

H. H. BALLARD.
SOUND REPRODUCING INSTRUMENT.
APPLICATION FILED JULY 6, 1908.

985,496.

Patented Feb. 28, 1911.

Fig. 1.

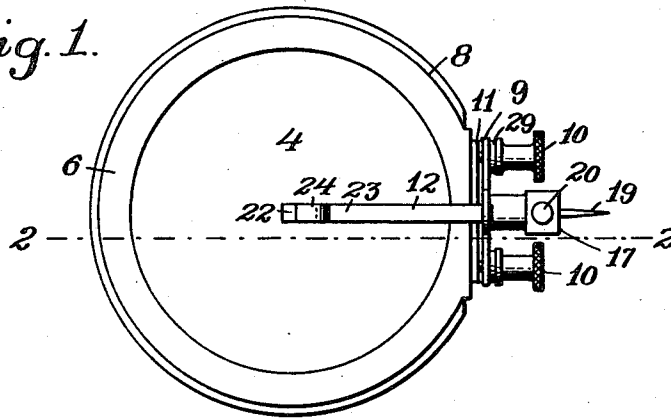


Fig. 2.

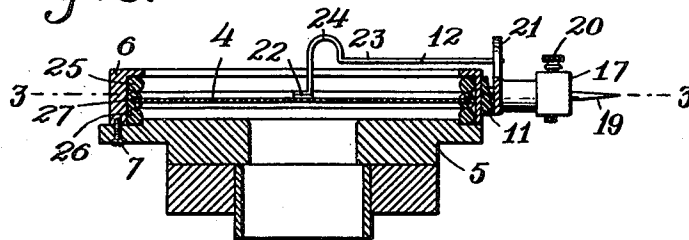
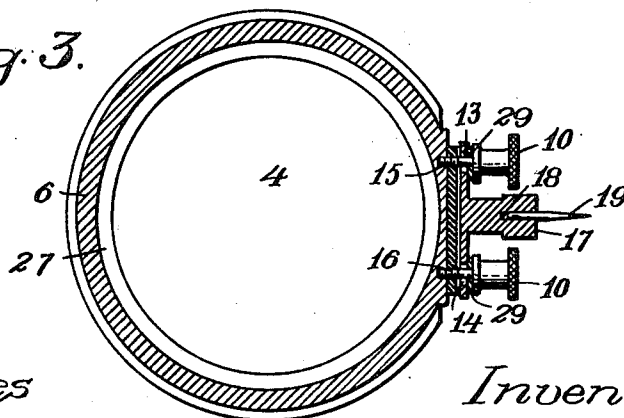


Fig. 3.



Witnesses

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SOUND-REPRODUCING INSTRUMENT.

985,496.

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To all whom it may concern:

Be it known that I, HARLAN H. BALLARD, a citizen of the United States, residing at Pittsfield, in the county of Berkshire, State of Massachusetts, have invented a certain new and useful Improvement in Sound-Reproducing Instruments, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in sound reproducing instruments, but more particularly to sound boxes for phonographs, graphophones, and the like. The greatest problem in the construction of these instruments has been to eliminate the metallic sounds caused by the contact of the stylus holder with the metallic portions of the sound box. Heretofore, the bar carrying the stylus holder has generally been supported upon metal projections or lugs upon the rim of the diaphragm holder, and controlled by spring arms also fastened to this rim. This connection of metal parts causes the vibrations of the stylus to be transmitted to the diaphragm holder, and produces the metallic sounds so common to instruments of this type.

In the present invention, this metallic contact has been avoided by means of vibration insulation separating the metallic parts.

One feature of the invention is the simplicity of construction. In place of spring arms with complicated adjusting screws and locknuts, as has heretofore been used, a cushion of resilient material has been placed between the stylus holding bar and the rim of the diaphragm holder. This allows free vibration of the stylus holder, but does not transmit the vibration to the box, as is the case with the steel springs now used. This bar is preferably fastened to the rim of the diaphragm holder by means of set screws passing through apertures in the bar. These apertures are preferably of a considerably greater diameter than that of the screws to allow free vibration of the bar and prevent metallic contact.

Another feature is the form of the cushion mentioned above. This is preferably wedge shaped so that it acts as a means for tilting, or regulating the lever which transmits the vibrations from the stylus holding bar to the diaphragm.

Heretofore, the diaphragm has been held between two washers within the diaphragm holder, but constant use has caused it to slide

between these washers and come in contact with the inside walls of the holder. To prevent this, a vibration insulating rim may be placed about the diaphragm, as will be described more fully hereinafter. In the instruments in use at present, the contact point of the vibration transmitting lever has generally been fastened to the center of the diaphragm, as this lever has been constructed of rigid material. This connection is the cause of great inconvenience, as the movement of the lever tears the diaphragm and causes false sounds.

A feature of the invention is a resilient lever which does not require fastening to the diaphragm, as it will follow the motions of the latter, and keep constant contact when properly adjusted.

Another feature is a resilient tip or contact point upon the lever which transmits to the diaphragm a more even tone than is produced by solid tip.

A lever which does not require attachment to the diaphragm allows the use of a great variety of materials in the construction of the latter as great strength is not required. Heretofore, it has been found necessary to use mica for diaphragms, as this was the only material of sufficient resiliency which could at all stand the strain. With the resilient lever or tip, paper, ivory, celluloid, parchment, or a large number of other materials, might be utilized which would give as good, if not better results, at a less cost.

It should be clearly understood that the invention is not limited to the construction and arrangement of parts herein described, as they may be materially varied without altering the invention.

One embodiment of the invention is shown in the accompanying drawings in which:—

Figure 1, is a top view of the sound box complete. Fig. 2, a section on 2—2 of Fig. 1. Fig. 3, a section on 3—3 of Fig. 2, with all parts above the section removed.

In the drawings, the diaphragm 4 is held in the sound box 5 by the diaphragm holder 6 which is fastened to the latter by means of screws 7. Upon the rim 8 of the diaphragm holder 6 is fastened the stylus carrying bar 9 by means of the thumb screws 10. Between this bar 9 and the rim 8, is inserted a cushion 11 of rubber, cork or other suitable resilient material. This cushion 11 is preferably wedge shaped with the narrow edge toward the top of the box 5, as is shown in

Fig. 2, and acts as an adjusting means for lever 12, which carries the vibrations from the bar 9 to the face of the diaphragm 4.

The stylus carrying bar 9 is provided with 5 apertures 13 and 14 to allow the thumb screws 10 to pass through them, and mesh in the tapped holes 15 and 16 respectively. These apertures 13 and 14 are preferably cut with their diameter considerably larger 10 than that of the thumb screws 10, so that the latter may not come in contact with the walls of the former. Also these large apertures allow the tilting of the bar 9 to adjust the lever 12, as will be described herein- 15 after.

Upon the bar 9 is the stylus holder 17 having an aperture 18 in which the stylus 19 is seated, the latter being held in place by means of the set screw 20. To the pro- 20 jection or ear 21 on the bar 9, is fastened the lever 12. This lever has a contact point 22 which may be fastened to the diaphragm 4, or may rest upon it. It may be of any suitable construction, but an advantageous 25 type is shown in the drawings in which a shank 23, attached to the ear 21, supports a crook 24, having at its end the contact point 22. The whole is preferably composed of flat watch spring steel or other resilient 30 material, so that the contact point may follow the vibrations of the diaphragm, and also move longitudinally with the shank of the lever. This prevents any tendency of the contact point to damage the diaphragm. 35 The diaphragm is held within the diaphragm holder 6 by the washers 25 and 26, and may be fitted with a washer or rim 27, preferably constructed of vibration-absorption material, about its circumference. This 40 prevents the diaphragm from sliding between the washers 25 and 26, and coming in contact with the metal inner wall of the holder 6.

Between the heads of the thumb screws 45 10 and the top of the bar 9, it is advisable to place small washers 29 of leather, rubber, or other suitable material, so that the latter holds the former more firmly, and prevents the communication of the vibration from the 50 bar 9 to the diaphragm holder.

The method of adjustment of the lever 12 is as follows:—If it is desired to cause the contact point to be pressed more firmly against the diaphragm, the thumb screws 55 10 are advanced, causing the heads 29 to press against the bar 9. As this bar is supported by the wedge shaped cushion 11, a pressure upon the former causes it to tilt forward, as the thick portion of the cushion 60 offers greater resistance than the thin portion. This tilting causes the contact point 22 to be pressed against the diaphragm. If the thumb screws are loosened, the contact point will be withdrawn in the same manner. 65 Thus it will be seen that the thumb

screws act as a means of fastening the stylus carrying bar 9 to the diaphragm holder 6, and as an adjusting means for the lever 12.

A resilient tip may be placed upon the contact point 22 of the lever 12. Where a 70 resilient tip or a spring lever is used, it is unnecessary to fasten the lever of the diaphragm, thus allowing greater freedom of action, and causing the instrument to produce sounds which would be too delicate to 75 operate the ordinary type of diaphragm.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In an instrument for producing sound, a sound box, a diaphragm within said sound 80 box, a stylus, a stylus carrier mounted upon the outside of said box, and insulating means between said stylus carrier and said box.

2. In an instrument for producing sound, a sound box, a diaphragm within said box, 85 a stylus carrier movably mounted upon the outside of said box, and an insulating cushion between said stylus carrier and said box.

3. In an instrument for producing sound, a sound box, a diaphragm within said box, 90 a stylus carrier movably mounted upon the outside of said box, and an insulating cushion of resilient material between said stylus carrier and said box.

4. In an instrument for producing sound, 95 a sound box, a diaphragm within said box, a stylus, a stylus carrier, a cushion of resilient material between said stylus carrier and said box, and means for attaching said carrier to said box whereby the carrier shall be 100 free to rock upon the cushion.

5. In an instrument for producing sound, a sound box, a diaphragm within said box, a stylus, a stylus carrier, means for connect- 105 ing said carrier with said diaphragm, a wedge shaped cushion between said carrier and said box, and means for movably attaching said carrier to said box.

6. In an instrument for producing sound, a sound box, a diaphragm within said box, 110 a stylus, a stylus carrier, a cushion of resilient material between said stylus carrier and said box, and screws passing through apertures in said carrier to attach said carrier to said box. 115

7. In an instrument for producing sound, a sound box, a diaphragm within said box, a stylus, a stylus carrier, a lever carried by said stylus carrier to connect the same with said diaphragm, a cushion of resilient ma- 120 terial between said carrier and said box, and adjusting screws passing through apertures in said carrier to fasten the same to said box.

8. In an instrument for producing sound, 125 a sound box, a diaphragm within said box, a stylus, a stylus carrier, a lever carried by said stylus carrier to connect the same with said diaphragm, a cushion of resilient material between said stylus carrier and said 130

box, and screws passing through apertures in said carrier to fasten the same to said box, said apertures being of a greater diameter than the screws to allow the carrier to rock upon the cushion.

9. In an instrument for producing sound, a sound box, a diaphragm within said box, a stylus, a stylus carrier, means for connecting said carrier with said diaphragm, a wedge shaped cushion of resilient material between said carrier and said box, and adjusting screws to fasten said carrier to said box whereby said carrier may rock upon said cushion.

10. In an instrument for producing sound,

a sound box, a diaphragm within said box, a stylus, a stylus carrier, a lever carried by said stylus carrier to connect the same with said diaphragm, a cushion of resilient insulating material between said stylus carrier and said box, and screws passing through apertures in said carrier to fasten the same to said box, said screws being insulated from said carrier.

In testimony whereof I affix my signature in presence of two witnesses.

HARLAN H. BALLARD.

Witnesses:

JEANNETTE E. WATERMAN,
LUCY B. BALLARD.