clarity. This will give you minimum of QRM, or interference.

* * *

Explain how a regenerative set should be tuned for good signals, using a grid variometer and plate variometer with vario-coupler.

Set the coupling of the vario-coupler at maximum degree; that is, with the primary and secondary as close to each other as possible. Now start tuning with the switch knob on both primary and secondary. Also tune with the grid variometer until the greatest signal-strength is obtained. Turn in plate variometer, which was at zero, until the greatest amount of signal strength is heard without distortion. It will be noticed that when tuning with the grid variometer a loud squeal is heard in phones. It will be noticed that this squeal starts at a very high frequency and as the variometer is turned, it decreases until it reaches an inaudible point. Increase again to a point where it becomes inaudible again. When no signals are heard between the two howls you have touched the point where you should hear the voice or music. It may be all Greek to the

By Edward Linwood

novice, but if a few attempts are made to tune in this manner, its simplicity will be seen. It must be remembered, first, to tune with the grid variometer; next tune with the plate variometer for regeneration. Make sure your tube is burning brightly for it to oscillate.

* * *

What is the principal idea of tuning?

The idea is to get the receiving tuner, or set, in resonance with the transmitting set so that the wave lengths of both stations are the same. For instance, if a certain broadcasting station is emitting a wave length of 360 meters, that station must employ in its circuit a given amount of inductance and capacity. We, therefore, must see that the same amount of capacity and inductance is used in the receiver in order to receive the 360-meter wave length. In order to get these different wave lengths we must employ the method of tuning.

* * *

Is it advisable to attempt to rejuvenate a B battery by opening the case and soaking it with water or vinegar?

No. This may work well with buzzer or bell operation where current or voltage is used intermittently, but in connection with radio, it is out of the question.

* * *

In building a set at home, is it advisable to consider making amplifying transformers?

No; because of the many uncertainties which must enter into such designs. You have no way to know or measure the permeability of iron. You are not certain that the core is correctly proportioned, and the best methods of interconnecting the coils of primary and secondary are always in doubt. The average amateur will have sufficient trouble in maintaining a cas-

cade amplifier-set in perfect operation with purchased transformers, without adding to his woes with poorly assembled, inefficiently designed apparatus.

* * *

What are some types of tuning coils?

Beginning with the simplest and working up to the latest and least used types, they are: single slide, double slide, switch controlled, loose coupler, vario-coupler, variometer, and honey-comb or duo-lateral.

* * *

Describe the single-slide tuning coil?

The single-slide tuning coil is the most elementary type and supplies the least range of selectivity. It consists of a tube with 50 or more turns of closely spaced copper magnet-wire. One end of the coil is connected to aerial and the other end to the ground. The slider—a contact that slides across the surface of the wires on a bare path scraped through the insulation—is connected to the detector and the lower end of the coil. The end which is connected to the ground is also connected to the other side of the detector.

* * *

Explain the audio-frequency transformer and what it does in a radio circuit?

The audio-frequency transformer is simply a small iron-core transformer that has a primary coil and a secondary coil wound on it. As iron tends to choke off the high-frequency currents, the first vacuum tube must be the detector and the succeeding vacuum tubes are the audio-frequency amplifiers. Usually the audio-frequency transformers are connected between the detector-tube, plate side and the grid of the next tube. These can be wired in this manner for any successive stages.

Don'ts for Vacuum-Tube Users

DON'T use excessive plate-voltage on power tubes. Remember that with excessive plate-voltage the life of the tube is shortened.

DON'T expect to get great results if an amplifier tube is used as a detector tube.

DON'T make the fatal error of connecting the plate-battery terminals to the filament terminals of the tube. Look carefully over the connections.

DON'T expect results if a loud-speaker is connected to a crystal set.

DON'T alternate any wiring while filaments of tube are in operation. A simple error in transferring a connection may prove fatal to your tubes.

DON'T burn out your tube through neglect and then expect your dealer to replace it.

DON'T make your tubes secure in the sockets until you are sure that all rheostats are turned off. Be sure of all connections. Go over your wiring carefully.

DON'T handle vacuum tubes roughly. You are likely to injure the elements contained in the tube.

DON'T apply too much voltage to plates of amplifiers. Usually the manufacturers state the required voltage to be used on the plate.

DON'T forget that vacuum tubes are expensive.

DON'T connect batteries up wrong. It may spell disaster.

DON'T search for the greatest volume of sound. Generally tubes are turned to a greater brilliancy for this. It isn't necessary.

Charging a Battery—from a French Radioist's Point of View

By Marius Thouvais

Honorable Secretary of the French Radio Club de Lologue

MANY amateurs have been hindered in their efforts to produce the 4- or 6-volt current to feed the filament of their receiving tubes. It is well known that primary cells are not suitable for this purpose, the best of this type is the bichromate battery. It is the only one which gives a large enough current to light the filaments brilliantly, but the current thus produced is not in any way sufficiently steady to get good results.

The usual type of receiving bulb takes from $\frac{1}{2}$ to 1 ampere, therefore a Lelanche battery cannot give a sufficiently heavy current.

With either the new Westinghouse detector tube, which requires a potential of but 1.1 volt drawing 0.2 amp. (less than $\frac{1}{4}$ watt) or the new French low consumption tube (4 volts 0.15 to 0.2 amp.) which were recently placed on the market, an attempt may be made with a large Lelanche sack-battery; but here, also, the current is not steady and, therefore, the storage battery is universally adopted as the best solution.

For the amateur who cannot use the lighting supply, there is a choice between two suitable primary charging batteries: The bichromate cell and the "Daniel" Sulphate-of-Copper cell. The former gives a heavy current and can charge up an accumulator in a relatively short time. A 3-cell battery gives 6 volts and will charge up a 4-volt accumulator. If the filaments take 6 volts, a 4 cell bichromate battery giving 8 volts will charge the 6-volt storage battery which is usually adopted with most American tubes. These bichromate batteries were used extensively to charge ignition accumulators before the World War; but today the bichromate is too costly—much more so than sulphate of copper—and they are tedious in the extreme to manage on account of dismantling, amalgamation of the zinc elements with mercury, preparation of solution with warm water, etc.

Sulphite of Copper cells are much more suitable for the purpose that we have in view. The voltage they give is much weaker—about 1 volt per cell instead of 2; and, therefore, twice the number of cells is needed.

That is to say, 6 cells for a 4-volt, and 8 or 9 for a 6-volt accumulator. But the current produced by such cells is quite steady; it is produced for a long period, week after week, without dismantling. It also eliminates the necessity of preparing another new solution. In order to reach a sufficient charging rate, cells large enough must be chosen. Glass jars 8 inches high by $4\frac{1}{2}$ inches in diameter, with porous pots 8 inches to $8\frac{1}{2}$ inches high by $2\frac{1}{2}$ inches wide, are very suitable. As a steady current is a necessity, it is preferable to put the zinc elements into the porous pots and the copper foil into the outer glass jars, so as to have a lower resistance in the element itself. The copper foil which surrounds the porous pot must be kept as near as possible to it without actually touching. Further, instead of using pure water in the jars, it is well to add a small quantity of salt, as salt water is a better conductor of electricity than any other solution and the current produced is much heavier. It will be useful to verify the density of the salt solution as the same degree must be kept in the complete cell, in the porous pots as well as in the glass jars, in order to prevent any unwarranted current passing from one liquid to another.

When the 6 or 8 elements—according to the desired voltage—are connected up in series and sulphate of copper has been poured into the glass jars, the battery already gives a steady current and the accumulators can be immediately put on charge. The current remains steady as long as there is zinc and sulphate of copper in the cells, and all that is needed is to add sulphate when

the solution which surrounds the copper foil has lost its blue color; also, to replace the zincs where they are eaten away. After some weeks, the density of the solutions will have increased too much. Then it is desirable to remove a little of the concentrated liquid and replace it with a little pure water.

The accumulators remain continuously on charge, day and night. An ammeter (reading 0.1 amp. to 0.3 amp.) will be found very useful to show the amount of current which is passing through the battery. A reliable, accurate, and inexpensive ammeter may be made easily, for a few cents, with a magnetic compass.

First: Take a small piece of dry wood, 6 inches long by 4 inches, fit a terminal at each end and the compass in the center. The greater the diameter of the compass dial the better as "readers" will then be more accurate. Drill two small holes each side of the north-and-south line on the wooden base and pass through them a heavy gauge insulated wire which must make a complete loop around the north-and-south line. Both ends of the wire are then connected to the terminals and the accurate ammeter is ready! However, with this simple device, it is necessary that the north-and-south line of the dial point to the north and the compass box must necessarily be pointed so before trying it.

After the apparatus is jointed and firmly fixed and current passing through the loop of wire causes the needle to deviate, the deviation to some extent is proportional to the intensity of the current. If desired the instrument may be compared with an accurate ammeter and calibrated against it. Inserted in series between the charging battery and the accumulators, it will tell us all we want to know; the charging rate.

A charging set built on the above lines has been in use for over two years at my station, and the Daniel battery gives me all the current I want to feed up either a single audion receiver of a three-stage amplifier. Even on occasions, I have found my accumulators overloaded and have had to switch off my battery.

The Radioman's Love Song

By John Webster

I AM high on the breast of the swelling sea,
And your voice comes from faraway home to me;
It comes clear and true from the weird above—
And you sing of love—you sing of love.

I START—I look! But you are not near!
I wonder—I ask: Is it you I hear?
Yes—'tis you!—though your voice comes o'er leagues of sea—
For you sing to me—you sing to me!

Working Diagrams for Beginners

By Fred. Chas. Ehlert

(See hook-ups on front cover of this number)

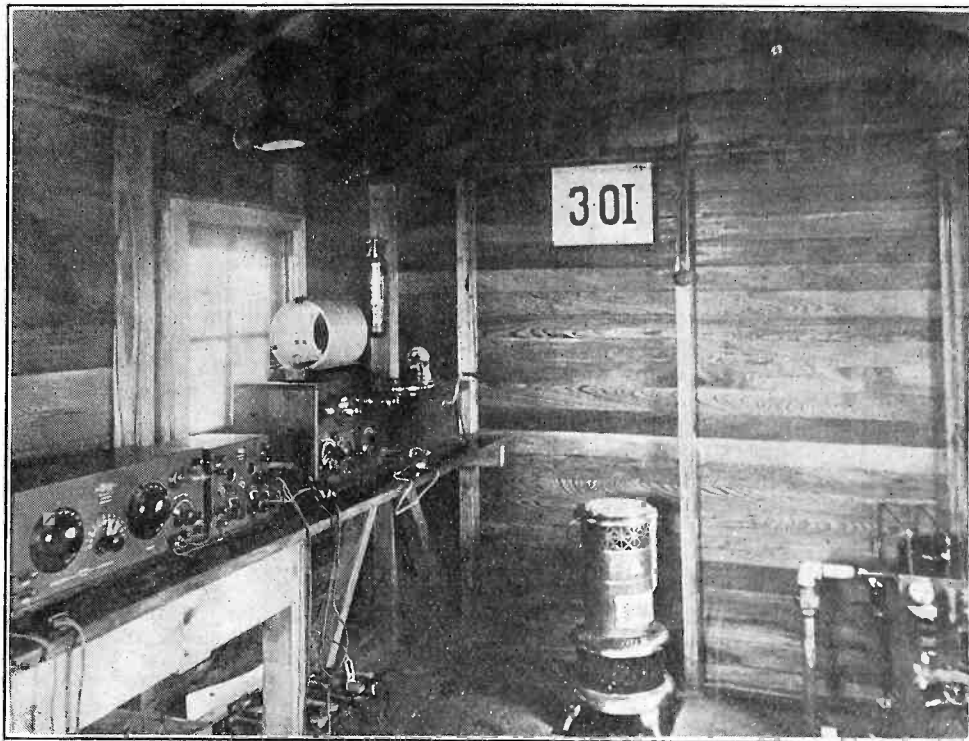
THOSE "wireless hounds" who hark back to the early days when —QSA— was merely three letters of the alphabet know that a regenerative set was seldom spoken of. In fact, the only standby in those days was the type of tuning coil which carried one or two sliders and its crystal detector. Crystal detectors were of the carborundum, or galena type, each operator carrying his own little piece of material which he would not sell "for all the gold in the world." Great changes have taken place since then in the development of the vacuum tube and the regenerative set. The regenerative set I shall describe in this article shows two circuits helpful to any amateur interested in regeneration. It must be understood that these circuits apply only to sets employing the vacuum tube as means of detection, as regeneration can only be used with vacuum types. Crystals cannot be used with regenerative sets.

The simple regenerative-set illustrated consists of a single coil, a variable condenser, a fixed phone-condenser, V-T detector and its batteries. The tickler coil, which is also shown, should be placed in an inductive relation to the single coil. If it is the desire of the operator to add one or more stages of amplification, the primary of the amplifying transformer should be connected at the two points of the telephones and the phones placed in the same position *after* the next tube.

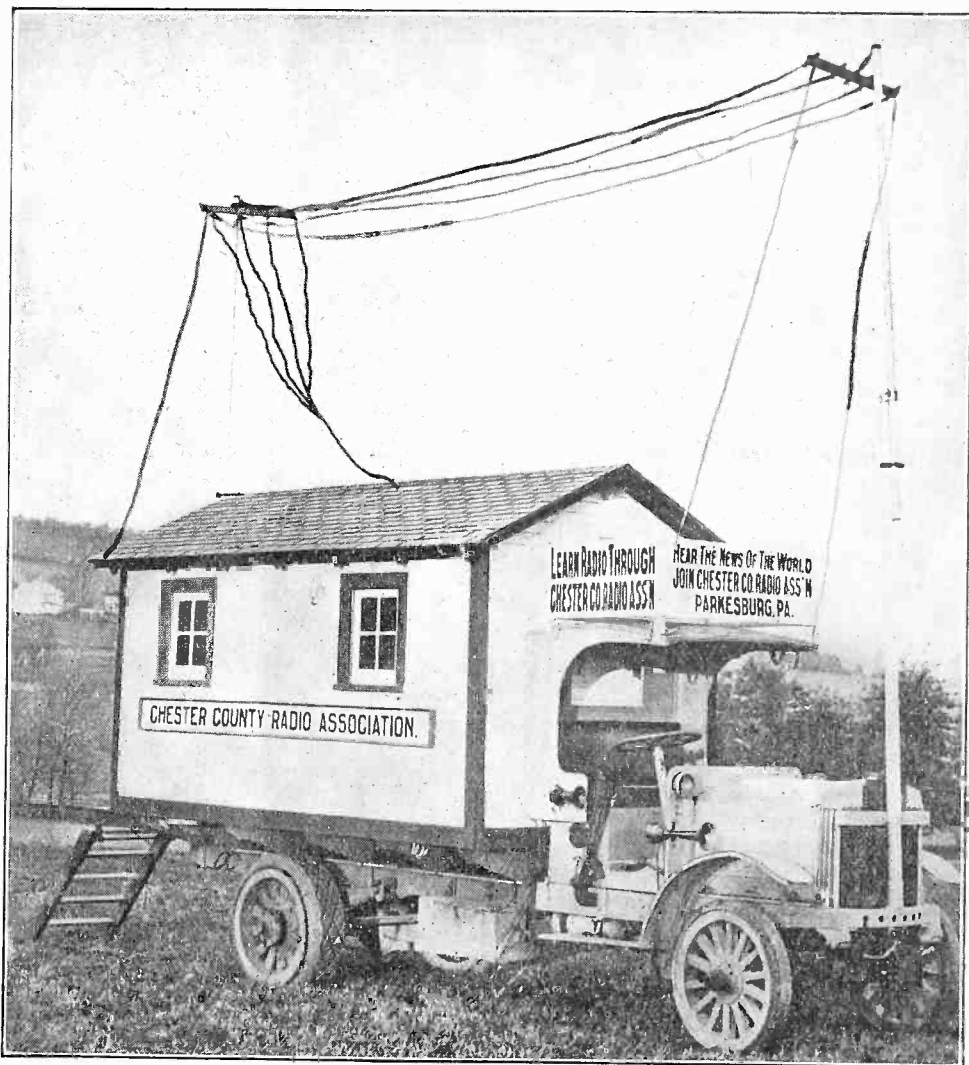
A second hook-up is shown in which the tickler coil is placed in inductive relation. It shows also how the magnetic waves cut the primary coil and the tickler coil. An ideal antenna for either of these hook-ups—for the reception of music from broadcasting stations operating on 360 meters—should consist of a single-aerial, copper wire, about 100 feet in length. The ground connection being made to the cold water pipes or radiator.

In adjusting the receiver the radio fan should tune his set and adjust the feed-back, or "tickler coil," at the same time. When the desired signals are heard, the tuner should be carefully adjusted for maximum signal strength, and the "tickler coil" should be carefully brought up to the point below where "howling" occurs. If the howling starts, the tickler should be reduced rapidly to a position below the critical point.

Radio Station Travels from Town to Town



(Both photographs C. Kadel & Herbert News Service.)



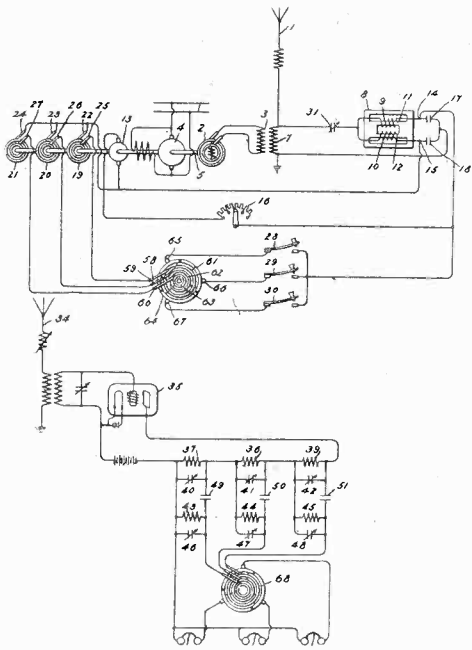
This is the first traveling and receiving broadcasting station in the world. It makes daily trips through rural and suburban districts of Pennsylvania in order that remote dwellers may hear what the broadcasters are sending out, and to transmit any important messages. This station was built by Horace A. Beale, of Parkersburg, Pennsylvania. It is one of the up-to-date radio "stunts" of the Chelsea Chester County Radio Association, one of the most ambitious radio clubs in the United States. The upper picture shows the interior of the traveling station; the lower, its exterior with aeri-als.

Radio Patents

E. F. W. Alexanderson Invents New Signaling System That Will Defy Interference

No. 1,426,944. Patented August 22, 1922.
Patentee: Ernst F. W. Alexanderson,
 Schenectady, N. Y.

ERNST F. W. ALEXANDERSON, inventor of the Alexanderson high frequency alternator—one of the most effective devices used in long-distance radio transmission—has been granted letters patent on a new device by which he expects to secure considerable im-



Principal schematic diagram of E. F. W. Alexanderson's signaling system for baffling static.

provement in both transmitting and receiving. The three principal objects of his invention are the following:

1.—To provide a system of multiplex signaling in which a plurality of mes-

sages may be transmitted and received simultaneously by the use of a single wave length.

2.—To provide a system for transmitting and receiving messages which is arranged in such a way that it will be practically impossible for another station to interfere with the efficient transmission and reception of the desired messages.

3.—To provide a system whereby messages may be transmitted between two stations in such a way that it will not be possible for a third station to receive them.

"In attaining the above objects," Mr. Alexanderson states, "I employ, for transmitting purposes, a source of continuous radio-frequency current, such, for example, as a high-frequency alternator, an arc generator or an electron discharge oscillator. I control the current in the antenna which is supplied by this source by means of a magnetic amplifier of the general type. By varying the controlling current supplied to the windings of this amplifier at a frequency lower than that of the source of supply, I produce amplitude pulsations of a desired frequency and of substantially sine wave form in the current supplied to the antenna."

"If it is merely desired to transmit simultaneously a plurality of different messages, I supply to the controlling windings of the amplifier currents of as many different lower frequencies as the number of messages which it is desired to transmit, these currents being supplied only during the intervals necessary to form the dots and dashes for each message. It will, of course, be apparent that in case several messages are being sent simultaneously, the amplitude pulsations produced in the fundamental wave will be the resultant or combination of the amplitude pulsations produced by several different frequencies employed."

* * *

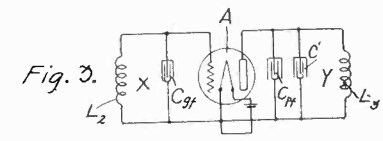
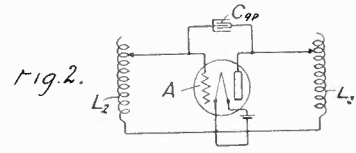
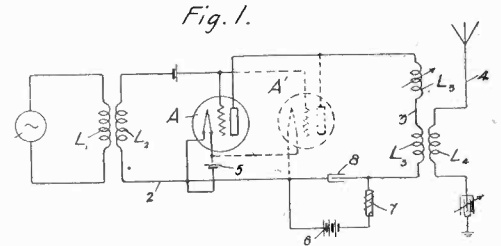
Raymond A. Heising's Device to Prevent Amplifiers from Oscillating

No. 1,426,733. Patented August 22, 1922.
Patentee: Raymond A. Heising,
 East Orange, N. J.

MR. HEISING'S invention relates to thermionic amplifiers or repeaters, and its object is to provide simple methods and means whereby a thermionic tube, or audion, used to amplify alternating current, and particularly high-frequency alternating current, can be kept from oscillating with a period, or periods, of its own, owing to the capacity coupling between the grid and the plate or other elements of the tube. In case a tube so tends to oscillate, and its ratio of amplification is sufficiently high, its own oscillations may be magnified to such a high degree as to interfere with the am-

plifying action of the tube or produce undesired frequencies in the output. In general, then, the object of the invention is to so proportion the parts of an inherently coupled amplifier circuit as to prevent it from oscillating.

When an amplifier tends to set up oscillations due to its inherent coupling, it has been found that this action can ordinarily be prevented by properly proportioning the parts of the circuit. In the case of a tube having an inductive input circuit and an output circuit, oscillations due to grid-plate coupling can be prevented by making the output circuit inductance of sufficiently large value. The value necessary will in general depend on certain constants of the circuit,



Three diagrams of R. A. Heising's device to prevent oscillation.

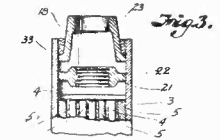
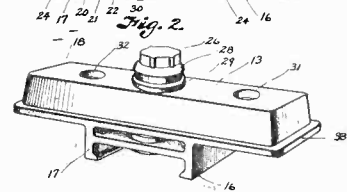
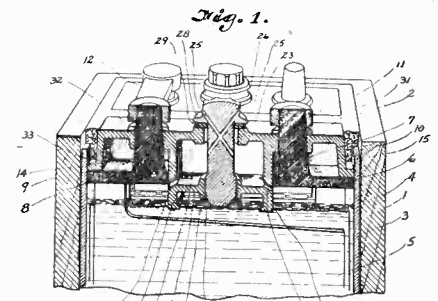
for instance, the internal impedance, the capacity between grid and plate, the input and output coil resistances and the effective inductance of the input circuit, the proper value of inductance in the output circuit necessary to accomplish the object stated, may be determined either experimentally or by calculation. If the coil resistances are negligible, the effective output inductance must bear the same, or a greater ratio, to the effective input inductance as the ratio of amplification in order to prevent oscillation.

* * *

Cell Covers for Batteries

No. 1,419,208. Patented June 13, 1922.
Patentee: Earle A. Berry,
 Kansas City, Mo.

THE principal object of Mr. Berry's invention is to provide a combined cell cover, filler tube, gas relief means and separator guard for storage batteries,



Diagrams of the Earle A. Berry battery covers.

which may be inexpensively constructed, conveniently applied and which will possess certain inherent advantages over known types of storage battery cell covers.

52 Weeks for \$6.00
 Complete Your File of RADIO WORLD
 Copies of Radio World No. 1

Radio and the Woman

By
Crystal D. Tector

AS a result of arrangements just completed with one of the leading caterers in Cincinnati, WLW, Cincinnati, will start transmitting daily menus for the benefit of the thousands of housewives who often are perplexed as to what to have for lunch and dinner. These will be broadcast at or about ten o'clock every morning. There will be two menus for each meal, one for the middle class of people and one for the wealthy class. When special dishes are suggested recipes will be announced. I understand that this very interesting-to-women broadcasting will begin this week.

* * *

I am overjoyed to hear that we may have Mary Garden as a radio singer. I understand that this remarkable soprano is more than anxious to sing over the ether waves. She wants to go on record as the first of the great prima donnas to sing through radio.

* * *

Friend Husband has asked me to deny that I am the boss of this radio household. So many letters come to us with just a hint that, because of my writings, I must "wear the pants," so to speak. Well, radio friends, there is nothing in that. We are just a normal American couple, and F. H. gives me my own way in all things that tend to make our home more happy. I started out to be a magazine writer, but radio appealed to me more strongly, so I just drifted into it—and I am not sorry.

* * *

F. H. is no more the boss than I am. We are both bossing this particular household, jointly, and we are doing it pretty well.

* * *

Because I am interested in radio, he is interested too—and we work at radio and study radio together. Just now we are deeply interested in the Armstrong super-regenerator—reading everything we can lay hands on and testing out every hook-up.

* * *

We are also interested in motor-car radio transmission. F. H. anticipates a fat fee before Thanksgiving. Then we will buy a car—and the first thing we do with it will be the installing of a radio set.

* * *

I am told that at Newport, this summer, a radio luncheon—the hostess was one of our most prominent belles—more than won the attention of a young Englishman who is touring

"the States." Unfortunately for him, he knew little or nothing about radio, being one of those chaps to whom life has been but a bed of roses and work a mystery.

The repast having reached the coffee-and-cigarettes stage, the hostess went to her set and "tuned in." There were a few sounds that reminded one of the interior of an African jungle; but the fair hostess so manipulated the dial that, in a few moments, the unpleasant sounds turned to beautiful music.

The young Englishman listened with appreciative countenance, and was soon asking many questions about the new wonder. In their enthusiasm, the young damsels present told him that radio would perform many things—too many, in fact, to be consistent with their veracity.

Finally one beautiful blonde from Philadelphia turned to him and asked:

"What would you prefer to have next?"

"Some juggling," replied the baffled Britisher.

* * *

One of my correspondents writes me that she must send her relations in faraway India a Christmas gift, and she has decided on "something radio," as she describes it. She asks my advice as to what she should send. Her request is a bit puzzling; but I am answering her here, for there may be others in the same fix.

I would go to some good radio dealer and purchase a first-class outfit. I wouldn't go in for the most expensive, but would try and pick something substantial and effective. Next I would get a good book describing just how aerials and all should be put in place. Thirdly—and finally—I would subscribe to RADIO WORLD for one year for my relations in India. I do not suggest this because I am connected with RADIO WORLD, but I consider that reading regularly such a publication is more than necessary to anyone just beginning to take an interest in the new science.

* * *

There seems to be a great deal of mystery about radio, but it is just as simple as it is interesting when once you get into it. Women come to me—and write me—as if I had solved some terrible problem, because I have become a fan. They "just can't see how I do it." But I tell them that many youngsters know more about it than I. Why, I have a friend whose ten-year-old daughter can operate a set as nimbly as any amateurs I have met. I tell my mystified inquirers that it is the simplicity of radio that is making it popular—and especially with women.

Late Radio News!

Supreme Court Justice Arthur S. Tompkins of Rockland County adjourned court last Friday by a radio message from a westbound steamship. Justice Tompkins, who is Grand Master of Masonic Lodges of New York State, was en route back from Europe. He was to have convened court at Nyack at 10 o'clock the following morning. Miss Natalie Couch of Nyack, court secretary, received a radio message from the Judge at sea advising her that he had adjourned the session to 11.30 o'clock Saturday morning, as the steamer he is returning upon would not dock in New York until 9 o'clock.

* * *

Lee de Forest is expected from Europe shortly to give demonstrations of his new phonofilm.

* * *

Radio messages received at Nome, Alaska, announce that Captain Amundsen is leaving for the Arctic, where he hopes to drift past the North Pole.

* * *

The world's record for a wedding audience is held by Mr. and Mrs. John H. Collier of Washington, D. C., whose matrimonial vows added to the program enjoyed by all radio fans within range. The strains of the Lohengrin wedding march, floating from the organ of the Church of the Covenant, were heard, and the radio listeners then wondered if it was the real thing and were not disappointed to hear the entire

ceremony, with the responses of the bride and bridegroom, through a broadcasting apparatus near the pulpit.

Radio and the Theater

THE theater is an established institution. Radio is an institution in the making. One can help the other. The theater can supply the broadcasting stations with talent, says "The Mail," New York, and in turn the broadcasting stations can help to popularize and advertise the theaters and their shows. Radio helped materially to make Ed Wynn's show, "The Perfect Fool," after it had run its span. People who heard it over the radio were impressed with Wynn's humor, and human-like, they wanted to see the man in the flesh. As a result of this curiosity on their part the sale of tickets for the show shot ahead at a lively rate, and the engagement was undoubtedly extended longer than it would have been otherwise.

When we hear a phonograph record that interests us we always enjoy listening to the singer, player or humorist, or whoever the performer may be, in person, and if they happen to visit our neighborhood theater or we see them billed downtown we try to get there. The same will hold true of radio, but it is going to be a hard matter to prove this to the theater owners.

If the theatrical interests openly declare war on radio they are going to find them-

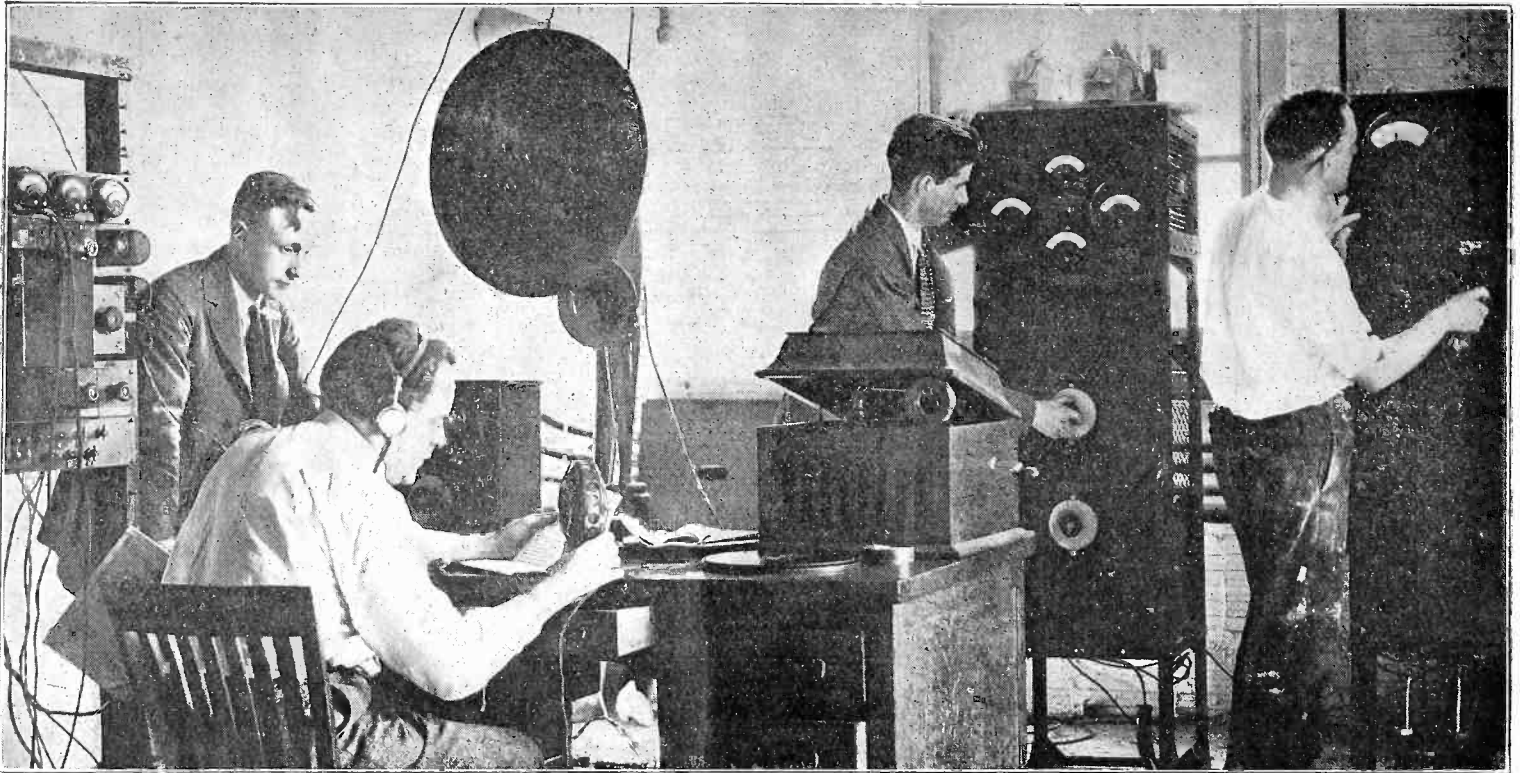
selves pitted against a mighty foe. They would do well to think twice before taking any drastic action. Radio can do more harm to the theaters than the theaters can ever do to radio. On the other hand, each can help the other if sensible co-operation supplants ridiculous and futile opposition. The theatrical interests should have perceived by this time that radio is rapidly becoming the ear of this country.

A Radio Christmas

THE coming holiday season will be known as the Radio Christmas confidently predicts a large manufacturer of apparatus, and there is little likelihood of any informed person disagreeing with him. Not only will the vogue of radio by December be greater than at any previous time, says "The Globe," New York, but radio sets and parts will be the feature of the gift-counters.

Several interesting projects are now being worked out to make attractive packages of radio sets or accessories to sell at varying prices. One that we saw contained all the parts necessary for a complete tube receiver, except the bulb, batteries and head-phone, to sell at a price slightly under \$15. There will undoubtedly be joy in the heart of many an American boy when he receives this sort of present on next Christmas morning.

Broadcasting Room of the Rochester University's \$5,000,000 Theatre

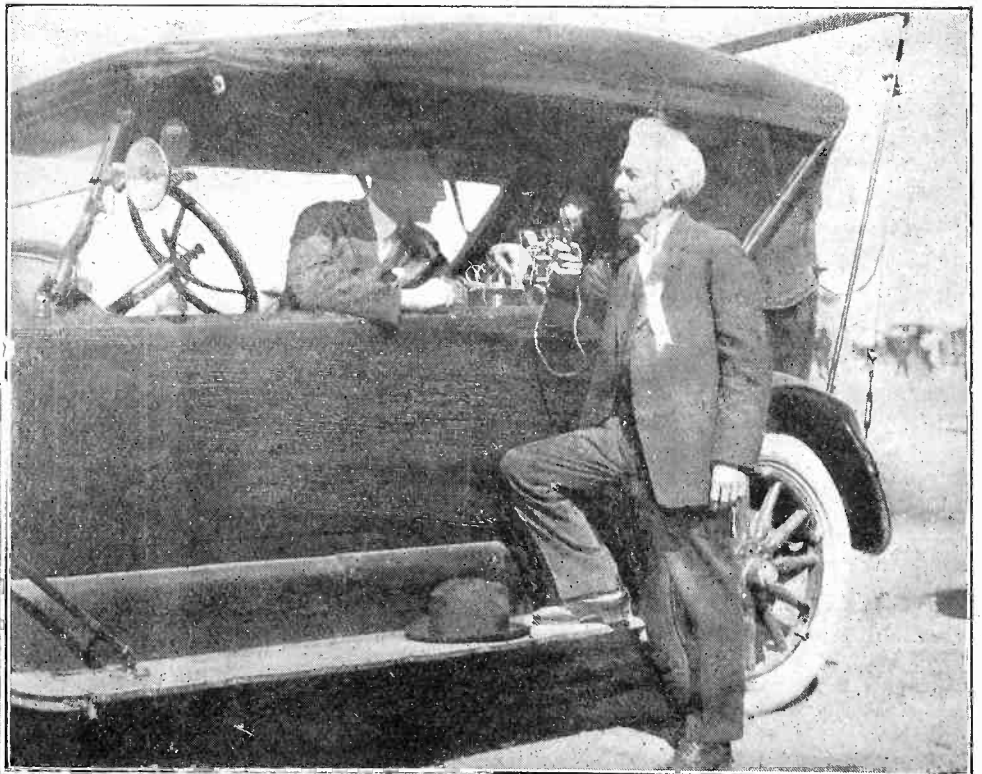


Radio room for both broadcasting and reception—in the new Eastman Theatre, built for the University of Rochester, New York, by George Eastman, millionaire camera manufacturer, at a cost of \$5,000,000. It is the first university-owned and operated theatre in the United States, and will soon be open as a unit of the Eastman School of Music of the university. The theatre is the last word in construction, convenience, architecture, and decoration. It has a seating capacity of 3,400. But our interest is largely confined to the radio department. The photograph gives an excellent view of the fine working outfit. It is Mr. Eastman's wish and the university's intention that both the School of Music and the broadcasting department shall benefit the public at large. With this in view, the musical programs will be broadcast free of charge.

First Motor-Car Broadcaster

A development that has placed radio in the front rank of service is the transmitter erected on a motor-car. Here is the reality—and it works successfully. This traveling station was devised and constructed by Mr. Nils E. Borch, of Oakland, California. Mr. Borch is photographed (at right) seated in the car, making adjustments on the transmitter. Luther Burbank, the horticultural wizard, is delivering his first radio address through Mr. Borch's portable broadcasting station. The aerials are erected atop the car. Practical use is being made of this broadcaster.

(C. International News Reel.)

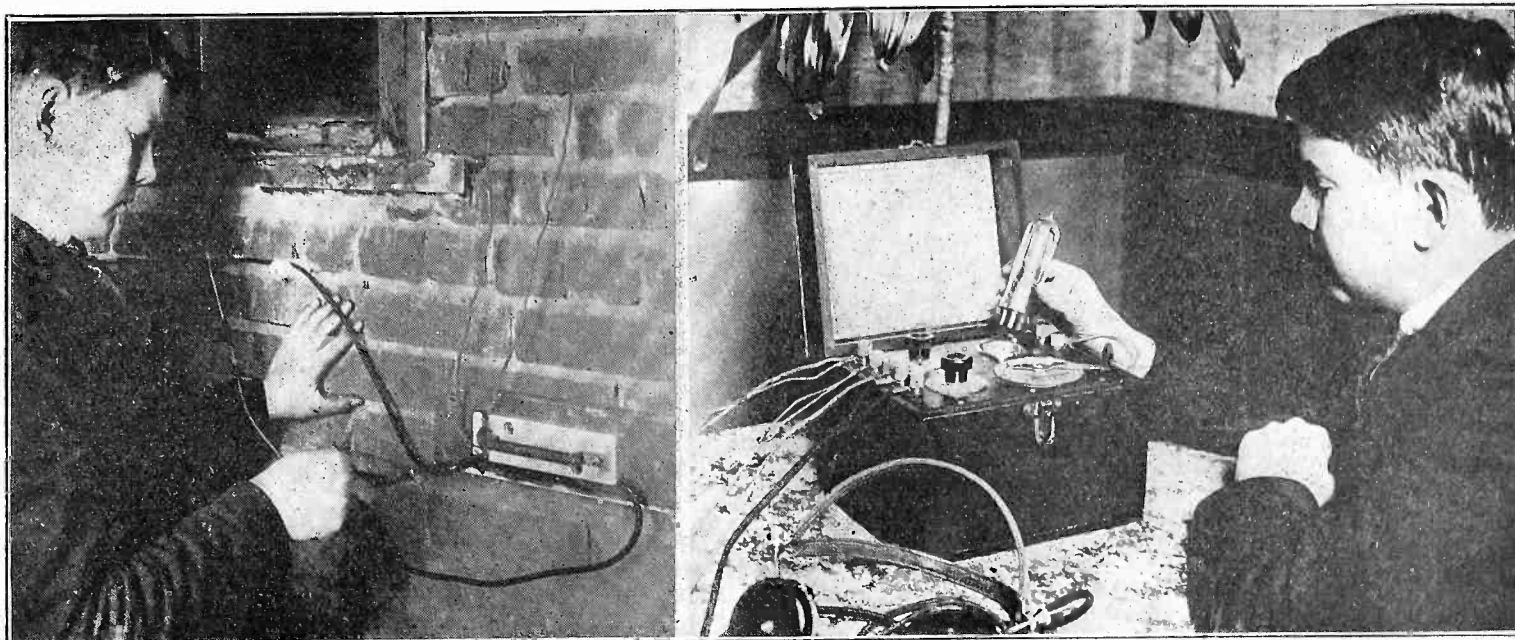


Boy Scouts Learn Radio

The illustration at the left shows the radio station of the Chicago Boy Scouts at White Bear Lake, Michigan. The set is a two-stage regenerative amplifier, utilizing honeycomb coils. The boys like their radio work, and await keenly the news and musical concerts sent out nightly from the broadcasting stations in Chicago. Their radio studies are intensely interesting. The Scouts are taught Continental Code and both transmitting and receiving, as well as the construction of hook-ups.

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

The Correct Way to Attach Your Antenna to Your House



(Three photographs C. Kadel & Herbert News Photos.)

THE insulated wire coming through the insulating entrance bushing in the window is shown in the upper left-hand photograph, attached to the single end of the protective device. A protective device is of vital importance and is required by the Board of Underwriters.

The protective device contains a fuse which will blow out and break the connection if a live electric-wire happens to come in contact with the antenna wire. It will also divert lightning to the ground connection. Many sets have been installed without a safety device or switch. Any reliable dealer in radio sets will recommend the types of devices accepted by the underwriters. This is important; otherwise, in case of fire, it may be difficult to collect on your fire-insurance.

Similar ground connections are made for the wire telephone and telegraph. The hazards are no greater for the radiotelephone. The heavy insulated wire, running to the left in this illustration, is the ground wire and the two small wires lead to the receiving set. The small wire connected to the same point as the ground wire leads to the ground post on the receiving set, while the small wire connected to the other terminal on the protective device, leads to the antenna post on the receiving set.



The upper right-hand photograph illustrates the inserting of type W-D 11 aeriotion tube into holes in the base that receives prongs on the tube. Be sure prongs register with holes and then press in firmly.

The boy in the photograph at the lower left-hand is fastening the "dead" wire. The wire may be considered dead, as it only supports the antenna wire. The insulator prevents electricity from running from a conductor, such as a lightning rod or live wire, on to the antenna.

The antenna wire is shown in the boy's left hand. The section running to the loop will be stretched through the air, without any interference from the house to a building, or tree, nearby. The wire running towards the ground, shown at the boy's third finger, leads into the house. The wire should be the same size as the antenna wire but insulated.

The boy at the extreme right is shown stretching the antenna wire through an insulator. The "dead" wire, attached to the building, should be at least 10 feet long. That is, the antenna wire ought to be at least 10 feet clear of all obstacles. When the connection is made to a tree, the antenna should be at least 10 feet clear of all limbs and branches. You will find this of vital importance when the sap is up and in case of lightning striking the tree.

The length of a single-strand antenna should be at least 100 feet long—the longer the better—stretched, not too lightly, from 25 to 50 feet above the ground. Single-wire antennas give the best results. A two- or three- or four-wire antenna is used only when the space available is insufficient for the long single-wire. You will find many radio enthusiasts who will tell you that these requirements are not necessary. However, those who are getting the best results in long-distance reception are following these practices.

Sometimes it is satisfying to know just what type aerial to erect. Some amateurs erect the inverted L-type while others take it off in the center making a T-type. All of these aerials have specific calculations when one is figuring wave length. Radio experts claim that capacity times inductance gives us wave length; so, therefore, it can be seen that with the T-type aerial we would have less wave length than the inverted L for the simple reason that with the inverted L the lead-in is taken off at the end allowing for the total wire to be figured in when calculating wave length. With the T-type aerial, the lead-in, which is taken off at the center, reduces the wave length one-half. That is to say: if with an aerial 100 feet long, the T type would have a



wave length of 200 meters and the inverted L would have 400 meters wave-length.

When erecting an inverted L, it is necessary to make the lead-in fast on the end pointing toward the station you wish to head. In the lower photograph, the aerial is of the inverted L-type. The direction of the loudest signals heard would be from the distance from the left of the insulator.

Aerials are half the radio battle provided they are erected properly. Too much cannot be learned about aerials. Proper insulation is another big factor for without perfect insulation most of our signal strength would be lost to ground. With good insulation provided for one should be able to get the best results, as all of the energy that can be absorbed will be sent to the receiver for rectification. Always remember that a good aerial with good insulation will give satisfactory results.

Radiograms

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

HERE is a radio fan who offers a reward for "air hogs." James S. Bryan, attorney, and radio fan, of Rochester, New York, has offered \$10 reward for information that will lead him to broadcasters near his home, who, he says, are "hogging" the air. Mr. Bryan says every night as he adjusts his apparatus to listen in, the amateurs begin broadcasting in code and interrupt him. Recently, he asserted, it has become so annoying that he is contemplating complaining to the radio officials at Detroit.

* * *

Radio is increasing in popularity. A survey completed by the National Radio Chamber of Commerce, on June 1, showed approximately 1,500,000 receiving sets in the United States. It is estimated that there will be 5,000,000 more within the next five years, equal to the number of phonographs in use to-day.

* * *

Dr. H. W. Nichols, an eminent electrical engineer, announces that the ether is not only not of use in radio transmission, but it is an interference. Dr. Nichols believes that much can be done to remedy the static disturbance by a means of sharper tuning.

* * *

The British are solving their radiophone broadcasting problems by floating a company composed of representatives of all the manufacturers of radio equipment to finance the scheme. Eight stations will be permitted by the Government, and they will be erected in certain selected areas. The Government will contribute partly to the expense of maintaining and operating these stations out of the license fees it receives from owners of receiving equipment. The manufacturers are to be given two years of outright protection against foreign equipment under the scheme.

* * *

A "dead" spot in the atmosphere which cannot be penetrated by radio has been discovered in Southern California. Amateurs have been perplexed about it for some time and they have come to the conclusion that there is some barrier to the waves that they cannot understand. An aviator undertook to fly through it a few weeks ago, and his machine became so unmanageable that it fell to the ground. He said that "the air just gave out."

* * *

The widespread extension of the use of the radio telephone is beginning to affect the mining industry in certain quarters of the country to such a degree that the supplying of crystals of certain ores has become a small industry in itself.

* * *

Radio waves may replace guns in the next "world war" if the present advance in radio science continues, according to opinion expressed by Professor A. M. Low, British scientist and inventor of the British wireless-controlled airplane and torpedo. The old-fashioned battle with infantry, cavalry, and artillery, fighting with the bayonet, the saber and gunpowder is a thing of the past. The weapons of the future are the airplane, the wireless, and the poison gas wave. Aerial electrical battles may turn the tide of future wars, Professor Low believes.

* * *

It is disappointing to learn that Italy is the most backward country in radio, notwithstanding the fact that it is the birthplace of the great Marconi. Commander Tosi, former navy officer and inventor of various radio appliances claims that this is due to the opposition of every ministry of the past twenty years. Says Commander Tosi: "It was twenty years ago that Senator Marconi sent a letter to a member of the government in which he outlined his wonderful scheme for making Italy the most perfectly equipped nation so far as wireless was concerned. He waited many weeks for an answer to his proposal. After some time, he received back his letter, in which he had given detailed notes of what equipment staff, and land reservations would be needed, and on the margin was written, in the minister's handwriting: 'I consider Signor Marconi a fit subject for an insane asylum.'"

* * *

The American Society of Composers, Authors and Publishers has issued an ultimatum to the Westinghouse Electric Company, General Electric, Radio Corporation of America, American Telegraph and Telephone Company and the National Radio Chamber of Commerce that on and after September 10 the society will bring suit in the Federal Court against any and all radio stations that broadcast copyrighted music on the premise that it comprises an infringement of the copyright law

as regards the public performance of copyrighted music for profit, without license. These companies, as well as the Secretary of Commerce and the Authors' League have been notified to attend a conference at the society's rooms September 20 for the purpose of formulating a plan whereby the copyright owners of popular and standard music may be reimbursed for the use of their catalogues.

* * *

Keep a sharp look-out for the man or woman selling fake radio stocks! A recent prospectus was so worded that it guaranteed, beyond all doubt, a return of \$100,000 on an investment of \$500 within six months. Such a promise should make anyone say, "No!" as if spoken through a loud-speaker. Anything offering more than 6 per cent. on the investment calls for the most careful investigation. The radio business must not be "Ponziized."

* * *

Visions of the radio future! Major E. H. Armstrong announces that he can make his radio signals ten thousand times shorter by making simple additions and rearranging the wires. General Electric has made a new tube that will replace the large alternators now used in long-distance sending. A new wire antenna is soon to be perfected. Marconi predicts a future for short waves.

* * *

The proficiency of Naval radio operators was established when a competitive radio drill was held among the destroyers of the Pacific fleet. Of the seventy-three ships represented, six squadrons secured 100 per cent., and one 99 per cent. Not one had a record below 83 per cent.

* * *

The Tropical Radio Telegraph Company is erecting in Tegucigalpa, Honduras, one of the most powerful tube-transmitting stations on the Western Hemisphere. It is expected that it will be in operation by December.

* * *

Evidently the lure of radio is stronger than the lure of scenery. The old-style railroad advertisement, featuring the beauties of the scenery through which the trains passed, has been supplanted by announcements that radio-telephone broadcasting concerts may be heard aboard the Buffalo Limited and the New York Limited.

* * *

The ten-day journey by stage coach made by Mark Twain over the Utah desert, in 1862, is now made in less than ten minutes. This is due to the radio-equipped airplanes of the United States Air Mail Service. This service has carried the mail from San Francisco to New York City in thirty-six hours. At 12 midnight, on July 16, last, it completed a year of daily service without a single fatal accident. During this time, planes flying over the New York-San Francisco route, covered 1,750,000 miles. More than 49,000,000 letters, weighing 1,224,500 pounds, were transported by air.

* * *

In November, 1907, the United States Navy installed only twenty-six sets of radio telephones upon as many battleships, torpedo-boat destroyers, and auxiliaries, prior to their round-the-world cruise. The specifications called for five-mile transmission for inter-fleet work! Some of those instruments, crude though they were compared with the present type, maintained communications for fifty miles. To-day the Navy demands instruments capable of a hundred-mile conversation between warships and nearly as many miles between airplanes and ship stations.

* * *

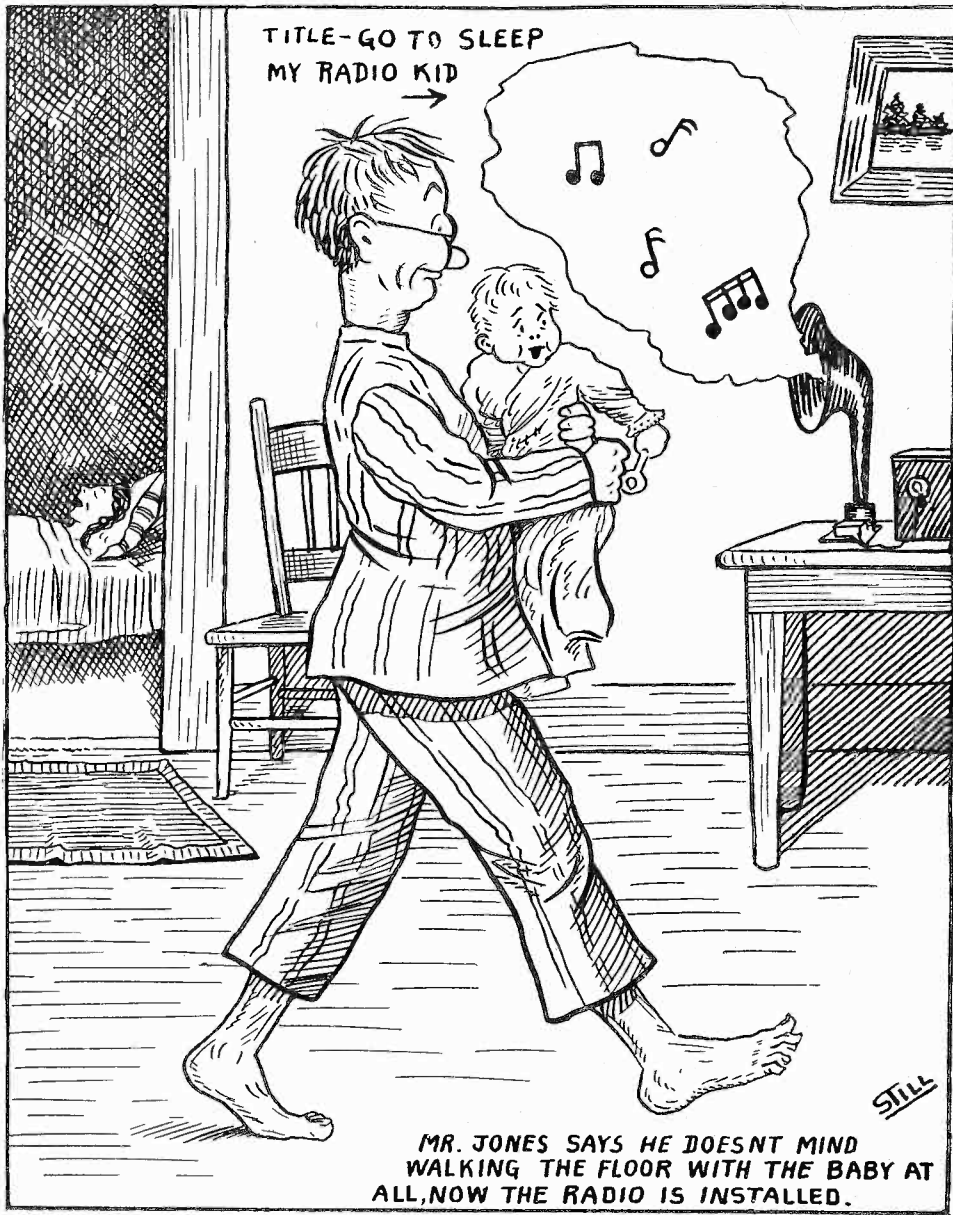
Listening in on the radio set at the Charles Street jail, Boston, George Rollins, convicted of the murder of Ordway Hall, a grocery store manager, in 1917, learned that Jesse Murphy, now in a Pennsylvania prison, had been pardoned by the Governor of that State and would be brought to Boston for trial on the charge of murdering Hall. Murphy, according to the police, has confessed the crime of which Rollins and his brother were convicted. Rollins threw off the headgear and cheered when he heard the news. Boston police officers left for Harrisburg, Pennsylvania, to take Murphy into custody on his release from the Eastern Penitentiary there. He has been serving a sentence for assault with intent to kill.

* * *

WGY, radio broadcasting station of the General Electric Company, will give a play-by-play report of the World Series baseball games. Direct wires to the baseball park will bring information of every play practically the second it happens and this will be relayed by wireless the instant received.

Radio Has Made It a Joy!

Cartoon by Harry R. Stillman



Court Grants Injunction in Radio Suit

Important Decision First Step in Clearing Up Crystal Patent Situation

AN important step in clearing up the somewhat tangled situation regarding radio patents was taken last week by Justice O'Malley of the New York Supreme Court, Special Term, in granting the injunction asked by the Freed-Eisemann Radio Corporation of New York against the Wireless Specialty Apparatus Company.

This decision is the first step of a series in defining patent rights which have arisen in the radio field as a result of the tremendously increased activity in this industry. The decision is of particular interest to all retailers of radio apparatus as well as to users of crystal-receiving sets.

It is stated that the Wireless Specialty Apparatus Company recently published a series of advertisements and circulars which indicated that crystal radio receiving sets are controlled by patents owned by them. These advertisements, which were addressed to radio dealers, advised these dealers to insist upon guarantees from other radio manufacturers,

holding them (the dealers) harmless in case suit was filed by the Wireless Specialty Apparatus Company, alleging patent infringements.

The contention of the Freed-Eisemann Radio Corporation, now sustained in the courts, was that these advertisements constituted unfair business competition and an injunction was granted restraining this form of advertising by the Wireless Specialty Apparatus Company. The injunction, just granted, was part of the suit—the balance of the suit, in which \$150,000 damages was asked, is still pending.

Justice O'Malley's decision is sweeping in the measure of relief afforded the plaintiff. The outcome of the suit will have an important bearing upon the entire crystal radio patent situation. It is stated, also, that a number of radio manufacturers, known as the Independent Radio Manufacturers, Inc., have organized to protect their members against unfair competition and unjust patent litigation.

This organization is represented by Pennie, Davis, Marvin & Edmonds, attorneys, 165 Broadway, New York City. At the offices of the Independent Radio Manufacturers, Inc., it was said by one of the directors that a large number of applications from radio manufacturers are now under consideration.

Be progressive—
enjoy wireless
programs daily
with the



MAGNAVOX
Radio
The Reproducer Supreme

*No wireless
receiving set
is complete
without it*

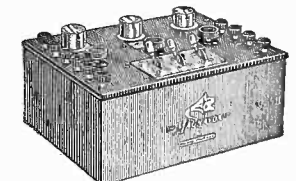
THE Magnavox Company have been pioneers in the development of devices for sound amplification. When you purchase a Magnavox Radio or Magnavox Power Amplifier you possess an instrument of the very highest quality and efficiency.

**Type 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, &c., but requires only .6 of an ampere for the field.
Price, \$85.00

**Type R-3
Magnavox Radio**
with 14-inch Horn

THE same in principle and construction throughout as Type R-2, and is ideal for use in homes, offices, amateur stations, etc.
Price, \$45.00



3-Stage

**Magnavox
Power Amplifier
Model C**

INSURES getting the largest possible power input for the Magnavox Radio. 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

Magnavox products may be had of good dealers everywhere.

The Magnavox Co.
Oakland, California
N. Y. Office: 370 Seventh Ave.

**Radio brings it
MAGNAVOX tells it**

Answers to Readers

I HAVE a crystal set. What can be done to it so the sound may be increased? The concerts come in satisfactorily. Can I change the connections?—Addison Jones, Cairo, N. Y.

Every time the writer of this department receives a query like the above, he has to walk around and cool off. There is nothing that can be done to increase the volume of this type of set. **Don't change any wiring.** If you wish to get louder signs for the employment of a loud speaker, then, of course, you will have to discard the crystal and get a tube outfit.

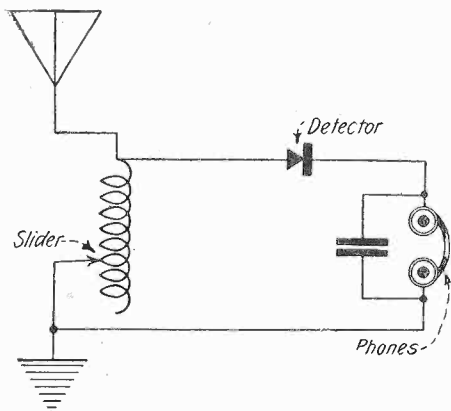
* * *

I have done some experimenting on Major Armstrong's superregenerative set. Will I be able to "get up" on 2,500 meters with a two-tube set? What should I look for in varying the taps of the vario-coupler? What resistance-head set should be used with this set? What type transformer is best to use?—Frank Piccolo, Montreal, Canada.

From most amateurs the reports seem to be that this wave length cannot be had as its amplifying powers are not available over 900 meters. Leave your primary vario-coupler switches at a maximum point, and tune with the variable condenser across the loop aerial for the station. This should be done very carefully. 3000-ohm receivers could be used, but we recommend the Baldwin telephone because of the tremendous amount of energy that is passed through the receiver. Even better results could be obtained by using the step-down transformer and a low-resistance telephone; but the Baldwin will answer the purpose very well.

* * *

Send me a hook-up of a simple tuning-coil with crystal detector and telephones? Beginner, Brooklyn, N. Y.



Hook-up requested by "Beginner," Brooklyn, N. Y.

The accompanying sketch shows the proper connections for a simple tuner and plain crystal-detector.

* * *

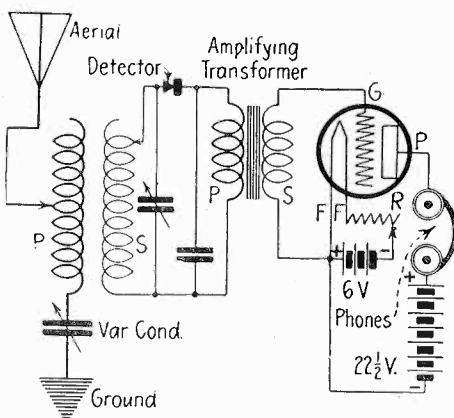
I have a regenerative set, consisting of a vario-coupler, grid and plate variometers. I receive concerts satisfactorily through the detector, but not the amplifiers. I have a good aerial and ground and am using Thordason amplifying transformers. Can you tell me where the trouble lies?—J. Stuck, New York City.

This is difficult to answer satisfactorily as you did not send a circuit. There may

be a number of things at fault such as poor B batteries, incorrect polarities, improper conditions, or poor tubes, we suggest that you submit a diagram of your set, in order that the trouble may be located.

* * *

I understand that an amplifier may be connected to a crystal set. Will you publish such a sketch? I believe it is impossible to connect this with a crystal detector.—Arthur James, Springfield, Mass.



Schematic diagram requested by Arthur James, Springfield, Mass.

The schematic diagram published above shows the proper connections utilizing a tube amplifier with a crystal detector. Watch your connections and use a UV-201 amplifying tube or any other type of amplifier tube. Satisfactory results may be expected if everything is wired correctly.

* * *

Where may Western Electric E tubes be purchased.—Maxwell K. Murphy, Eastport, Maine.

This tube is known also as the "VT2 Signal Corps." See the advertising columns of Radio World.

* * *

Would you please publish a vacuum-tube hook-up employing spider-web coils?—Roy G. Lane, Havana, Cuba.

This was fully described in Radio World, No. 22, dated August 26, in "How to Build a Spider-Web Coil Receiver," by Frederick J. Rumford.

* * *

How may I connect the tickler coil in your diagram in "Answers to Readers," Radio World, No. 22, dated August 26?—Drennan Miller, La Harpe, Ill.

The tickler coil is connected in series with the plate circuit of your detector tube and should be variable.

* * *

When measuring the wave length of an antenna, should I include the ground wire?—Paul Johnson, Fresno, Cal.

Yes, the ground wire must be accounted for and figured in as part of the aerial circuit when the wave-length range of a receiving station is being figured or calculated for wave length.

* * *

What is the correct capacity used with the Armstrong super-regenerative set described in RADIO WORLD, No. 19, dated August 5? This variable capacity is in series with the iron choke. I have seen many other hook-ups and they seem to give it as .005 mfd. This is in reference with

your C5 condenser as .001 mfd.—Marty Olsen, Arverne, L. I.

Regarding the variable condenser in series with the iron-core choke, Major Armstrong's own figures were .001 mfd. capacity, but he pointed out the fact that this would have to be varied according to the circuit itself and the character of the iron choke used.

* * *

Please publish the connections for a T-type aerial and show me how it should look when erected—also, the rat tail or lead-in. —Warren Dodge, Bloomfield, N. J.

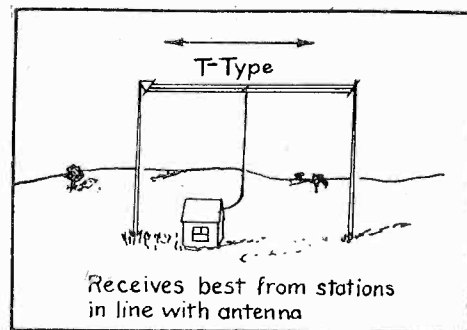


Diagram of T-type aerial requested by Warren Dodge, Bloomfield, N. J.

The accompanying sketch shows the T-type aerial with proper lead-in wires. The lead-in is taken from the center. This makes this type indirectional. It also decreases the wave length almost one-half.

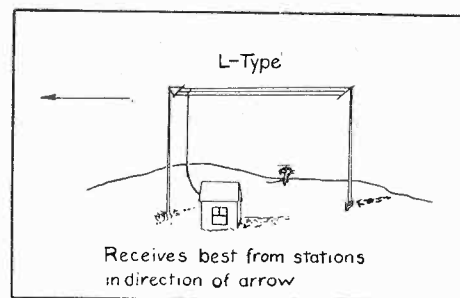
* * *

Publish a hook-up of a vario-coupler, variable condenser, and two radio-frequency transformers.—Ursin L. Cuevas, Cuevas, Miss.

This schematic diagram was explained thoroughly by George W. May in an article entitled, "Perfect Short-wave Radio-Frequency Amplification," in Radio World, No. 24, dated September 9.

* * *

In erecting an inverted L aerial, which end should the lead-in be taken from.—John Malcolm, Columbus, Ohio.



Inverted-L-aerial diagram requested by John Malcolm, Columbus, O.

The accompanying sketch shows the lead-in from an inverted L. The arrow indicates the direction from which the loudest signals will be received. This aerial is known as the direction antenna and will respond to signals at the end from which the lead-in is taken.

SO MANY READERS ARE

disappointed in not receiving their copies of RADIO WORLD on the newsstands regularly, from week to week—due to early selling out by dealers—that we suggest that you place a standing order with your newsman. Ask him to save you a copy of every issue.

Nonagenarian Missionary To-day Radios to Former Fields

SIXTY-SIX years after he traveled Indian trails to the frontier of the nation, Reverend E. W. Rice, of Philadelphia, sent his voice with the speed of light to the grandchildren of the people he sought to reach in the early days, traveling by stage coach, on horseback, and afoot.

Dr. Rice, now in his ninety-second year, recently delivered an address, from WGY, the radio-broadcasting station of the General Electric Company, Schenectady, New York, and letters which have reached the station indicate that residents of Iowa, Minnesota, and Wisconsin, the field of his missionary travels in 1856, plainly heard Dr. Rice's talk on "The Viewpoint of a Nonagenarian."

With the aid of radio, the former missionary of the gospel was able to reach at one time people within a radius of many hundreds of miles of the point he was speaking from.

Dr. Rice is the father of E. W. Rice, jr., honorary chairman of the board of directors of the General Electric Company and of M. P. Rice, manager of the publication bureau of the same company.

MBD Flashes Its "73"

MBD, the famous call of Pondhu, England, has sent its last message. A correspondent of "The World," New York, says that this well-known call for which ships' operators have listened eagerly for the last nineteen years, is now replaced by MFT, the sign of Clifden, the Irish station of the Marconi Company, which has taken up the duty of talking to people who go down to the sea in ships, telling them at midnight what has been happening throughout the world during the preceding twenty-four hours.

Poldou's last message was on a matter of business to the little Spanish Town of Cieza. Now the new wireless station at Ongar, in Essex, is responsible for this Spanish traffic.

Perched on the rockbound coast of Cornwall, Poldhu has made history. It was the first highpower wireless station to be built, and from here the first wireless message was sent across the Atlantic in a 2,000 metres wave-length, on December 12, 1901, to St. John's, N. F.

Coupling Defined

AMONG the many puzzling and mystifying terms with which the radio amateur must wrestle is the term coupling, says Arthur R. Nilson, A. M. I. R. E., in "The Globe," New York. He hears of loose, tight, critical, close, direct, flexible, inductive, capacity or electrostatic (static for short) and conductive coupling as well as co-efficient and percentage of coupling, and, last but not least, that ideal condition, perfect coupling.

Now, the question naturally arises: why all this coupling, what does it do and for what is it used? Coupling is to a radio set what gears are to an automobile. Unless set just right, things don't go well. Coupling is a verb, adjective, or pronoun or whatever else you might wish it to be. We say, couple the circuits closely, the coupled circuits are easily adjusted or the coupling was tight. Boiled down to a definition it might read as follows:

Coupling is the ratio of the mutual induction between two circuits compared with the self-inductance of each circuit.

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

Remington Terminal Indicators

5 CENTS EACH



Type A

REMINGTON RADIO CORP., FRANKLIN, MASS.



Type B

A perfect panel engraving imitation. Fits any binding post. Black japanned, white enameled letters. Supplied in the following: Antenna, Ground, Phones, Grid, Input, Output, A Bat +, A Bat -, B Bat +, B Bat -. Lettering in two positions. Order direct from ad.

Dealers! Write for Discounts!

"TUNING IN"

TO THE RIGHT TUNE IS VERY SIMPLE WHEN YOUR CONNECTIONS ARE
SOLDERED WITH THE NEW

"POST SOLDERING IRON"

(The Iron with the Platinum Heating Unit). Removable Soldering Tip



1/2 Actual Size

LIST \$6.00

Designed especially to cover every requirement for delicate work. The smallest practical, efficient instrument on the market. Attaches to any socket. Universal current. Fully guaranteed. From your jobber or write

POST ELECTRIC COMPANY

30 EAST 42ND STREET

NEW YORK

Spirola Concert

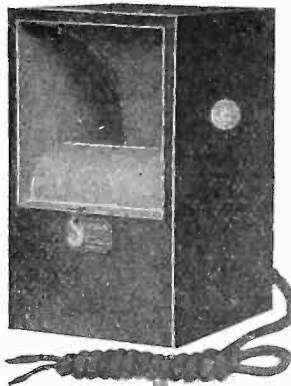
TRADE MARK PATENT PENDING

THE COMPLETE LOUD SPEAKER

—No "units," headsets, extra batteries or adjustments required. Complete with cord, ready to connect in, in place of your headset.

LOUDNESS—Just a sample of actual performance. In our testing laboratory, using a small outdoor aerial and an ordinary set with two stages of amplification (the ideal set for average conditions unless near a broadcasting station) we have received broadcasting stations more than six hundred miles away, so loud it can be heard a hundred feet away. Or again, while this compact little instrument (it stands less than eight inches high) is designed for home use rather than for large halls—yet with the same set stations thirty miles away come in somewhat louder by direct comparison than a full sized phonograph playing a loud record with a loud steel needle.

And TONE—While we welcome comparison on loudness, what will really impress you



"Spirola Speaks"

most about your SPIROLA CONCERT is the tone. We have absolutely eliminated distortion and all metallic, "tinny" quality. Violin, orchestra music, voice, even the difficult piano come to you through your SPIROLA so clear and natural you can hardly believe they are not in the same room.

Beautiful cabinet type, choice of dark oak or mahogany finish, bronzed throat; at your dealers or prepaid anywhere in the U. S., Canada or England \$12.50

We are so sure you will be pleased with your SPIROLA CONCERT that we absolutely guarantee it. If you wish to return your SPIROLA for any reason whatsoever, do so within ten days and your money will be immediately refunded. Made and sold by

L. H. Donnell Mfg. Co., Dept. B, Box 70, Ann Arbor, Mich.

A Fitting Birthday Present for Those Interested in Radio

Are you cudgeling your brain in an effort to think of an appropriate present for a relative or friend? If that relative or friend is interested in radio, WHY NOT SEND HIM OR HER RADIO WORLD FOR THE COMING twelve months? Send us \$6.00 for each subscription you want, and we will place the names on our subscription list for one year, postpaid, and we will also send special cards to the addresses you send us announcing that the subscriptions were sent with your compliments.

Address Subscription Department, Radio World, 1493 Broadway, New York City, N. Y.

SUBSCRIPTION BLANK

RADIO WORLD

RADIO WORLD

1493 Broadway, New York City.

Please send me RADIO WORLD for months, for which

please find enclosed \$

SUBSCRIPTION RATES:

Single Copy\$.15

Three Months1.50

Six Months3.00

One Year (52 Issues)..... 6.00

Add \$1.00 a Year for Foreign

and Canadian Postage.

Advertising Rates, Display, \$5.00 per inch, \$150.00 per page

Radio Merchandising

Classified Quick-Action Advertising, 5 cents per word

Telephone Bryant 4796

Making an Asset of Difficulties

A great opportunity is now before American business—the opportunity of making a big and permanent asset out of the very difficulties of the present situation. The conviction that this can be done is extremely heartening. It is enough to put a new thrill of life and activity into every form of industry.

From one point of view the present situation is by far the most desirable, the soundest, the sanest, and the most hopeful this country has ever seen. Why? Because it brings into bold relief, through sheer necessity, the latent power to create conditions as we would like to have them.

The curtailment of Demand for the products of industry brought us face to face with the question, hitherto ignored, as to what causes demand. Then it was discovered that Demand was a created thing, and that more of it could be created in almost any direction—if enough of the right effort were applied.

Chief among the means of creating Demand is now seen to be Advertising. Wherever you find a big demand for any product, you find, invariably, that the demand for that product has been stimulated by human effort, and chiefly through advertising.

It is obvious to any one who will think it through that the present demand for any product could be substantially lessened if it were possible to eliminate all forms of advertising — including pictures, displays, and word of mouth, as well as printed and painted messages—and just let that product depend on the natural or unstimulated demand.

And it is equally obvious that a demand for any worthy product can be created and stimulated by means of Advertising.

This fact puts within the hands of the business man the means of creating his own market. That would be the biggest asset he could have—an assured market for all he could produce.

[Published by RADIO WORLD in co-operation
with The American Association of Advertising Agencies]

Radio Goods that Stand the Test

Manufacturers, send a sample of your goods to our Technical Editor, Fred. Charles Ehlert, 9006 Pleasant Street, Queens, Long Island, N. Y. It will be carefully tested and returned. If your goods satisfy our experts, RADIO WORLD'S endorsement will be published in our merchandise department without charge or obligation of any kind on your part. This is a free service on the part of RADIO WORLD, calling for no expense whatsoever on the part of the manufacturer, except the sending of a sample of his goods.

Micon Noiseless Mica Condenser

(Chas. Freshman Co., Inc., 290 Hudson Street, New York City)

A.00025-MICROFARAD MICON mica condenser was tested out in the Armstrong superregenerative set with amazing results. It must be remembered that condensers play an important part when working with this circuit.

Micon fixed mica condensers are new departure in condenser design. The outer casing is of seamless brass, or copper, tubing. The interior is built up after the best practice of alternate layers of clear Ruby India Mica and brass, or copper, sheets. The tubing is partially flattened then the condenser elements are inserted and the presses complete the operation of flattening into the final form. This process produces constant equal pressure over the entire plate-area and does away with troublesome noises of ordinary condensers. The metal case

protects the plates and reduces hysteresis to a minimum. Ordinary receiving-condensers are tested to 1,000 volts by these condensers are also made to stand several thousand volts if desired.

Micon is manufactured under license of patents of Charles T. Vawter, of the Thompson Levering Company, Philadelphia, by Chas. Freshman Company, Inc., 290 Hudson street, New York. The manufacturing is in charge of Ernest Walker Sawyer, the well-known radio engineer of New York and London.

A Useful Microdenser

(E. R. Knott Machine Co., 1 Ellery Street, South Boston, Mass.)

THE Knott Microdenser is an instrument that gives the tuning on a variable condenser. The critical point may be stretched out on the vernier condenser provided the Microdenser is employed with it. The Microdenser works well on long-distance work, but is not a necessity on local operation. It is adapted for C-W work.

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.)

Radio Taxi Corporation, Manhattan; \$10,000; W. and B. Bettinger, P. Sherman. (Attorneys, Cohen, Gutman & Richter, 111 Broadway, N. Y.)

Poellnitz Electric Service Corporation, New Rochelle; \$10,100; W. C. Poellnitz, E. J. Boule, T. Smith. (Attorneys, Mahlstedt & Fallon, New Rochelle, N. Y.)

Arras Equipment Corporation, Manhattan, mechanical and electrical apparatus; \$5,000; T. N. Pfeiffer, M. P. Bloch. (Attorney, N. J. Palzer, 120 Broadway, N. Y.)

Moss Radio Supply Company, Manhattan; \$10,000; H. A. and M. G. Moss, S. Schatzberg. (Attorney, L. Susman, 3208 Third Ave., N. Y.)

Dectograph Manufacturing Company, Wilmington, Del., manufacture; \$1,000,000. (Colonial Charter Co.)

Deluxe Radio Corporation, Wilmington, Del., apparatus; \$500,000. (Corporation Service Co.)

F. Wilsonville Electric Corporation, Manhattan, X-Ray equipment; \$10,000; F. W. Ille, J. Ferguson, J. Wolfert. (Attorney, M. F. Eichner, 1545 Broadway, N. Y.)

The Electrocar Corporation, Philadelphia, has increased its capital stock from \$500,000 to \$33,000,000.

Canadian-American Radio Company, Dover, Del.; \$41,000,000; Frank Kweton, West New York, N. J.; L. F. Sniffin, Yonkers, N. Y.; Earl L. Keys, New York. (Corporation American Radio Co.)

Archer Radio Company, 2309 Archer Ave., Chicago. Adolph Holman.

Beatrice Radio Company, 808 East Court St., Beatrice, Neb. D. M. Church, manager.

Washington Radio Shop, Washington Boulevard and Clifford St., Detroit, Mich.

Rose Radio & Electrical Supply Company has moved to 129 Camp St., New Orleans, La.

Central Radio Co., 454 South 5th St., Louisville, Ky. S. B. Kirby, proprietor.

Roth Radio Co., 1600 Elm St., Dallas, Texas.

Radiophone Supply Co., 1907 Main St., Dallas, Texas. W. H. Fine, manager.

The F. A. Emphall Department Store Co., Watertown, N. Y., has added a radio department.

Jacob G. Hardin, radio supplies, Greenwood, Johnson Co., Indiana.

Duchess Battery & Radio Corporation, Poughkeepsie, 5,000 shares preferred stock, \$50 each, 10,000 common, no par value; active capital, \$5,000; H. Eggleston, F. J. Slater, F. Blown. (Attorney, C. W. H. Arnold, Poughkeepsie, N. Y.)

The Baldwin Radio Company of Salt Lake City, Utah, capital \$1,000,000, has been organized and completely financed. The officers are David A. Smith, president; Lester D. Freed, vice-president, and J. F. Nibley, secretary and treasurer.

It is well designed of neat construction. Simply connect the wire on the end of the Microdenser rod to the terminal of the moving plates of your variable condenser and connect the other wire to the stationary terminal. Adjust your variable condenser to the whistle and then the Microdenser, by a simple operation, will bring in the signals.

Visible-Stop Rheostat

(E. R. Knott Machine Co., 1 Ellery Street, South Boston, Mass.)

THE Knott positive, visible-stop, dial Rheostat was tested out with various tubes in various circuits. It has for its main purpose a scale which is encased around the knob. When in use a pointer over the scale immediately indicates every turn on the rheostat. This is a serviceable stunt, as a record may be kept, from day to day of adjustments, also the condition of the battery. It indicates, also, when the electricity is turned off.

Results

IN selecting an advertising medium to merchandise radio goods—what do we buy—Circulation?

Who cares how much circulation a paper has if it does not pull—produce profitable results—orders?

Who cares how old a publication is—if the younger publication brings more orders for the advertising dollar? In the final analysis, it is only reader-interest and RESULTS that counts.

Radio World has a greater reader-interest than any other radio paper. Why? Because it is the only national illustrated radio weekly. It illustrates and fully describes, each week, all that is new in radio. It gives all the new marvels in radio from four to six weeks before the monthly radio-publications can copy it. To be up-to-date in radio, one must read Radio World each week. As a weekly we are not obliged to jam all advertisements in one issue. The reader's attention and the advertisement's individuality are lost when sandwiched in between a hundred or more pages of other radio advertising, as it is in some of the monthlies. In Radio World, every advertisement is next to interesting radio news.

To buy advertising profitably, the most important thing to consider is results—profit—the pulling power of the publication. Sentiment and prejudice make poor guides. The volume and the kind of results competitors get from a publication, comprise the best reason for knowing in advance what you can expect from your advertising dollar in that particular publication.

Champlain Manufacturing Company, 90 West Broadway, New York state that within three days after the appearance of their first four-inch double-column advertisement in Radio World, they could trace sales of over 20,000 rheostats. In other words, a forty-dollar advertisement in Radio World sold for them \$20,000 worth of rheostats in three days! Radio World is the one quick-action radio-advertising medium.

For example: The Wholesale Radio Equipment Co., 24 West William Street, Newark, N. J., informs us that within two hours from the time Radio World was put on the news stands, their small advertisement brought them \$5,000 worth of orders. Another important thing is that this house does exclusively a wholesale business, proving that dealers read Radio World.

The Liberty Radio Company, Church and Liberty Streets, New York, advertisers in various radio magazines, and newspapers having radio sections, inform us that 90 per cent. of their entire results from advertising could be traced to Radio World.

The greatest test, probably, is reported by Radio Guild, 256 West 34th Street, New York. This firm used thirty-three publications, among them a publication having a circulation of nearly two million. They wrote us, on June 24 last, that as a result of this campaign in which they got over 12,000 cash orders, over 6,000 came DIRECTLY from Radio World.

The Lincoln Advertising Service, Inc., 265 Fifth Avenue, New York, placed an advertisement of Lefax, Inc., in the six leading radio-publications, one a monthly whose rate is four times higher than Radio World's. They inform us that from an actual keyed test, Radio World pulled "three to one."

We feel that these two letters conclusively prove that it is not the volume of circulation, but the reader-interest that brings profitable results.

Copies of these wonderful result-tests are yours for the asking.

It is on this evidence of results that we feel you should advertise in Radio World. It offers you an audience of over 70,000 radio buyers, many of whom have never heard of you or seen your advertisement. Radio World offers you a virgin field in which to garner your orders.

Our advertising rates, today, are but \$150 per page or \$5 per inch. On a four time order \$4.50 per inch. Our minimum rate on a 13- to 52-time order is \$4.25 per inch. We probably shall double our rate in the next 60 days, and if the present increase in circulation maintains, it will be \$15 per inch by next spring. That's why the leading houses are giving us 52-time orders, using a one-inch rate holder and using pages, half or quarter pages, as they see fit.

The latest lists obtainable show:

Retail Radio Dealers.....	9,270
Radio Manufacturers.....	1,084
Radio Supply Jobbers.....	1,307
Radio Broadcasting Stations.....	360

It is estimated that only one-half of these, about 5,000 retail dealers, carry a full line of radio goods. There is said to be one million receiving sets now in use. It is predicted there will be three million by this time next year.

ADVERTISING RATES:

One inch, one time.....	\$ 5.00
One page (3 1/2 inches).....	150.00
Classified, a word.....	0.05

SUBSCRIPTION RATES:

Per copy.....	\$0.15
Yearly (52 issues).....	6.00
Six months.....	3.00
Three months.....	1.50

10 per cent. discount for four times; 15 per cent. discount for 13 times.

Write Fred S. Clark, manager, Radio World, 1493 Broadway, New York, N. Y., for "Brass Tack" Facts on Radio Merchandising.

Plans for the American Radio Exposition

ANNOUNCEMENT has been made of the plans for the American Radio Exposition to be held in Grand Central Palace, New York City, from December 21 to 31 next, under the direction of the American Radio Exposition Company, 120 Broadway. Radio apparatus, accessories, and ma-

terials will be exhibited by manufacturers and dealers and there will be daily orchestral concerts, numbers by grand opera artists, broadcasting, illustrated lectures and other entertainment and educational features, the company announces.

The practical uses of radio and the prin-

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.

ANNUAL SHOW OF THE ST. LOUIS RADIO ASSOCIATION, St. Louis, Mo., October 4 to 7, inclusive.

CHICAGO RADIO SHOW, Coliseum, Chicago, Ill., October 4 to 22. U. J. Hermann, managing director, 549 McCormick Building.

KANSAS RADIO EXPOSITION will be held at the Kansas State Fair, Hutchinson, Kansas, September 16 to 22, inclusive. A. L. Sponsler, secretary.

RADIO CLUB OF AMERICA. First autumn meeting will be held the last Friday in September. Renville H. McCann, secretary, Columbia University, New York.

CINCINNATI RADIO-AND-ELECTRICAL EXPOSITION, Music Hall, Cincinnati, O., October 7 to 14, inclusive.

NEW YORK ELECTRICAL AND INDUSTRIAL EXPOSITION, Grand Central Palace, New York City, October 7 to 14, inclusive.

NEWARK'S SECOND ANNUAL RADIO SHOW, Robert Treat Hotel, Newark, N. J., October 4, 5, 6 and 7.

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

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

AMERICAN RADIO EXPOSITION, Grand Central Palace, New York City, December 21 to 31, inclusive. Direction American Radio Exposition Company, 120 Broadway.

BOSTON RADIO EXPOSITION, AND NEW ENGLAND AMATEUR CONVENTION, Mechanics Building, Boston, October 30 to November 4, inclusive.

SPRINGFIELD RADIO EXPOSITION, Springfield Auditorium, Springfield, Mass., October 3 to 7, inclusive.

ELECTRICAL RADIO AND AUTOMOBILE ACCESSORY EXPOSITION, Smith's Academy, Passaic, N. J., September 14, 15, 16.

principles on which it operates will be explained through the medium of motion pictures and by actual demonstration of apparatus. There will be a lectures by a prominent engineer on Senator Marconi's latest development in directed wireless. Senator Marconi has loaned his original equipment, and a duplicate of it will be exhibited and demonstrated in conjunction with the lecture.

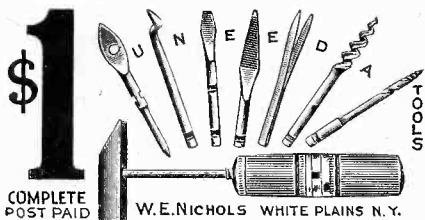
Sound-proof rooms for the demonstration of loud-speaking devices will be constructed by exhibitors, each room to have a window opening on the street or area-way so that it may be ventilated without interfering with the demonstration of other apparatus.

Various other activities are now being planned by the officers and directors of the company. They are Frank Hitchcock, president; Walter Gordon Clark, consulting engineer of New York, vice-president; Harold Bolster, head of Bolster & Co., New York, secretary and treasurer; George Brokaw Compton, of the New York law firm of Peaslee & Compton, and Chester Humphrey, vice-president of the Old Colony Trust Co., of Boston, directors.

The two main floors of Grand Central Palace have been leased and an option has been obtained on the third floor. The co-operation of the Radio Corporation of America has been assured. The Radio Corporation will exhibit its latest equipment.

Trade Note

GORDON C. SLEEPER, of the Sleeper Radio Corporation, 88 Park place, New York City, was one of the active organizers and was present at the first meeting of the National Association of Radio Manufacturers which grew out of the radio apparatus section of the Manufacturers of Electrical Supplies, and which is doing much to protect the interests of manufacturers of radio apparatus.



COMPLETE POST PAID
W.E. NICHOLS WHITE PLAINS N. Y.

Law Storage Battery

Constant voltage, large amperage. Will run two months without recharging.
Attractive Dealers' Discounts
Write for Details

WILLIAM LAW COMPANY
Aborn and Sabin Streets, Providence, R. I.

Variable Air Condensers

(Knock-Down Only)
Made with Pure Aluminum Die-Cut Plates
43-Plate \$2.25
23-Plate \$1.85
13-Plate \$1.50
3-Plate (Vernier) 90c.
Includes all necessary parts, with instructions for assembling.

THE EDDY-MARSH COMPANY
95 Westminster Street Providence, R. I.



NA-ALD DE LUXE V. T. SOCKET

Contact strips of laminated phosphor bronze press firmly against contact pins, regardless of variation in length. No open current trouble possible. Socket moulded from genuine Condensite. Practically unbreakable. Special protected slot, with exterior reinforcement. Unaffected by heat of bulbs or soldering iron. All excess metal eliminated, aiding reception. May be used for 5 Watt power tube.
Highest quality throughout. Price, 75c.
Special proposition for dealers and jobbers.

ALDEN-NAPIER CO.

Dept. L.
52 Willow St. Springfield, Mass.

KNOCKED-DOWN VARIABLE CONDENSER MONEY-SAVING PRICES

An accurately made, fully efficient instrument that cannot get out of order or adjustment. Fully guaranteed. Extra heavy aluminum plates. Condensite and pieces. All other parts heavily nickel-plated. Knob and pointer included. Furnished assembled or knocked-down at the following low prices. Easily assembled by anyone following instructions furnished. Save money—order from us. Folder upon request.



No. of plates	M.F.D. Capacity	Assembled	Knocked-down
3	.0007	\$1.75	\$1.50
11	.00025	\$2.50	\$2.00
21	.0005	\$3.25	\$2.50
43	.001	\$3.90	\$2.90

Lott's Better Radio Condenser Co.
475 ORANGE STREET NEWARK, N. J.

NOVO "B" BATTERIES FOR RADIO

22½-45 & 105 VOLTS



**NOISELESS
DEPENDABLE
GUARANTEED**

ASK YOUR DEALER

NOVO MANUFACTURING CO.
424-438 W. 33rd ST.
NEW YORK

531 SO. DEARBORN ST., CHICAGO.

Every Amateur on His Own Wave Length

WITH the advent of cooler weather, which is to bring with it tremendous demands for radio broadcasting, there is arising a certain amount of bitter feeling against the amateur who either is transmitting code or testing his home-made broadcasting station. In the larger cities these amateurs are becoming so numerous, and are in many cases so disregarding the government regulations regarding wave lengths, that they rapidly are becoming hindrances to the thousands of persons who desire to listen to the music, lectures, news, etc., being broadcast by the larger and more efficient stations.

Now there is no getting away from the fact that the amateurs have as much right to operate as have the broadcasting stations, they have as much right to fulfill their desires for pleasure as have the owners of receiving sets and have as much right to attempt to improve their work as have the more powerful plants. But it must be remembered by them that there are government regulations forbidding them operating on other than certain wave-lengths and that when they violate these regulations the chances are they are infringing upon the pleasures of their neighbors. No one believes any of the amateurs who are preventing others enjoying concerts are doing so intentionally, and it has been proven that a call on the air or on the wire phone will result in the amateur either returning to his correct wave or standing by until after the close of the program with which he is interfering.

In Cincinnati this is especially true. There are a few who have been "butting in" during the concerts broadcast by the Crosley Manufacturing Company, operators of the station WLW, and on numerous occasions persons listening in have telephoned that company. A request has been made that the operating amateurs be reported to the government. There was a serious problem faced by WLW. Persons in charge of the station did not desire to report offending amateurs, and still they did not want to have marred the pleasures of the men, women, and children who listen in every time the station opens up. And so, instead of sending reports to Washington, reports which in all probability would have resulted in the cancellation of some amateur's license, the following message was broadcast:

"We understand some amateur in or near Cincinnati, sending code, is operating on a 360 meter wave and is interfering with our concert. The operator doing this either knows he is violating government regulations, or is operating in ignorance of the fact that he is far off his own wave. We would appreciate it if this person, who is operating station —, would stand by until the close of our concert."

The effect was instantaneous. Either the operator or someone in his station was listening in, and no sooner had the message been broadcast by WLW than the amateur signed off. Now WLW has a friend it would not have had had a different course been pursued. The following day the amateur operator came to Crosley Company with an apology, and never since that night has a Cincinnati amateur operated on a wave that interferes with the music broadcast by WLW.

A Radio Necessity!

Latest 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.

Attention

Vacuum Tube Users

SAVE \$1.50
ON
DETECTORS

SAVE \$3
ON
AMPLIFIERS

REPAIRING

Marconi, Moorhead, Electron Relay, A. P.
Radiotron UV200—UV201
Cunningham C-300—C-301
Detectors for \$3.50 Amplifiers \$3.50

Prompt Deliveries, Satisfactory Results
Reasonably Guaranteed

GEO. H. PORELL CO., INC.
CUTTER SQUARE WEST SOMERVILLE, MASS.

LOWEST PRICES

FORMICA RADIO PANELS

3/16 in. thick, cut to size, per sq. in. 2c.

MAGNET WIRE, per 1/2 lb. Spool

B. & S. Gauge	Enam.	D. C. C.	D. S. C.
22	\$.40	\$.68	\$1.22
24	.48	.79	1.41
26	.54	.96	1.75
28	.58	1.12	2.08

HUGHES ENGINEERING CO.
P. O. Box 57 Terrace Park, Ohio

Welcome! Come in and hear the

Coraco

Radio Concert

Daily, 9 A. M. to 5 P. M.

18th Floor, 220 W. 42nd St., next to
Amsterdam Theatre

The Coraco Super-Radiophone is the latest and greatest improvement in radio, it has no outside connections—no installations expense—is as simple to operate as a phonograph. If you cannot call, write for full information.

The Coraco Company, Inc.

220 West 42nd Street New York

Buy Your Radio Receiving Set at Manufacturers' Cost

Buy your Radio Supplies at a large discount below the list or retail price. If a saving of \$15.00 to \$140.00 on a Radio Receiving Set or if a saving of 25% to 40% on Radio Supplies interests you, write or telegraph us today.

KING RADIO MFG. COMPANY
521 Penn Ave. Wilkinsburg, Pa.

Pictures and Facts About Armstrong Amplifier

Radio World has published a number of pictures, diagrams and descriptive articles regarding the New Armstrong Super-Regenerative Amplifier. The numbers containing this material are dated June 24, July 8, July 15, and August 5. They will be sent postpaid on receipt of 15 cents each, the four copies complete for 60 cents. Or you can subscribe, \$6.00 year; \$3.00, six months; and have your subscription start with the number dated June 24. RADIO WORLD CO., 1493 Broadway, New York.

NOW THAT YOU ARE BACK FROM YOUR VACATION—

Be sure to see that your file of RADIO WORLD is complete. There will soon be so great a demand for back numbers that the supply will not be sufficient to cover it. RADIO WORLD has been issued every week from April 1 to date (22 numbers up to August 26th issue). Mail, postpaid, for 15c a copy; any seven copies for \$1.00. The first 22 copies sent on receipt of \$3.00. Or send \$6.00 for one year (52 issues) and have your sub start with No. 1.—RADIO WORLD, 1493 Broadway, New York City.

The Octagon Elec. Co.

We Make and Install Complete Radio Sets.
Full Line of Accessories Carried in Stock.

The Octagon Elec. Co.

219 West 14th St. New York City

The Nelson Radio Parts Co.

Manufacturers and Distributors of

RADIO APPARATUS

Write for Catalog.

89 ACADEMY STREET, NEWARK, N. J.
Tel. Market 4066

Rocky Mountain Crystals

BETTER THAN GALENA

The most sensitive mineral rectifier known. Can also be used with one or more stages of amplification.

Mounted, 35c.; Unmounted, 20c.; Postpaid
Manufacturers, Jobbers, Dealers, Clubs,
Apply for Special Trade Prices

Rocky Mountain Radio Products, Inc.

9 CHURCH ST., NEW YORK, N. Y.

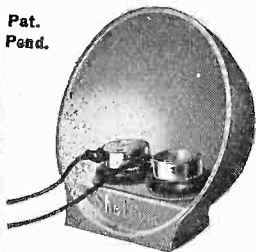
RADIO MAILING LISTS

6900 RETAIL RADIO DEALERS covering the United States, by states, price per thousand\$7.50
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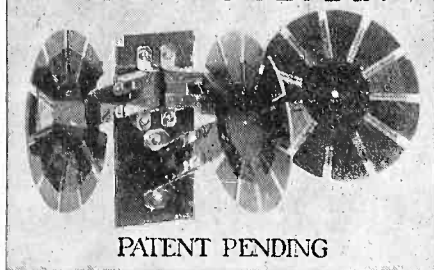
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Dr. Miller, of Chicago, writes: "My perfectly good variometers and vario-coupler now go into the discard."

The Human Body as An Aerial

THE radio novice, studying the exterior mechanism of the receiving apparatus, while listening to a broadcasting program, is likely to discover, to his consternation, that he can change music into discordant squeals and squawks by putting his finger against the grid-leak or a transformer, or merely by passing his hand near some part of the sensitive tuning apparatus, says Henry Smith Williams, in "The American," New York.

If he seeks an explanation of the anomaly, he is told that "body capacity" has done it. And this means, in simple English, that a charge of electricity from the body has entered into the delicately adjusted circuit of the radio apparatus, putting the receiver "out of tune."

Such an experience serves to give tangible evidence that the human body is, in effect, an aerial sharing with the wires of the radio apparatus a capacity to store electricity. In the technical phrase of the radio fan, the body, like the wired aerial, has "inductance," and "capacity." It transmits electricity as well as stores it. It also offers a certain resistance to the passing of an electric current. And since these qualities are essential characteristics of the apparatus with which the radio operator traps the radio waves and brings the message-bearing current to his receiver, it follows that the human body is virtually an aerial.

Moreover, it has been shown that on occasion the body can practically take the place of the ordinary aerial of wire.

The body is not an efficient aerial, however, but its efficiency may be enhanced by winding a few coils of wire about the waist, as was done recently by one of Signor Marconi's assistants in testing a sensitive amplifier.

The time will probably come when people will go about their regular business wearing a wired belt for aerial, and carrying an invisible apparatus in a pocket, like a watch. To make this feasible, nothing more is required than to condense the radio-receiving apparatus to compact form, as the original grandfather's clock timepiece was condensed to make a watch. Perhaps we shall even be able to do away with the belt, and let the body serve as aerial.

Many boys have made "freak" radio-receiving sets of diminutive size. One such is in a match box; another, shaped like a ring. But these are relatively feeble receivers, of the crystal-detector type, and they require more or less cumbersome aeriels. The desideratum is a vacuum-tube set divested of long aerial wires and of large batteries. Such a set will probably be an achievement of the near future.

Radio-Frequency Sets

DESPITE the fact that radio-frequency amplifying apparatus is tricky and difficult to build and handle, there have now appeared on the market a number of radio-frequency units, says "The Scientific American," which may be used in connection with the usual receiving set, as well as complete receiving sets with one-, two- and even three-stage radio-frequency amplifiers, a detector, and one or two stages of audio-frequency amplification. It is still too soon to say just how efficient these manufactured radio-frequency amplifiers are, but we hope that they are thoroughly practical and devoid of all the experimentation that generally goes along with a home-made radio-frequency outfit.

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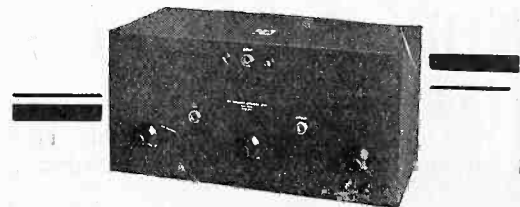
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Over the Hertzian Waves

WGY, Schenectady, N. Y., Sept. 12-15 inc.

WGY, the radio broadcasting station of the General Electric Co. at Schenectady, N. Y. introduced its new fall schedule of Monday evening, September 11 with the presentation of "The Garden of Allah," the drama founded on Robert Hichens's novel. Edward Smith and players who made such a pronounced success recently in the radio production, "The Wolf," by Eugene Walters, will read the story in three episodes.

The station will offer programs of entertainment, in the future, four nights a week, Monday, Tuesday, Thursday and Friday with an extra program every Friday at 10:30 p. m. eastern standard time. A daily program of music and addresses was added Monday, September 11. At 2 o'clock every day, except Saturday and Sunday, musical numbers will be transmitted and also short talks of special interest to women.

(All time references are Eastern Standard Time. If your community is on Daylight Saving Time, programs will be one hour later.)

Wednesday, September 13

P. M.
 12:00—United States Naval Observatory time signals.
 12:30—Noon stock market quotations.
 12:45—Weather forecast on 485 meters.
 2:00—Music.
 6:00—Produce and stock market quotations and reports; baseball results; news bulletins.

Thursday, September 14

12:00—United States Naval Observatory time signals.
 12:30—Noon stock market quotations.
 12:45—Weather forecast on 485-meter wave length.
 2:00—Music.
 6:00—Produce and stock market quotations; baseball results; news bulletins.
 7:45—Concert program.
 Soprano solo: Pilgrim's Song.....Tschaikowsky
 Jeanne Woolford
 Cornet solo: Serenade.....Gounod
 Frederick J. Cinnick
 Soprano solo: A Dream.....Bartlett
 Master Walter Sickles
 Reading: The Vagabonds.....Trowbridge
 William Nugent
 Soprano solo: The Danza.....Chadwick
 Jeanne Woolford
 Cornet solo: Polka, "The Bride of the Waves".....Clarke
 Mr. Cinnick
 Soprano solo: Oh, for the Wings of a Dove.....Mendelssohn
 Master Sickles
 Reading: Whisperin' Bill.....Bachelor
 Mr. Nugent
 Soprano solo: Trees.....Fergus
 Jeanne Woolford
 Cornet solo: The Volunteer.....W. Rogers
 Mr. Cinnick
 Soprano solo: Still Wie Die Nacht.....Bohm
 Jeanne Woolford
 Readings: (a) Leetle Batiste.....Drummond
 (b) If.....Kipling
 Mr. Nugent
 Soprano solo: Ray of Sunshine.....Di Capua
 Master Sickles
 Piano solo: Fantaisie Impromptu, Op. 66.....Chopin
 Harold Bauer—Duo-Art
 Soprano solo: Rondel of Spring.....Bibb
 Jeanne Woolford

Friday, September 15

P. M.
 12:00—United States Naval Observatory time signals.
 12:30—Noon stock market quotations.
 12:45—Weather forecast on 485-meter wave length.
 2:00—Music and address on "Thrift in the Household."
 6:00—Produce and stock market quotations; baseball results; news bulletins.

6:30—"How the Rhinoceros Got His Skin," from Kipling's Just So Stories. Kolin Hager, reader.
 7:40—Health talk: "Scarlet Fever," by Herman M. Biggs, New York State Health Department.
 7:45—Concert program.
 Piano solo: Spring Dance.....Grieg
 O. G. Yettru
 Violin solo: Concerto (2nd movement), Mendelssohn
 Tom De Stephano
 Soprano solo: My Mother Bids Me Bind My Hair, Haydn
 Miss Gladys Davey
 Miss Smith, Accompanist
 Quartet: A. The Mill.....Raff
 B. Interludum in Modo Antico, Glazounwo
 WGY Instrumental Quartet; Edward Rice, Leader
 Piano solo: To a Wild Rose.....MacDowell
 O. G. Yettru
 Quartet: A. Drink to Me Only with Thine Eyes, Old English, Pochon
 B. Spring.....Grieg
 WGY Instrumental Quartet; Edward Rice, Leader
 Soprano solos: A. I Meant to Do My Work Today, Dent Mowry
 B. There Are Fairies at the Bottom of Our Garden.....Lehmann
 Miss Gladys Davey
 Miss Smith, Accompanist
 Quartet: Andante Cantabile.....Tschaikowsky
 WGY Instrumental Quartet; Edward Rice, Leader
 Violin solo: Melodie.....Huerter
 Tom De Stephano
 Soprano solo: Care Selve (Atalanta).....Handel
 Miss Gladys Davey
 Miss Smith, Accompanist
 Instrumental Quartet: Finale, from the American Indian Quartet.....Dvorak
 WGY Instrumental Quartet; Edward Rice, Leader

Friday, September 15 (Late Program, 10:30 p. m.)

Orchestra: A. March, Behind the Hounds...Allen
 B. Walze, Dreamy Hawaii, Wandersloot
 C. Fox Trot, Lonesome Mama Blues, Brown
 WGY Instrumental Quartet
 Tenor solos: A. To My First Love.....Lohr
 B. Dear Little Girl.....Lohr
 Carl Jester
 Orchestra: Irene.....Tierney
 WGY Instrumental Quartet
 Cornet solos: My Regards.....Lewellyn
 Theodore F. Nessler
 Tenor solos: A. Little Banjo.....Dichmont
 B. Mighty Lak a Rose.....Nevin
 Mr. Jester
 Orchestra: A. Overture, The Calif of Bagdad, Boieldieu
 B. Fox Trot, Why Is the Moon Always Shining.....Flynn-St. John
 WGY Instrumental Quartet
 Cornet solo: My Heart at Thy Sweet Voice, Saint Saens
 Mr. Nessler
 Tenor solo: Ah, So Pure! "Martha".....Flotow
 Mr. Jester
 Orchestra: A. Fox Trot, Dancing Fool.....Snyder
 B. March, United States Field Artillery.....Sousa
 WGY Instrumental Quartet

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Radio to Be Big Factor in World Communication

New Transmitting Stations as Well as New Cables Necessary to Meet Steady Demand for Speedy Service

COMMUNICATION systems throughout the world were so generally affected by the World War that the traffic handled on every route in operation after the armistice was greatly in excess of any previous record, says P. E. Nagle, communications expert of the Department of Commerce in the current issue of "Commerce Reports." This increased traffic, he states, is partly due to the suspension of service on such important communication routes as the Indo-European Telegraph Company, the Great Northern Telegraph Company, and the various German and German-Dutch cables, and the officials of American companies were generally of the opinion that with the restoration of service on the routes mentioned there would be a noticeable falling off in the volume of messages handled by American companies. Events, however, according to Mr. Nagle, did not bear out this view, and at the present date, American cable and radio companies are handling more traffic than they ever did except during the war and the two years immediately following armistice.

"The result of this steady growth in traffic has been to keep up the interest in plans for new cables and new radio stations, and every American communication company is now actively engaged in the construction of additional facilities and in plans for new routes and methods for the improvement of operation conditions.

"In the field of radiotelegraphy, the provision of American facilities for communication with foreign countries is dependent to a large extent on the erection of the corresponding stations abroad, and since, with the possible exception of Latin America, radiotelegraphy is a government monopoly in foreign countries, or at least a monopoly of a domestic enterprise, the development of the art in foreign countries and the provision of the requisite funds is a preliminary to any progress in the United States.

"Most of the Latin American republics permit the erection, in their territory, of foreign-owned radio stations for intercontinental work, and, at present, construction work is in progress at Buenos Aires on a high-power transmitting station and its corresponding receiving station, and on similar units at Rio de Janeiro. In the case of these two countries, the foreign countries involved, American, British, French, and German, have united to build one high-power central station with the units necessary for direct communication with the countries of Europe and North America. It is said that the Buenos Aires station will be completed in another year, and the one at Rio de Janeiro within two years from this date. This service, when established, will form the first direct communication by radio from South America to other continents, although, at the present time, a wireless press service is being received at Buenos Aires from France."

Work Advancing on Atlantic Coast

"The consolidation and coordination of the system of high-power radio stations on the Atlantic Coast is going steadily on, and is keeping pace with the development abroad. Regular radio-service from the United States is now maintained by commercial companies with the Hawaiian Islands, Japan, Norway, the United Kingdom, Germany, and France, and by land wire distribution from many of these countries to points beyond. In addition the United States Naval Communication service is handling commercial traffic to the Philippine Islands, China, Siberia, Siam, Dutch East Indies,

portions of Australasia, and to Italy, and Belgium. Many of these foreign centers receive radio messages from the United States Navy and distribute to points beyond. The Belgian circuit, it should be noted, is a one-way route only, as Belgium has not yet a high-power station capable of transatlantic communication. This commercial service, via naval radio, is temporary, however, since the Navy is authorized to handle commercial radio-traffic only where no private companies have circuits in operation. With the completion of the new Belgian station near Brussels, and the new Italian station at Cultano, the radio traffic will undoubtedly pass into the hands of American commercial-radio companies. The same is true of the projected extension of governmental radio-facilities in the Far East.

"American radio companies are also developing systems of radio communication with Central America, with New Orleans as the main center for American reception and transmission.

"A new high-power station is in course of construction in Poland, another is nearing completion near Christiania, and various others are projected in the smaller European countries. A new high-power station has just been completed at St. Assise, Department of Seine et Marne, France, which is designed to communicate chiefly with the United States, replacing the Lafayette station at Bordeaux. With this station and with those at Christiania and Warsaw, communication will be direct with the United States."

New Cables in Connection with Radio

"In the cable field, cables from New York to Emden, Germany, via the Azores, are planned by two American cable companies. These will restore the routes formerly existing from the United States to Germany, and discontinued as the result of the seizure of the German cables by the Allies during the war. These same two companies are each planning a new Pacific cable, one by way of Hawaii and Midway Island to

Japan, and the other north by way of Alaska and the Aleutian Islands to Siberia and the Orient.

"One of these American companies plans, also, to open its service from the United States to Brazil within the next few months and to extend this service overland and up the West Coast to Panama. Eventually this company will have a complete circuit around the continent of South America. Another American company plans a cable extension along the northern coast of South America touching various ports in Colombia and Venezuela and connecting with the West Indian system of the same company.

"All of these developments and the great improvements they foreshadow in the foreign communications of the United States, are impeded at present by various difficulties such as political considerations in the foreign countries concerned, and obstacles in the form of exclusive concessions held by foreign companies. Steady progress is being made, however, in the solution of these problems, and within the next two years the cable and radio system available for the use of American business interests should be considerably enlarged, and the service decidedly improved."

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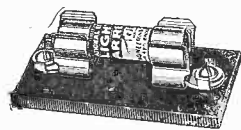
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Our list prices:—2000 Ohms, \$6.50; 2200 Ohms, \$7.50; 3000 Ohms, \$9.00 each.



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COMPLETE RADIO SET
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 This outfit is intended for the fan that appreciates a good thing. It includes a high grade tuner with a 40 to 60 mile radius, 1200 ohm phone, insulators, and complete aerial set. **SEND NO MONEY** unless you wish. Simply send us your name and address, and we will mail immediately. You pay Postman on arrival, our price, plus postage. Satisfaction guaranteed, or money refunded.
THE UNWIN TRADING CO.
 55 BROADWAY NEW YORK

Radio Waves Set 2,500-Ton Train in Motion
 AN event which history will record as comparable with George Stephenson's locomotive—when it started its first journey over wooden rails propelled by its own steam, in 1805—took place last week when the International Trade Special, comprising a steam locomotive and thirty-five cars loaded with electrical equipment for the State Railways of Chili, was set in motion by radio waves from KDKA, Westinghouse station, East Pittsburgh, Pennsylvania.

When young George Stephenson started his first locomotive on the Merthyr-Tydvil Railways in South Wales, it hauled several wagons containing ten tons of bar iron at five miles an hour. At once, the intrepid inventor was beset with objections, the principal one being that to permit "such a device to travel at so high a rate of speed would be a menace to life and limbs." For a long time it looked as if steam power was doomed by the narrow-minded. Slow are the footsteps of progress!

Today, 117 years later, a train weighing, with its heavy load, 2,500 tons and measuring a quarter of a mile in length, is set in motion by radio.

The International Trade Special's way-bills stated that the freight it carried was valued at \$750,000. When the big locomotive hooked up with the sealed cars, and all was ready for the long journey, the president of the Westinghouse Company closed a switch on a pole about 150 feet from the railroad track on which the train was standing, and one-half mile from the broadcasting station. The closing this switch was communicated to KDKA, causing them to broadcast a special code-signal consisting of a series of dots and dashes. The special radio receiving apparatus set up in the cab of the locomotive, and including an aerial mounted on top of the engine cab, was set to pick up only the special code signal broadcast from the station. When this signal was broadcast, the radio receiving apparatus on the locomotive picked it up and, by means of a selector switch, the control circuits in the locomotive were closed and the train was set in motion and accelerated automatically.

As the train gained in momentum and attained a speed of ten miles an hour, the engineer took his seat in the cab and the big load was moving over its first lap to Chili.

Radio Travels to Mars
 EVERY radio wave that leaves a transmitter here on the earth starts out on an endless journey through space, says Raymond Francis Yates in the "Evening Mail Radio Review." Marconi's first message is still sweeping through the ether lanes billions upon billions of miles beyond the earth. It will go on forever. Every ether wave that leaves the earth touches the planet Mars a few months later. By the time an ether wave reaches Mars, however, much of its energy is spent, and it is questionable if the Martians, if they do really exist, have instruments sensitive enough to detect these waves.

A Wonderful Age!
 WHAT a wonderful age we live in! exclaims "The American," New York. An American concern has just been awarded a contract for the construction of a two-million-dollar wireless station in Sweden. This powerful new plant will be a link in the chain of wireless stations which will eventually encircle the world.
 An Italian developed the wireless for the world. An American concern will first send a message by it around the world.

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RADIO DIRECTORY..... .50
RADIO FOR BEGINNERS..... 1.00
 Buy them to-day from your dealer or direct from
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AGENTS
 Wanted in every city and town to sell radio apparatus. Good commissions. A few stocking agencies open to reliable parties.
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 The above tubes are the genuine army J's and E's, respectively.
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CRYSTAL SET \$4.00
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 A practical, inexpensive receiving set with which you can hear all stations within your vicinity.
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Why Alternating Current Is Used

IF you use a small spark-coil it will be necessary to have about four dry cells or a storage battery of 60 ampere-hours capacity. Larger coils could use a larger battery. The voltage to be used varies with the particular coil, but generally ranges from six to twelve.

If you use a transformer, you must connect it with your alternating current supply line, which is usually either 110 or 220 volts. Be sure and find out the line voltage, and get a transformer to suit. Also, be sure that you have alternating current, as otherwise your transformer, or possibly the line wiring, would burn out. A one-half kilowatt transformer draws from three to four amperes of current.

The current for transformers up to one-half kilowatt may be supplied from a lamp socket, but transformers of higher power should have special wiring.

Condensers for transmission on a wave-length of 200 metres should not exceed a capacity of .01 microfarad. Leyden jars, as used on commercial sets, have a capacity of .002 mfd., and five of these connected in parallel would give a value of .01 mfd.

The primary of the oscillation transformer should have about four or five turns, and the secondary should have about ten or twelve turns.

With a quarter kilowatt set, the antennae ammeter should have a maximum scale reading of about three amperes.

Other powers should have meter readings in proportion.

The rotary gap rotor should have from four to twelve electrodes, this depending on the speed of the motor and the tone desired.

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

APRIL 8.

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

APRIL 15.

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

APRIL 29.

Valuable Pointers on Aerial Construction, by Edward Linwood.
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 Honey-Comb Coils and Condensers, by Edward Linwood.
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 Why the Condenser Doesn't Condense, by E. L. Bragdon.
 Making Signals Louder with Two-Stage Amplifier, by George W. May.

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latest issue of the Radio Service Bulletin and will be continued if found of service to the readers of the Government publication.

The lists cover subjects of importance and interest to the more advanced radio enthusiasts and include not only American publications but also those published in

foreign countries. Bureau of Standards Circular No. 122, "Sources of Elementary Radio Information," suitable for the novice, may be had from the Superintendent of Documents, Government Printing Office, Washington, D. C., for five cents. They are valuable to all amateurs.

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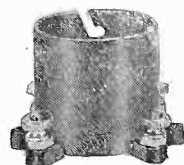
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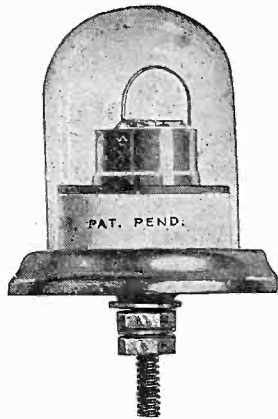
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Not So Easy to Win "The Blue Ticket"

WHILE studying theory and while getting your set in condition for operation, you can still keep up your code practice, and gain proficiency, says "The Globe," New York. It is the same with code as with music; you have to keep in continual practice. Even after you have gained considerable speed, you must keep up your practice, or else you will grow "stale," and lose some of your ability to copy messages.

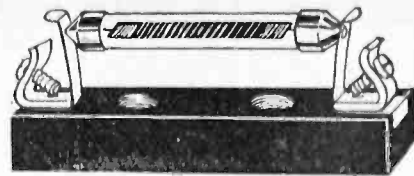
Not only must the characters of the alphabet be known, but also a number of the conventional signs and "Q" signals. You must also know how to send a message in proper form.

So the radio enthusiast who desires to install and operate a set of apparatus for voice transmission only, the regulations requiring a knowledge of the code may seem foolish—and to a certain extent they are foolish. Eventually a fairly thorough technical knowledge, and a sufficient knowledge of the code to recognize distress signals and "keep-out" signs, will be all that is necessary to comply with the requirements to operate a radiophone sending station.

Probably the first thing that you will try for is the amateur first-grade license, or "blue ticket." As far as code is concerned, this means that you will have to copy at least ten words a minute (five letters to a word), and you must copy at least fifty letters in their consecutive order. The grades of Commercial Second, and Commercial First, require code speeds of twelve and twenty words a minute, respectively.

The technical examination covers the adjustment and operation of the particular set that you intend to use. A diagram is necessary, and you will be required to explain the different parts.

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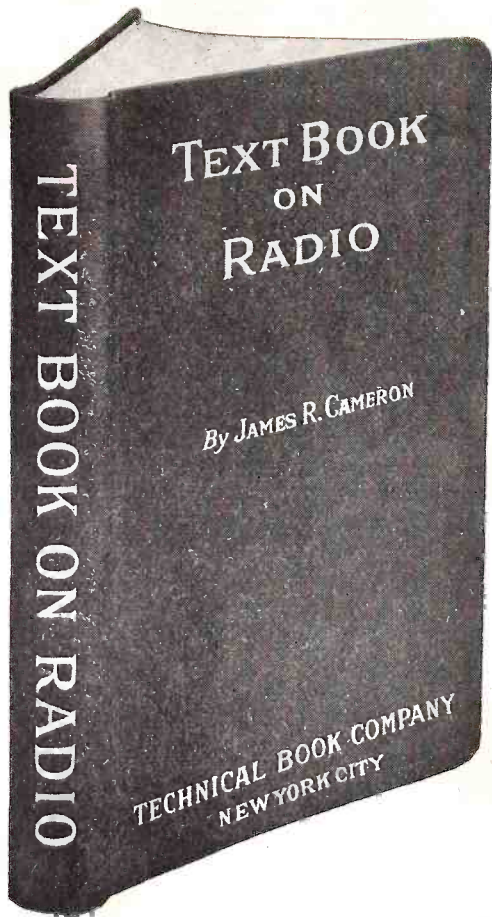
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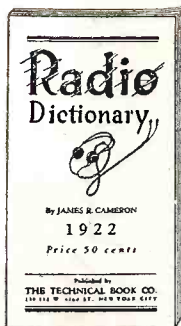
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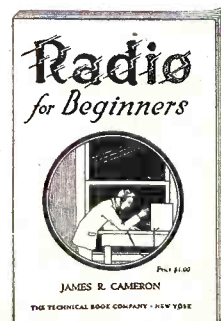
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