C. E. WOODS.

SOUND BOX FOR TALKING MACHINES.

APPLICATION FILED JULY 14, 1914.

1,145,535. Patented July 6, 1915.

Fig. 1.

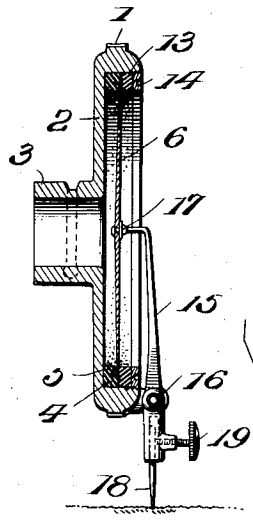


Fig. 4.

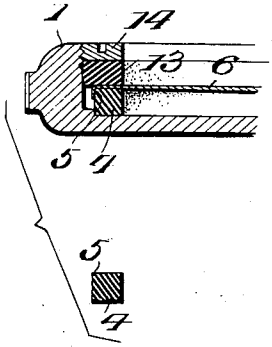


Fig. 5.

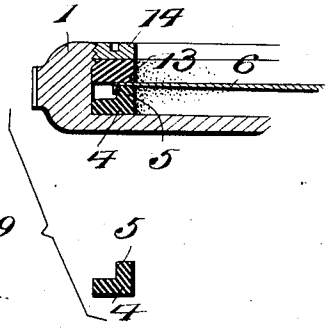


Fig. 2.

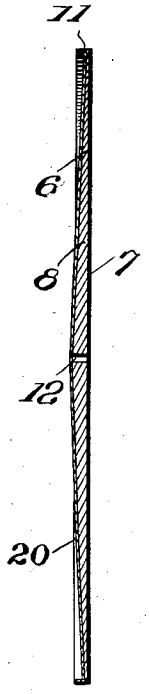


Fig. 3.

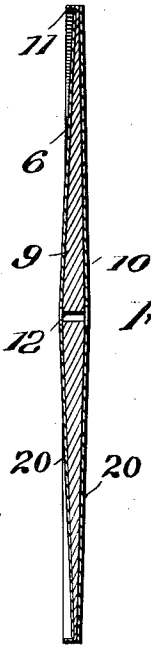
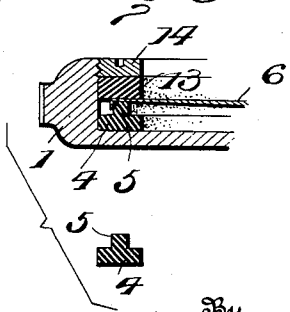


Fig. 6.



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UNITED STATES PATENT OFFICE.

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SOUND-BOX FOR TALKING-MACHINES.

1,145,535. Specification of Letters Patent. Patented July 6, 1915.

Application filed July 14, 1914. Serial No. 850,889.

To all whom it may concern:

Be it known that I, CLINTON E. WOODS, a citizen of the United States of America, and a resident of Bridgeport, Connecticut, have invented a new and useful Improvement in Sound-Boxes for Talking-Machines, which invention is fully set forth in the following specification.

This invention relates to reproducers for talking machines, and has for its objects to improve the quality of the sound reproductions obtained by the use of such reproducers, to cheapen the construction thereof, and to provide an instrument of this character which may be subjected to ordinarily rough handling without danger of destroying or injuring the delicate diaphragm thereof.

In reproducers as heretofore constructed, a great variety of materials have been employed for the diaphragms, such as metal, mica, glass, etc., all of which were open to more or less serious objections. Mica diaphragms, generally speaking, have given the best results, but they are the most expensive. Some metal diaphragms, and particularly diaphragms of aluminium, have given very superior results, and the same can be cheaply manufactured, but as heretofore constructed they are open to the objection that the metal is easily buckled or distorted by any slight blow on the reproducing needle or needle bar, thereby destroying the same as a means of obtaining a reproduction of fine quality. Glass diaphragms have also given good results, but glass is fragile and easily broken.

Among the metals, aluminum has long been recognized as possessing very superior acoustic properties, and as being a most excellent substance from which to construct diaphragms, but for the fact that when the diaphragm was made sufficiently delicate to take advantage of the superior qualities of the metal for reproducing purposes, it would become buckled after short use, and in fact had to be handled very carefully in assembling the parts of the reproducer to insure desirable results when it was new. So great have been the difficulties encountered in the use of an aluminum reproducer that, notwithstanding its recognized desirable qualities as a metal for giving reproductions of superior quality, its commercial use has in many instances been abandoned for that of the more expensive mica diaphragms.

One of the objects of my invention, therefore, is to provide a reproducer with a metal diaphragm and more specifically an aluminum diaphragm, thereby taking advantage of the recognized superior quality of this metal for such purpose, and to so construct the diaphragm and other parts of the reproducer that the buckling, distortion and other objections that have heretofore prevented the extended use of aluminum and other metal diaphragms may be entirely avoided.

With these objects in view, the invention consists in a reproducer or other sound-box (such as a recorder) provided with a metallic diaphragm, preferably of aluminum, and preferably thickest at its center and gradually diminishing in thickness toward the periphery of the diaphragm, the periphery being provided with an upturned flange preferably at approximately right angles to the plane of the diaphragm itself. This diaphragm is made of less diameter than the interior diameter of the sound-box itself, and in order to insure that no part of the diaphragm shall come in contact with the metal of the sound-box casing itself, and for the further purpose of holding the diaphragm with great firmness in its position in the sound-box, there is provided an annular gasket of elastic material, such as rubber or cork, which is provided with an annular shoulder whose external diameter is less than the internal diameter of the sound-box casing, which shoulder is engaged by the flange of the diaphragm. When the diaphragm is in position with its flange engaging the shoulder of the gasket, it is held firmly in place by any suitable retaining means, as for example a screw bezel or ring, preferably with a gasket of suitable elastic

material, as rubber or cork, interposed between the retaining member and the face of the diaphragm.

The inventive idea involved is capable of receiving a variety of mechanical expressions, some of which, for the sake of illustrating the invention, are shown in the accompanying drawings, but it is to be expressly understood that such drawings are for the purpose of illustration only, and are not designed to define the limits of the invention, reference being had to the appended claims for this purpose.

In said drawings Figure 1 is a central transverse section through a reproducer embodying my invention, with the stylus bar, the stylus and the retaining screw shown in elevation; Fig. 2 is a central transverse section of a diaphragm on an enlarged scale, in which one face of the diaphragm is a plane surface, while the other face gradually tapers from the center toward the periphery thereof; Fig. 3 is a like section of a diaphragm in which the thickness of the diaphragm gradually tapers on both faces from the center toward the periphery thereof; and Figs. 4, 5 and 6 show some of the forms which the shouldered gasket may assume.

Referring to the drawings, in which like reference numerals indicate like parts throughout the several views, 1 is a sound-box casing of metal or any suitable material, cup-shaped as shown, and provided with the usual back wall or bottom 2 and neck 3, by means of which it is connected to the tone-arm of the machine. Seated within the casing 1 is an annular gasket 4 of any suitable elastic material, as rubber or cork, and this gasket is provided with an annular shoulder 5 on that face of the gasket which is turned outward from the back or wall 2 of the casing 1, the external diameter of said shoulder being less than the internal diameter of the casing. Different forms of gaskets provided with such shoulder are shown in Figs. 1, 4, 5 and 6. In Fig. 1 the shoulder is formed by an annular slit in the gasket face. Fig. 4 shows the gasket of simple rectangular form in cross section, while Figs. 5 and 6 show the gasket with an annular rib forming said shoulder.

6 is the diaphragm of any suitable metal, such as aluminum, said diaphragm being thickest at its center and tapering gradually from the center to the periphery. The thickness of the central portion of the diaphragm may vary within limits, as well as the thickness of the peripheral portion thereof. I have found that very superior results are obtained by making the central portion, when the diaphragm is of aluminum, about .015 of an inch, and the thickness at the periphery about .004 of an inch. The diaphragm may be made with one face thereof plane, as shown at 7 in Fig. 2, and the other face thereof tapering, as shown at 8 in said figure, or both faces may taper from the center toward the periphery, as shown at 9 and 10 (Fig. 3). The diaphragm having been formed with the desired taper, is then provided with a peripheral flange 11. Preferably in imparting this form to the diaphragm, a circular disk of the metal is cut from a sheet thereof having approximately uniform thickness, and it is then struck several blows in a suitatble die with a proper hammer. This serves, not only to impart the tapering thickness to the diaphragm, but also to harden the metal and impart to the same a uniform molecular construction. The disk having been thus treated, the flange 11 is then formed thereon by drawing in suitable dies, or otherwise, and a suitable perforation 12 having been provided in the center thereof, the diaphragm is placed in position with the flange 11 engaging the shoulder 5 on the gasket 4. Preferably a second annular gasket 13 of cork, rubber or other elastic material is then placed against the outer face of the diaphragm, as is common in this art, and the parts are secured in position by any suitable retaining means, as for example, a screw bezel or ring 14. Any suitable stylus bar 15, fulcrumed upon the frame of the sound-box, as at 16, is then secured by suitable means to the center of the diaphragm at 17, said stylus bar being provided with the usual stylus 18 and retaining screw 19.

With the parts thus constructed and assembled, it will be found that there is provided a reproducer which will reproduce recorded sounds with great faithfulness and accuracy, and of remarkably fine quality, and in which the diaphragm will not buckle or become distorted under the roughest usage.

For the purpose of protecting the surface of the diaphragm from atmospheric action, and for the further purpose of enhancing the appearance of the diaphragm, I apply decalcomanias 20 on one or both faces of the diaphragm, and I have discovered that the fine quality of the reproductions obtained is in no way impaired when such decalcomanias are employed.

While I have, for convenience of description, herein referred to my invention as applied to a reproducer, it will be apparent to those skilled in the art that the same is equally applicable to sound-boxes for talking machines, whether the same be employed for recording or reproducing sound, and the claims hereto appended are intended to include both forms of sound-box.

I am aware of the fact that it has heretofore been proposed to provide a diaphragm with a peripheral flange, and also that it

has been proposed to construct diaphragms which are thickest at their centers and taper toward the periphery. And I do not broadly claim either of these constructions *per se* as of my invention, but

What I do claim is:—

1. In a sound-box for talking machines, the combination of a frame or casing having an annular seat, a gasket of elastic material seated therein said gasket having an annular groove formed in that face on the opposite side from said seat, a diaphragm having a peripheral flange engaging the groove in said gasket, and means retaining said diaphragm in position.

2. In a sound-box for talking machines, the combination of a frame or casing having an annular seat, a gasket of elastic material seated therein said gasket having an annular groove formed in that face on the opposite side from said seat, a diaphragm thickest at its center and tapering toward its periphery and having a peripheral flange engaging the groove in said gasket, and means retaining said diaphragm in position.

3. In a sound-box for talking machines, the combination of a frame or casing having an annular seat therein, a gasket of elastic material seated therein and having an annular groove formed in that face on the opposite side from said seat, a metal diaphragm, peripherally flanged, thickest at its center and tapering toward its periphery, with its flange entering the groove in said gasket, and means retaining said diaphragm in position.

4. In a sound-box for talking machines, the combination of a frame or casing having an annular seat therein, a gasket of elastic material seated therein and having an annular groove formed in that face on the opposite side from said seat, an aluminum diaphragm, peripherally flanged, thickest at its center and tapering toward its periphery, with its flange entering the groove in said gasket, and means retaining said diaphragm in position.

5. In a sound-box for talking machines, the combination of a cup or casing, a resilient diaphragm-support or gasket seated therein and provided with an annular shoulder of less diameter than the internal diameter of said casing, a diaphragm of less diameter than said casing and having a peripheral flange engaging said shoulder, and means retaining said diaphragm in position.

6. In a sound-box for talking machines, the combination of a casing, an annular gasket seated therein and provided with an annular shoulder of less diameter than the internal diameter of said casing, a metal diaphragm of less diameter than the internal diameter of said casing and having a peripheral flange engaging said shoulder, and means retaining said diaphragm in position.

7. In a sound-box for talking machines, the combination of a casing, an annular gasket seated therein and provided with an annular shoulder of less diameter than the internal diameter of said casing, an aluminum diaphragm of less diameter than the internal diameter of said casing and having a peripheral flange engaging said shoulder, and means retaining said diaphragm in position.

8. In a sound-box for talking machines, the combination of a casing, an annular gasket seated therein and provided with an annular shoulder of less diameter than the internal diameter of said casing, a metal diaphragm thickest at its center and tapering toward its periphery and having a peripheral flange engaging said shoulder, and means retaining said diaphragm in position.

9. In a sound-box for talking machines, the combination of a casing, an annular gasket seated therein and provided with an annular shoulder of less diameter than the internal diameter of said casing, an aluminum diaphragm thickest at its center and tapering toward its periphery and having a peripheral flange engaging said shoulder, and means retaining said diaphragm in position.

10. In a sound-box for talking machines, the combination of a casing and a flanged aluminum diaphragm of less diameter than the internal diameter of said casing, with resilient means supporting said diaphragm in said casing but out of contact therewith.

11. In a sound-box for talking machines, the combination of a casing and a peripherally flanged aluminum diaphragm thickest at its center and tapering toward its periphery, with resilient means supporting said diaphragm in said casing but out of contact therewith.

12. In a sound-box for talking machines, a diaphragm having a decalcomania protecting coat or covering on the face thereof.

13. In a sound-box for talking machines, the combination of a metal cup, an annular gasket seated therein and having a slit or groove formed in that face opposite to its seating face, a peripherally flanged aluminum diaphragm thickest at its center and tapering from its center toward its periphery and with its flange entering the slit or groove in said gasket, a second annular gasket over said diaphragm, and means retaining said parts in position.

14. In a sound-box for talking machines, the combination of a casing, a peripherally flanged aluminum diaphragm of decreasing thickness from its center to its periphery, and a pair of annular elastic gaskets between which said diaphragm is held at its

periphery, one of said gaskets having an annular shoulder engaged by the flange on the diaphragm.

15. In a sound-box for talking machines, the combination of a casing, a peripherally flanged diaphragm thicker at its center than at its periphery, and a pair of annular elastic gaskets between which said diaphragm is held at its periphery, one of said gaskets having an annular shoulder engaged by the flange on the diaphragm.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CLINTON E. WOODS.

Witnesses:

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J. S. GRIFFITH.