

May 9, 1939.

G. W. BLESSING ET AL
SOUND REPRODUCING APPARATUS

2,157,158

Filed Nov. 5, 1937

2 Sheets-Sheet 1

FIG. 1.

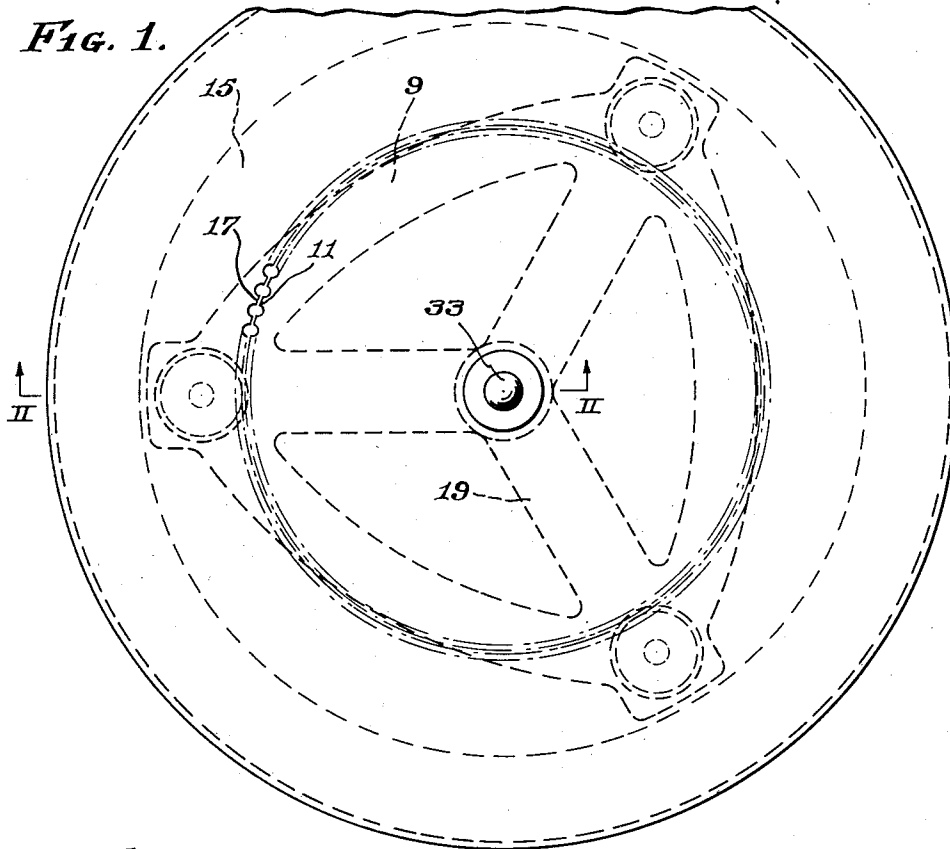


Fig. 2.

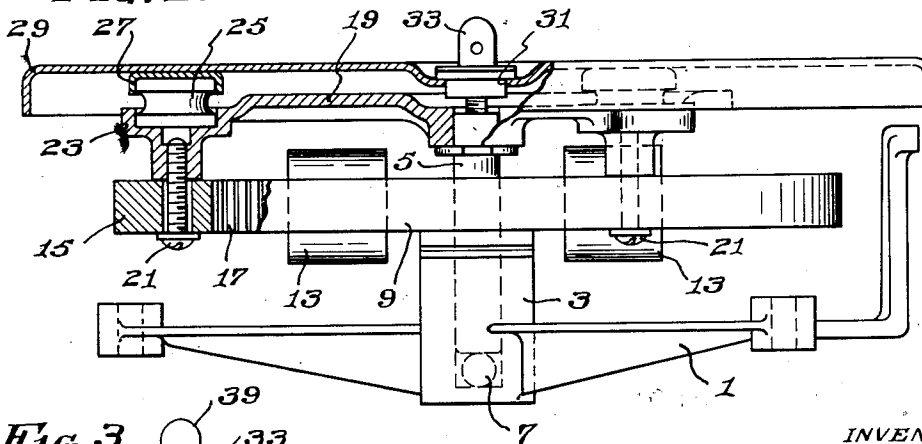


Fig. 3.

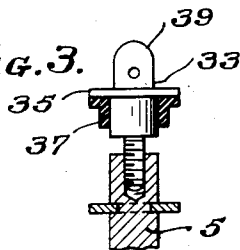


Fig. 4.



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FIG. 5.

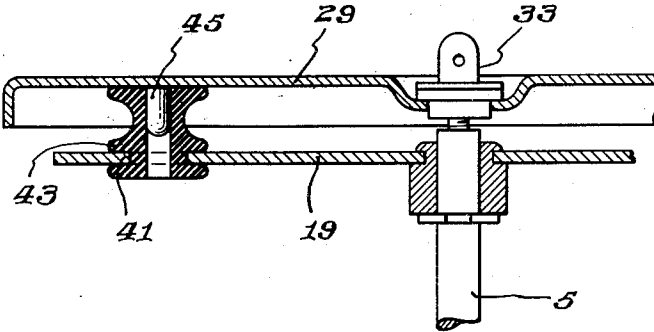
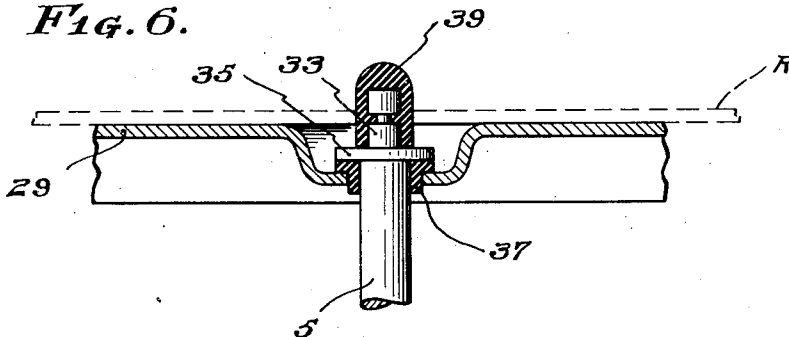


FIG. 6.



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2,157,158

SOUND REPRODUCING APPARATUS

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Application November 5, 1937, Serial No. 172,886

9 Claims. (Cl. 274-9)

This invention relates to sound reproducing apparatus, and more particularly to a turntable mounting upon a motor, the present invention being an improvement upon that disclosed in the copending application of H. E. Roys, Serial No. 8,664, filed February 28, 1935, now Patent No. 2,113,384, granted April 5, 1938, and assigned to Radio Corporation of America.

In the aforesaid application, there is disclosed a synchronous motor to the rotor element of which is, connected a record supporting turntable by means of a plurality of circumferentially spaced rigid pins, bolts, or the like. While a motor of this type is satisfactory for many purposes, it has been found that occasionally mechanical vibrations of the motor are transferred to the turntable and the record supported thereby through the aforesaid rigid connection, and this results in what is known as "rumble".

The primary object of our present invention is to provide an improved motor and turntable mounting of the type set forth above which will be free from the aforementioned difficulty.

More specifically, it is an object of our present invention to provide an improved motor and turntable mounting by means of which mechanical vibrations arising in the motor will not be transferred through the turntable to the record being reproduced.

Another object of our present invention is to provide an improved phonograph turntable unit as aforesaid which will rotate a disc record without imparting undesirable slight mechanical vibrations thereto.

Still another object of our present invention is to provide an improved record supporting turntable construction for phonographs wherein the possibility of transferring mechanical vibrations to the record has been eliminated from all elements with which the record is in contact.

A further object of our present invention is to provide an improved synchronous motor and turntable assembly of the type set forth which is inexpensive of manufacture, which readily lends itself to rapid quantity production and which is highly efficient in use.

In accordance with our present invention, we couple the turntable to the rotor of the synchronous motor by means of a plurality of resilient coupling devices which are capable of absorbing any slight mechanical vibrations originating in the motor without transferring them to the turntable. To further reduce the possibility of transferring any slight mechanical vibrations which are set up in the motor to the record supported

on the turntable, we place a rubber bushing around the record centering spindle associated with the turntable, and also place a rubber sleeve over the end of the spindle on which the record is threadedly received to be supported on the turntable. An arrangement of this sort effectively eliminates the possibility of having any slight mechanical vibrations transferred from the motor to the record, and thus the well known "rumble" is effectively eliminated.

The novel features that we consider characteristic of our invention are set forth with particularity in the appended claims. The invention itself, both as to its organization and method of operation, together with additional objects and advantages thereof, will best be understood from the following description of several embodiments thereof, when read in connection with the accompanying drawings, in which

Figure 1 is a plan view of a motor and turntable assembly formed according to our invention,

Figure 2 is a partly elevational and partly sectional view taken on the line II--II of Fig. 1,

Figure 3 is a fragmentary view showing the details of the record centering spindle associated with the turntable,

Figure 4 is a sectional view of one of the resilient coupling elements which couple the turntable to the rotor,

Figure 5 is a sectional view showing a modification of our invention, and

Figure 6 is a sectional view showing, in detail, the relation between the record centering spindle and the turntable.

Referring more particularly to the drawings, wherein similar reference characters designate corresponding parts throughout, we have shown, in Figs. 1 and 2, a motor comprising a supporting frame 1 provided with a bushing 3 in which is rotatably received a shaft 5 supported on a thrust bearing 7 in the bushing 3. Fixed to the upper end of the bushing 3 in a manner more fully set forth in the above identified patent is the stator 9 comprising part of a prime mover, such as synchronous motor, the stator being provided with a plurality of peripheral teeth 11 constituting pole faces, and having a pair of energizing coils 13 mounted thereon. An annular rotor 15 which constitutes the rotor element of the prime mover is provided with a series of internal teeth 17 of substantially the same arcuate length as the teeth 11 and cooperates with the teeth 11 to constitute cooperating pole faces, the rotor 15 being mounted on a spider 19, as by means of the screws 21, and the spider 19 being fixed to

the upper end of the shaft 5 in any suitable manner.

The spider 19 is formed with a plurality of cup-shaped retaining members 23 in which are received the lower ends of a number of spool-shaped, soft rubber coupling members 25, shown in detail in Fig. 4. The upper ends of the coupling members 25 are received in inverted cup-like elements 27 which are staked or otherwise suitably secured to the lower surface of a record supporting turntable 29, the upper surface of which may be suitably covered with felt or the like in conventional manner. The turntable 29 has a central opening 31 through which extends a record centering spindle 33 threadedly received in the upper end of the shaft 5, as clearly shown in Fig. 3. The spindle 33 is preferably formed with a flange 35 below which a rubber bushing 37 is fitted on the spindle in order to vibration-insulate the spindle 33 from the turntable 29. This prevents transfer of mechanical vibrations from the shaft 5 to the turntable 29 through the spindle 33. Above the flange 35, the spindle 33 is provided with a rubber sleeve 39 which is adapted to threadedly receive a record R to be supported on the turntable 29 for playing.

It will be seen, from the foregoing description, that we have provided a novel arrangement of motor and turntable in which mechanical vibrations arising in the motor will be effectively prevented from reaching the record. The resilient coupling members 25 prevent transfer of these vibrations directly to the turntable itself. Similarly, the rubber sleeve 37 prevents transfer of mechanical vibrations from the shaft 5 to the turntable, while the rubber sleeve 39 prevents any vibrations from being transmitted from the spindle 33 to the record. In a construction of this sort, therefore, the "rumble" usually found in conventional phonographs will be entirely absent.

In Fig. 5, we have shown a modified form of our invention wherein the spider 19 may be formed of a punched disc provided with a series of circumferentially spaced openings 41 in which are received the resilient coupling members 43 corresponding to the coupling members 25 shown in Figs. 1, 2 and 4. The coupling members 43 are also made of soft rubber and are secured to the spider 19 in the openings 41. A plurality of pins 45 secured to the turntable 29 are received within the bores of the coupling members 43 and serve to couple the turntable 29 to the rotor 15 through the spider 19 in a manner similar to that in Fig. 2.

Although we have shown and described two modifications of our invention, it will, no doubt, be readily apparent to those skilled in the art that many other modifications are possible. We desire, therefore, that our invention shall not be limited except insofar as is made necessary by the prior art and by the spirit of the appended claims.

We claim as our invention:

1. In a phonograph, the combination of a prime mover, a record supporting turntable, resilient means connecting said turntable with said prime mover, a record centering spindle for said turntable, vibration insulating means between said turntable and said spindle, and vibration insulating means surrounding said spindle, said last named means being adapted to threadedly receive a record to be supported on said turntable.

2. In a phonograph turntable, the combination

of a motor having a rotor element, a record supporting turntable, a plurality of cooperative retaining devices on said rotor element and said turntable, and resilient coupling elements carried by said retaining devices resiliently connecting said turntable to said rotor.

3. The invention set forth in claim 2 characterized by the addition of a record centering spindle for said turntable, and vibration insulating means interposed between said spindle and said turntable.

4. The invention set forth in claim 2 characterized by the addition of a record centering spindle for said turntable, vibration insulating means interposed between said spindle and said turntable, and vibration insulating means surrounding said spindle, said last named means being adapted to threadedly receive a record to be supported on said turntable.

5. The invention set forth in claim 2 characterized in that said retaining devices are constituted by cup shaped elements, and characterized further in that said resilient coupling elements are constituted by rubber members having their ends seated in said cup shaped elements.

6. In a phonograph, the combination of a synchronous motor comprising a frame, a bushing formed on said frame, a stator carried by said frame, a shaft rotatably carried in said bushing, a spider fixed to said shaft for rotation therewith, a rotor associated with said stator and supported by said spider in cooperative relation to said stator, a record supporting turntable, and a plurality of resilient coupling elements connecting said turntable to said spider.

7. In a phonograph, the combination of a synchronous motor comprising a frame, a bushing formed on said frame, a stator carried by said frame, a shaft rotatably carried in said bushing, a spider fixed to said shaft for rotation therewith, a rotor associated with said stator and supported by said spider in cooperative relation to said stator, a record supporting turntable, a plurality of resilient coupling elements connecting said turntable to said spider, a record centering spindle secured to said shaft and extending through said turntable, and a rubber bushing interposed between said spindle and said turntable for preventing transfer of mechanical vibrations between said turntable and said spindle.

8. In a phonograph, the combination of a prime mover, a record-supporting turntable, means including a resilient member coupling said turntable with said prime mover, a record-centering spindle for said turntable, vibration-insulating means between said turntable and said spindle, and vibration-insulating means surrounding said spindle, said last-named means being adapted to threadedly receive a record to be supported on said turntable.

9. In a phonograph, the combination of a prime mover including a rotor element, a record-supporting turntable, means including a resilient member coupling said turntable with said rotor element, a record-centering spindle for said turntable, vibration-insulating means between said turntable and said spindle, and vibration-insulating means surrounding said spindle, said last-named means being adapted to threadedly receive a record to be supported on said turntable.

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