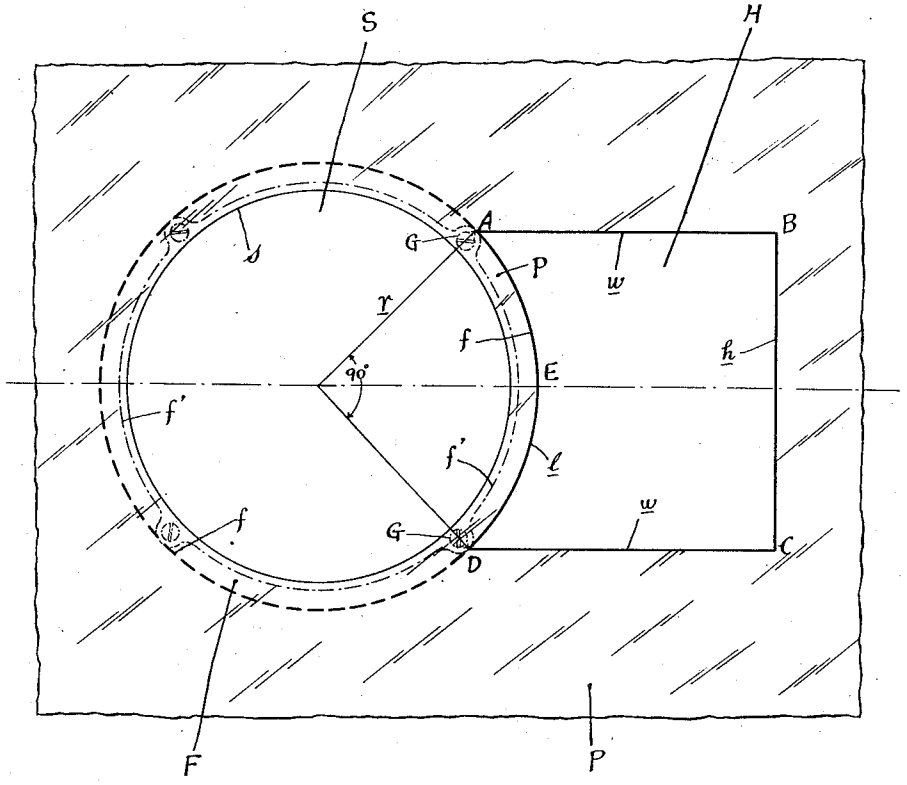
July 2, 1957 TAKAKUNI SHIMIZU 2,797,765

LOUD-SPEAKER MOUNTED IN FRONT PANEL OF OPEN-BACK CABINET

Filed June 30, 1953



TAKAKUNI SHIMIZU
INVENTOR.

BY

United States Patent Office

2,797,765

Patented July 2, 1957

2,797,765

LOUD-SPEAKER MOUNTED IN FRONT PANEL OF OPEN-BACK CABINET

Takakuni Shimizu, Meguroku, Tokyo, Japan

Application June 30, 1953, Serial No. 365,059

3 Claims. (Cl. 181—31)

This invention relates to an improvement in open-back radio cabinets and, more particularly, to a special acoustic device in the ordinary open-back radio cabinet.

The object of this invention is to secure a good acoustic effect without any increase in the cost of the radio cabinets.

The feature of this invention relates to the provision of an open port of a special shape and size in the panel of an open-back radio cabinet at the side of the speaker.

Providing a port in the front panel of radio cabinets of the closed type below, and spaced from, the speaker for the purpose of securing a good acoustic effect has been carried into practice. But, the use of such expedient, namely a port in the front panel below, and spaced from, the speaker, in open-back cabinets has never been reported.

With the object of securing an improved acoustic effect in open-back cabinet radios by applying thereto such teaching, this inventor has conducted a large number of experiments on ordinary open-back cabinet radios having a speaker of 6.5 inch diameter to determine the most suitable shape, size and position relative to the speaker of the port in the front panel. As the result of numerous experiments it was found that a port in the front panel of substantially rectangular shape horizontally aligned with the speaker gives the best acoustic effect, particularly, a substantially rectangular port having its center line horizontal and passing through passes the axis of the speaker, the port having one concave side which substantially coincides with a part of the periphery of the flange of the speaker.

The invention will be more fully understood by the following detailed description taken in connection with the appended drawing, in which the front view of a part of the panel including the port according to this invention and the speaker opening is illustrated.

As shown in the drawing, the open port H is of substantially rectangular shape and has one concave side which coincides substantially with peripheral portion f of the flange F of the speaker S. s is the speaker opening periphery. According to this invention based on numerous experiments, it was found that a port H having a length l of concave side AED equal to a quarter of the length of the periphery of flange F produces the best acoustic results. The reason why the peripheral length of the flange has been taken as the basic measure is due to the fact that the over-all diameter of the flange of the speaker measured where the flange is fastened to the panel P by screws G is customarily taken as the measure of the overall diameter of the speaker, even where the periphery of the speaker flange deviates more or less from the circle f of such over-all diameter, as shown by the dot and dash line f' in the drawing.

Thus, the length l of the concave side AED of the hole H is substantially equal to the length of the portion of periphery f of the flange F subtending a central angle of 90°, the width w of the port H or the length of the straight side AB or DC, and the height h of the hole or

the length of the straight side BC may be expressed as follows taking the outermost radius r of the flange as the basis:

$$l=\frac{2\pi r}{4}=\frac{\pi r}{2}$$

$$w=\frac{7}{8}\times l=\frac{7\pi r}{16}$$

$$h=\sqrt{r^2+r^2}=\sqrt{2}r$$

According to the results obtained in connection with 6.5 inch speaker, l, w and h for several radios of the open-back cabinet type were calculated as listed in the following table.

$2r$ (inches)	l (inches)	w (inches)	h (inches)
3	2.356	2.061	2.121
4	3.141	2.748	2.828
5	3.926	3.436	3.535
6.5	5.105	4.466	4.596
8	6.283	5.497	5.656
10	7.853	6.872	7.071
12	9.424	8.246	8.485

And, the same good results were obtained with respect to all of the said radios within the tolerance of ±5%, ±10% and ±5% in the dimension of l, w and h respectively. The excellent results were obtained when this invention was applied to radios having a pentode or a beam power output tube, such as 6F6, 6K6, 6V6, 5OL6, 5OB5 etc. without negative feed back (current and voltage), while a suitable corrective filter, a condenser and a resistor in series, is inserted at the primary of an audio output transformer.

If a table model television receiver has a speaker opening in the side panel, the port according to this invention must be cut to the side of the speaker opening toward the front of the cabinet. The ventilation holes in the back of a cabinet must be enlarged as much as possible. In designs in which the bottom board of an open-back cabinet with legs is omitted for the purpose of reducing the box resonance, a bottom board must be provided.

In small table model radios, containing the chassis and the speaker in the same cabinet, and having a loop antenna board of a dust proof screen with ventilation holes at the back of the cabinet, the ventilation holes must be enlarged as much as possible.

For protecting the chassis and the tubes from damage, some suitable cloth and rods can be arranged on the open port according to this invention.

The structure according to this invention is very simple and very effective, and is applicable to radio and television receivers of various size for reproducing familiar sounds in the living room.

I claim:

1. A sound reproducer comprising an open back cabinet, one cabinet wall having a speaker opening therethrough, a loudspeaker having a diaphragm, a flange integral with the diaphragm and attached to the peripheral region of the speaker opening, and the one cabinet wall having a second opening with two parallel sides spaced equally from an axis horizontally aligned with the center of the speaker opening and immediately adjacent to the speaker opening with the entire extent of the third side of the second opening coinciding with the adjacent peripheral region of the flange and the fourth side being perpendicular to the two parallel sides.

2. A sound reproducer according to claim 2 in which the second opening is substantially rectangular with the coincident side thereof arcuate and its other three sides straight, the flange is of a radius r, the length of the arcuate side of the second opening being $\pi r/2$, the hori-

zontal width dimension thereof being $7\pi r/16$, and the vertical height dimension thereof being $\sqrt{2r}$.

3. A sound reproducer according to claim 2 in which the second opening is substantially rectangular with the coincident side thereof arcuate and its other three sides straight, the flange is of radius r, the length of the arcuate side of the second opening being of the range of

$$\frac{\pi r}{2} \pm 5\% \frac{\pi r}{2}$$

the horizontal width thereof lying in the range of

$$\frac{7\pi r}{16} \pm 10\% \frac{7\pi r}{16}$$

and the vertical height dimension thereof lying in the range $\sqrt{2r} \pm 5\% \sqrt{2r}$.

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