

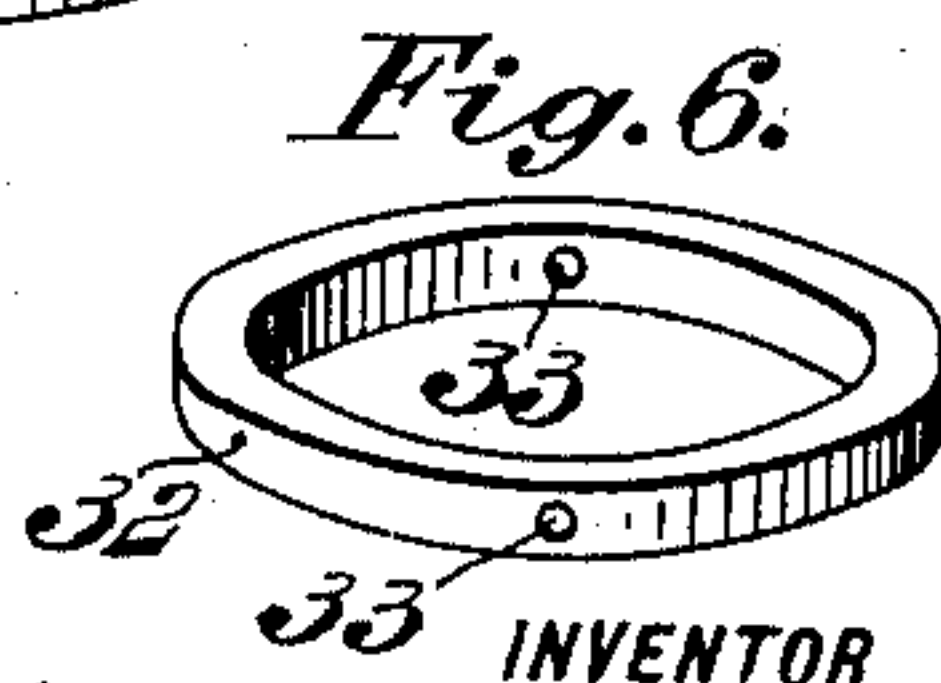
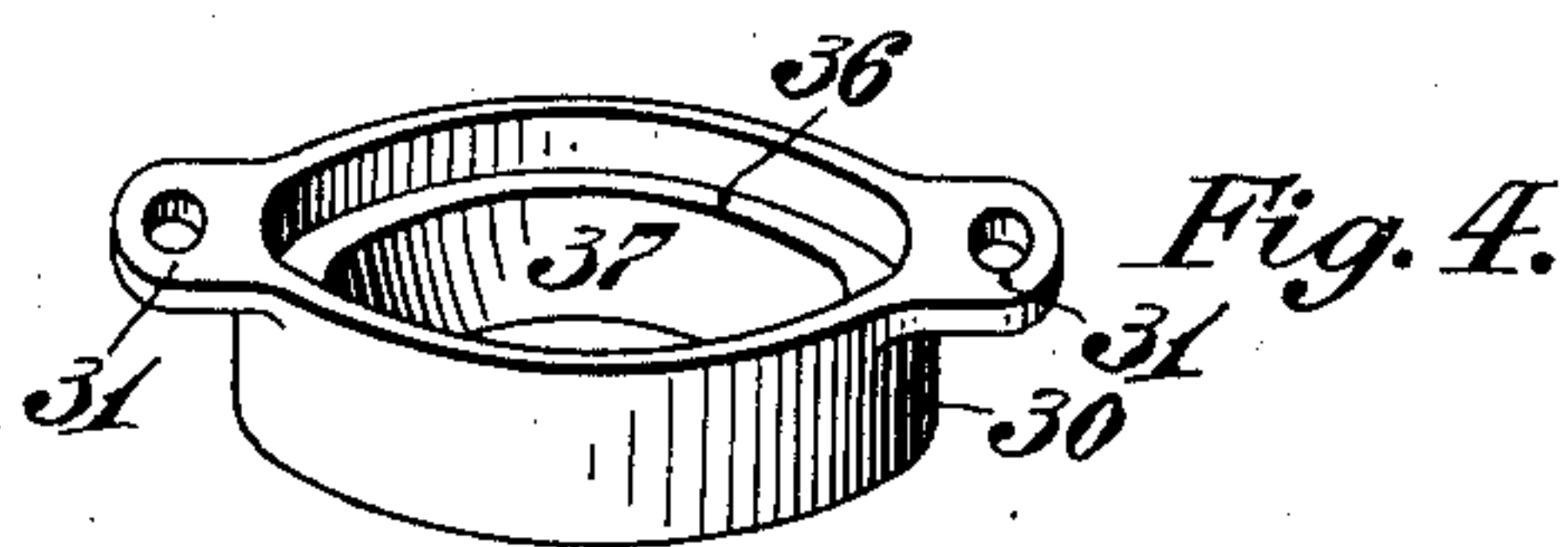
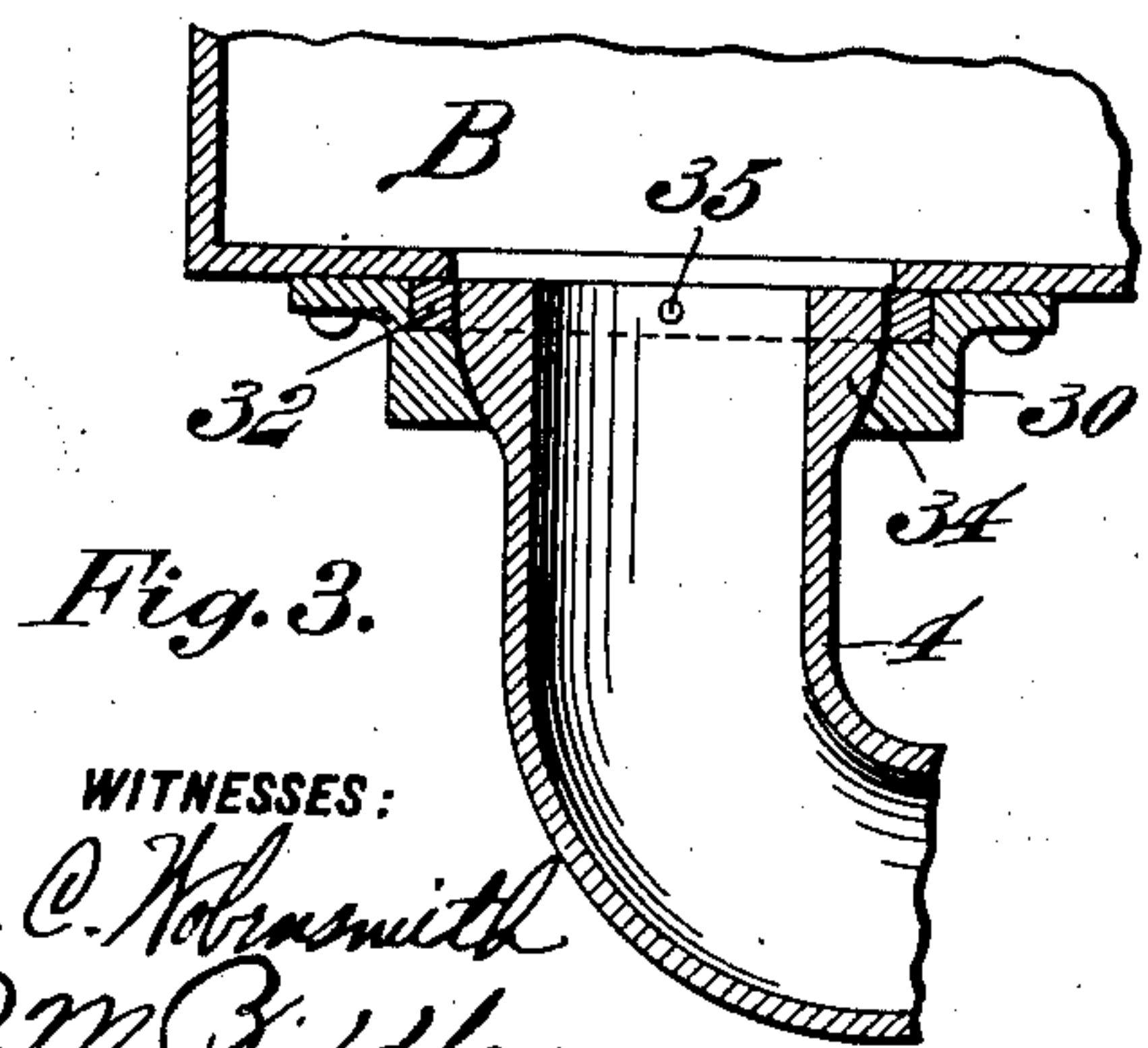
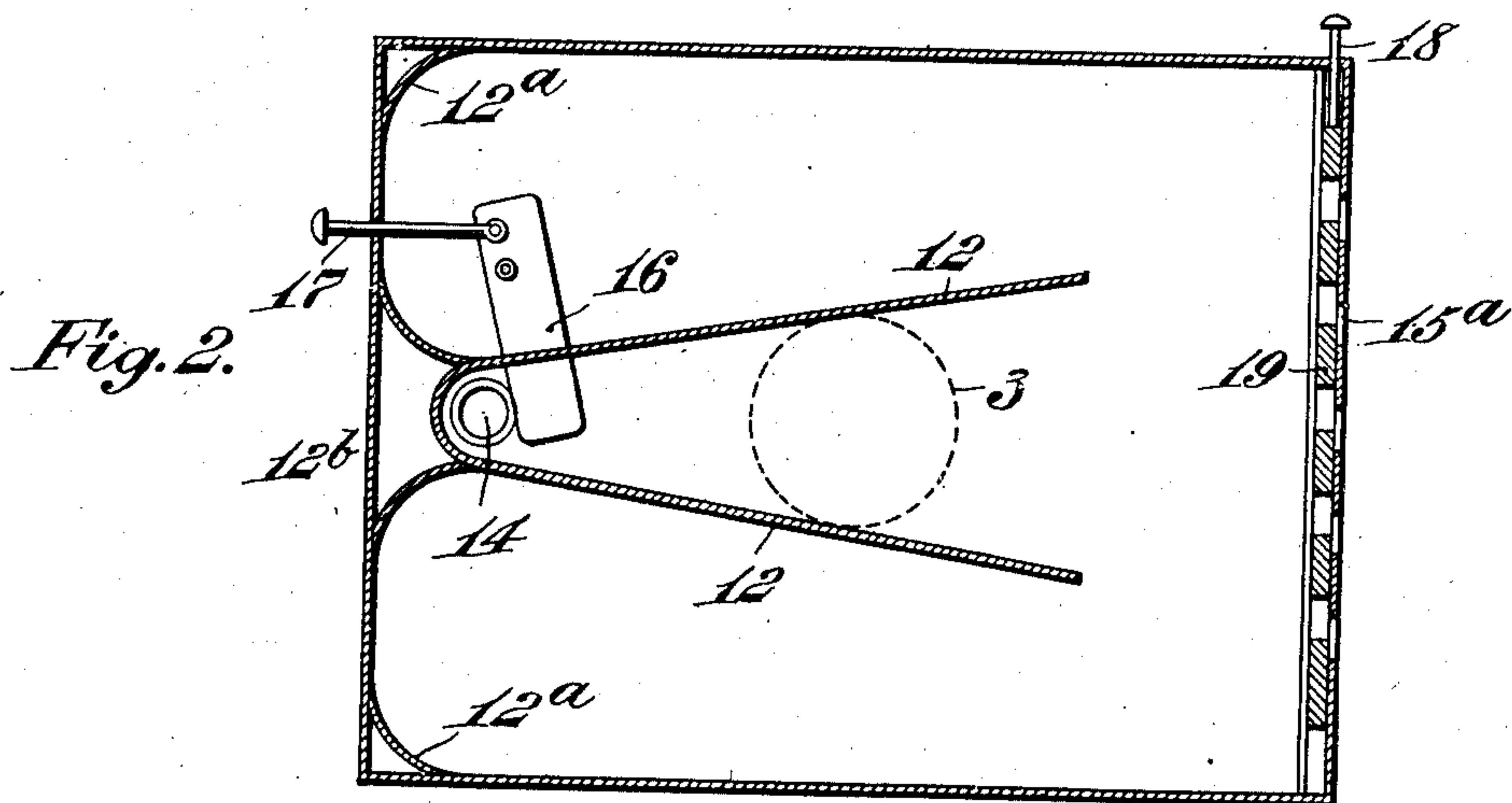
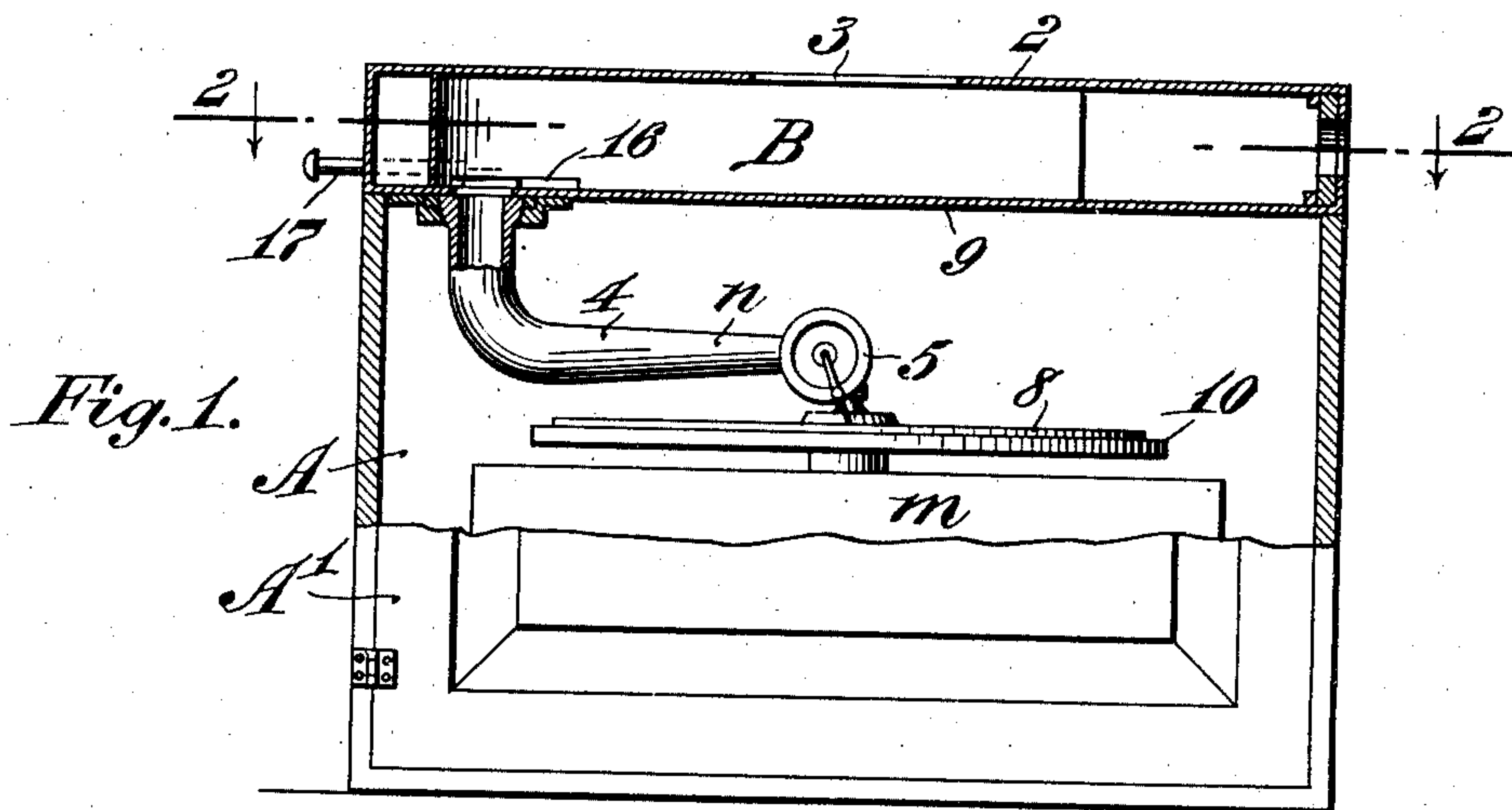
No. 873,937.

PATENTED DEC. 17, 1907.

L. T. HAILE.  
SOUND REPRODUCING MACHINE.

APPLICATION FILED MAY 27, 1907.

2 SHEETS—SHEET 1.



WITNESSES:  
*Geo. C. Kohnsmith*  
*Q. M. Biddle*

INVENTOR  
*Luther J. Haile*  
BY *H. V. Seaton*

ATTORNEY.

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2 SHEETS—SHEET 2.

Fig. 7.

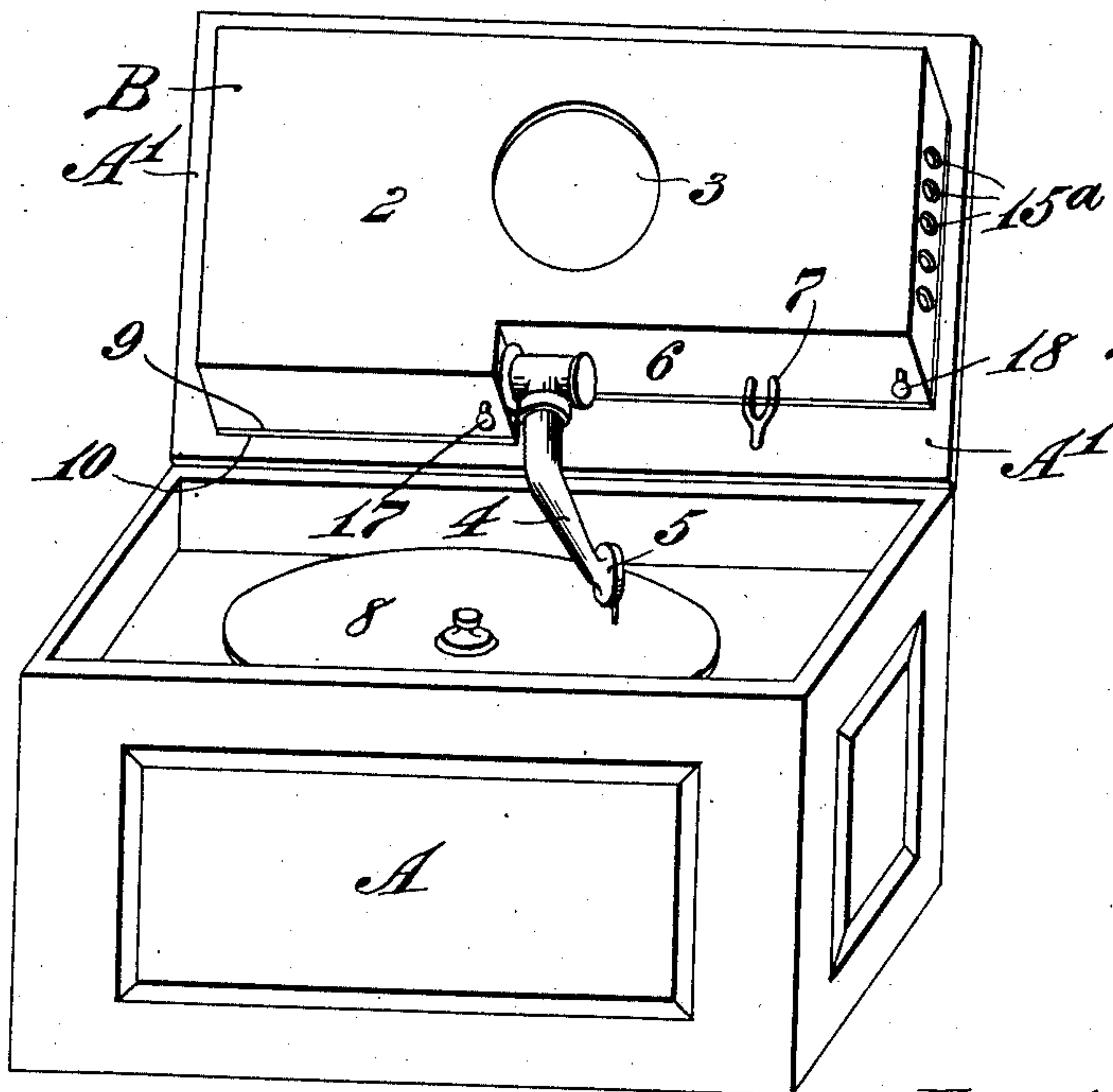


Fig. 9.

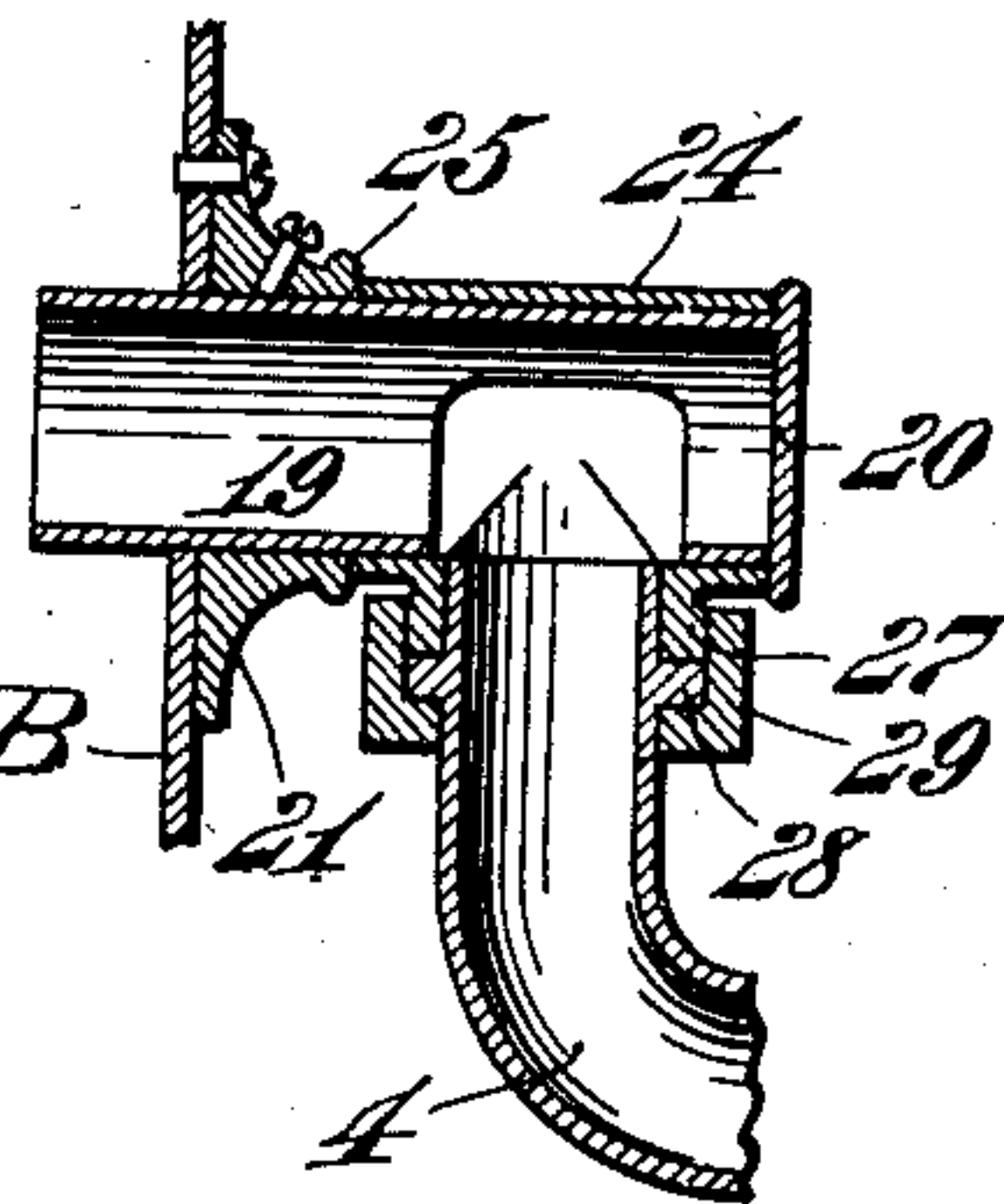


Fig. 10.

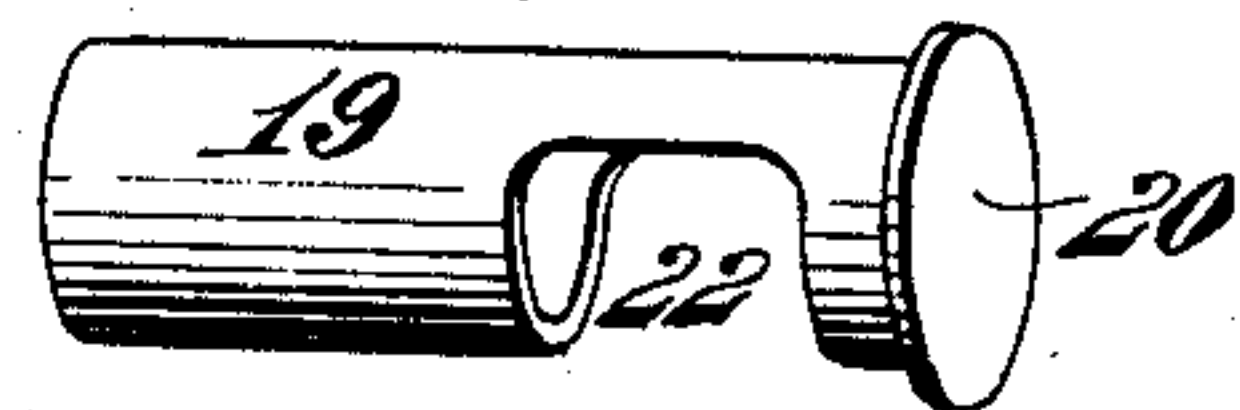


Fig. 8.

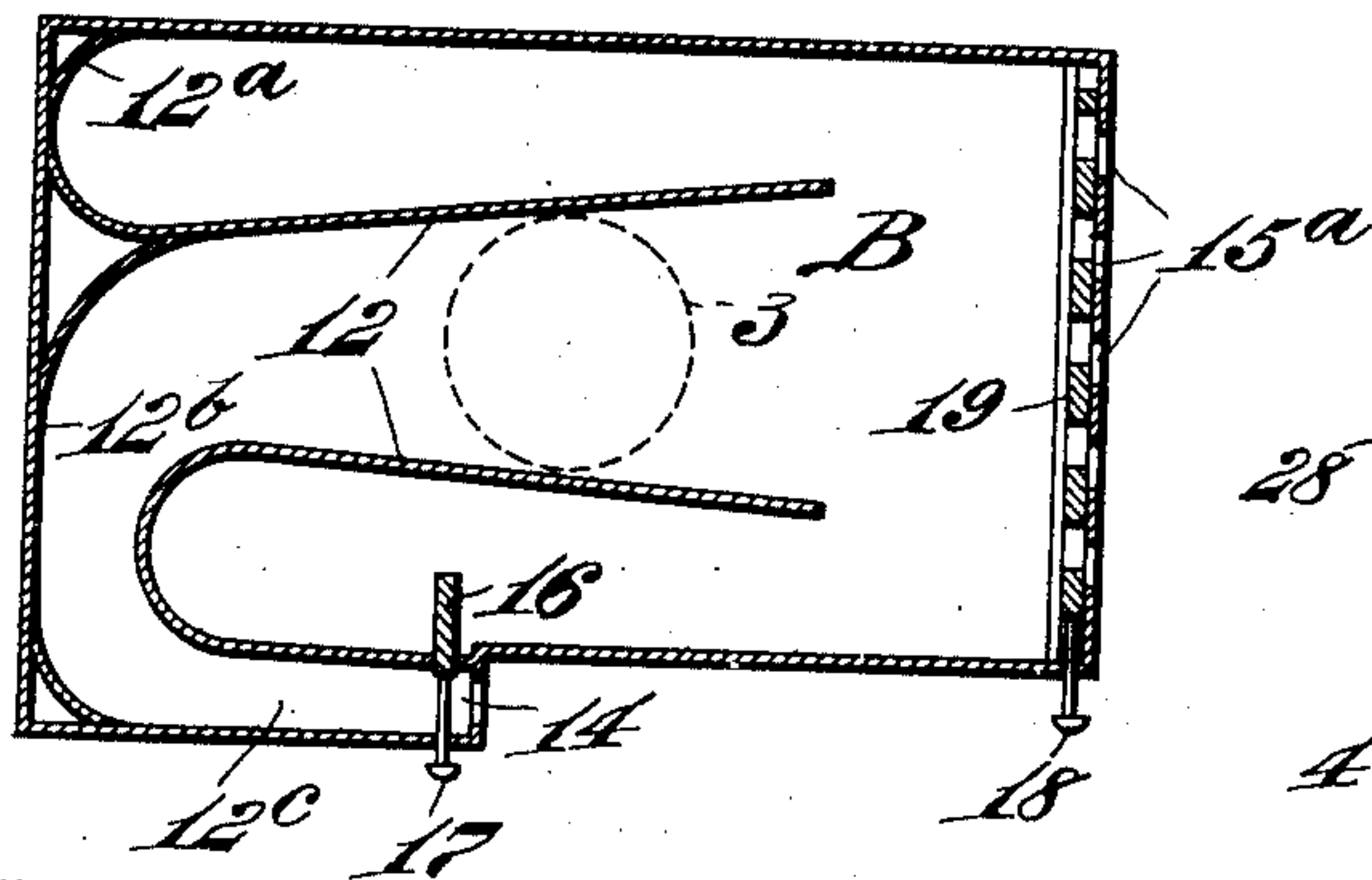


Fig. 11.

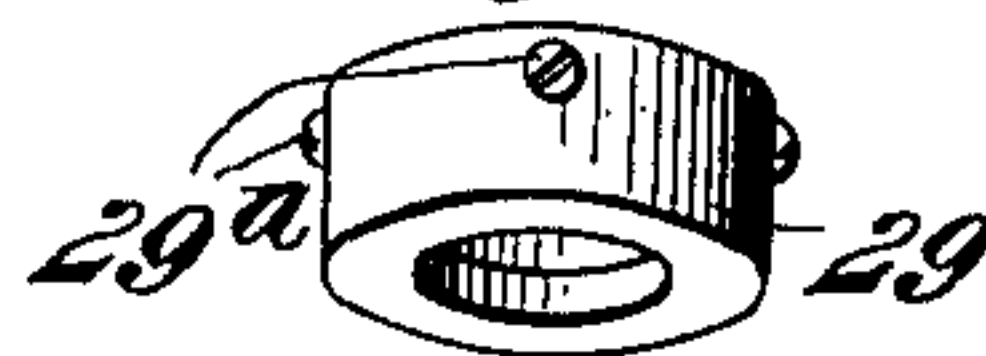


Fig. 12.

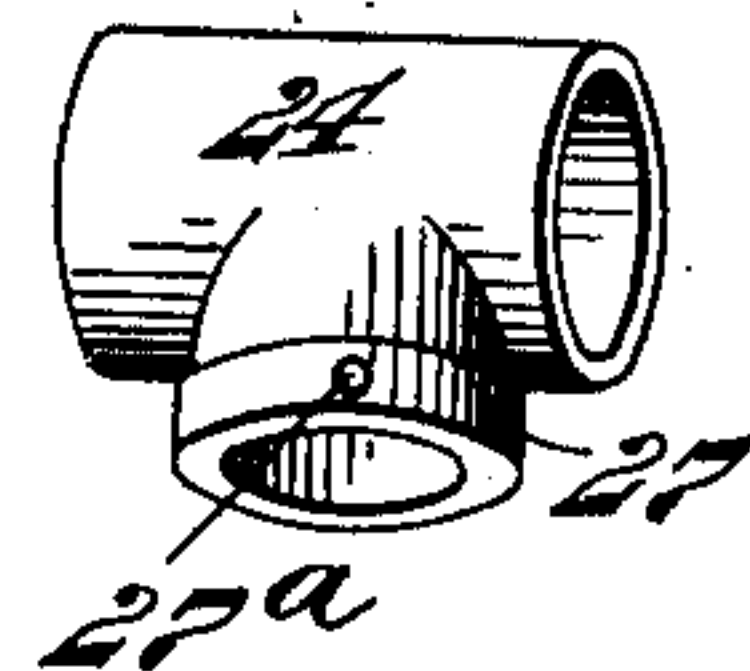
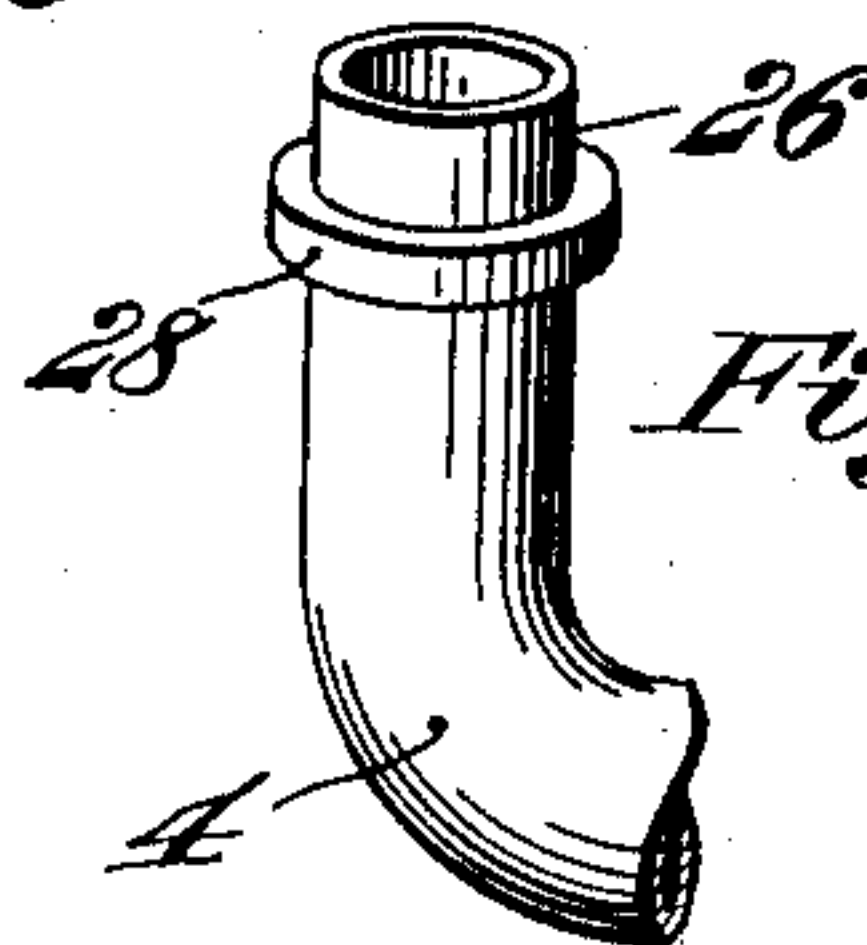


Fig. 13.



WITNESSES:

Geo. C. Tolson  
Q. M. Ciddle

INVENTOR

Luther T. Haile

BY

F. V. Seaton

ATTORNEY.



# UNITED STATES PATENT OFFICE.

LUTHER T. HAILE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF NINE ONE-HUNDREDTHS TO JOSEPH W. SHANNON, ONE-TENTH TO FREDERICK J. GEIGER, AND ONE-TENTH TO LOGAN W. MULFORD, ALL OF PHILADELPHIA, PENNSYLVANIA.

## SOUND-REPRODUCING MACHINE.

No. 873,937.

Specification of Letters Patent.

Patented Dec. 17, 1907.

Application filed May 27, 1907. Serial No. 375,766.

*To all whom it may concern:*

Be it known that I, LUTHER T. HAILE, a citizen of the United States, residing in the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to sound-reproducing machines for the reproduction of vocal and instrumental sound-waves from a "record" thereof, and has for its object to so amplify and modify the sound-waves so produced as to restore, in large part if not wholly, their original tone and timbre, closely simulating the original sounds recorded; and, as incidental advantages the elimination of the amplifying and discharging horn and its adjunctive parts, commonly employed with talking machines, and the metallic resonance resulting therefrom.

To these ends my invention consists of a new instrument comprising the combination, in or on a containing cabinet, with an interiorly-disposed sound-reproducing machine, of any known type in which sound-waves are recorded on a disk or cylinder record and sought to be reproduced therefrom by a diaphragm vibrated by a relatively traversing stylus and record, of a contiguously-mounted resonance-chamber, at least one wall of which is a sounding-board, into the interior of which chamber the sound-waves produced by the diaphragm of the reproducer are discharged; and means such as a pivotally-mounted hollow sound-conveying arm on the free end of which the sound-reproducer of the talking machine is mounted, the other and pivotally supported end of said arm being mounted in an apertured wall of said resonance-chamber in such manner as to discharge the sound-waves thereinto. Also in deflecting partition walls in the resonance-chamber, operating primarily as an amplifying conduit for the sound-waves on their passage through the resonance-chamber and during their impingement against the inner face of the sounding-board, and secondarily to modify their tone by contact of such partition walls with the resonant fibers of the sounding-board. Also in the provision of

valve mechanism governing the inlet to the resonance-chamber, as also valve mechanism governing its discharge ports, whereby the tone production may be regulated, namely, producing either loud or soft tones, with diminuendo or crescendo, at the will of the operator and while the machine is in operation. Also in other detail features of construction and arrangement of the elements relatively to the cabinet, in each of the two alternate forms thereof hereinafter described; the combined elements being well adapted to be contained in a cabinet and constitute a compact, self-contained and readily transportable machine or instrument.

The basic principle of the invention is exemplified in a device wherein sound-waves are reproduced from a "record" thereof by a contacting stylus vibrating a diaphragm and discharging the sound-waves so produced into the interior of a resonance-chamber of the character recited, whereby they operate to sympathetically vibrate the sounding-board wall or walls thereof; while a further basic principle is the deflection modification and amplification of such sound-waves within the resonance-chamber, exemplified by the provision of outwardly-diverging partition walls interiorly disposed between the sounding-board wall or walls of such resonance-chamber.

In the accompanying drawings illustrating my invention in two of its best forms: Figure 1 is a vertical section, partly in elevation, wherein the interior of the cabinet is reached through a hinged closure in one of its side walls, and wherein the resonance-box is placed over the open top of the cabinet, the back of the former constituting the top of the latter and not necessarily having any function as a sounding-board. Fig. 2 is a section of the resonance-box, drawn on the line 2—2 of Fig. 1. Fig. 3 is an elevation of the pivoted sound-conveying arm constructed to operate with the form of device shown in Fig. 1. Figs. 4, 5 and 6 are elevations in perspective of the elements comprising the sound-conveying arm of Fig. 3. Fig. 7 is an elevation in perspective of another form of the device, wherein the top of the cabinet is provided with a hinged lid or door and the resonance-box mounted on the inner face of the door, in such manner that both the top and back



sides of the resonance-chamber may operate as sounding-boards; and Fig. 8 is a horizontal sectional view thereof, through the center of the resonance-chamber. Fig. 9 is an elevation of a form of the pivotally-mounted sound-conveying arm constructed to operate with the form of device shown in Fig. 7; and Figs. 10 to 13 inclusive are elevations in perspective of the elements comprising the sound-conveying arm of Fig. 9.

Referring now to said drawings A indicates an inclosing cabinet, with an outwardly opening door A' in its side wall, in the form shown in Fig. 1, but with the door A' forming the top covering or lid, in the form shown in Fig. 7; the cabinet, in either case, containing a sound-reproducing or "talking-machine" of any usual type, the drawings showing the gramophone type, indicated in Figs. 1 and 7 wherein a motor-containing box is indicated at *m*, the turn-table at 10, the "record" at 8, and the sound-box mechanism, comprising a diaphragm and a stylus, at 5.

Sound waves produced by the diaphragm of the sound-box 5 are discharged through the sound-conveying tube 4, which is a tapering tube proceeding directly, and by its smaller end, from the back of the sound-box 5 to the aperture 14 in the base wall (Fig. 1) or of the adjacent side wall (Fig. 7) of the resonance-box B; and it is essentially a pivotally-mounted hollow arm to permit of the usual and required movement of the sound-box in its radial traverse over the "record".

If the hollow arm 4 is constructed with the usual joint, indicated by dotted lines at *n* in Fig. 1, then the arm 4 need have but a swinging movement in a horizontal plane, otherwise it must have also a limited movement vertically in a short arc of a circle. Means to permit it to have both motions are shown in the drawings, Figs. 3 to 6 inclusive, in which Figs. 4, 5 and 6 show the elements and Fig. 3 the same when assembled; and they are as follows:—A bracket-bearing ring 30, with ears 31 to attach it to the superposed box, is provided interiorly with a narrow ledge 36 and a curved annular wall 37. The upper end of the hollow arm 4 is provided with an enlarged head, shown in Fig. 5, having a curved exterior 34 adapted to register with the curved wall 37 of the ring, and between the two is interposed the ring 32 (Fig. 6); while to limit the vertical arc movement of the member 34 in the member 37, the former is provided with two oppositely-disposed pins 35 entering holes 33 in the ring member 32, which latter rests on the ledge 37 of the member 30 and fills the space above it and is held firmly in place when the parts are assembled and secured to the base-wall of the resonance-box B, as shown in Fig. 3. A somewhat different form of means providing for these movements of the sound-conveying arm 4 is required by reason of the mounting

of the resonance-box B on the inner face of the lid of the cabinet, as shown in Fig. 7, and these modified means are shown in Fig. 9, wherein the elements of the pivotal bearing are shown assembled. These elements are: an annular flange 28 slightly below the upper end 26 of the hollow arm 4. Upon said flange rests the lower end 27 of a three-way coupling 24. A retaining ring 29 holds the coupling 24 in place on the flange of the arm 4, being secured by screws 29<sup>a</sup> entering holes 27<sup>a</sup>. A cylindrical hollow member 19 provided with a flanged head-end 20 and a peripheral slot 22 is arranged sleeve-like within the coupling union 24, the flanged head 20 abutting and closing one end of the coupling, while the other end of the coupling member 24 abuts against the bead 25 on the bracket 21 which is screwed to the wall of the resonance-box B. The device has practically a universal joint, and is so designed to enable the arm 4 to have the requisite movements before described with reference to the pivotal bearing shown in Fig. 3, when the machine is in operation; but also, when it is desired to throw the machine out of action and close down the lid of the cabinet, the arm can then be swung upwards at a right angle to the face of the resonance-box and then downward, in a line therewith, resting in the recess 6 provided therefor and held supported therein by a hook 7 or other similar means.

The remaining and chief element of the new device, consisting of the resonance-box B and its adjunctive parts, I will now describe. In essentials it must provide a hollow chamber, preferably rectangular in planular outline and otherwise resembling the resonance-box of a guitar or violin, and have at least one of its sides operating as a sounding-board. It must have one or more sound-discharge openings. And it should have vertical partition walls, which are relatively diverging walls. Such a box is shown in Fig. 1 in which the top 2 of the resonance-box is a true sounding-board, shown with a central sound-discharge opening 3. Other sound-discharge openings may be provided therein, and a series of openings 15<sup>a</sup> in one of the side walls, governed by an apertured sliding valve 19 actuated by a handle 18, may be provided. In said form shown in Fig. 1, the base 9 of the resonance-box is shown as the top of the cabinet, and is not necessarily another sounding-board for obvious reasons. In the form shown in Fig. 7, however, the base 9 of the resonance-box B is a true sounding-board, for it is insulated, so to speak, from the inner face of the cabinet lid by a narrow strip 10 interposed between the four edges of the base 9 and the cabinet lid. In both forms of resonance-box B there is provided an inlet port indicated at 14. In both the sound-waves impinge, so to speak, against the top sounding-board 2, at a direct



right angle in Fig. 1, and substantially so in Fig. 7, the sounding-board being thus set in sympathetic vibration.

Entrance of sound-waves to the resonance-chamber is governed by a valve 16 actuated by a lever-handle 17, and the partial opening or closing of this port has the effect to control the degree of loudness or softness of tone and produces a perfect diminuendo or crescendo at the will of the operator and while the machine is in operation if desired to so operate it.

An important, indeed an essential feature, in the construction of the resonance-chamber to produce the complete effect desired is in the provision of the interior partition walls. Referring first to Fig. 1 as the simpler form, the pair of partition walls 12, 12, are united in a curve at 12<sup>b</sup> which is located adjacent to and inclosing the aperture 14, proceeding thence on gradually diverging lines which pass on either side of the aperture 3 in the sounding-board 2. Other curved walls 12<sup>a</sup> are provided as shown in Fig. 1, as it is believed that such corners in the resonance-chamber should be eliminated; at least my experience with the machine so constructed has been more satisfactory. Such a partition is provided at 12<sup>a</sup> in the form shown in Fig. 7, but in that form of resonance-box, the sound-waves from the diaphragm enter the sound-chamber through an aperture 14 cut in one of its side walls, hence the partition walls 12, 12, are curved to form the sound-passage 12<sup>c</sup> leading directly to the aperture 14 which is governed by a valve 16 as in the other form of machine.

It is to be understood that my invention is not limited to the employment of either particular external form of resonance box shown, nor to either particular form of pivotal mounting of the hollow sound-conveying arm, nor to the employment in the cabinet, of a sound-reproducing machine of a gramophone type, employing a "disk" record; but on the contrary, a sound-reproducing machine of the phonograph or any other type, may be substituted, care being taken to supply the appropriate form of pivotal bearing for the sound-conveying arm to adapt it to any particular form or type thereof selected.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. A machine for reproducing sounds from a record thereof and modifying their tone and timbre, comprising an inclosing cabinet and the following interiorly contained instrumentalities in operative combination, namely, mechanism for reproducing sound-waves from a sound-record, a resonance-box one wall of which is a sounding-board adapted to be vibrated sympathetically by said

sound-waves, and forming a resonance-chamber which is substantially closed other than by sound-discharge openings, with connecting tubular means operatively mounted to convey said sound-waves from the reproducer to the interior of said resonance-chamber.

2. A machine of the character recited, comprising a containing cabinet, and the following interiorly-contained elements in operative combination, namely: mechanism for reproducing sound-waves from a record thereof, a contiguous resonance-chamber formed by a box one exterior wall of which is a sounding-board, the interior of said box containing outwardly-diverging partition walls operating primarily to form an amplifying passage for said sound-waves and secondarily to modify the tone thereof; with means for conducting the sound-waves from the sound-reproducing mechanism to said amplifying passage in the resonance-chamber.

3. A machine of the character recited comprising the following instrumentalities, in operative combination, namely a cabinet with interiorly-contained mechanism for reproducing sound-waves from a sound-record, a contiguously mounted box providing a resonance-chamber the exterior wall of which is a sounding-board, a pivotally-mounted hollow sound-conveying arm leading to an aperture in an oppositely-disposed wall of said box by which it is mounted in the cabinet, said arm operating to convey sound-waves from the sound-reproducer to the interior of the resonance-chamber, with valvular means governing the delivery thereof to said chamber.

4. A machine of the character recited comprising the following instrumentalities, in operative combination, namely a machine for mechanically reproducing vibratory sound waves from a sound-record, a box providing a resonance-chamber one wall of which is a sounding-board, and having interior diverging partition walls, with a pivotally-mounted hollow sound-conveying arm leading said vibratory sound-waves to the diverging passageway within the resonance-chamber.

5. A machine of the character recited comprising the following instrumentalities, in operative combination, namely a machine for mechanically reproducing vibratory sound-waves from a sound-record, a box providing a resonance-chamber to which said sound-waves are delivered and having a pair of oppositely-disposed sounding-boards and interior diverging partition walls, with a pivotally-mounted hollow sound-conveying arm leading said vibratory sound-waves to the diverging passageway within the resonance-chamber.

6. A machine of the character recited comprising a containing casing, and within it a



machine for mechanically reproducing vibratory sound-waves from a sound-record, a superposed resonance-box mounted on and forming the top of said casing, said box comprising top and bottom connected walls, the former of which is a sounding-board, and the latter of which forms the top of said casing, with a pivotally-mounted hollow sound-conveying arm leading the sound-waves from the sound-reproducer and discharging them through an aperture in the contiguous wall of said resonance-box.

7. In a machine of the character recited comprising a cabinet with interiorly-contained mechanism for reproducing sound-waves from a sound-record, the combination therewith of superposed means operating as well to amplify the tone and modify the timbre of the sound-waves so produced, said means consisting essentially of a resonance-chamber having its upper and exterior inclosing wall adapted to operate as a sounding-board, and containing interiorly a pair of outwardly diverging partition walls constituting a sound-amplifying passage, with a vertically-disposed sound-conveying arm pivotally mounted against an aperture in the lower and contiguous wall of said box, operating to convey the sound-waves from the reproducer to said amplifying passage within the resonance-chamber and against the sounding-board wall thereof.

8. In a machine of the character recited, an inclosing cabinet, with a chamber containing mechanism for reproducing sound-waves from a record thereof, a superposed resonance-box formed by a pair of oppositely-disposed sides, the upper one of which is a sounding-board, with connecting upright side-walls one of which is apertured to provide sound-discharge openings, with valvular means governing the same, a hollow tapering sound-conveying arm leading from the sound-reproducing mechanism and pivotally mounted at its end of largest diameter, against an inlet aperture in the basal wall of said resonance-box, with valvular means

governing the entrance of such sound-waves therein.

9. A machine of the character recited comprising an inclosing cabinet with a hinged lid, interiorly-contained mechanism for reproducing sound-waves from a sound-record, a resonance-box mounted on the inner face of said lid and consisting of a pair of oppositely-disposed sounding-boards with connecting side walls, the exterior sounding-board having a sound-discharge opening and the other being secured to the face of the hinged lid, with an edge strip of material interposed between them; a tapering hollow sound-conveying arm leading the sound-waves from the reproducer and discharging them through an aperture in one of the connecting side walls of said resonance-box, said arm having pivotal bearings permitting both vertical and lateral movements thereof relatively to the resonance-box on which it is mounted.

10. A machine of the character recited comprising an inclosing cabinet having a hinged lid, and interiorly contained means for mechanically reproducing sound-waves from a sound-record, the combination therewith of a hollow sound-conveying arm with pivotal bearings permitting both vertical and lateral movements thereof at its discharge end, and a superposed box mounted on the inner face of said hinged lid and constituting a resonance-chamber, with sound-discharging apertures, and having interior diverging partition walls; said box comprising two oppositely-disposed flat sides, one of which is a sounding-board, with connecting side-walls one of which is apertured to operatively support the delivery end of said sound-conveying arm.

In testimony whereof, I have hereunto affixed my signature this 23rd day of May A. D. 1907.

LUTHER T. HAILE.

Witnesses:

A. M. BIDDLE,  
C. A. DUNLAP.