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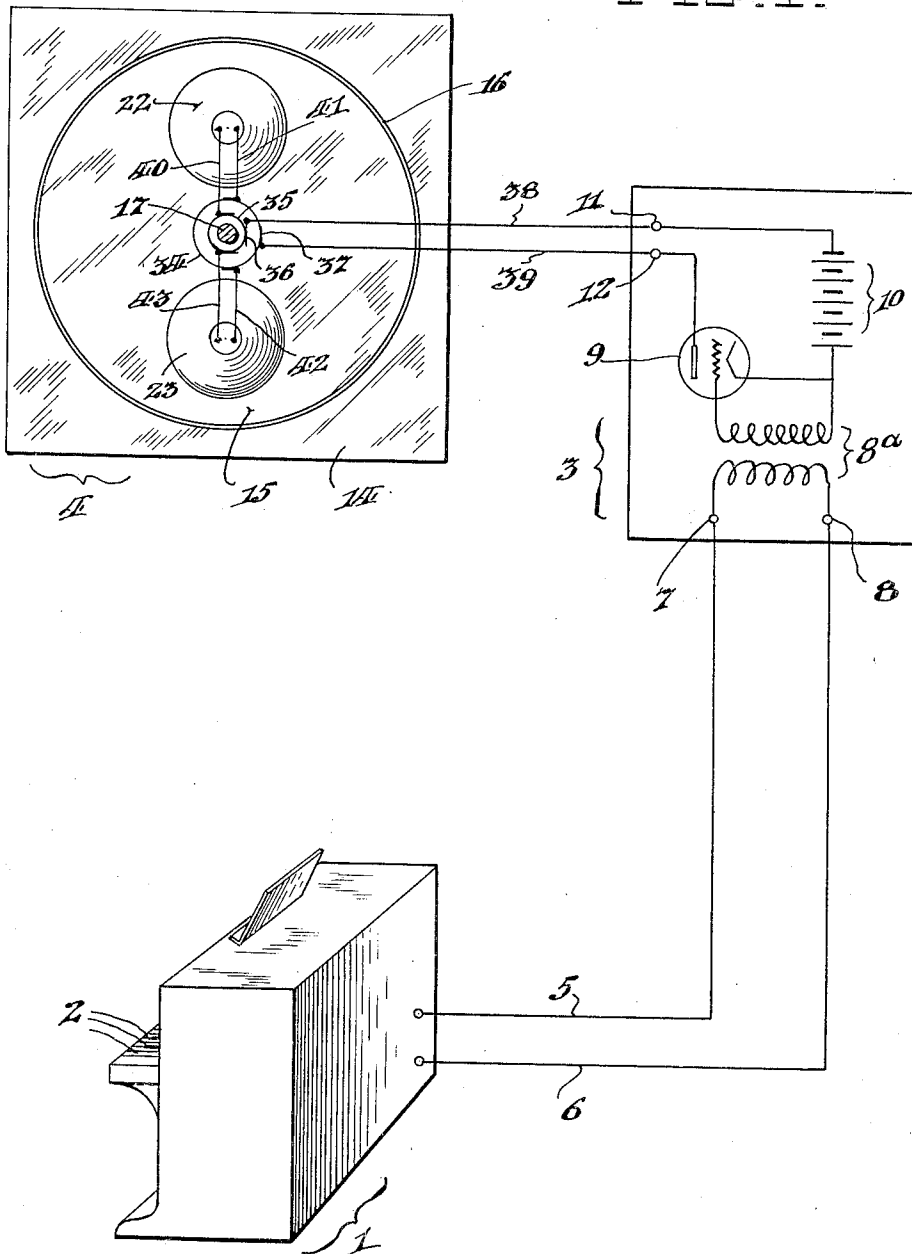
J. MARKOWITZ
ROTATABLE LOUDSPEAKER SUPPORT WITH
ASSOCIATED STATIONARY BAFFLE

2,491,674

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2 Sheets-Sheet 1

Fig. 1.



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FIG. 2.

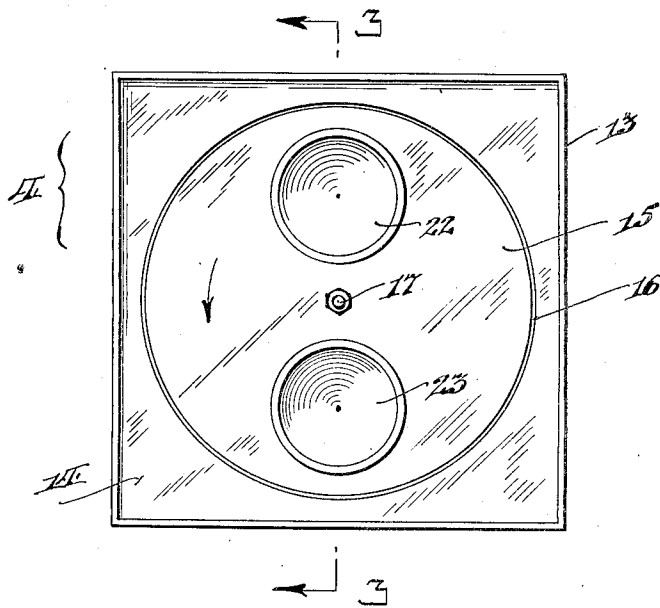
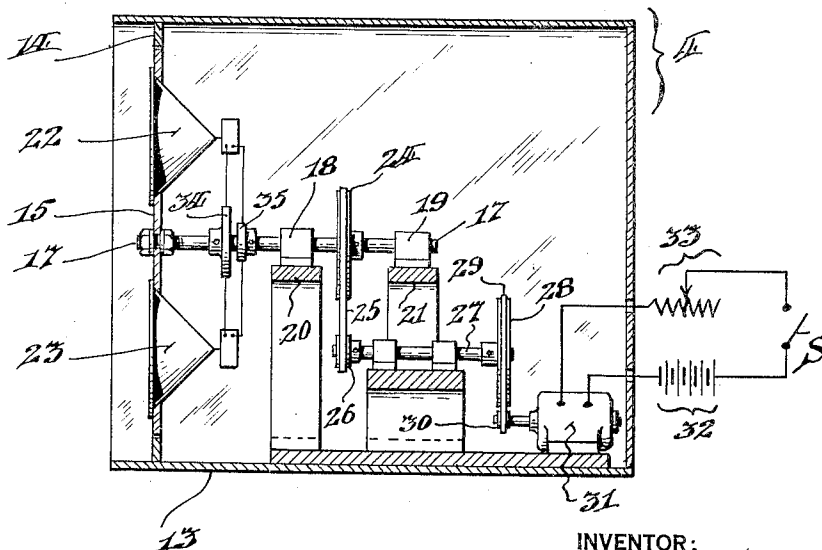


FIG. 3.



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ROTATABLE LOUD-SPEAKER SUPPORT
WITH ASSOCIATED STATIONARY
BAFFLE

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13 Claims. (Cl. 181—31)

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This invention relates to electrical musical instruments, such as electric organs, electric phonographs, radios, etc., embodying an electrical system which produces, or reproduces, sounds, tones, or music, and also concerns a loud speaker arrangement for such a system, capable of imparting to the normal sounds emanating therefrom, a certain quality, or effect, similar to that produced when a multiplicity of musical tones are successively, or simultaneously, emitted from relatively spaced sound sources, such as the relatively spaced pipes of a pipe organ, or the different instruments of an orchestra.

Electrical musical instruments, such as modern electric organs, generally are provided with a stationary loud speaker unit or arrangement, from which the electrically produced organ tones are emitted. The tone quality of each individual musical tone of such an electric organ is substantially the same as that of the similar individual tone of a pipe organ. However, when playing a musical selection on an electric organ, and playing the same selection on a pipe organ, a quite noticeable difference becomes apparent in the tonal quality of the two instruments. This difference in tone quality or effect, is mainly due to the spaced relationship of the individual pipes, or sound sources of the pipe organ, and the combined, or "tout ensemble" character of the tone produced thereby, as against the tone quality or effect emanating from the single sound source of the electric organ, that is, from the loud speaker unit thereof. This difference in tone quality or effect, may also be partly due to the directional difference in which the respective sound sources of the two instruments are pointed. While the sound openings of the individual pipes of a pipe organ usually all point in the same general direction, the said openings are nevertheless located in different vertical or horizontal planes, whereas in an electric organ, the direction of the single and the multiple sounds, is not similarly diversified, or dispersed, by the loud speaker unit.

I am aware of certain loud speaker systems in which movable speakers are employed, such as methods in which speakers facing in opposite directions are rotated. However, this method has the disadvantage of greatly limiting the power output unless very bulky, baffling devices are employed. I am also aware of systems in which a speaker unit is enclosed and where the sound emanating therefrom is deflected in various directions by rotating horn or megaphone-like mechanisms. These systems have the disadvantage of limiting the power output as well as fre-

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quency response. Furthermore, the constantly changing direction in which the sound is focussed causes an unnatural "phase shifting" effect on the tones.

The problem of overcoming the indicated tone deficiency, or variation, existent in an electric organ, as compared with a pipe organ, exemplifies a more or less common problem existent in other prior art musical instruments embodying an electrical system and loud speaker unit arranged to produce, or reproduce, sounds, tones, or music. To my knowledge, this problem has heretofore not been successfully solved.

One object of my invention is to provide a novel electrical musical instrument of the type indicated, which solves the said problem and overcomes the noted tone deficiency of the similar prior art musical instruments, in a simple, practical and effective manner.

Another object is to provide a novel electric organ capable of simulating the indicated "tout ensemble" tone quality, or effect, of a pipe organ.

Another object is to provide a novel loud speaker unit for electrical sound producing or reproducing systems, comprising one or more loud speakers that are movable in a manner causing the normal sounds emitted therefrom to be dispersed, or modified, to an extent simulating the above mentioned characteristic tout ensemble sound quality or effect.

Another object is to provide such a loud speaker unit, which can be used with an electrical musical instrument, such as an electric organ, electric phonograph, etc., to impart to the normal sounds produced by the instrument and emitted from the loud speaker unit, the said tout ensemble tone quality or effect.

Another object is to provide a loud speaker unit which can be connected to an electrical organ which will continuously produce the effect of a slight pitch uncertainty.

An additional object is to provide such a loud speaker unit which can be combined with an electrical system arranged to produce, or reproduce, a sound, tone, or music, and which unit comprises a plurality of loud speakers simultaneously fed from said system, which speakers are mounted on a vertically positioned rotatable support in such manner that the longitudinal axis of each speaker is substantially parallel with the rotational axis of the support, and the speakers are arranged in spaced opposition with one another at diametrically opposite points of the center of the support.

It is also an object to provide such a loud

speaker unit in which two separate loud speakers are mounted at diametrically opposite locations of the center of a rotatable disc, or baffle board, so that the longitudinal axis of each speaker is in substantial parallelism with the rotational axis of the disc, in conjunction with means for effecting rotation of said disc at a determined speed, during the simultaneous sound producing operation of the speakers.

Another feature of the invention resides in the provision of such a loud speaker unit comprising a multiplicity of loud speakers each of which is adapted to be fed from the output of an electrical sound amplifier, in conjunction with a vertically arranged rotatable support along one side of which said speakers are spacedly mounted in substantially axial parallelism relative to each other and the rotational axis of the support, so as to effect unidirectional projection and dispersion of the sound emitted from all the speakers.

It is also an object to provide such a loud speaker unit which can be connected to the electrical system of an electric organ, to cause the organ sounds emanating from the speaker, to be modified in a manner simulating the tone quality or effect resulting from the spaced arrangement of the pipes of a pipe organ.

Another object is to provide such a loud speaker unit which comprises a baffle board made up of sectional parts arranged in the same plane, one of which parts has one or more loud speakers mounted thereon and is movable in a certain manner relative to the other part.

Another object is to provide such a loud speaker unit comprising a baffle board consisting of two parts arranged in the same plane, one of which parts is in the form of a disc that is rotatably mounted centrally within the confines of the other part.

Another object of the invention is to provide a device which offers all the musical advantages previously mentioned, which is of simple mechanical construction and employs standard cone type speakers.

An additional object of the invention is to provide a loud speaker mechanism which imparts ensemble or a "celeste" effect or a tremulant quality to tones emanating therefrom.

With these and other objects in view, which will become more apparent from the following detailed description of a practical exemplification of my improvements illustrated in the accompanying drawings, the invention comprises the novel electrical musical instrument and loud speaker improvements, elements, features of construction and arrangement of parts in cooperative relationship, as more particularly defined by the hereto appended claims.

In the drawings:

Figure 1 is a diagrammatic view of an electric organ system embodying my invention, and illustrates the manner in which the latter may be applied to electrical musical instruments in general.

Fig. 2 is a front elevational view of a loud speaker unit which forms part of my invention, and

Fig. 3 is a central vertical cross-sectional view, taken substantially as indicated by the arrows 3—3 in Fig. 2.

The electric organ of my invention generally comprises a standard or conventional type of electric organ console unit 1, which is constructed, arranged and equipped in accordance with modern practice so as to include such usual parts

as keys 2, and the electrical musical sound or tone producing means (not shown), to which latter is connected a standard form of vacuum tube amplifier 3, and a novel loud speaker unit 4.

In accordance with modern practice, the electrical means for producing the organ sounds or tones, may be either housed within the console unit 1, or may be mounted in a separate casing. In either case, the said means is connected, in usual manner, by conductors 5 and 6, with a pair of input terminals 7 and 8, of the vacuum tube amplifier 3. The latter comprises such well-known electrical devices as a transformer 8a, and a vacuum tube 9, and the various elements of these devices are connected to each other, with a source of electrical energy 10, and with a pair of amplifier output terminals 11 and 12, in usual manner, as clearly indicated in Fig. 1.

The novel loud speaker unit 4 generally comprises a box-like casing or housing 13, the front wall of which is in the form of a flat segmental baffle board comprising a stationarily mounted segment 14, and a rotatably mounted disc-like, or circular segment 15. The front surfaces of the baffle board segments 14 and 15 are alignedly arranged in a vertical plane and separated from each other by a narrow slot or opening 16, of sufficient width to permit free rotational movement of the segment 15 relative to the stationary segment 14. The baffle board segment 15 is centrally secured to the front end of a shaft 17, journaled in two axially aligned bearings 18 and 19, respectively secured to cross members 20 and 21 of a supporting frame unit located within the casing 13.

From the foregoing it will be apparent to those skilled in the art that the only unusual energy loss which would be noticed in this system is that which would occur through opening 16. Since this slot can be made very narrow, any loss in low notes will be so slight that it may be disregarded for all practical purposes. It will be understood that the size and shape of the baffle board segment 14 is determined in accordance with modern practice so that it will function effectively to prevent cancellation of the tonal energy produced by the loud speaker arrangement of the unit. To this end, the baffle board segment 14 is made larger or smaller, depending upon the frequency of the tonal effect produced by the loud speaker or speakers of the system. As is well-known to those versed in this art, the housing 13 functions as an extension of the baffle board segment 14.

The rotatably mounted baffle board segment 15 functions as a support for two standard type loud speakers 22 and 23, that are secured to the baffle board segment 15 at diametrically opposite points of the center of rotation thereof, and arranged so that the longitudinal axis of each speaker is substantially parallel with the rotational axis of the baffle board segment 15, thereby to effect unidirectional projection of the sound emitted from the speakers.

In order that the baffle board segment 15 may be rotated at a desired speed, the shaft 17 has fixedly mounted thereon a relatively large belt pulley 24 which is connected by a belt 25 with a smaller belt pulley 26 secured to one end of a shaft 27, the other end of which shaft has secured thereto a belt pulley 28 in turn connected by a belt 29 with a smaller belt pulley 30 directly secured to the shaft of an electric motor 31.

The motor 31 is connected to a source of electrical energy 32 having in the electric circuit there-

of a switch S, and a variable rheostat 33 for selectively determining the extent of the current flow to the motor 31 and thereby controlling its driving speed.

Fixedly secured to the shaft 17 are two separate metallic contact elements or rings 34 and 35, which are insulated from the shaft 17 and provided with flat circular surface portions adapted to have resting thereon a pair of spring pressed brushes, or other conductor elements 36 and 37 connected by wires 38 and 39 with the output terminals 11 and 12 of the vacuum tube amplifier 3.

The loud speaker 22 is connected by two wires 40 and 41 with the elements 34 and 35, and the loud speaker 23 is similarly connected by two wires 42 and 43 with the elements 34 and 35.

To effect operation of the electric organ and loud speaker unit 4, the latter is first turned on, that is, the switch S in the motor circuit is closed and the rheostat 33 regulated so that the baffle board segment 15 is rotated by the motor 31 at the desired speed. Assuming that the electric organ system is in operation so that depression of the keys 2 of the organ console 1 will cause the sound or tone-producing means of the organ to function in usual and well-known manner, then the sounds or tones produced will be simultaneously emitted from the loud speakers 22 and 23, at constantly varying points in the circle of rotation thereof. This will cause a dispersion, or variation in the tone quality and pitch, or effect, similar to that produced when a multiplicity of musical tones are successively, or simultaneously, emitted from relatively spaced sound sources, such as the relatively spaced pipes of a pipe organ. Accordingly, when utilizing my novel loud speaker unit with an electric organ system, in the manner shown and described, the sounds or tones emitted from the loud speakers of the unit 4 will be in all respects like those of a pipe organ.

From the foregoing, it will be understood that when my novel loud speaker unit 4 is connected with another type of electrical musical instrument, such as an electric phonograph, radio, etc., in substantially the same manner as shown and described in connection with an electric organ, the same results will be attained, namely, the sounds emitted from the loud speakers of the unit will have a tout ensemble quality, or effect, similar to that produced when a multiplicity of musical tones are successively, or simultaneously, emitted from relatively spaced sound sources.

It will also be understood by those skilled in this art, that various changes, or modifications, can be made in my novel loud speaker unit 4, to better adapt it to the conditions or circumstances which may prevail in connection with other types of sound producing systems. For example, instead of two loud speakers, one loud speaker may be mounted on the baffle board segment 15, or a greater number of loud speakers, such as three or four, may be secured thereto in substantially the same manner as disclosed, thereby to decrease, or increase the sound volume, quality, or other effect, resulting from such a different loud speaker arrangement. Furthermore, by connecting a plurality of separate complete loud speaker units 4, for example three such units in parallel with the vacuum tube amplifier 3, and operating such units simultaneously, the effect of many tone sources is greatly enhanced and at the same time it becomes increasingly difficult for an individual with a practiced ear to detect and analyze what is actually occurring. Some other practical type of standard speed reducing means may also be

substituted between the motor 31 and the shaft 17, for the one disclosed in the drawings.

Of course, the electrical musical instrument and loud speaker unit improvements herein specifically shown and described, can be otherwise changed, or modified, in various ways, without departing from the invention herein disclosed, the scope of which is more particularly indicated by the hereto appended claims.

I claim:

1. A loud speaker unit for an electrical sound producing system of the character described comprising, a plurality of conical loud speakers, a rotatable baffle board support, a stationary baffle board arranged in the same plane as the rotatable baffle board support and in surrounding relation to the latter, means mounting the loud speakers on the support in such manner that they are in substantially axial parallelism relative to each other and the rotational axis of the support so as to effect unidirectional projection of the sound emitted from all the speakers, and means arranged to rotate said support.

2. A loud speaker unit for an electrical sound producing system of the character described comprising, a loud speaker, a disc-like rotatable baffle board support, a baffle board arranged in alignment with and spaced relation beyond the confines of said rotatable baffle board support, means mounting the loud speaker on the support in such manner that its longitudinal axis of sound propagation is spaced from and substantially parallel with the axis of rotation of said support, and means arranged to effect rotation of said support at a determined speed.

3. A loud speaker unit for an electrical sound producing system of the character described comprising, a loud speaker, a disc-like rotatable baffle board support, a baffle board provided with a circular aperture in which said support is alignedly mounted for rotation, means mounting the loud speaker on the support in such manner that its longitudinal axis is spaced from and substantially parallel with the axis of rotation of said support, means arranged to effect rotation of said support, and means arranged to selectively vary the rotational speed of said support.

4. A loud speaker unit for an electrical sound producing system of the character described comprising; a loud speaker; a baffle board including two separate sectional parts arranged in the same plane, one of which parts is of circular configuration and mounted for rotational movement within the confines of the other part; means securing the loud speaker to the rotational part in such manner that its longitudinal axis of sound propagation is spaced from and substantially parallel with the axis of rotation thereof; and means arranged to effect rotation of said circular part at a determined speed.

5. The combination with an electrical system arranged to produce musical sounds; of a loud speaker fed from said system; a rotatable flat baffle support; a fixed flat baffle device arranged in aligned surrounding relation to said support; means mounting the loud speaker on the support with its longitudinal axis of sound propagation spaced from and substantially parallel with the rotational axis of the support; and means arranged to rotate said support so as to effect unidirectional sound projection from the loud speaker in substantially right-angular relation to the movement of the latter.

6. A loud speaker unit for an electrical sound producing system of the character described

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comprising, a housing one wall of which is shaped to form a baffle board provided with a circular aperture, a loud speaker, a disc-like baffle board support arranged in alignment with said wall and mounted for rotation within said aperture, means mounting the loud speaker on the support in such manner that its longitudinal axis of sound propagation is spaced from and substantially parallel with the axis of rotation of said support, and means within said housing arranged to effect rotation of said support.

7. A loud speaker unit for an electrical sound producing system of the character described comprising, a housing one wall of which is shaped to form a baffle board provided with a circular aperture, a plurality of loud speakers, a disc-like baffle board support arranged in alignment with said wall and mounted for rotation within said aperture, means mounting the loud speakers on the support in such manner that the longitudinal axis of sound propagation of each loud speaker is spaced from and substantially parallel with the axis of rotation of said support, and means within said housing arranged to effect rotation of said support.

8. A loud speaker unit for an electrical sound producing system of the character described comprising, a conical loud speaker, a rotatable baffle board support, a stationary baffle board arranged in the same plane as the rotatable baffle board support and in surrounding relation to the latter, means mounting the loud speaker on the support in such manner that it is in substantially axial parallelism relative to the rotational axis of the support so as to effect unidirectional projection of the sound emitted from the speaker, and means arranged to rotate said support.

9. A loud speaker unit for an electrical sound producing system of the character described comprising, a plurality of loud speakers, a disc-like rotatable baffle board support, a baffle board arranged in alignment with and spaced relation beyond the confines of said rotatable baffle board support, means mounting the loud speakers on the support in such manner that the longitudinal axis of sound propagation of each speaker is spaced from and substantially parallel with the axis of rotation of said support, and means arranged to effect rotation of said support at a determined speed.

10. A loud speaker unit for an electrical sound producing system of the character described comprising, a plurality of loud speakers, a disc-like rotatable baffle board support, a baffle board provided with a circular aperture in which said support is alignedly mounted for rotation, means mounting the loud speakers on the support in such manner that the longitudinal axis of sound propagation of each speaker is spaced from and substantially parallel with the axis of rotation of said support, means arranged to effect rotation

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of said support, and means arranged to selectively vary the rotational speed of said support.

11. A loud speaker unit for an electrical sound producing system of the character described comprising; a plurality of loud speakers; a baffle board including two separate sectional parts arranged in the same plane, one of which parts is of circular configuration and mounted for rotational movement within the confines of the other part; means securing the loud speaker to the rotational part in such manner that the longitudinal axis of sound propagation of each speaker is spaced from and substantially parallel with the axis of rotation thereof; and means arranged to effect rotation of said circular part at a determined speed.

12. The combination with an electrical system arranged to produce musical sounds; of a plurality of loud speakers fed from said system; a rotatable flat baffle support; a fixed flat baffle device arranged in aligned surrounding relation to said support; means mounting the loud speakers on the support so that the longitudinal axis of sound propagation of each speaker is spaced from and substantially parallel with the rotational axis of the support; and means arranged to rotate said support so as to effect unidirectional sound projection from all the loud speakers in substantially right-angular relation to the movement of the latter.

13. A loud speaker unit for an electrical sound producing system of the character described comprising, a rotatable support, loud speaker means mounted on said support in such manner that the longitudinal axis of sound propagation of the loud speaker means is spaced from and substantially parallel with the axis of rotation of the support, means arranged to effect rotation of the support, and stationary baffle means arranged in adjacent surrounding relation to the loud speaker means so as to maintain the intensity of the tonal energy produced by the system.

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