

Combining Radio Frequency and Regeneration. (See Inside)

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March 24

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RADIO

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WORLD

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WEEKLY

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(C. Harris and Lwing)

An ingenious radio receiving set, the novelty of which is that it makes its own record of messages received, without the necessity of the operator being constantly "on the job." It recently was perfected for use by the Bureau of Standards, Washington, D. C. The illustration shows the two inventors, Dr. J. C. Karcher (left) and Dr. E. A. Eckhardt (right), getting their machine into final working order. The large cylinder in the center of the picture is the roller upon which is drawn a jagged line, representing the dots

and dashes of the message, and which preserves the record of the signals received. The record is taken down by an ordinary fountain pen which travels horizontally across the sheet, actuated by a very slow feed fine machine screw attachment, driven by a small motor. The signals themselves are amplified, and the output actuates a very sensitive relay which in turn works the mechanism which causes the pen to oscillate in irregular lines, which are transcribed at the leisure of the operator.

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RADIO WORLD, 1493 Broadway, N. Y.

VOLUME TWO OF
RADIO WORLD

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

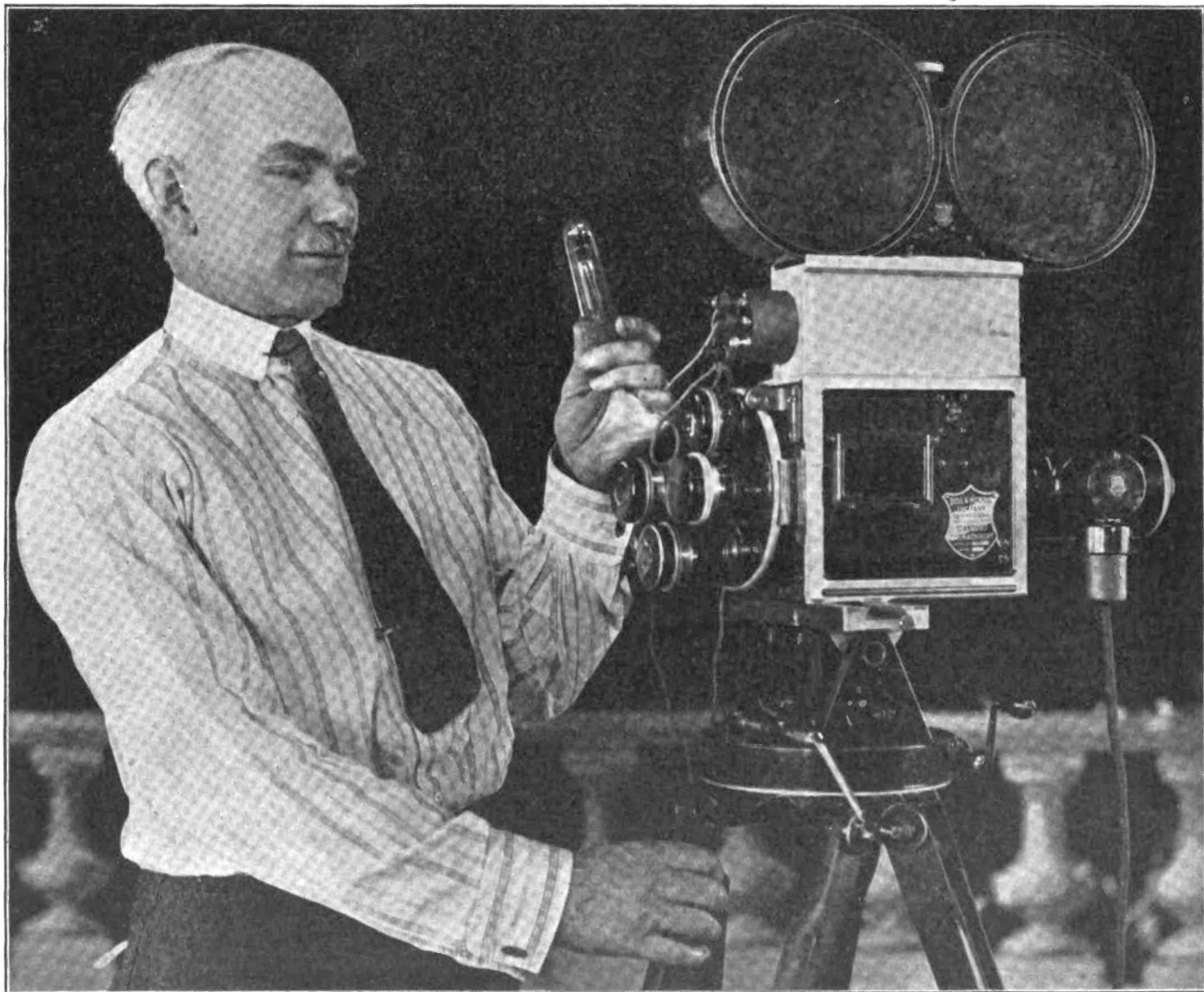
A Weekly Journal, Published Every Wednesday and Dated Saturday, by Hennessy Radio Publications Corporation from Publication Office, 1493 Broadway, New York, N. Y. Telephone: Bryant 4796.

Vol. II, No. 26. Whole No. 52

March 24, 1923

15c per copy, \$6.00 a year

Dr. Lee De Forest Demonstrates His Talking Picture Machine



Dr. Lee De Forest demonstrating his wonderful new invention which will make talking motion pictures possible. Dr. De Forest is holding the "Photion" tube, which is the heart of the invention. (C. Paul Thompson)

A vital step forward in the field of science was demonstrated on March 12, 1923, in Dr. Lee De Forest's studio, New York City, by Dr. De Forest himself. The device exhibited was a machine for photographing the human voice on the edge of a regular motion picture film while the picture itself is being taken.

Dr. De Forest has been working for the past three years on this invention, and has at last been able to call his experiments a success. The illustration herewith shows the inventor, who is also responsible for the present day audion and vacuum tube, with an ordinary motion picture camera, which he has adapted for use with his new device. He is holding what is

termed a photion tube, that is used to produce the voice on the film itself in a manner that at the present time cannot be made public.

By means of this device it will soon be possible to sit in your favorite moving picture theatre and instead of looking at the "pictures" you will also be enabled to hear the voices of the actors themselves. This idea is not new in itself, as many inventors have attempted to do the same thing for a number of years. Those of you whose memories are good will remember the attempt to synchronize motion pictures and talking machines at the old Eden Musee in New York some years ago that met with such a terrible failure.

Combining Radio Frequency and Regeneration

By C. White, Consulting Engineer

RADIO frequency amplification and regeneration have often been looked upon as two different ways of obtaining the same end and have seldom, if ever, been considered as a possible combination. The reason for this opinion has been due largely to the trouble experienced in keeping the tubes in the radio-frequency stages from oscillating. This tendency has existed even when no type of tickler or feed-back was employed. Poorly designed radio-frequency amplifying transformers, inductive reaction of the fields of the various radio stages due to a compact assembly with little or no intershielding, poorly insulated connecting wires, and incorrect style or make of vacuum tube have been blamed. But, the most potent reason, which was the feed-back of current through the common "A" and "B" batteries, was generally left unconsidered.

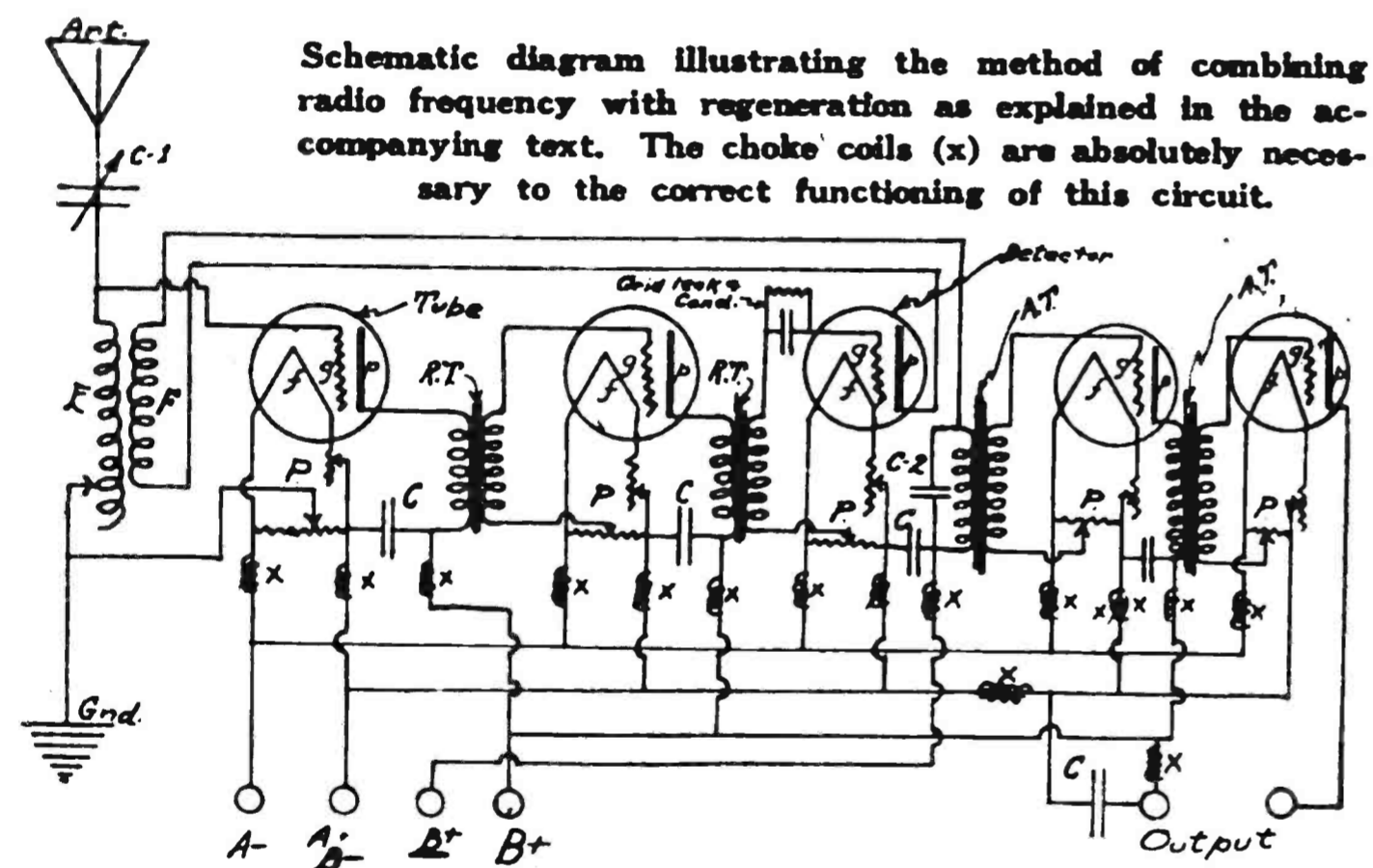
From my own laboratory experience it has been definitely proved that howling and other reactions that are far above the range of audibility are produced by this

the distant stations come in on a loud speaker that for a time we were almost certain that it was a rather nearby broadcasting station.

To many looking for the first time at the diagram the cost of this set will appear to be excessive; but such is not the case, for it is possible by careful selection of the right apparatus and the right place to buy to complete this set at a total cost of about \$150.

For the amateur who wishes to extend the range of his present single circuit regenerative tuner, the schematic connections as shown in the illustration herewith will be an aid. It simply will be necessary for him to insert two radio-frequency amplifying transformers and two extra tubes before the detecting bulb and add the audio-frequency stages after the detector. Then he will have the combined advantages of two stages of radio-frequency, a regenerative detector, and two stages of audio-frequency amplification. Of course, he will have to place in the lead wires of his outfit the necessary choke coils marked X and the by-pass condensers designated by the letter C. Although the potentiometers are an added refinement still their use is fully justified since with them in the circuit it is possible to hold the grid of each tube to the correct negative potential and thus cut down all tendency of oscillation in the radio-frequency stages, thereby confining oscillation and regeneration to the detector tube alone, where it should be.

The constants and the types of apparatus for the various important parts of the circuit are as follows: The condenser C-1 is a 23 plate air variable, the unit E-F is an ordinary standard variocoupler employing E for the stator in the circuit and F for the rotor. All the units marked P are potentiometers having a resistance of about 250 ohms, the units marked X are choke coils that have an inductance of .1 henry, and the condensers lettered C have a capacity of .25 mfd. apiece. The transformers labeled R.T. are the radio-frequency transformers and those with A.T. on them are the audio-frequency amplifying transformers. A grid leak and grid leak condenser are recommended for use in the grid circuit of the detecting tube. The resistance and capacity of the same solely depends upon the particular tube used and easily can be found by trial, since the operation of the entire outfit does not critically depend upon it. The condenser C-2 is a fixed mica condenser of .002 mfd. capacity. The "B" battery terminal marked B+ is the positive terminal for the plate voltage applied to the detecting bulb, since it will be necessary to impress less plate potential on the detector than on the amplifiers. In order to keep the expense of operation as low as possible it is recommended that the new UV201-A Radiotrons or Cunningham's C301-A tubes be employed for all the stages and the detector. WD-11 tubes do not function satisfactorily with this type of circuit, and the ordinary tubes would require five amperes at five volts for operation whereas the type recommended would require only 1¼ amperes at five volts—just one-fourth as much power to light the filaments. Phone terminal jacks can be used on the audio-frequency stages but it is far better to adjust amplification by lowering the filaments of both tubes than to put out one tube and burn the other brightly.



frequent cause. Many receivers using a single tube as a detector without a tickler or feed-back and several stages of radio-frequency severely suffered in their range of reception efficiency due to the fact that at times for no apparent reason one or more of the tubes would start oscillating. At times, however, the inter-reaction was so severe that a constant hum or whistle could be heard in the phones. After placing choke coils and by-pass condensers in the battery lead wire circuits it was ascertained that practically all trouble due to oscillations was eliminated, that the reception efficiency was remarkably increased and the reliability or stability of operation was greatly enhanced. So stable and steady did the operation become when a potentiometer was placed across the filament of each tube in the set that it was decided to try out a tickler coil in the plate circuit of the detecting tube and see if the old tendency to oscillate when the filament was turned up a little too high returned.

It was found, however, that there was practically no difference between the outfit and an ordinary regenerative receiver in case of oscillation and stopping the same to adjust for maximum regeneration which is obtained when the detector is on the verge of jumping into oscillation. The receiver tuned-in very distant stations as easily as a good reliable single circuit regenerative tuner picking up local stations. So clear did

Boy Scouts Carry Radio With Them on Hikes

By David B. Rogers

WHEN the Boy Scouts go week-ending at Kanohwahke Lakes, N. J., in the Palisades Interstate Park where the Boy Scout Foundation of Greater New York conducts the largest all-the-year-round Scout camp in the world, they carry their radio with them. During the day it is useful for keeping in touch with headquarters, and at night it is called upon to prove its recreational value.

Several hundred Boy Scout troops in New York City now have sets, mostly of the portable type for field use, but in addition some of the troops maintain powerful tube sets at their headquarters. In many cases the sets have been designed and built by the boys themselves. Scout Robert S. Dunham of Troop 501, Manhattan, is responsible for one of the most efficient of these home-made sets. By an ingenious hook-up and panel plan, with jacks permitting the insertion of either head phones or microphone, he has concentrated his whole apparatus in a small rectangular box weighing less than ten pounds.

The Scouts were active in wireless work even previous to the recent radio boom. For a number of years now, a special radio award has been included on the list of Merit Badges given to Scouts acquiring specific knowledge of some sixty different vocational and avocational activities such as agriculture, signalling, plumbing, chemistry, printing, public health, craftsmanship, first-aid, business, civics, art, and electricity. And now the Radio Badge is worn with pride on many a khaki service sleeve.



Boy Scouts carry a portable radio set on their hikes and practice receiving and transmitting between different units.

Chronology of Speech Transmission by Wire and Wireless

In its annual report to stockholders for the year 1922, made public last week, the American Telephone and Telegraph Company publishes the following interesting chronological table of events in the transmission of speech:

- 1875 First words transmitted by telephone.
- 1876 First complete sentence transmitted by telephone. First conversation by overhead line, 2 miles—Boston to Cambridge.
- 1880 30,872 Bell telephone stations in the United States. Conversation by overhead line, 45 miles—Boston to Providence.
- 1881 Conversation by underground cable, $\frac{1}{4}$ mile.
- 1884 Conversation by overhead line (hard-drawn copper), 235 miles—Boston to New York.
- 1890 211,503 Bell telephone stations.
- 1892 Conversation by overhead line, 900 miles—New York to Chicago.
- 1900 676,733 Bell telephone stations owned and connected.
- 1902 First conversation by long-distance underground cable, 10 miles—New York to Newark.
- 1906 Conversation by underground cable, 90 miles—New York to Philadelphia.
- 1910 5,142,692 Bell telephone stations owned and connected.
- 1911 Conversation by overhead line, 2,100 miles—New York to Denver.
- 1913 Conversation by overhead line, 2,600 miles—New York to Salt Lake City. Conversation by underground cable, 455 miles—Boston to Washington.
- 1915 First conversation by transcontinental line, 3,650 miles—Boston to San Francisco. Speech transmitted for the first time by radio telephone from Arlington, Va., across the continent to San Francisco, over the Pacific to the Hawaiian Islands, and across the Atlantic to Paris.
- 1920 11,795,747 Bell telephone stations owned and connected.
- 1921 Conversation by deep sea cable, 115 miles—Key West, Fla., to Havana, Cuba. First conversation between Havana, Cuba, and Catalina Island by submarine cable, overhead and underground lines and radio telephone—distance 5,500 miles. Extension of Boston-Philadelphia cable to Pittsburgh—total distance 621 miles. President Harding's inaugural address delivered by loud speaker to more than 100,000 people. Armistice Day exercises at burial of unknown soldier delivered by means of loud speaker and long lines to more than 150,000 people in Arlington, Va., New York and San Francisco.
- 1922 Ship-to-shore conversation by wire and wireless between Bell telephones in homes and offices and the S. S. America 400 miles at sea in the Atlantic.
- 1923 14,050,565 Bell telephone stations owned and connected. Successful demonstration of trans-oceanic radio telephony from a Bell telephone station in New York City to a group of scientists and journalists in New Southgate, England.

A Simple Method of Winding Coils for the Flewelling Circuit

By Arthur S. Gordon

IF you are experimenting with the new Flewelling circuit as described in RADIO WORLD for Feb. 24, 1923, by Robert L. Dougherty, you will appreciate the simple method of winding honeycomb coils outlined in the following paragraphs. If you already know how to wind the coils, but are hesitating because of the difficulty encountered in mounting them, you will appreciate the novel and original idea suggested here, in

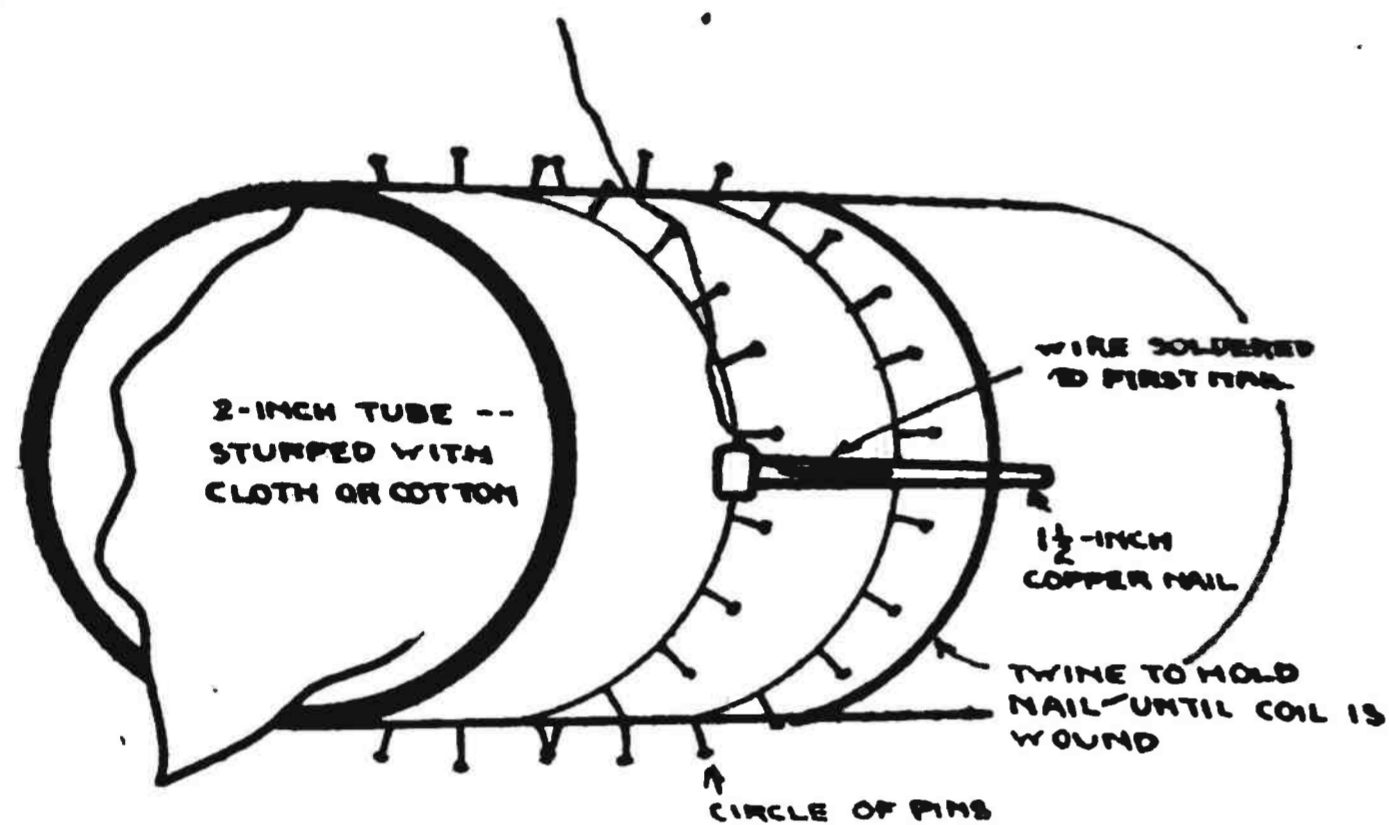


Fig. 1. Illustrating how the cardboard tube is prepared for the winding and how the end of the wire is soldered to a copper nail which is afterward employed as a contact for use with the adapter.

which two copper nails and two contact clips from a discarded B battery are made to serve the purpose of the most complicated adapter. At any rate, this article is offered at this time because of the increased interest in that hook-up which not only achieves super-regeneration with a single tube, but achieves it by the use of no more complicated a tuning device than the honeycomb coil.

Not only in the Flewelling circuit, however, does the honeycomb coil find its ideal application. Long before super-regeneration was thought of, single circuit amateurs were using DL coils because they were so easily

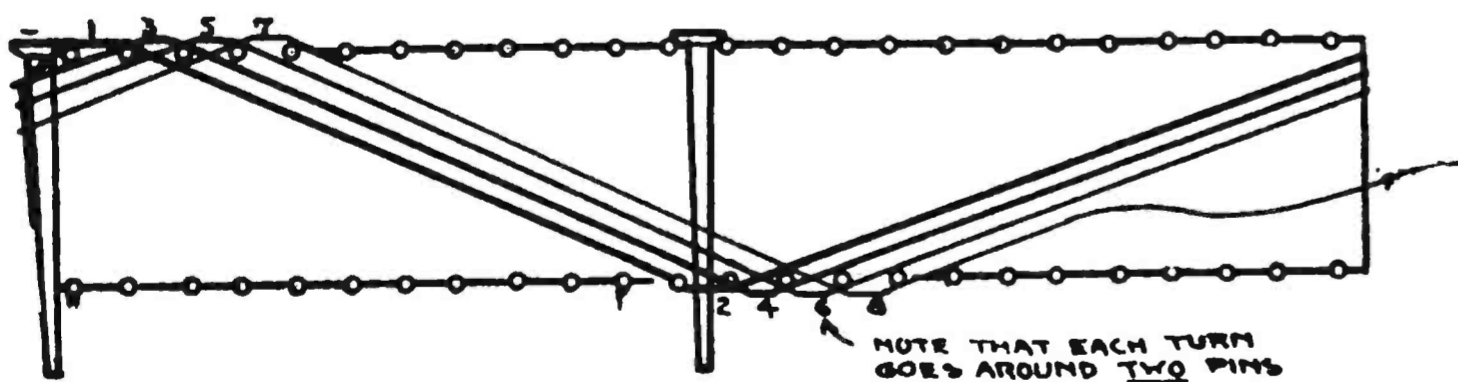


Fig. 2. Showing how the turns are carried around the coil. Note that they jump two pegs instead of one as is usually the case. The winding goes over the nails and holds them in place.

replaced with similar coils of a lesser or greater inductance. A set supplied with a complete row of honeycombs could jump instantly from 200 meters to 2,000 meters with no more effort than merely placing in the adapter that coil which possessed the required number of turns. This flexibility has given DL coils a deserved popularity in the past, and the new use for them in connection with the Flewelling super-circuit is bound to increase the number of amateurs who look with favor upon them. Possibly many of these enthusiasts will be meeting the honeycomb winding for the first time; and for this reason, as well as for those given above, the construction of a DL coil of any desired number of turns is described and illustrated herewith in detail.

A cardboard tube, two inches in diameter, is ideal

for the form about which to wind the coils. Wound on smaller tubes, the coils do not function well, while the use of larger cardboard forms increases the linear amount of wire without adding anything to the efficiency of the coils. The same statements apply to the width, which should be about one inch. Of course, there is a little margin on each side of these dimensions which makes no difference whatever.

Measure off and mark on the tube two pencil lines one inch apart. Leave a margin of one-half inch between the first line and the edge of the tube, because in this simplified method of winding where common pins are used as angle pegs, there must be extra cardboard on both sides of the line. Before placing the double row of pins around the form, however, as shown in Fig. 1, stuff the tube with cloth or cotton, making it, in effect, a cardboard pin cushion. This padding gives strength and steadiness to the pins and effectively takes the places of the wooden cylindrical block usually employed.

When the pins are in place about one-quarter inch apart, 25 pins once around, the form is ready for wind-

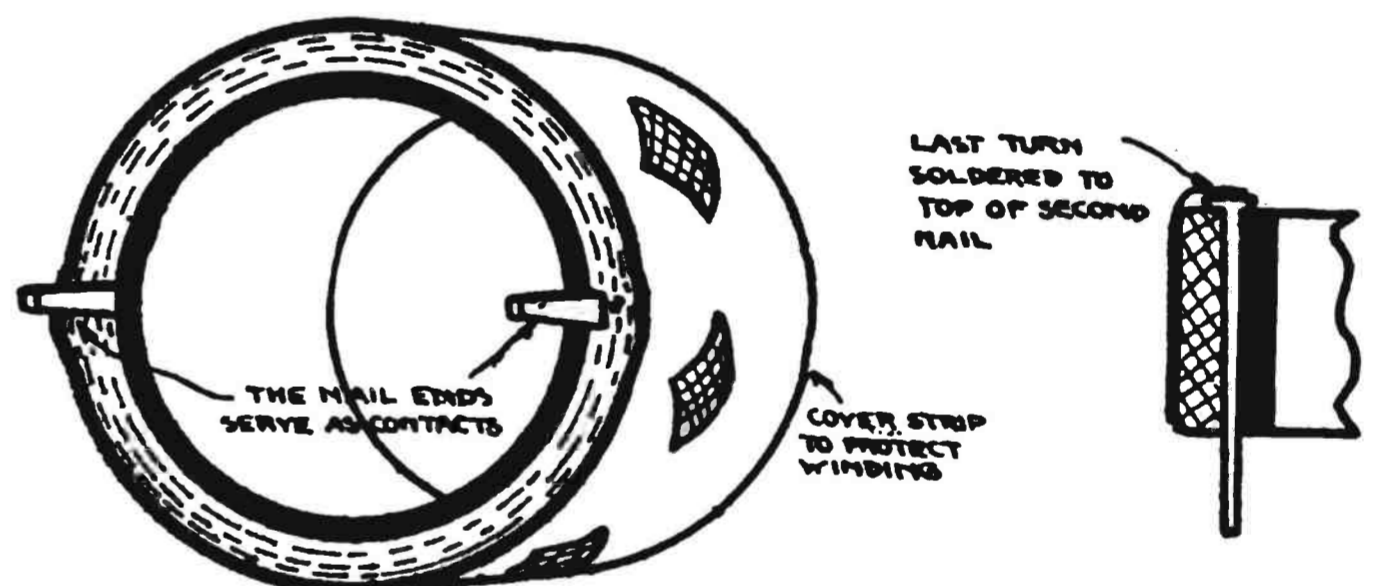


Fig. 3. The coil when finished. A cover of thin fibre is added for protecting the winding and also for appearance. The smaller sketch shows the method of attaching the winding to the nails.

ing. The right size of wire for coils of 50 and 75 turns is No. 22 or No. 24 SCC copper, although finer wire up to No. 30 may be, and is, used on coils of a greater number of turns. Before winding, solder the beginning of the wire along the upper half of a plain copper nail, which may be bought cheaply at any hardware store. Place this nail between any two pins with its lower part projecting beyond the second row of pegs, as shown in Fig. 1. A second and identical copper nail is placed in a like position on the other side of the coil, and both are, for the time being, held in place by a piece of twine. Later, of course, this twine is cut and thrown away, for every turn on the coil goes over these two copper nails and binds them as securely as though they were embedded in solid rock.

It will be noted in taking the next step that the turns go around two pins at a time instead of only one. It will be left to the amateur to discover the subsequent ease and neatness with which the turns fall in place. In detail, the winding is as follows: Take the wire from the first copper nail around the nearest two pins in the top row; then cross to the bottom row, at the same time making just one-half a turn with the tube. So around the two lower pins which imprison the second nail (see 2, Fig. 2) and then cross to the top row, this time also going around two pins, but including in

(Continued on next page)

Seven New Broadcasting Stations

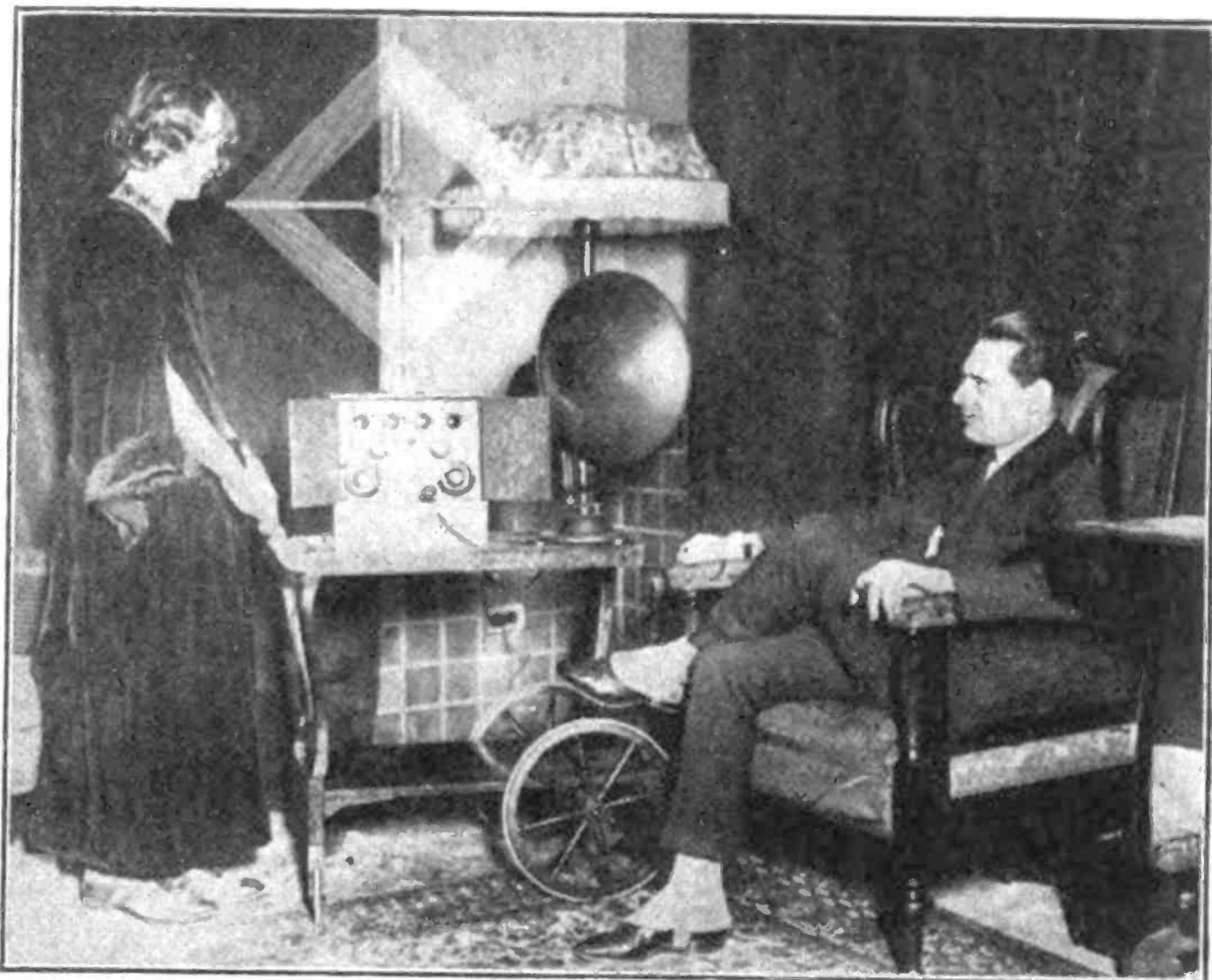
SEVEN new stations were licensed to broadcast on 360 meters during the week ending March 10, 1923. They are located as follows:

Call	Station	
KFHA	Colorado State Normal School, Gunnison, Col.	50 watts
KFDX	First Baptist Church, Shreveport, La.	200 watts
WQAZ	Greensboro Daily News, Greensboro, N. C.	300 watts
WOAQ	Portsmouth Kiwanis Club, Portsmouth, Va.	15 watts
WQAX	Radio Equipment Co., Peoria, Ill.	20 watts
KFFO	Smith, Dr. E. H., Hillsboro, Oregon.	5 watts
WRAP	Winter Park Elect. Const. Co., Winter Park, Florida.	20 watts

Radio for Safety and National Welfare

The use of radio for safety at sea and the welfare of the nation must be given first consideration in standardizing services, according to Admiral Ziegemeier, Chief of the Naval Communications Service. Discussing precedence of the several services recently, Admiral Ziegemeier pointed out the necessity of granting suitable wave lengths to the mobile stations, including ships and aircraft.

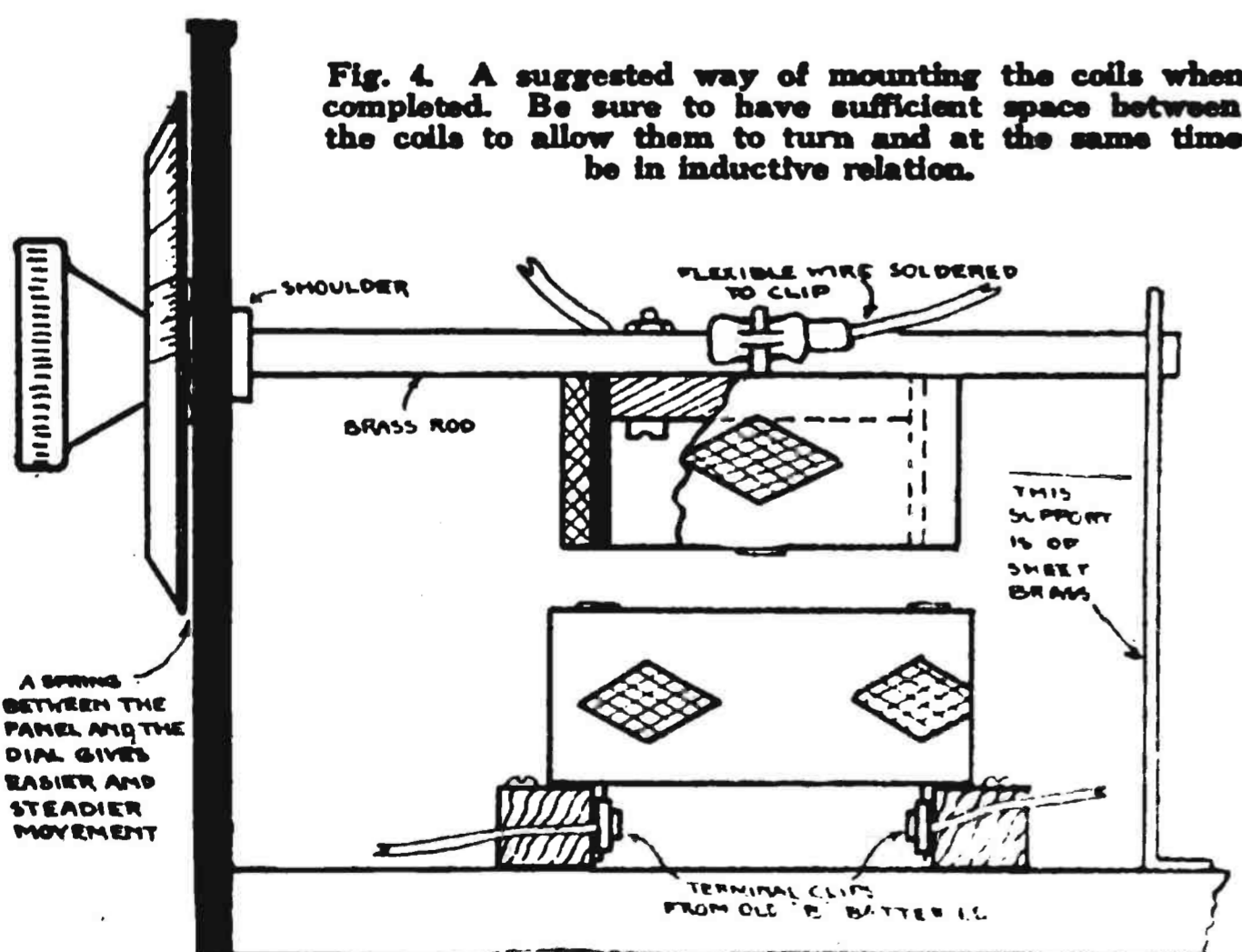
A "Tea Wagon" Radio Set



(C. Underwood and Underwood)
Miss Florence Kiersted entertains Mr. R. W. E. Decker with a "tea wagon" radio set at the recent New York convention.

ATTENDING the Second District Radio Convention recently held at the Hotel Pennsylvania, New York City, were many notables—in fact, so many that it would require columns of RADIO WORLD to describe them. However, out of all the chaos stepped a few to be meekly led before the "clicker" and snapped. It was therefore a fortunate moment when the photographer caught Mr. R. W. E. Decker, known on the "air" as 2VA, while seeking a few minutes rest from the excitement of the occasion. Mr. Decker is shown in the illustration listening to the "tea wagon set" demonstrated by Mrs. Florence Kiersted, of Brooklyn, N. Y.

(Continued from preceding page)
that number one that has already been used. In other words, although each turn goes around *two* pins, it only



goes in advance of itself *one* pin at a time. Fig. 2 illustrates this.

When one layer is on the tube, you have wound 25 complete turns. Two layers contain 50 turns, while three make a DL coil of 75 turns. Whichever size coil you make, the winding should stop at the second nail and the end of the wire should be soldered to the flat head of that nail. Now take out all the pins except two, those two being the pegs about which the last

half turn was taken. Soak the coil—also the working end of the tube—with hot paraffin. Wait until the paraffin is almost cold, then press it between the turns with your fingers. When this cementing process is finished, take out the last two pins, cut off the cardboard on both sides of the now completed coil, put on a cover strip to protect the winding, and you will have a coil which looks something like Fig. 3.

Now for the adapter. At some point during the preceding explanation, you have probably wondered what sort of an arrangement would take a coil with the ends of two copper nails protruding from it. Did you ever notice the terminal clips on a B battery? Or the clips that are on sale in even the smallest radio stores, the kind that bend over, press down and leave a little bridge of spring brass under which to slip the wire or cord tip? Well, these contact clips solve the problem and solve it ingeniously.

Looking at Fig. 4 you will find the stationary DL coil resting on two blocks of either wood or bakelite. The inner side of each of these blocks is one contact clip, so placed to receive the copper nail ends coming from the coil. The leads from the other instruments are, of course, soldered to the clips. That's novel enough and as simple as a device doing its work can be.

The movable coil is served in a little different manner. The method of mounting the coil on a circular block of wood, which is in turn bolted to a brass rod, is incidental. The real purpose of the upper half of Fig. 4 is to show how the contact clips are soldered to flexible wires which go to the other instruments of the set, and which are clamped on the nail-end contacts.

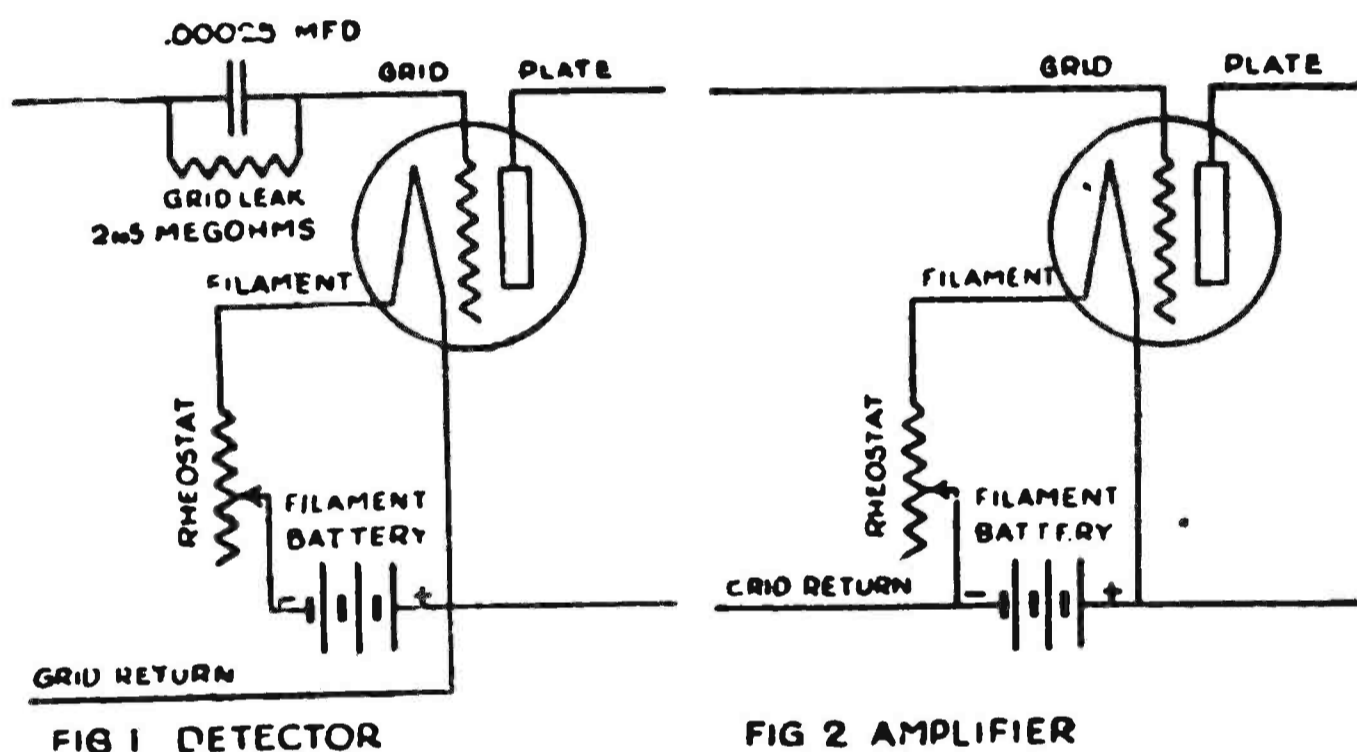
An Improved Radiotron Type Vacuum Tube

By J. L. Bernard

A NEW and improved radiotron type UV-201-A superior in many respects to the UV-201 tube and designed to supersede the latter recently has been announced by the Radio Corporation of America, of New York City, as the latest addition to their vacuum tube line.

While in outward appearance UV-201-A resembles UV-201, with the exception of a slight discoloring of the bulb, the new tube incorporates several distinctive features.

One of the outstanding features of the new tube is its special filament. Radiotrons UV-200 and 201 contain pure tungsten filaments which require about one ampere with a six volt battery source for the production of normal filament emission. The latest tube, however, contains a new and improved filament requiring only one-quarter of an ampere (.25) at five volts across the terminals of the filament and with this current the filament emission averages about five times that of the UV-201 tube. It is remarkable that with



Diagrams Illustrating Method of Using Radiotron Tube as Detector or Amplifier.

this special filament, the electron emission is increased five-fold and not, as one might expect, at the expense of additional filament power. Furthermore, this high filament emission is not accomplished at excessively high operating temperatures. On the contrary, the filament, when burning at normal brilliancy, has a temperature materially less than that of the UV-201 tube.

Aside from its superior filament properties, the new tube is exhausted to an exceedingly low pressure. A high vacuum is recognized as representing one of the most important factors in the design of vacuum tube amplifiers and every effort has been made in the case of UV-201-A to completely expel the gases from the bulb. The successive stages in the exhaustion of the new tube are carried out with extreme care so as to insure satisfactory performance.

During this process of exhaustion a mirror-like film collects on the inside wall of the glass bulb which remains after the exhaustion is completed. The translucent film should not lead the owner to believe that the tube is defective. This slight discoloring does not interfere with the operation of the tube in any way.

High filament emission in a vacuum tube, when accompanied by exhaustion which is carried to the lowest pressures obtainable in production determines, in a large measure, the success of the tube as an amplifier of radio-frequency currents as well as low frequency energy. The practical significance of these features is:

(1) Filament emission from the filament, averaging

about five times that of the ordinary amplifying tube, make it an exceptional tube for power amplification such as that required for loud speaker operation. (2) The filament of one tube consumes one-quarter ampere and it may be operated from four dry cells in series thus eliminating the use of storage batteries. If more than one tube is used, it is recommended that a storage battery of from 20 to 40 ampere-hours be employed. If radiotrons—UV-201-A—are used instead of UV-201, the battery will last four times as long. (3) Having exceedingly high vacuum, the tube is exceptionally quiet in operation there being no inherent tube noises. High vacuum also assures uniform characteristics. (4) It is particularly adapted to radio-frequency amplification. (5) In its operation as a detector, radio-frequency or audio-frequency amplifier the results obtained are exceptionally independent of filament adjustment. Critical adjustments of grid leak or grid condenser are not required. (6) It can be used in any equipment which at present uses the ordinary tube and will give improved results. No adapter is necessary when the standard four-prong socket is used. (7) If the filament is supplied by a six-volt battery the resistance of the filament rheostat should be at least four ohms, preferably six ohms. (8) Filaments should always be operated at the lowest current consistent with satisfactory results. (9) The tubes should be mounted on cushioned bases when used for detection and audio-frequency amplification.

When the tube is used as a detector it is usually preferable to connect the grid return to the positive side of the filament exactly as shown in Fig. 1 herewith. A grid condenser of .00025 mfd. and a grid leak of two to five megohms are recommended. Critical adjustments of grid leak and condenser are not required. The best plate voltage for detection is approximately 40 volts.

When the UV-201-A radiotron is used as an amplifier it is important that the filament rheostat should be placed in the negative lead from the "A" battery and that the return lead from the grid circuit should be connected to the negative side of the "A" battery and not to the negative side of the filament. These connections should be made as shown in Fig. 2.

For the best results the negative grid bias voltage should be increased with increase in plate voltage. In general, the following grid bias voltages are suitable: 40 volt plate, 0.5 to 1.0; 60 volt plate, 1.0 to 3.0; 80 volt plate, 3.0 to 4.5; 100 volt plate, 4.5 to 6.0.

Negative biasing cells should always be placed in that portion of the grid circuit where it returns to the filament circuit rather than next to the grid terminal of the tube.

What Most Appeals to You in RADIO WORLD?

Drop us a line and let us know what you like and what you don't like in our text pages. We are trying to keep our thumb close to the pulse of the radio public. Judging by the sales of this paper, we are succeeding. Let's hear from you. Address Editor, Radio World, 1493 Broadway, New York City.

Prize Winning Amateur Set at Radio Fair, New York

THE amateur constructor, in the making of his set, is taking more care and pains than was his wont in the old days. This has been proved conclusively in the many sets which have come forward at recent conventions and fairs where various amateurs exhibited their work.

It used to be that when a fan was making a set, any old thing he found lying around would serve the purpose as long as it worked, even half way. This has given way to the man who, with electric soldering iron, automatic drill, templates and the best of material, is making the most up-to-date circuits for his own use. His workmanship is excellent, frequently surpassing that of the professionally manufactured article in point of novelty and idea, if not in work alone. Of course the hand-made set must of necessity give way to the machine drilled and assembled set, but for work where care has been taken and ideas worked out in concrete form, the American amateur who makes his own set is without peer as a model maker.

An example of this fine type of workmanship is the set illustrated herewith, which was constructed by W. H. Spalding, of Brooklyn, N. Y., and which won first prize at the Amateur Set Contest of the Permanent Radio Fair, Hotel Imperial, New York City. The judges had many sets to test and look over. After due consideration the prize was awarded to Mr. Spalding for workmanship, novelty and actual working qualities. The set was entirely constructed by Mr. Spalding who used the three unit honeycomb circuit, embodying several new ideas in the construction of the set, such as the elimination of the jacks and plugs for the switch-

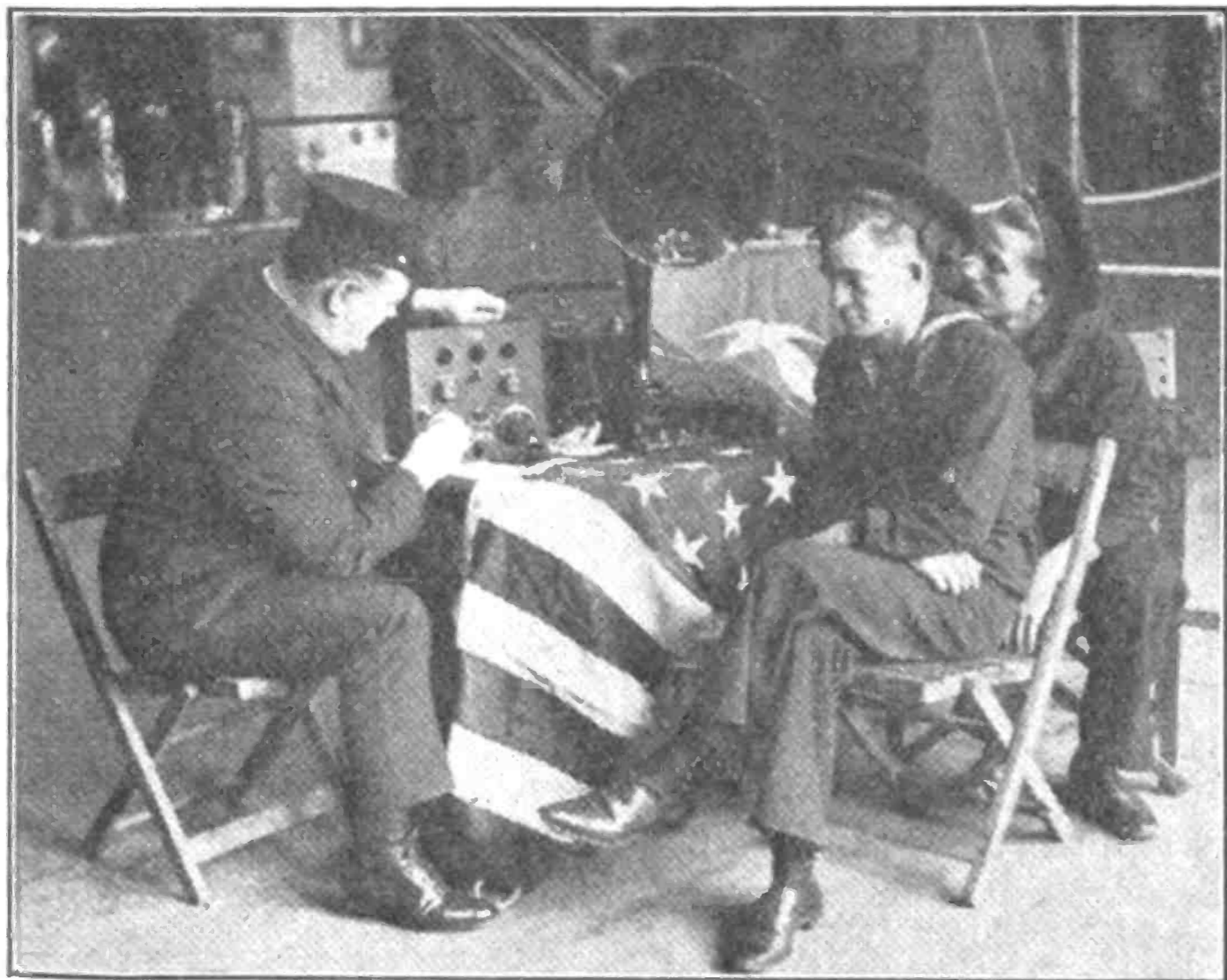
ing of the phones from the detector to the different stages of amplification. This was done by means of



(C. Photonews)

W. H. Spalding and the three tube receiver with which he won first prize at the Permanent Radio Fair, New York City. The set operates on the famous $1\frac{1}{2}$ volt cells. Transfer from detector to first stage and first stage to second is made by an ingenious arrangement of push switches, instead of the regulation plug and jack. The set is self-contained, having space for the batteries in the cabinet. It won on points of utility as well as workmanship, the interior being wired with utmost care.

two small push switches, and embodies several novel constructional details evolved by the builder in the course of his work.



(C. Kadel & Herbert)

Chief Petty Officer W. L. Whalen tuning in Pittsburgh at the Motor Boat Show, New York City, where the radio division attracted much attention. The set shown is a De Forest Reflex with Magnavox loud speaker.

Radio at the New York Motor-Boat Show

ONE of the most interesting exhibits at the recent Motor Boat Show, Grand Central Palace, New York City, was the radio booth. Here gathered all the "old salts" even if they only owned a row boat. Some of the radio sets, designed for use on small yachts, attracted much attention, but on the whole, the most attractive was the one incorporating the loud speaker through which music from the different broadcasters was heard. Of course, nobody who owns a yacht, catboat or small motorboat can be considered up-to-date these days, unless they incorporate a full-fledged radio receiving, and maybe transmitting, set on their craft. The delight of "sailing, sailing, over the bounding main," is not complete these days unless refreshing music from one of the larger broadcasters is to be heard. Think of the comfort of knowing that you are always in touch with land, no matter how sea-sick you are. Many amateur yachtsmen have also become enthusiastic radio fans and are building their own sets for use on their craft.

Broadcast Test Between London, England, and Newark, N. J.

REPORTS from British fans telling of the reception of American stations in England has influenced the British Broadcasting Corporation to arrange for a special program in an attempt to reach the United States. Tentative arrangements had been made between 2LO, which is the main station of the broadcasting chain controlled by the corporation and WJZ, the Radio

Corporation-Westinghouse station in Newark, N. J., for reception of the former's program early in April. As a new station is being erected by the Broadcasting Corporation which will be more powerful than the original one, the test has been postponed.

Station 2LO will conduct its tests with WJZ on 360 meters, which will enable fans equipped with broadcast receivers to tune in that wave to listen in. The Newark station will stand by during the test, and the cooperation of other local stations will be asked.

The Kenotron Rectifier for Obtaining High Voltages

By *B. R. Cummings*

Radio Engineer of General Electric Company

THE development of three-element vacuum tubes for use as generators of radio frequency power has been accompanied by the requirement for a power supply of high voltage direct current, which is applied between the plate and filament of the three-element tube. At lower powers the high voltage direct current is obtained from a direct current generator with a rotating armature. At higher voltages than are obtainable from such machines, however, it has been necessary to develop other means for obtaining this supply. The kenotron rectifier has been developed primarily for this purpose in connection with radio telephone and telegraph transmitters, although it is applicable to other uses where a high voltage direct current power supply is required.

The word "kenotron" was originated by the General Electric Company about 1913 as a name to cover all types of vacuum tubes. The word is derived from two Greek words, "keno" and "tron," the former meaning space or vacuum, and the latter meaning object or thing; the word kenotron, therefore, implies a vacuum device. As used at present, the term refers only to the two-element rectifying tube, the term "pliotron" being used for the three-element tube. The kenotron is similar in appearance to the more familiar three-element vacuum tube, the underlying difference being in the omission of the third or control electrode, commonly known as the "grid." In one of its earliest forms it was known as the "Fleming valve," although that valve was built for handling comparatively small currents only, and was used almost entirely as a detector tube in radio receiving circuits.

The kenotron depends for its functioning upon its inherent unidirectional conductivity, which briefly may be described as follows: In common with the more familiar three-element tube, a filament in a highly evacuated vessel is heated to incandescence by the passage of direct or alternating current through it. Under these conditions the filament emits a great number of electrons, which are unit charges of negative electricity. If a potential difference is created between the filament and the second electrode, known as the "plate," and the plate is made positive with respect to the filament, the negative electrons will be attracted to the plate and will enter it, causing a flow of current between the filament and plate inside the tube and from the plate back to the filament in the circuit external to the tube.

The flow of current, therefore, is based fundamentally on two things. First, on the continuous emission of electrons by the filament; and, secondly, by the attraction of these electrons to the plate. It is apparent, therefore, that the current in such a device can flow in one direction only; for if the plate is made negative with respect to the filament, in an effort to cause a current flow in the opposite direction, the fact that no electrons are emitted by the plate will leave no medium for current flow in the space between the filament and the plate. Under these conditions, the result is an open circuit. As soon as the potential of the plate again becomes positive, however, current will again

flow through the tube. Therefore, if a kenotron tube of suitable capacity is placed in series with an alternating current supply, it will be found that current will flow in the circuit only during every other alternation, during which the current flows from the filament to the plate. For the alternations which would normally cause the flow of current in the opposite direction, the kenotron acts as an open circuit.

The output of such a rectifier will be a pulsating direct current, each successive alternation of the power supply, of the same polarity, producing a pulse of direct current. It is customary, therefore, where direct current of constant amplitude is required to add a so-called "filtering system" in the output circuit of the rectifier, which will smooth out the ripple.

For the production of high voltage direct current by means of a kenotron rectifier, it is customary to step-up the alternating current supply voltage, by means of a transformer, to a voltage somewhat higher than that actually required for the operation of the three-element pliotron in the radio transmitter proper, so as to allow sufficient additional voltage to compensate for the voltage drop through the kenotron tubes and the filter system. This high voltage alternating current is rectified by means of kenotron rectifiers, the circuits and the number of kenotrons used depending upon an economic consideration of the purposes for which the equipment will be utilized. It is possible, by means of a number of kenotrons, and by utilizing a multiplicity of phases, to obtain a direct current output from the kenotron rectifier which will have remaining in it only a small percentage of intermittent direct current.

Particularly in the radio telephone transmitter it is essential that the plate supply to the pliotron tubes be constant, and it is customary in such equipment to associate with the kenotron rectifier a filter system. Here again the extent to which the filtering is carried out is dependent upon economic conditions, and it is usually found that it is preferable to permit a very small ripple in the output rather than provide a filter system which would be sufficiently elaborate to remove this ripple entirely. Such filter systems usually consist of a combination of condensers and reactors of comparatively high capacity and inductance connected across, and in series with, the load. In some cases it is found that a "trap" circuit, consisting of a capacity and an inductance in parallel, tuned to the frequency of the ripple in the rectified output, can be effectively used to suppress the ripple.

The kenotron rectifiers built on this principle are applicable not only to radio equipment, but to any circuit in which a high voltage direct current is required. Such rectifiers have been built with capacities up to 30 kilowatts at 15,000 volts direct current, although much larger equipments can be developed. Such equipment is preferable in many respects to revolving machinery, even at voltages at which the latter can be built. The kenotron rectifier is noiseless in operation, has no moving parts and requires no maintenance other than the infrequent replacement of the rectifier tubes.

Capital Radiations

By *Washington R. Service*

WASHINGTON, D. C.—For the first time an army order directs an officer to report his arrival in this country by radio. Ordinarily an officer is advised to report by telegraph or in writing, but today radio has begun to usurp other means of communication and the order quoted is an indication of future practice. Major A. B. Hitchcock, of the 7th Infantry, who has been ordered to return from Alaska to the States, was the first officer ordered by radio to report to his new commanding officer for assignment.

* * *

An investigation to ascertain whether or not there is

will be undertaken and contracts and agreements will be examined to learn if exclusive rights or special privileges for transmission or reception have been made. No announcement has as yet been made by the Commission.

* * *

Radio will play an important part in the International Ice Patrol Service which will begin for the summer as soon as the Coast Guard cutter "Tampa" leaves Boston. The purpose of this service to which the cutters "Tampa" and "Modoc" have been assigned by the Coast Guard, is to locate dangerous ice near the

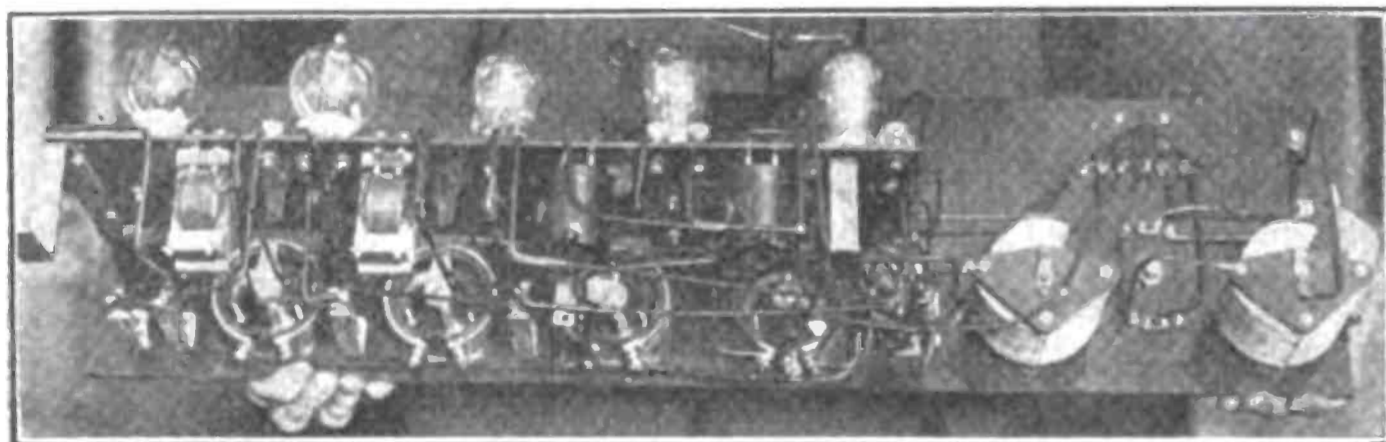
Radio Entertains the Bedridden



(C. Gilliams Service)

About the meanest fate in the world is lying in a hospital, unable to move, and depending upon people to bring a little sunshine into your life in the conventional manner with flowers and a little gossip of the outside world. That is as it used to be, but is not at the present time. An up-to-date case is that of William Snider, a telephone lineman, who recently suffered broken arms and legs in a fall from a particularly high telephone pole. His comrades, hearing of his plight, and knowing that he was an especially active man, understood that he would suffer from his forced inactivity. So they installed a radio set in his room.

A Fire Escape Antenna



(C. Kadel and Herbert)

An unusual DX accomplishment accredited to A. S. Mawhinney, 891 Riverside Drive, New York City, recently was described in RADIO WORLD, and now the fans are given a chance to see the workings of this remarkable set. This set picked up California, using a wire attached to the fire escape as an antenna. The set illustrated, it will be noted, uses five tubes—the first two on the right as radio frequency amplifiers, the third tube as a detector, and the two V. T. 2s as audio frequency amplifiers. The work of this set is a marvel, as is also the work on it.

New Use for Phonograph Records



(C. International Newsreel)

One of the newest wrinkles in the way of home-made radio apparatus was recently shown by W. J. Simpson, of St. Paul, Minn. Having a lot of old phonograph records which had outlived their usefulness, he tried using them for mounting radio apparatus. This, of course, is not absolutely new, as many people have used defunct records for different parts of radio sets before. The novelty of the idea is that he made the entire set on the record, using it as a panel to mount his apparatus on. The illustration shows two sets made by Mr. Simpson. They are easy to work with, and are good insulators, being made of rubber composition. A neat cabinet for this type of apparatus can be made from a hatbox such as Mademoiselle, the Modiste, sends home to your wife. It can be painted black and no one will know the difference.

a radio trust will soon be launched by the Federal Trade Commission in compliance with the requirements of a House resolution. This resolution directing the Commission to investigate the status of the radio industry to ascertain whether anti-trust statutes were being violated, was received by the Commission last week. It is understood that a conference of the officials and probably a preliminary investigation will be held before formal action of any sort is taken or witnesses are called. A complete survey of the radio patent field

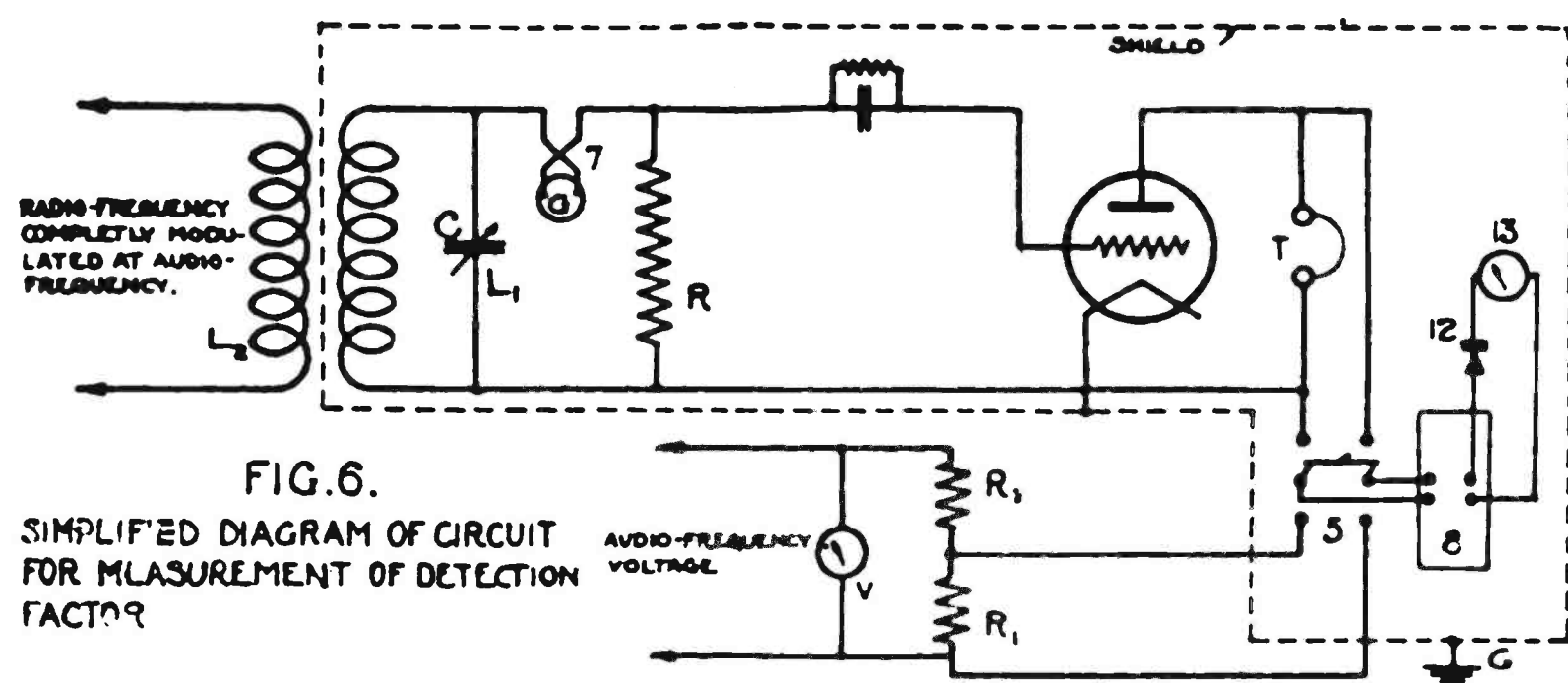
transatlantic steamship lane, patrol the section and broadcast warnings twice daily on 600 meters. The ship on patrol answers to the call KFOG and gives information upon request. Once each evening a radiogram is sent to the Hydrographic Office of the Navy in Washington defining the ice danger zone. This information is re-broadcast from naval radio stations at Arlington, Annapolis, Boston, New York and Norfolk every morning and evening because the ships' apparatus is not powerful enough to carry long distances.

Methods of Measuring Properties of Electron Tubes

A Convenient and Readily Determined Detection Factor

Various detection factors have been proposed* to express the merits of the electron tube as a detector. A factor to be useful should be readily determinable and simple of application in desired calculation. The audio-frequency output voltage (or current) produced by the rectification of a completely modulated radio-frequency input varies for most detector tubes over a limited voltage range approximately as the square of the input voltage. So for a load of given impedance in the plate circuit the ratio of the voltage across this load to the square of the input voltage will be nearly a constant over this limited range of voltages. This ratio forms a convenient detection factor, which may be readily determined with the tube under actual operating conditions. (This factor is used in calculations by L. M. Hull in the report mentioned above.)

The method of measurement can be understood by reference to Fig. 6. It consists of applying a completely modulated radio-frequency voltage to the input of the tube and measuring the audio-frequency output by comparison with a known audio-frequency voltage of the same frequency.

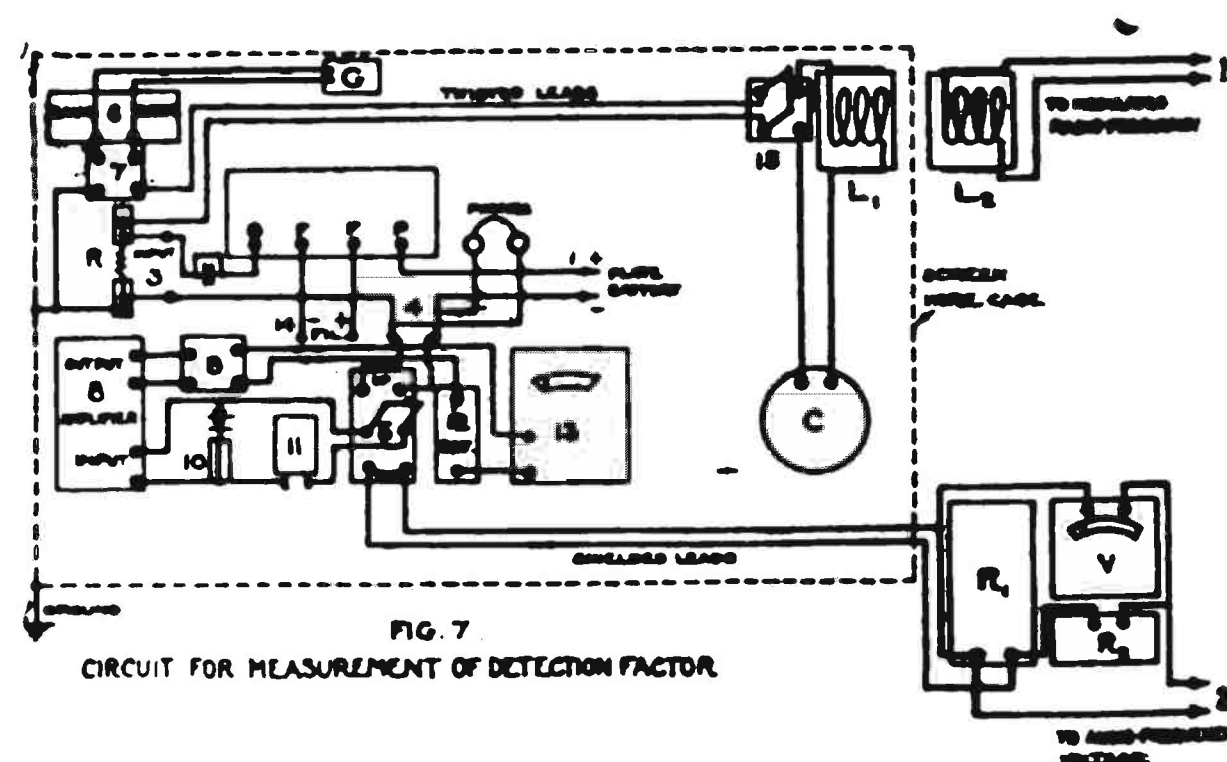


- R_2 , Radio-frequency link resistance.
- R_1 , Decade resistance box, 0-1,000 ohms.
- R_2 , Resistance box, 0-10,000 ohms.
- V, Hot-wire voltmeter, 0-30, 0-150 volts.

The tube and measuring apparatus are completely enclosed in a grounded screen wire cage, which shields the apparatus from the radio generator and from stray radio signals or disturbances, and is supplied with modulated radio-frequency and audio-frequency current from apparatus outside of the cage.

The modulated radio frequency is supplied by an electron-tube, radio-frequency generating set, enclosed in a metal-lined box and placed about 3 meters from the cage. The wave length of the generated radio frequency is variable over the range desired. The plate voltage is about 120 volts alternating current, supplied by a small 500-cycle motor generator, which also furnishes, through a step-down transformer, 30 volts to the leads 2.

The radio frequency, adjusted to the wave length at which measurements are to be made, is introduced into the cage by means of coils L_1 and L_2 , the coupling of which



The complete circuit arrangement is shown in Fig. 7, in which the following legends are used:

1. Leads to radio-frequency supply.
2. Leads to audio-frequency supply.
3. Terminals connected to input of tube under test.
4. Terminals connected to input of tube under test.
5. DPDT switch.
6. Galvanometer shunt.
7. Vacuum thermoelement of low resistance.
8. 3-stage audio-frequency amplifier (resistance coupled).
9. Audio-frequency transformer.
10. Grid leak, 2 megohms and 2.5-volt battery in input circuit of amplifier.
11. Mica condenser, 0.02 microfarads capacity.
12. Crystal detector (carborundum). (These may be replaced by thermoelement and galvanometer.)
13. Milliammeter.
14. Filament battery terminals.
15. DPST switch.
- C. Variable condenser, maximum capacity, 0.005 microfarad.
- G. Sensitive galvanometer (low resistance).
- L_1 and L_2 , radio-frequency coupling coils.

can be varied. The coil L_2 , outside the cage, has an inductance of about 140 microhenries, and, since it is in an untuned circuit, is used over the entire range of wave lengths. Two coils are used at L_1 in the tuned circuit, L_1 -C-15-7-R, inside the cage, to cover the range of wave lengths required—one the same size as L_2 , used from 600-1,500 meters, and a larger coil having an inductance of about 860 microhenries, used from 1,500-4,000 meters. This input circuit is tuned to the radio-frequency current in L_2 by varying the condenser C.

The input to the tube is the iR drop across the resistance R, due to the radio-frequency current flowing through R, and is varied by using different values of R and varying the current through R by changing C. This current is measured by the thermoelement 7 and galvanometer G, which are calibrated with the shunt 6. The resistances used at R are standard high-frequency link resistances,* varying from 0 to 30 ohms. They must be measured occasionally on a direct current bridge to check their resistance as they do not remain constant.

The grounded input terminal at 3 may be connected to either the negative or positive side of the filament. Short leads should be used in all connections to the tube.

The audio-frequency comparison voltage is supplied to the switch 5 through shielded leads by the voltage divider

*Stuart Ballantine, Proc. I. R. E., April, 1919. L. M. Hull, Radio Laboratory Report, Bureau of Standards, CR134d. John R. Carson, Proc. I. R. E., April, 1919. Hulbert & Brett, Phys. Rev., 16, 1920, p. 274 and p. 408. H. J. R. R. 811, "Thermionic Vacuum Tubes," p. 339.

*See Bureau of Standards Circular 74, p. 176.

(Continued on next page)

Prof. Hazeltine Demonstrates His New Neutrodyne Circuit

A DEMONSTRATION of the neutrodyne circuit designed by Professor Hazeltine, of Stevens Institute of Technology, was given last week at Columbia University, New York City. Its principles were fully explained by the inventor and by its builder. This receiver operates on an entirely new principle and because of that fact, it is incapable of oscillating. It is known as the "set that cannot cause interference through its re-radiating signals and oscillations."

The circuit utilizes two stages of tuned radio frequency, detector and two stages of audio frequency, but through the agency of an entirely new design of several of the component parts of the receiver, it may be said to be one of the revolutionary models of radio receivers. The signals received are of such volume that it is possible to receive them without either antenna or ground. As demonstrated at Columbia, the clearness of the received signals was on a par with crystal detection, no distortion or other extraneous noises being noticeable. The signals came in with perfect modulation, a feature of note in itself, as many of the regenerative circuits of today distort music and the voice to such an extent as to make them totally unrecognizable when they are amplified to any great extent.

This receiver marks one of the greatest advances made in the design of receiving apparatus so far, and will tend to revolutionize the designs of receiving apparatus. The circuit is licensed for manufacture to the Independent Radio Manufacturers, Incorporated, and will shortly be placed on the market.

As explained in RADIO WORLD for March 10, 1923, in which a descriptive article appeared with an illustration of the receiver, one of its great advantages is that it will tend to decrease the interference in receiving due to nearby receivers re-radiating signals and causing the receivers in the vicinity much trouble especially when faint signals are being received from far distant stations. The interference of one set employing the regenerative principle, with two or more steps of audio frequency and at least 100 volts on the plate can be felt for quite a distance, especially in the case of

a section of the country where there are a great many sensitive receivers located in a small congested area, such as the residential districts of New York, where there are often 50 to 100 tube receivers located within a space of a city block. Any one familiar with the difficulties of receiving DX signals in such a section, will realize the benefit of this type of receiver. It is often



(C. Kadel & Herbert)

Demonstration at Columbia University, New York City, of the new neutrodyne circuit designed by Prof. Hazeltine (left) and built by J. D. R. Freed (right). The audience overflowed the room and many had to be turned away.

possible for a crystal detector to be set oscillating through the agency of a powerful regenerative set in the vicinity, through the heterodyne principle which uses a separate oscillator to enable a non-oscillating detector to receive undamped oscillations.

When the Hazeltine circuit, or neutrodyne receiver, comes into popular use all this will be eliminated, because of the fact that the receiver does not depend upon oscillations for its effective operation.

(Continued from preceding page)

at $R_1 R_2$, consisting of a resistance R_1 variable by one ohm steps from 0-1,000 ohms, to which are connected the leads into the cage, in series with resistance R_2 variable from 0-10,000 ohms in 10 ohm steps. The voltmeter V and supply voltage from the 500-cycle generator are connected across $R_1 R_2$ as indicated.

When either the audio-frequency output voltage of the tube under test or the comparison voltage obtained from the voltage divider is connected to the input of the voltage-indicating circuit by switch 5 it is amplified by the 3-stage audio-frequency amplifier 8 and transformer 9, causing an alternating current to flow in the circuits 9, 12, 13. This current is rectified by the crystal detector 12, and deflects the milliammeter 13.

With the frequency of the radio-frequency generating set adjusted to the desired value and switch 5 up resistance links are inserted at R , always opening 15 before removing a link at R , increasing R until a suitable deflection is obtained on the milliammeter 13.

The comparison voltage is now connected to the voltage-indicating circuit by throwing switch 5 down, and R_1 and R_2 are adjusted until approximately the same deflection on the milliammeter is obtained as previously. Switch 5 is thrown to the up position again and the tube input varied by varying C , it being equipped with a small variable condenser for fine adjustment until exactly the same deflection is obtained with switch 5 either up or down. The audio

output voltage e_t is now equal to the comparison voltage across R_1 , and, since the voltage E across R_1 and R_2 , measured by voltmeter V , is known, the tube output voltage—

$$e_t = E \frac{R_1}{R_1 + R_2}$$

The galvanometer being calibrated, the current i , flowing through R is obtained from the galvanometer deflection, and the radio input voltage—

$$e_i = i R$$

From the definition given above the detection factor

$$k = \frac{e_t}{e_i^2}$$

These measurements are repeated at different frequencies if desired.

This detection factor has the disadvantage that it must be specified with a given load in the plate circuit. However, for a comparison of several tubes this load may be kept constant, and a good factor for judging the tubes is given.

(This is the third and last of a series of three articles. The other two appeared in RADIO WORLD for March 10 and March 17, 1923.)

The Radio Primer

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

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

By Lynn Brooks

WHAT is meant by "shielding a panel"? By shielding a panel is meant to line the side with a metallic sheet, in order to eliminate the bothersome "body capacity effect" which is so noticeable when a regenerative circuit is employed. This body capacity is an annoyance because when tuning a set which is not shielded, the set actually can be thrown out of tune by removing the hands, placing the hands near any of the major controls and oftentimes by grasping the phone cords. This can be eliminated by shielding the panel.

* * *

How should a panel be "shielded"?

The method of shielding a panel is as follows: Take a sheet of heavy tin-foil, copper-foil, or thin sheet aluminum, and mark it for drilling the same as the panel. This is done easiest by first drilling the panel itself. Then using the panel as a template, drill the metallic sheet, being careful to drill all the holes in the shield itself larger than those of the panel. This is done to prevent any of the metallic parts of the instruments coming in contact with the shielding and shorting through the agency of the machine screws

with which the instruments are themselves fastened to the panel. Then either using a heavy shellac or small machine screws, fasten the shielding in its proper place on the rear of the panel, making a connection from the shielding to the ground. If tinfoil is used, it is best to allow a lug to remain on the sheet and then fasten this under the ground post. If you try to solder on tin foil you will be disappointed as it is almost impossible. If copper foil or aluminum is used they can be soldered.

* * *

What parts of the panel should be shielded?

In the shielding of a panel it is only necessary to shield the parts of the panel that house the tuning controls, such as the variometer, variocouplers or tuners. The detector and amplifying units do not have to be shielded. In some of the commercial sets the units are shielded separately. There is a separate shield for each variometer, tuner, condenser, or other tuning unit.

* * *

Is shielding necessary on all sets?

Shielding should be used on all sets employing regeneration. The straight audion does not need this so much, as the capacity effect is not so noticeable.

* * *

How can it be determined if shielding is necessary?

If when the set is tuned and the hand taken away from the controls, the signals fade appreciably or are lost altogether, that is an indication that the body capacity has been called into effect when tuning, and immediately when the hand has been taken away, it has disappeared. In this case, the panel of the tuning unit should be shielded, or if that is not advisable, a "long-armed control" should be employed.

RADIO WORLD'S ANNIVERSARY NUMBER NEXT WEEK

RADIO WORLD is hard at work on its Special Anniversary Number, dated March 31, published March 28.

This issue will celebrate the beginning of the third volume of RADIO WORLD, the great national illustrated weekly.

The red advertising form has gone to press. Last page of last black form closes March 23.

Regular advertising rates are in force as follows:

One page: One time—\$150.00.

Half, Quarter, Third and Two-thirds pages at proportionate rates.

One inch, one time—\$5.00. Per agate line, \$0.40.

On four consecutive issues, 10 per cent discount.

On thirteen consecutive issues, 15 per cent discount.

Cover and preferred position rates made known on application.

Write or send copy and order now and get the best possible publication value by being represented in the Special Anniversary Number of RADIO WORLD.

NOTICE TO READERS—Orders received indicate a great demand for this Anniversary Number. We have tried to provide for this in advance. If you want to be sure to get RADIO WORLD for March 31, leave an order with your newsdealer.

RADIO WORLD, 1493 Broadway, New York City.

Radiograms

The Navy Department will offer two engineering students from each of the country's leading universities the opportunity to cruise for two weeks on navy vessels. The plan will go into effect next summer to allow students to study the mechanics, electrical apparatus and radio equipment of warships.

* * *

Fire destroyed Shepard's department store in Providence, R. I., last week, with a loss of \$1,500,000. The store's radio was broadcasting a concert when the flames were discovered. After sending a message that the entertainment must stop because the store was afire the twenty entertainers escaped to the street.

* * *

Jackie Coogan, the seven-year-old motion picture star, addressed the radio audience of WGY, the Schenectady radio broadcasting station of the General Electric Company, on March 23. Jackie's voice was photographed by the pallophotophone a few weeks ago and this record was reproduced by radio. Jackie, now back in Los Angeles at work on a new picture, heard himself talk across the continent. As he explained: "I got quite a thrill from hearing myself talk to myself three thousand miles away from myself."

The extent of the great interest manifested in radio was indicated in St. Louis last week when a large advertisement appeared in the newspapers of a 54-apartment building just being completed, in which every apartment is supplied with complete radio equipment.

* * *

Columbia University has placed at the disposal of the American Institute of Electrical Engineers a scholarship in electrical engineering in the School of Mines, Engineering and Chemistry. Reappointment of the student is conditioned upon good standing. Francis Blossom, F. B. Jewett and Professor W. I. Slichter have been appointed as a committee to pass upon the fitness of applicants.

* * *

Through arrangements with the American Telephone and Telegraph Company radio station, WEA, Arthur Hammerstein, who is at Palm Beach, Fla., was the first theatrical producer to listen in on his own production. On Thursday evening, March 15, a special wire was installed at the Casino Theatre, New York City, where the producer's musical play, "Wildflower," is the attraction, and the entire performance was broadcast from overture to finale. Incidentally, it is said that this is the first time an entire production has been broadcast. During the intermissions of the piece a synopsis of the play was given so that the radio audience would receive the full benefit of the performance.

Radio and the Woman

By Crystal D. Tector

MY best friend and myself had a terrible argument the other day because of the fact that I went to the Third Annual Radio Convention and didn't call for her. I had told her that I intended going, and when I came home, of course a lot of my friends wanted to know how the show was. I was all properly enthused and of course she heard about it. Just because I hadn't told her that I was going, she went off in a huff and said she wouldn't go. Well, I have heard of silly people biting their noses off to spite their faces, but this is even worse. I would have pardoned my worst enemy to go to the show. And F. H. is sore at himself because he couldn't get tickets for the banquet.

* * *

I notice that a station is giving out information on household budgets and how to cook various little dishes that are not heard of much these days. I never knew how to make "Floating Island" until I heard the little lady tell how, and so I surprised F. H. that night by having it for supper. When he asked me what it was I replied: "Well, that's the newest radio development, called 'Hetrodyne Pudding.' and I really think that he believed me."

* * *

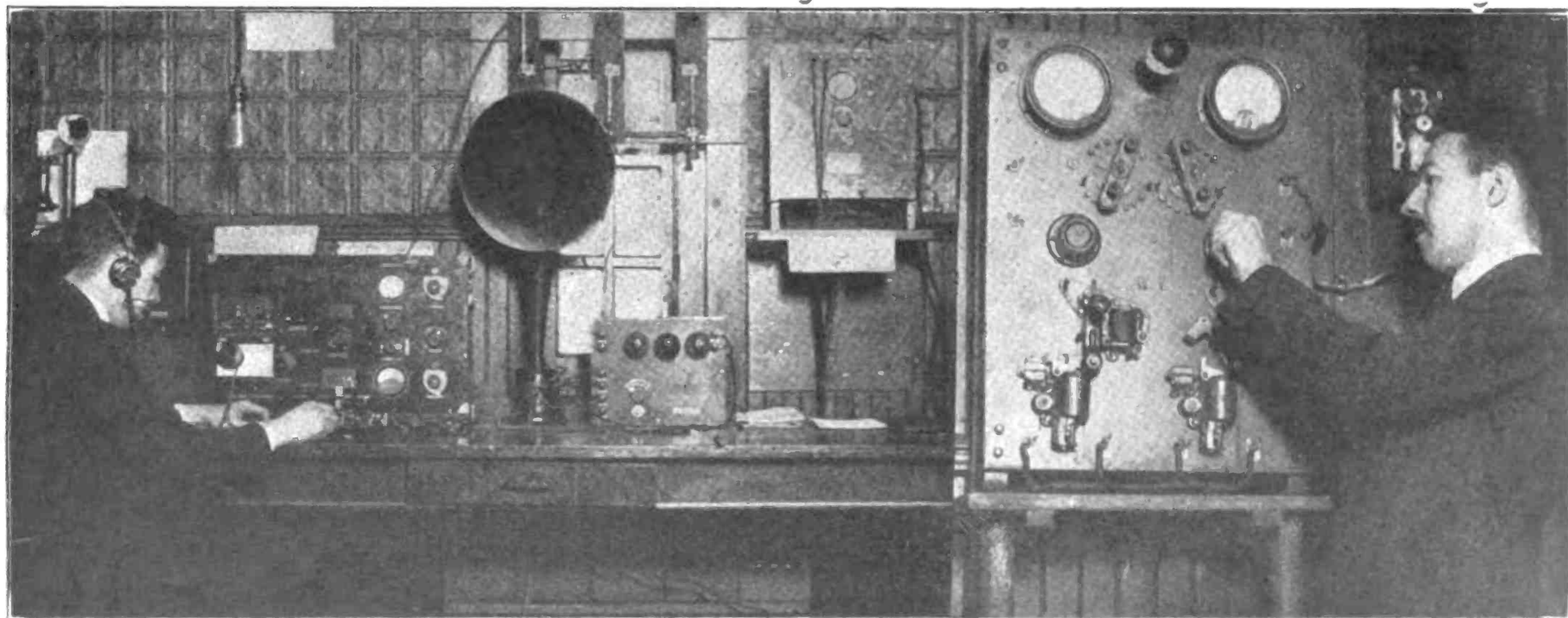
Friend Husband came home one evening all excited and wearing a big mysterious smile. Under his arm he carried the funniest looking long parcel, like the old fashioned French bread that you used to get when Old New York was young. I tried to make him tell me what it was, but all he would say was, "Wait a while, noney; don't get impatient, or I won't show you." Well, the only thing that I could do was wait and you girls know how a husband can be mysterious when he wants to. Teasing won't do any good with F. H. 'cause he just assumes that legal air and freezes right into his shell. After dinner, he sneaked up into his room and I heard him hammering and puttering around and

I tried to get in but he had locked the door. I went down and started in to finish my novel, or listen in, I forget which now, because I was so full of curiosity that I really couldn't digest anything that I was doing or trying to do. After about an hour, I heard the upstairs door open and F. H. come sneaking softly down. I never moved, or tried to even peek. He passed the parlor door and went down stairs, and pretty soon I heard him slam the furnace door. When he finally returned upstairs, he was wearing a very disappointed look and he finally delivered a lecture to me on the subject of "If dumbbells like me didn't believe everything that people told them, then the wise men that sting them with radio sets in a cane—you don't even need an antenna—wouldn't be able to earn enough to make the price of a cup of weak tea," and so on. It was quiet evident that even a wise "radio man" like F. H. can be fooled by a slick salesman some time. The best way, I think, of providing against that is to have the thing demonstrated right there and investigate it before you even think of buying it, even if it does look good.

* * *

'Member last week I told you about my "home-made Flewelling?" Well, I think that we have had more fun and heard more different stations with that "funny looking contraption," as Brother-in-law Jack says, than with any set I have ever had before. I can have more fun playing with the different squeals and howls and then tuning them into WLW or one of those DX stations to the complete mystification of all my friends. It really is a most complete education to try to make a set by yourself and then succeed after numerous and grievous set-backs, such as burns, wrong connections and other things too numerous to mention, but always interesting to look back upon. I always remember my first attempt to make a dress and a cake, and I always will remember my successful attempt to make a Flewelling.

Radio Equipment in a New York City Armory



Interior of Station BG4, located at the 101st Signal Battalion Armory, Park Avenue and 34th Street, New York City, showing the airplane transmitter and receiver used, with the loud speaker, directly next to which is the power amplifier enabling the signals to be heard through a large room. The picture to the right shows the charging panel, which keeps the batteries at full charge at all times.

(C. Photonews)

Photographic Glimpses

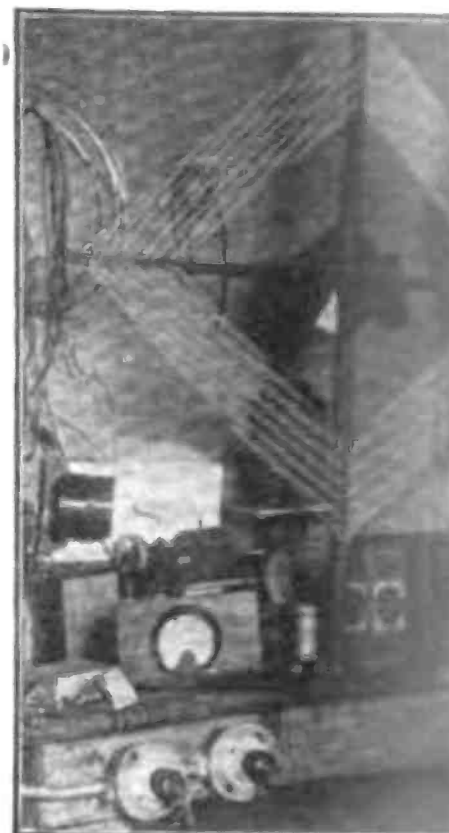
Captions by Roy



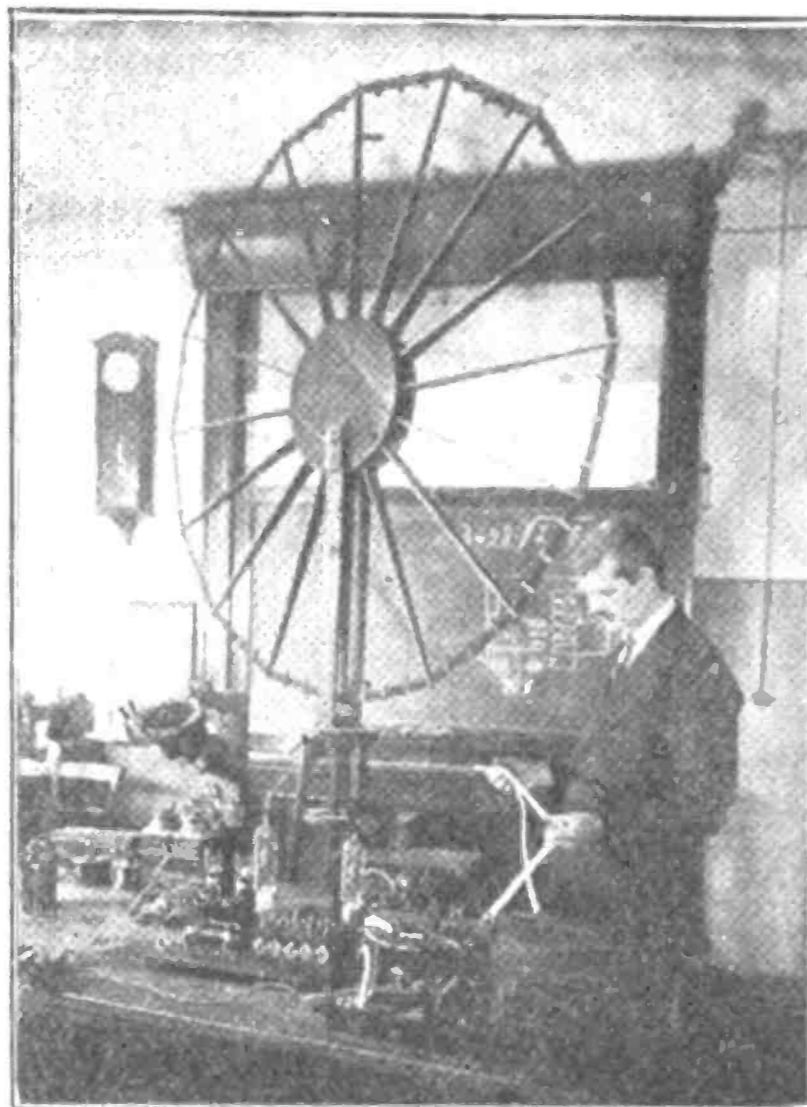
(C. Kadel and Herbert)
Gilda Gray, nationally known dancer and "Follies Star," on a visit to the recent Radio Exposition, finds the radio teapot the most interesting thing there because of the fact that it "let's one have music with one's tea." The set in question is built into a teapot and has a range of 1,000 miles. It utilizes a peanut tube for reception, with compact wound inductances, allowing the entire set to be mounted atop a silver tea pot, as seen in the picture.



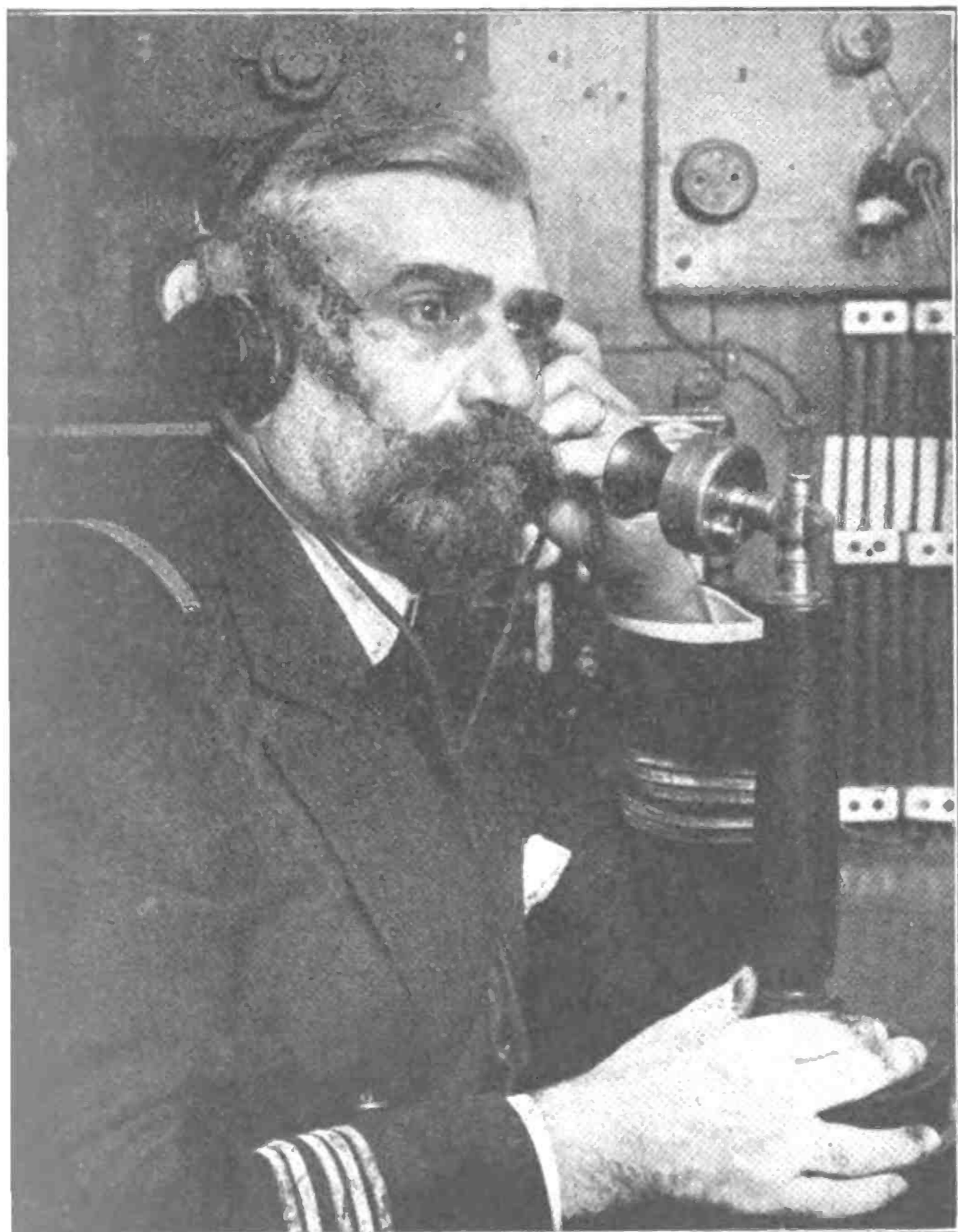
(C. Photonews, N. Y.)
A neat and compact receiver which attracted considerable attention at the Permanent Radio Fair, Hotel Imperial, New York City. It was mounted on the base of a regular socket. The tuning inductances, as can be seen, are spider-webs, and comprise the entire tuning unit of this unique receiver.



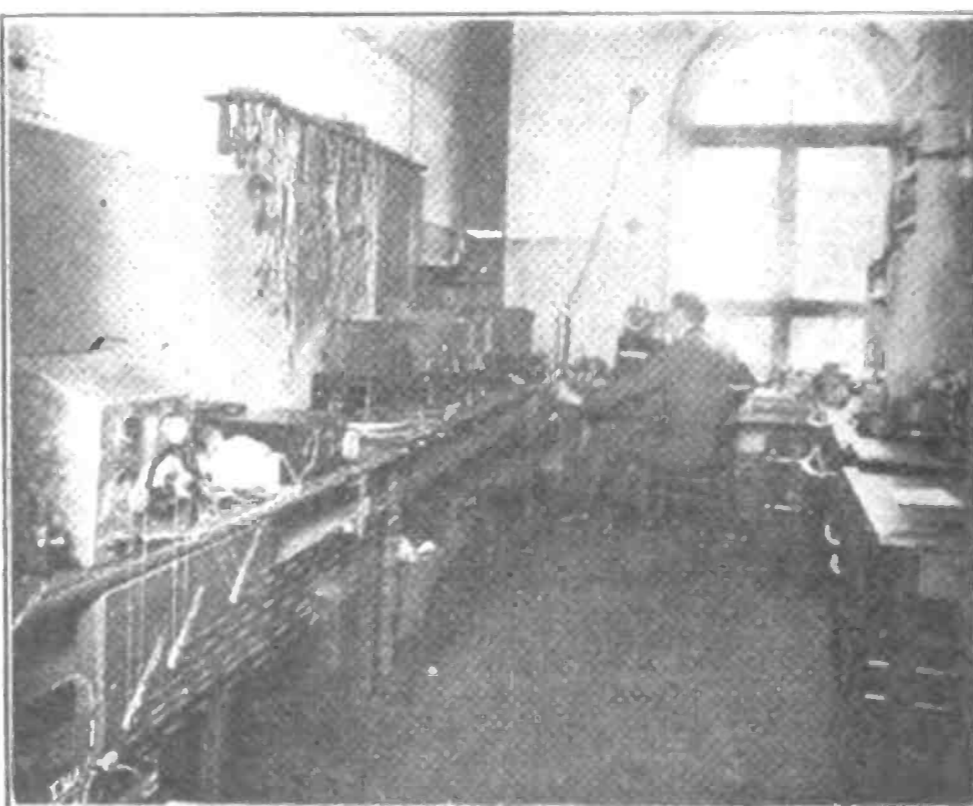
(C. Kadel and Herbert)
B. R. Mayo, 18-year-old his marvelous set, which for less than \$20.00, yet over 1,000 miles. It requires to receive signals. It works on distant stations, loop antenna



(C. Wide World Photos)
One corner of the Research Bureau of the Berlin National Departmental Wireless Telegraphic and Telephone Co., Berlin, Germany. This office is experimenting with the advisability of long distance reception and transmission on small loops. The signals received are automatically registered on a moving tape, as can be noted in the picture.



(C. P. & A. Photos)
Captain Maurras, of the S. S. Paris, talking to Captain Roch, of the S. France, more than 250 miles distant. This is one of the advantages of radio to captains of ships sailing the high seas. It allows them to converse with much less trouble than on land, because there is no danger of getting the numbers mixed up. The radio telephone has become so important to "those who roam the watery lanes" that its importance is only eclipsed by the machinery of the ship itself.



(C. Wide World Photos)
Unique method of control to eliminate any body capacity, used in the Research Bureau of the Berlin National Wireless Department. The receiving instruments are so super-sensitive that the control is accomplished at a distance by means of strings and pulleys.



(C. Keystone View Co.)
The receiving antenna at which is one of the principal European signals handled in America. The antenna is 9 miles long. Mr. E. G. Keene, engineer, and the man responsible for throwing the ground switch

From the Realm of Radio

by L. Dougherty



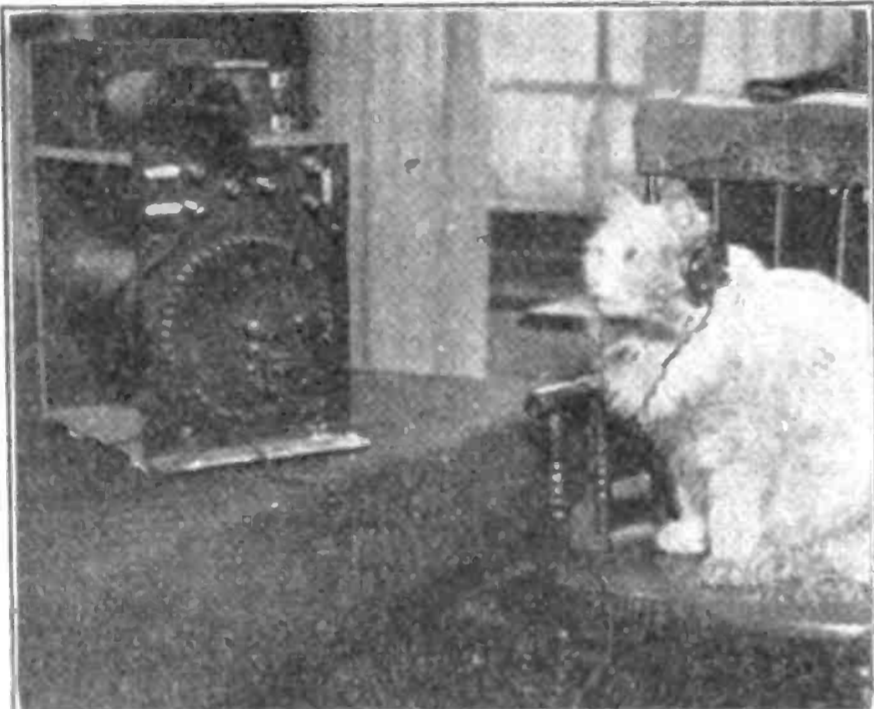
radio enthusiast, and can be made to sell which has a range of no outside antenna operate a loud speaker despite the fact that a is used.



(C. Kadel and Herbert) When you hear J. E. K. announcing at WOR, you know it is a woman, but few of you Westerners have ever seen her, and that same applies to a great number of the local Eastern fans, so an introduction is in order. Therefore, "Radio fans, meet Miss Jessie E. Koweing, one of the official broadcasters of Station WOR."



(C. Kadel and Herbert) A fair fan's idea that saves a lot of worry when she shuts off for the evening. Miss Margie O'Neil found that she sometimes went to her downy and forgot to turn the current off her Magnavox, with the result that the battery was run down the next morning. So she placed a small six volt lamp in parallel with the battery line, which warns her to "turn off."



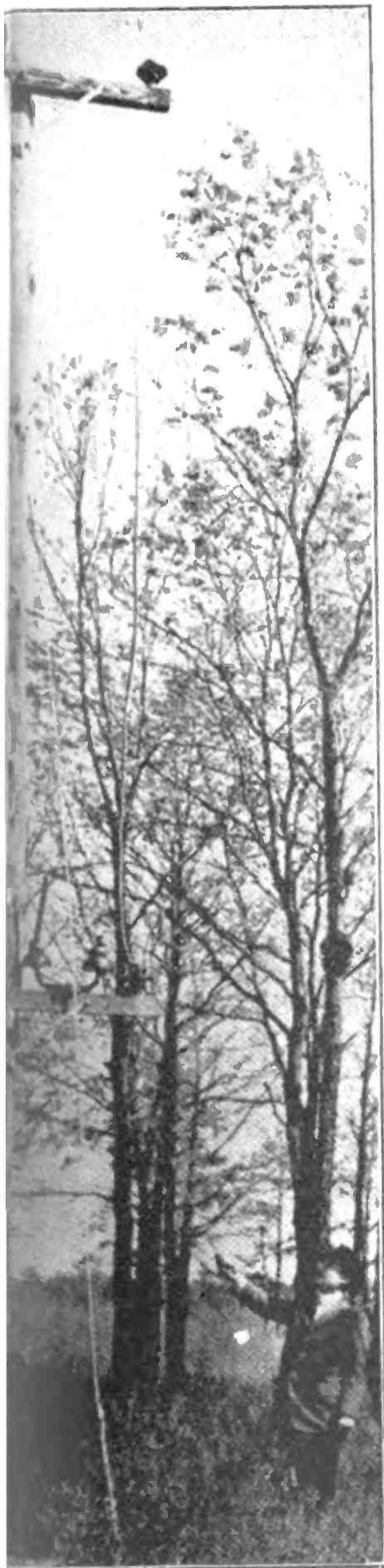
(C. Kadel and Herbert) Some of you fans have often wondered who originated the term "cat whiskers." If you will look at the above picture you will see the originator and possessor of the finest cat whiskers in the land. All hail the "Radio Kink of the Cat Whiskers."



The speech by Secretary Herbert Hoover, arbiter of radio telegraphy and telephony, which recently broke all distance records of KHJ, the Los Angeles station. Mr. Hoover's speech from that station was heard 500 miles east of New York City, a distance of 3,500 miles, and was a distance record for this station. The picture shows Secretary Hoover speaking on that occasion.



(C. Harris and Ewing) W. W. Tupper, of the Bureau of Lighthouses, and the receiving set he designed to make it possible for keepers of isolated lighthouses to keep in touch with the outside world. The set uses three spider web inductances to tune with and a WD-11 as a detector. As the Bureau has no appropriation to install the sets, blueprints and detailed instructions will be furnished by the Bureau to all keepers desiring them.



Overhead, Long Island, N. Y., stations for the reception of by the Radio Corporation of 7 30 feet from the ground, but W. W. Alexander, Chief Engineer for this station, is shown which protects the entire system wire.

Answers to Readers

WILL you give me a hook-up for the Reinartz circuit using honeycomb coils, and also the proper size coils to use? 2. What is the correct spelling of the name? 3. What is the Welsh peanut tube No. W.T.-501, and how does it compare with the standard 6-volt tubes? Refer me to back issues if necessary for the diagrams as I have all the back numbers.—A. E. McCulloch, 649 East Buchtel avenue, Akron, Ohio.

1. While this circuit can be used with honeycomb coils, you will not have very great success with it. The feature of the entire set is the fact that the coil, which is a spider-web type, and the coupling are fixed, the tuning being accomplished by means of taps and condensers. We refer you to page 23 of RADIO WORLD for January 13, 1923, where you will find the hook-up with all constants, as well as a detailed description of how to wind and tap the coil, in answer to a query from Mr. C. W. Stewart.

2. The correct spelling of the word is "Reinartz." It is the name of the man who discovered the circuit.

3. This is a new, small tube, manufactured by W. Guild, 68 Glen Ridge avenue, Glen Ridge, N. J. We do not discuss in this department the relative merits of competitive types of apparatus such as this. We suggest that you write to the address given for descriptive literature.

* * *

I have seen advertised a new tube made by the General Electric Company, called the U.V. 201 A. Kindly let me have all the data on this tube.—A. J. Patterson, Westport, N. J.

We refer you to the article on the subject in this issue of RADIO WORLD.

* * *

I have constructed the set described by Mr. J. Rumford in RADIO WORLD for March 3, 1923, and have been unsuccessful in getting any results out of it except a loud, buzzing sound. What may be my trouble?—W. A. Cale, 56 Beaver street, New York City.

You mention in your letter the fact that you have your honeycomb coils mounted one above the other. This is wrong. They should be mounted in a vertical position at right angles to one another, exactly as shown in the diagram, so that they will form two sides of a rectangle. They should be mounted about three inches apart. The wiring for this set should be as short as possible. Do not wire with straight-line bus-bar wire, but use heavy cord wire that can be run in straight "bee" lines. Use correct capacities as marked in the drawing, and do not have the variometer in inductive relation to either of the coils. By that we mean do not mount it near them. A grid leak is not necessary with this set, and should not be used. The honeycomb coils should not be mounted in such a fashion as to be movable, but made stationary. Make sure that you have a hard tube, as a detector will not function well with this set. If it does function at all it will give little better results than you have already obtained.

* * *

In relation to circuit No. 2, published on page 4 of RADIO WORLD for February 3, 1923, will you kindly advise me how this could be hooked up as a single-circuit

regenerative set, what apparatus is used and where placed?—Roy McShaffrey, Star Theater, Monessen, Pa.

It is not advisable, but it can be done in the following manner if you wish, although the results you will get are questionable: Instead of using the loop, hook the leads from the single-circuit coupler to the leads where the loop is now connected with the variable condenser across the leads. Make the antenna lead tap off so as to go to the grid of the first tube, and the other end of the circuit (the one going to the ground) go to the other lead, where the other side of the loop is connected. Then connect the rotor of the coupler in the plate circuit of the third tube (detector) in the same manner as you would connect it were you using a single-circuit regenerative. This is for your information, and, although it might prove to be an interesting experiment, it is doubtful if it would work. The circuit as it stands is capable of oscillating, due to the back-coupling of the circuit through the tubes and transformers. We advise first hooking up the circuit as it stands. If you care to use a regular variocoupler, with antenna and ground, connect the rotor in place of the loop the same as in a regular circuit.

* * *

1. In the article appearing on page 11 of RADIO WORLD for March 3, 1923, Mr. Rumford states that it is not advisable to use an outdoor aerial. But as I have a 60-foot outdoor aerial, will it be possible for me to use it? 2. Kindly advise me if I could construct the two honeycomb coils—namely, L. 1500 and 1250—and how to do it.—P. G. Pedicord, Premier Service Co., 120 No. Market street, Wichita, Kan.

1. The reason for this statement is that the set is so super-sensitive that a great deal of outside interference, such as static and re-radiated signals, would make reception extremely hard. The loop is the ideal medium for this set, and should be used, although, as an experiment, you might try the antenna and ground, connecting them in the place marked for them.

2. It is so much easier and cheaper to buy these coils that it would not pay you to make them. They have 1250 and 1500 turns apiece, and it would probably cost you more to construct them yourself than the market price. You must also take into consideration that the manufactured article is usually perfect, whereas you would have to take a chance on your construction being O. K. The building of small coils which do not require over 75 or 100 turns is a different matter. Details for the construction of such coils are given in this issue by Ortherus Gordon under the heading "How to Make the Honeycombs for Your Flewelling."

* * *

Is there any postage or tax imposed on radio apparatus coming from Great Britain?—John Docherty, 179 East 110th street, New York City.

There is the regular duty, plus a special tax on electrical goods manufactured outside the United States, which is imposed on all goods of this sort. Apply to the Collector of the Port of New York, Custom House, New York City, for values and assessments on these as they change with the value of import and salable value of goods.

Radio to Prevent Mine Disasters

HERBERT E. METCALF, a radio engineer, has predicted that disasters in mines may be averted, mining camps put in touch with the outside world of business and entertainment, and the expense of communication lessened by the installation of radio telephony. Mr. Metcalf gives an affirmative answer to the question, "Can radio be used underground?" Mr. Metcalf is quoted as saying:

"Radio waves do penetrate the ground and do travel through the earth much the same way as they travel above the ground. There are, however, certain limitations which tend to absorb the power of the transmitting set when sending underground; but, due to the increase in efficiency and sensitiveness of receiving sets, it may be stated with authority that no difficulties are encountered in sending messages from the surface to the bottom of the deepest mine unless perhaps the receiving set in the mine is surrounded by a high metallic content iron ore. The above remarks apply principally to receiving below from a sending set above. The reverse—sending from below to be received above—is a little more difficult, especially in metallic ore mines."

Secretary Hoover Will Appeal Radio License Case

AN appeal will be taken by Secretary of Commerce Hoover from the recent decision of the District of Columbia Supreme Court ordering Mr. Hoover to issue a radio license to the Intercity Radio Company of New York, according to an announcement by the Department of Commerce. Secretary Hoover, empowered by legislation to regulate radio communication, refused a license to the Intercity Company on the ground that it interfered with naval and other radio communication around New York City. The company took the matter to the court and obtained a favorable decision.

Colby Academy Radio Club

EDITOR, RADIO WORLD: The officers of the Colby Academy Radio Club are as follows: Thomas O. Parker, Faculty Advisor; Vermal C. Buchlin, President; Raymond Knight, Chief Operator; R. W. Ringrose, Secretary.

Membership in the club is open to the whole student body. The apparatus is bought by the Science Division. Radio concerts are given twice a week to the students in the chapel. The radio room is open daily from 5 to 6 p. m.

Yours truly,
VERMAL C. BUCHLIN,

March 15, 1923.
New London, N. H. President.

Sewickley, Pa., "Y" Radio Club

EDITOR, RADIO WORLD: The names of the officers of the Sewickley "Y" Radio Club are: Instructor, W. S. Fraser; President, John Kinsvatter; Secretary, Robert Ritchey; Property Man, Edwin Hingst.

Yours truly,
Sewickley, Pa. ROBERT RITCHEY,
March 20, 1923. Secretary.

Growing Into Big Figures

SECRETARY HOOVER, of the Department of Commerce, recently estimated that there were at present somewhere between 1,500,000 and 2,500,000 radio-receiving stations now in use in the United States.

Latest Radio Patents

Radio Receiving Apparatus

No. 1,446,800; Patented Feb. 27, 1923. Patentee: Lloyd Espenschied, Hollis, N. Y.

THIS invention relates generally to systems for transmitting energy, and particularly to the protection of such systems against disturbance. Its object is to provide a method of, and apparatus for, eliminating or minimizing the effects of disturbances in such systems, whether in power circuits or signaling systems, and in either wire or wireless systems of communication. The invention finds one very important application in the radio transmission of intelligence as a protection

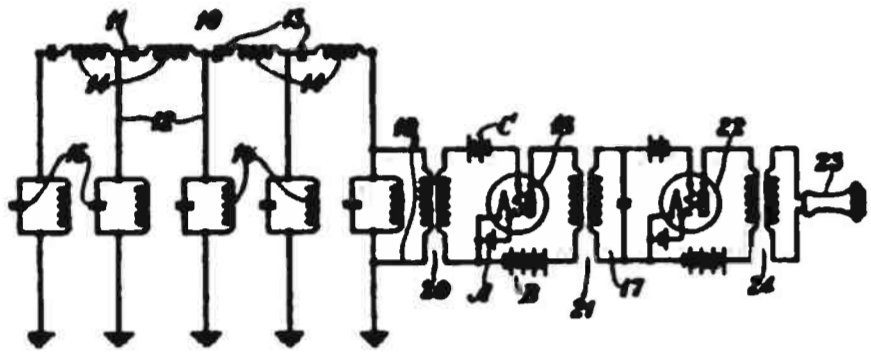


Diagram of Receiving Circuit as improved by Lloyd Espenschied and explained in the following text.

against the electrical disturbances commonly known as "static"; and the invention will be here described as applied to such a system, but, as will clearly appear hereinafter, the invention is of much broader applicability.

In radio signaling systems the usual antenna is sharply tuned to increase its responsiveness to waves of the particular fre-

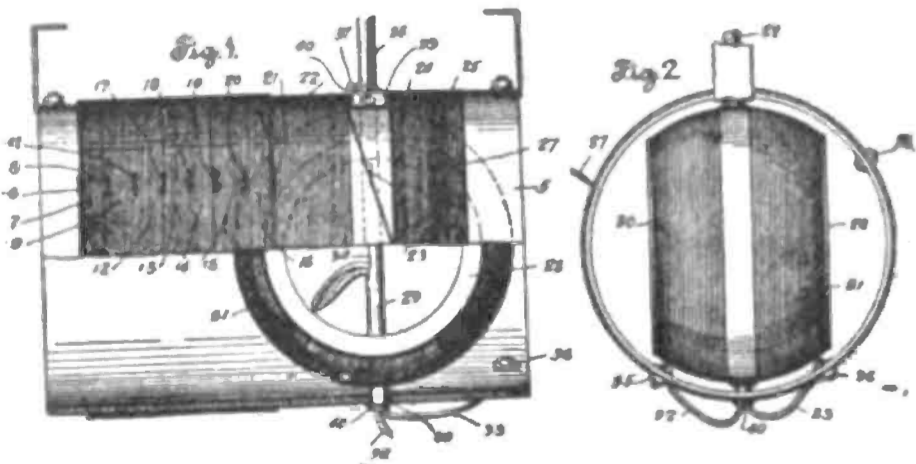
quency to be received and to reduce the liability of interference from signals of other frequencies. The effect of static disturbances upon an antenna thus sharply tuned seems to be analogous to that of a blow upon a tuning fork; that is, the energy of the impact is converted largely into oscillations of the frequency to which the device is tuned. In a wireless receiving system this means that the disturbance will appear in the receiver to the confusion of the signals it is desired to observe. In other words, the receiving systems, instead of excluding the static disturbances by reason of existing differences between them and the signaling impulses, or instead of accentuating or producing differences between them, tends to effectually extinguish the differences that do exist, so that the disturbance is in a sense manufactured by the system for its own receiver. Like phenomena may occur in almost any energy transmission system where some or all of the transmitting medium has a natural period or is capable of responding sympathetically to foreign disturbances.

This invention proposes to avoid such disturbances by changing or diverting the disturbing energy into a plurality of frequencies other than that of the energy to be transmitted or into a band of frequencies of considerable extent so that, even though the frequency being transmitted falls within its scope, only a small proportion of the disturbance reaches the translating or indicating devices of the system.

Variable Inductance

No. 1,445,806; Patented Feb. 20, 1923. Patentee: Marvin C. M. Lane, Roselle Park, N. J.

THE special objects of the present invention are to combine in a simple, compact structure all the functions of a variometer, variocoupler and variable inductance, which will be capable of a fine degree of tuning throughout a comparatively wide range, including the longer as well as the usual short wave lengths. In the accomplishment of



Schematic drawing illustrating the new Variocoupler as patented by Mr. C. M. Lane.

these objects the inventor uses a single tubular core upon which there is placed a bank-wound coil provided with taps and as a continuation of that a straight wound coil within which is journaled a rotor so positioned that it can be turned to carry its windings partly beneath the bank-wound coil.

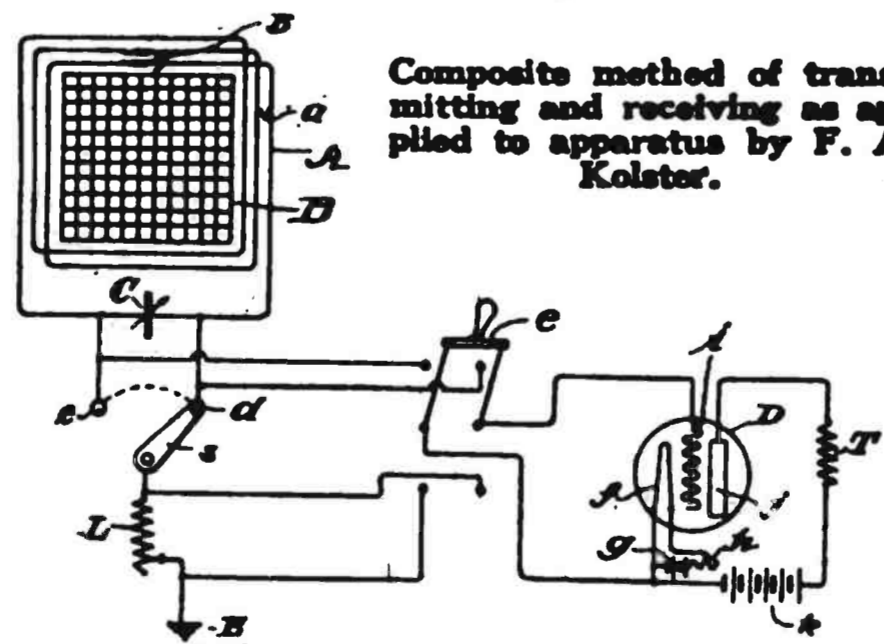
Radio Method and Apparatus

No. 1,447,165; Patented Feb. 27, 1923. Patentee: Frederick A. Kolster, Washington, D. C.

MY invention relates to apparatus for transmitting or receiving electro-radiant energy or electro-magnetic waves for the transmission of intelligence, as for

telegraphy or telephony, or for signaling in general, or for any other purpose.

My invention resides in apparatus of the character referred to comprising a closed circuit whose distributed capacity and inductance are preferably very small or substantially nil—the closed circuit—and particularly the inductance or coil therein, operating as a capacity area connected through tuning apparatus, as variable in-



Composite method of transmitting and receiving as applied to apparatus by F. A. Kolster.

ductance, with the earth or any counterpoise capacity.

Receiving apparatus embodying my invention is an absolute direction finder or a true radio compass whereby the location of a source of radiant energy may be determined. Such receiving apparatus serves also as an excellent interference preventer; that is, for permitting reception of signals from a desired station to the exclusion of signals from other stations differently located with respect to the receiving station, and to the exclusion of atmospheric or natural electrical effects.

Transmitting apparatus embodying my invention has the property of transmitting energy of greater intensity.

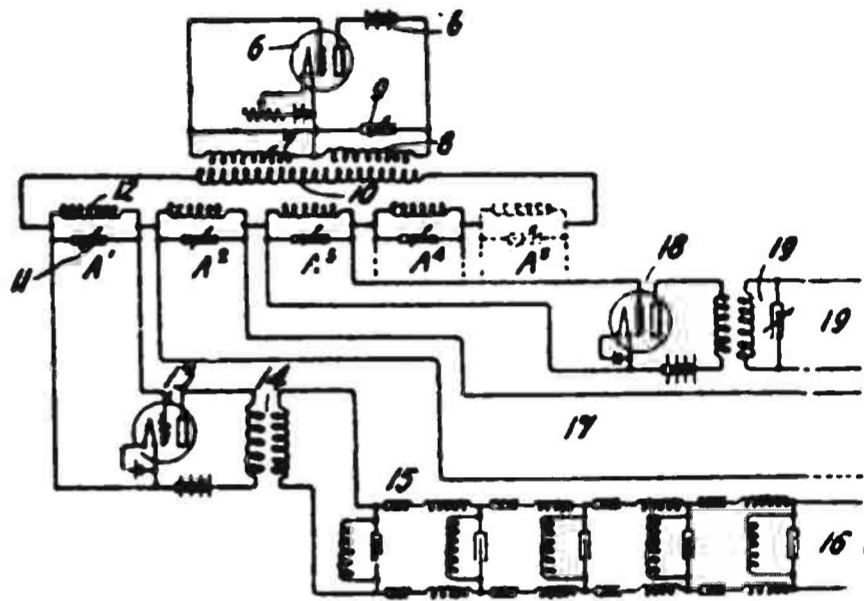
Generator and the Generation of Multiple Frequencies

No. 1,446,752; Patented Feb. 27, 1923. Patentee: Burton W. Kendall, New York, N. Y.

THIS invention relates to a method and means for the generation of multiple frequencies, and has for an object to provide a means for producing currents of a frequency or frequencies higher than a given basic frequency. The higher frequency currents may be used for any suitable purpose, such as sources of carrier waves for multiplex signaling.

The higher frequency currents are obtained by distorting the wave form of the fundamental frequency and by selecting the overtones or multiple frequencies present in the distorted wave.

The distortion may be effected by means of an electric discharge device, which has the following characteristics that give rise to a distortion: First, equal increments in



Mr. B. W. Kendall's method of producing multiple frequency for the transmission of high frequency currents.

the voltage applied to the device do not produce proportional changes in its output current. This gives rise to a distortion, as the input voltage is not faithfully reproduced in the output circuit. This characteristic belongs to all audions which have not been provided with special means to change this characteristic. Secondly, a further and greater distortion is obtained, according to the present invention, by considerably overloading the audion. This is done by applying to its input terminals an alternating potential such that the maximum value carries the operation of the tube beyond that portion of its characteristic which is substantially linear, thus substantially distorting the wave form of the applied alternating potential as repeated by the tube. This applied alternating potential may be such that the maximum positive value will exceed that necessary to cause the tube to become saturated and the maximum negative value will exceed that negative value required to reduce the output current substantially to zero, or one of these conditions may exist alone to the substantial exclusion of the other. The number of electrons which can be given off by a thermionic cathode at a certain temperature has a limiting or saturation value, and the corresponding point on the characteristic curve of the electron discharge device may be termed the saturation point of the cathode for that temperature. Accordingly the cathode will limit the space current which can flow in the thermionic device, and variations in the internal impedance in the circuit of the space current are not followed by proportionate changes in the value of space current. Thus the wave form of the output current will be considerably distorted. Thirdly, in some cases a further distortion may be obtained in the suppression of the alternate half waves by passing the distorted wave through a unilaterally conducting device, such as a thermionic rectifier. A particular electric discharge device may have one, two or even three of the distorting characteristics just described.

New Records of The DX Nite Owls

Paste These in Your Hat

From W. H. Howe, Route 6, Phoenix, Arizona

I AM enclosing herewith a list of stations that I have heard, and which I know will be of interest to the DX Nite Owls.

The greatest distance covered is 2,200 miles, from WGY, Schenectady, N. Y. Early Sunday morning, March 4, this station was coming QSA on one stage of audio, and on two stages they nearly knocked the phones off my head. WDAP, Chicago, was also very strong at the same time.

The set is home-made, being a two-circuit detector with two stages of audio frequency and one stage of radio frequency, which is tuned with an ordinary variometer. A 400-ohm potentiometer is used; 27 volts on the detector, 110 volts on the plates of the amplifiers, and 4½ volts on the grids of the audio amplifiers. Aerial is inverted L type, 65 feet long and 25 feet high.

The following stations have been heard here:

Call	Location	Distance
AGI	San Francisco, Cal.	650
DN4	Denver, Colo.	600
KDN	San Francisco, Cal.	650
KDPT	San Diego, Cal.	300
KDYL	Salt Lake, Utah	500
KDYM	San Diego, Cal.	300
KDYS	Great Falls, Mont.	1,025
KDYW	Phoenix, Ariz.	8
KFAB	Portland, Ore.	1,025
KFAD	Phoenix, Ariz.	8
KFAF	Denver, Colo.	600
KFBK	Sacramento, Cal.	675
KFCB	Phoenix, Ariz.	8
KFCL	Los Angeles, Cal.	350
KFDB	San Francisco, Cal.	650
KFDL	Denver, Colo.	600
KFGH	Stanford University, Cal.	625
KFHJ	Santa Barbara, Cal.	450
KFI	Los Angeles, Cal.	350
KFV	Yakima, Wash.	1,050
KGG	Portland, Ore.	1,025
KGO	Pasadena, Cal.	350
KGW	Portland, Ore.	1,025
KHJ	Los Angeles, Cal.	350
KJS	Los Angeles, Cal.	350
KLP	Los Altos, Cal.	625
KLS	Oakland, Cal.	650
KLX	Oakland, Cal.	650
KLZ	Denver, Colo.	600
KMJ	Fresno, Cal.	500
KNJ	Roswell, N. M.	425
KOB	State College, N. M.	300
KOG	Los Angeles, Cal.	350
KPO	San Francisco, Cal.	650
KQW	San Jose, Cal.	625
KRE	Berkeley, Cal.	650
KSD	St. Louis, Mo.	1,300
KUO	San Francisco, Cal.	650
KUS	Los Angeles, Cal.	350
KUY	El Monte, Cal.	325
KWG	Stockton, Cal.	585
KWH	Los Angeles, Cal.	350
KYJ	Los Angeles, Cal.	350
KYW	Chicago, Ill.	1,600
KZN	Salt Lake, Utah	500
WAAP	Wichita, Kan.	900
WBAP	Fort Worth, Texas	825
WBL	Anthony, Kan.	800
WDAF	Kansas City, Mo.	1,050
WDAH	El Paso, Texas	300
WDAP	Chicago, Ill.	1,600
WDAV	Muskogee, Okla.	925
WFAA	Dallas, Texas	850
WGY	Schenectady, N. Y.	2,200
WHB	Kansas City, Mo.	1,050
WKY	Oklahoma City, Okla.	825
WMAB	Oklahoma City, Okla.	825
WOC	Davenport, Ia.	1,300
WOAI	San Antonio, Texas	825
WPA	Fort Worth, Texas	825
WWJ	Detroit, Mich.	1,800
9ZAF	Denver, Colo.	600

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

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

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

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

Send a Stamp for This Hook-Up

From Ben E. Noble, Box 156, Pacific, Mo.

I AM a regular reader of your fine magazine, and I have got some helpful hints from every issue. I am submitting my record since January 15, 1923. I did not think so much of it until I noticed so many others, and I believe I have something to be proud of. I am using a one-stage WD-11 tube set I made myself, vario-coupler, 23-plate condenser with vernier adjustment in series with aerial, Jenkink rheostat on detector tube and Freshman grid leak.

The number of stations I have heard is 115, covering 37 states on the Pacific Coast and Atlantic Coast; also five provinces in Canada; Gulf Coast and San Antonio, on the border. My greatest distances are:

WLAJ, Fairbanks, Alaska; PWX, Havana, Cuba; KFD, Los Angeles, Cal.; KGW, Portland, Ore.; KDYL, Salt Lake City, Utah; KDYS, Great Falls, Mont.; KWJ, Roswell, New Mexico; WOAI, San Antonio, Texas; WOR, Newark, N. J.; WHAZ, Troy, N. Y.; CKCK, Regina, Canada; CFCA, Toronto, Canada; CKAC, Montreal, Canada; CFCB, Vancouver, B. C.; CJCG, Winnipeg, Man.; WNAQ, Charleston, S. C.; WFAH, Port Arthur, Texas; WAAB, New Orleans, La.; WKAH, Palm Beach, Fla.; WJAP, Duluth, Minn.; KFAF, Denver, Colo.; WBZ, Springfield, Mass.; WDAL, Jacksonville, Fla.

I have heard a few distant stations while our local station, KSD, twenty-five miles away, is transmitting. I have no trouble at all tuning them out for the eastern stations, and on one occasion I had PWX, Havana, Cuba, only eight degrees from the post, and could not hear the post. Any one wanting this hook-up of my set may have same by sending a stamped envelope. I did not think anything of my log until I noticed what others were doing.

DX News From New Brunswick, Canada

From Neal Coleman, St. John, N. B., Canada.

AFTER having seen many records in RADIO WORLD I wish to submit my list of stations. My set consists of a vario-coupler, a variable condenser and two stages of amplification. I have an aerial 90 feet long with a lead-in of 40 feet, single wire. My stations are:

WGY, WJZ, WOR, WNAC, WGI, WIP, WOO, WWJ, WFAF, WSB, WMAQ, WMAK, WHAZ, WHAS, WDAS, WCAE, WHA, WHK, WFI, WNAT, CHCX, PWX, WQAA, WEAA, WCAU, CKAC, CFCF, WHAM, WBAY, WGR, WOC, KOP, KDKA, KSD, WBZ, WBT, WBAP, WDAP, and about twenty more stations. I have only had my set for five months.

A New Sailor Nite Owl

From R. W. Higgins, U. S. Naval Training Station, Newport, R. I.

I HAVE something for the good of the order. I have no hook-up of my own, but an \$18 regenerative set, using WD-11 tube with adapter and lighting circuit for aerial. Here is my record night for you to slant at: WEAN, WJAX, WGY, WBZ, WJZ, WFAF, WGAS, WBAK, WOC. How is that for the electric-light aerial? Chicago and Davenport clear as a bell.

Can Equal the Record

From Roger H. Burrill, Campello, Mass.

AFTER seeing your DX night owl department I think that I can equal the record of anyone who has the kind of set that I have. My set is of the single circuit regenerative type. My aerial is one hundred and fifty feet long. The ground is attached to a water pipe. The set I have is a one-tube WD-11 with 43 volts on the plate. These are a few of the stations that I hear regularly: PWX, WSB, WHAS, WGY, WGI, WNAC, WLW, CFCF, CFCA, KDKA, WOC, KYW, WEAC, WOO, WOR, WJZ, WIP, WBZ, WHAM, WFAF, WRW, WFI, NAA, etc.

Doing Away with Taps

From J. White, Brooklyn, N. Y.

SEVERAL days ago the windings on the rotor of my vario-coupler came loose, and I began experimenting with my set, and at last hit on a substitute for my vario-coupler. By setting the two coils of the stator in series and disconnecting the rotor so that it acted like the rotor of a vario-coupler I had a good substitute. By placing the aerial and ground on the stator and the usual secondary connections on the rotor I obtained good results. I received KDKA, WGY, WJZ, WOR, WFAF, WAAM, WBAN and WQA in one hour on last Sunday night.

I had a regenerative receiver employing one vario-coupler, one variometer and one vario-condenser (21-plate), using a WD-11. Of course the results were not so loud, but it is a good substitute for the amateur who wishes to do away with taps.

Good Record for Single Tube

From Perkins Bennehan, 637 Poplar Ave., Fresno, Cal.

I HAVE written before, but if this is printed I will promise to forever hold my peace. I wish to present a list of DX stations which I heard on a recent night, using a single UV-200 detector tube only: PWX, Havana, 2,425 miles; WCAE, Pittsburgh, 2,150; WSB, Atlanta, 2,025; WGM, Atlanta, 2,025; WWJ, Detroit, 2,000; KYW, Chicago, 1,775; KSD, St. Louis, 1,625; WOC, Davenport, 1,600; WHB, Kansas City, 1,400; WDAF, Kansas City, 1,400; WBAP, Fort Worth, 1,300; CFCN, Calgary, 1,100.

How is that for a nice little record, Mr. Editor? No doubt it has been beaten by fans using two, three or more tubes. But who has done better on a single tube? As I have not as yet seen any that beats this I claim the record for single-tube, single-night reception. If you have beaten this, Mr. Fan, let's hear from you.

(Continued on page 26)

Electric Ferry "Poughkeepsie" Is Revolutionary Type of Craft

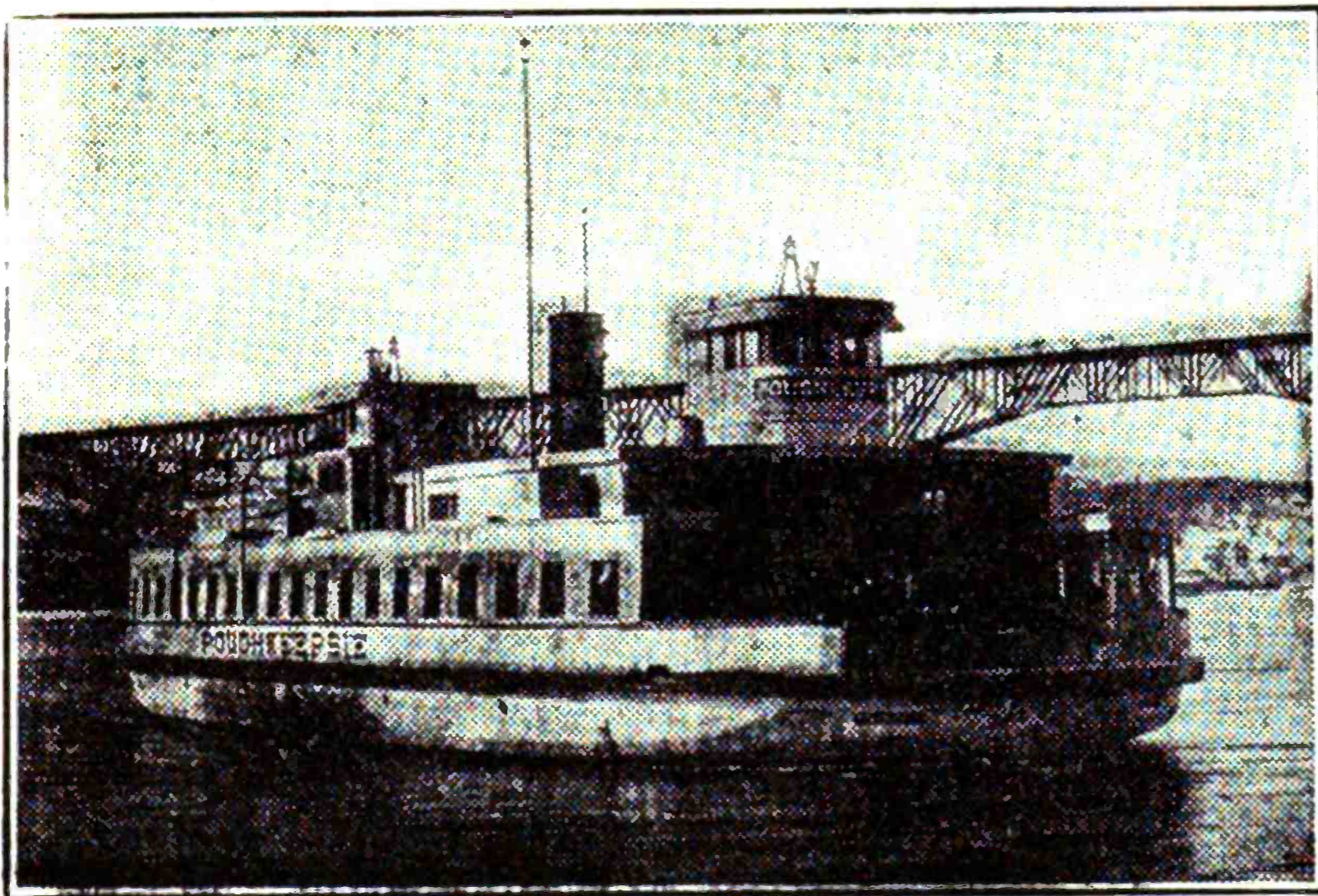
THE most unique boat in the world is now plying the Hudson River between Poughkeepsie and Highland. She is the ferry boat "Poughkeepsie," and she is not only electrically propelled, but she is controlled like an automobile, she has a lower operating cost than any other vessel of her size and power afloat, and she is also specially designed for breaking through ice. Because of this unusual combination of novel features, she has probably attracted more attention than any vessel since the "Monitor."

The United States Navy was the first to appreciate the advantages of electricity for ship propulsion and it took a long step in advance of other naval powers by equipping all of our recent battleships with electrical propelling machinery. Electric drive is also in successful use on several pleasure yachts and on certain other craft of a more or less

understood. This facility of control is of great importance to a vessel that must constantly enter slips and thread its way through crowded traffic.

No less important, however, is the "Poughkeepsie" high fuel economy. Because her engines are of the internal combustion type, they can develop their full power on less than one-third the amount of fuel required by the most efficient type of steam engine. This means that her operating cost is extremely low and makes this type of drive very desirable in all classes of vessels in which it can be used.

A feature of the "Poughkeepsie" that will be especially appreciated by motorists crossing the river next summer is that because of the compactness of her Diesel-electric machinery it can all be contained within the hull with no superstructure on the main deck. Hence this deck is perfectly clear and



Electric Ferry Boat "Poughkeepsie" Is Controlled from the Pilot House

experimental character but the "Poughkeepsie" is one of the very first commercial vessels to be electrically operated. She is, therefore, a pioneer; and in the opinion of many marine engineers she marks the beginning of the electrification of our river and harbor vessels, and perhaps our merchant marine as well.

An electrically-operated ship differs from an electrically-operated locomotive in that she cannot get her electric power by wire or third rail, but must generate it herself. The "Poughkeepsie's" generating plant consists of two Winton engines of the so-called Diesel type; that is to say, they resemble automobile engines but use heavy oil instead of gasoline for fuel. Each engine is rated at 125 horsepower and drives a 90-kilowatt Westinghouse electric generator. These generating units operate continuously at constant speed and in one direction only when the boat is in use. They do not control the speed or movement of the boat, but merely furnish electricity for two 100-horsepower Westinghouse motors which are geared to the propellers.

The control of the propeller motors is centered in a small handle mounted behind the wheel in each pilot house. By moving this handle, the pilot himself starts the propellers, changes their speed, stops or reverses them. He therefore operates the boat just as a chauffeur does an automobile, without losing time signalling to the engineer or running the possibility of being mis-

can accommodate four lines of automobiles, instead of the usual two lines only. In fact, though the "Poughkeepsie" is barely half the size of a Staten Island ferry boat, she can actually carry more cars. This large capacity is expected to eliminate waiting at Poughkeepsie and Highland during the coming touring season.

The "Poughkeepsie" has to be an ice-breaker if she is to operate continuously during the winter, since the ice is often over two feet thick at this point. To look at her, she seems broad, shoal, and of very light draught. This is not the case, however, for under her visible hull is a second one, known as the "hullfin," which carries the propellers. When the "Poughkeepsie" runs into ice, she does not wedge into it as a boat with an ordinary keel would do, but her broad end rides over it, crushes it, and then pushes it aside. Her propellers, being beneath the main hull on the hullfin, are always deep in the water and are uninjured by the ice.

Victor Erects New Building

The new building recently erected by the Victor Talking Machine Company at Camden, N. J., will be used for the manufacture of phonograph records and not for making radio equipment. Vacuum tubes are now used by the Victor company in recording the voice.

The Power Amplifier for your Magnavox Radio

THE Magnavox, in reproducing with extreme sensitiveness every signal supplied to it from the receiver, must necessarily reproduce any extraneous sounds which may originate in the receiver or power amplifier itself.

Therefore, to obtain all the wonderful results of your Magnavox Reproducer, use it with the Magnavox Power Amplifier.



R-2 Magnavox Radio with 18-inch horn



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

R-3 Magnavox Radio with 14-inch horn

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

Requires one ampere field current from your filament battery.



Magnavox Power Amplifier—Model C

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

2-Stage and 3-Stage

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

Magnavox products may be had of good dealers everywhere.

Write to us for illustrated booklet

The Magnavox Company
Oakland, California

New York Office: 370 Seventh Ave.

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

Radio Merchandising

Classified Quick-Action Advertising, 5 cents per word.

Telephone Bryant 4796

New Radio Firms

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

De Forest Phono Film Corp., Dover, Del., patents, \$4,750,000. (U. S. Corporation Co.)
Marvel Electric Supply Co., New York City, \$5,000; D. E. and M. Greenbaum, A. L. Popper. (Attorney, M. Popper, 99 Nassau St.)
Wallace Electric Co., Rochester, N. Y., to issue 500 shares preferred stock, \$100 each; 300 common, no par value.
Radio Construction Co., Wilmington, Del., radio, \$750,000. (Corporation Trust Co. of America.)
Tristan Sales Corp., New York City, make wireless apparatus, \$100,000; G. M. Jost, C. W. Hanes, A. Klein. (Attorney, L. Cohn, 1540 Broadway.)
Woodlawn Electrical Appliance Co., Wilmington, Del., \$100,000. (American Guaranty & Trust Co.)

Backus, Minn., Telephone Subscribers Get Free Radio Concerts

RADIO reception has been greatly simplified in Backus, Minn. If the Backus resident is a telephone subscriber he simply takes his telephone receiver from the hook and music, drama, sermon or lecture pour out. He has no need to worry about run-down batteries, weak tubes, the intricacies of hook-up or the length or height of his antenna. Miss Anna Ozier, chief operator for the Backus Telephone Company, recently wrote WGY, the radio broadcasting station of the General Electric Company, Schenectady, N. Y., as follows:

"We have a receiving station here and by putting the horn close to the transmitter and connecting up the farm lines, I have a system now by which the subscribers on our farm lines who have never had an opportunity of getting concerts direct from the air have passed many of these winter evenings enjoying themselves by turn and turn about at the telephone.

"I know of several cases where three or four people have listened in on the same receiver at once. In one case I was surprised by being recompensed by a lady who was so much pleased by the concert and the part she though I took in it, that she brought me a dozen eggs. As she said, it was her way of saying 'thank you.'"

Radio Stocks

(Quotations as of March 14, 1923, furnished by Frank T. Stanton & Co., 35 Broad Street, New York, Specialists in Wireless Securities.)

Stock	Bid	Asked
American Marconi, Stamped..	5*	15*
American Marconi, Unstamped.	5*	7*
American Tel. & Tel.....	125¼	125½
Canadian Marconi	23½	3
De Forest Radio.....	7	10
Dubilier Condenser	9	9¼
English Marconi com.....	11	15
English Marconi pfd.....	11½	15½
Federal Tel. Cal.....	5½	6
General Electric	188½	189
Hennessy Radio Pub.....	9	11
Mackay Co. com.....	111	115
Manhattan Elec. Supply.....	55	57
Marconi Int. Marine.....	7	10
Radio Corporation com.....	4¼	4¼
Radio Corporation pfd.....	3¾	3½
Spanish Marconi	1	3
Western Union	115	116
Westinghouse E. & M.....	65	65½

*Cents per share.

Naval Communications Service Has a Big Year

GOVERNMENT messages totalling 15,763,308 words were handled by the Naval Communications Service during 1922, according to a statement made public last week by Acting Secretary Roosevelt. Of this total, 10,000,000 were for the Navy, the remainder being official business for the various Government departments. The House of Representatives is at the bottom of the list with 505 words, with the White House next to last with 1,258.

Coming Events

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

ANNUAL HOME AND CITY BEAUTIFUL EXPOSITION, featuring radio exhibits. Atlantic City, N. J., June 16 to September 8, 1923.

RADIO AND ELECTRICAL EXPOSITION, including amateur home-made set contest, San Francisco, Cal., April 3 to 8, inclusive.

Crosley Celebrates Second Anniversary

THE Crosley Manufacturing Company, Cincinnati, Ohio, home of the broadcasting station WLW, celebrated its second anniversary last week. This celebration, however, applied to the radio division. Two years ago, on Washington's Birthday, Powel Crosley 3d wanted his dad, Powel Crosley, Jr., president of the company, to purchase a radio-receiving set for him. His classmates had one, and, boy-like, he, too, wanted one.

When Mr. Crosley went to the Precision Equipment Company to buy the radio set he found the prices were very high. With the idea in mind that there must be thousands who would want a set he called in an engineer, and together they designed a cheap radio set. The first of these receivers was ready March 21, 1921. The Crosley socket with its design for mounting upon a panel, the variable condenser with its book-type action, and other distinctive apparatus now well known in the Crosley line, came as a result of a little boy wanting a radio set.

It is interesting to note that, within two years from the time Powel Crosley, Jr., went to the Precision Equipment Company to inquire the cost of a radio-receiving set, he purchased the company.

The Crosley Manufacturing Company has one large factory, where an extensive line of radio apparatus is manufactured; another makes the cabinets, while a third establishment is the printing plant. A little informative newspaper is issued, called the "Crosley Radio Weekly," which gives programs of the Crosley station.

The Delta Dry-Cell Tube

The Delta Midget Tube Company, 241 Market street, Newark, N. J., have brought out a new dry-cell tube taking three volts and using an amperage of .15. It is said to be equal to doing the work of the W-D 11 tube. This firm also manufactures sockets and adapters for their tube. The entire line of products, both because of the present shortage of tubes and the inherent quality of the line, is proving very popular.

These Cheerful Workers Make "Signal" Radio Equipment



Advantages of the Hazeltine Neutrodyne Circuit

THE most remarkable feature of the neutrodyne circuit, invented by Professor L. A. Hazeltine, of Stevens Institute of Technology, Hoboken, N. J., which was illustrated and briefly described in RADIO WORLD for March 10, 1923, is that great distances, hitherto unobtainable, are secured with clear and undistorted reception.

The neutrodyne circuit is non-regenerative. Therefore the familiar whistles and squeals which attend the "tuning in" of a regenerative set are entirely absent. Experts who have tried the few sets available at this early date report picking up stations clear across the continent; and, what is most remarkable, the quality of the music and speech is practically like the clear tones received on a short-range crystal detector set.

To the initiated radio enthusiast the neutrodyne set looks unlike any heretofore constructed. There are no variometers, no variocouplers and no ticklers. Tuning is effected by three variable condensers, two of which are set at the same definite settings for definite wave lengths, and antenna tuning is accomplished entirely by a single dial operating a variable condenser.

Other features are the use of new types of jacks for automatic filament control and the devices called "neutroformers," to which the high amplification is due.

The invention, from a technical standpoint, comprises means for neutralizing the effect of the inherent capacity between the grid and plate circuits of a vacuum tube, thus enabling any degree of high frequency amplification to be obtained without regeneration or feed back, and without the distortion which attends regeneration.

The term "neutrodyne" is used advisedly, "neutro" meaning equal and "dyne" meaning a force. An electrostatic force is applied to the grid of each high frequency amplifier tube, which force is equal and opposed to the effect of the "grid-plate" capacity of the tube. Thus undesired effects of the inherent tube capacity are

neutralized or balanced out. In technical circles it is expected that this invention will entirely revolutionize radio-receiver design.

One of the pleasing features of the neutrodyne circuit is its great selectivity. It is possible for the "listener-in" to make a log or station record, in which the settings of the dials are recorded for various stations. Once this log is made any large station in the United States with a transcontinental sending range is picked up by merely setting the dials at these positions. Unless a sending station changes its wave length the record of dial settings is permanent and never varies for that particular installation.

The patents of the inventor have been exclusively licensed to a group of manufacturers united in a trade organization known as the Independent Radio Manufacturers, Inc., 165 Broadway, New York City. Among this group are three who will manufacture the Hazeltine apparatus under sub-licenses. They are Freed-Eiseman Radio Corporation, New York City; F. A. D. Andrea, New York City, and the Garod Corporation, Newark, N. J.

The anniversary number of RADIO WORLD, to be dated March 31, 1923, will contain an extended description, with several illustrations, of the Hazeltine neutrodyne circuit.

Princeton University Radio Club Sets a Mark

THE Princeton University Radio Club, Princeton, N. J., has established what is claimed to be a record for the number of messages handled in a month by an amateur station. From the 15th of one month to the 15th of the next the Undergraduate Club passed the 1,000 mark. The record of the club is 1,226 radio messages in a month, and in the four months of the existence of the club the amateurs have handled more than 4,000 messages. The club, which was started last November, has been licensed by the Government to carry on experimental work. It has twenty-five members, seven of whom are licensed operators, and they operate the station on a twenty-four-hour basis.

"WINDSOR CASTLE" PHONES



\$5.90

"Windsor Castle" Phones are made in the United States for the Canadian trade. Hence the British flag on the label.

Marvelous 3000-Ohm Instrument

It is your opportunity to get into the big D-X Class. Toronto, Canada, hears WEAJ, as well as WOC and other distant stations nightly with these Phones. Look for the full name on the Cap. And be sure you are getting the Special

IMPREGNATED BLUE DIAPHRAGM

This BLUE DIAPHRAGM is IMPREGNATED with a Special Chemical for Stability. Insist on it and the name "Windsor Castle."

Send us a Money Order and our Mail Department will do the rest quickly and efficiently. We pay Postage east of Mississippi. Checks or Stamps not accepted.

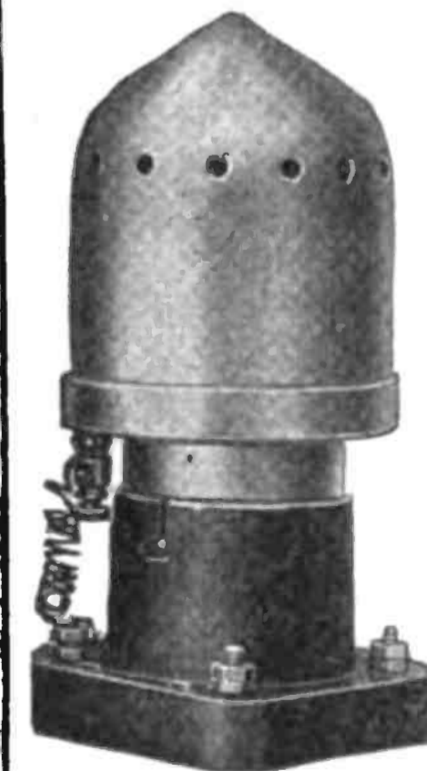
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D-X-RADIO CO.

123 Liberty Street New York City

SIX REASONS WHY A

"Vac-Shield"



Patent Pending

Will ship immediately by mail postpaid on receipt of \$1.00.

ORANGE RESEARCH LAB.

41 North 16th Street East Orange, N. J.

150-3000 Meters, with free diagram.....	\$4.00
Honey Comb Cell—D L No. 50.....	1.50
Honey Comb Cell—D L No. 75.....	1.50
6-Way Phone Connector.....	.75
45 Volt B Batteries.....	1.75
22½ Volt B Batteries.....	.75
Acme Transformers.....	2.25
Special W.D.-11 Transformer.....	2.00
King Variometer.....	2.25
Small Type Variometer.....	1.75
Coupler.....	1.25

WHITE RADIO CO.

123 E. 23rd ST. NEW YORK CITY
Cash with Order—Wholesale, Retail

CRYSTAL-TUBE FOR CRYSTAL SETS
Now ready for distribution. It gives clearer tone and protects your crystals. 35c (Silver). Our descriptive circular sent free on receipt of your address. (Discount to dealers.)
VACUUM ELECTRIC WORKS, Toledo, Ohio



SUNBEAM MOTTO

FIRST FOR PRICE, QUALITY, AND SERVICE

11 years at the same spot

All standard merchandise guaranteed.

Prices going up. Take advantage of present low rate.

Our guarantee provides you satisfaction, or your money back, we will repay transportation charges if not satisfied.

LOUD SPEAKERS	PHONES	VARIOCOUPERS
\$45.00 Magnavox, new type.....\$30.50	Baldwin Superphone..... \$9.50	Dayton Fan..... \$7.50
55.00 Western Electric..... 50.00	Baldwin unit..... 5.20	150 Degree Silk Wound.... 2.55
20.00 Amplitone..... 15.00	Brandes..... 5.00	VARIOMETERS
20.00 Dictograph..... 15.00	Federals..... 5.40	Dayton Fan..... \$8.50
TRANSFORMERS	Borwick..... 3.75	Arrow..... 2.00
U. V. 712..... \$5.85	Murdock 3000 ohm Special.. 4.25	Searle Bakelite..... 7.50
U. V. 714..... 5.45	Auth..... 3.75	RHEOSTATS
Acme..... 8.75	POTENTIOMETERS	Outler-Hammer Vernier..... \$1.25
Dayton..... 4.75	Federal, 200 ohms..... \$1.25	Outler-Hammer Non Vernier .85
Bestone..... 8.85	Radio Corporation, 250 ohms 3.00	Safetyrite..... .85
CONDENSERS, BAKELITE	"B" Bat., Eveready, 22½ V., Large..... 2.00	"B" Bat., Eveready, 45 V., Large..... 2.75
11 plate, Radio Stores..... \$1.15	COIL MOUNTINGS	3 Coil DeForest..... \$8.00
20 plate, Radio Stores..... 8.75	3 Coil Crown..... 4.00	(DeForest Coils in stock)
43 plate, Radio Stores..... 4.10	MISCELLANEOUS	2" Dials..... \$.20
83 plate, Vernier..... 4.80	3" Dials..... .30	3" Dials..... .50
43 plate, Vernier U. S. Tool..... 5.00	4" Dials..... .50	Plugs Fifth..... 1.00
23 plate, Fibre ends..... 1.50	Jacks Single contact..... .25	Jacks Double contact..... .60
43 plate, Fibre ends..... 2.10	Blinding Posts, Nickel or Rubber..... .05	Sockets..... .30, .50, .75, 1.00
RECEIVING SETS	Sockets with Rheostat..... 1.00	Miscellaneous..... .50
DeForest Radiobone Detector..... \$11.00	Grid Leaks, Freshman..... .70	Paper Condensers, All Sizes..... .15
DeForest 2 Stage Amplifier..... 10.00	Antennae Wire..... .35	Insulators..... .10
Acme 2 Stage Amplifier..... 45.00	Crystals..... .20	Coll Only 3 Layer, Bank Wound, Silk Wire (Hook-up Furnished with Coll)..... \$3.25
Sunbeam Detector..... 45.00		
Sunbeam 1 Stop Amplifier..... 75.00		
Sunbeam 2 Stop Amplifier..... 125.00		
(Complete with Tubes, "B" Battery, "A" Battery, Phones, Aerial, etc.)		
BATTERIES		
Storage, Eveready, 50 Amp..... \$14.00		
Storage, Eveready, 90 Amp..... 18.50		
Storage, Eveready, 110 Amp..... 18.00		
"B" Bat., Eveready, 22½ V., Small..... 1.20		
Sunbeam Multirange Variocoupler, 150 to 3000 Meters, Complete with Solid Bakelite Variometer Mounted..... \$11.95		

Select your set and write us for prices. We'll do the rest.

SUNBEAM ELECTRIC COMPANY

71 THIRD AVE. (Bet. 11th and 12th Sts.), NEW YORK

Farm Lighting Plants at Bargain Prices.

RADIO PANELS

High dielectric resistances.

6"x24"	\$1.00
8"x24"	1.50
12"x24"	1.75

Manufacturers' special sizes collected.
Agents wanted.

PAGESON COMPANY
Box 88, Merchants Station, St. Louis, Mo.

RADIO MAILING LISTS

12,400 Radio Dealers, covering U. S. by States, per M. \$7.50
 1,814 Radio Mfrs. covering U.S. by States, per list, \$15.00
 1,757 Radio Supply Jobbers, covering U. S. by States, per list \$15.00
 200 Radio Stations, per list \$4.00
 287 Mfrs. who make and assemble complete Radio Sets, per list \$4.00
 25,000 Radio Amateurs and Managers of Radio Stations, per list \$7.50

Ask for price lists for Canada, Mexico, and other foreign countries.

TRADE CIRCULAR ADDRESSING CO.
108 W. ADAMS STREET CHICAGO, ILL.

1/4 to 10 ACRE

Radio Farms

As Low As **\$89** Per Acre

Greatest land offer of the day. Radio Farms directly adjoining World's Greatest Radio Station of The Radio Corporation of America at Miller's Place, North Shore of Long Island, in famous fruit and truck garden section. These fertile farm plots, 60 to 100 feet above sea level, perfect for chickens, fruit and vegetables. Only one and a quarter miles from a delightful beach; superb boating, bathing, fishing. Unsurpassed for summer bungalow camp sites. New State concrete highway crossing property direct to 59th Street, New York. Easiest of easy terms. Titles guaranteed. Write for Radio Farm Facts.

O. L. Schwencke Land Co.
279 BROADWAY NEW YORK
Established 25 years.

Flewelling Circuit

No ground, no aerial. Portable; can be carried in your car, train or camp. Will get long distance on a loop.

Simple to operate; can be worked with W. D. 11 Tube. We sell the complete parts to make up this wonderful set for \$20.25. Includes the following:

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1 .0005 finest Vernier condenser.....	4.35
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TELEPHONE, BRYANT 4700
 PUBLISHED EVERY WEDNESDAY (Dated SATURDAY OF SAME WEEK)
 FROM PUBLICATION OFFICE,
 1493 BROADWAY, NEW YORK, N. Y.
 BY HENNESSY RADIO PUBLICATIONS CORPORATION

ROLAND BURKE HENNESSY,
President and Editor
M. B. HENNESSY, Vice-President
FRED S. CLARK, Secretary and Manager
 1493 BROADWAY, NEW YORK, N. Y.

Managing Editor: Stephen L. Coles
 Technical Editor: Robert L. Dougherty

SUBSCRIPTION RATES

Fifteen cents a copy. \$6.00 a year. \$2.00 for six months. \$1.50 for three months.
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 Receipt by new subscribers of the first copy of RADIO WORLD mailed to them after sending in their order, is automatic acknowledgment of their subscription order.

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

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Beacon Fires, Radio, and Cable Will Aid Arctic Explorer

ROALD AMUNDSEN, the famous arctic explorer, plans to hop off in an airplane from Wainwright, Alaska, next June and fly over the North Pole and land at Spitzbergen, Norway—if he's lucky. An elaborate system of communication will be established to report the time Amundsen starts his flight. Wainwright is 400 miles from the nearest radio station, at Noorvik, on the Kobuk River, Alaska. The Chamber of Commerce at Nome, Alaska, has planned a chain of signal fires made of drift wood and coal, and each tended by two Eskimos. These bonfires will be built 15 miles apart. When Amundsen starts the first fire will be lit, and when its smoke is seen the natives will light the second fire, and so on down the line.

The news of the start thus received at Noorvik will be broadcast by radio, picked up by other radio stations and relayed by telegraph and cable to Spitzbergen. Here will be in waiting a number of fast scout planes, ready to rush to Amundsen's assistance if he gets into trouble toward the end of his flight.

Renews Subscription to the "Best Radio Paper"

Editor RADIO WORLD:
 I am renewing my subscription to RADIO WORLD as it is the best radio paper in my opinion and I have tried them all. Enclosed please find check for six dollars for one yearly renewal beginning with date stated on bill.

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 150 W. 86th St.
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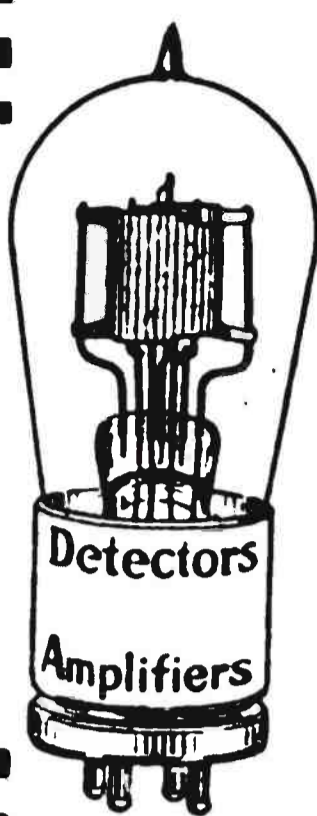
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Dealers write for special trade proposition.

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Shall WHN Remain Silent on Certain Nights?

EDITOR, RADIO WORLD: As you are probably aware, Station WHN, Ridgewood, Long Island, N. Y., has been asking, on the air, for the past few nights for letters from the radio audience as to whether they want WHN to be silent on certain nights for the purpose of allowing the "DX fans" a chance to listen in to long-distance stations, or whether they want the late evening programs (10:30 to 12 p. m.) to continue.

I know of numerous DX fans who, on account of not being able to tune out WHN, don't listen to him at all.

I would suggest agitation as to having a rule passed to compel all eastern stations to close down at, say, 10:30 every night. Also, how about allotting a different wave length (not 360 or 400) to those stations which, on account of having late hours allotted to them, have no alternative in the matter but to interfere with us DX fans on account of their late hours?

Personally I have nothing against Station WHN as I think their programs are very good considering the fact that they are a low-powered station; and, as far as I have heard, they don't advertise themselves in any way. They evidently must be under a heavy expense, and it is all done to please the radio listeners, with no hope of return.

In conclusion, would like to say that all DX fans, I am sure, will appreciate anything you may be able to do in this matter.

March 10, 1923. H. D. STRULLER.
111 Broadway, New York City.

Prize Essay Contests on Radio Subjects

THE management of the American Home and City Beautiful Association Exposition, to be held on the Million-Dollar Pier, Atlantic City, N. J., this summer, has completed arrangements for conducting a nationwide essay contest on the following subjects: "The Best Way to Educate the Public on Radio"; "Why Radio Should Be in Every Home, and How It Can Be Done"; "Who Shall Carry On and Pay for Future Broadcasting?" and "The Complete Radio Set as the Logical Installation."

The following men, prominently identified with the radio industry, have been invited to be represented on the Board of Judges for awarding prizes to winning contestants: Dr. Lee De Forest, De Forest Company, Newark, N. J.; Paul Godley, Adams-Morgan Company, Upper Montclair, N. J.; A. H. Grebe, The Grebe Company, Jamaica, L. I.; General J. G. Harbord, David Sarnoff and P. Boucheron, Radio Corporation of America, New York City; M. P. Rice, General Electric Company, Schenectady, N. Y.; Dr. W. H. Easton, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.; Paul Findley, Western Electric Company, New York City; Major-General George O. Squier, Chief Signal Officer, U. S. A.; Dr. A. N. Goldsmith, Director of Research, City College of New York; Roland Burke Hennessy, Editor, RADIO WORLD, New York City; H. Gernsback, Editor, *Radio News*; Major J. Andrew White, Editor, *Wireless Age*; Kendall Banning, Editor, *Popular Radio*; Henry M. Shaw, President, Radio Trade Association; Lawrence A. Nixon, Editor, *Radio Dealer*, Secretary, Radio Trade Association, and Jack Binns, Editor, New York Tribune Radio Section.

Those who compose the Board of Judges also have been appointed as the Radio Committee for the Radio Exhibit. The above committee will also direct the essay contest and award prizes to winners in a contest in which only radio fans or those who listen to broadcasting are eligible to submit

Prize Winners at the Permanent Radio Fair, New York City

THE winners in the prize contests for amateurs at the Permanent Radio Fair, New York City, have been announced as follows:

For the smallest one-tube, portable set—First prize: R. S. M. Long-Distance Receiving Set, manufactured by the Boston Scale and Machine Co.—Won by Fred W. Proctor, Hotel Ambassador, New York City. Second prize: Eagle Radio Portabloop—Won by Milton Brownshield, 1922 Wallace avenue, Bronx, New York City.

For self-contained home-made, three-tube, dry-cell receiving set—First prize: Paragon RD-5 and A-2 amplifier, manufactured by Adams-Morgan Co.—Won by W. H. Spalding, 27 Monroe place, Brooklyn, N. Y. Second prize: two-step amplifier, manufactured by Acme Apparatus Co.—Won by Carson Borthney, 168 West 4th street, New York City.

The prizes are on exhibition in the Broadway window of the Hotel Imperial, New York City. The Permanent Radio Fair has had several requests to hold another contest, and would like to hear from radio fans as to just what kind of contest they would like to have.

Navy Dirigible to Make Polar Flights

DURING the coming summer, when the ZD-1, a navy dirigible now under construction, is placed in commission, she will be sent on a flight around the world and on trips to the North and South poles. Rear-Admiral William A. Moffett, Chief of the Naval Bureau of Aeronautics, announced on March 6 in an address broadcast from WJZ by way of the Waldorf-Astoria, New York City.

Short-Circuited His Purse

"That doctor is a regular human dynamo."
"Yes, and when I came in contact with him I myself was highly charged."—*Science and Invention*.



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WALCON Transformers are tested and guaranteed. Particularly adapted for use with W.D.-11 tubes.

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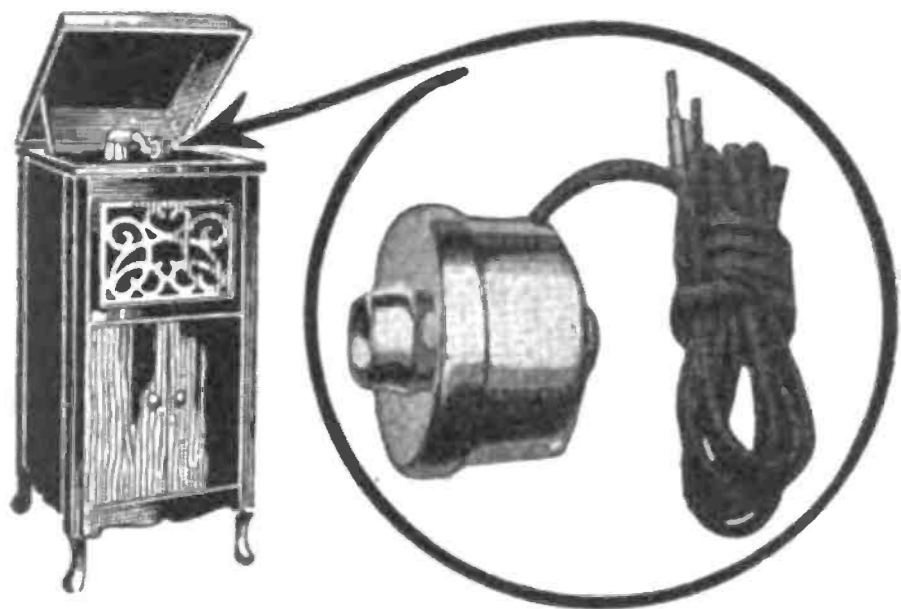
DX Nite Owls

(Continued from page 20)

Proud of His Record

From Jack Allison, New York City.

ON a recent night I heard the following list of stations: WGY, WAAM, WIP, WSB, WDAP, KDKA, WOC, PWX, WOO, WWJ, WJAX, WDAF and WAAN. I think that I have made a good night's DX work. I am using a honeycomb coil set with one stage of audio amplification,



RADIO LOUD SPEAKER FOR PHONOGRAPHS

The MORRISON Loud Speaking Unit, for use on phonographs, takes the place of awkward headphones. Possesses a tone value 100% true—an achievement never before attained in a loud speaker.

Attaches in Place of Reproducer

Slips on tone-arm of phonograph in place of reproducer, or can be used with horn. Adapted to any bulb set with one or more stages of amplification. Adjustable from soft to loud tone. Cannot possibly rattle or loosen through excessive amplification. A popular-priced Loud Speaker that compares with most expensive instruments on the market. Thousands in use, giving perfect satisfaction. Handsomely nickel plated, complete with 5 ft. cord, \$10—at your dealer's or direct. Sent C. O. D., if desired. Fully guaranteed. Money back if not satisfied. (When ordering, specify make of phonograph).

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115 West 23rd Street New York

two 43-plate condensers, and, although I have not heard as many as some of the other fans, I am very proud of my home-made set.

Another New One Due to Crystal Not Re-radiation

From Leo Schecter, 1935 Sempie Ave., St. Louis, Mo.

I WROTE to you some time ago about my reception with a 1-slide crystal set. Since then I have received a new station, WLB, Minneapolis, Minn., and am receiving other stations much louder. I think the reason for this is because I am using crystals sold by the Rusonite Company, advertised in RADIO WORLD. I have come to think that my tuning-coil is not the reason for my reception, because I have just built a 2-slider and have heard WCX and WOC in one night on it. The reason for my wonderful reception must be in my phones, which are 509 w. Western Electrics, and my aerial, which is a 2-wire, 85 ft. long and 36 ft. high. Many people have told me that my reception is due to re-radiation, but two authorities, Mr. Flewelling and Dr. Greenleaf W. Pickard, famous radio inventor, both say that re-radiation is impossible. I will be glad to give the details of my 2-slider tuning coil to anyone who writes for them.

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12.00	Western Electric 509W	9.50
12.00	Baldwin Type C, Master	8.50
6.00	Baldwin Type C, Single	4.00

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2-inch dial for rheostat potentiometer use, 50c;
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FOR the benefit of those interested in Radio and those who are becoming interested, Rand McNally & Company have prepared a publication containing a wealth of information of greatest value. It shows in the most comprehensive way, the location of the broadcasting stations, gives their classification, the call letters, wave lengths, ownership, etc., of each.
Everyone who wishes to get the maximum pleasure and enjoyment from Radio should have a Rand McNally Radio Map of United States. It is complete, accurate and up-to-date.
The Rand McNally Radio Map of United States is 28x30 inches in size. The locations of broadcasting stations are shown by distinctive symbols. The call letters of each station are given, also the wave lengths of each. The Radio Districts with numbers are shown in red and the Radio Relay Divisions are in blue. Time zones are included. Alphabetical lists of stations and alphabetical lists of call letters are in the margins. Convenient pocket form with cover.

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This book answers every question one can ask about modern aircraft, their construction and operation. 275 pages, 150 specially made illustrations with 7 plates. Price, \$2.50

THE COLUMBIA PRINT

The Passing of the Publishers' Friend

The passing of Stephen Farrelly removes one of the big figures from the periodical and news distributing trade in this country. Mr. Farrelly was eighty years of age, but he came of that sturdy stock to which the calendar means nothing and was active almost to the end.

For many years he was a moving force in the conduct and counsels of The American News Co., which owes so much to the activities, loyalty and strength of character of the members of the Farrelly family. Mr. Farrelly was helpful to and sympathetic with all the great American publishers, and never too busy to give his advice to the younger members of that craft. His big friendships and his effect on the business, social and spiritual life of New York were fully indicated by the immense assemblage of noted men and women from all walks of life who attended his funeral services at the Cathedral in New York.

Mr. Farrelly will be missed by his associates and all those who knew him, but at least his family have the satisfaction of knowing that he passed out into the Great Beyond full of honors and with the love and respect of every one with whom he had come in contact during his many years of business and public service.

Broadcasting Station Has Plate Glass Walls

THE Edgewater Beach Hotel, Chicago, will soon have a new broadcasting station, with the call WJAZ. It will be located on the main floor of the hotel, and its walls will consist of three thicknesses of plate glass. Spectators will thus be afforded a full view of the station in operation.

NATIONAL RADIO SERVICE CO.

140 W. 32nd St. New York, N. Y.

OCTAGONAL SHAPED LOUD SPEAKER

Handsomely Finished in Gun Metal for Use with Head Phones—SPECIAL **\$4.50**

Sheltone Loud Speaker..... \$3.50

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FILAMENT RHEOSTATS		LXL-13	25.00
Moulded, Fada Type, 6 ohms, 1/2 Ampere	\$1.00	Bright Star "B" Battery, 2 1/2 V.	1.75
Curtler-Hammer	1.00	Bright Star "B" Battery, 5 Positive Terminals, 2 1/2 V., Variable....	3.00
Outler-Hammer, Vernier	1.50	Bright Star "B" Battery, 7 Positive Terminals 45 V., Variable.....	5.00
Klosner, Vernier	1.50	MISCELLANEOUS	
Framingham, Vernier	1.50	Homecharger, DeLuxe Model, for Alternating or Direct Current.....	18.50
Amsoe Potentiometers, 360 ohms Resistance	1.75	Post Electric Soldering Iron.....	6.00
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The rate for this RADIO WORLD QUICK-ACTION CLASSIFIED AD. DEPT. is 5¢. per word (minimum of 10 words, including address), 10% discount for 4 consecutive insertions, 15% for 13 consecutive insertions (3 months). Changes will be made in standing classified ads. if copy is received at this office ten days before publication. RADIO WORLD CO., 1493 Broadway, N. Y. C. (Phone, Bryant 4796).

ARE YOU ALL RECEIVING Porto Rica, Havana, Florida, Denver, Kansas City, San Antonio, Texas, and others? Send twenty-five cents in coin and I will tell you how I do it. It's a simple set, easily operated, selective, good volume and range. Every radio fan write. Don't miss it! B. E. BROWN, Lincoln, Maine.

FOR SALE—Variometers and variocouplers, \$3.00 each, 3000 meters. Receiving transformers, \$6.00. Anthony Sini, Box 123, Shoreham, Long Island, N. Y.

CRYSTAL-TUBE for Crystal Sets. See advertisement on page 23.

GET RESULTS—Build a real crystal set by using long range crystal coils. Range 50 to 500 miles. Coils and hookup, \$1.00, postpaid. L. S. Musser, 2407 Jackson St., Anderson, Indiana.

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J. MULBERG, DEALER—Radio Sets and Supplies. Key West, Florida.

SOLDER YOUR RADIO CONNECTIONS with Radsol, the new soldering paste. Price, 20 cents. Dealers write. DAVIS PROCESS CO., 219 Devos St., Brooklyn, N. Y.

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Address Wanted—The address of Arthur Kimberling. Write Business Dept., Radio World, 1493 Broadway, New York City.

DO YOU WANT TO SAVE MONEY in making your set? Send for the Jan. 27 issue of RADIO WORLD, containing a full-page drawing of how to make filament control rheostats, as well as easily understandable text, which makes construction easy. 15c a copy, or \$1.00 a year. Send your order with this issue. RADIO WORLD, 1493 Broadway, New York.

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FOR SALE—"Homcharger" battery charger, \$14.00. Frost Phones, \$4.00. Brandes Superior, \$6.00. U. V. 200 Tube, \$3.00. Volt-ammeter, "Pignolet" make, 0.30 amperes, 0-30 volts, 0-3 volts, also Cadmium eReading, mounted in neat case, \$15.00. All goods are new and guaranteed perfect. ADRIAN SHANLEY, Aberdeen, So. Dakota.

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

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WIRING A HOUSE. By Herbert Pratt. Shows a house already built; tells just how to start about wiring it; where to begin; what wire to use; how to run it according to insurance rules; in fact, just the information you need. Directions apply equally to a shop. Sixth edition. COLUMBIA PRINT, 1493 Broadway, N. Y. C. Price, 35 cents.

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RAND-McNALLY RADIO MAP OF UNITED STATES—Is 28 x 30 inches in size. The locations of broadcasting stations are shown by distinctive symbols. The call letters of each station are given, also the wave lengths of each. The Radio Districts with numbers are shown in red and the Radio Relay Divisions are in blue. Time zones are included. Alphabetical lists of stations and alphabetical lists of call letters are in the margins. Convenient pocket form with cover. Price, 35c. The Columbia Print, 1493 Broadway, New York City.

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VACUUM TUBE RESULTS WITH A CRYSTAL SET!—Cover distance with a "PT" ULTRA-SENSITIVE CONTACT in your crystal detector. Beats gold and other ordinary catwhiskers. DOES NOT JAR OUT. Using the "PT," Myrtle Wood heard over 43 broadcasting stations in a thousand mile radius! Other users testify: "Heard new stations on first adjustment. Has all advantages you claim. Receives music so loud it hurts my ears." The "PT" has received 3,300 miles through static. Price only twenty-five cents. "PT" CRYSTAL CONTACT COMPANY, Box 1641, Boston, Mass.

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American Equipment for High-Power Swedish Station

SIFFER LEMOINE, radio engineer of the Royal Board of Swedish Telegraphs, has spent the past two months in the United States making arrangements for the delivery of apparatus and equipment for the new high-power radio station to be erected at Goteborg, Sweden. The contract for this equipment, which was secured by an American company in competition with British, French and German bidders, provides for the supplying of a 200-KW Alexanderson generator, with all necessary equipment and apparatus, and plans and specifications for complete installation. The steel towers to be erected for the antenna will be similar in height and arrangements to those used in the latest American high-power radio stations, but the actual design of the towers and the material will be furnished by a Swedish firm. It is expected, according to information received by the Department of Commerce, that the installation will be completed and the initial tests made before the end of the year.

Goteborg is the most important communication center in Sweden, since it not only is the site of the proposed high-power radio station, but is the terminus of the cables from England and Denmark, as well as of the toll cable to Stockholm. The new station will be operated by the Royal Board of Swedish Telegraphs. A direct circuit will be established with the Rocky Point station of the Radio Corporation of America, thus providing the first direct radio communication between the two countries.

New York and Atlantic City Radio Exhibitions Combine

IT is announced that the Permanent Radio Fair, Inc., New York City, has combined with the National Exhibitors, Inc., of Atlantic City, N. J. Manufacturers of radio products can now reach the twenty millions of visitors who patronize the all-year seashore resort annually. The exhibits of radio manufacturers will be displayed on the boardwalk, where there is space covering 7,000 square feet, beautifully laid out, including two of the finest stores along the boardwalk, with 200 feet of window space, and a concert hall seating 500 people. No admission will be charged at either the New York City or the Atlantic City exhibitions. Booklets will be distributed from manufacturers. Demonstrations will be given of the manufacturers' exhibits, and everything possible done to help the actual user of a receiving set.

Removal of Federal Institute

The Federal Institute of Radio Telegraphy has increased its facilities for manufacturing its "3YQ" audio-frequency transformer by removal to larger quarters at 1003 Broadway, Camden, N. J.

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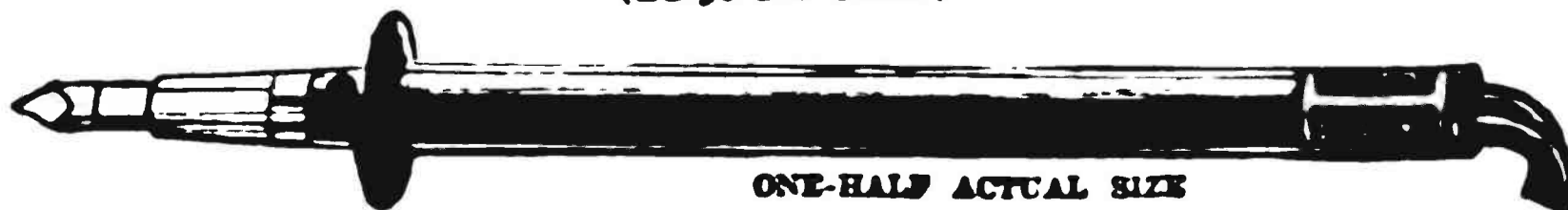
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The Principles of Radiotelegraphy, by Walter J. Howell.
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The Cost of a Single-Circuit Receiver, by Howell W. Miller.
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How to Compute and Build a Fixed Condenser, by E. L. Bragdon.
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Underlying Principles of the Vacuum Tube, by George W. May.
Practical V-T Detector Panel, by Frederick J. Rumford.
Revised Radio Dictionary, by Fred. Chas. Ehlert.
The Beginner's Catechism, by Edward Linwood.
Importance of Aerials to Radiation, by C. White.

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Using Radio Frequency to Extend Range, by George W. May.
Things Every Radio Fan Must Know, by E. E. Hawley.
Revised Radio Dictionary, by Fred. Chas. Ehlert.

AUGUST 12.

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Practical Measurements of Capacity and Inductance, by W. A. Dickson.
Experimenting with Armstrong Circuit Produces Unusual Hook-up, by Dr. O. S. Kelly.
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How to Build a Portable Field Busser, by De Witt H. Thompson.
Using Two Tubes for Receiving, by C. White.
The Storage Battery as an Important Factor in Radio Reception, by Donald Van Wyck.
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Complete Method for Building an Electron-Tube Detector Unit, by Experts of the United States Bureau of Standards.

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Broadcasting Stations of United States and Canada.
The Radio Primer for the Beginner, by Lynn Brooks.

OCTOBER 14.

Neat Home-Made Tube Socket, by Gordon S. Arthur.
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EDITOR, RADIO WORLD: Realizing that the lot of none of your caste is any too happy, but that a word of sincere appreciation might brighten it a bit, I am sending this word of thanks for your good, practical magazine, and especially for your article by Ortherus Gordon in your issue of January 20, 1923.

Before running across RADIO WORLD of that issue I had scanned several so-called radio magazines, with their articles, high- and low-brow, and their data on the construction of sets, and it was not until I saw your article that I had the courage to essay building a set. The detail and clarity of that contribution gave me the necessary stamina, and I set about the purchase of parts and their construction and the building of the set described by Mr. Gordon.

After the usual delays—largely waiting for the receipt of good apparatus—I got the set together, and made it "perk" on February 17. Since that date I have received the following stations: WEAJ, WGY, KDKA, WJZ, WLW, WDAJ, WCAE, WJAX, WNAC, WHAS, WMC, WDAP, WBZ, WOR, WIP, WMAQ, WQAA, WBP, WSB, WGM, WGI, KYW, WWJ and WHA.

You will note that this list covers the territory from Boston to Memphis, via Chicago, and from Troy to Atlanta; all received repeatedly, together with a Los Angeles station received once. It is very difficult to tune in Los Angeles on account of the powerful 360-meter stations near by. The fine part of the set is that it is not only very selective, but clear as a crystal.

I find your magazine is full of such practical data as contained in this article, and want to thank you many times for all of it.

Such articles repeatedly appearing in RADIO WORLD will make it the best periodical there is on radio.

Very truly yours,
Monticello, N. Y. LESLIE E. HICKS.
March 17, 1923.

Error in Economy Radio Advertisement

In our issue of March 10th was advertised 2-Coil Mounts De Forest License \$2.15. The Economy Radio Co., of 132 Nassau St., New York City, tell us that this price should be \$2.35.

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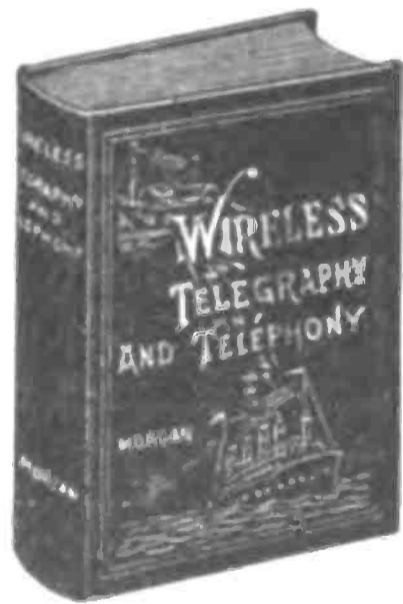
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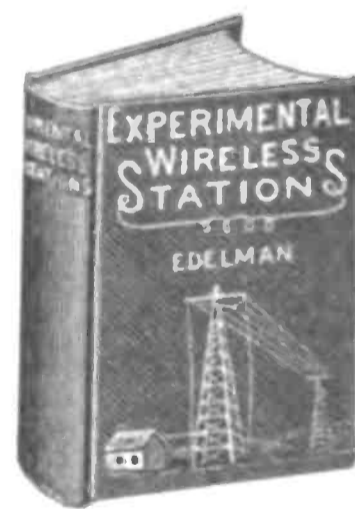
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