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RADIO RECEIVING APPARATUS

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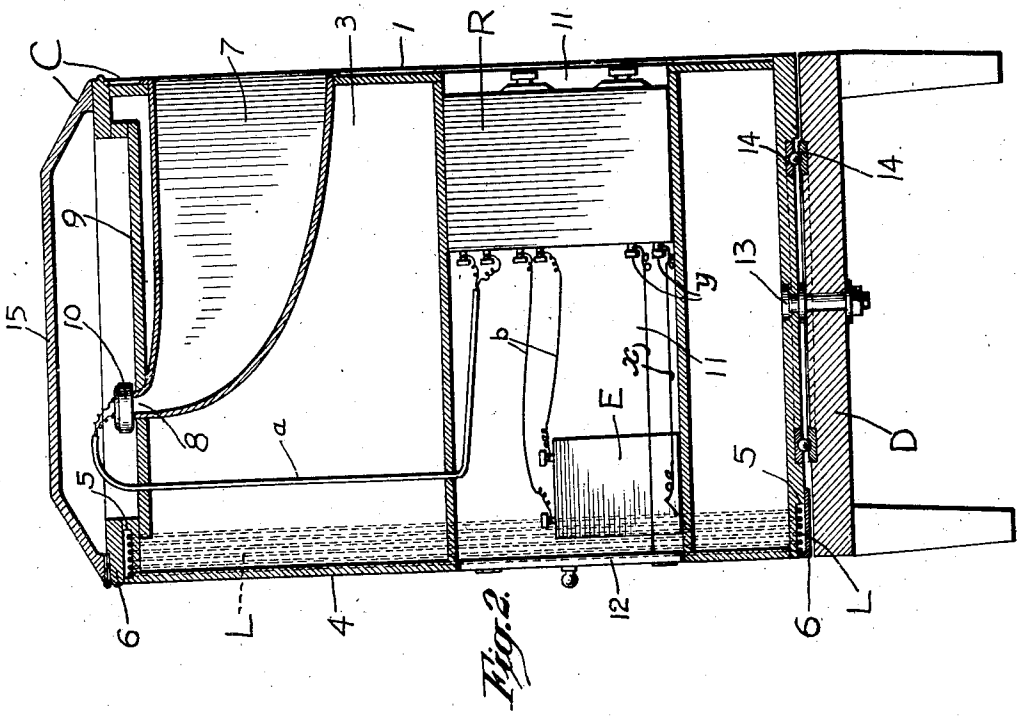


Fig. 2.

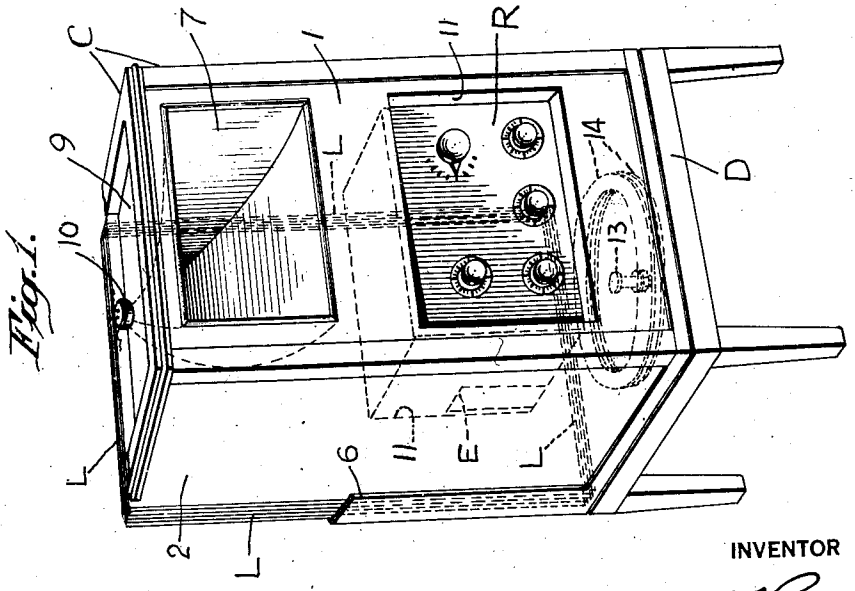


Fig. 1.

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RADIO RECEIVING APPARATUS.

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My invention relates in general to the art of reproducing sound and its object is to provide a new and improved apparatus adapted for radio reception.

In radio-receiving outfits, it has been suggested to use indoor loop aerials or antennæ where outdoor aerials could not be installed,—as, for instance, in apartment houses, hotel rooms, etc. The loop aerial, as heretofore constructed, was a separate piece of apparatus, quite as much as an outdoor aerial, and it required not only additional space, but exposed wire connections to the rest of the radio outfit.

In fact, one of the worst objections to radio receivers, especially in the small apartments of city dwellers, has been their unsightliness. With a long box, a set of batteries, a loop, a loudspeaker, and exposed wiring, scattered all over the room and collecting dust, radio-receiving outfits made an apartment look like a laboratory and were highly objectionable, especially to the housewife.

A separate loop is undesirable for several reasons. In the first place, as already mentioned, it is an individual mechanism, unsightly at best, for which a place must be found in the room. Besides, separate loops are expensive, since they require a special frame and stand. Then, the connecting wires from the loop to the receiving set are necessarily exposed and may be of considerable length, perhaps running across the room. Such wires, particularly if they are of appreciable length, are liable to act as a horizontal receiving antenna and thus interfere with the proper operation of the loop. Furthermore, it is known that leads in a radio frequency circuit have inherent capacity. Now, the capacity of leads running from a separate loop to a receiving set may have an unbalancing effect on the loop. If a person should disarrange the wires, as may easily happen with exposed long connections in a room, their inherent capacity is disturbed and the set may be thrown out of tune.

Now, according to my invention, I incorporate the loop aerial and preferably also the amplifying horn in a cabinet carrying other parts of the radio-receiving apparatus, whereby a single piece of household furniture constitutes a complete loudspeaking radio-receiving unit. This may be made as self-contained as a phonograph cabinet, with little or no wiring in sight when the cabinet is closed, and as ornamental as desired.

Briefly stated, the radio-receiving cabinet of my invention is provided with a molding as part of the outer cabinet structure, and this molding conceals a receiving loop adapted to be connected with a radio set in the cabinet. The loop occupies no other available space and therefore does not increase the size of the cabinet. The molding that conceals the loop wires is preferably made to harmonize with the design of the cabinet, so that seemingly it is nothing more than a permanent part of the cabinet. In one embodiment of my invention, as herein illustrated and described by way of example, the cabinet is of the upright type rotatable on a base, so that the loop may be readily adjusted into the right direction. Any practical form and design of cabinet may be used in carrying out the underlying idea of my invention.

In order to explain my invention to those skilled in the art, I shall describe in detail the construction illustrated in the accompanying drawings, in which

Figure 1 is a view in isometric perspective showing a cabinet constructed in accordance with my invention, certain parts being broken away for clearness; and

Fig. 2 is a vertical cross-section, on an enlarged scale, of the cabinet shown in Fig. 1.

The outer framework or body of the cabinet shown in the drawings is indicated as a whole by C. The outer upright walls of this cabinet are substantially rectangular in outline and comprise a front wall 1, sides 2 and 3, and a back wall 4. When I use the terms "front" and "back," I do so merely in a relative sense, for it is immaterial which is considered the front and which the back of the cabinet. The body of the cabinet is preferably constructed of wood or other suitable non-metallic material.

Along the rear edge or outline of the cabinet is a groove or recess 5 in which is mounted a loop antenna or aerial indicated as a whole by L. In the instance illustrated, the antenna consists of a number of loops of wire of suitable conducting material, the

loops being out of electrical contact with each other. As indicated in Fig. 1, the loop antenna L follows generally the edge or outline of one side of the cabinet and is in the form of a rectangle. Obviously, if the outline of the cabinet is other than rectangular, the form of the loop will vary accordingly. The antenna L is preferably covered with a non-metallic strip or strips 6, which may be in the form of an ornamental molding of wood or other suitable material. In this way the antenna is concealed from view and becomes to all intents and purposes an integral part of the cabinet itself. It will thus be seen that the supporting frame for the loop wires is part of the cabinet structure, thereby eliminating the cost of a separate loop frame and adding to the compactness of the cabinet as a whole.

The cabinet C is provided with a sound amplifier, which is shown in the form of a built-in horn 7 open at the front of the cabinet. The inner or smaller end 8 of the horn 7 terminates in the top board 9 of the cabinet for permitting ready attachment of a telephone receiver 10.

In the lower portion of the cabinet there is a chamber 11, which may for convenience extend across the cabinet from front to back and which is preferably open at both ends. If desired, a door 12 may be provided for the rear end. In the front portion of chamber 11 is mounted a suitable radio-receiving set indicated as a whole by R. As there are many kinds and styles of such sets on the market, ranging in price from a few dollars to several hundred dollars, and as the construction and operation of these sets are well understood, I do not consider it necessary to show or describe any structural details of the set R, particularly since the construction of this set does not in and of itself form any part of my invention. It will, therefore, be understood that the set R is representative of any suitable form or type of radio receiving set. The specific location and arrangement of the compartment or recess for supporting the radio set in the cabinet, or within the outer confines thereof, are immaterial and will naturally vary in accordance with the size, style and design of the cabinet.

In the rear part of chamber 11 are batteries E, which may be taken as indicative of any suitable type of radio batteries on the market. Batteries E may include a so-called "A" or filament battery and a "B" or plate battery, for use in sets having vacuum tubes. As the installation and use of these batteries are well known in the art, I need say nothing further about them.

It goes without saying that loop antenna L, radio set R and receiver 10 are properly connected in circuit with batteries E. As these connections (or hook-ups, as they are popularly called) are well understood, even by the vast army of radio amateurs, it will not be necessary to show or describe them. It is enough that I have diagrammatically indicated an electrical connection *a* from set R to receiver 10, and circuit connections *b* from batteries E to set R. The ends of the loop antenna L are led out at any suitable point, usually from the bottom wires, for ready connection to set R. As these connections are well understood, I need only to show a pair of wires *x* leading from opposite ends of loop L to appropriate binding posts *y* on radio set R. It is usual to shunt a variable condenser across the loop terminals for tuning, as radio experts will understand. When the cabinet is sold with the radio set R installed therein, the set is permanently connected with the loop. By this I do not mean that the electrical connections between the set and the loop are inseparable (for they may be very easily disconnected if they lead to binding posts), but I simply mean that, in the fully equipped cabinet containing loop and radio set, these two are operatively connected together.

It has been found that in the use of loop antennæ, the reception of radio transmission is most satisfactory when the plane of the loop is in the direction of the transmitting station; or, to put it differently, when the horizontal turns of the loop point toward the transmitting station. In order to permit a quick and easy adjustment of the loop antenna L in the proper direction, I mount the cabinet C in this particular embodiment of my invention so as to rotate on a base D. Any practical rotary connection between cabinet and base may be adopted. In Figs. 1 and 2, I have shown a central pin or stud 13 passing from the bottom of the cabinet into or through the base, with suitable antifriction rings 14 interposed. In this way, the cabinet (which may have considerable weight) is easily turned until the antenna L points in the right direction. If desired, cabinet C may have a lid for the top and a door for the front. Fig. 2 shows a lid 15, which is omitted in Fig. 1 for the sake of clearness.

In the operation of a loop as a receiving antenna, the effective portions are the sides, whether vertical or oblique. At least, that is the prevailing theory today. In the construction of cabinet shown in Figs. 1 and 2, the height of the loop is approximately equal to the height of the body of the cabinet. This provides a loop of maximum receiving power, and yet occupying no space, practically speaking. As will be clear to those skilled in this art, a large loop with few turns of wire is more desirable than a small loop with a greater number of turns. So that, my new radio cabinet combines efficiency with compactness in a high degree.

As radio sets and batteries possess consid-

erable weight, it is preferable to mount them on diametrically opposite sides of the pivot point of the cabinet, as shown in Fig. 2, so that their weights counterbalance each other.

It will be seen from the foregoing that my invention provides a unitary self-contained structure in the form of a cabinet, which in itself, when properly equipped, constitutes a portable radio-receiving station in the shape of a single piece of furniture. The practical advantages of this construction will be apparent to those skilled in the radio art. In the preferred embodiment, all the parts that go to moke up a radio-receiving set are contained (and practically concealed) in a single piece of ornamental household furniture, that may be moved about in a room, or moved from one room to another, wherever desired. The loop, being in the cabinet, requires but short and direct leads to the radio set, thereby obviating long and exposed wiring, which is highly objectionable, as previously explained. Also, by mounting the loop wires on the cabinet structure itself, no separate supporting frame for the loop is required. Thus, it is clear that by incorporating the loop in the cabinet, the operation of the radio set is simplified and improved, aside from the advantages of eliminating a separate piece of apparatus. Where the entire cabinet rotates, as in the form shown in the drawings, the relation of loop and radio set remains fixed, thus obviating the disturbing effect liable to be produced when a loop is bodily adjusted relatively to the set itself.

The cabinet of my invention may in its outward appearance be as ornamental and elaborate as desired. By mounting the loop in the cabinet as shown, the vertical sides of the loop are practically equal to the height of the main body of the cabinet. This provides a loop of maximum receiving power, since the effective portions of a loop are the vertical sides. From the viewpoint of manufacture, it will perhaps be preferable to place the cabinet in the market with its full equipment of radio set, telephone receiver and batteries, in addition to the antenna which is practically a part of the cabinet itself. The cabinet may, however, be sold without the first-named parts, leaving it to the individual purchaser to put his own favorite type of radio set, receiver and battery in the cabinet. In that event, the terminals of the loop antenna are left in position for ready connection with the radio set and batteries.

In the broader aspect of my invention, when I speak of the cabinet being provided with a recess for receiving a loop antenna in its structure, I mean any practical construction providing a space for receiving the loop in the framework of the cabinet as a permanent part of its structure.

The particular construction of the antenna itself is immaterial. It may comprise one or more loops of wire, as shown, or it may consist of a metallic strip or bar bent into one or more loops. So that, when I speak of a loop aerial or antenna in the broader aspect of my invention, I mean any form of conducting member or members adapted to be mounted substantially within the outer framework of the cabinet and constructed to act as a receiving antenna. When I speak of the framework of the cabinet, I include of course such outer doors or panels as the cabinet may have.

As far as I know, I am the first to produce a household cabinet as a complete and self-contained loudspeaking radio-receiving unit in which the loop is concealed as a permanent part of the cabinet structure, and I claim this construction in a fundamental way.

Although I have illustrated and described a certain specific construction, I want it understood that I have done so merely to explain my invention and not by way of limitation or restriction. It will be obvious that the various features of my invention may be mechanically carried out in other ways than those herein set forth by way of illustration.

What I claim is:

1. In a rotatably mounted radio receiving cabinet, means for mounting a loop antenna comprising a recess formed along a substantially rectangular edge of the outer structure of said cabinet, wires in said recess to form a receiving loop, and a molding forming part of the outer cabinet structure for covering said recess, whereby said loop is invisibly incorporated into the framework of the cabinet.

2. In a radio receiving cabinet, means for mounting a loop antenna comprising a recess formed along a substantially rectangular edge of the cabinet structure, wires in said recess to form a receiving loop, means for permanently covering said recess to conceal the loop wires in all positions, and means whereby said loop is rotatable into the desired receiving position.

3. In a rotatable radio receiving cabinet, a loop antenna comprising wires wound on the outer framework of the cabinet, and means forming a permanent part of the cabinet framework for permanently concealing said loop in all its positions.

4. A radio receiving cabinet having a molding as a permanent part of the outer cabinet structure, and a loop antenna consisting of wires running along said molding and permanently concealed thereby.

5. In a radio receiving cabinet, an outer framework having a recess formed along a polygonal edge thereof, wires in said recess to form a receiving loop, and means form-

ing part of the cabinet structure for covering said recess, whereby said loop is invisibly and permanently incorporated into the framework of the cabinet.

6. A cabinet having a radio loop mounted in a vertical plane on the outer framework of the cabinet as a permanent part of said framework, said loop being permanently invisible outside and inside the cabinet, and means for swinging said vertical loop horizontally to adjust the same into the desired receiving position.

ADOLPH ALEXANDER THOMAS.