Oct. 10, 1967

H. H. HARE

3,346,070

ELECTRONIC ORGAN SPEAKER SYSTEM

Filed Dec. 16, 1966

2 Sheets-Sheet 1

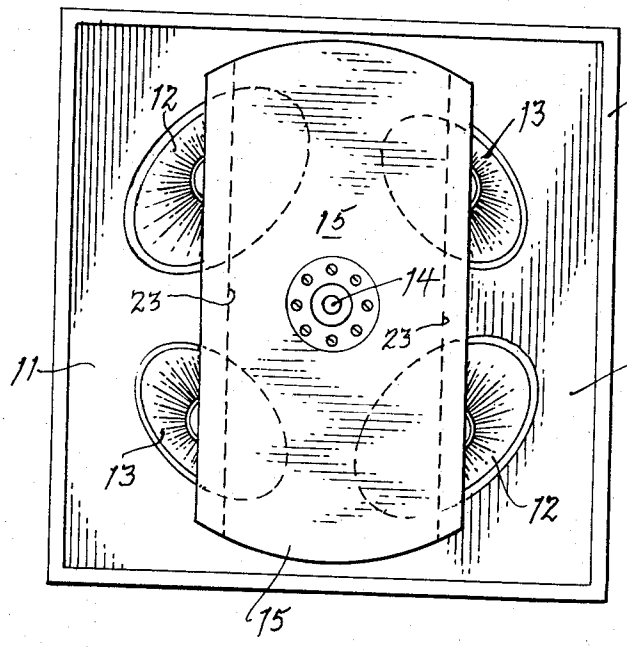


Fig. 1.

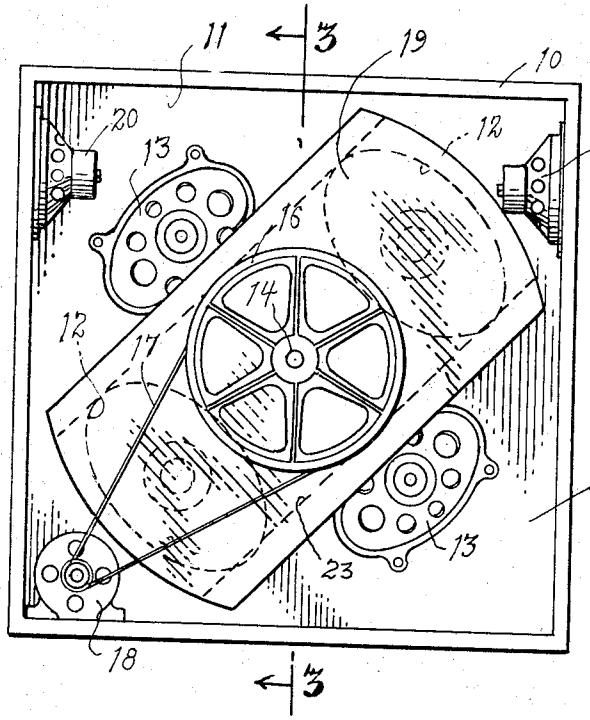


Fig. 2.

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2 Sheets-Sheet 2

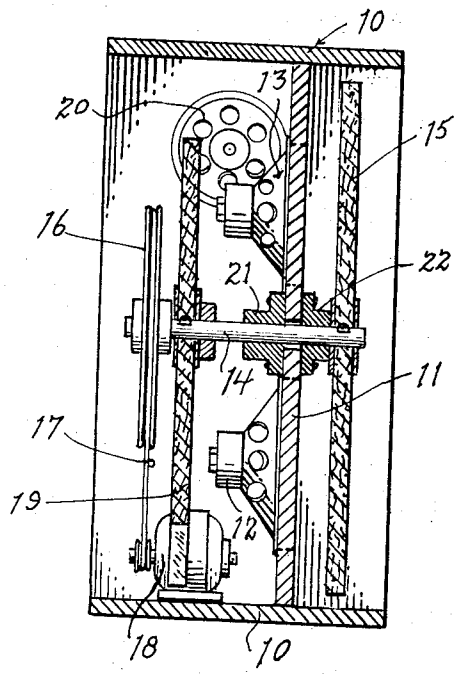


Fig. 3.

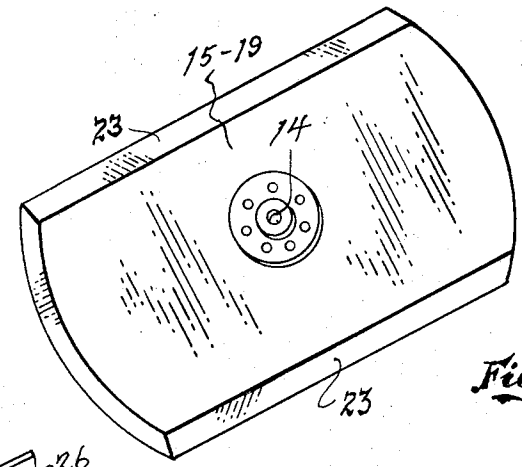
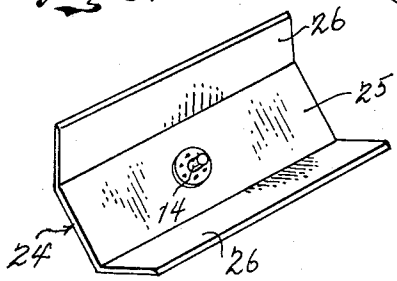


Fig. 4.

Fig. 5.



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ELECTRONIC ORGAN SPEAKER SYSTEM

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2 Claims. (Cl. 181—31)

ABSTRACT OF THE DISCLOSURE

In brief, my invention contemplates the employment of a relatively shallow sound reverberating chamber having a plurality of electro-magnetic and/or dynamic cone type speakers arranged in a common plane upon a supporting baffle with a rotating sound interrupting means by which the output of the individual speakers is periodically and successively interrupted by said means and thus produce the effect of movement in the source of the sound. In other words, the sound emanating from the several speakers will give the appearance of movement in the source transverse to the axis of the speaker elements which will result in a tremolo or stereophonic effect as the speakers are operated in the conventional manner through an electronic amplifier under the control of a conventional electric organ console.

My present invention relates to new and useful improvements in sound reproducing systems and more particularly a sound reproducing system that will improve the rendition of electronically amplified organ music and is an improvement on the prior Patent No. 3,204,722, dated September 7, 1965, entitled, "Electronic Organ Speaker with Tremolo Effect."

One of the objects of the invention is to provide a sound reproducing system to be used with an electric organ, which will faithfully reproduce the sound and provide a pleasing tremolo effect in the upper frequency range and in the middle and lower bass frequencies.

Another object of the invention is to provide an improved speaker arrangement for creating a tremolo effect for the notes from an electric organ with a reverberation of the music to simulate the choir or celeste effect of pipe organ music with slightly reduced reverberation in the high frequency range and with increased brilliance.

A further object of the invention is to provide a sound reverberating chamber with a plurality of dynamic speakers and baffle with a rotating sound deflector means by which a stereophonic effect is produced in a novel manner.

Another object of the invention is to produce a sound reproducing system employing an open sided chamber with a plurality of cone type speakers that will lend brilliance to the tones and overtones that issue from the chamber and produce sound with high fidelity for the notes in the high, low and lower frequencies with a tremolo effect and a reverberation that is not possible with other like sound reproducing means.

Another object of the invention is to provide a sound reproducing system for carrying out the reproduction of sound, which consists primarily of a cabinet with a plurality of sound reproducing dynamic speakers, mounted in a conventional baffle in association with an improved sound intercepting means that will operate successively on the individual speakers to produce an overall tremolo and celeste effect.

Other and further objects, features and advantages will be apparent from the following description of presently preferred embodiments of the invention, given for the purpose of disclosure and taken in conjunction with the accompanying drawings, where like character references designate like parts throughout the several views.

In the accompanying drawings where like numerals refer to like parts throughout the several views,

FIGURE 1 is a front view of my improved sound producing cabinet,

FIGURE 2 is a rear view of the device as shown in FIGURE 1,

FIGURE 3 is a vertical sectional view taken along line 3—3 of FIGURE 2 looking in direction of arrows,

FIGURE 4 is a perspective view showing details of a sound wave interrupting member, and

FIGURE 5 is a similar view showing another form of sound interrupting member for use in accordance with the invention.

For a more detailed description of the invention reference is made to the accompanying drawings wherein the numeral **10** designates a frame-like chamber forming member which with a baffle **11** may be described as an open ended cabinet. The cabinet **10** formed as shown is substantially square in outline and mounted upon the baffle **11** there are four cone type dynamic loud speakers, the two larger ones designated by the numeral **12** are arranged diametrically opposite each other in a circle as will be here and after pointed out. Also arranged in this circle and between the loud speakers **12** there are two smaller speakers **13**. In this arrangement the speakers **12** and **13** are shown as of elliptical form with their long axes disposed tangent to the circle in which they are arranged. Extending centrally and by the speaker carrying baffle **11** there is a rotatable shaft **14**, upon which there is mounted a sound wave interrupting member **15** that is disposed at the front of the speakers **12** and **13**. This sound wave interrupting member, as will be here and after pointed out is adapted and arranged to move across and the sound wave paths of the several speakers when the system is in operation.

As shown in FIGURE 2 the shaft **14** carries a relatively large belt accommodating pulley that is driven through a belt **17** by a small electric motor **18** located to one side and at the bottom of cabinet **10**. As here shown the shaft **14** also carries a sound interrupting member **19**, which like the sound interrupting member **15** is adapted and arranged to move into sound intercepting relation at the backs of the speakers **12** and **13**. In this latter figure of the drawings it is to be noted that the sound wave deflecting member **19** is disposed at an angle with respect to the sound interrupting member **15** which as shown in FIGURE 1 is in a substantially vertical position. The sound interrupting members **15** and **19** are of a width sufficient to substantially encompass entire output area of the larger loud speakers and when in rotation, these members will operate in a nonsynchronized sound interrupting effect at the fronts and backs of the loud speakers **12** and **13**. As a further feature I may also employ loud speakers **20** at the sides of the cabinet forming frame **10** to provide some straight and uninterrupting sound which will blend with the slow tremolo effect of the other speakers **12** and **13** when the sound interrupting members **15** and **19** are operating at their medium speed. This in effect provides over tones which blend and provide a celeste quality in the tone somewhat like that produced when two sets of organ pipes are purposely detuned from each other to cause beats or a wavering of tone.

While all of the speakers **12** and **13** may operate within the same tonal range, different effects can be provided by varying the tonal range of the successive speakers as arranged in a circle as described above. The rate of speed of the sound interrupting members **15** and **19** may vary from 125 to 200 r.p.m., which would be the fast speed, at about 30 r.p.m. at modern speed and as low as 15 r.p.m. at the lower speed. In this connection the speeds will be adjustable and may be varied to accommodate each particular organ and/or the conditions under which

the system is to operate. Normally the cabinet **10** will be located a suitable distance from the wall of a room in order that the sound from the back or one side of the cabinet **10** will not be blocked. In practice it is contemplated that the speaker cabinet should be set in the front wall of a hall or auditorium either remote from or immediately adjacent to the electronic organ console.

As shown in FIGURE 3 the sound interrupting members **15** and **19** are of sufficient construction and thickness to be free of resonance. Preferably the members **15** and **19** will be formed of ply-wood with four or more plys. As here indicated the shaft **14** is mounted in a bushing assembly and journaled for rotation upon bearing forming bushings **21** and **22** that are secured upon the speaker supporting baffle **11**.

In operation it will be found that very little turbulance will be set up by the rotating sound interrupting members **15** and **19**. However, when operating at their higher speeds and to avoid any turbulance at these higher speeds the members **15** and **19** are chamfered along their sides **23**, at an angle of approximately 45 degrees and inclined in a direction away from the source of sound produced by the speakers. These chamfered sides **23** provide knife-like edges tangent to the axis of the shaft **14** and serve to deflect sound toward the top, bottom and sides of the cabinet. The cabinet **10** as shown here is open at both ends, but it will be understood that for appearance when used exposed to view the ends of the cabinet **10** may be covered or closed with a sound pervious fabric as is well understood in this art.

In FIGURE 5 there is shown a modification of the sound interrupting member, here designated by the numeral **24**, which has a main sound interrupting portion **25** with flaring side portions **26** that extend outwardly a greater depth from the source of sound than does the chamfering **23** of the members **15** and **19**. In this showing a greater depth in the chamfering as shown in FIGURE 4, is obtained without any material increase in the weight or mass of the rotating member. While the sound interrupting members **15** and **19** with the champering **23** as shown have a lateral sound deflecting function, the flaring sections **26** of the member **24** will provide a greater sound distributing effect. In order to obtain this result the member **24** is here shown as formed of single-ply wood of reduced thickness which will at the same time provide a greater depth in the sound deflecting and flaring portions **26** of the member **24**. This sound interrupting member **24** will be found particularly suited to the lower tonal ranges and will rotate at speeds preferably lower than will the sound interrupting members **15** and **19**.

While I have, for the sake of clearness and in order to disclose my invention so that the same can be readily understood, described and illustrated specific forms and arrangements, I desire to have it understood that this invention is not limited to the specific forms disclosed, but may be embodied in other ways that will suggest themselves to persons skilled in the art. It is believed that this invention is new and all such changes as come within the scope of the appended claims are to be considered as part of this invention.

Having thus described my invention what I claim and desire to secure by Letters Patent is:

1. In a sound reproducing system for electronic organs, the combination of a sound reverberating cabinet having an open end, a vertically disposed speaker supporting baffle mounted within said cabinet inwardly from the open end thereof, a plurality of electrodynamic sound reproducing speakers mounted in a circle upon said supporting baffle with their axes in line with the open end of said cabinet, an elongated sound wave interrupting member of non-resonant material mounted in outwardly spaced relation at the front of said speakers having a total width corresponding substantially with the effective diameter of said speakers and of a length sufficient to cover at least two diametrically opposite speakers in said circle, said sound wave interrupting member having a central portion extending transverse to the axes of said speakers and flaring side portions extending outwardly therefrom at an angle of substantially 45 degrees, and means including a motor driven supporting shaft for turning said sound interrupting member when said speakers are in operation, whereby a roving stereophonic and tremolo effect will be produced in the sound waves emanating at the open end of said chamber.

2. In a sound reproducing system for producing pipe organ effects in sound produced by an electronic organ, the combination of a horizontally extending sound reverberating cabinet of resonant material having sound transmitting open ends, a vertically disposed speaker supporting baffle located intermediate the open ends of said cabinet, a plurality of dynamic speakers mounted in a circle upon said baffle to project sounds from the front and backs thereof and at opposite sides of said speaker supporting baffle, rectangular sound interrupting members mounted at each side of said baffle upon a rotating shaft extending centrally through said speaker supporting baffle, said sound wave interrupting members being of a width to cover the area of a single speaker as mounted in said circle and of a length sufficient to cover at least two radially aligned speakers in said circle, means for driving said shaft to turn said sound interrupting members in a plane transverse to the direction of the sound waves produced by said speakers, and characterized by the fact that the ends of said sound interrupting members are rounded to compare with the circumference of a circle about the axis of said supporting shaft and are chamfered along their sides in a direction outwardly from said speakers at an angle of substantially 45 degrees.

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STEPHEN J. TOMSKY, *Primary Examiner.*