

951,781.

Patented Mar. 8, 1910.

Fig. 1.

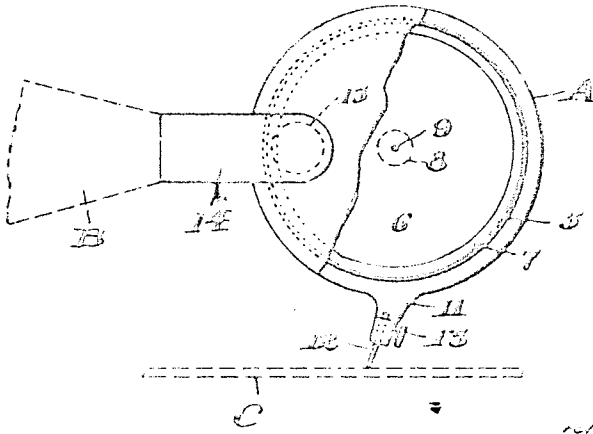


Fig. 2.

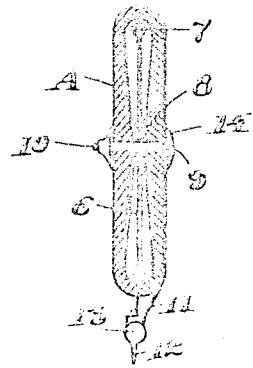


Fig. 3.

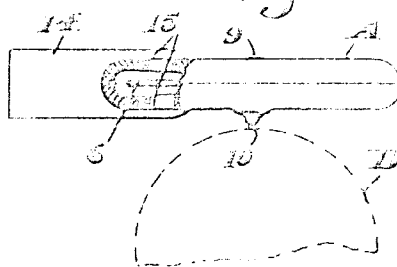


Fig. 4.

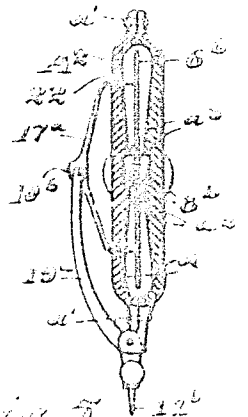


Fig. 5.

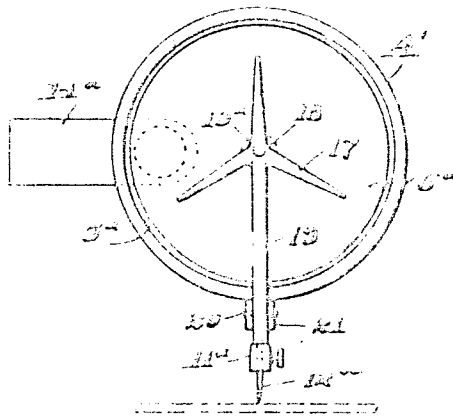
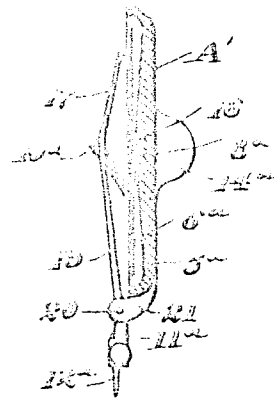


Fig. 6.



WITNESSES  
*Edw. M. ...*

INVENTOR  
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# UNITED STATES PATENT OFFICE.

ROBERT HEAD, OF NEW YORK, N. Y.

PHONOGRAPH-REPRODUCER.

951,781.

Specification of Letters Patent.

Patented Mar. 8, 1910.

Application filed May 18, 1904. Serial No. 208,540.

*To all whom it may concern:*

Be it known that I, ROBERT HEAD, a citizen of the United States, residing at the city of New York, borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Phonograph-Reproducers; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in phonograph reproducers, wherein I seek to provide an improved construction adapted for the reproduction of sounds which are free from harsh metallic tones and grating noises, the latter being serious objections to ordinary talking machines.

Another part of the invention is the provision of a sound box, which is constructed and arranged for use in connection with a disk record or a cylindrical record, such end being attained without change in the structure of the sound box and by simply changing the position thereof.

Another part of my invention is an improved reproducer embracing a vibratory diaphragm which is mounted in a novel manner to secure greater sensitiveness and an increased amplitude of vibration, and furthermore, to so construct the diaphragm as to prevent it from splitting, and to make it work steadily under the vibration given thereto.

The invention resides, broadly, in a reproducer having a vibratory diaphragm held or confined in or on a suitable body, the edges being free or unconfined, as distinguished from an ordinary reproducer wherein the edge portion of the diaphragm is fixed or secured firmly to the body.

The invention further consists of a phonograph reproducer wherein I use a sound box chambered for the reception of a non-metallic diaphragm.

The invention further consists in the employment of a non-metallic diaphragm having a rim which imparts weight to the free edge of the diaphragm, said rim also serving in connection with a mica diaphragm as a means for preventing the layers from separating or splitting.

The invention further consists of a phonograph reproducer comprising a sound box having a plurality of styli arranged and adapted for use on different classes of records of either cylindrical or disk form,

either stylus being brought into its working position by a simple change in the position of the sound box.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which like characters of reference are used to indicate corresponding parts in the several figures.

Figure 1 is a side elevation, partly broken away, and showing my reproducer adapted for use in connection with a disk record. Fig. 2 is a cross section of the sound box of Fig. 1. Fig. 3 is a sectional elevation of the sound box adjusted for use on a cylindrical record. Figs. 4 and 5 are views in side elevation and cross section respectively of another form of sound box. Fig. 6 is a cross section of still another form of sound box.

In the embodiment of the invention shown by Figs. 1 to 3 inclusive, A designates a sound box which is, practically, closed and provides a sound-chamber 5. Within this sound box is arranged a vibratory diaphragm 6, the same being made preferably of non-metallic material and mounted or held centrally in the sound chamber 5. According to one embodiment of the invention, the diaphragm 6 is made of mica, or other suitable material. Such a diaphragm is equipped with a rim 7 that imparts weight to the free edge portion of the diaphragm, said rim being adapted to embrace the edge of the mica and prevent the layers from splitting and separating under the vibrations which are given to the diaphragm. This rim may be of sheet metal, crimped or folded around the edge of the diaphragm.

The sound box has inclined walls which converge toward the center so as to confine or hold the diaphragm centrally, and as shown by Fig. 2, washers 8 are interposed between the diaphragm and the walls of the sound box, thus separating the diaphragm from direct contact with said sound box. A pin or stem 9 passes through the sound box, the washers and the diaphragm to assist in holding the latter firmly in place without fastening its edge or rim in the reproducer. With this stem is associated a stylus 10 which is outside of the sound box and projects in one direction from the same, said stylus extending laterally or from one side of the sound box. This stylus is preferably of a non-metallic nature, such as glass, and it is united directly in a suitable way, as by

cementing, to the pin 9, thus associating said stylus 10 with the diaphragm for imparting vibrations thereto. The sound box is furthermore provided with another stylus holder 11, which is shown as projecting from the edge of said box and in a different direction from the stylus 10. This holder 11 is adapted for the reception of a stylus 12, in the shape of a pin which is held or confined in said holder by any suitable means, such as the clamp 13 that is represented as a binding screw.

A hollow neck 14 projects beyond one edge of the sound box, as shown. This neck is attached to, or forms a part of the sound box, and it is in communication with the chamber 5, thereof by an opening 15, the latter being provided in one or both walls of the sound box, as indicated by full and dotted lines. This neck coöperates with a suitable form of horn B, which may be united to the neck or the latter may be part of the horn.

The two styluses, 10, 12, enable the reproducer to be used in connection either with a disk record, as C in Fig. 1, or with a cylindrical record, as D in Fig. 3. By adjusting the sound box, A, in the vertical position shown in Figs. 1 and 2, the stylus 12 is imposed on the disk record C to follow the undulations therein, and to be influenced thereby so as to transmit the vibrations to the diaphragm 6, thereby vibrating the latter in the chamber 5, and producing sound waves which flow through the neck 14 into and through the horn B. For using the reproducer on the cylindrical record D, the sound box is turned to a horizontal position, as in Fig. 3, thus bringing the glass stylus 10 into position to ride on the record, whereby the vibrations are communicated to the diaphragm for reproducing the sounds.

Another form of construction is shown by Figs. 4 and 5, wherein an open sound box A' is employed in connection with a centrally held non-metallic diaphragm 6'. This reproducer has a body open on one side and formed with a chamber 5', the wall of which has a bearing face 16 for the reception of a washer 8' that separates the diaphragm from direct contact with the sound box.

To make the diaphragm more sensitive I provide a spider 17 having a plurality of arms that engage at a number of points with said diaphragm, said arms resting on or being attached to the diaphragm. Said spider is shown as lying opposite to the open side of the sound box, and it is attached centrally to the diaphragm by a pin or stem 18, the latter being equipped with one stylus 10'. Said spider has an arm 19, the same being pivoted by a pin 20 on a lug 21 of the sound box, and with this arm is associated another stylus 12' that is suitably fastened to the stylus holder 11'.

The construction of Figs. 4 and 5 includes the same elements as the device of Figs. 1, 2 and 3, the same being adapted for use in substantially the same way.

As another construction of the reproducing sound box adapted for centrally clamping a non-metallic diaphragm, I have shown the box A<sup>2</sup> of Fig. 6 made of complementary sections *a a*, each of dished form, and flanged circumferentially in a way to be united by the screw *a'*. These box sections are thickened centrally at *a<sup>2</sup>*, and provided with sockets *a<sup>3</sup>*, the latter receiving the washers 8<sup>b</sup>, of fiber or other suitable material. These washers are arranged to be clamped forcibly upon the metal portion of the diaphragm 6<sup>b</sup>, by the sections *a* when they are drawn together by the screws *a'*. A stem or pin may or may not be used to fasten the diaphragm securely to the sound box and the washers, said diaphragm being thus held centrally in the chamber of the box and free to vibrate throughout the major portion of its area.

Another form of construction is represented by Fig. 6, wherein an externally located spider is combined with a closed sound box and a diaphragm mounted in said box.

The diaphragm 6<sup>c</sup> is held centrally in the sound box A<sup>2</sup> in either of the ways heretofore described, and in one side or sections of this sound box there are provided openings 22 which permit the legs of the spider 17<sup>a</sup> to play freely in the box, said legs being attached to or associated with the diaphragm for the purpose of imparting vibrations thereto. This spider carries a cylindrical record stylus 10<sup>b</sup>, and to the spider is pivoted an arm 19<sup>a</sup> that also has pivotal connection with the sound box, said arm being combined with a stylus 12<sup>b</sup> adapted to ride on a disk record.

The employment of the spider tends to increase the sensitiveness of the diaphragm, and it makes provision for the use of the styluses 10<sup>b</sup> and 12<sup>b</sup>, which are adapted for coöperation with the different kinds of records by merely shifting or changing the position of the sound box.

The stylus adapted for coöperation with a curvilinear record, such as the stylus 10 of Figs. 2 and 3, the stylus 10<sup>a</sup> of Figs. 4 and 5, and the stylus 10<sup>b</sup> of Fig. 6, is composed of rigid material, preferably of a non-metallic nature, such as glass. On the other hand, the stylus which is adapted for coöperation with a plane record, such as the stylus 12 of Figs. 1 and 2, 12<sup>a</sup> of Figs. 4 and 5, and the stylus shown in Fig. 6 as extending from the perimeter of the sound box or body portion, consists preferably of a flexible needle, as shown in the drawings.

Although I have shown a reproducer with a diaphragm held centrally in a sound box, it is evident that the diaphragm may be fastened at its edges to said box. Further-

more, a thin metal diaphragm may be used in lieu of a mica diaphragm.

Having thus fully described the invention, what I claim as new and desire to secure by Letters Patent is:

1. A sound reproducer comprising a sound-box, and a diaphragm held against movement at its middle or central portion, the edge portion of the diaphragm being free.
2. A sound reproducer comprising a sound-box, and a diaphragm held or confined against movement at its middle or central portion only.
3. A phonograph reproducer, comprising a sound box, and a mica diaphragm mounted at its central portion therein, said diaphragm being free to vibrate at its edge and throughout the major portion of its area.
4. A sound reproducer having a diaphragm held centrally from movement and provided with a rim at its edge portion.
5. A sound reproducer having a diaphragm held centrally against movement, and a rim embracing the edge portion of said diaphragm.
6. A phonograph reproducer, comprising a sound box and a diaphragm fastened at its center thereto, the edge portion of the diaphragm being unconfined.
7. A phonograph reproducer, comprising a sound box, a diaphragm held centrally against movement therein, and one or more interposed spacing devices at the central part of the diaphragm.
8. A phonograph reproducer, comprising a sound box, a diaphragm unconfined at its edge, and a transverse pin or stem passing through the diaphragm.
9. A reproducer comprising a body portion, a diaphragm substantially incased by said body portion, and a plurality of reproducing styluses cooperating with said diaphragm, one of said styluses extending in one direction from the body portion so as to cooperate with a plane record, and another of said styluses extending in a different direction from the body portion for the purpose of enabling the second named stylus to cooperate with a curvilinear record.
10. In a reproducer, a chambered body portion, a diaphragm cooperating therewith, and a plurality of reproducing devices operatively related to said diaphragm, said reproducing devices extending in different directions from the body portion, whereby in one position of the body portion one of said reproducing devices is adapted for cooperation with a plane record and by a partial rotation of the body portion the other of said reproducing devices is brought

into position for cooperation with a curvilinear record.

11. In a reproducer, a chambered body portion, a diaphragm cooperating therewith, and a plurality of reproducing styluses operatively related to said diaphragm, one of said styluses being composed of substantially unyielding material and adapted for cooperation with a curvilinear record, the other of said styluses being a substantially yielding or flexible needle adapted for cooperation with a plane record.

12. In a reproducer, a chambered body portion, a diaphragm separate from the body portion and attached thereto, and a plurality of reproducing styluses cooperating with said diaphragm, one of said styluses being composed of non-metallic rigid material and adapted for cooperation with a curvilinear record, the other of said styluses consisting of a yielding needle adapted to cooperate with a plane record.

13. A phonograph reproducer, comprising a sound box, a diaphragm, and two styluses, one being arranged to extend laterally from the central part of the diaphragm, and the other projecting from an edge of the sound box.

14. A phonograph reproducer, comprising a sound box, a diaphragm, and a plurality of styluses projecting from the middle and from the edge portions of said box; the sound box being changeable to horizontal or vertical positions and arranged to bring one or the other of the styluses into position for service on a disk or cylinder record.

15. In a reproducer, a sound box, a diaphragm in contact therewith, and a plurality of reproducing styluses, one of said styluses being mechanically connected to the perimeter of the sound box, and another of said styluses being positioned substantially at the central portion of said sound box, laterally thereof.

16. A phonograph reproducer, having a sound box, a diaphragm held against movement at its middle only, and a spider engaging with said diaphragm.

17. A phonograph reproducer having a sound box, a diaphragm inclosed therein, a spider, and a plurality of reproducing styluses associated with said spider, the respective styluses being adapted to cooperate with plane and curvilinear records.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ROBERT HEAD.

Witnesses:

JAB. H. GRIFFIN,  
EDWIN WALKER.