

July 2, 1963

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3,095,940

ACOUSTICAL VIBRATO APPARATUS

Filed May 28, 1959

2 Sheets-Sheet 1

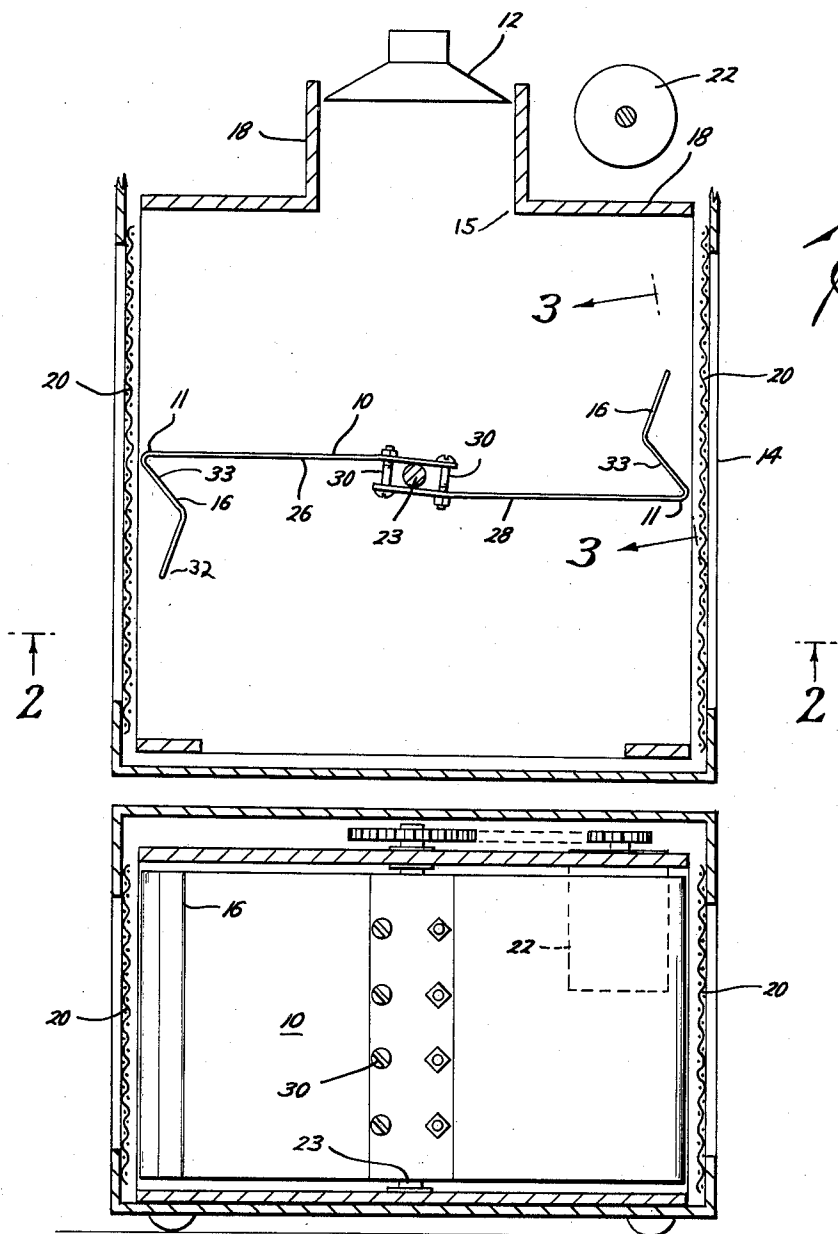


Fig. 2

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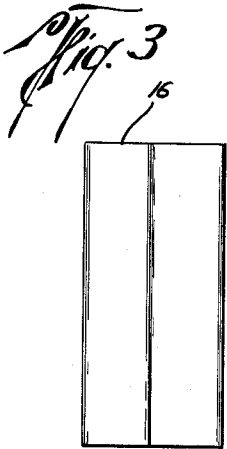
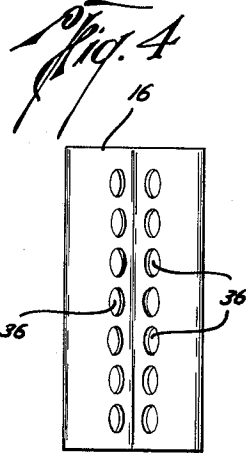
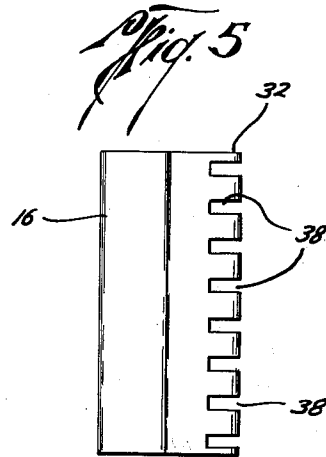
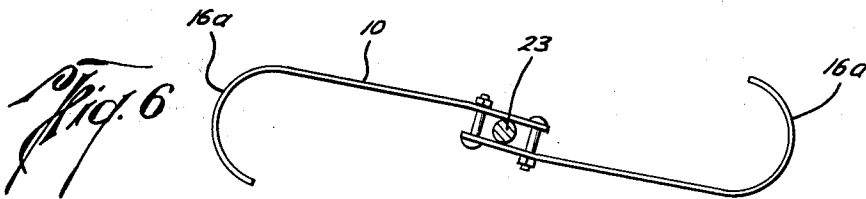
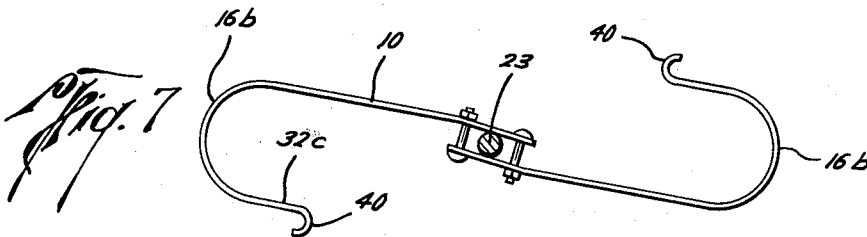
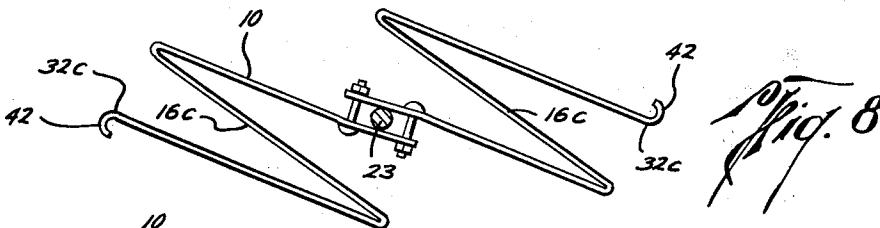
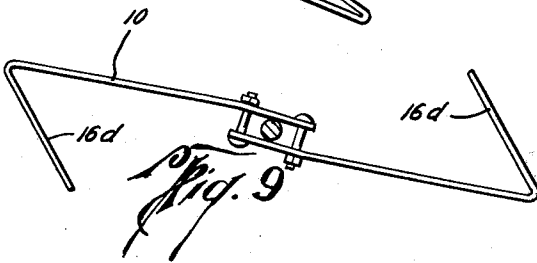
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ACOUSTICAL VIBRATO APPARATUS

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4 Claims. (Cl. 181—27)

The present invention relates to an acoustical vibrato apparatus and, more particularly, relates to the improvement in a rotatable vibrato producing deflector which results in the production of improved tonal qualities from a sound source.

Generally, various types of mechanical acoustical apparatus have been used such as rotating horns and rotating blades to add tremolo or vibrato to the sound produced by a loud speaker. For instance, see my Patent Number 2,847,081 which discloses a rotatable blade mounted in front of a speaker enclosed in a baffled enclosure or housing. The tremolo producing blades of the prior art changes the sound output from the speaker by producing a variation in the volume output of the speaker. The present invention is directed towards improvements in the rotatable deflector blade which adds desirable acoustical qualities to the tremolo or vibrato produced as the deflector is rotated.

It is therefore an object of the present invention to provide an improved rotatable deflector which includes flanges connected to the outer extremities of the deflector which create a compression or close loading on the front of the speaker thereby changing the tonal output from the speaker.

It is a further object of the present invention to provide a rotatable tremolo producing blade having flanges which when rotated parallel to the mouth of the speaker change the pitch of the sound output. This pitch change effect may be varied by changing the angle at which the flanges are connected to the rotatable blade.

A further object of the present invention is the provision of various shaped and sized flanges which are positioned along the outer edges of the rotatable tremolo blade and parallel to the axis of the blade which produce multiple loading effects on the front of the speaker and provide a phase shift on the sound produced by the speaker and introduce breakup in the sound. The degree of the effects produced depend upon the size and shapes of the flanges selected.

Yet a further object of the present invention is the provision of flanges along the outer extremities of a rotatable vibrato blade provided with a plurality of openings in the flanges which add brilliance and smooth out the string ensembles of an organ input to the speaker.

A still further object of the present invention is the provision of axial flanges along the outer extremities of a rotatable blade having a plurality of slots in the free ends of the flanges which also improve the tonal quality by adding brilliance to and enhancing the sound of strings.

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, and where

FIGURE 1 is a partial view, in cross-section, illustrating a rotatable deflector in an acoustical enclosure and illustrating an apparatus according to the invention,

FIGURE 2 is a view taken along the line 2—2 of FIGURE 1,

FIGURE 3 is a view taken along the line 3—3 of FIGURE 1,

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FIGURE 4 is a view similar to that of FIGURE 3 illustrating the flange of FIGURE 3 and including a plurality of openings in the flange,

FIGURE 5 is a view similar to that of FIGURE 3 illustrating the flange of FIGURE 3 and including slots provided along the free edge of the flange,

FIGURE 6 is a cross-sectional view of a modified form of a rotatable blade having curved flanges,

FIGURE 7 is another modified form of the present invention similar to FIGURE 6 with the addition of curved ends added to the free ends of the flanges,

FIGURE 8 is another modified cross-sectional view of the present invention in which the flanges are provided in the shape of exaggerated V's, and

FIGURE 9 is the cross-sectional view of another modification of the present invention illustrating a single flat type flange.

Referring now to the drawings, and particularly to FIGURES 1 and 2, the reference numeral 10 generally designates the rotatable deflector blade which is conventionally rotated in front of and parallel to the opening 15 of the speaker 12, both of which, are suitably enclosed in an acoustical enclosure or housing 14. The present invention is directed to the flanges 16 which are attached to the outer extremities of the rotatable blade 10. The acoustical enclosure 14 is not part of the present invention as the flanges 16 may be used in various types of acoustical enclosures such as disclosed in my Patent No. 2,847,081 or the acoustical enclosure of George, Patent No. 2,780,302. Preferably, however, the speaker 12 must be baffled to some extent to allow the tremolo blade 10 and the flanges 16 to produce multiple loading effects on the front of the speaker and create compression on the sound output from the speaker 12. Therefore, the speaker 12 may be, if desired, positioned recessed in a support member 18 in one side of the acoustical enclosure similar to that shown in FIGURE 1 and in my Patent No. 2,847,081. Preferably, the cabinet enclosure or housing 14 has openings 20 on opposite sides of the cabinet 14 and parallel to the axis 23 of the rotatable blade 10. Thus, a stereophonic effect is produced by the use of the two openings 20 on either side of the rotatable blade 10. As is conventional in acoustical enclosures, the top and bottom sides (not shown) are provided to increase the baffling or loading effect on the speaker 12. A motor 22, as is conventional, is provided to rotate the blade 12 by any desirable connections. Of course, other types of speaker and acoustical enclosure arrangements may be utilized in connection with the flanged rotatable blade of the present invention and various types of baffling arrangements may be used.

The rotatable tremolo blade or paddle 10 may be made integrally as shown in the prior art and connected to its rotatable axis 23 or as shown may include for ease of manufacture sides 26 and 28 connected at the axis 23 by any convenient means such as bolts 30.

As best seen in FIGURE 1, the flanges 16 of the present invention are connected axially to the outer ends 11 of the rotatable blade 10 and parallel to the blade axis 23. Since the clearance between the outer ends 11 and the supporting recessed partition 18 is maintained as small as possible to increase the loading of the rotatable blade 10 on the speaker 12, the free ends 32 of the flanges 16 are preferably positioned so as not to protrude radially outward any further than the ends 11. Preferably, as shown in FIGURE 1, the direction of rotation of the rotatable blade 10 is in the clockwise direction and the flanges 16 are connected to the outer ends 11 so as to trail behind the blade 10 as it rotates. Thus as the flanges 16 are rotated in a plane in front of and parallel to the opening of the speaker 12 the flanges produce multiple

loading effects on the front of the speaker, and introduce harmonic breakup in the air column or sound path of the speaker 12, change the pitch and cause a phase shift in the sound output. Of course, the degree of the effects produced depend upon the size and shape of the flanges 16. As shown in FIGURE 1, one type of flange which has produced very desirable characteristics is the V-shaped flange having one side 33 connected to the end 11 of the rotatable blade 10 while the other side 32 of the V is free. While the dimension of the flange 16, as best seen in FIGURE 2, along the line of connection or joinder to the blade 10 is the same as the blade 10, the dimension of the flanges 16 from their connection at the outer ends 11 of the rotatable blade 10 in a rearwardly direction from the blade 10, as best seen in FIGURE 1, is no greater than the diameter of the speaker opening 15 although they are of a sufficient extent to increase the loading effect on the speaker.

As best seen in FIGURES 4 and 5, various modifications can be made to the flanges 16 to add desirable tonal qualities to the sound output from the speaker. As shown in FIGURE 4 a plurality of holes 36 may be provided, preferably near the apex of the flanges 16 which, it has been found, add brilliance to the high frequencies. Of course these holes may be of other shapes such as square or rectangular. As best seen in FIGURE 5, slots 38 may be provided in the free end 32 of the flanges 16 which also add brilliance to the high frequencies.

Of course various modifications of the flanges 16 may be made which provide a loading effect on the speaker 12 and add desirable tonal qualities to the sound output. FIGURES 6, 7, 8 and 9 illustrate modifications of the flanges according to the invention, the letters "a," "b," "c," and "d," being applied to parts corresponding to those in FIGURES 1-3, inclusive, for convenience of reference. FIGURES 6 and 7 illustrate a rotatable blade deflector 10 having arc shaped flanges 16a and 16b, respectively. In addition, FIGURE 7 illustrates a modification having a reversed tip 40 added on to the free end 32c of the flanges 16b.

FIGURE 8 illustrates another modification in which the flanges 16c consist of an exaggerated deep V. The reversed tip 42 may also be provided at the free end 32c of these flanges. FIGURE 9 illustrates another modification in which the flanges 16d consist of a single flat body.

The angle between the flanges 16, 16c, and 16d, respectively, and the rotatable blade 10 may be varied thereby effecting changes in the pitch of the sound output.

The paddle 10 and flange 16 are preferably made of a resilient metal so that as compression on loading of the speaker occurs as the paddle is rotated, the paddle 10 and flange 16 will have a radial springing or vibrating motion caused by their loading the speaker thereby adding harmonics to the sound output.

In use, the rotatable deflector 10 is rotated at tremolo speed which is in the range of 5 to 7 cycles per second. Therefore, since the blade 10 has sides 26 and 28, the speed of rotation of the shaft 23 is one-half of the desired tremolo beat. If desired only one-half of the blade 10 need be used and in that case the motor pulley is revolved at the speed of the desired tremolo. As the blade 10 rotates the blade 10 creates a compression on the front of the baffled speaker 12 thereby producing the tremolo or vibrato as is conventional. If desired, the clearance between the ends 11 of the paddle 10 and the support-

ing partition 18 is made a practical minimum to load the front of the speaker 12. The flanges 16, 16a, 16b, 16c, and 16d produce multiple loading effects on the front of the speaker as they in turn are periodically positioned in front of and parallel to the speaker opening and produce various degrees of pitch change, sound breakup and phase shift depending upon the size, shape and angular position of the flanges with respect to the blade 10. Furthermore, the addition of openings 36 (FIGURE 4) in the body of the flanges or slots 38 (FIGURE 5) to the free end 32 of the flanges produce the desirable effect of adding brilliance to the high frequencies. Furthermore, reverse curves such as 40 (FIGURE 7) and 42 (FIGURE 8) may also be added to the various flange shapes to add a multiple tremolo beat to the sound output. The use of resilient metal blades and flanges will also produce a radial vibrating motion of the blades and flanges and add harmonics to the output.

The present invention, therefore, is well adapted to carry out the objects and attain the ends and advantages mentioned as well as others inherent therein. While presently preferred embodiments of the invention are given for the purpose of disclosure, numerous changes in the details of construction and arrangement of parts and numerous modifications of the flanges may be made which will readily suggest themselves to those skilled in the art which are encompassed within the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. In a rotatable vibrato sound producing apparatus having a speaker in a housing, such speaker having an opening, a rectangular blade deflector having first and second ends, and having a width sufficient to extend across the speaker, said blade deflector being rotatable about an axis positioned in front of and parallel to the plane of the speaker opening, and means operatively associated with the blade deflector for rotating said blade deflector, the improvement comprising,

two flanges, one of which is connected to the first end and the second of which is connected to the second end of the blade deflector, the dimension of the flanges at the line of connection to the blade deflector being the same as the blade deflector, the entire body of said flanges extending rearwardly from the blade deflector relative to the direction of rotation, the distance of said rearward extent being no greater than the speaker opening, but being of a distance sufficient to increase the loading effect on the speaker.

2. The invention of claim 1 wherein the flanges in cross section are substantially V-shaped members.

3. The invention of claim 2 including openings in said flanges proximate the apex of the V.

4. The invention of claim 1 wherein the flanges include a plurality of openings.

References Cited in the file of this patent

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