No. 680,431. Patented Aug. 13, 1901.

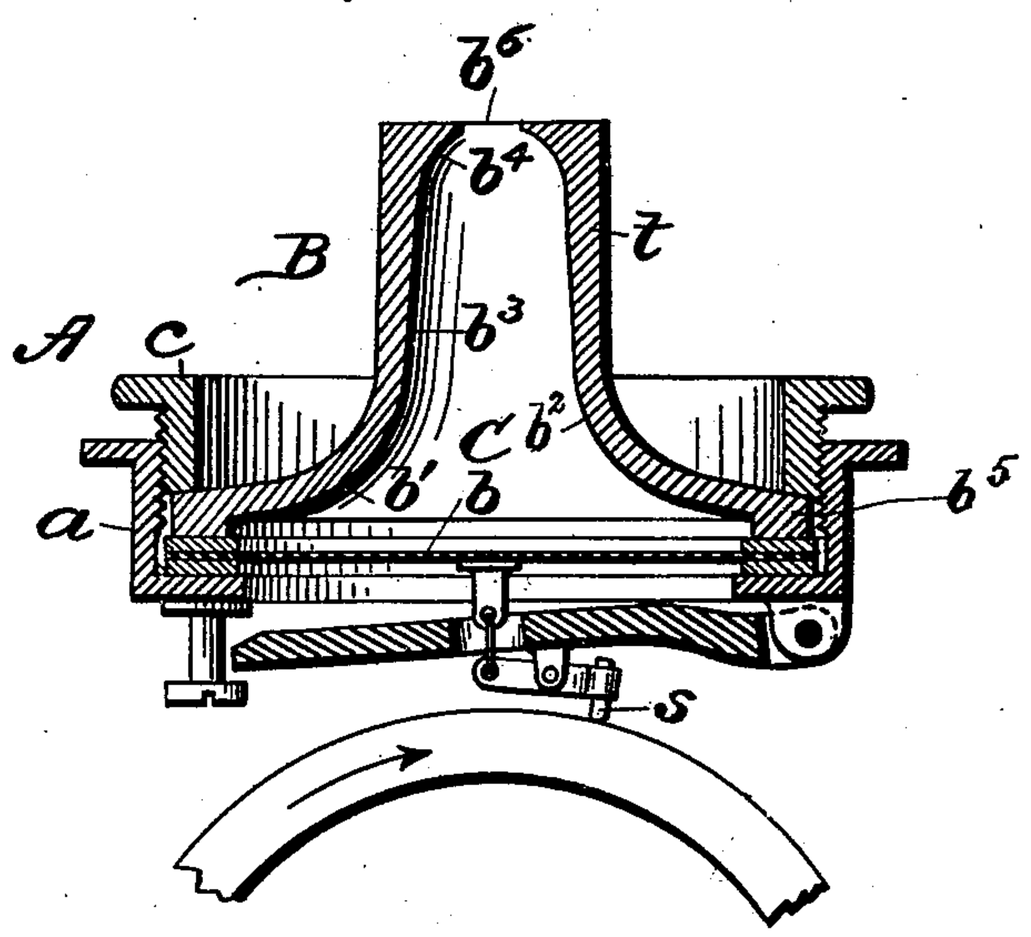
W. R. DUTEMPLE.

DIAPHRAGM TUBE PLATE FOR PHONOGRAPHS.

(Application filed Oct. 12, 1900.)

(No Model.)

FIG. 1.



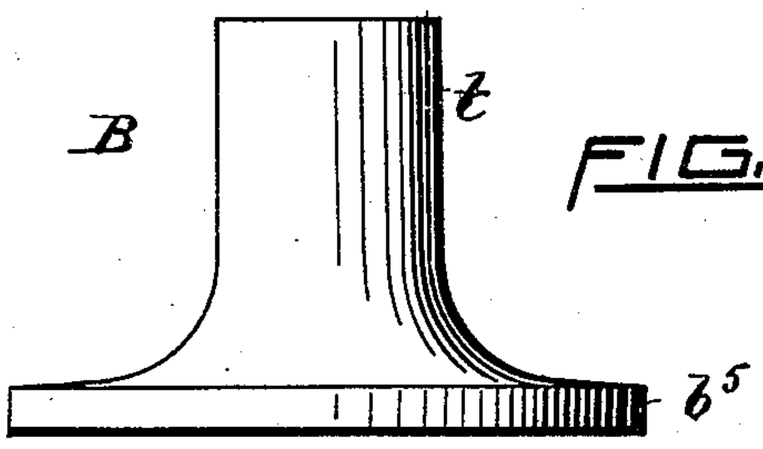


FIG. 2.

WITNESSES.

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WILLIAM R. DUTEMPLE, OF AUBURN, RHODE ISLAND.

DIAPHRAGM TUBE-PLATE FOR PHONOGRAPHS.

SPECIFICATION forming part of Letters Patent No. 680,431, dated August 13, 1901.

Application filed October 12, 1900. Serial No. 32,841. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM R. DUTEMPLE, a citizen of the United States of America, and a resident of Auburn, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Diaphragm Tube-Plates for Phonographs, of which the following is a specification.

My invention relates to improvements in phonographs, and more especially to the diaphragm tube-plates of the sound-boxes of such sound recording and reproducing machines; and it consists, essentially, of a chambered diaphragm tube-plate or initial sound-receiving member having its lower end enlarged and adapted when in use to be removably mounted above the diaphragm seated in the frame or housing of a sound box or reproducer and having a contracted or reduced diaphragm-chamber, made by forming the base of the tube-plate with convex interiorly-curved walls which merge into a central taper-bored shank, which terminates by a concave surface into a reduced central opening, the inner periphery of the opening having thin and sharp edges, whereby the sound-waves are first condensed and then contracted before expanding into the open air or projector, all as will be more fully hereinafter set forth and claimed.

In the construction of sound-boxes of the class above referred to it has been usual heretofore, so far as I am aware, to make the base portion of the tube-plates practically flat, the diaphragm-chamber in such case being comparatively shallow, while at the same time the bore of the tubular portion is substantially cylindrical or having divergent sides in direct communication with and forming a part of the diaphragm-chamber. In another case the base portion of the diaphragm tube-plate has a convex or dome-shaped diaphragm-chamber, this too being in direct communication with the straight or cylindrical bore of the central tubular part. In these as well as in other sound-boxes the diameter of the opening or bore at the mouth or upper end of the tubular portion of the tube-plate is substantially the same or larger than at the point where the bore intersects the lower or enlarged portion of the diaphragm-chamber. There are objections or disadvantages inherent in sound-reproducing machines provided with diaphragm tube-plates having diaphragm-chambers constructed substantially as above described even when the machine is fitted with any of the well-known devices through which the diaphragm is vibrated by means of a stylus in engagement with the grooved path or track formed in the traveling record. In such former sound-boxes the sound-waves are first collected in the diaphragm-chambers thereof. Said waves upon being discharged or projected therefrom possess to a considerable degree what may be termed a "metallic" sound, or, in other words, this metallic tone in the sound-waves is due largely, I believe, to the imperfect form of the diaphragm-chamber, in that the latter does not permit the sound-waves to become sufficiently contracted or condensed, as it were, before they are discharged into the outer air. I have discovered and demonstrated by experiments that by providing the bore of the outer or upper end of the tube-plate or diaphragm-chamber member with a contracted opening equal, say, to at least one-half the diameter of the normal bore the sound-waves thus reproduced and issuing from the diaphragm-chamber possess greater strength and intensity, while being less metallic the tone is purer and the enunciation is clearer and more distinct, while the volume of sound is as great and as far-reaching as compared with diaphragm-chambers or diaphragm tube-plates as usually constructed.

In the accompanying drawings, Figure 1 is a transverse central sectional view, enlarged, of a sound-box or sound-reproducer provided with a diaphragm tube-plate embodying my improvements; and Fig. 2 is a side elevation of the tube-plate member detached from the sound-box.

In the drawings, A indicates a sound-box of well-known construction, the same comprising the frame or housing member *a*, the diaphragm *b*, seated therein, an annular follower *c*, screwed into the frame, whereby the diaphragm is kept firmly in position, and mechanism or levers for carrying the movable

stylus *s*, a portion of said mechanism being rigidly secured to the under side of the diaphragm *b* at its center.

The chambered diaphragm tube-plate B forming the subject of my present invention has its lower portion *b'* flaring outwardly and provided with an outer rim or flange b^5, whereby the tube-plate and diaphragm are adapted to be firmly clamped in position in the said frame *a* and above the diaphragm by means of the follower-nut *c*, as usual. The upper or tubular portion *t* of the member B is substantially cylindrical exteriorly and adapted to receive thereon the small end of a cone-shaped "horn," also as usual. The diaphragm-chamber C of the said member B, I prefer to make substantially as represented, the same having the upper surface of its lower or base portion slightly beveled and extending upwardly in a gradually-decreasing diameter having convex sides b^2. From this point upwardly the interior of the said tubular part *t* is provided with a tapered bore b^3 in direct communication with and forming a part of the diaphragm-chamber. The upper end b^4 of the bored portion is spherical or concave and terminates in the comparatively small central opening b^6. I prefer to true off the face of the upper end of the tubular shank or neck *t*, thus making the axis of said opening b^6 at right angles therewith, the construction being such that the intersection of the upper end portion b^4 of the bore and the said opening forms a practically sharp or thin edge, all as clearly shown.

In a diaphragm tube-plate provided with a diaphragm-chamber C embodying my invention the sound-waves produced by the vibrations of the diaphragm *b* are first collected in the lower part of the chamber, the curved sides b^2 acting to greatly condense the waves and reflect them toward the center of the chamber and are still further condensed in passing upwardly along the tapering bored part b^3 until they are suddenly reflected and contracted by striking against the concave surface b^4. The thus condensed waves now in flowing out of or being discharged from the tube-plate impinge against the sharp edge of the small or contracted opening b^6 and quickly expand into the outer air or projector, if one be used.

I do not claim, broadly, as my invention an apertured diaphragm tube-plate provided interiorly with a sound-collecting chamber having an enlarged base; but

What I do claim, and desire to secure by United States Letters Patent, is—

1. In a sound box or reproducer for phonographs or other analogous sound-reproducing machines, the combination with a suitably-mounted diaphragm and stylus-carrying mechanism in engagement with said diaphragm, of a diaphragm tube-plate located above the diaphragm, and having a contracted or reduced diaphragm-chamber made by forming the base of the tube-plate with convex interior-curved walls which merge into a central taper-bored shank which terminates by a concave surface into a reduced central opening, the inner periphery of the opening having thin and sharp edges, whereby the sound-waves are first condensed and then contracted before expanding into the open air or projector, substantially as described and for the purpose set forth.

2. In a device of the class described, the combination of a housing member having a diaphragm mounted therein and stylus-carrying mechanism in engagement with said diaphragm, of a diaphragm tube-plate mounted above the diaphragm, an annular follower-nut adapted to engage the interior of the housing member and clamp the tube-plate to the diaphragm; said tube-plate having a contracted chamber whose base is provided with an interior convex surface which merges into a central taper-bored shank and then terminates in a spherical or concave upper portion, through which a small central opening is formed having thin and sharp edges, substantially as described.

Signed by me at Providence, Rhode Island, this 11th day of October, A. D. 1900.

WILLIAM R. DUTEMPLE.

Witnesses:

GEO. H. REMINGTON,

WILLIAM A. SULLIVAN.