July 17, 1928. 1,677,589

J. H. HALLBERG

RADIO APPARATUS

Filed Nov. 18, 1922

Fig. 1.

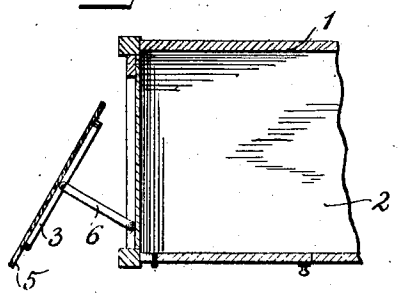


Fig. 3.

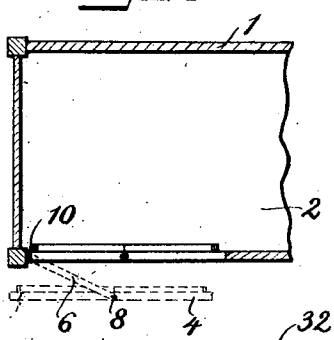


Fig. 2.

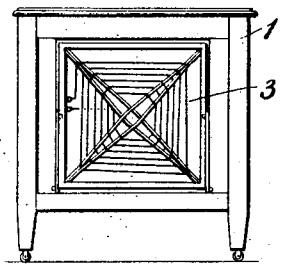
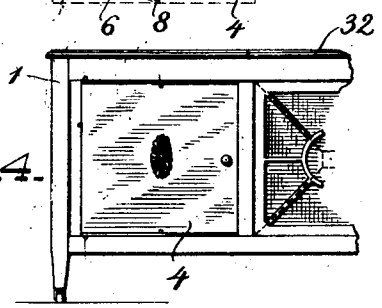


Fig. 4.



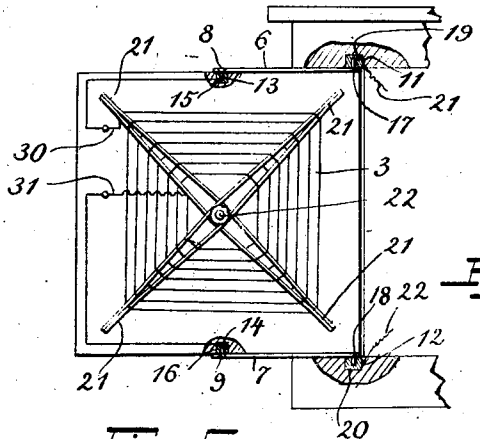


Fig. 5.

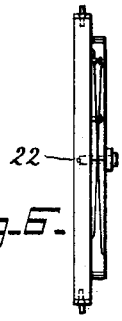


Fig. 6.

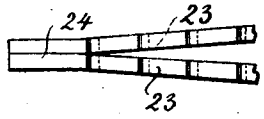


Fig. 7.

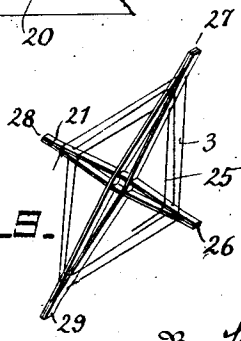


Fig. 9.

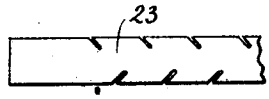


Fig. 8.

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By his Attorney Geo. H. Benjamin

Patented July 17, 1928. 1,677,589

UNITED STATES PATENT OFFICE.

JOSEF HENRIK HALLBERG, OF NEW YORK, N. Y.

RADIO APPARATUS.

Application filed November 18, 1922. Serial No. 601,796.

My invention relates to improvements in radio transmitting and receiving apparatus. The object of my invention is to provide means whereby radio messages can be transmitted and received clearly without extraneous noises and where the same can be amplified, so they can be clearly heard with or without the use of the ordinary head-piece telephone receiver.

My invention also does away with the necessity of using an exterior antenna.

Further objects and advantages of my invention will be brought out hereinafter.

Referring to the drawings:

Fig. 1 is a top view in section of one end of my cabinet.

Fig. 2 is an end view of my cabinet, looking at Fig. 1 from the left, with the end panel removed.

Fig. 3 is a modification of my invention, showing a top view partly in section, of one end of my cabinet.

Fig. 4 is a left hand, front view of one of the preferred forms of my cabinet, embodying the construction shown in Fig. 3.

Fig. 5 is a front view of the left hand end of my cabinet, showing the door of the same in its extreme open position.

Fig. 6 is an edgewise view of the door shown in Fig. 5, looking at the same from the left.

Fig. 7 is a detail view of the receiving coil supports.

Fig. 8 is a detail view of Fig. 7, looking at the same from the top or bottom.

Fig. 9 is a detail view in perspective, showing method of mounting the receiving coil on the supports.

In this application I have disclosed my invention as applying principally to means for receiving radio transmissions. I wish it understood, however, that there are many features disclosed herein which may be applied to the transmission of radio messages.

Referring now to the drawings, it will be seen that the compartment, (2) is provided with a door, 4, which may also serve to support and adjust the position of the receiving coil, 3 or loop antenna.

I have found after considerable experimentation that by forming my receiving coil in a peculiar way, as will hereinafter be described, it is possible for me to construct it within the dimensions of the door, 4. In the form shown in Figs. 4 and 5 I mount this coil, 3, on the inside of the door, 4, of the cabinet. This door, 4, is mounted on the front of the cabinet and controls access to the compartment, 2. At the center top and the center bottom of the door, 4, and centrally pivoted thereto on a vertical axis, I provide links, 6 and 7, (Fig. 6). One end of the links is pivoted to the door as at 8 and 9,—the other end of the links is pivoted to the door frame, as at 11 and 12. The links, 6 and 7, are provided with pins, 13 and 14, respectively, which rotate in sockets 15 and 16. The sockets are mounted on the upper and lower edges of the door 4. The opposite ends of the links, 6 and 7, are provided similarly with pins, 17 and 18, respectively, which rotate in sockets 19 and 20, mounted in the top and bottom of the door frame, respectively. It is seen at once that this construction gives the door, 4, a freedom of motion, such that it can be placed in any position around its central vertical axis, thereby permitting it to be adjusted in the proper plane to receive messages, and also permits the door to be opened and closed, as if it were on ordinary hinges.

Mounted on the inside of the door, 4, is the coil supporting frame, 21, (Fig. 6), consisting of four strips, 23, arranged in two pairs, each pair located on the diagonal of the door, and the two pairs or halves of the frame being secured to the door, perpendicularly to each other, by a centrally located bolt, 22.

In order to secure the best results I have found it necessary to make this frame and wind it in a certain definite way. By following this method I am able to secure superior results to those obtained by any other method known in this art. I will now describe the coil support, 21, and my method of winding the coil, 3, thereon.

In Figs. 7 and 8, I have shown one end of a pair of the strips, 23, 23, referred to above, forming a part of the frame, 21. These strips I make of some suitable insulating material, such as wood, bakelite, etc., each strip, 23, being of rectilinear-cross section, with its width appreciably greater than its thickness. These strips, 23, I mount side by side, as shown in Fig. 7, the ends being secured together as at 24, Fig. 7, while the strips at their longitudinal center are spaced apart, one from the other, as best shown in

Fig. 5, providing thereby, a means of securing the frame, 21, to the door, 4, by means of the bolt, 22, already referred to. Upon both edges of the strips, 23, comprising the frame, 21, I provide lateral notches diagonally disposed thereon, and of a suitable depth to receive the wire forming the coil, 3. These notches run diagonally toward the center of the strip, 23. The coil, 3, consists of an electrical conductor, a copper wire, for example, wound spirally on the frame, 21, Fig. 9, in such a way that the wire runs from one side of a strip, 23, to the opposite side of the next strip, and thus continues to alternate from one side to the other of the successive strips, for three quarters of one turn, the last quarter of the turn taking place on the same side of two successive strips.

In order to make this clear I will number the ends of the strips, 23, composing the frame, 21, separately, as shown in Fig. 9. Starting at the inner end, 25, the coil, 3, is wound as follows: upper edge 26, lower edge 27, upper edge at 28, upper edge at 29, lower edge at 26, upper edge at 27, lower edge at 28, lower edge at 29, upper edge at 26, lower edge at 27, upper edge at 28, and so on. From this it will be seen that the coil, 3, is composed of four sections, forming a square grid. In three of the sections, the proximate wires are in diagonal relation to each other, while in the fourth section, the wires are in parallel relation to each other. I will not attempt to explain the reasons why this form of receiving coil works better than any of the others, but suffice to say that it does excel the other forms, and to a very marked extent.

The terminals 30 and 31, of the coil, 3, are connected electrically to the upper and lower sockets, 15 and 16, respectively, through suitable connections, as shown in Fig. 5. The sockets 19 and 20, in the door frame, are also provided with electrical connections, 21 and 22, which connect the coil, 3, to the receiving apparatus in the cabinet.

The advantages of a receiving coil mounted as just described, outside of its compact size, will be appreciated by anyone familiar with the radio art, in that upon opening the door, 4, and swinging the same around its pivots, 8 and 9, the coil, 3, mounted thereon can be adjusted to be responsive to radio transmissions approaching from any direction. The position of the door, 4, and the coil, 3, secured thereto, can be used also as a modulating means to control the intensity of messages received, for the reason that the messages will vary in their amplitude from zero to a maximum through 90 degrees motion of the door on its pivots, 8 and 9, and therefore all modifications are available between these two limits.

In the embodiment of my invention which I have just disclosed I have shown the door, 4, of the compartment, 2, as the means of supporting the receiving coil, 3. This method of supporting the coil, 3, however, at times may be an objection as the door, 4, may extend out into the room, when in use, depending of course, upon the direction from which the messages are being transmitted. In order to overcome this possible objection I have shown in Figures 1 and 2 a modification thereof. In this case the coil, 3, is mounted on the inside of a movable panel, 5, the panel 5, and the coil, 3, being pivoted by links, 6 and 7, similarly to those shown in connection with the door, 4, and is provided with other detail parts, the same as described above, as applying to the door, 4. The panel, 5, in this case, I prefer to mount on the end of the cabinet, as distinguished from the front thereof, as in this position it will not protrude into the room, when in use. The cabinet is placed against the wall, in most instances, near the corner of the room, and the outer positions of the panel, 5, would not, in this case, be an objection.

In the above, I have shown and described two positions for my receiving coil. I wish it distinctly understood, however, that I do not limit myself to any position in which I may place or operate my receiving coil. Manifestly, by making the cabinet a little longer, and if sufficient space were provided, I could mount the coil inside the cabinet. I could also adjust the coil, by turning it on pivots, such for example, as 8 and 9, which pivots, in this case would have sockets permanently secured to the top and bottom of the compartment, provided for the receiving coil inside the cabinet. In this case the coil could be rotated into adjustment, either by having access to it through an opening or door in front of the cabinet or by extending a controlling knob or wheel through the top of the cabinet, 32.

I have found, as a result of a considerable amount of investigation and experimentation that by employing the above disclosed methods comprising my invention I am enabled to produce superior results to any of the methods now employed or known to the art.

I do not limit myself to the construction described above nor to the specific uses given, as there may be many modifications made, in the parts and additional uses found, (such, for instance, as recording on the phonograph disc the messages received by radio so as to make a permanent record thereof), which would come within the scope of my invention. The disclosure above is simply one embodiment of my invention, as required by the statutes.

Having described the same so that anyone skilled in the art to which it pertains can

make and use it, what I claim as my invention, and wish to be secured by Letters Patent, is:—

1. An antenna for radio receiving apparatus comprising a carrier having parallel top and bottom edges, an electrically conducting loop wound on the carrier, conducting bearings at mid-points on the top and bottom edges of the carrier upon which the carrier can freely rotate, connections from the conducting loop to said bearings and links hingedly mounted on a support for said antenna having pivoting means thereon whereby said loop is rotatably mounted and conductively connected to said support.

2. An antenna for radio receiving apparatus consisting of a frame on which is wound a coil of wire, mounted on a door to a cabinet, connection means between the door and the cabinet including supporting strips hingedly mounted on the cabinet, conducting means for rotatably pivoting the door about an axis substantially at its middle portion, mounted on the strips and an electrical circuit connected with said coil through said conducting means.

3. An antenna for radio receiving apparatus consisting of a frame on which is wound a coil of wire, mounted on a door to a cabinet, connection means between the door and the cabinet, including supporting strips hingedly mounted on the cabinet and means supported by said strips for rotatably pivoting the door about an axis substantially at its middle portion, said means including conducting pivots and connections from said coil of wire through the pivots and onto the cabinet.

In testimony whereof, I affix my signature.

JOSEF HENRIK HALLBERG.