Nov. 18, 1969 C. A. ROSS 3,478,837

ROTARY SOUND SOURCE WITH OPTICALLY ENHANCED VIBRATO

Filed Nov. 27, 1967 2 Sheets-Sheet 1

Fig. 1.

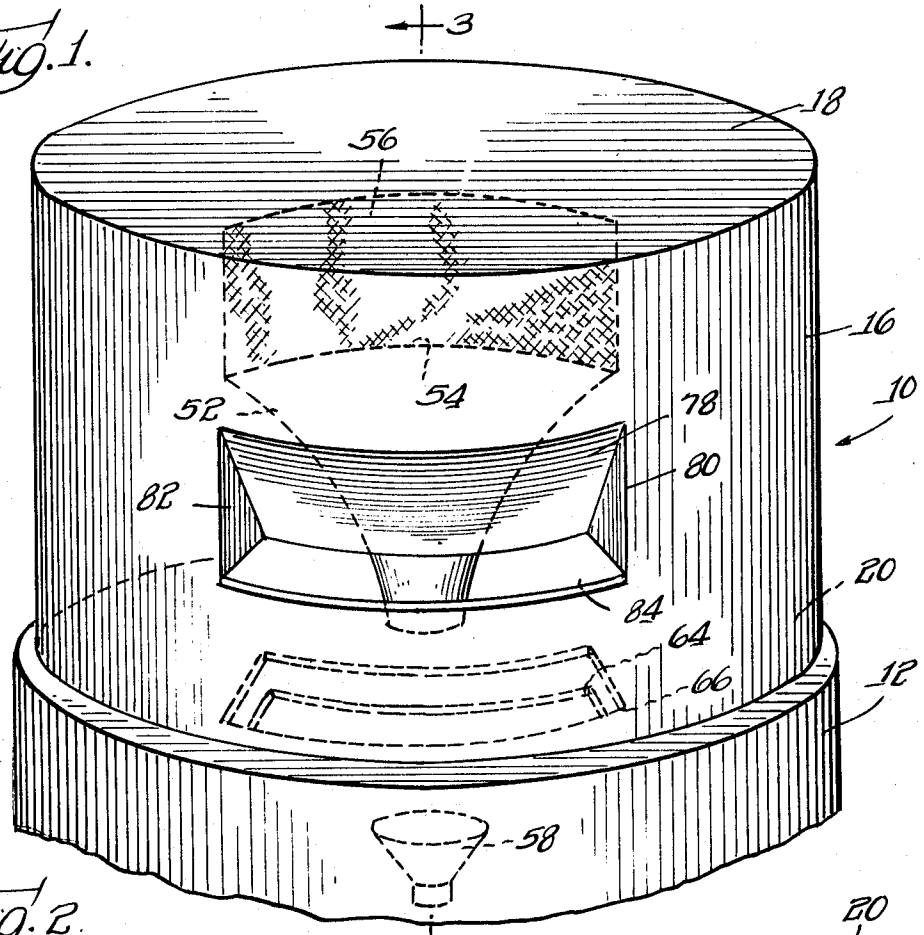
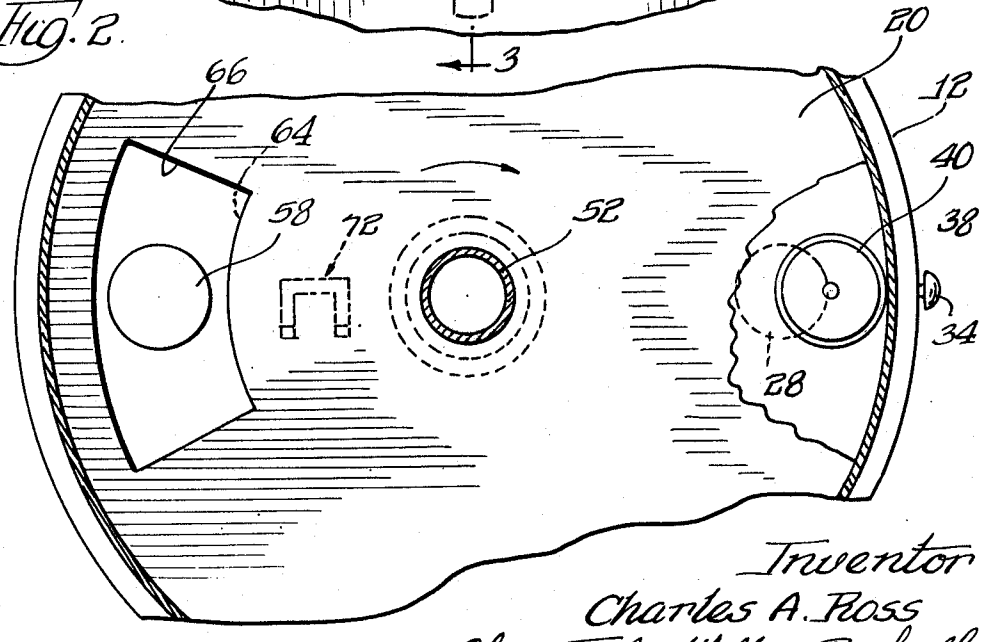


Fig. 2.



Inventor
Charles A. Ross
By: Olson, Treyler, Wolters & Bushnell
Attys

Nov. 18, 1969 C. A. ROSS 3,478,837

ROTARY SOUND SOURCE WITH OPTICALLY ENHANCED VIBRATO

Filed Nov. 27, 1967 2 Sheets-Sheet 2

Fig. 3.

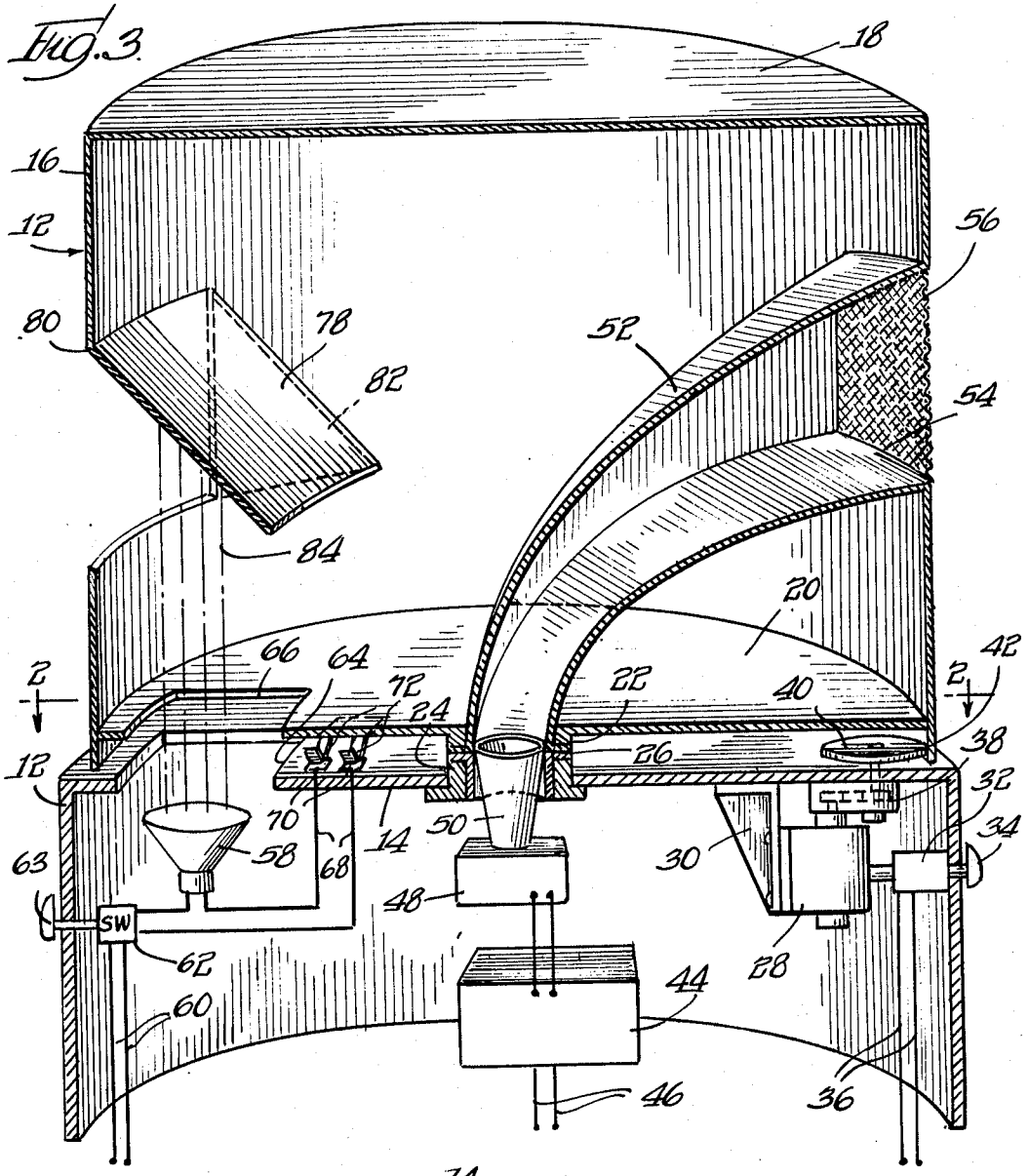
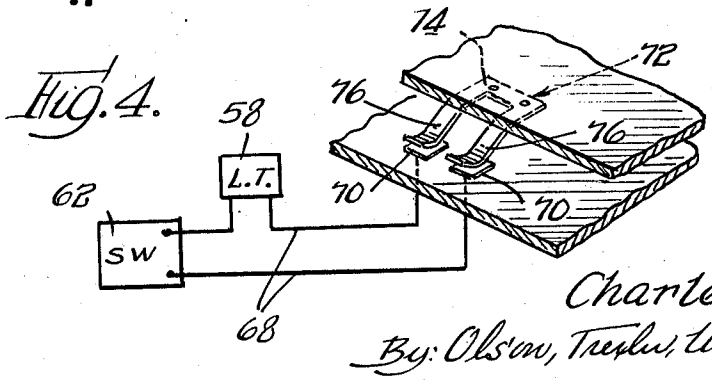


Fig. 4.



Inventor
Charles A. Ross
By: Olson, Trexler, Wolters & Bushnell
attys.

United States Patent Office 3,478,837 Patented Nov. 18, 1969

3,478,837

ROTARY SOUND SOURCE WITH OPTICALLY ENHANCED VIBRATO

Charles A. Ross, Chanute, Kans., assignor to Kustom Electronics, Inc., Chanute, Kans., a corporation of Kansas

Filed Nov. 27, 1967, Ser. No. 685,786
Int. Cl. G10k 13/00, 11/10
U.S. Cl. 181—31 9 Claims

ABSTRACT OF THE DISCLOSURE

A fixed loudspeaker operating in conjunction with a rotating horn to produce a Doppler effect vibrato in combination with a synchronized flashing light source, the light optically enhancing the vibrato.

Various rotating apparatus for producing a Doppler effect vibrato have heretofore been known both in the prior patent art and available in commerce. For example, a fixed sound source is used in connection with a rotating horn in Leslie U.S. Patent Re. 23,323. The loudspeaker is physically rotated in several patents, and faces tangentially of the direction of motion in Arsem et al. Patent 3,069,958. The speakers face forwardly, and rotate parallel to their own axes in various patents, including Markowitz 2,491,674. The loudspeaker faces radially out from the axis of rotation in patents such as Teikowski 2,831,051.

All of the above-mentioned patents and many others relate to the physical development of a Doppler effect vibrato, and apparently the apparatus of each of these patents will develop a Doppler effect vibrato to a greater or lesser degree. For many types of music, the vibrato developed is probably quite satisfactory. However, in modern "pop" music as produced by the use of electric guitars, combo organs, percussion instruments, etc., a very definite beat or emphasis is produced. The vibrato produced by a Doppler effect, although musically very pleasing, is not quite in keeping with modern "pop" music, and something is needed to enhance the vibrato effect. I have not been able to find any such enhancement in any patent art or commercially available product known to me.

In accordance with the present invention, it is proposed to provide a rotary speaker system Doppler effect vibrato in combination with a flashing light synchronized with the rotating system, hence to emphasize the musical beat and optically to enhance the vibrato.

Thus, it is an object of the present invention to provide an enhanced vibrato.

More specifically, it is an object of the present invention to provide an enhanced Doppler effect vibrato.

More specifically, it is an object of the present invention to provide a Doppler effect vibrato which is enhanced visually or optically.

Specifically, it is an object of the present invention to provide a Doppler effect vibrato which is optically enhanced by a flashing light synchronized with a rotating speaker system.

Other and further objects and advantages of the present invention will be apparent from the following description

when taken in connection with the accompanying drawings, wherein:

FIG. 1 is a perspective view of an optically enhanced rotary sound source Doppler effect vibrato apparatus in accordance with the present invention;

FIG. 2 is a horizontal cross-sectional view therethrough taken substantially along the line 2—2 in FIG. 1, a part being broken away for clarity of illustration;

FIG. 3 is a vertical sectional view partly in perspective as taken generally along the line 3—3 in FIG. 1; and

FIG. 4 is a fragmentary view in perspective showing an electrical contact arrangement for the flashing light.

Turning now in greater particularity to the figures, and first to FIGS. 1–3, there will be seen a rotary sound system identified generally by the numeral **10** and including a base **12** of any suitable shape, illustrated as cylindrical, adapted to stand on the floor or any other suitable supporting surface. The base **12** is substantially closed at the top by a roof or horizontal wall **14**. A rotary deflector structure **16**, likewise shown as cylindrical and closed at the top at **18**, is mounted on top of the base **12** for rotation thereon. Specifically, the rotary deflecting structure **16** is provided with a bottom wall or floor **20** spaced up slightly from the bottom edge of the cylindrical structure **16**. A depending central boss **22** cooperates with an upstanding boss **24** on the wall **14** through the medium of suitable bearing means **26** to permit rotation of the structure **16** relative to the base **12**. The bearing structure is not shown in detail, and can simply be a plastic bearing, such as the material generally known commercially as "Teflon" and generically known as polytetrafluorethylene. Alternatively, conventional roller or ball bearings can be used, or simply an oil impregnated porous bronze bearing.

An electric motor **28** is mounted within the base by means such as a bracket **30**. The motor is wired to a switch **32** having an externally accessible control knob or handle **34**. The motor may be of any common variety, preferably an induction motor, and electricity is applied to the switch **32** through wires **36**. The motor is provided with a speed reducer **38** which drives a rubber-tired wheel **40** above the wall **14** and bearing against the depending rim **42** of the rotary deflecting structure below the wall **20**. The speed of rotation may be preset, or the switch **32** may include voltage varying means, or tap switching means for varying the speed of the motor **28**, whereby to vary the rotational speed of the rotary deflecting structure **16**. It is generally agreed that a vibrato frequency on the order of 6 to 8 cycles per second is most desirable, but different effects can be produced by different speeds of rotation.

An amplifier **44** preferably is mounted within the base **12**, and is supplied with electrical tone signals through wires **46**. Such tone signals may come from a phonograph, from an electronic sound source such as an electronic organ or an electric guitar, or from a microphone. The amplifier is connected to an electroacoustic transducing device **48**, preferably a loudspeaker of the type having a horn **50**. Alternatively, an external power amplifier may feed the loudspeaker or transducer **48** directly, and the internal amplifier **44** may be omitted. The bosses **22** and **24** are hollow, and the horn **50** extends up into these bosses. The horn opens into an expanding exponential horn **52** formed in the rotary deflecting structure **16**, and exiting through the side thereof through an aperture

54, preferably covered with grill cloth 56. As the rotary structure 16 rotates, sound from the horn 50 is deflected by the exponential horn 52 and rotated to produce a Doppler effect vibrato. As will be understood, the particular horn structure shown is illustrative only insofar as the principles of the present invention are concerned, since deflector plates could be used in place of the horn 52, or the loudspeakers themselves could be rotated, as is known in the prior art.

A light source 58 is disposed within the base 12, being energized from wires 60 through a switch 62, having an externally accessible knob 63 for turning the switch on and off. If desired, the switch may also include one of the new solid state dimming devices to vary the intensity of the light source 58. Although it is contemplated that different types of light sources could be used, and for example a flashing gas lamp of the stroboscopic variety could be used, the illustration herein is of a reflecting spotlamp. A rectangular opening 64 is provided in the wall 14 above the lamp 58 in alignment therewith. A similar rectangular opening 66 is provided in the wall 20, and is capable of being aligned with the opening 64.

Connection is made from the switch 62 to the light source 58 through wires 68 which lead to contact patches 70 mounted in insulated fashion on the wall 14, as best may be seen in FIGS. 3 and 4. Preferably, the wall 14 is itself made of insulating material. However, it is contemplated that the wall 14 could be metallic, and the patches 70 could be insulated therefrom in known fashion.

A shorting bar structure 72 is mounted under the wall 20, and likewise is insulated relative to the wall, it again being contemplated that the wall itself could be made of insulating material. The shorting bar structure includes a base portion 74 secured by suitable means to the wall 20, and having depending contact strips 76 respectively engageable with the contact segments or patches 70. As will be understood, each time the contact strips 76 engage the patches or segments 70, a circuit between the patches 70 is completed, and the light 58 is energized to throw a beam upwardly, the beam passing through the apertures 64 and 66 which are aligned at the time the aforesaid electric contact is made.

A mirror 78 is disposed in vertical alignment with the opening 66, and lies at a 45° angle whereby to intercept light from the lamp 58, and reflect it out through a rectangular opening 80 in the side wall of the rotary deflecting structure 16. The mirror is supported at the top edge from the wall of the rotary structure 16, and is supported along the sides by gussets 82, and may also be supported at the bottom by a transparent glass or plastic sheet 84. The opening 80 may also be closed by a transparent glass or plastic sheet, if so desired.

Since the shorting bar structure 72 is carried by the rotating structure, there is no problem of synchronization. The lamp 58 is easily made to emit light precisely when the aperture for opening 66 is aligned with the opening 64, the mirror 78 being at that time directly overhead. In the illustrative embodiment of the invention, the mirror 78 is displaced 180° from the exponential horn 52. As will be understood, if the light is aimed toward the listener, this will be a null point of the Doppler effect. As will be understood, it is preferabe that the light flash should be either at a nul point, or at a point of maximum vibrato, i.e. at 90° angular displacement from the exponential horn 52. Indeed, it is contemplated that more than one light source and mirror could be provided, whereby flashes could be emitted at 90° and 180° relative to the sound source, or even at 0° relative to the sound source.

In any event, it will now be appreciated by those skilled in the art that I have disclosed an apparatus for producing a Doppler effect or frequency shift vibrato, accompanied by a flashing light synchronized with the vibrato so as to produce a marked visual or optical effect on the observer at a timed rate relative to the vibrato. This enhances the feeling of vibrato to the observer, thus making the vibrato more in keeping with the present day trend in "pop" music of producing a marked "beat" in the music. Furthermore, the flashing light can readily be used, if so desired, for the musicians to time their beat, so that all will be in certain synchronism. The apparatus is simple in construction, and hence reliable in operation.

Since the sound emanation from the rotating structure is sometimes directly away from the listener, and sometimes directly toward the listener, as well as at various points in between, there will be some change in volume as well as in phase or frequency. Hence the sound variation comes under the terms that previously has been defined as pulsato.

Pulsato is a term meaning cyclic variation of an otherwise relatively constant component or components of music or musical tones at the rate of from five to eight cycles per second. If the only varied component is frequency characteristic of the tone, then the pulsato is vibrato. If the only varied component is amplitude, then the pulsato is tremolo. Other musical components may be varied to produce pulsato.

The light source itself could rotate, rather than being fixed in the base and cooperating with a rotating mirror. The light could be continuously on and visible, but rotate in timed relation to the pulsato. In this connection, it will be noted that the present structure produces a moving light beam when an incandescent light source is used and which inherently will remain on for a finite time as the mirror moves. The finite degree of rotation of the structure during the on-time of the light produces a certain sweeping effect of the light which is beneficial in optically enhancing the aural vibrato effect.

It is to be understood that a flashing light source could emit rays from the base, or that a moving or flashing light could be synchronized with or timed to an electric pulsato.

The specific example of the invention as herein shown and described is for illustrative purposes. Various changes in structure will no doubt occur to those skilled in the art, and will be understood as forming a part of the present invention insofar as they fall within the spirit and scope of the appended claims.

The invention is claimed as follows:

1. Apparatus for producing optically enhanced pulsato including a base, rotary structure mounted on said base for rotation relative thereto, means acting between said base and said rotary structure for rotating said structure relative to said base, sound emanating means supported at least in part by said structure and rotatable therewith to produce a Doppler effect vibrato, a light source, and means coacting between said base and said rotary structure to cause said light source to emit flashes of light in timed relation with the rotation of said rotary structure.

2. Apparatus as set forth in claim 1 wherein the light source is mounted in said base.

3. Apparatus as set forth in claim 2 and further including a reflector on said rotary structure intercepting light rays from said light source and reflecting said light rays outwardly of said rotary structure.

4. Apparatus as set forth in claim 1 wherein the means coacting between the base and the rotary structure include electric contact means on said base and on said rotary structure and engageable with one another.

5. Apparatus as set forth in claim 1 wherein said rotary structure includes means for emitting light rays from said light source.

6. Apparatus as set forth in claim 5 wherein the light emitting means of the rotary structure is displaced a predetermined angle from said sound emanation means of said rotary structure.

7. Apparatus as set forth in claim 6 wherein said light emitting means is displaced 180 degrees.

8. Apparatus for producing optically enhanced pulsato, including means for emitting sound, means associated with said sound emitting means for incorporating pulsato in the sound emitted, a light source, on-off means for causing said light source to emit a flashing light alternating between visible and invisible, and means operatively interconnecting said pulsato producing means and said light flashing means for timing the light flashes to said pulsato.

9. Apparatus as set forth in claim 8 and further including means cooperable with said light source and operatively interconnected with said light flashing means to produce a movable light beam synchronized with said flashing light and said pulsato.

References Cited

UNITED STATES PATENTS

2,491,674	12/1949	Markowitz	181—31
2,629,044	2/1953	Marfisi	240—10.1
3,100,024	8/1963	Leslie	181—27
3,170,538	2/1965	Detrick	181—31

FOREIGN PATENTS

1,199,013	6/1959	France.

STEPHEN J. TOMSKY, Primary Examiner

U.S. Cl. X.R.

84—464; 181—27; 240—10.1