May 14, 1963 P. J. MORGILLO 3,089,562

LOUDSPEAKER BAFFLE ASSEMBLY

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Fig. 2.

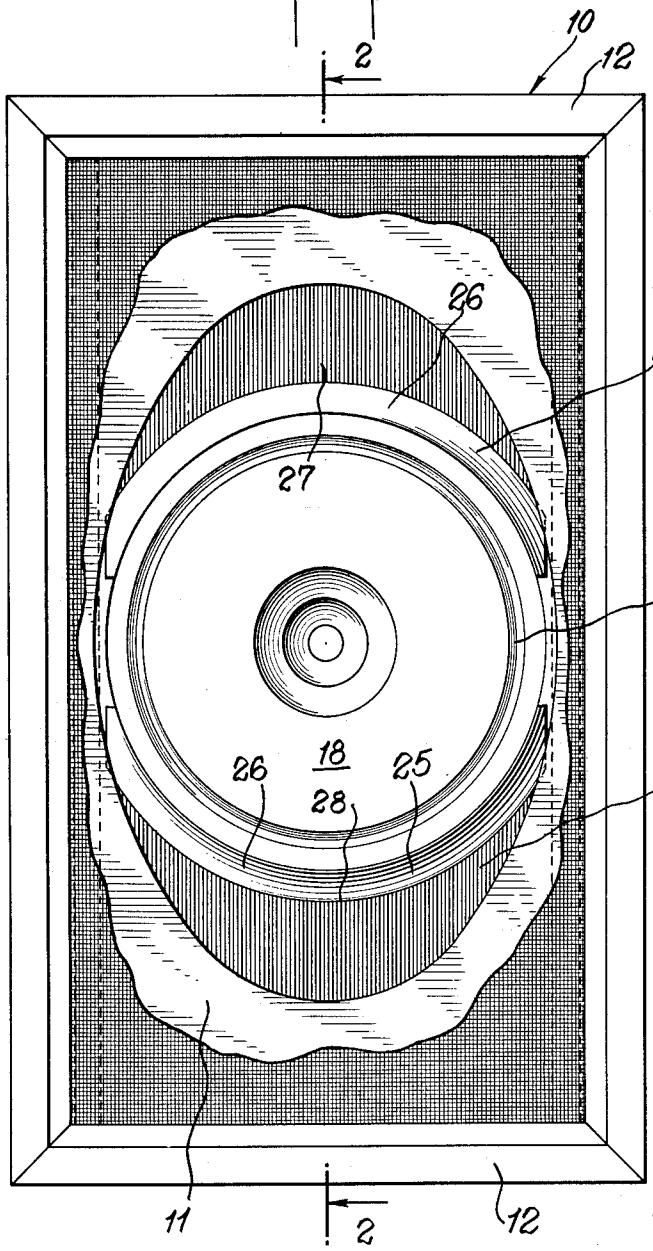

Fig. 1.

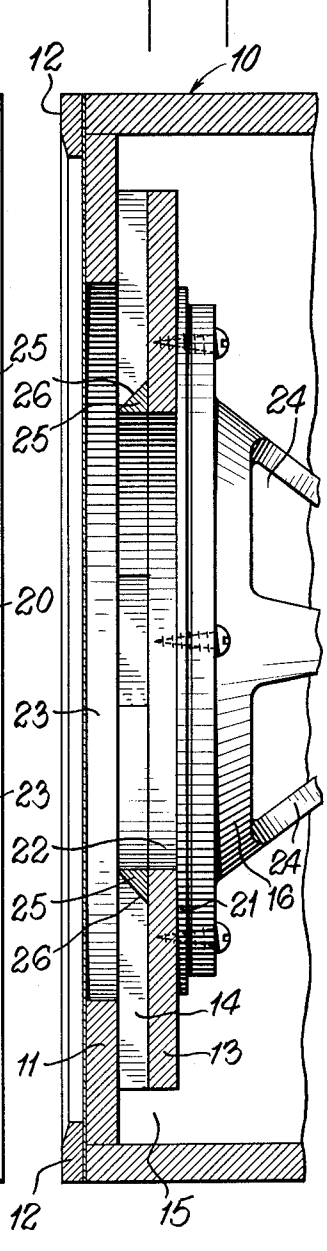

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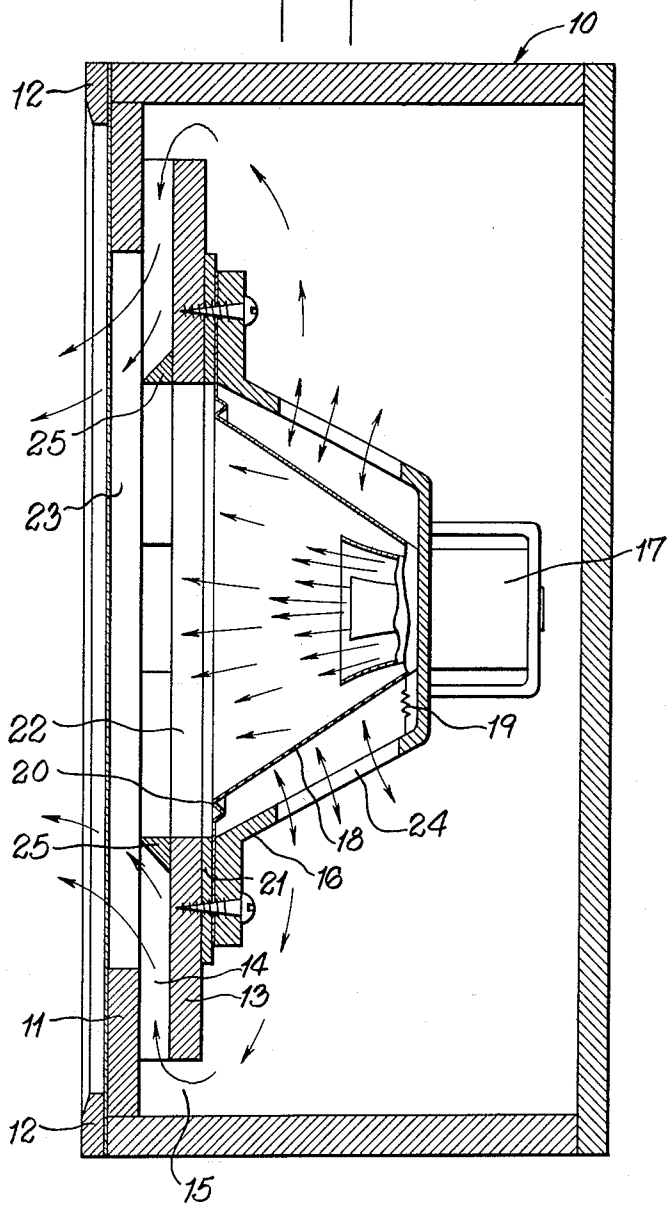
Fig. 3.



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LOUDSPEAKER BAFFLE ASSEMBLY

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8 Claims. (Cl. 181—31)

My invention relates to a loudspeaker baffle assembly.

In electrically operated loudspeakers, electric impulses generated by a sound track or other source are transformed by an electromagnetic transducer within a cabinet into mechanical vibrations. These vibrations are imparted to the apex of a hollow cone, flexibly supported forwardly at its base in a baffle plate at the forward end of the cabinet in such manner that it vibrates longitudinally of its axis of generation. Each forward movement generates a compression wave in the air in front of the cone and each rearward movement generates a wave of reduced pressure in this air, the alternate compression and reduced pressure waves constituting the sound wave. The sound waves pass from the cabinet through an elliptical opening in the front wall of the cabinet.

Similarly, alternate compression and reduced pressure waves are generated from the rear face of the cone but of opposite phase from those in front of the cone, the forward movement of the cone generating a reduced pressure wave and the rearward movement a compression wave. The sound waves from the rear of the cone are brought into phase with those from the front of the cone by leading them from the space within the cabinet back of the cone to a space between the front wall of the cabinet and the baffle plate, the length of the path of these rear sound waves being equal to one half the wave length of the sound waves at approximately the middle of the range of tones of the cone. These waves from the rear of the cone are in phase with those from the front of the cone and if directed in the same direction would reinforce the sound waves from the front of the cone thereby giving the loud speaker greater power.

The sound waves passing over the front surface of the baffle plate have a tendency to cling to the surface of the plate even to the opening and to turn inwardly at the opening and, opposing the sound waves coming from the front of the cone, reduce the power of the loud speaker.

My invention provides means, whereby these sound waves are directed forwardly, in the direction of the sound waves from the front of the cone to reinforce the latter and increase the power of the loudspeaker.

In my invention I provide about the circular opening in the baffle plate and extending forwardly thereof an annular deflecting flange the outer surface of which slopes radially inwardly and forwardly. The slope of this surface is most effective at an angle of 45° to the plane of the baffle plate but for particular conditions may vary from 45°. The opening in the front wall is of a generally elliptical shape with the minor axis equal to the diameter of the opening in the baffle plate, the centers of both openings being on a common axis. This provides a pair of diametrically opposite crescent shaped openings for the sound waves from the back of the cone. The sound waves from the front and from the back of the cone thus proceed forwardly approximately in phase and without interference.

The various features of the invention are illustrated, by way of example, in the accompanying drawings, in which:

FIG. 1 is a vertical section of the forward part of a loud speaker cabinet and of the baffle assembly of my invention taken through the common axis of the cone and the baffle plate and front wall openings;

FIG. 2 is a front elevation of the cabinet showing the front wall and the baffle plate, parts being broken away to show interior details, and

FIG. 3 is a vertical section of the apparatus similar to that of FIG. 1.

In the embodiment of the invention shown in the accompanying drawings, the loudspeaker baffle assembly is illustrated as mounted in a cabinet **10** having a front wall **11**. This front wall may have a molding **12** about its front edge for the purpose of appearance or reinforcement. A baffle plate **13** is mounted to the rear of the front wall **11** and spaced therefrom to form a space **14**. The outer edges of the baffle plate are also spaced from the side wall of the cabinet to form a passage **15** from the rear of the baffle plate to the passage **14**.

The baffle plate **13** may serve as a mounting and support for a cone and an electromagnetic transducer. For this purpose a basket **16** may be mounted on the rear face of the baffle plate **13** extending rearwardly to mount the transducer **17** and the vibrating cone **18**.

The rear end or apex of the cone is supported by a spider **19** which may comprise springs at circumferentially spaced intervals to enable the cone to vibrate forwardly and backwardly under the action of the transducer. The front end or base of the cone is supported for vibratory forward and rear movements by a surround **20** of flexible sheet material the outer margin of which is engaged between the front edge of the basket and the rear face of the baffle plate **13** a gasket **21** of a dead material being interposed between the marginal edge of the surround and the back face of the baffle plate to deaden any vibrations that might be transmitted through the surround from the cone.

The vibrations from the front or interior surface of the cone pass through an opening **22** in front of and co-axial with the cone and thence through an opening **23** in the front wall of the cabinet. Vibrations from the rear surface of the cone are transmitted through openings **24** in the basket, thence from the rear part of the cabinet through the passages **15** and **14** toward the opening **22** in the baffle plate. These vibrations are deflected by means of an annular flange **25** enclosing the periphery of the opening **22** and extending forwardly toward or to the front wall **11**. The annular flange **25** has a sloping outer annular surface **26**, the angle of slope being preferably 45° to the surface or plane of the baffle plate.

The opening **22** is circular and centered on the axis of the cone **18**, and the annular wall **25** is also circular. As shown in FIG. 2 the opening **23** of the front wall is of a generally elliptical shape having its minor axis about equal to the diameter of the opening **22**. There is thus formed a pair of crescent shaped passages **27** and **28** diametrically positioned on opposite side of the periphery of the opening **22**.

The sound waves from the rear of the cone which were originally in opposite phase to the sound waves of the front surface of the cone are brought into phase with the vibrations of the front of the cone by making the length of the path from the rear of the cone through the passages **15** and **14** equal to one-half wave length of the tones in the intermediate range of the cone **18**. This is a well known expedient in the art. Consequently when a compression wave starts from the front surface of the cone a compression wave from an adjacent cycle arrives from the rear of the cone and being deflected forwardly through the passages **27** and **28** moves forwardly together with the compression wave from the front surface of the cone. The crescent shape of the openings **27** and **28** facilitates this forward movement brought about by the deflector **25** so that sound waves from the rear of the cone and those from the front of cone flow parallel and without impinging one on the other. The power of the

loudspeaker is thus brought to its maximum efficiency.

It will be apparent that the intermediate tone whose wave length has been used to determine the length of path from the cone to the opening **23** will be among the low tones of the cone, namely those in the range in which the cone would act as a "woofer" for a high fidelity loudspeaker. The tones coming from the "tweeter" and "whizzer" are not influenced by the passage between the baffle plate and the front wall.

Having described my invention, what I claim is:

1. A baffle plate assembly for loudspeakers which comprises, a front wall having an opening, a baffle plate spaced rearwardly of said wall and having an opening of lesser area than that of the opening in the front wall and centered on a common axis therewith and a deflecting flange on said baffle plate about the periphery of the opening therein and extending forwardly toward said front wall.

2. The baffle plate assembly of claim 1 in which the opening in the baffle plate is circular and in which the opening in the front wall is of a generally elliptical shape having a minor axis approximately the same as the diameter of the opening in the baffle plate.

3. The baffle plate assembly of claim 2 in which the outer surface of the deflecting flange is at an angle of approximately 45° to the plane of the baffle plate.

4. A loudspeaker comprising a cabinet having a front wall, said front wall having an opening, a baffle plate spaced rearwardly of said front within said cabinet and having an opening of lesser area than that of the opening in the front wall and centered on a common axis therewith, said cabinet having a passage from the interior of the cabinet back of said baffle plate with a space between said baffle plate and said front wall, and a deflecting flange on said baffle plate about the periphery of the

opening therein and extending forwardly toward said front wall said cabinet being closed except for the said passage and said opening in said front wall.

5. The loudspeaker of claim 4 in which said opening in said baffle plate is circular and the opening in said front wall is of a generally elliptical shape having its minor axis approximately equal to the diameter of said circular opening.

6. The loudspeaker of claim 5 in which the outer surface of said deflecting flange is at an angle of 45° to the plane of the baffle plate.

7. The loud speaker of claim 6 having a supporting basket mounted on the rear wall of said baffle plate and a transducer and vibrating cone mounted on and within said basket.

8. The loudspeaker of claim 7 in which the length of the passage from the interior of the cabinet back of the baffle plate to the opening in the baffle plate is equal to one half of the wave length of tones in the intermediate range of said cone.

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