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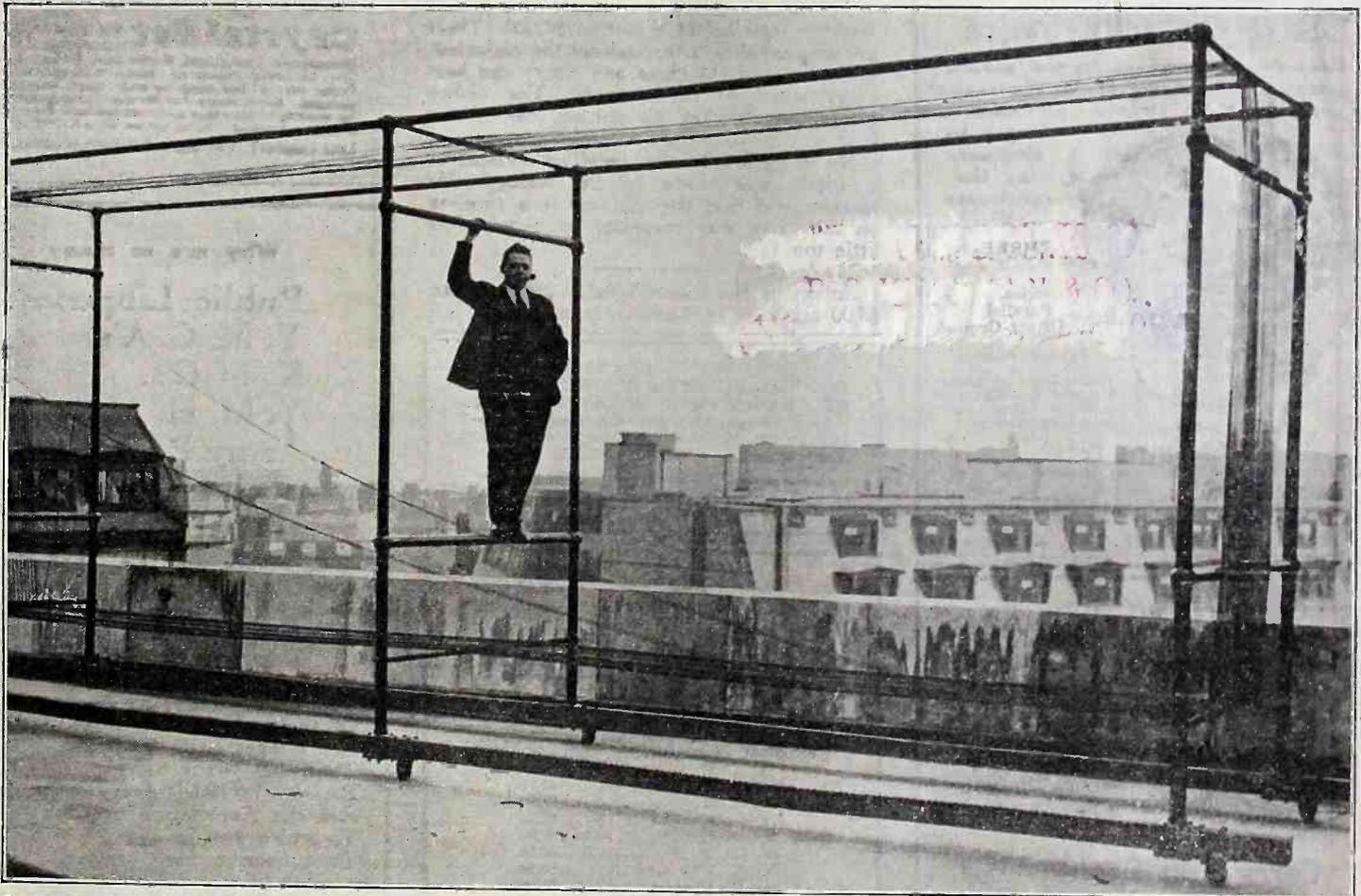
RADIO WORLD

Title Reg. U. S. Pat Off.

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EVERY WEEK

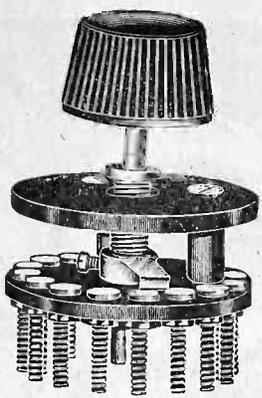
U. S. SHIPPING BOARD HAS POWERFUL RADIO AT LONDON



(C. International Newsreel)

This illustration shows the largest cage aerial in England, on the roof of the new Bush House, England's largest and newest building used by business concerns. The United States Shipping Board has its offices in the new edifice and maintains a powerful radio station which is in direct communication with Annapolis, Md. Messages are picked up and sent across the Atlantic without resorting to relaying. Mr. Redmond, who installed the great cage aerial, is shown in the picture.

Aetaco Back Mounting Inductance Switch



12 Points Sure Contact

For convenience in mounting the set and for continued reliable service, the AETACO back mounting inductance switch is unsurpassed. The AETACO trade mark is sufficient guarantee of its quality and workmanship.

AETACO Condensers

Fine Adjustment.	Accurate Spacing	
43 Plate Condenser.....		\$1.75
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Attractive proposition to dealers and jobbers.

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235 Fulton Street New York City

Marvel - Capacity - Switch

Receives long waves in the parallel position; short waves in the series position; and waves of medium length by eliminating the condenser entirely.



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Series, Parallel, Direct-Ground

Patents Pending
Instructions for mounting and for wire connections given with each instrument.

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DID YOU GET THE VACATION NUMBER OF RADIO WORLD

It had page after page of interesting and practical ideas and hook-up for people who are going camping, canoeing, yachting, or just vacationing up in the mountains. You really can't afford to be without it, if you intend leaving the city behind this summer and want to take your radio with you. Dated June 2. Mailed for 15c. Radio World, 1493 Broadway, New York City

Col. Green's Loud Speaker Causes Protest

STATION WMAF, owned and operated by Col. E. H. R. Green at his summer home at South Dartmouth, Mass., which was illustrated and described in last week's RADIO WORLD, is the subject of a protest from the residents of Nonquit, Mass., six miles away. The battery of loud speakers mounted on top of a water tank is causing the objection.

With a desire to let his neighbors share the programs from prominent broadcasting stations, Col. Green not only installed the loud speakers, but allowed free entree to his estate and even provided automobile parking space. Hundreds came nightly. Scores of automobiles lined the road and parked in the meadows.

Colonel Green and his guests enjoyed the experiment, but the Summer colony at Nonquit, six miles away, did not. First came a faint stir of protest and then a roar. Colonel Green was surprised by the protests, so he has announced that the concerts will be discontinued until horns and mechanism can be so arranged that the sound will not carry to Nonquit.

Bishop Bars Amplifier from Altar

BISHOP WILLIAM T. MANNING has ordered removed from the high altar of the Cathedral of St. John the Divine, in New York City, a receiver for a system of amplifiers.

"Nothing of a worldly nature should be in this sacred place," he is quoted as saying. "Besides, communicants should know their service by heart, and it should not be necessary for them to hear the words of the celebrant."

The altar receiver was a part of a system recently installed at a cost of \$9,000. There are nine amplifiers throughout the cathedral, and now even the choir and clergy can hear every word of the sermon. The bishop himself, seated on his throne, can "listen in."

No objection to the amplifier system as a whole was made by the bishop. He merely held that the placing of a receiver on the altar was carrying "modernism" a little too far.

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Mounted on any panel in a few seconds—2 screws serving as connections behind panel.

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RADIO WORLD

1493 Broadway New York City

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[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.

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July 28, 1923

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Single Crystal Sets for Broadcast Listeners

By Kenneth M. Swezey

MANY aspirant broadcast fans become discouraged when their glances at every turn collide with a complicated diagram or a high price. In its year or so of existence, the army of listeners has advanced to such a degree that the radio shops and the magazines have to keep going at a good pace to satisfy its demand. The result is that the beginner with the very modest pocketbook is often forgotten. Not so very long ago the question when fan met fan was this: "What kind of a crystal are you using now?" Today the question would be more likely, "What kind of a tube do you recommend for the sixth amplifier stage?" Yes, times have changed; but crystal sets are as good now as ever they were, and, within their limitations, will give very satisfactory service.

In the first place, crystals are very efficient as radio detectors; even much more so than the vacuum tube. Although sometimes they are rather difficult to adjust and to keep in adjustment, they do not distort the incoming waves. The chief thing to recommend them to the beginner, however, is the simplicity of the crystal set and the comparative inexpensiveness.

The disadvantages might include the lack of stability and sensitivity as compared with the vacuum tube. Located within 25 miles of a good broadcasting station, and used with ear-phones, a crystal outfit ought to give very satisfactory results.

The simplest form, of a crystal set that is workable consists of a detector, a receiver, and the usual aerial and ground connections. This circuit, shown in Fig. 1, is the type generally used in "tie-pin," "nut-shell," and other very tiny sets. The disadvantage is that such a set cannot be tuned, but must respond to waves

whose lengths approximate that of the natural wave length of the aerial and ground system.

In Fig. 2 we have the simplest crystal circuit that is really practical. In addition to the crystal and phones, it has a small fixed condenser and a single slide or tapped tuning coil. The condenser is not used for tuning at all, but merely affords a by-pass for the radio-frequency waves around the high resistance phones, and also stores the audio-frequency rectified waves and discharges them at the proper time through the re-

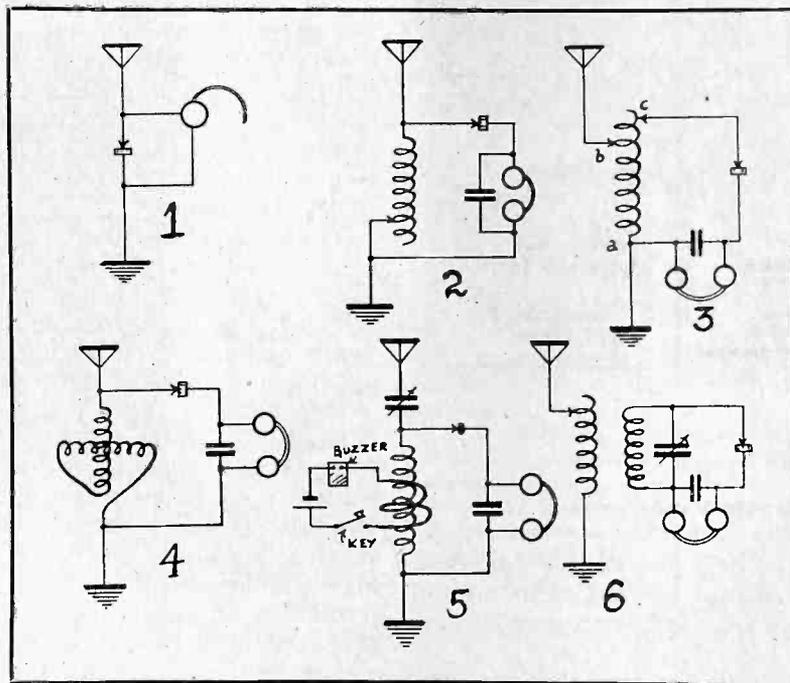
ceivers. The tuning coil generally consists of a number of turns of insulated wire wound around an insulating cylinder, or tube, and having a slider that can be adjusted so as to make contact with any desired turn. For broadcast reception, with a 100-foot aerial, the coil could very well have about 80 turns on a three- or four-inch tube. The tuning is accomplished simply by moving the slider back and forth, cutting turns in or out as desired.

By adding another slider we have the more selective set, shown in Fig. 3. Here we really have a two-circuit receiver, with what is known as *conductive* coupling. The turns of

the coil that are included between a and b might be considered as the aerial circuit, or primary, and the turns between a and c, the closed circuit, or secondary. This is quite a good circuit, is fairly selective, and is widely used by beginners. In many cases rotary switches and taps are used in place of the sliders, thus allowing better mechanical construction and mounting on a panel.

For short waves, the variometer lends itself very well as a tuning device, in the manner shown in Fig. 4. With one of average design, a range of wave length

(Concluded on next page)



Figs. 1 to 6. Simple circuits suitable for broadcast listeners.

Single Crystal Sets for Broadcast Listeners

(Concluded from preceding page)

between 300 and 500 meters ought to be secured without difficulty. Such a set would have but one control to manipulate, besides the detector adjustment. For longer wave lengths a loading coil could be connected in series.

Fig. 5 shows a crystal circuit that is quite good for short wave work. Here the tuning is accomplished by means of a variable condenser of about .0005 to .001 mfd. capacity in series with a fixed coil. The fixed coil, in this case, is not a useless piece of loading, but is included to sharpen the tuning qualities of the circuit. A long aerial wire has good absorptive qualities, but it does not allow of the sharp tuning that could be obtained by the addition of a concentrated inductance in the form of a coil.

This diagram also includes a buzzer test outfit, which device allows the adjustment of the detector at moments when there are no stations coming in. It consists of simply an ordinary buzzer, or one of the high frequency type that are made especially for the purpose; a dry cell; a key, switch, or push button; and a small coil of a few turns of wire which is placed near, or in inductive relation to, the fixed tuning coil. When

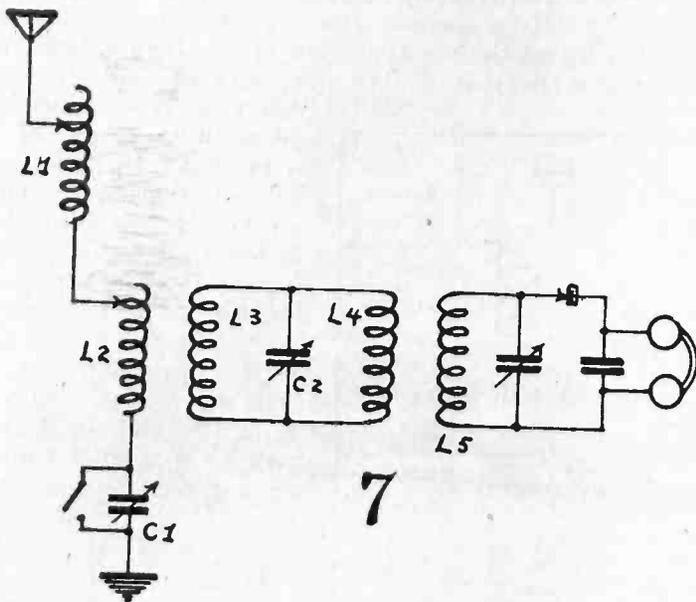


Fig. 7. Crystal set circuit which is quite selective.

the buzzer is in operation, the detector can be adjusted to its most sensitive point without the aid of incoming signals. This test outfit can be used with any of the sets described.

The crystal receiving set that has two distinct circuits is slightly more complicated than those just mentioned, but in a number of ways it is more satisfactory; the most important is that it is more selective. Sets having loose couplers or variocouplers are of this type. The coil that is in the aerial circuit is called the *primary* and the one in the detector circuit, the *secondary*. If the secondary has a fixed value, a variable condenser is usually connected across it to vary the wave length. For broadcast reception, the primary should have about 80 turns, and the secondary—if it has a variable condenser across it—should have about 40 turns. To get such a set into operation the detector must first be adjusted, if you have a buzzer test, and the secondary condenser set at some arbitrary point. Use very close coupling between the two coils. Now move the

primary slider, or adjust the primary switch, until a station becomes audible. Next adjust the secondary condenser for maximum response. A change in the coupling might now make the signals louder, or reduce the interference from another station that is not desired. Loose coupling will tend to reduce static disturbances, as static is less capable of jumping between coils that are inductively coupled than are radio oscillations.

An arrangement that is still more selective is shown in Fig. 7. Here we have an intermediate circuit consisting of fixed inductance coils L3 and L4, tuned by the variable condenser C2. The aerial coupling coil L2, and the detector circuit coil L5 are not in inductive relation to each other, but are connected solely through the intermediate circuit. In practice, two variocouplers would do very well for the four coils mentioned. The primary of one as L2, the primary of the other as L5; and one secondary as L3 and the other as L4. The two couplers should be separated at least six inches. C2 is an ordinary .0005 mfd. variable condenser. If waves beyond the normal range are desired, the loading coil L1 may be included in the circuit. For shorter waves put in the series condenser C1. For some of the lower wave lengths it may be necessary to have a fewer number of turns on L3 and L4, than that of secondary of the average coupler.

Crystal detectors are voltage actuated devices, and therefore it is desirable to have a preponderance of inductance, rather than capacity. That means that wherever possible, coils should be used in preference to condensers. This, however, does not apply to the phone condenser. This last named condenser should, for usual practice, have a fixed value somewhere between .001 and .005 mfd.

The crystals that are used most at the present time for detectors are galena, silicon, and a few synthetic crystals that go under different trade names. Of natural crystals, galena is the most sensitive, with silicon as a fairly close second. However, a great deal depends upon the individual crystal. Some of a particular kind are extremely sensitive, while others are just the opposite.

There is a mistaken impression that crystals must be changed every few weeks or months. This is unnecessary. The author has a good piece of galena which he has used in a detector over a period of eight years, without even having a cleaning, and without any appreciable signs of deterioration.

Exposure to the air causes a thin film of oxide to accumulate, which might render the crystal less sensitive. Handling with the fingers renders a crystal insensitive, by depositing on it a coating of oil or grease. If oxidized, a new surface may be prepared by scraping with a knife; or better still, by splitting off a thin layer, along the line of cleavage, which is most likely parallel with the present surface. An oil film may be removed with alcohol or ether.

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Except in rare instances, a crystal set cannot be used with a loud speaker. And except when very close to a broadcasting station, it cannot be used with a loop aerial. There are no crystal regenerative sets, but crystal detectors are used to good advantage, in connection with vacuum tubes, in some of the new reflex circuits. Vacuum tube amplification may be added, if so desired.

Army Center Handles 322 Messages Daily

By Carl H. Butman

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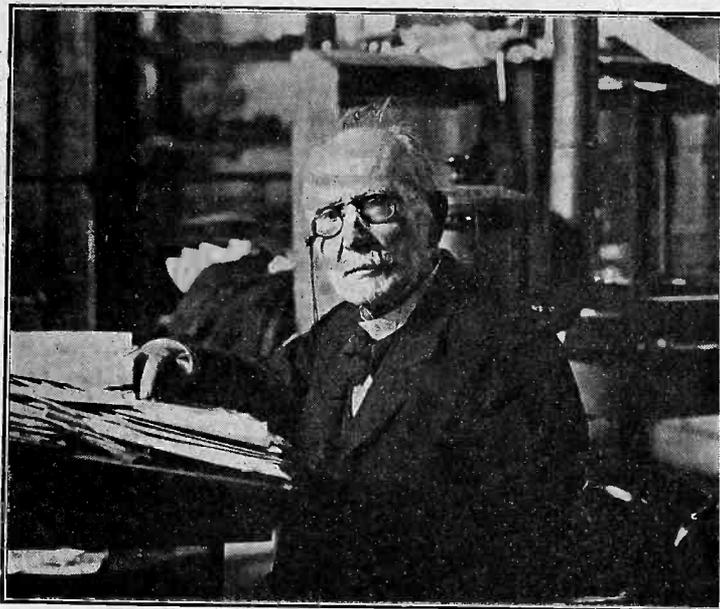
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South Dakota College Man Saves Ship by Radio

YANKTON, S. D.—Stranded for eight days on an island in the Mediterranean, after an accident in which two sailors were killed, the S.S. "Manhattan Island" was rescued by destroyers through a distress message sent out by the radio operator, Homer Fitch, formerly a boy amateur of this place and member of the American Radio Relay League.

A report of the accident and the part played by Fitch was received here from Constantinople to which port the "Manhattan Island," a government Shipping Board vessel, proceeded after having been dredged out of the sand by vessels coming to the rescue.

The vessel was on its way to Constantinople from

Palermo, Sicily, when it ran aground. Fitch, who is only 19 years old, was the only operator aboard and it was his skill at the key, gained while an operator at the Yankton College radio station 9YAK, that brought the desired aid to the ship stranded on the island shore.

At one time a student at the college, Fitch will exchange his officer's uniform for a football suit next fall. He made his letter for the last two years as guard and center. He obtained his first position as radio operator through friends in Texas whom he knew only through communicating with them by radio. He expected that it will prove efficient in handling traffic during peak loads.

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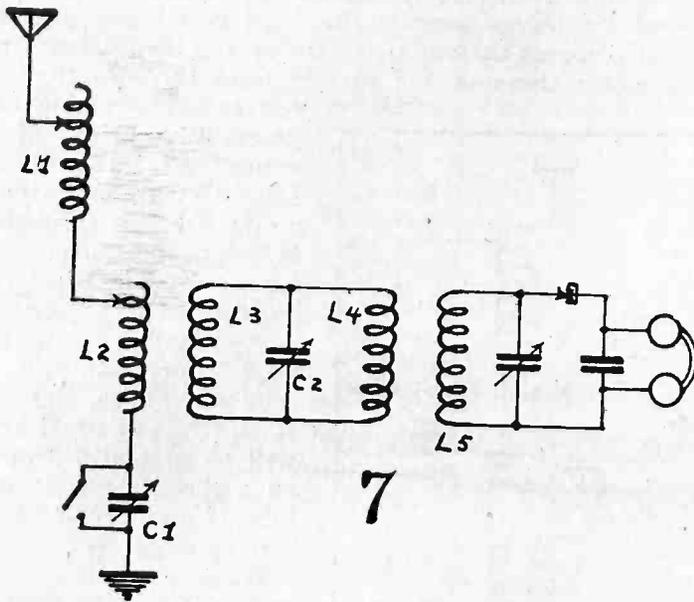


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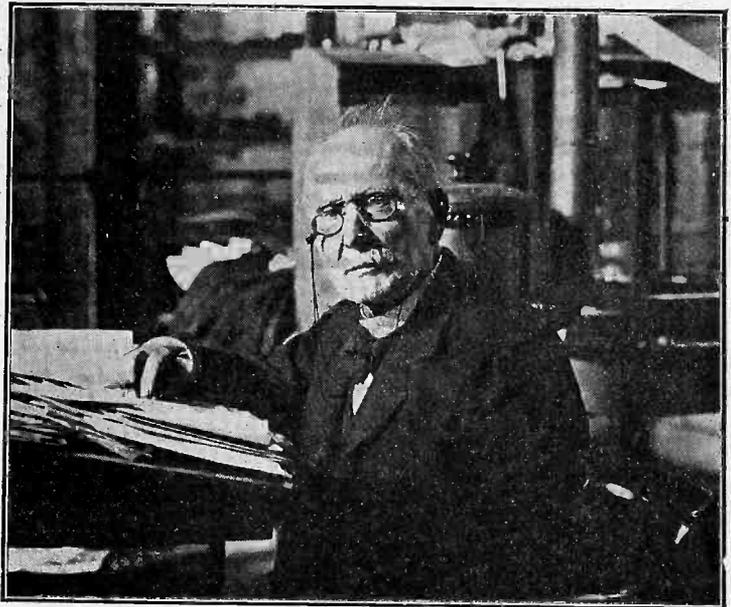
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A report of the accident and the part played by Fitch was received here from Constantinople to which port the "Manhattan Island," a government Shipping Board vessel, proceeded after having been dredged out of the sand by vessels coming to the rescue.

The vessel was on its way to Constantinople from

Palermo, Sicily, when it ran aground. Fitch, who is only 19 years old, was the only operator aboard and it was his skill at the key, gained while an operator at the Yankton College radio station 9YAK, that brought the desired aid to the ship stranded on the island shore.

At one time a student at the college, Fitch will exchange his officer's uniform for a football suit next fall. He made his letter for the last two years as guard and center. He obtained his first position as radio operator through friends in Texas whom he knew only through communicating with them by radio. He expected that it will prove efficient in handling traffic during peak loads.

Radio and the S. S. "Leviathan's" Trial Trip

By Pierre Boucheron

ONCE a telegraph operator, always an operator. Whatever effect the dots and dashes may have on the psychology of a person who becomes a master of that staccato language, the facts remain that the clicks of the sounder or the buzzes of the radio have a fascination that never dies.

And the latest proof of this simple philosophy is to be found in what transpired aboard the great ship "Leviathan" during her recent trial trip from her berth in Boston harbor to the warm waters of the southern Atlantic and back again to New York City. While press accounts have been replete with details of the huge liner's notable passenger list on that occasion, of her gigantic dimensions and her splendid appointments, of her reconditioning from a troop transport of the stirring days of war to our mightiest merchant ship, and of the startling records made during the trial run, little has been said or written regarding the radio equipment of the "Leviathan."

Yet when the huge liner set out on her trial trip under the critical gaze of the American public the time had come for the acid test of the super-radio plant installed on the new "Leviathan." Soon messages began to pour into the radio quarters aboard from men of every calling, for her list of guests was a representative cross-section of American business and public life. Soon there was a large volume of radio traffic from passengers aboard to relatives and friends and business associates ashore.

So far so good. But shortly after, when the chief radio officer, E. N. Pickerill, called the radio coastal stations and announced to America at large that the flagship of our merchant marine was under way, these stations flashed back the significant information that they had batches of urgent messages for the "Leviathan," all ready to be transmitted.

Pickerill, old-time operator that he is, with a wealth of experience and a skill that is second to none, was in a quandary. The notable passengers aboard were besieging Pickerill to dispatch their radiograms post-haste, with ever-increasing volume of dispatches; while the coastal stations were pressing him to take their radiograms without delay. Never before had such a problem presented itself to a ship radio operator.

It was at this point in radio affairs that David Sarnoff, vice-president and general manager of the Radio Corporation of America, and a guest on the "Leviathan," happened into the radio cabin to look things over. Mr. Sarnoff was in a sports suit and smoked a large cigar, obviously set for a few moments of leisure snatched out of a tireless business activity. "How is traffic?" he inquired of Pickerill. And the latter, surrounded by a rising tide of radiograms, hastily explained the extraordinary situation to the executive.

Now Sarnoff is a man of action. He knew that something had to be done, for the radio equipment of the "Leviathan" was just as much under the scrutiny of the American public as the turbines or the crew or the guests of that ship. The traffic had to be handled without loss of time no matter how voluminous it might be. So Sarnoff repaired to Mr. Lasker's stateroom, where he discussed the situation with the head of the U. S. Shipping Board. "I believe," concluded Sarnoff, "that the American public is entitled to know as quickly as possible, through the medium of the newspapers, of the progress of the finest liner under the American flag. For that reason I believe

we should temporarily withhold transmission from the shore stations in favor of the 'Leviathan's' transmission." Mr. Lasker agreed. So did the men of affairs aboard the great ship. Soon Sarnoff was instructing all shore stations to receive press traffic from the "Leviathan" first, and when all the radiograms had been dispatched from the ship they could, in turn, transmit their accumulated messages.

With the plan of action settled it was quite another matter to reduce the pile of radiograms that had collected in the radio cabin. Sarnoff required no consultation with any one in solving this problem, for he is the man who, ten years back, while stationed in New York, received the dispatch from the steamship "Olympic," 1,400 miles out at sea, giving the first confirmation of the sinking of the "Titanic" after a crash with an iceberg. He is also the man who, seven years ago, when radio telegraphy alone was considered an accomplished fact, presented a detailed plan to his superiors, which conceived a simple radio telephone "music box" for every home boasting of a talking machine. This plan is today in actual use in the form of radio telephone broadcasting.

Little wonder, then, that Sarnoff, the man who has been through every stage of the radio business, from messenger boy to radio operator, and then to inspector, engineer, commercial manager and traffic manager, and then, still higher, to vice-president and general manager of a great radio corporation, felt the irresistible urge once more to handle the traffic of America's pride of the seas. In a moment he was a changed man. All his executive problems—if he had them on his mind during what had started out to be a restful trip—were temporarily put aside, and Sarnoff set himself for the task of clearing the accumulating radio traffic, giving Pickerill a much-needed reinforcement.

With his coat thrown off and sleeves rolled up Sarnoff took his place at the key, while Pickerill relayed the message blanks for G. Harold Porter, general marine superintendent of the Radio Corporation, and also trial trip guest, who took the bundle of messages presented by newspaper men and others at the doorway of the radio cabin. News soon passed around that Sarnoff had assumed the role of chief communication officer, and in a short while radiograms aggregating 15,000 words or more were placed before the telegraph operator, who at one time was the fastest in the service.

The limit of physical capacity for transmitting radiograms was soon reached. It was at this time that Pickerill, sizing up the situation, hit upon the idea of starting up another transmitting set for the purpose of handling part of the ship's traffic on another wave length, it being at the same time that Sarnoff was steadily unloading the radiograms that lay before him, thus relieving the pressure brought to bear by an all-but-overwhelming traffic. The generators were started, and shortly the second transmitter got into action on another aerial provided for emergency use. A hurried call to the nearest coastal station was answered by "Get you fine. Shoot your messages."

So two separate radio transmitters worked away on board the "Leviathan," with Sarnoff at one key and Pickerill at the other—two star operators intent on their work. The two transmitters sent and received at the same time without mutual interference, each communicating with

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its own shore station. The rate of dispatching the radio traffic was, of course, doubled. The pile of radiograms soon melted away under this relentless onslaught of skilled operators as they were placed in the hands of the shore operators. The "Leviathan" was all the while linked on the one hand with a station at Boston, and on the other with the station at Chatham, Mass.

Sarnoff from that point on took his trick with the operators—namely, John R. Irvin, Anthony Tamburino and R. J. Green—in four-hour shifts. Rarely have radio operators sat at their keys ticking away constantly for four-hour shifts. Aside from taxing their ability they became fatigued from their tedious job, but nevertheless one operator was always on hand to do a few minutes' relief work while the man on duty rested his arm, which was suffering from muscular strain. Two days after leaving Boston one of the operators became exhausted, and one of the relief men was snatching a few hours of well-earned sleep. Again Sarnoff answered the call. Attired in a tuxedo and after a hurried meal he arrived in the radio cabin, removed his coat and went to work again, pounding the key for two hours at a stretch, while Porter arranged for filing the dispatches.

During the brief lull in the radio business Pickerill was reminded of the fact that he had promised to call his wife, living in Brooklyn, N. Y., via the radio telephone equipment—the only one, by the way, of its kind installed on a merchant ship. This feat was accomplished by calling the Bush Terminal radio station, which normally handles radio telegraph traffic from and to ships at sea. After testing out the set Pickerill's voice went on the air. "Hello, Bush Terminal! Please call Mrs. Pickerill on the telephone when you get a chance and tell her everything is going fine," was the telephonic message of the chief operator.

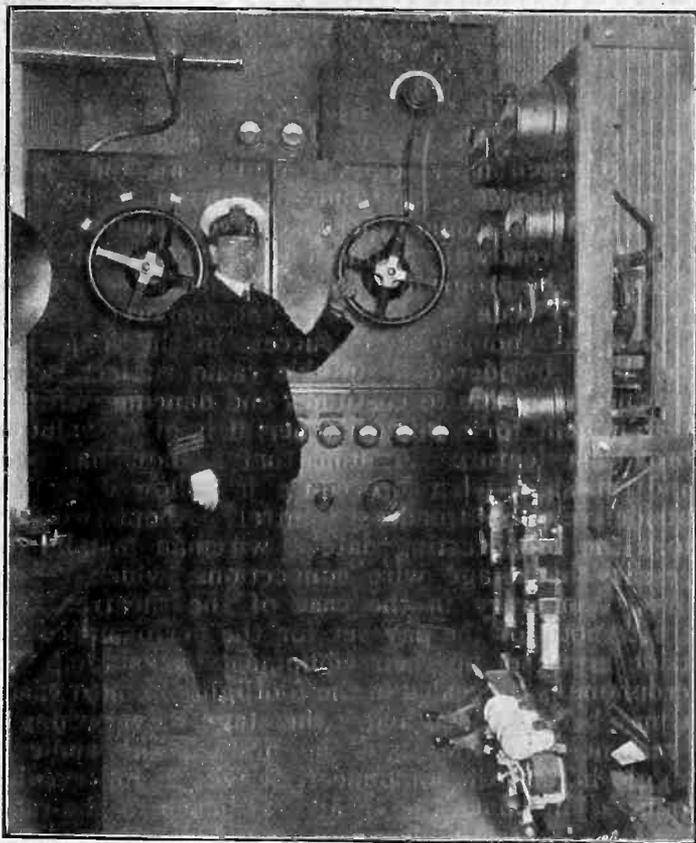
Being the wife of a radio man Mrs. Pickerill has a radio set in her home, which she uses for receiving radio broadcast concerts. It so happened that Mrs. Pickerill was listening in when her husband's voice was sent from the "Leviathan," and she heard it perfectly. Upon receiving the voice message Mrs. Pickerill called Bush Terminal radio station by telephone, saying: "You need not bother with the message from Mr. Pickerill, I have received it at home."

Thus it will be seen that the radio telephone messages were readily heard by the very persons for whom they were intended. Indeed, the usual radio telephone is by its very nature an excellent means of broadcasting or disseminating information. In marked contrast the radio telegraph as employed in transoceanic work and for ship-to-shore communication assures a maximum degree of secrecy and privacy since the radiograms are in code and can only be deciphered by a skilled operator. For extreme secrecy the messages may be coded into cipher.

And so the "Leviathan's" radio equipment received its acid test, and was not found wanting in any particular. The main transmitter performed flawlessly, "pumping" from 30 to 40 amperes into the antenna. The auxiliary continuous wave transmitter of two-kilowatt capacity

served to handle the overflow of traffic, as already mentioned. The radio telephone, of the duplex type, permitting two-way conversation, also did good work when called upon. The "Leviathan" even boasts two life-boats which are provided with radio equipment. These have not been, and, it is hoped, never will be, tried under actual conditions of service.

After the voyage was completed Mr. Sarnoff remarked that, due to the position of the "Leviathan" in tropical waters and the heat wave along the coast, static was abnormal. In fact, during all his experience as an operator prior to becoming an executive in the company, he had never listened to static of such great intensity and persistency. As a consequence, for the first time in the history of marine radio, it was necessary to use the Cape Cod high-power station and divert it from European communication to the "Leviathan's" business. The power and wave length of reception was then increased from four kilowatts and



(C. Radio Corporation of America)

High power tube transmitter on the S. S. "Leviathan." The picture shows the chief radio officer, E. N. Pickerill, changing wave length.

1,600 meters to 200 kilowatts and 16,000 meters. In diverting the high-power station at Cape Cod from European to ship communication the Radio Corporation of America in this instance placed at the disposal of the "Leviathan" radio facilities on shore costing about \$2,000,000. Something like 40,000 words of press, private and official communications were exchanged between the giant ship and the American shore stations during the famous trial trip.

WRC, Washington, D. C., the Latest Broadcaster

WRC, the call to be assigned to the Washington Radio Corporation station this week, will identify that new station excellently, when it gets on the air. Officials of the corporation are planning to open the station on August 1, with due ceremonies and an excellent program, details of which are being arranged by the program manager Ralph Edmunds, formerly identified with several opera companies and moving picture interests. His active con-

tacts with musicians and actors, it is believed, will serve Mr. Edmunds excellently in preparing and executing exceptional broadcast programs. WRC is a duplicate of the 2 K. W. New York station WJY and Z on Aeolian Hall, but at the outset, only about ½ KW of power will be used. All parts of the transmitter are in duplicate, so that in the event of a breakdown an immediate switch to the other circuit can be made to cover the emergency.

How Broadcast Central Transmits from Theatres and Hotels in New York

By J. L. Bernard

FEW people who read the radio programs have a clear conception of what is meant by the phrase "this concert will be broadcast by Station WJZ by direct wire from the — Theatre" or wherever the event is held. The layman's imagination does not seem to favor the idea of using wires in connection with radio broadcasting.

The heart of the "direct wire" system used by Broadcast Central is composed of three main arteries. In addition to these three arteries there are nine additional permanent wires, from which lines are run underground to Aeolian Hall Building, thence to the control room of the station. Various other net works of wires are tapped off, and which lead to the station from the main circuits. This artery system enables Broadcast Central to reach many points in Manhattan, and affords the radio audience a multitude of concerts, talks, and plays which they could otherwise never receive.

When a Broadway production is to be broadcast, a member of the program staff is detailed to review the play about a week in advance of the proposed date—if the play has enough of its success in the songs and lines, it is considered a suitable radio subject, while if its success is due to costumes and dancing, with no entertainment for a blind listener, it is of no value as a broadcast feature. Assume that a show has been found suitable—what procedure is followed by the "outside crew" of Broadcast Central? About two days before the broadcasting date a wireman installs the necessary backstage wire connections, which are of course, temporary in the case of the theatres. On the afternoon of the day set for the performance the outside crew set up their equipment backstage. The microphone is concealed in the footlights in most cases, but may be suspended above the stage. Everything is in readiness by the time the first of the audience straggle in, and the announcer, arrives in full evening regalia to introduce the theatre audience to the radio audience. The announcer generally has a microphone just back of the scenes, so as to be in close touch with

all that goes on, but occasionally is given a small dressing room, with interphone communication with the stage. As soon as the performance is over the microphones are removed.

In the case of the Goldman Band Concerts on the Mall, which are being sent out from Broadcast Central, the wire is run through the trees in the Park, well out of reach of passers-by, to the main circuit, thence to the station by way of a lead-off. The wire is tied high up on one of the posts of the band stand, a table is requisitioned, and the microphone stands in full view of the leader. The announcer uses a separate microphone, and stands as near the leader as possible so that one may time his actions to fit in with the leader.

In St. Thomas' Church the installation is permanent, the microphone being properly located to effect perfect transmission from all parts of the service. There is a permanent installation in the Mark Strand Theatre and the music which is broadcast from this theatre every week has become one of the most popular of radio concerts. Everything is run according to schedule time, with no allowance for hitches or mishaps—not one has ever occurred. The theatre management has fitted up the screen room as a miniature broadcasting studio, and after the artists have completed their turns on the stage they may broadcast a purely radio program.

Visitors at the Waldorf-Astoria, the Plaza, the Commodore, and the Astor Hotels this past season have known the purpose of the little black disc suspended in the midst of the tea-room orchestra—but the uninitiated have wondered a bit. The little black disc is the microphone, the only part of the transmitting apparatus visible to the public. Hidden in the near background there are always two operators and an announcer. Because they always keep in the background very few of the diners and dancers at the various hotel roofs have realized that the music to which they danced was being sent out to all parts of the country—there is so little ostentation about it that it seems uncanny.

RADIO PRIMER

ANTENNA ERECTION: With the exception of sets employing loops in connection with radio-frequency, outdoor antennae have been the only method that the average amateur and fan have of receiving signals. Many erect an antenna without any thought as to the importance of various details that enter into its construction.

In order to be most efficient, the outdoor antenna should be clear of all objects such as iron structural work, tall trees and towers. To work properly, it does not have to be extremely high but should be high enough to clear all surrounding objects of this sort.

The insulation of the antenna is equally important. There is no sense of erecting an antenna if it is not well insulated, because poor insulation will only cause leakage of the minute currents with corresponding weakness in the received signals. The best insulators are those made of moulded composition with steel eyes

in the ends. They are also the strongest and can be relied upon to stand up under any strain without rupture. If it is not possible to obtain these, the common porcelain cleat can be used. Two of these should be placed together for strength, and two sets of these at each end will give sufficient insulation, where a receiving set is concerned. The only bad point about the use of the cleats is the fact that they are very liable to become soot covered, and leak, but if they are cleaned every six months or so, they will stand up fairly well.

Another point that is generally neglected when an antenna is erected is the soldering of the lead-in wire to the antenna proper. If the wire is just wrapped around the antenna wire, the copper wire will corrode in time, and a poor connection will be the result. The lead-in wire should be soldered and taped and no trouble will be experienced from this end.

The bringing in of the lead-in wire is also another point that should not be neglected. A porcelain tube, or regulation lead-in insulator, should be used. In most cases the wire is just run through the open top of the window.

A Circuit to Play Around With

By C. White, Consulting Engineer

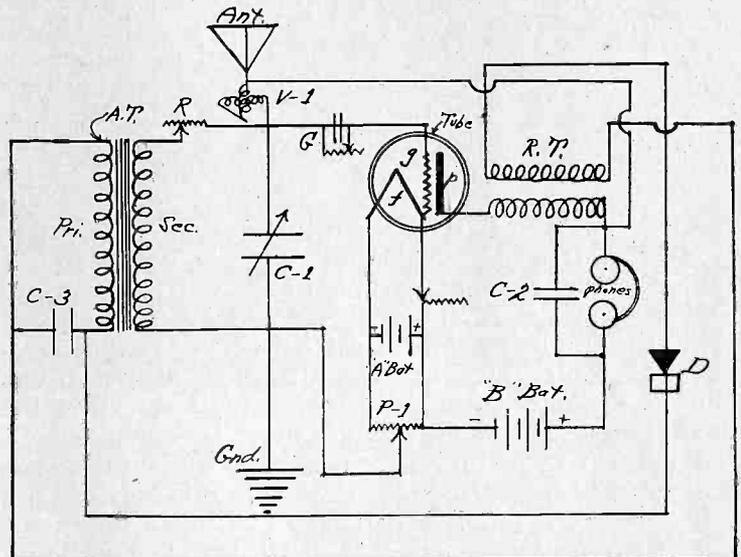
IF you are at present resting at ease and looking for something to play with I heartily advise you to fool around with the peculiar reflex circuit outlined in this brief article. But, before I start, I do not want anyone who has never built a radio set to decide to make this circuit his favorite receiver, because he will no doubt experience quite a little bit of trouble in making it work and the only man who can really make it function is the radio fan who has solved or assembled many radio circuits before and whose experience will be a guide to the correct results. Reflex circuits are always peculiar things to work because the constants for such circuits must be exact. In the particular circuit outlined I could get fair results with one audio transformer, no results at all with another, and still excellent results from a third. This in no wise reflects upon the quality of the various transformers, but it only goes to show that the constants of transformers greatly vary and you will always find that a certain one will fit a given reflex circuit better than any other for this reason alone. If you do decide to experiment with this circuit purchase a good reliable fixed crystal because an ordinary crystal will cause you much worry to get the right adjustment and keep the adjustment while you are changing things around in the circuit. At first you will discover that the action of the circuit is regenerative; that is, the crystal detector will make absolutely no difference at all in the circuit.

The schematic diagram gives the idea of the general assembly of the circuit. The variometer V-1 is no more than an ordinary variometer, and, the condenser C-1 is an 11 plate variable condenser. The resistance R should have a range of 1,000 to 100,000 ohms resistance. It is nothing more than a grid leak type of resistance. A grid leak resistance for the tube should also be variable, having such limits as advisable to employ with the type of tube used; that is, if a UV201A be used a leak varying from 2 to 5 megohms approximately should be secured. The grid leak condenser should be a fixed condenser having a capacity of .00025 mfd. The fixed condensers C-2 and C-3 should have a capacity of .002 mfd. apiece. The potentiometer P-1 must have about 300 or 400 ohms resistance, the latter value being more preferable. The audio-frequency transformer A.T. will play a large part in the correct performance of the circuit but it is almost next to impossible to specify any particular ratio because the right one will largely depend upon many constants of the other apparatus and wiring of the receiver. The radio-frequency transformer R.T. also plays a most essential part in the circuit and often by changing this around or trying another make you will discover very surprising changes in results.

After you have assembled the receiver keeping the grid leads as short as possible and you are all ready and set to listen in, most likely the first thing you will hear is a very strong alternating current hum. This immediately indicates one of two things, either you have made a mistake in the wiring and have an open circuit somewhere, or, the grid leaks R and G are not adjusted to the correct values. The latter is most likely to be the trouble and after playing around with these controls you will soon be able to alter the prevailing condition and eliminate the hum. After the hum is out of the way you will find that there are two ways to tune in a signal, either with the condenser C-1 or the variometer V-1, or maybe by varying both to-

gether. But, there is only one ideal condition and that is when the variometer is placed in a certain position and the final tuning is accomplished with the condenser. The wiring of the receiver permits it to be used as a regenerative circuit or a reflex circuit. You can readily ascertain which method you are using in the circuit by removing the fixed crystal detector D. If the signal completely falls out you know that the crystal was working, and if the crystal makes no difference in the volume then you know that the tube was acting as a detector. When the crystal functions you will note that the signal is much clearer than when the tube works alone, and the volume will be slightly greater. In reality there is a little combination of the two actions generally.

Although there is nothing wonderful or remarkable about this circuit, it does form a good circuit to experiment with if you have the necessary apparatus available. You will soon discover that there are many changes you can make and still have a good set or get clear reception. For instance, you can try removing



Schematic diagram of a reflex circuit that will surprise and delight the average fan who likes to have a little latitude in the construction of a set. It is important that a good ground connection be used with this set, because of the fact that a single circuit tuner system is used.

the grid leak and grid leak condenser G from the circuit and note the effect. Then try removing or varying R and note the changes. Change the size of the fixed condensers C-2 and C-3, change the types of radio and audio-transformers. Try out the various types of fixed crystals and discover which one gives the best rectification. I repeat that I do not recommend this circuit for the novice, that is, the radio fan who has never built or assembled a receiver. He is most likely to be puzzled at the various troubles that he will meet, but, the old radio fan will know from experience what to do. There are no parts in this receiver that are not standard and cannot be used in other circuits if you wish to do so later on, and therefore you will waste no money if you go to the expense to purchase a part or so to experiment with in this circuit. One of the greatest pleasures of radio I think is fussing around with new circuits, and it is very easy to do this experimental work if you live near one or more large broadcasting stations where you can experiment and test out your changes readily and without delay.

Naval Airship Will Carry Radio to Pole

By Carl H. Butman

WASHINGTON, D. C.—When the great Naval Airship ZR-1 goes to the North Pole, she will carry radio to the top of the world, whether it is late this summer or next spring. If she reaches that northern pinnacle, and experts insist there is no reason to doubt her ability, the Naval airship will be able to prove the fact by virtue of her bearing from northern radio stations. In these days of scientific achievement proof is required, and in the event an arctic explorer gets to the pole with a radio compass or a transmitting set, there can be no doubt of his exact position.

Together with a complete radio receiving and transmitting set, the ZR-1 is equipped with the latest type of radio compass, which at the pole would show radio stations picked up as bearing directly south, while at all radio stations within communication distance, her position would be due north.

By the time the aerial explorers are ready to start their northern flight, toward the end of August, MacMillan's radio experiments from the "Bowdoin" will have proven whether radio will carry through the aurora, a point on which there seems to be some doubt. MacMillan, however, will not be able to take his set very near the pole, but will be forced to abandon it and the "Bowdoin" at the edge of the ice, leaving it to the Navy to carry radio to the pole itself. Weather Bureau officials report that messages from Amundsen's "Maude" have been received by relay, and that a daily message on meteorological conditions is received regularly during the winter months from Spitzbergen located at latitude 78 north. If it is possible to put radio messages through from the far north, the world will hear of the ZR-1's progress and her arrival over the northernmost point on earth.

While Rear Admiral Moffett, Chief of the Naval Bureau of Aeronautics, and the crew of the ZR-1 believe the trip is feasible and are literally "rarin' to go," the date of departure depends upon her flight trials scheduled in August. Since the trip would only require a few days it is possible that it can be made before the long winter of the north sets in with its low visibility and extreme cold, but if tests and flights are delayed until September the exploration cruise may have to be postponed until next spring. No details as to route have been mapped out. Two courses are being considered, however, one directly north from Lakehurst, N. J., her home station, and the other northwesterly to Alaska, using Nome as an advance base. From Nome the course due north would be 1,766 statute miles, a little over a good day's run. The British R-34 crossed the Atlantic and returned to England in 1919, traversing a distance of over 7,000 miles in a week's time, and in 1917 a German Zeppelin made a cruise of 5,500 miles in four days. The cruising radius of the Naval craft is between four and five thousand miles, so the distance of the polar trip is not considered extreme for this 680-foot craft.

Meteorologists and Captain Evelyn B. Baldwin, an Arctic explorer, point out that while surface winds from the far north blow in a southwesterly direction, at higher levels the warmer currents bear toward the north and would aid a polar flight. Captain Baldwin, who suggested an aerial polar flight years ago, recently talked to the ZR-1 crew on polar exploration, answering innumerable questions. Among other things, he explained the advantages of a summer flight, as

against one undertaken in darkness and cold. A winter trip, however, radio experts point out would aid radio transmission materially. But with her radio operating from a 300 foot antenna at a great height, it is felt that the aerial cruiser would be able to send satisfactorily in the Arctic day as well as in the night. According to Ralph Upson's report to the General Electric Company, in using radio from his balloon at an altitude of over 3,000 ft., he encountered no static whatever during the recent balloon race.

Radio stations in the north are fairly numerous, and it is believed that the ZR-1, once on her trip could keep in communication with several to check her course. In the event she was uncertain of her position, she would either call two or more radio compass stations and ask for her position, or, having picked up two or more radio stations and observing their bearings by her radio compass, plot her own position. In this manner she could hardly go wrong and could correct her course readily provided her radio continued to operate successfully.

Incidentally, she could not "fake" her position at the Pole, as the world would soon be advised by radio stations that her reported position was incorrect. Captain Baldwin points out that in the far North, the compass is sluggish and that data for its correction are meager. It is his belief that the only accurate method of proceeding in the polar trips today is with the aid of radio and radio compasses.

Among the stations to which the ZR-1 could report are: Three in Iceland; Spitzbergen, on the 78 parallel; Ingoy, 71 N.; several in northern Russia; our own Army and Navy stations in Alaska; Jan Mayen station on Iceland, and Mijgbugton, 73 degrees N. on the coast of Greenland. Certainly there are sufficient to get cross bearings and correct the course northward. If the stations are equipped with compasses, all the better, but as the ship will have a radio compass, the reception of their signals is all the navigation officer will require.

The ZR-1 is equipped with a type S.E. 1390 transmitter, designed for flying boats like the N.C.-4 which made the record trip across to England. It has modifications, making it gas-proof.

The transmitter uses six 50-watt tubes giving it an input of 300 watts and an average output of 150 watts for wave lengths of 507, 600, 800 and 975 meters on I.C.W. and C.W. communication. It is possible to use this set for radio telephone work but it is not contemplated on the early flights.

The whole set has been tested on the bench with a phantom type having the same characteristics as a trailing wire antennae three hundred feet long, i. e., fundamental wave length 315 meters; 300 microfarads capacity; and 93 microhenries inductance, the resistance ranging through the wave lengths from nine to 13 ohms, giving a radiation of five amperes.

Arrangements will be made for an antenna for use when making a landing. It will be of the loop type fixed between the control car and the two leading wing cars and can be used for communicating when on the ground.

The airship's receiving apparatus will consist of a tuner of the ordinary two circuit type, in conjunction with a six-step amplifier using six S.E. 1444 tubes, three stages radio, a detector and two stages of audio am-

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RADIOGRAMS

WORLD NEWS HAPPENINGS BRIEFLY
PHRASED FOR OUR BUSY READERS

Irving H. Kempner, who is now in Paris, France, disposed of a piece of New York City real estate by wireless last week.

Private radio messages have been made possible. Now if something could be done to make the phonograph more private.—Chicago American Lumberman.

The Soviet Government, according to the Russo-British Chamber of Commerce Bulletin, has recently prohibited the importation of the following articles into Russia: Non-insulated copper wires and cables; insulated copper flexible cables; various electrical products of glass and porcelain.

Hamilton Holt and Supreme Court Justice Daniel F. Cohalan debated the World Court question over the radio one night last week from Station WJZ of the Radio Corporation of America in Aeolian Hall, New York City. Mr. Holt supported the proposal that the United States enter the Court and Justice Cohalan opposed it.

Long-distance hypnotism by radio was demonstrated one day last week with apparent success at the offices of *Science and Invention*, New York City, when Joseph Dunninger, hypnotist and mind-reader, speaking into the microphone at Station WHN, Ridgewood, L. I., threw the subject, Leslie B. Duncan, into an hypnotic state in the office, ten miles away.

Captain Donald B. MacMillan, the Arctic explorer, now on his way north in the "Bowdoin," reported, one day last week, that Operator Mix had picked up amateur stations at Waterloo, Ia.; Belton, Texas; Wilmington, N. C.; Bordeaux, France, and many points in the eastern and middle western United States. Several concerts from the United States have been enjoyed by the crew of the "Bowdoin."

George W. Beauchamp, a retired Chicago business man, has had built for himself and family a "Pullman" touring automobile, in which he is making a tour of the country. It cost \$12,000, is 23 feet long, six feet three inches wide, seven feet ten inches high, and has a wheel base of 196 inches. Sleeping and dining accommodations are provided for four persons—and, of course, the equipment includes a radio set.

Last Saturday evening a special program was given from Station WSAI, United States Playing Card Co., Cincinnati, Ohio. A wave length of 309 meters was used. Only one vocal artist appeared, but an effort was made to reach every state in the Union as well as Canada and Mexico. The artist appearing on this program is an American soprano, Mrs. Clara Thomas Ginn, who has a promising voice for the world's finest in broadcasting. She sang selections from various operas in French and English. Mrs. Ginn is a graduate of the Cincinnati Conservatory of Music.

One of the world's largest consumers of copper is the Southern California Edison Company of Los Angeles. The company now has 26,694,000 pounds of copper in service on its system. It is engaged in the largest hydroelectric development project in the world, involving an expenditure of \$375,000,000, or \$15,000,000 more than the cost of the Panama Canal. On its 600,000-volt transmission lines there are 8,838,000 pounds of copper and on its 30,000-volt lines there are 740,000 pounds of

copper. It is estimated that the purchase of copper for 1922 was 6,000,000 pounds.

Gen. Gouraud, the French veteran now visiting the United States, keeps in touch with the country by means of a radio set installed on the private car "Berwick" on which he is making a six weeks' transcontinental tour.

An interesting feature was on the program of Station WOR, L. Bamberger & Company, Newark, N. J., last Wednesday night. Howard Thurston, premier magician of the present day, who is

Radio Reports Prize Fight



(U. S. Army Service)

More than two million people listened to the description of the Willard-Firpo fight broadcast direct from the ringside at Boyle's Thirty Acres, Jersey City, N. J., according to the estimate made by the American Telephone and Telegraph Company. The microphone, placed near the ringside, was connected with the apparatus of Station WEAJ in New York City, and by long distance telephone lines connected with the transmitting equipment of WCAP, Washington, D. C., and WMAF, at South Dartmouth, Mass. The picture shows the radio equipment being set up on the afternoon before the fight.

also a recognized authority on psychic matters, delivered a lecture, entitled "Spiritualism," during which he explained some of his new theories pertaining to the "after life," and also told how he happened to arrive at the conclusion that the belief in spiritualistic communication is founded on fact after a long series of experiments. For the past twenty years Thurston has been a relentless anti-psychic, and he has exposed many mediumistic frauds. When he recently announced that he had been converted into a "spiritist" of a new variety he created a sensation.

(Concluded from preceding page)

plication. The long range receiver will be one of new design having a range up to thirty thousand meters using as an amplifier. A universal amplifier of six steps with telephone jacks for using either radio-audio or audio alone in one or two steps will be employed.

The radio compass probably will be installed in the keel, just forward of the control car and may be used for taking bearings on wave lengths from 500 to 30,000 meters. This compass coil is rather unique in that it is of spherical shape and has two sets of coils. In the long-wave reception all the winding are used but in

the short-wave reception it is divided into two coils and the variometer effect is taken advantage of.

The airship's name will constitute her radio call, just as the WR-2 before her destruction answered to "WR-2." Lieut. J. H. Gouan, U. S. N., will be in charge of radio, assisted by Chief Radioman J. T. Robertson. The electric power will be supplied by a gasoline-engine driven generator and a 200-ampere hour storage battery, similar in operation to the electric power plant of an automobile. These units will supply current for lighting as well as radio purposes. The battery itself will have sufficient capacity to provide between one and two hours' operation for the radio set in case of a generator break down.

Summer Interest in Radio Is Good This Year

FOR many reasons interest in radio is likely to be maintained this summer to a far greater extent than last year, according to the radio experts of the Bureau of Standards. The maintenance of this interest and of good radio business during the summer depends very largely on the broadcasters and radio dealers.

Two elements of radio receiving sets which have been perfected during the last year or two have gone far to help in making it convenient and satisfactory to use radio receiving sets outdoors. The first of these is the dry battery tube; that is, electron-tube detectors and amplifiers which require only a small dry battery rather than a heavy storage battery to light the filaments. The second improvement is the development of more satisfactory loud speakers which furnish a considerable volume of sound without undesirable distortion. Thus it is possible now with small portable receiving sets which can be purchased or which can be fairly easily assembled, to receive satisfactory radio broadcasting while out camping or boating or making automobile tours. It is a noteworthy fact that exploring parties now take radio receiving sets with them for the dual purpose of furnishing amusement during the evening hours at camp and for receiving time signals with which to check their chronometers.

It must be recognized that radio transmission conditions are not as good in the summer time as in the winter. Transmission range is decreased so that it is not possible to hear the distant stations which can be received in the winter. The presence of atmospheric disturbances often makes it difficult to hear weak signals and reliance must be placed on stations which are near enough and powerful enough to produce loud sounds from the receiving set. Fortunately it is not necessary to rely entirely on distant stations since there are now nearly 600 licensed broadcasting stations in the United States. In fact, about nine-tenths of the area of the country and probably 95 per cent. of the population is within one hundred miles of a broadcasting station which furnishes quite satisfactory service. Therefore, while it has been possible during the winter to receive from any one of a large number of broadcasting stations, the summer decrease in transmission range will not mean an entire stopping of broadcast service for large numbers of people, but only a decrease in the number of stations between whose services they can choose.

There are a number of ways to minimize the interfering noise which is caused by atmospheric and other stray disturbances. At important government and commercial stations certain devices and methods are in use by means of which strays are appreciably reduced and it is made possible to obtain fairly reliable reception during the summer. The apparatus and methods employed at such stations are usually too elaborate to be used at the ordinary broadcast receiving or amateur station. One method which is easily employed and which will be found helpful in reducing certain types of strays is the use of a small antenna. If the ordinary open type of antenna is used its height and length may be reduced and the loss in signal strength recovered by employing a more sensitive receiving set. A coil antenna may be constructed by winding a suitable number of turns of wire with proper spacing on a wooden form about four feet square. In case a coil antenna is used there is some loss in signal intensity but there is an added gain in freedom from interference on account of the directional characteristics of the coil. Thus by rotating a coil antenna to

the proper position the directional types of strays may be greatly reduced and a better ratio of signals to strays will be obtained.

Some relief can also be obtained by persons having good amplifiers by using a "ground antenna." This is a long insulated wire run in a shallow trench or on the surface of the ground. The ground wire should be run in the direction of the station from which the most signals are to be received and should preferably be several hundred feet long.

It is also worth while to use various means to improve the sharpness of tuning of the receiving set. Then such interference as is picked up by the antenna will to some extent be filtered out before it reaches the telephone receivers. The receiving set itself should be thoroughly shielded to prevent the tuning coils and transformer windings from direct induction from the source of trouble. Inductively coupled receiving sets should be preferable to single-circuit sets under these conditions. Radio-frequency amplification with sharply tuned inter-stage transformers is also helpful. A well designed regenerative receiving set is also very selective. If the receiving set is one which has a series condenser in the antenna circuit it is sometimes helpful to shunt the set with a high resistance (several thousand ohms) connected between the antenna and ground terminals. This may provide a shunt path for some of the interfering currents and avoid their entrance into the receiving set.

While the increase in the number of broadcasting stations in operation is an important factor in the radio situation this year, a still more valuable feature from the viewpoint of the listener is a very notable improvement in the quality of programs, and other features of operation of broadcast stations. There are now about thirty Class B broadcasting stations operating on individually-assigned frequencies between 1000 and 550 kilocycles (300 and 545 meters). These stations furnish programs of high quality and employ transmitting sets of 500 to 1000 watts power in order to secure the privilege of frequency assignment in this band. The large number of Class A broadcasting stations are also distributed over a range of frequencies from 1,350 to 1,050 kilocycles (222 to 286 meters). A number of these stations as well as some of the Class C stations operating on 833 kilocycles (360 meters) have well-designed transmitting sets and carefully selected programs. The assignment of broadcasting stations to frequencies differing by at least 10 kilocycles, in accordance with the recommendations of the Second National Radio Conference, has resulted in a decrease in interference and an improvement in the quality of broadcast service which is obtainable by the average listener.

Broadcasters Reassigned

Week ending July 14, 1923

Transfer Class C to Class A

Call	Station	Class	Frequency Kcys	Wave Meters	Lgth. Meters	Power Watts
WDAX	First National Bank Centerville, Iowa... "A"		1120	268		100
WPG	Nushawg Ptry Farm, New Lebanon, O... "A"		1280	234		50
WJAM	Perham, D. C., Cedar Rapids, Ia... "A"		1120	268		20

Transfer Class C to Class B

WOS	Missouri State Mktg. Bureau, Jefferson City, Mo. "B"		680	441		500
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The Ideal Portable Receiver

By A. D. Turnbull

PORTABLE receivers seem to have captivated the popular fancy at the present time, partly due to the fact that people desire a receiver that can easily be taken away to the country with them or taken on a trip in a car. In order to be of any great use such an outfit should embody simplicity, ease of tuning, and efficiency to work on a comparatively small collector (antenna).

Under the heading of simplicity the size of the outfit must be small and easily adapted to portability. No one desires to take a set away that takes up half a trunk and needs storage batteries and an expert to operate.

The ideal portable receiver must not have a multiplicity of controls in order to accomplish reasonably fine tuning. Numerous condenser and inductance adjustments only tend to exasperate when signals are quickly desired.

As a loop antenna is to be employed and accommodated to a single tube receiver it is necessary to use the super-regenerative principle, that particular type of circuit giving the best and loudest signals possible on one tube. Unlike most "super" circuits, however, this one does not depend upon large inductance values. Advantage was taken of the principle on which the "flivver" circuits work and an extremely efficient receiver of moderate cost was the result.

The material needed for this portable receiver is: 1 variometer (preferably small size); 1 vernier variable condenser, .0005 mfd.; 1 fixed condenser, .006 mfd.; 1 fixed condenser and variable grid leak, .00025 mfd.; 1 fixed condenser, .001; 1 tube (U. V. 199, or dry cell tube); 1 tube socket; 1 loop antenna; 1 pair phones, 3000 ohms; 1 good vernier rheostat.

If you happen to have any of these parts you can use them, but I want to caution prospective builders to use only the best possible parts. In the choice of fixed condensers it is necessary to get those using mica dielectric. If paper insulated ones are used the difference in capacity in damp weather and dry weather will be so great that the set will not operate at all. Also do not use a condenser whose capacity you can change by squeezing. It is best to pay the few cents more that the best will cost than to buy inferior goods and then be disappointed in the results. In purchasing a rheostat be sure to get one that is capable of fine adjustment. For this reason it is best to get the carbon pile type, as their range of adjustment is extremely large, and very fine adjustment can be had by careful manipulation.

The entire set easily can be accommodate in a cabinet 10 inches by six inches by six inches. So get a panel that size and drill it for the variometer, variable condenser and rheostat, mounting them as your fancy suits you, but bearing in mind that as the variometer will be used the most it should be placed so as to be handy.

Shield the entire panel carefully with copper screening or foil and ground it to the minus side of the A battery. Watch out when shielding that your jack is clear of the shielding, as I managed to short my shielding on the jack, and wondered for some half hour what could possibly be the trouble.

When the panel is drilled, and everything is in readiness, connect up the instruments as shown with tinned bus bar wiring, using varnished cambric tubing on all of the leads. This is a necessary evil in all portable sets, especially where they are to be contained in small cabinets as the wiring is necessarily close and no

chance should be taken with accidental short circuits due to jarring. When connecting the fixed condensers in the circuit take the precaution to mount them far enough from the shielding. If they are mounted too near the shielding they will add stray capacity to the circuit and the set will howl and act in general like a "mad dog" instead of a docile receiver.

No instructions are given as to the construction of a loop as numerous articles have appeared in RADIO WORLD on this subject.

The B batteries can either be carried as part of the set, or separately, depending upon the amount of voltage that is desired, always keeping in mind that the volume depends directly upon the voltage in this circuit. It will work fine on 22½ volts, but best results are to be had when 45 or 67½ volts are used.

After making sure of your connections and going over them several times before inserting your tube in the circuit, turn the filament on. Place the variometer at 50° and swing the loop in the direction of the station desired. When the signal or carrier is heard reduce the filament current and tune the variometer. During the first operation of the set, the high-pitched whistle or scream of the "super" will be noted. This should be varied until it is almost too high to hear, by varying the grid leak capacity. After it is set, it will be noted that it will vary slightly with the tuning of the variometer,

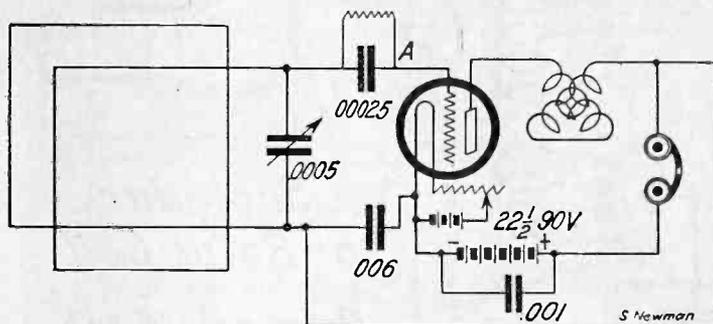


Diagram of a loop set employing the "flivver" principle that will work admirably on a comparatively small loop. Care should be taken in the construction and placing of the condensers.

and that the signals will always be the loudest when the pitch of this whistle is highest. This whistle should always be present, as if it stops, the circuit is not working correctly and the grid leak should be re-set until it appears.

The last operation of the set is clearing out the signals by means of the vernier control of the variable condenser. If any interference is noted it can easily be tuned out by swinging the loop, but in that case the entire set should be re-tuned.

Extremely long distance is possible with this loop set, and it is not an exaggeration when I state that I have consistently logged WDAR and KDKA on a 3-foot loop from Nova Scotia, which is a distance of 1,000 miles. It is simple to construct and tune and the dials can be set for certain stations and the same station will always come in on the same settings, regardless of anything else.

As a final note I again want to caution builders to be very careful in their construction, especially in the connection of the instruments, keeping all the leads separated and cross them at right angles. Do not vary one bit from the diagram and expect to get any results, as the circuit is simplified as it is.

A Long Distance Sensitive Crystal Receiver

By Richard B. Wilbur

FOR radio fans who do not want to put much money into a radio receiving set, and who wish to get long distance stations, herewith are the details of a very sensitive crystal receiver, using an ordinary crystal detector. This set, if properly built and operated, will get results that will be surprising. The writer has a set of this kind that has received a station at a distance of 1,410 miles with plenty of volume and clearness of reception. This set is the tube's only rival.

The parts needed to construct it are as follows: 1 6½"x12" panel (any kind); 1 23-plate variable condenser; 1 .002 mfd. phone condenser; 2 switch levers; 18 switch points; 4 switch stops; 2 3" dials with knobs; 1 crystal detector (ball and socket type is best); 1 unmounted galena crystal; 1 empty shaker salt box (3½" inside diameter, 6" long); 1 3" rotor ball; 1 ¼"x6" tube for rotor shaft; 1 8 oz. spool of No. 22 DCC mag-

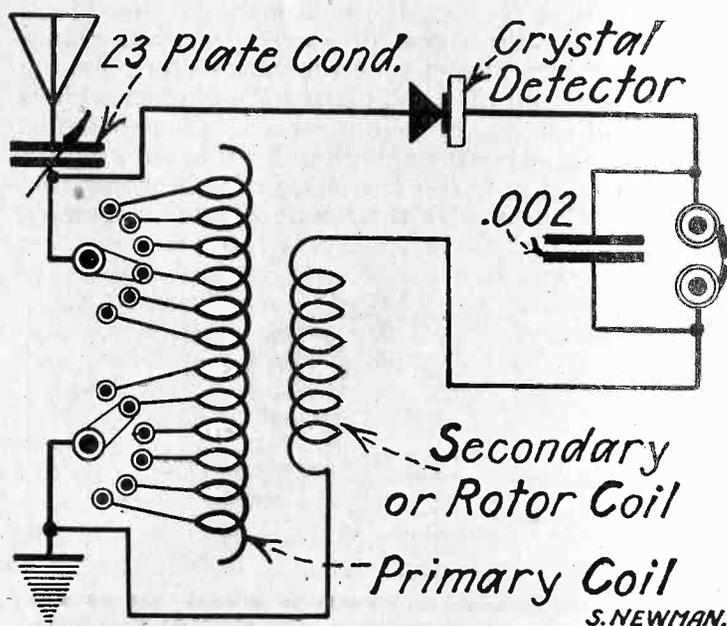


Fig. 1. Hook-up for Wilbur's long distance sensitive crystal receiver.

net wire; 1 ¼" board, the same size as the panel; 2 pieces of flexible wire, 6" long (leads for rotor).

The total cost of these parts ought not to be over \$6.50.

Use a variocoupler that will tune from 150 to 650 meters. It is best to make one yourself and it's a trifle cheaper than buying one—and it will be more efficient.

To make a coupler take the empty shaker salt box which will measure 3½" inside diameter, and 6" in length. Measure to the center of the box and make a mark. Now get a stiff piece of paper ½" wide, and measure around the outside of the box, commencing at the center mark. Get the exact diameter of the outside of the box, fold the strip of paper and cut. You now have one-half the diameter of the box. Take one of these strips and place one end on the center mark, hold tight on the box and mark the other end of the strip. Now then you have the marks on the box where you are to make holes for the rotor shaft.

In winding the primary coil, first make two small holes in the box ¼" down from the top, then take the wire and weave it through the two holes a couple of times to anchor it, and leave about seven or eight inches for a connection. Now start winding. Wind

on 20 turns of wire (clockwise), then take off a 6½" twisted tap, wind on 30 more turns of wire taking off a twisted tap every fifth turn, and shorten each tap ½" each time; also stagger each tap a little, so that one will not be directly under the other. You have now wound the tube to the center, where the holes are for the rotor shaft. Leave a space ½" wide and angle across between the shaft holes and start to wind again, wind on 50 more turns of wire taking off a twisted tap every fifth turn. Take off the first tap after crossing the ½" space in the same position as you took off the first one in the beginning of the winding, and stagger them the same way. When the last tap has been taken off, cut and anchor the wire. The primary coil is now wound, so scrape off the cotton covering of the ends of the twisted taps.

The three inch rotor form is to be wound next. It should hold about 76 turns of wire. Wind each side of the rotor in the same direction, and solder the two wires together that meet in the center of the rotor. An inch of wire should be left at the beginning of each winding, so that you can connect the flexible leads.

Take the 6" shaft and cut a slot in it about 2" from one end. This slot will be for the flexible leads to pass through.

After this is finished, insert the rotor into the center of the primary coil and put the shaft through it, with the end that has the slot in to the back side. The two 6" flexible leads should be next inserted into the slot in the shaft and started out the end. Solder the flexible leads to the ends of the rotor windings and pull the slack out of the flexible leads. The variocoupler is now completed.

The panel should be drilled next. A sketch of the panel is here shown. Use a ruler in measuring each hole to be drilled so that when the set is finished it will look neat. The variable condenser should be placed in the left center of the panel, with the variocoupler in the right center, the two switches (one above the other) and the detector in the center, between the condenser and coupler. The antenna and ground binding posts go in the upper left side, and the phone binding posts in the upper right side. The .002 condenser should be used to measure the spacing of the four binding posts. The .002 phone condenser is fastened on the panel with the phone binding posts.

After the panel has been drilled, the next thing to do is to fasten the twisted taps of the coupler to the switch points. Fasten the first turn of wire on the coupler, to the first switch point of the upper switch. Commence with the switch point on the left. The first eight twisted taps go to the upper switch and the other 10 go to the lower switch. Fasten both sets of taps the same way and in the same direction. After this is finished, fasten the baseboard to the panel with four small screws. Fasten the variocoupler to the baseboard next. Be sure that enough of the rotor shaft goes through the panel so that you can fasten the dial to it. It is best to put the dial on the shaft, then fasten the coupler to the board. By doing this you can easily fasten the coupler so that the dial won't wobble when it is turned. Fasten the variable condenser to the panel next, then the detector, and binding posts. You are now ready to wire the set. Herewith is a sketch of the hook-up for this set.

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Fasten a wire to the antenna binding post and run it to the back side of the variable condenser where you fasten it to the connection of the rotor plates. Fasten another wire to the stator plate connection of the condenser and run it to the upper switch lever and fasten. Fasten another wire to the stator plate connection of the condenser and run it to the crystal side of the detector and fasten. Attach another wire to the cat-whisker side of the detector and run it to the upper phone binding post and fasten. Run another wire from the lower phone binding post to one of the flexible rotor leads of the coupler and solder it. Solder another wire to the other rotor lead and run it to the ground binding post and from here over to the lower switch lever and fasten it. The wiring is now completed and the receiver is ready for use. A cabinet can be made for this set at a small cost and will improve the looks of it.

The best kind of antenna to use with this set is a single wire not over 100 feet long, 35 feet or more in height, with about a 35 foot or more lead-in depending on the height that it is erected.

A good ground should also be used with this set. The best kind is a five foot piece of lead or zinc pipe driven in the earth with a No. 14 wire soldered to it and run to the receiver.

The writer has received stations up to 50 miles without a ground connection to the set, and has also received stations up to 35 miles without an antenna connection to the set. So you may know that this set is very sensitive. But you *must have patience* to operate it successfully. Don't give up when you first sit down to it to tune in if you don't hear anything. It may be because there isn't any one on the air. Wait until you are sure there is someone broadcasting. Use the most sensitive unmounted galena that you can buy. The reason why the unmounted is best, is because it has six surfaces to it where the mounted only has one, and it is much cheaper, too. The writer will be glad to help any one with suggestions pertaining to this set.

Herewith is a list of stations that has been heard in two weeks time with a set of this kind. The distances are also given:

WHAZ—Troy, N. Y.....	1,322 Miles
WLW—Cincinnati, Ohio	690 "
WWJ—Detroit, Mich.	730 "
WCX—Detroit, Mich.	730 "
WJAZ—Chicago, Ill.	575 "

WDAP—Chicago, Ill.	575 Miles
WLAG—Minneapolis, Minn.	517 "
WOC—Davenport, Ia.	429 "
WOAW—Omaha, Neb.	230 "
WOS—Jefferson City, Mo.....	270 "
KSD—St. Louis, Mo.....	385 "
WHB—Kansas City, Mo.....	160 "
WDAF—Kansas City, Mo.....	160 "
WMAJ—Kansas City, Mo.....	160 "
WBAP—Fort Worth, Tex.....	402 "
WFAA—Dallas, Tex.	402 "
KLZ—Denver, Colo.	460 "
WKY—Oklahoma City, Okla.	200 "
KWH—Los Angeles, Cal.....	1,265 "
KUO—San Francisco, Cal.....	1,410 "
KFBC—San Diego, Cal.....	1,234 "
CHCF—Winnipeg, Can.	833 "
WGM—Atlanta, Ga.	805 "
WSB—Atlanta, Ga.	805 "
WKN—Memphis, Tenn.	460 "
WSY—Birmingham, Ala.	690 "
WHAS—Louisville, Ken.	632 "
WGF—Des Moines, Ia.	314 "
WJAQ—Topeka, Kans.	100 "

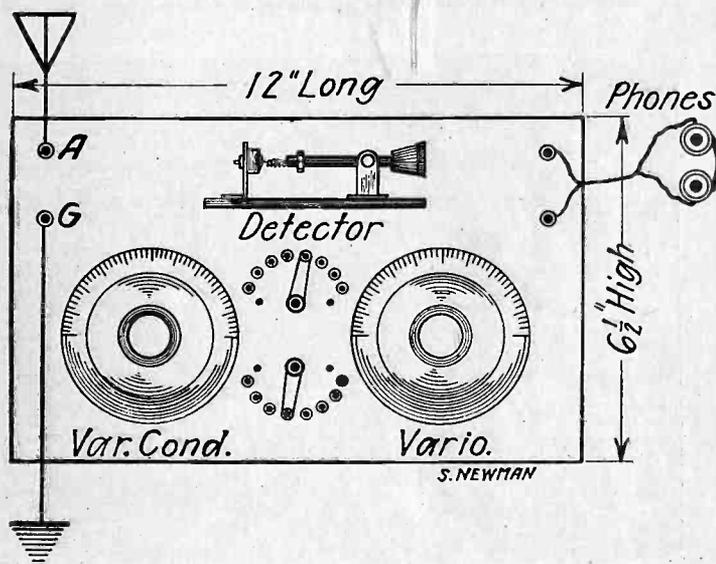


Fig. 2. Instrument layout on panel board, Wilbur's long distance sensitive crystal receiver.

I have not listed the stations under 100 miles for it would take up too much paper to write them on.

Broadcasting Pres. Harding's Speech in Texas

FORT WORTH, TEXAS.—Future possibility of carrying the human voice over a wide area during political campaigns by means of a battery of broadcast stations connected by long-distance telephone lines was demonstrated recently when Station WBAP of the Wortham-Carter Publishing Company here broadcast into thousands of Texas and southwestern homes the speech of President Harding, made 700 miles away at Station KSD, at St. Louis.

This remarkable feat was accomplished through the Fort Worth "Star-Telegram," and its success assured on account of the co-operation given by F. M. Corlett, manager of the West Gulf Division of the American Radio Relay League, and a League member at St. Louis.

As static and other atmospheric conditions would not permit the direct reception of the President's speech by listeners in the vicinity of WBAP they would have been

unable to hear the address at all had it not been for the arrangement by which his words were received at the station of a St. Louis member of the American Radio Relay League, turned into a loud-speaker and finally into a long-distance connection with the Texas newspaper's radio room, where they were amplified for WBAP.

The idea of sending out through the air an address by means of several stations broadcasting simultaneously by the aid of toll telephone lines, or similar connections, has been frequently visualized by far-seeing radio men, yet never has it been attempted over so great a distance or with the same result as in this case.

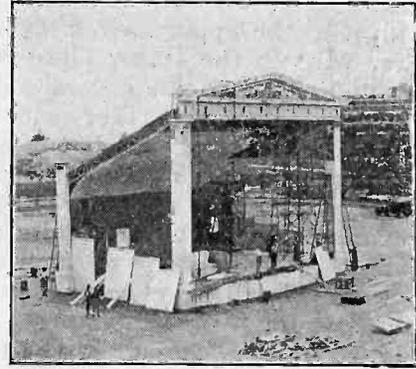
According to the management of WBAP, the "Star-Telegram" local telephone exchange was jammed with long-distance calls of appreciation from enthusiastic listeners who had been informed by broadcast and through its news columns of the spectacular side of the feat.

Variety Certainly Is the Spice



(C. Kadel and Herbert)

Illustrating one of the methods recently proposed over the radio in order to gain good self-control. If you hit the fellow's nose it doesn't count and you have to do it over again until you get it perfectly. Wonder if Willie Keeler (en repose) has anything on his conscience? He surely must have faith in Phil Hughes' ability to absorb instructions over the radio.



(C. Kadel and Herbert)

The orchestra stand being built at the City College stadium, where the New York Philharmonic Orchestra will open its season and broadcast through station WJZ. This is one of the largest structures of its kind and will cost \$15,000. Special attention to acoustics suitable for radio has been paid in its construction.

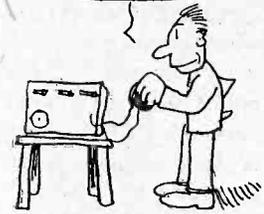
Cap
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(C. Kadel and Herbert)

M. Carnido, Spanish poet, recently broadcast his poems through the Eiffel Tower broadcasting station in Paris, France. Note the immense microphone that is used by the French people. Quite different from the small, innocent-looking "tin-cans" or diaphones used over here. The illustration shows M. Carnido before the "unseen voice of the air."

ILL GIVE MY NEW RADIO-SET A GOOD TRY-OUT TO-NIGHT



THE OPENING WILL BE A S FROM "THE S OF HOBOKEN"

BARON O'BROME WILL RECITE "A DIME IS ONLY TWO NICHELS" ASSISTED BY MME. COLDSLAUGH



SHOWS FORGET TO SUNDAY S SATURDA NIGH 2 2 2 2 2

Underdonk Kedonk is suddenly on Sunday—thank



(C. Western Electric)

The operating and control room of Station WSAI of the United States Playing Card Co., Cincinnati, Ohio. Standard Western Electric apparatus is used. The panel on the left is the speech amplifier control board and the two boards in front of the operator contain the power control apparatus and the tuning apparatus and tubes. Note the receivers in front of the operator by which he can determine how the signals are going out by utilizing a separate receiver.



(C. Kadel and Herbert)

The Young Women's Christian Association headquarters at 610 Lexington Avenue, New York City, has installed a complete portable radio receiver on the roof of the building and when the girls go up for afternoon tea, or sit out in the warm evenings, they are entertained by means of this receiver. The illustration shows them listening in to a Sunday musicale.

Life In Radio News Pictures



(C. Kadel and Herbert)

Secretary of State Hughes, who recently made his plea for a World Court via radio from Columbia University, New York City. The speech was broadcast through WEAF and heard throughout the greater part of the United States.



(C. Kadel and Herbert)

Ivan Andre, well-known artist of England and France, finds that radio concerts are a great aid to his inspiration. At present he is in this country, executing a number of miniatures and landscapes. His only hobby outside of painting is radio and his portable set is always with him. It is a three-tube reflex using U.V.299 tubes with a small loop antenna. One is reminded that there is no accounting for the tastes and idiosyncrasies of temperamental people like artists and musicians. When we catch an office boy whistling shrilly and doing a piece of work at the same time we are prone to think that his temporarily divided mentality isn't especially good for the work—but he may whistle fine. The right program received by radio doubtless is soothing.

CERT
TE
BERS

MADAME DE CEAT
WILL NOW SING "YOU
CANT TELL HOW OLD A
CABBAGE IS BY LOOKIN'
AT IT"



R- DONT
YOUR
G- ITS
IT TO-

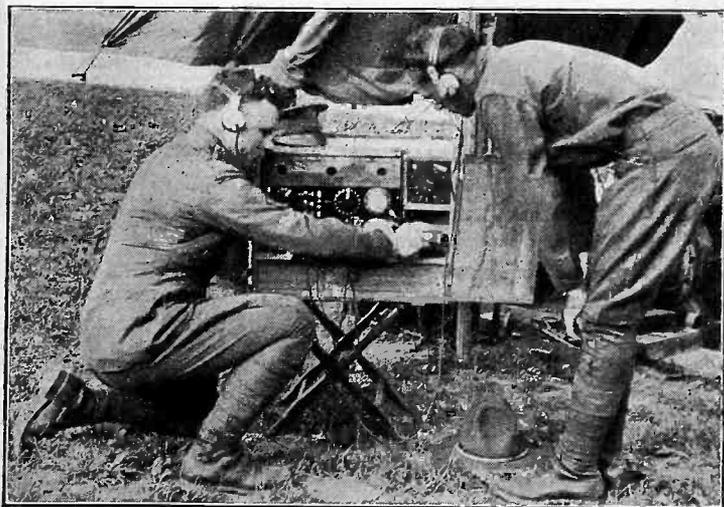
GOING T'
CHOSE RIGHT
AWAY

GIVE ME
\$2 WORTH OF
HAMBURGER!



B.S. STANLEY '27

inded that he will be hungry
Station WOP.



(C. International Newsreel)

Members of the 101st Signal Battalion, New York National Guard, in camp at Peekskill, listening to broadcasting by means of a French army field set. The members of the battalion are given a thorough course in radio which has supplanted field telegraph and telephone to a great extent in the army because of its portability and ease of control.



(C. International Newsreel)

The English Parliament recently were Signor Marconi's guests at a demonstration which took place at the Chelmsford and Ongar wireless stations in England. This is an unusual photograph of Marconi, inasmuch as it shows him with a head set on. On the left is Godfrey Isaacs, M.P., and on the right is Gratton Doyle, M.P., taking great pleasure in listening in on Marconi's portable receiver located in the limousine.

A Simple and Satisfactory Regenerative Reflex Receiver

By J. E. Anderson, M. A.

SIMPLICITY of control is one of the main characteristics of a reflex receiver. In many of the circuits there is but one variable while in others there are only two. None of these simple circuits is regenerative, and for this reason they are neither as selective as they might be nor is the volume of output as large. It is ordinarily believed that if they are made regenerative they become too difficult to manipulate; but this is not necessarily so. By the sacrifice of a little simplicity a reflex circuit may be made regenerative, and the regeneration may be held under perfect control. Only one or two additional controls are necessary.

The writer has tried out numerous reflex regenerative circuits with a view of finding a simple and satisfactory combination. The trouble encountered was not in finding good circuits but in selecting the best out of the many good circuits tried. Many of them seemed equally good, some excelling in sensitivity, some in selectivity, and others in simplicity of control. The

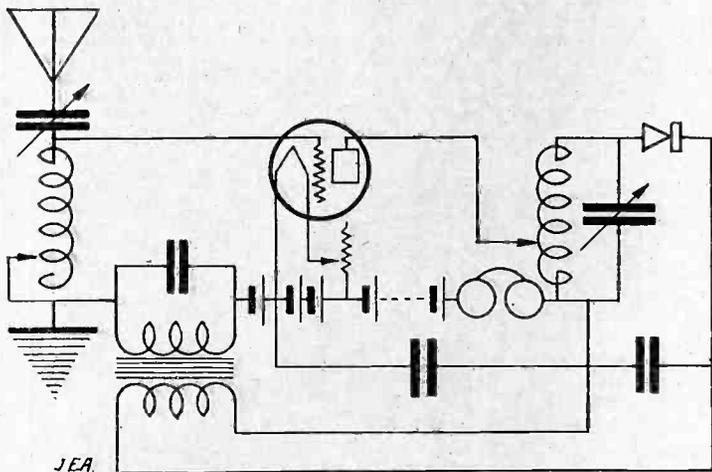
will oscillate, when a slight detuning of the condenser will just stop the oscillations and bring the signals to the desired intensity, or to the maximum intensity obtainable. If the circuit will not oscillate, the inductance in the grid circuit is also increased, and the plate variables readjusted. It may be necessary to change all the four variables at the same time; that is, the two variable condensers and the two variable coils, in order to get best results. Usually a very large value of inductance is needed in the grid circuit and a comparatively small value in the plate circuit.

The inductance coil in the grid circuit should not be less than 75 turns on a 3.5 inch tube or the equivalent. This should be capable of variation in steps of two to five turns. The condenser in the antenna circuit should not be larger than .0005 mfd. A .00025 mfd. condenser would be preferable if it is available. The inductance in the plate circuit coil should be about 60 turns on a 3.5 inch tube, or its equivalent, and this should be tapped every five turns. The condenser across this coil may be one of .0005 mfd.

The by-pass condenser in the primary of the audio-frequency transformer may be omitted if desired. If it is used it should not be larger than .001 mfd., because it directly affects the tuning of the plate circuit. The by-pass condenser in the secondary of the transformer may also be omitted as the safe-capacity of the leads is about sufficient. However, if it is used, it should not be larger than .0005 mfd. Both of these by-pass condensers, if too large, will also by-pass the high audio-frequencies to an appreciable extent. The effect is a general lowering of the tone of music and speech. If the signals are too shrill, that is, if the high audio-frequencies are too pronounced, these condensers may be used to reduce the distortion and render signals of a more pleasing tone.

Sometimes it is not possible to cause the tube to oscillate, especially for the higher broadcasting wave lengths, even if large inductances are used both in the plate and the grid circuits. Some tubes oscillate much more rapidly than others, due to greater inter-electrode capacities. When the tube will not oscillate because these capacities are too small, it is necessary to introduce additional reactance between the plate and the grid circuits. This may take any of the customary forms used to secure regeneration, but it does not need to be variable unless desired, as sufficient variation can be secured in the two variable coils or the two condensers.

Just a few words will be said about the performance of this circuit. It was first tried out during a time when the local broadcasting stations were silent. But the traffic in the ether was really heavy. Many medium distance stations were brought in, and a surprisingly large number of small local stations were "discovered." But since most of these stations had never been heard before on that antenna, it was not much of a test of the circuit. However, when WOR opened up it was no longer necessary to wear the head phones; for the signals were so loud that they could be heard all over the room. It was more than the little dry cell tube used could carry, and consequently the quality of the signals was very bad.



Anderson's simple and satisfactory regenerative reflex receiver hook-up.

circuit shown in the accompanying diagram seemed best to meet the requirements.

This is a single circuit tuner, single tube reflex that is made regenerative by varying the inductance, or more accurately the reactance, in the plate circuit. It may be operated in three different ways. In the first place, as a simple regenerative receiver, in the second as a simple reflex, and in the third as a regenerative reflex. If it is desired to use it as a simple regenerative circuit all that is necessary is to lift the catwhisker from the crystal and tune the plate until the proper amount of reaction is secured. When it is used in this manner the circuit is extremely selective. If it is desired to use the circuit as a simple reflex the catwhisker is adjusted for maximum sensitivity and the secondary of the plate auto-transformer is tuned to the desired frequency. The portion of the coil that is included in the plate circuit is then adjusted to a value such that the circuit will not oscillate. For short wave lengths only a few turns are necessary, while for the longer broadcasting wave lengths the entire coil may be required. If it is desired to use the circuit as a regenerative reflex the secondary of the auto-transformer is tuned accurately to the frequency desired. Then the plate inductance is increased until the circuit

Latest Radio Patents

Receiving System for Electric Waves

No. 1,457,069: Patented May 29, 1923. Patentee: Lucien Levy, Paris, France.

In the specification of patent application Serial No. 249,572 filed August 12, 1918, the applicant has described a system of electric transmission at a distance, applicable to wireless telegraphy and telephony and comprising a special transmitting station device and a special receiving station device.

In this patent it was specified that this receiving station device could be combined with a local generator permitting it to re-

2. Arrangements which permit of the practical carrying out of the improved method and ensuring very great sensitiveness of the system.

The present improved method comprises, broadly, the following operations consisting:

1. In producing in the primary detecting selector circuits, before the first detection, beats of adjustable amplitude and of adjustable ultra-acoustic frequency (of the order for example of 10,000 per second)

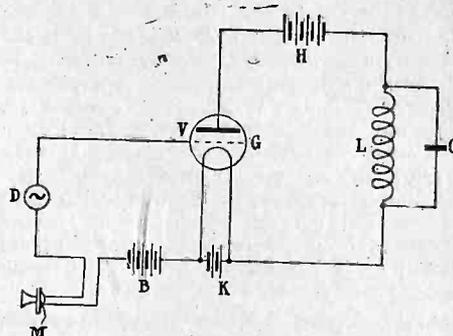
4. In amplifying the selected currents of ultra-acoustic frequency and in transforming them into current of acoustic frequency by causing them to beat with a local current of ultra-acoustic frequency and then in detecting the beats obtained.

5. In effecting a selection on the acoustic frequency.

Modulated Wireless Signaling System

No. 1,455,845: Patented May 22, 1923. Patentee: Norman Lea, London, England.

This invention relates to modulated electric signaling systems and particularly to wireless signaling systems.



Lea's modulated wireless signaling system.

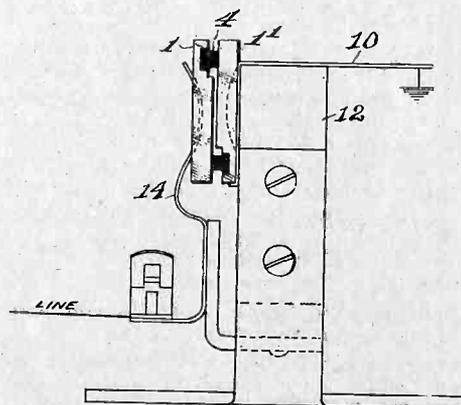
The principal object of the invention is to provide an amplifying appliance wherein the high frequency output of an amplifying power valve energized by a suitable source of oscillating current is modulated by causing the separately produced modulating potentials to vary the potential of the grid of the power valve about a certain negative value and thus to vary the high frequency output of the valve.

Electrical Protector

No. 1,457,249: Patented May 29, 1923. Patentees: G. W. Janson, Brooklyn, N. Y., and L. H. Rovere, Richmond, N. Y.

This invention relates to protective devices for electric circuits, commonly referred to as lightning arresters.

The purpose of the present invention is to provide an arrester in which the air-gap is very accurately determined and definitely maintained and wherein no mica or other separators are interposed between the arcing surfaces so that an inspector can readily de-



Janson's improved device for protecting electric circuits.

tect any attempt to alter the thickness of the air-gap. We furthermore provide for a direct positive contact between the electrodes whenever the arcing continues beyond a predetermined interval, thus avoiding the expense of providing fusible inserts as well as any uncertainty which may be occasioned by relying upon a connection of fusible metal.

Fig. 1.

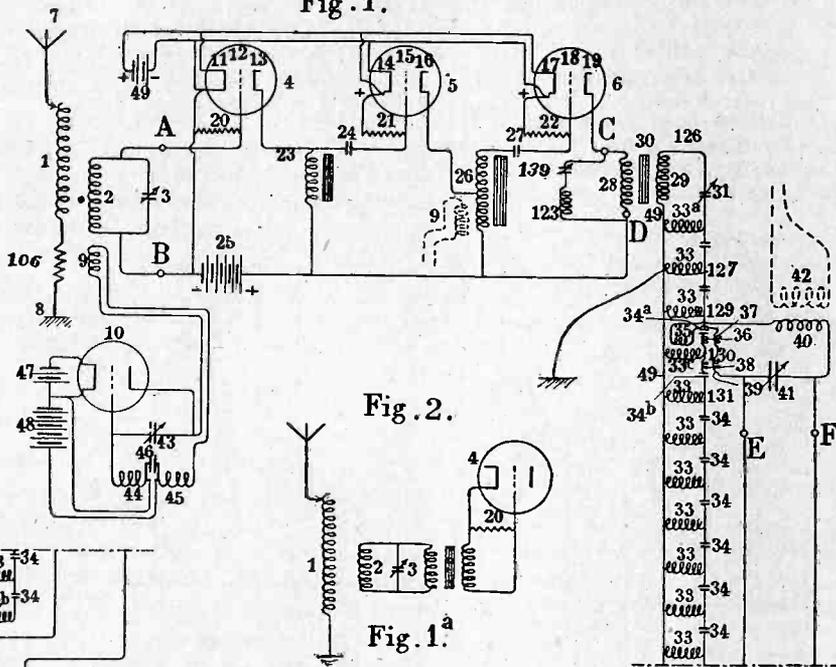
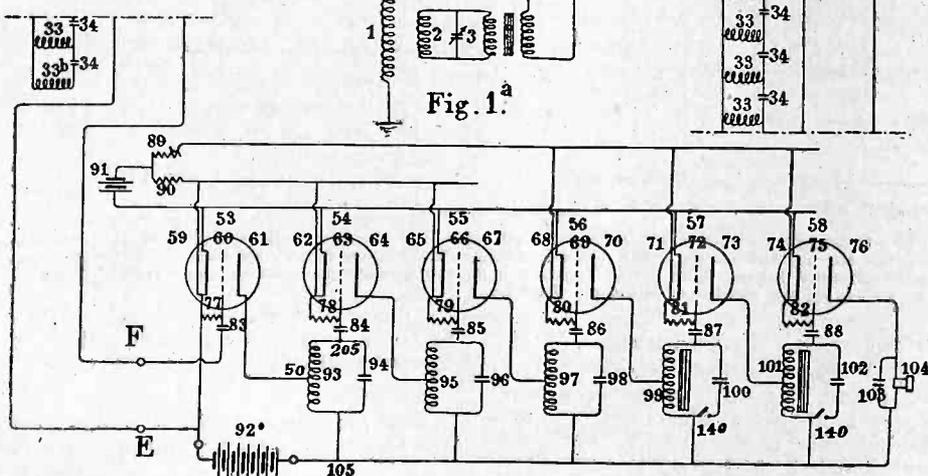


Fig. 2.

Fig. 1^a.



Circuit diagrams of Levy's improved system for receiving electric waves.

ceive the ordinary emissions of the continuous wave stations under sufficient conditions of selectivity in spite of the disturbances of spark stations or atmospheric parasites.

The present application has for its object an improvement made in the receiving system described in the original application of the applicant in the case of its application to waves emitted by ordinary stations, for the purpose of obtaining a more complete selectivity and a greater protection against atmospheric parasites.

These improvements consist in:

1. A special method of secondary selection based on the original principle described and comprising also various complementary operations intended to ensure efficient working of the system in all cases, even when the parasitic disturbances or confusion are very intense.

between the currents induced in the circuits by the oscillations of the receiving antenna and the current which is induced by a local generator of high frequency.

2. In amplifying and then detecting these beats in a detecting amplifier of high frequency.

3. In separating the numerous periods of current of ultra-acoustic frequency furnished by the detection of the beats of the continuous wave, from some periods of limited amplitude and very small in number, (one or two furnished by parasites) and from the currents of low frequency coming from the succession of the parasites: this selection taking place in a secondary selector the working of which, is based generally on the known phenomena of propagation of electric waves of systems with capacities and self inductors distributed in a relatively small number of elements.

Answers to Readers of Radio World

Is amplification without tubes possible? Is it practical? Is any firm making instruments of that sort?—Joseph Shannon, 702 Seventh Avenue, New York City.

Amplification is possible by the use of magnetic amplifiers, utilizing the microphonic vibration principle. They are not practical because of the harsh sounds that they make. No firms that we know of make instruments of this sort. There is no market for such apparatus, as the present tube amplifiers are much more efficient.

What set would you consider best for one using not more than three tubes? Will the 22-turn coil and 43-plate condenser used in the antenna circuit of Mr. Shull's set, described in RADIO WORLD for February 17, be of any value in other circuits? Can a .001 variable condenser with vernier be used in place of an .0005 variable condenser? Will connecting four .001 fixed condensers and one .001 variable condenser in parallel as per enclosed sketch give me a useful capacity of .005?—Jesse I. Seward, 1 Clinton Street, Palmyra, N. Y.

Would suggest that you use a three-tube

be blown. Test each one out independently by means of a dry cell and a pair of phones. If you do not hear a click when the circuit is made and broken you will know that you have a burnt-out winding, or that one of the windings is damaged in some manner.

I intend building a portable set to take away to camp with me. Is it possible to use the flashlight cells to light a six-volt tube if I use six cells, three in series and three in parallel?—Jacob Winslow, 374 Elm Street, Boston, Mass.

You should be able to light your tube by the use of the cells you mention, but you have the wrong idea in regard to the connections. You should hook up two sets of three in series and put them in parallel with each other.

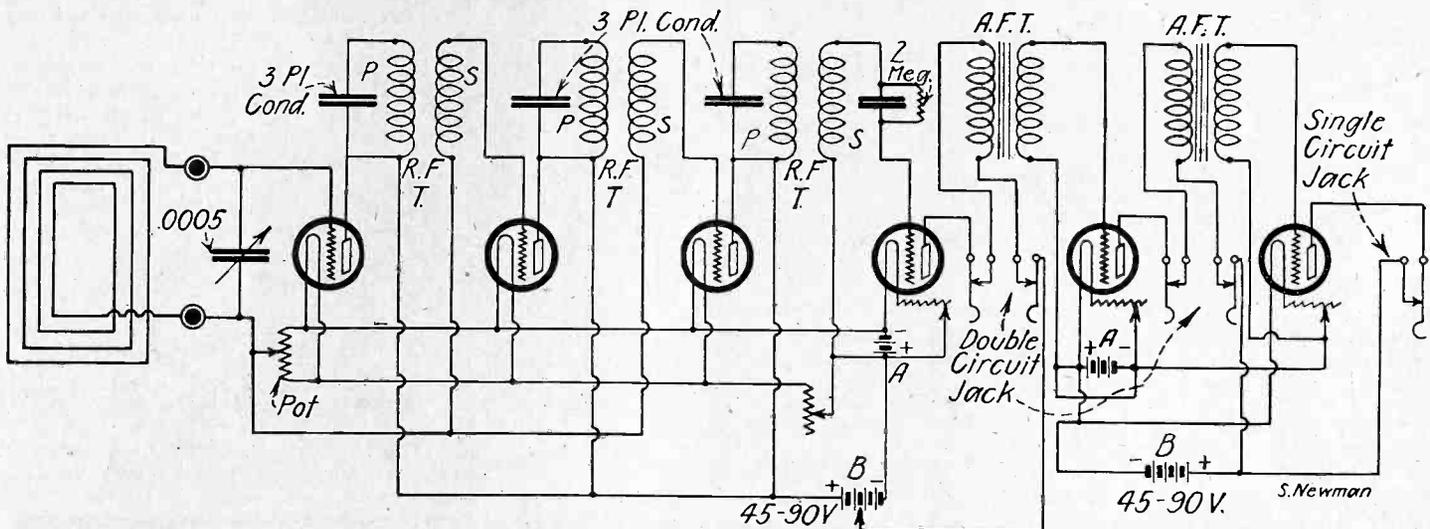
Kindly publish a circuit diagram of a three-stage radio-frequency, detector, and two-stage audio-frequency set, with a loop antenna and separate rheostat for each tube in the audio-frequency tubes and 3 plate condensers across the radio-frequency

In a paper recently presented before our local radio club one of the talkers made mention of the fact that the windings on a coupler of a radio set should be made with the same size wire on both primary and secondary. I have made a coupler, but have used 20 DCC wire on the primary and 24 SCC on the secondary. Should I rewind it? Will it give me better results?—Lawrence Houston, Palm Cottage No. 6, Florida.

The common method of procedure is to wind the same size wire on both the primary and secondary of the couplers, but it will not detract from your set by having different size wire on both windings.

I recently built the circuit described by George W. May in RADIO WORLD for Feb. 17 and have had wonderful results. Can I turn this receiver into a reflex set? If so, will you please give me a diagram and constructional data for doing it.—Edward Walter, 5624 Locust Ave., Kansas City, Mo.

You can use some of the apparatus for a reflex circuit, but turning the same circuit into a reflex is impossible. We refer you



Circuit diagram asked for by C. E. Nordstrom. The radio-frequency amplifiers are all controlled from one rheostat, which simplifies the controls considerably. Separate A and B batteries are furnished for the audio-frequency and radio-frequency tubes to prevent any chance of trouble due to radio-frequency currents leaking through to the audio-frequency tubes. This is the best method of procedure in a set of this type. Tuning is done by means of the condenser shunting the loop.

reflex circuit, such as the D7 Reflex, using a crystal as a detector. This will allow you to get the most out of three tubes if you take extreme care in the construction and use the best apparatus. You can use the coil and condenser you mention in other circuits that call for a coil of this size. The condenser can be used in any circuit. You can use a .001 variable vernier in a circuit that calls for a .0005 by using half of its capacity. The arrangement of condensers that you suggest would allow you to get a useful capacity of .005.

In RADIO WORLD for April 14 you published a circuit by Arthur S. Gordon. I have constructed this circuit and have had good results when I use the detector, but when the amplifier is plugged in the set seemingly goes dead. I have checked the diagram with my set and find that it is absolutely correct. What can my trouble be and how can I remedy it?—William Oakes Morris, 197 So. Whitney Street, Hartford, Conn.

Suggest you test your amplifying transformers. It is quite evident that, as you have tested out your circuit and found it absolutely correct, one of the windings must

transformers.—C. E. Nordstrom, 3224 18th avenue, South, Minneapolis, Minn.

The circuit you wish is published herewith. It is necessary when constructing a circuit of this type to keep your leads separated and the battery leads apart. Two sets of batteries are furnished for both the radio-frequency and audio-frequency circuits to prevent any trouble due to leakage from one circuit to another. A coupler is not necessary when a loop is used.

I noticed the term "phantom circuit" used in connection with the measurements of various circuits in experimental work. What does the expression signify?—Robert Mackay, Box 14, Sheepshead Bay, L. I.

In laboratory experiments it is not advisable to use regular antenna and ground circuits in conducting all kinds of work; therefore resistances and inductances are used which measure exactly the same as would the regulation antenna and ground system. Experiments are conducted in this manner. Thus one is able to find out how different experiments work out without actually using the regulation system. When they are working in this manner they are using "phantom circuits."

to RADIO WORLD for Feb. 24 and March 3 for reflex circuits.

Is it possible to utilize a battery charger for filament current without using a storage battery? How will I connect it?—Harry Gilbourne, Yard Street, Freehold, N. J.

You cannot do what you mention. You would blow your tubes. A battery charger is not meant for that kind of work. It is designed for charging storage batteries alone, and cannot be used for anything else. The use of any rectifier feeding directly from alternating current would produce a very disagreeable hum in your tubes.

I am desirous of building a radio-receiving set that will enable me to clearly get long-distance stations. What is the most advisable circuit to use that will allow me to accomplish this?—Dr. B. Kahn, First National Bank Building, Winters, Texas.

We would advise the use of a reflex circuit for the purpose you name, with radio-frequency, detector and audio-frequency set as a second choice. Numerous circuits of both these types have appeared in back numbers of RADIO WORLD.

Origin of the SOS Call

By Jack Binns

WHAT do the letters SOS used by ships at sea as a distress call stand for? That is the question which I have been asked a thousand times, says Jack Binns in the New York *Tribune*. The answer to it is simple enough, but in view of the general aptitude to assign a catch phrase to any arbitrary group of letters, a simple answer will not suffice the average person. In this case the letters are associated with the cry "Save our souls!" so far as the public is concerned, while the call CQD, which it superseded, meant "Come quick, danger!" to the layman.

As a matter of cold fact, neither of these two phrases is correct. Unfortunately, it is the truth that both groups of letters were adopted as a matter of expediency and not because of their peculiar susceptibility to dramatic interpretation. The original CQD was arrived at by the ordinary process of evolution in the detail work of communication, while SOS was an arbitrary adoption of the first international radio telegraph convention.

The story of the distress call has never been adequately told, and in view of the large number of questions that have been raised on the point I am going to outline in this article the history of the famous calls.

When wireless telegraphy was first placed into commercial use the ordinary telegraph and cable systems had been in operation several years and had reached a high state of development. The operation of the latter systems was governed by an international convention which periodically laid down rules to meet necessary operating requirements.

Among these rules was a series of double letter symbols which were used by operators to facilitate the working of special circuits, and these symbols invariably incorporated the letter Q because it is one of the least used letters in the alphabet, and in the Continental code its dots and dashes are distinctive. In these various groups there was the signal CQ. This was used on telegraph lines where more than one station was on the line, and it meant that the operator sending the call wanted every station along the line to listen in to what he was about to say.

Now most of these operating symbols were adopted by Marconi's new company

when it began commercial operation at sea in the year 1902. The call CQ particularly adapted itself to wireless use, because any ship hearing the call would answer and thus establish communication with the ship making the call.

As the system gradually developed there were a number of minor emergency calls made, and it was quickly observed that the call CQ was not of sufficient distinction for emergency purposes. As a result of these experiences the following general order, known as "Circular No. 57," was issued by the Marconi company on January 7, 1904:

"It has been brought to our notice that the call 'CQ' (all stations), while being satisfactory for general purposes, does not sufficiently express the urgency required in a signal of distress.

"Therefore, on and after February 1, 1904, the call to be given by ships in distress or in any way requiring assistance, shall be 'CQD.'

"This signal must on no account be used except by order of the captain of the ship in distress, or other vessels or stations transmitting the signal on account of the ship in distress.

"All stations must recognize the urgency of this call and make every effort to establish satisfactory communication with the least possible delay.

"Any misuse of the call will result in instant dismissal of the person improperly employing it."

This is the exact wording of the famous general order as issued. The original is now framed, and exhibited as part of the important archives of the Marconi company. It was superseded in July, 1908, by the adoption of the call SOS as a distress signal by the International Radio-Telegraphic Convention, which sat in Berlin. As this convention was not completely ratified by all of the nations represented for at least a year, the call CQD remained in force sufficiently long enough to be used in the first major sea disaster where wireless played an important part.

The call SOS is purely arbitrary in its grouping of letters and was chosen because of the unusual combination of dots and dashes which make it distinctive above all other calls. It consists of three dots, space, three dashes, space and three more dots.

Do You Remember When—

A receiver consisted of a coherer and you used to hold your breath when it clicked?

You first made your tuning coil, laboriously winding a rolling pin with wire, connected it to a galena or carborundum detector, and then tuned for Navy, and boasted about it for a week?

You used to try and copy some of the crack operators in the Navy and you covered sixteen sheets with two letters, a word, and then finally a whole sentence?

You first heard a signal over another fellow's "audion?" And then for nights you used to lay awake and plan ways of making enough money to get one?

You used to copy Arlington press and weather and pride yourself on the fact that you never missed a word?

You got so used to hearing the weather report that you could tell what was coming and write it down before it was sent?

You blew out your first tube?

You went down to the Navy yard for your license? Gosh, but a radio officer can make you nervous!

The Farmer Informs the City Feller

A PARTY of city dwellers, returning from an automobile trip into the Adirondacks the evening of July 4 began to discuss the Shelby financial fiasco. It was after 8 o'clock and they were naturally curious about the outcome of the fight. Passing a farm house, one of the men in the party saw a radio antenna running from dwelling to barn and he suggested that they ask the farmer for the latest news on the fight.

The farmer was caught as he came in from the barn. He calmly heard their question as though it was the most natural thing in the world that he should be asked the outcome of a fight in Shelby, Montana.

"Dempsey won on points," the farmer laconically answered.

The radio story of the fight, broadcast by WGY at Schenectady, N. Y., gave the farmer the news as quickly as it arrived in the offices of great metropolitan newspapers.

MAGNAVOX
Radio Products



R2
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Radio
The
Reproducer
Supreme

The Utmost in Sound Amplification

Where the reproduction of broadcasted programs is desired in large volume, the Magnavox Reproducer R2 should be used.

Thanks to the Magnavox (electro-dynamic) principle of construction, this result is secured with minimum electrical energy.

Without Magnavox equipment, no Radio receiving set is complete.

Magnavox R3 Reproducer and 2 stage Power Amplifier . . . \$90.00

R2 Magnavox Reproducer with 18-inch curvex horn: the utmost in amplifying power; requires only .6 of an ampere for the field . . . \$60.00

R3 Magnavox Reproducer with 14-inch curvex horn: ideal for homes, offices, etc. . . \$35.00

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

AC-2-C, 2-stage, \$55.00

AC-3-C, 3-stage, \$75.00

Magnavox Radio products can be had of good dealers everywhere. Write for copy of our new booklet.

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Oakland, California
New York Office: 370 Seventh Avenue

THE RADIO BUSINESS IS GETTING INTO FINE SHAPE AS FORBES SAYS: "THE BEST STEEL IS THAT WHICH HAS UNDERGONE THE HARDEST POUNDING."

Radio Merchandising

Advertising Rates: Display, \$5.00 an inch, \$150.00 a page. Classified Quick-Action Advertising, 5 cents a word.

Telephone Bryant 4788

Radio Literature Wanted

Manufacturers of and dealers in radio apparatus and accessories are notified that literature and catalogues describing their products have been requested, through the Service Editor of RADIO WORLD, by the following:

Watford Slee, W714 Shannon Ave., Spokane, Wash.

Harry Dufout, 111 South Water St., East Port Chester, Ct.

John Rohlig, 119 Gladstone Ave., Windsor, Ontario, Canada. (In market for radio supplies).

Wm. Norman Kearney, 2918 North 6th St., Philadelphia, Pa. (Retailer. Makes up sets to order).

The Sterling-Miles Radio Co., 288 Judson St., Pontiac, Mich. (Retailers).

George Fisher, 129 States Ave., Atlantic City, N. J.

F. L. Bartlett, 944 Sherman St., Denver, Colo. (In market for radio equipment, especially high grade sets).

Walter Klyce, 1234 Lamar Blvd., Memphis, Tenn. (Wants to become a distributor of radio sets and parts).

Q S A Radio Club, care Michael L. Tortariello, 154 Ridge St., Newark, N. J.

E. B. Gray, Livingston, Tenn.

E. O. Drumgoole, Zachary, La. (Wants reliable radio parts).

J. A. Schmitt, 355 Wilkins St., Rochester, N. Y.

W. P. Harper, 360 Juan Manuel St., Guadaluajara, Mexico. (Retailer. In market for radio telephone transmitter equipment of 50 and 100 watts output).

Wm. A. Greer, Aledo, Ill. (Rebuilds and overhauls radio sets. Retailer parts).

W. Hall Moss, "Anything Electrical," Dayton, Tenn. (Dealer. Requests discounts.)

E. L. Harris, 2536 Harriet Ave., Minneapolis, Minn.

W. A. McKay, 5092A Easton Ave., St. Louis, Mo. (Wants No. 18 S. C. C. copper wire in small quantities.)

Thomas McNulty, 7249 Rhodes Ave., Chicago, Ill. (Requests dealers' discount.)

QST Radio Club, Daniel Crecca, Secretary, 38 Berkeley Ave., Newark, N. J.

G. B. Sherwood, 610 Third Ave., Johnsonburg, Pa.

Norman A. Krebs, 317 Cherry St., West Homestead, Pa.

Irvin F. Marutz, P. O. Box 57, Freelandville, Ind.

Hardy G. Meissner, Kerrville, Texas.

Doyle Frampton, Route 1, Tyman, Miss.

R. Burchard Lawrence, 507 South Main St., Taylor, Pa.

G. R. Warren, 1548 Seventeenth St., Santa Monica, Cal.

\$3,000,000 Radio Purchase

GIMBEL BROTHERS, of New York City, it was announced last week, have closed a deal with the Radio Corporation of America for the purchase of 20,000 Radiola R. C. receiving sets, manufactured by the Westinghouse Electric & Manufacturing Co., over 60,000 of which are now in use in the United States. The purchase price was not divulged, but it was reported that the value of the merchandise, at present nationally established list prices, is about \$3,000,000.

Station WOR Awards Prize to Dr. Gildersleeve

STATION WOR, owned and operated by L. Bamberger & Co., Newark, N. J., recently offered a prize for the photograph showing the best and most decorative arrangement of a radio receiving set in the home. Many amateurs entered the contest, some of them submitting three and four photographs. The prize, which is a hand-colored enlargement of the winning photograph, has been awarded to Dr. Donald M. Gildersleeve, 169 Prospect Park West, Brooklyn, N. Y., for the picture of his set used as an illustration on page 13 of RADIO WORLD for July 21, 1923.

A Fixed Crystal Detector

THE Grewol detector, distributed by the Randel Wireless Company, Newark, N. J., takes the crystal detector out of the group of adjusting instruments, which the fan has to learn to operate. It performs all the duties of a detector, but requires no more attention than a fixed condenser. The Grewol detector comes to the consumer already set and fixed so that the adjustment is vibration and jar-proof. At the factory the most sensitive spot on the crystal surface is found, and the cat-whisker is secured so as to stay exactly on this spot. A glass cover fits snugly to keep out moisture and dust. This detector on a set can be forgotten. The makers claim that it will continue always to be as sensitive as the day it was purchased because the adjustment cannot be "lost."

DeForest Company Again in the Courts

PAPERS were served on July 17 on the DeForest Radio Telephone and Telegraph Company, of Jersey City, N. J., in a suit brought by the Wholesale Radio Equipment Company of Newark, N. J. The plaintiff wants \$125,000 for breach of contract, alleging that on Oct. 6 last it signed a contract with the DeForest company by which the plaintiff company was to handle the defendant company's products for two years.

The DeForest company recently notified the Newark concern that the contract would be canceled on June 23. The plaintiff company had \$7,500 worth of the defendant company's products on hand, it said, the value of which was depreciated by the sale of the defendant company's products by the defendant company to other agents in the same territory at a lower price.

Radio Trade Notes

W. L. Armitage, 647 Yonge St., Toronto, Ontario, Canada, would like exclusive agencies for Canada.

* * *

Yale Radio Electric Co., 4816 South Vermont Ave., Los Angeles, Cal., offer aggressive representation for radio goods in their territory.

* * *

A. M. Connell, 564 Washington St., Boston, Mass., desires one line or several small lines of radio merchandise.

* * *

The Northwestern Electric Equipment Company, 174 East Sixth St., St. Paul, Minn., will hereafter confine their efforts to the wholesale distribution of electrical, radio and telephone supplies.

* * *

The Blue Ridge Electric Company, 709 National Bank Bldg., Charlottesville, Va., has been organized to act as manufacturers' agent for electrical appliances and supplies.

Every City Should Have Its Broadcasting Plant

SOME months ago there appeared in RADIO WORLD an article about the new broadcasting station to be built and operated by the City of New York. This article attracted a great deal of attention.

RADIO WORLD is now starting a campaign for the purpose of interesting the city fathers of all the good-sized American municipalities in a plan by which each city shall have a municipal broadcasting station of its own. In this way the message of radio will reach the homes of millions of Americans who are not now owners of radio sets, and in the near future should lead to millions of new sales of radio sets that would not otherwise be made.

RADIO WORLD is getting in touch with the city authorities in thousands of towns throughout the

country in the effort to make known its plan, which is a most comprehensive one and shows how it can be operated for the benefit of present local radio fans and fans-to-be.

By the way, a nominee of either party who would come out on a platform, one of the planks of which would be "Our city should have its own municipally operated broadcasting station," undoubtedly would be a popular candidate among local voters.

The more municipal broadcasting stations that are organized throughout the country on the order of New York City's broadcasting station, the better it will be for all owners, manufacturers, distributors, dealers, and the art, science and business of radio generally.

THE EDITOR.

Daily Newspapers Publishing Radio News and Programs

AS a part of its service to readers RADIO WORLD publishes herewith the names of daily newspapers which carry radio programs and radio news. Wherever possible the name of the radio editor of the paper is given. Additions to the list will be published as received.

Oakland Tribune, Oakland, California. Publishes radio programs. Radio editor, Seth T. Bailey. Operates Radio Club of the Oakland Tribune, Station KLX.

The Chicago Tribune, Chicago, Ill. Lists Chicago stations somewhat fully and gives the program hour of about 20 outside stations, making mention of "specials." Elmer Douglass, radio editor.

The Sun, Baltimore, Md. Carries radio programs in morning, evening and Sunday issues. Frank Chapman, radio editor.

Illinois State Journal, Springfield, Ill. Carries daily radio department, which includes the programs of broadcasters throughout the country. S. Leigh Call, editor.

The Birmingham News, Birmingham, Ala. Publishes daily programs of its local broadcasting station, WSY. Sunday department sketches programs for the coming week of large broadcasters. Jack Turner, radio editor.

The Boston Post, Boston, Mass., publishes very complete programs and devotes from one to two pages to radio daily and Sunday. Lewis S. Whitcomb, radio news editor. Prof. Henry Bayard Phillips, technical editor.

Waiting for the Stinger

HE was running a small hardware store in a newly developed district, and the wholesale dealers found him backward in payment of his accounts. They sent him letter after letter, all of them polite, but each more threatening than the last. Finally they sent their representative down to give him a sporting chance.

"Now," said the caller, "we must have a settlement. Why haven't you sent us anything? Are things going badly?"

"No, everything's going fine. My bankers will guarantee me all right."

"Then why haven't you paid up?"

"Well, you see, those threatening letters of yours were so well gotten up that I've been copying them and sending them out to some customers of mine who won't pay up, and I've collected nearly all outstanding debts. I was only holding back because I felt sure there must be a final letter, and I wanted to get the series complete."—Forbes Magazine.

Thanks for the Appreciation!

EDITOR, RADIO WORLD: I take this opportunity to express my gratification with such a high-grade radio publication as RADIO WORLD and for the good it is doing the radio business.

Very truly yours,

THOMAS McNULTY.

7249 Rhodes Ave.,
Chicago, Ill.

Are You Coming to New York?

ARE you an out-of-town radio dealer or manager of a radio department for one of the big stores? And are you coming to New York in the near future? If so communicate with us and, we believe, it will be to your advantage. Address Business Manager, RADIO WORLD, 1493 Broadway, New York City.

Western Union's Revenue for Past Six Months

THE Western Union Telegraph Company, for the first six months of 1923, reports gross revenue, including dividends and interest received, of \$56,097,327, comparing with \$50,603,181 in the same period last year. Total operating expenses, including charges for repair and reserves for depreciation, aggregated \$48,141,299 against \$43,856,579 in 1922, leaving a balance, after all expenses, of \$7,956,028 against \$6,746,602. After deduction of interest charges on bonded debt there remained net income available for the capital stock of \$6,802,603 against \$5,593,177 in 1922.

E. F. Gallatin, vice-president and controller in his statement, says that the expenses for the first half of 1923 include charges for accrued proportion of employees' income participation, whereas no corresponding charges were incurred for the same period of 1922.

Mr. Kullman Is a Great Radio Enthusiast

P. C. KULLMAN & CO., New York City, "the wireless brokerage house," is sending out the fifth of a series of circulars designed to "put radio on the map of the world." This latest piece of constructive propaganda has been mailed to officials in charge of wireless telegraphy and radio telephony in 112 foreign countries. It gives interesting information of radio development in the United States, including the following statistics:

UNITED STATES	
Trans-Oceanic Stations	12
Experimental Stations	292
Broadcasting Stations	591
Point-to-Point Commercial Stations	128
General Public Service Stations..	41
Aeroplane Stations	2
Technical Training School Stations	128
Amateur (Licensed) Stations....	18,357
Limited Public Point-to-Point Stations	40
Ship Stations (Estimated).....	3,000
Amateur (Unlicensed) Stations (Estimated)	3,500,000

New Radio and Electric Firms

Barnes & Corry Radio Co., 1502 Commerce St., Dallas, Tex.

Smith Porter Elec. & Radio Co., Pawnee, Oklahoma.

Brockaway Radio Corp., Geo. H. Stevens, 234 Temple St., Boston, Mass.

Federal Radio Co., 19th and Harney Streets, Omaha, Neb.

King Electric Co., 221 W. 2d St., Los Angeles, Cal.

Sterling Electric Co., Bedford and Centre Streets, Cumberland, Md.

J. F. Ambros Co., 1107 Fifth St., Miami Beach, Fla.

R. V. English Electrical Co., 226 Gold Street, Buffalo, N. Y.

Jones-Cornett Electric Co., Welch, W. Va. Lewis-Neal Electrical Co., Danville, N. Y.

West Side Electrical Co., 116 Charlestown Street, Charlestown, W. Va.

Fox Hardware Co., New York City, 200 shares preferred stock, \$100 each; 300 common, no par value, active capital \$21,500;

H. L. Rashbaum, I. J. Feldman, B. Weiner. (Attorney, B. Chess, 302 Broadway.)

Mu-tron Radio Corp., install radio; \$250,000; Geo. A. Blackford, Wheeling, W. Va.;

A. Tegarden, Martin's Ferry, Ohio; T. M. Darrah, Wheeling, W. Va. (Horace G. Eastburn, Wilmington, Del.)

Harlem Radio, \$5,000; H. C. Bernheim, M. Lovett. (Attorney, M. L. Gilman, 27 Cedar St., New York City.)

Associated Manufacturers Of Electrical Supplies Hold Annual Convention

THE annual convention of the Associated Manufacturers of Electrical Supplies was held at the Hotel Griswold in New London, Conn., recently, with a large membership in attendance.

This association is a representative of the engineers and executives of the leading electrical industries of the United States, an organization which in the versatility of its aims and objects as well as membership exceeds any of its kind in the country.

With the expansion of the radio industry, a section of the society was formed by radio manufacturers. The chief objects of the Radio Section are to further the simplification and standardization of radio apparatus, to develop among the radio manufacturers more efficient manufacturing processes, and to establish a centralized bureau for the dissemination of unbiased radio information, whether news or technical, for universal press consumption.

Up to the time of the present convention, which marks the second year of the establishment of the Radio Section, radio representatives have acquired a wealth of knowledge on all phases of their activities by virtue of the contact between radio manufacturers and electrical manufacturers. That the presentation of papers before the various meetings of the association by those engaged in electrical manufacturing, has materially enhanced the working knowledge of the radio producers, is indicated by the measures adopted by the latter at the recent convention. These measures, when carried by the radio membership, will make for simplicity in design and operation of radio equipment of every description and the standardization of complete sets and parts.

The Committee on Publicity has adopted measures which set a definite policy with respect to future shows and exhibits, these measures to be helpful to the radio memberships of the association. Recommendations were made for the establishment of a centralized office from which newspapers, radio magazines and others interested might apply for information on radio subjects.

During this convention the following officers for the Radio Section of A. M. E. S. were elected to serve during the period of June, 1923, to June, 1924: Chairman, E. B. Mallory, Westinghouse Electric & Mfg. Co.; Eastern Vice-Chairman, D. R. Murdock, William J. Murdock Co.; Western Vice-Chairman, C. E. Hammond, Signal Electric & Mfg. Co.; Secretary, Quinton Adams, Radio Corporation of America; Treasurer, George E. Eltz, Jr., Manhattan Electric Supply Co.

General Electric Handling Tremendous Business

ORDERS received by the General Electric Company for the six months ending June 30 totaled \$164,263,755, compared with \$114,219,248 for the corresponding period of 1922, or an increase of 44 per cent., according to a statement made public last week by President Gerard Swope. For the first quarter the orders totaled \$84,249,710, as compared with \$62,883,948, or an increase of 34 per cent.

D. X. FANS

Send your name with type of set for details regarding the RaDioXor—the sensation of 1923.

WILLART SALES CO.

110 West 40th St. New York City



Sell Shirts

Sell Madison "Better-Made" Shirts, Pajamas, and Nightshirts direct from our factory to wearer. Nationally advertised. Easy to sell. Exclusive patterns. Exceptional values. No experience or capital required. Large steady income assured. Entirely new proposition. **WRITE FOR FREE SAMPLES.** MADISON SHIRT CO., 503 B'way, N.Y. City



ON APPROVAL FOR 30¢
ZOBEL-STEIN LABORATORIES
322 9TH ST. BROOKLYN, N.Y. SOUTH 2650

WD-11 and WD-12 TUBES REPAIRED

WD-11 or WD-12	\$2.50
C-300 or UV-200	2.75
C-301 or UV-201	3.00
C-302 or UV-202	3.50
C-301A or UV-201A	3.50
Moorehead Detectors	2.75
Moorehead Amplifiers	3.00
DV-6 or DV-6A	3.00
Also the new UV-199	3.50

All tubes guaranteed to work like new.
Mail Orders Given Prompt Attention
"24 Hour Service"

NEW DX 1½ VOLT TUBES \$4.00

RADIO TUBE CORP.

55 Halsey Street Newark, N. J.
TUBES SENT PARCEL POST, C. O. D.

Explaining Aerial Discharges on Steamer

Editor, RADIO WORLD: In reference to the query from E. M. Pace, of 807 Cherry Street, Vicksburg, Miss., in the June 23d issue of RADIO WORLD, I would like to advance the following theory which may possibly explain the electrical discharges from his aerial on the Mississippi steamer.

Though it is not possible accurately to state the cause without observing conditions as they existed, I would offer the explanation that the discharges from his aerial were due to negative charges being carried away through small particles of matter which came in contact with it. These particles might be dust, carbon (in the smoke) or water from steam. The latter would tend to explain the excessive discharges when the boat whistled, since the whistle would probably be equivalent to turning loose at boiler pressure a good-sized pipe of steam.

It is a well known fact that an insulated conductor will have a charge of approximately 60 volts for every meter that it is distant from the earth, provided the negative charge can be carried off. This may be accomplished experimentally by suspending an insulated metallic vessel in the air and allowing water to drop slowly from it.

If a condenser was used in series with the lead-in, this charge would be stored till the air gaps between plates could be broken down.

The fact that this phenomenon was not present at night may have been due to dampness in the air allowing the charge to leak off as it was formed, or the fact that the smoke or steam did not pass the aerial due to change in direction of the wind or the boat. The starting up of the boat's generator at night also may have had considerable effect on neutralizing the removal of negative charges from the aerial, as suggested by Mr. Pace. It is entirely possible that the generator may

have had the negative lead grounded, either intentionally or accidentally. This ground would extend to the stack or steam piping, thus giving the small particles an initial charge, so that further charges could not be carried away from the suspended wires; or if other suspended matter were responsible for removal of charges, enough charges of opposite sign would be added to neutralize the effect. This principle has recently been demonstrated by Prof. Bancroft, of Cornell University, in his experiments for dispersing clouds by use of charged particles of sand. These unite with oppositely charged particles of water and fall as rain.

In the opinion of the writer this method of producing a charge on an insulated conductor is responsible for a goodly portion of the so-called "static" which is far less noticeable when a loop aerial is in use that is not subject to this effect. I believe it might lead to interesting results if the Bureau of Standards or other capable organization would make some tests along these lines with the object of reducing static by use of initial charges on the antenna.

This condition, I believe, could be relieved, to some extent at least, by using either the condenser shunted around the primary tuning coil instead of in series; or, better still, by using a tuning arrangement in the aerial circuit which would not require a condenser. These arrangements would leave the aerial practically grounded and thus carry off charges as they were formed, though possibly with the accompaniment of considerable "static."

Another preventative would probably be the relocation of the aerial so that no smoke or steam would pass it; though it is possible that there might be enough suspended particles in the air to still give the effect.

Hoping this discussion will help a fellow-reader of the RADIO WORLD as many others have aided me, I am,

Very truly yours,

J. FRANK NAUGLE.

251 Maple Street,
Brooklyn, New York.

The Small Boy Chooses Radio

WHEN a small boy is confronted by the problem of choosing between a radio concert and studying for examinations, the radio generally wins—that is, if mother and father are not near to influence the choice.

A ten-year-old Philadelphia youngster, writing WGY at "Skednety," N. Y.—Schenectady was a little bit too much for him—took advantage of his mother's absence and scribbled a note to WGY as follows:

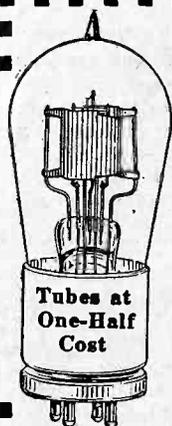
"I was one of your many radio fans of Tuesday night, June 18, 1923. I wish you to accept a thousand compliments from me. I am only a boy ten years old and a radio fan. I have built a set with a peanut tube. My mother says I pay more attention to it than to my studies and this letter looks it. I was listening Tuesday night to WFI in my own city and all of a sudden I heard in a stearn loud voice 'this is station WGY, the next number is—' I blotted out WFI intirly. You had some power. Oh boy!"

"Verry cincerely Yours."

(Name withheld for reasons shown in postscript.)

"P. S.—My mother is out I guess it looks it. Please excuse this as I haf to get it out to you before she sees it. She will tare it up and say 'Get to your studies young man,' as my examanations are going on."

Evidently mother came in before the young Philadelphian could get a stamp for his letter. In the upper right hand corner, generally decorated by a postage stamp, he had written, "Collect on the other end please."



IT HAS HAPPENED TO ALL OF YOU IN A FRACTION OF A SECOND!

WHEN the filament burns out, at least \$5.00 goes with it to put the set in operation again.

WHY not save nearly one-half the cost of a new tube by sending us your burned out or broken tube to be repaired?

WE REPAIR EVERY TYPE OF tungsten wire filament receiving tube. All our tubes are TESTED and GUARANTEED to function as well as when new.

All tubes returned P. P., C. O. D.

HARVARD RADIO LABORATORIES
BOSTON P. O. BOX 1781 MASS.

RADIO FANS

Do you want to sell your old set?
Do you want to exchange anything for something?
Do you want to buy something?

If so, why don't you use the Classified Department of Radio World? You can get fine results for five cents a word, minimum ten words. Your message will reach thousands including other fans, dealers, etc., etc.

Try Radio World's Classified Department
for your personal radio and other needs.

RADIO WORLD, 1493 Broadway, New York City

Future of Radio on the Pacific Coast

IN any business, as in radio, certain portions of the United States respond more readily, buy more freely than others. This is chiefly an economic condition. Respecting this declaration it might be truthfully stated that the Pacific Coast is the "bright spot" in the radio business to-day.

Radio manufacturers and wholesalers say there are two chief reasons for this—the climate lends itself to easy reception of broadcast matter and secondly, the excellence of the broadcast programs.

Human nature, in most cases, leans towards laziness; it is only natural that they should seek luxury. If the climate on the Pacific Coast permits facile reception and does away with tedious "tuning in" the public is certainly more interested in doing something where they can easily obtain a result. Hundreds and thousands of dollars have been spent by private enterprise in the perfection of broadcasting apparatus and the securing of artistic entertainment, with the direct result that the public is eager to "listen in," knowing full well they will hear something worth while.

It is logical to conclude that with the varied programs, large number of Class B stations, a suitable climate to enable easy operation of radio sets, a greater proportion of the western Pacific public would be inclined to experiment along radio lines.

Numerous opinions and analyses have been printed on the economic trend of radio business. In the last analysis it is merely a repetition of what has happened in many other businesses. With the country-wide interest aroused in radio, manufacturers went wild, produced sets and supplies not for the purpose of improvement or quality, but to supply the demand. In 1922 the Pacific Coast market was flooded with "junk" and it has taken six months to liquidate these goods. Prices were smashed. Competition was keen. Hundreds of inexperienced men, who had entered the radio business with no knowledge of what they were selling, went to the wall, sold out and quit. Radio then began to stabilize itself.

We all know the story. New prices—better apparatus—a continual striving for long distance reception—new inventions and a hundred and one other issues. The Pacific Coast was hit hard and took longer to recover because radio had instituted itself very strongly into the daily life of the western public.

It is a proven fact that radio is here to stay and its future on the Pacific Coast is dependent upon the prices of eastern manufactured goods and the merchandising service rendered. If the western public can get their goods when they want them and at a price to suit their pocket-books, they will buy.

Advertising has played a great part in the development of radio business on the Pacific Coast. Month after month national radio periodicals have placed their columns before our buying public, showing every conceivable make and style of suitable apparatus and the public have bought. Sometimes they have been satisfied, sometimes not, and it still remains true that the greater part of developed business in the west has been due to systematic advertising in local and national periodicals as well as the efforts of the local representatives.

The Pacific Advertising Agency has for the past year, centered a large part of its energy in the placing of radio advertising copy. They saw in that field an opening to develop sensible advertising. It has been their endeavor to "prick the bubble" of sensationalism, do away with vague and misleading copy and advertise

radio goods for their actual worth. Pacific Coast manufacturers have backed them up in their effort, realizing that the ultimate success of their business either in the West or the East, was partially dependent upon a true portrayal of their product's worth.

Maintenance of a policy of conservatism will increase the confidence and trust of a sadly misled public and make for bigger strides in the future of radio.

Perhaps the most potent factor from an advertising manufacturer's viewpoint, is the value of keeping his name before the public. Competition is too keen on the Pacific Coast to trust to the individual sale as an advertiser. The public is confused. The buying field is large. The buyer must choose. And what does he buy? Generally a well advertised product that has proven its worth and practicability, for the Pacific Coastean is well known as a skeptic. It is only the truth which will bring the radio public to a greater confidence in the radio wholesaler and retailer.

General Electric's Wonderful Increase in Sales

THE annual sales of the General Electric Company increased from about \$12,000,000 to \$243,000,000 in the thirty years between January 1, 1893, and January 1, 1923, according to a statement issued by the company.

The outstanding capital stock increased from \$35,000,000 to \$184,000,000, and the value of its manufacturing plants from \$4,000,000 to \$167,000,000. The number of employees grew from 4,000 to more than 74,000.

The statement was issued as a review of the corporation's accomplishments under the leadership of Charles A. Coffin, who is retiring as chairman of the board after thirty years of continuous service. Tribute is paid also to the accomplishments of E. W. Rice, Jr., former president of the corporation, and to its corps of engineers, including Professor Elihu Thomson and Dr. Charles P. Steinmetz.

Mention is made of Thomas A. Edison, who gave the world the first central plant in which to generate electricity for public lighting.

Fifty-two issues for \$6.00. Subscription Department, RADIO WORLD, 1493 Broadway, New York City.

YOU SAVE 50% OF THE USUAL COST



2 VOLT STORAGE BATTERY for WD11—WD12 \$5.00
 6 Volt, 80 Amps. \$10.00
 6 Volt, 80 Amps. 12.50

World Radio Batteries
 Are Guaranteed 2 Years in Writing
 Will ship C. O. D. subject to inspection or allow 5% discount for cash with order. Order shipped same day received. **WRITE TODAY.**

World Battery Co.
 Dept. 17
 1219 So. Wabash Ave. Chicago, Ill.

8 Volt, 100 Amps. \$14.50
 6 Volt, 120 Amps. 16.00

WE REPAIR

WD-11, \$3.50

AND POSTAGE

Also other vacuum tubes, excepting VT-1 and VT-2.

Mail orders solicited and promptly attended to.

H. & H. RADIO CO.
 514 Clinton Avenue Newark, N. J.

That Dependable Coupler



Necessary for your radio set. Made of best materials and tested before leaving factory.

Price anywhere in the U. S. **\$5.00**

Dealers, Investigate!

COAST COUPLER CO.
 245 E. 7th Street Long Beach, Cal.

"RADIO TUBES REPAIRED"
 Work Guaranteed

W. D. 11 and 12 **\$3.25**
 U. V. 201 A

SIX VOLT TUBES
 DETECTORS \$2.75
 AMPLIFIERS \$3.00

Radio Tube Laboratories
 776 Broad Street Newark, N. J.

WOULD YOU LIKE TO RECEIVE RADIO ADVERTISING MATTER?
 Are you in the market for radio goods of any kind, either as a consumer, a distributor or a retailer? If so, send us your name and address on a post card and we will see that your name reaches the right people so that you will receive pamphlets, circulars, etc., regarding the goods you want.

ADDRESS SERVICE EDITOR, RADIO WORLD, 1493 BROADWAY, NEW YORK CITY

FILL OUT AND MAIL NOW

SUBSCRIPTION BLANK

RADIO WORLD

RADIO WORLD 1493 Broadway, New York City

Please send me RADIO WORLD for months, for which please find enclosed \$.....

SUBSCRIPTION RATES:

Single Copy	\$.15
Three Months	1.50
Six Months	3.00
One Year, 52 Issues	6.00
Add \$1.00 a Year to Foreign Postage; 50c for Canadian Postage.	

Cyclone



WORLD'S BEST

"A" and "B" BATTERIES specially built for your Radio Set in all types.

Highest quality GUARANTEED for DISTANCE, CLEARNESS, and LONG LIFE.

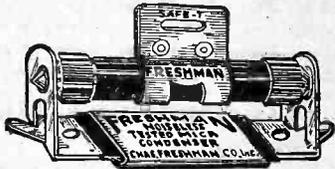
Standard Electric Novelty Co.

NEW YORK CITY

Best proposition for Jobbers and Dealers. Some territory still available for New Distributors. Write for details at once.

Freshman FIX-O

A Fixed Resistance Leak Combination—4 in ONE



Freshman Condenser Leak Mounting
Freshman Fixed Leak
SAFE-T HANDLE

Price Complete
65c

Furnished in any value of resistance from 1/2 to 10 Megohms

Separate Condenser and Mountings 40c
Separate Leaks with Safe-T Handle 30c

At your dealers. Otherwise send purchase price and you will be supplied without further charge.

Chas. Freshman Co. Inc.
Radio Condenser Products
166 SEVENTH AVENUE NEW YORK

Broadcasting Forecast in "Looking Backward"

Do you remember the interest created in 1887 by the book "Looking Backward," written by Edward Bellamy? He was classed as a new Jules Verne, but many people hooted derisively at some of the prophecies in his story. If you are too young to have read Bellamy's book ask your parents or grandparents if they remember the passages quoted below. They certainly read like an inspired forecast of present-day radio broadcasting:

"Come, then, into the music room," she said; and I followed her into an apartment finished without hangings, in wood, with a floor of polished wood. I was prepared for new devices in musical instruments, but I saw nothing in the room which, by any stretch of the imagination, could be conceived as such. It was evident that my puzzled appearance was affording intense amusement to Edith.

"Please look at today's music," she said, handing me a card, "and tell me what you would prefer. It is now five o'clock, you will remember."

The card bore the date of September 2, 2000, and contained the longest program of music I had ever seen. It was as various as it was long, including a most extraordinary range of vocal and instrumental solos, duets, quartets and various orchestral combinations.

I observed that this prodigious program was an all-day one, divided into twenty-four sections, answering to the hours. There were but a few pieces of music in the 5 p. m. section, and I indicated an organ piece as my preference.

She made me sit down comfortably, and, crossing the room as far as I could see, merely touched one or two screws, and at once the room was filled with music of grand organ anthem.

"Grand!" I cried as the last great wave of sound broke and ebbed away into silence.

"Wait a moment, please," said Edith. "I want to have you listen to this waltz before you ask any questions." And as she spoke the sound of violins filled the room with the witchery of a summer night. When this had ceased she said: "There is nothing in the least mysterious about the music, as you seem to imagine. It is not fairies, or genii, but by good, honest and exceedingly clever

human hands. There are a number of music rooms in the city perfectly adapted acoustically to the different sorts of music connected with all the houses of the city whose people care to pay the small fee.

"There are on that card for today, as you will see, district programs of four of these concerts which can be heard by merely pressing the button.

"The programs are so co-ordinated that the pieces at any one time simultaneously proceeding in the different halls offer a choice not only between instruments and vocal, and between different sorts of instruments, but also between different motives from grave to gay, so that all tastes and moods can be suited."

Zion Broadcasting Station WCBD

STATION WCBD, owned and operated by Wilbur Glenn Voliva, is located at Zion, Ill., on Lake Michigan, midway between Chicago and Milwaukee. The station slogan is, "Where God Rules Man Prospers." J. H. Depew, manager, writes to RADIO WORLD as follows:

"We have been requested by various listeners to our station and programs to furnish your magazine with our schedule and call letters.

"I am enclosing schedule, and you will note that we broadcast on 345 meters, or under the new arrangement of 870 kilocycles frequency, and that our call letters are WCBD.

"This is a standard Western Electric equipment with 'T' type aerial, and 150-foot towers, standing at an elevation of 234 feet above Lake Michigan. At present we are using two oscillating tubes of 250 watts each and two tubes of modulation.

"This station, complete, cost about \$40,000, and is said to be one of the best equipped in the country.

"A cordial invitation is extended by the management to the editor and any one associated with your valued magazine to pay us a visit at any time you are passing this way.

"Station WCBD is located in plain view of Sheridan Road in the city of Zion, and is open to receive visitors every week-day."

The schedule sent by Mr. Depew reads:

EVERY LORD'S DAY (SUNDAY)
Zion Orchestra, from 9:00 a. m. to 9:45 a. m.

Principal Service of the Entire Week, from 2:30 p. m. to 5:30 p. m.

Special Music by Zion Band, Organ (one of the largest in the world), and Zion White-Robed Choir.

Address by Wilbur Glenn Voliva, General Overseer of the Christian Catholic Apostolic Church in Zion.

EVERY MONDAY

Concert, beginning at 8:00 p. m.

EVERY WEDNESDAY AND FRIDAY

From 2:30 p. m. to 3:45 p. m.

Sacred solos and duets, and an address either by Wilbur Glenn Voliva, General Overseer of the Christian Catholic Apostolic Church in Zion, or one of his representatives.

EVERY FRIDAY

Concert, beginning at 8:00 p. m.

All broadcasting is done on local daylight saving time.

This schedule effective until October 1, 1923.

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

Preparing for the New School Term

Radio World wants a representative in every grammar, high and preparatory school in the United States and Canada.

We have a special proposition that will enable representatives to make money. Appointments made now. Give name of school you will attend in the Fall.

Address Circulation Dept., RADIO WORLD, 1493 Broadway, New York City.

SPECIAL VACATION SUBSCRIPTION OFFER (FOR NEW SUBSCRIBERS ONLY)

In order to materially increase our subscription list we are offering for a limited time a special subscription of seven issues of Radio World for \$1.00. You may begin your subscription now, or have us start sending the first issue on this subscription offer when you go out of town.

CUT OUT THIS TODAY SO THAT YOU WILL NOT FORGET ABOUT IT

Radio World's Special Summer Subscription Offer

Radio World, 1493 Broadway,
New York City

Enclosed find \$1.00, for which send me Radio World for seven issues, beginning with your number dated.....

SUBSCRIPTION RATES

Single Copy.....\$.15
One Year (52 numbers).....6.00
Six Months.....3.00
Three Months.....1.50
Add \$1.00 a year for foreign postage.
50 cents extra yearly to Canada.

Name.....
Address.....
City and State.....

LATEST BROADCASTING MAP IN COLORS FREE to RADIO WORLD SUBSCRIBERS

The latest radio broadcasting map of the United States and Canada, containing all the new allocations and changes, is offered *free* to subscribers for Radio World who send in their subscriptions within the coming four weeks. This map is printed on fine map paper stock and has just the information you want regarding broadcasting stations throughout the continent, including army and navy stations.

If you are already a subscriber you can get this map by renewing your present subscription now.

Send direct to this office or you may subscribe thru your newsdealer who can send your subscription direct to us.

Use the coupon attached.

RADIO WORLD FREE MAP SUBSCRIPTION BLANK

Radio World,
1493 Broadway, New York.

For the accompanying \$3.00 please send me Radio World for six months (26 numbers) beginning with issue datedand also, without any expense to me whatsoever, the latest radio map as advertised.

Name

Address

City and State.....

If you wish two maps, one for yourself and one for a friend, send \$6.00 for a yearly subscription and the two maps will be sent to different addresses if you wish.

Heard Over the Radio Counter PART XXI.

W HEW, gosh all fishhooks, but it sure is warm! Are you too warm to give me a little information?"

"You're right, it's warm, but as for the information, if I can give it, why summer or winter does not matter."

"Well, I had my set out in camp last week, and it was working fine and dandy, until that terrible rain storm. I think it must have gotten wet, but I don't see how it could, as I had it sitting on a box; ever since, I can't seem to get it working right. Probably you can give me some idea of why it doesn't function since then."

"Wow, man, you sure are a bear at asking questions, but tell me where were your batteries?"

"Oh, I had my filament battery in the cabinet, but I left the B battery down on the ground. It got soaked, but I laid it in the sun and it dried out all right. I just bought it before I left, and it looks O. K."

"There is your trouble, old man. It is a funny thing, but I had another camper in here this morning who told me the same thing, only he had his set in a car, and the batteries got soaked. I think if you get another battery you will find that your trouble was right there."

"O. K. You had better give me one right away. Say, what is that funny looking thing there?"

"Why, a new loud speaker that is very good. Would you like to hear it?"

"I don't mind if I do, I have to get one sometime, so I had better start looking around now and get some idea of what they are."

"Will you step over here? I'll show you how it works on a detector and one step."

"Why, that sounds real clear. Who is that?"

"It must be WJAO, because they were on about ten minutes ago."

"What is the price of that?"

"That sells for \$6.00, with six feet of green cord and a plug to connect it with. Say, listen to that violin! Sounds natural, doesn't it?"

"Well, if I didn't know that it was coming from that funny looking thing I would think that he was right here. Better pack that one up for me. I don't think I can go wrong, and I don't want to make the mistake I did before. I waited for tubes to come down, and they went skyrocketing up instead, so think I will take it now."

"Perfectly all right with me. Just one moment, and I will have it wrapped up for you."

"Here you are. That is the correct change, so I won't wait for a slip. Here, take a smoke on me. Well, guess I will trot along, and get it working."

"Good day, sir. Drop in anytime I can help you along."

"Thanks, I will. Good-bye."

Ideal Control For All Tubes Especially U.V. 199's

and all dry cell tubes, permits accurate and superfine adjustment necessary at critical operating point. Utilizes great tuning possibilities of vacuum tube itself.



200

at

Dealers

Everywhere

GUARANTEED

The FIL-KO-STAT is to all purposes "fool proof." Each instrument is packed with the maker's guarantee that it will be replaced if broken within one year.

The filament control of infinite adjustment

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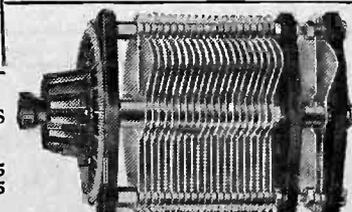


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EVERY RADIO FAN should have these two books, "101 Receiving Circuits" and "Six Successful Receiving Sets." By M. B. Sleeper. They are the most up-to-date radio books for the fan who likes to make his own, and will help you out and save you many times their cost. Both books are full of illustrations. Price, 50c. each, with 10c. extra for postage, or both for \$1.00 sent postpaid. COLUMBIA PRINT, 1493 Broadway, New York City.

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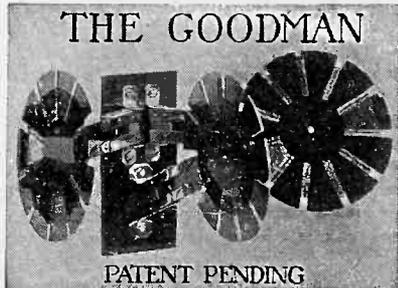
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**Protection of Trade-Marks in
Latin-America**

THE Inter-American High Commission
has issued a detailed explanation of the
convention adopted at the recent Santiago
Congress to harmonize American and
Latin-American laws affecting trade-mark
and patent protection.

There is a fundamental difference, it is
explained, between the trade-mark laws of
the United States and those of Latin
America in that right of protection to a
trade-mark is obtained in the United States
through use, while in Latin America such
protection is obtained through registration.

"The provision which covers this essential
difference in the national practices is espe-
cially important for the American trade-
mark owners," says the statement, "and it
is believed that, giving them full protection,
it does not violate in any way the laws of
the Latin-American countries. The main
principle which has inspired the convention
is the principle of protecting rights legiti-
mately acquired."

One article of the convention provides that
"all differences between the contracting
states relative to the interpretation or
execution of this-convention shall be decided
by arbitration."

Tore It to Scraps

ONE of our readers writes to tell us this:
Last week the local broadcast station
made the following announcement: "Miss
Xantippe will now render that famous
ballad entitled 'Kiss Me Again.'" Believe
me, fellows, she didn't rend it—she posi-
tively ripped it to shreds!



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Until Only
August 20, 1923

Take Radio Camping With You

By *Velma Carson*

WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY.

IT takes one more paddle to go canoeing nowadays than it used to. Besides the one for propelling the boat, there must be a paddle for catching concerts.

And besides a girl, some cushions, a camera, and a lunch basket, the young man takes along a small radio receiving set. They come now in small boxes with a handle and are as easy to carry as any of the aforementioned prerequisites to the successful canoe trip.

He puts the set between himself and the girl in the bottom of the boat, places the extra paddle perpendicularly against the back of the seat and has her lean on it to hold it secure. Then he attaches one wire to the upright end of it for an aerial and trails the other wire in the water to ground his circuit. They put on the headphones. He tunes in to the nearest station and paddles off to the shadiest nook he can find.

Imagine this canoe on a moonlight night away off down the river and an unseen orchestra playing "Melody of Love"!

If there is any time in the world that a person is in the mood for good music it is at the end of a long, thrilling day exploring in the woods or doing any of the relaxing things that are a part of camp life.

Even the rattley-bang piano player with a one-sided repertoire, or the banjo picker who knows eight old songs, or the sixteen-year-old with a thin voice and ukulele have always been welcome in a summer camp. Well, if the man who can improvise on a mouth organ has had his share of appreciation out in the woods, the radio, with its diverse programs, is sure to be listed right along with the iron skillet when the question comes up concerning camping paraphernalia.

The business man who wants to hide himself from business annoyances, the telephone, newspapers, and other people, can still get the news of the day and satisfy his curiosity about the baseball scores.

If mother does not care about too much strenuous hiking and swimming, she can be sure of having entertainment while she rests in camp. The children can be kept occupied at the awful hour of bedtime, and the young people can have dance music without the trouble of importing a victrola or a piano. Besides, if one is to go into wilds sufficiently wild these cumbersome instruments are practically impossible.

One group of Camp Fire Girls learned the joy of doing interpretive dancing in their bare feet on grassy slopes near their camp in the North Woods by radio last summer. They also studied the art of telling stories from the Dreamtime Lady.

It is no small help in any camp to get the weather report and river conditions.

"Humoresque" goes beautifully with bacon and eggs or trout and flapjacks, and does not detract in the least from the chirp of crickets.

Fans, Watch Your Step

NOW that no broadcaster from the United States reaches Porto Rico we wonder what will our friends do for a list of stations heard. A little imagination and a good radio call book can accomplish wonders. Be careful how you connect that ½-kw. "coffin" to the S. P. D. T. switch. The boys at the university must have made a mistake.—*Porto Rico Radio News.*

Get Them While They Last!

Useful Technical Articles Published in 1922 Issues of RADIO WORLD

See prices at end of this page

APRIL 1.

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

APRIL 8.

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

APRIL 15.

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

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Valuable Pointers on Aerial Construction, by Edward Linwood.
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MAY 6.

The Advantages of Radio Frequency, by Harold S. Potter.
How to Construct, Protect and Operate a Storage Battery, by George W. May.
The Beginner's Catechism, by Edward Linwood.
Tuning and What Is Meant by It, by Fred. Chas. Ehlert.
New Frequency Amplifier Brings Faintest Waves in Strong, by G. W. May.

MAY 13.

My Practical V. T. Detector and Two-Stage Amplifier, by Frederick J. Rumford.
The Principles of Radiotelegraphy, by Walter J. Howell.
The Reason for the Loop Aerial, by George W. May.
Tuning and What Is Meant by It, by E. L. Bragdon.
The Beginner's Catechism, by Edward Linwood.

MAY 27.

The Beginner's Catechism, by Edward Linwood.
How to Make Your Own Condenser, by George W. May.
Tuning as Applied to Telegraphy, by Walter J. Howell.
Why the Condenser Doesn't Condense, by E. L. Bragdon.
Making Signals Louder with Two-Stage Amplifier, by George W. May.

JUNE 3.

The Cost of a Single-Circuit Receiver, by Howell W. Miller.
The Beginner's Catechism, by Edward Linwood.
How to Compute and Build a Fixed Condenser, by E. L. Bragdon.
Design for an Amateur's Receiving Set, by O. C. White.
Simple Method of Recharging a Storage Battery, by John Grayson.

JUNE 10.

Radio Receiver for Short Waves, by George W. May.
How to Filter Atmospheric Conditions, by C. White.
The Messenger Boys of Broadcasting, by E. L. Bragdon.
Are You a Member of the N. O. D. C.? by E. L. Bragdon.
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How to Construct One- and Two-Slide Tuning Coils, by George W. May.

JUNE 17.

The Vacuum Bulb's Start in Life, by C. White.
How to Select the Right Set, by E. L. Bragdon.
The Beginner's Catechism, by Edward Linwood.
Test of Inductance Coils, by Fred. Chas. Ehlert.
Short Waves from a Simple Receiver, by Stanley Bryant.

JULY 1.

Novel Unit-Detector and Amplifier, by Frederick J. Rumford.
Why You Must Use a Condenser, by C. J. Williams.
How Wave Lengths Travel, by Fred. Chas. Ehlert.
Radio World's Revised Dictionary, by Fred. Chas. Ehlert.
The Beginner's Catechism, by Edward Linwood.
Use of the Vacuum Tube Detector, by George W. May.

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Radio's Place in the Phenomena of Nature, by E. L. Bragdon.
The Function of the Loose Coupler, by Charles H. Plath.
Armstrong's Superregenerative Amplifier Fully Explained, by John Kent.
Operating a Transatlantic Station, by Fred. Chas. Ehlert.
The Beginner's Catechism, by Edward Linwood.
Reducing Strays and Static, by Fred. Chas. Ehlert.

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Assembling a Detector and Two-Stage Amplifier, by H. S. Stanford.
Combined Radio and Audio Frequency Amplification, by C. White.
The Beginner's Catechism, by Edward Linwood.
Locating Your Aerial, by Harold Day.
Facts for Beginners, by Fred. Chas. Ehlert.

JULY 22.

When Your "Movies" Come by Radio, by Stanley Bryant.
Underlying Principles of the Vacuum Tube, by George W. May.
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Revised Radio Dictionary, by Fred. Chas. Ehlert.
The Beginner's Catechism, by Edward Linwood.
Importance of Aerials to Radiation, by C. White.

JULY 29.

The Vacuum Tube as a Transmitter, by Charles H. Plath.
My 20-Kilowatt Tube and its Uses, by Irving Langmuir.
Importance of the Capacity Switch, by E. L. Bragdon.
The Truth about Lamp-Socket Aerials, by Harold R. Hart.

AUGUST 12.

The Work of the Audio-frequency Transformer, by George W. May.
Practical Measurements of Capacity and Inductance, by W. A. Dickson.
Experimenting with Armstrong Circuit Produces Unusual Hook-up, by Dr. O. S. Kelly.
How to Secure Perfect Regeneration, by Fred. Chas. Ehlert.

AUGUST 19.

How to Build a Portable Field Buzzer, 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.
The Use of Capacity in a Circuit, by George W. May.
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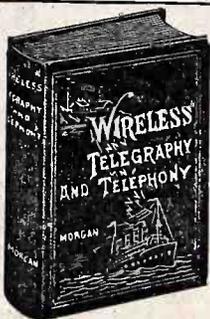
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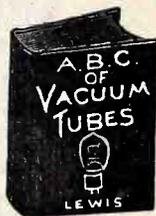
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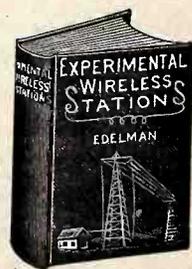


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