April 3, 1934. LE ROY W. STAUNTON 1,953,135

RADIO APPARATUS

Filed April 8, 1931 2 Sheets-Sheet 1

Fig. 1.

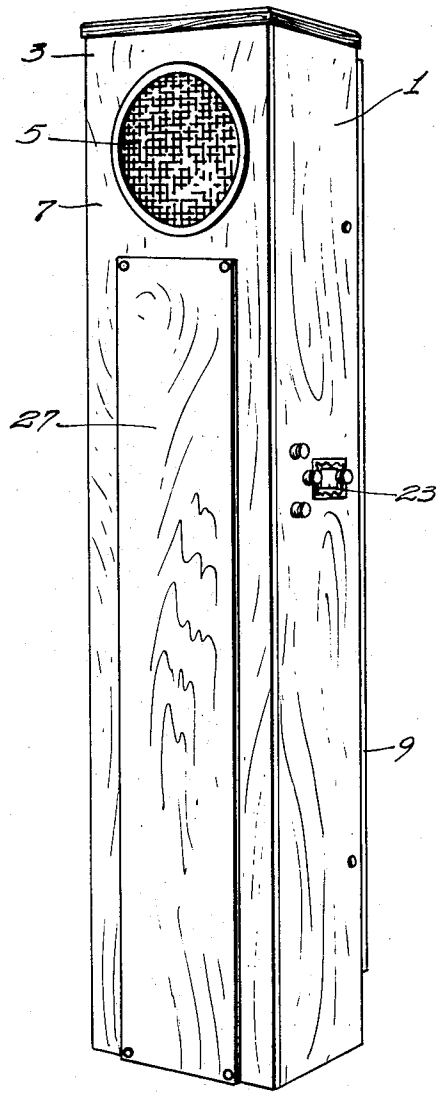
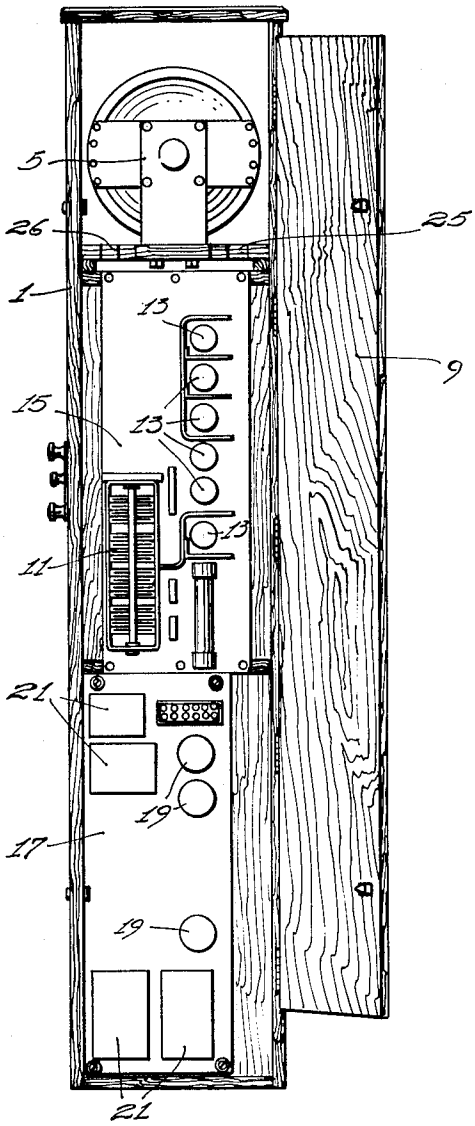


Fig. 2.



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Fig. 3.

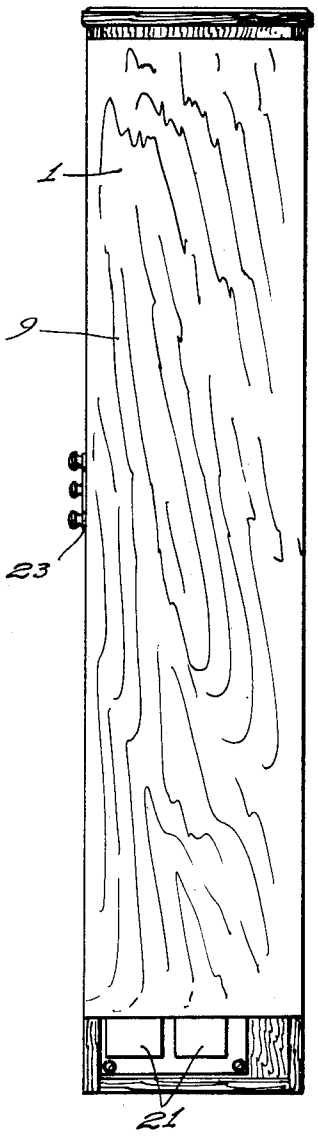
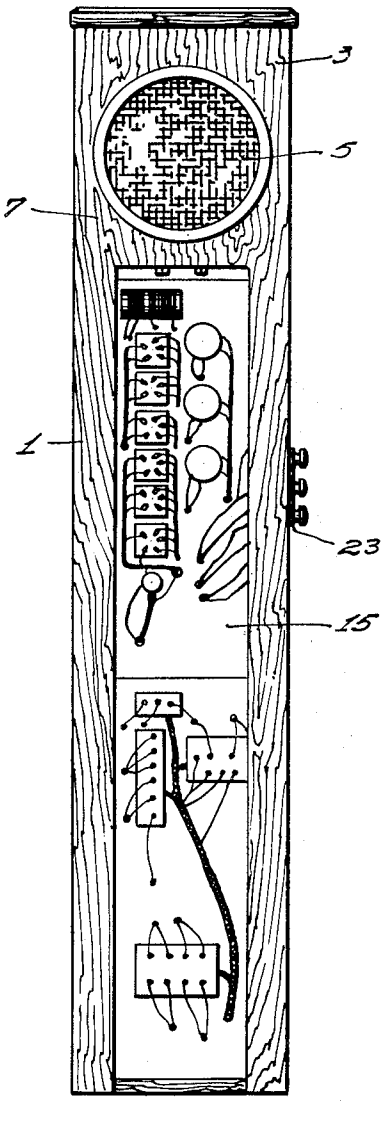


Fig. 4.



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UNITED STATES PATENT OFFICE

1,953,135

RADIO APPARATUS

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Application April 8, 1931, Serial No. 528,468

1 Claim. (Cl. 250—14)

My invention relates to radio apparatus and particularly to apparatus of the home receiver type and comprises material improvements therein whereby a more efficient and a more desirable apparatus may be obtained.

Insofar as I am aware, radio apparatus of the home receiver type has been housed in cabinets of standard conventional designs, these cabinets being either long and flat or broad and high, ventilation being provided either by leaving off the back of the cabinet, or by providing a row of ventilating apertures in the back or by covering the open back with rattan or wire netting to provide an outlet for the heat generated within the thermionic devices and other heat-developing elements of the receiver apparatus.

Going more into detail in the standard construction of radio receivers, as known by me, the cabinets are supported upon legs a substantial distance above the floor and the apparatus is housed therein. The chassis, comprising a subpanel upon which are mounted the elements of the receiver proper, is supported in horizontal position upon a horizontally disposed partition or shelf which defines a chamber below the chassis for housing power-supply units, such as A and B battery eliminator apparatus. Various modifications of the arrangement of the apparatus in the cabinet, as described above, have been employed but, in all cases, one or more pieces of the complete apparatus have been hemmed in by partitions or shelving or the apparatus has been otherwise supported in a horizontal position, the effect being that the supporting base of the apparatus will function in a manner equivalent to that of a horizontal partition or shelf to produce the undesirable results which I will subsequently point out and which it is one object of my invention to avoid.

By reason of the fact that the radio apparatus proper, according to the prior art, has been housed in cabinets provided with partitions, shelves or the equivalent thereof, it has been difficult to obtain a high degree of natural ventilation and cooling of the apparatus which, during operation, is prone to develop a substantial amount of heat.

Heated air possesses a natural tendency to rise and, because of the present-day practice of mounting radio apparatus in a horizontal position or on horizontal partitions, the upward travel of heat generated within the apparatus is impeded. The horizontal partitions or the like, in combination with their supporting walls, create pockets, wherein the heated air is readily entrapped. Therefore, to provide the necessary cooling effect, the cabinets are constructed of sufficiently large depth to provide an excess of unused space therein, whereby the temperature of the apparatus may be maintained within safe limits.

Another deficiency is the radio receiver constructed according to present-day practice lies in the construction of the cabinets whereby the apparatus proper is supported well above the floor. Since the maximum height of a radio receiver is limited, it follows that the vertical length of the space column is likewise limited and, consequently, when the apparatus is supported above the floor, maximum advantage cannot be taken of the circulation phenomenon or draft, as it is commonly termed, which is automatically set up by heat generated close to the floor of a room. The closer to the floor that the heat is generated, the more pronounced circulation and cooling effect will be obtained. This inability to take effective advantage of the circulation phenomenon is further aggravated by the horizontal partition and shelving employed in present-day radio receivers which, by reason of the horizontal positioning of the apparatus, must occupy a relatively large area in a horizontal plane.

Other deficiencies in the general run of receivers constructed according to present-day practice reside in the fact that these sets occupy a large area of floor space. The high-power receiving sets of the present day, employing upwards of six tubes or more, by reason of poor ventilation and other considerations, require, on the average, an over-all cubical space displacement of approximately fifteen cubic feet and a floor-space displacement of about four square feet.

The present tendency in cities, toward the promotion of apartment-house dwellings and efficiency apartments has placed space, particularly floor space, at a premium. The modern sets, in addition to occupying an over abundance of floor space, also, by reason of their size, do not harmonize with the surroundings of a small-size apartment dwelling. These circumstances have led to the development of the midget or mantelpiece radio. The change comprised a crowding of the apparatus within a minimum space and into a small-size cabinet, and also resulted in a reduction in the number of tubes employed. The resultant article, therefore, was less powerful and, by reason of the crowding of the apparatus into such a small space, the heating effect was

increased, thereby bringing about a reduction in operating efficiency.

It is one object of my invention to provide a radio apparatus of the home-receiver type employing full-size standard apparatus of the high-power type which shall occupy less floor space than other high-power receivers and operate at an increased efficiency.

Another object of my invention is to provide a radio apparatus of the home-receiver type which shall occupy a minimum amount of floor space.

Another object of my invention is to provide an efficient ventilating system in an apparatus of the home-receiver type.

Another object of my invention is to provide an apparatus of the home-receiver type having improved ventilating characteristics and occupying a minimum amount of floor space.

Another object of my invention is to provide a radically new departure from the conventional mechanical arrangement of the composite parts of a receiver, whereby new and useful results may be obtained.

Another object of my invention is to provide a structure of the home-receiver type wherein the apparatus is supported by the walls of the cabinet.

Another object of my invention is to provide a structure of the home-receiver type in which the heat-generating elements are disposed in substantially vertical relation.

In addition to the above objects of my invention, which have as their aim to overcome the deficiencies of receivers constructed according to present practice, my invention has for additional objects:

To provide radio apparatus of the home-receiver type wherein the front panel shall be free from tuning elements or controls,

To provide radio apparatus of the home-receiver type whereby the component parts shall be easily accessible and the servicing thereof shall be materially facilitated, and

To provide apparatus of the home-receiver type having a pronounced baffle function, in combination with a loud speaker employed therewith.

Additional objects of my invention will be pointed out in the following description of my device.

All the above objects have been fulfilled in apparatus constructed in conformity to my invention, as described below.

According to my invention, I have provided apparatus, of the home-receiver type, wherein the disadvantages attributed to the present-day receivers have been materially reduced or entirely eliminated, and new results have been obtained to the end that I have produced an apparatus having highly desirable characteristics, particularly as to space requirements and capable of operating at higher efficiency, and, consequently, at less expense to the owner. These desirable results have been accomplished by me by providing a relatively new design of cabinet and by rearrangement of the receiving apparatus in a con-conventional manner which will be more fully described by me, in combination with the accompanying drawings illustrating an embodiment of my invention, wherein

Figure 1 is a view, in perspective, of a receiver constructed according to my invention.

Fig. 2 is a rear view of the receiver, the back wall being in its open position to show the novel arrangement of parts whereby the desired improvements described above are made possible.

Fig. 3 is a rear view of the receiver with the back wall in normal position.

Fig. 4 is a front view of the receiver showing means whereby the elements may be exposed for servicing.

Referring more particularly to Fig. 1, I have shown a radio cabinet 1 of unconventional design, comprising a front wall 3 in which the loud speaker 5 may be mounted, two side walls and a hinged back wall 9; the dimensions of the structure being approximately as follows: the base being about 10 inches in depth by approximately 13 inches in width, and the height being approximately 5 feet. The structure, therefore, will provide a housing for a radio receiver which occupies only substantially a square foot of floor area and a cubical displacement of about five cubic feet. These dimensions of the housing are not the result of merely selecting convenient values but have been made possible by a peculiar and novel arrangement of the apparatus to be housed therein. As compared with radio sets of conventional design wherein the floor space occupied covers approximately four square feet or more, and the all-over height of which is approximately five feet, it will be seen that the cabinet designed by me occupies approximately one fourth of the floor space of the present-day sets of similar rating and about on third of the cubical displacement.

My cabinet, by reason of the arrangement and location of the apparatus therein, possesses sufficient room for housing radio receivers of the higher-power type, employing six tubes and upwards, in combination with the necessary power units which, according to present-day practice, require cabinets displacing approximately three times as much space and which operate less efficiently as regards adequate ventilation. So far as I am aware, no cabinet has heretofore been designed which is capable of accomplishing the results which are accomplished by a cabinet of my design, when employed in conjunction with apparatus as described below.

In Fig. 2, I have shown the arrangement of apparatus in the cabinet whereby the cabinet of novel design, as described by me, is employed to its maximum efficiency. The apparatus disclosed therein comprises a radio receiving set of conventional design, the elements of which comprise a gang condenser 11, thermionic devices 13 and other necessary elements mounted upon a chassis 15; a power pack 17, comprising all the necessary apparatus such as rectifiers 19, transformers and condensers 21, for converting alternating current into direct current and filtering the same to provide a steady direct-current supply to the receiver, and a loud speaker 5 preferably of the dynamic type, capable of being operated in conjunction with the apparatus mentioned above.

The power unit 17 and the chassis 15 are supported in vertical relation upon the walls of the cabinet (in this particular modification, on the front wall of the cabinet) preferably with their main dimension vertical, thereby avoiding the necessity for providing partitions, supporting brackets or other equivalent devices such as have heretofore been employed.

The power pack is preferably mounted at the lower end of the cabinet in close proximity to the floor, since this unit generates the major portion of the heat generated in a radio receiver. For this reason, maximum cooling effect will be obtained, since the heating of the surrounding air

will cause the generation of circulating air currents throughout the height of the apparatus.

Of the major pieces of apparatus installed in the cabinet, the power unit is possessed of the greatest weight. Therefore, by reason of this characteristic, another advantage is obtained by mounting the power unit lowermost in the cabinet and this advantage is that the center of gravity will be dropped below the center of the cabinet, and the apparatus, which, by reason of its tall elongated construction, would normally be unstable, is thereby stabilized.

The chassis 15 is preferably mounted above the power pack in substantial vertical alignment therewith. This arrangement, as is clearly disclosed in the drawings, results in a substantially uniform disposition of the heat-generating elements of the apparatus in a vertical direction, thereby distributing the generation of heat throughout the major portion of the cabinet whereby concentration of generated heat will be avoided and better ventilation of the apparatus will be obtained, the greater portion of the heat being generated close to the floor where its beneficial effect in causing a draft is greatest.

It will be noted that, by reason of the fact that the apparatus described is mounted directly upon the wall of the cabinet in the relationship described, a substantially unimpeded air path is provided from the bottom of the cabinet to the top, whereby substantially unimpeded circulation of air may be obtained. The addition of the back to the cabinet, leaving an opening at the bottom and one at the top, will provide a chimney construction capable of functioning as such. By reason of this chimney effect, and the generation of the greater portion of heat close to the floor, a well defined circulatiton of air will be obtained, whereby the cooling effect upon the thermionic devices and the other heat-generating elements will be much more efficient than in sets constructed according to present-day practice.

The apparatus, therefore, can be operated more efficiently, and the life of the same will be increased. While I have disclosed a power pack mounted with its main dimension vertical and below the chassis of the receiver, which is also mounted with its main dimension vertical, it is possible to rearrange the parts by placing the power pack above the chassis, but the arrangement described above and disclosed by me in the drawings is the preferable arrangement for the reasons outlined above and also by reason of the fact that, by placing the chassis above the power pack, as described, I have found it possible to bring the tuning controls 23 out at the side of the cabinet at a height very convenient for manipulation by the average person without necessitating undesirable stooping or bending during the tuning operation.

In the top end of the cabinet the loud speaker may be supported by means of a small shelf 25 having V-shaped notches 26 in the free edge thereof for substantially eliminating whatever impedance the shelf would normally offer to the circulation of air and, when positioned in the upper portion of the cabinet, as shown, the speaker will be supported on an approximate level with the ear, whereby improved reception may be obtained.

The tall elongated cabinet having an opening at the bottom imparts to the cabinet the property of functioning as a baffle, according to the teachings of the Rice Patent #1,361,646 of June 7, 1927 when supporting a speaker in the position shown. With the cabinet closed at the top, the sound waves generated at the interior surface of the cone will find their shortest path to the exterior surface of the cone by traveling the length of the interior of the cabinet, out at the opening in the base of the back and thence up along the outer surface of the cabinet to the speaker. The path thus defined totals approximately nine feet, the cabinet thereby defining a baffle equivalent to one of nine feet diameter. Since the air distance between both faces of the diaphragm determines the lowest frequency for which the baffle will function, as such, and since, according to the Rice patent, this distance is one quarter of the corresponding wave-length, it follows that my cabinet will function as a baffle for frequencies down to approximately 30 cycles per second.

The ventilating opening at the top of the cabinet would normally have the tendency to forestall the baffle effect of the cabinet, but this opening is purposely made comparatively small, as compared with the opening at the bottom, whereby very little of the sound energy will be detoured through the vent opening. Therefore, while the baffle effect may be slightly reduced, the degree of reduction will not be such as to materially impair the beneficial baffle effect obtained by causing the greater portion of the internally generated sound-wave energy to make its exit through the bottom opening.

Referring more particularly to Figs. 1 and 4, I have illustrated the front wall as being of a composite structure comprising a wall having an opening therein of sufficient size to expose the so-called under side of the chassis and power pack, whereby the wiring of the apparatus becomes easily accessible.

In prior art, as known by me, receivers are so constructed, that, when servicing becomes necessary, the chassis has to be disconnected, and either entirely removed from the cabinet or provisions made for shifting the position thereof to render the wiring accessible. The operativeness of the repaired device can not easily be determined until the chassis has been replaced and reconnected into the system. This troublesome procedure is occasioned more or less by reason of the horizontal positioning of the apparatus within the cabinet.

By mounting the apparatus in vertical relation, as described by me, the under side of the chassis and power pack can be made as easily accessible as the other side wherein the tubes are mounted. This is accomplished, as described above, by providing an opening in the front wall for the purpose. This opening may be covered by a removable panel or door 27, hinged or otherwise removably positioned on the front wall, 7. In servicing the apparatus, therefore, displacing the back wall 9 and the panel or door 27 leaves the entire works exposed. There is no need to disconnect the chassis or power pack from the rest of the circuit and, consequently, the apparatus, is always in condition for testing.

It will thus be seen that, by rearranging the apparatus normally employed in the higher-power sets and by providing a cabinet of novel design to house the apparatus arranged in the manner described by me, I have produced an apparatus, of the home-receiver type, which possesses marked improvements over those of present-day conventional designs.

The apparatus provides desirable speaker output, extended baffle effect, convenient control

means, very efficient ventilation, and easy accessibility to all parts for servicing.

In addition, the cabinet lends itself to various decorative improvements whereby, by reason of its tall, elongated shape, and the small amount of space which is occupies, it is adapted to harmonize in locations where space conservation is an important factor.

While I have described my invention in great detail, I do not desire to be limited to the exact details thereof, except as is necessitated by reason of the prior art and the appended claim.

I claim as my invention:

In apparatus of the home-receiver type, a housing, and apparatus enclosed therein and fixed to a vertical wall thereof, portions of the walls of said housing facing said apparatus being removable to expose said apparatus from both the front and rear.

LE ROY W. STAUNTON.