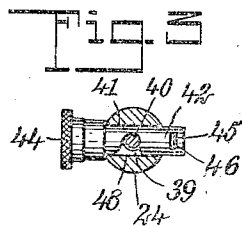
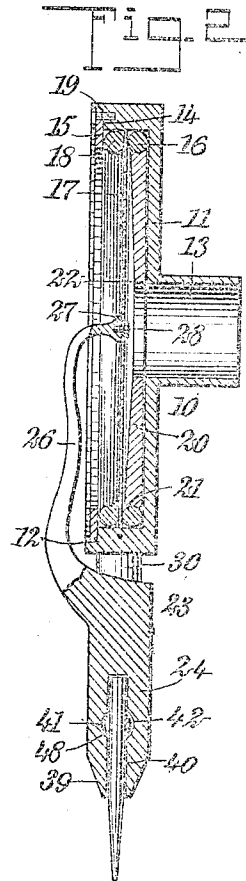
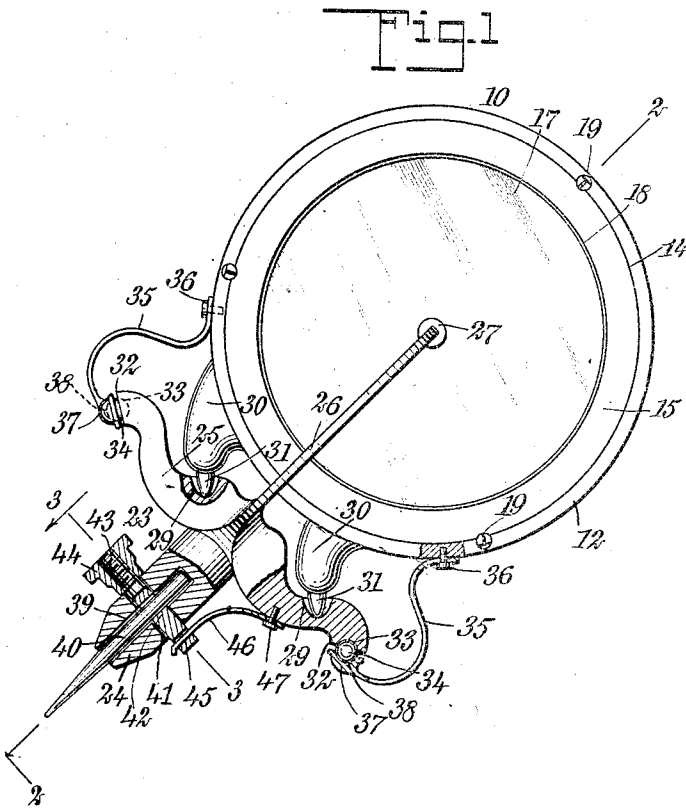


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SOUND BOX.
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Patented Dec. 14, 1909.



WITNESSES

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SOUND-BOX.

943,339

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM ALBERT CHAPMAN, a citizen of the United States, and a resident of Smithville, in the county of Lawrence and State of Arkansas, have invented a new and Improved Sound-Box, of which the following is a full, clear, and exact description.

This invention relates to sound boxes for 10 phonographs, talking machines and the like, and more particularly to devices of this class which include a casing, a diaphragm suitably mounted within the casing, a stylus bar controlling the diaphragm and having a 15 yoke, means for resiliently holding the yoke with respect to the casing, and means for mounting the stylus bar, whereby the same can swing transversely of the plane of the diaphragm, and whereby the direction of 20 pressure upon the bar, due to the weight of the box and the drag of the needle upon the record, is substantially vertical when the box is in the inclined, operative position, preferably at an angle of 45° with the horizontal. 25 The invention also includes means for removably attaching the needle point to the stylus bar and for mounting the diaphragm in the casing.

An object of the invention is to provide a 30 simple, inexpensive and efficient sound box for reproducing or recording the sounds by means of records, employed in phonographs, talking machines and similar apparatus, by means of which the sounds can be repro- 35 duced with clearness and distinctness, and with all their original tonal qualities, and in which the relatively movable parts are not subjected to excessive wear.

A further object of the invention is to pro- 40 vide a device of the class described, which is so arranged that it can be employed at a normally operative angle of between 40 and 50° with respect to the horizontal, in which this inclination does not tend to distort or 45 unnaturally strain the stylus bar, the means for mounting it and the diaphragm, and in which the parts are so connected that they automatically and resiliently adjust themselves to the various movements necessary in 50 the reproduction and recording of sounds.

A still further object of the invention is to

provide a sound box in which the diaphragm is mounted in a suitable manner, having adjacent to the back, a back plate provided with a central opening and tapered inwardly 55 to the opening, to permit the diaphragm to vibrate freely while the plate during certain vibrations presents its face substantially parallel to the adjacent face of the diaphragm, and in which the stylus bar has a recess 60 adapted to receive the needle points and is provided with means for keeping the needle points in place so that they can be instantly attached or detached, without difficulty.

Another object of the invention is to pro- 65 vide a sound box in which the stylus bar is mounted to rock freely transversely of the plane of the diaphragm, on conical fulcrum points located in the line of the resistance to motion due to the weight of the box resting 70 on the point of the needle, and the dragging of the needle on the record, and which is provided with auxiliary supports in the form of balls or rollers resiliently held in place on engaging seats provided therefor 75 near the ends of laterally extended portions of the stylus bar, whereby is afforded a varying contact or frictional engagement as the bar rocks under the impulses communicated thereto by the needle in traversing the sound 80 grooves of the record, in consequence of which the resilient positioning of the stylus bar automatically adjusts itself to the varying positions and movements of the parts.

The invention consists in the construction 85 and combination of parts to be more fully described hereinafter and particularly set forth in the claims.

Reference is to be had to the accompanying drawings forming a part of this speci- 90 fication, in which similar characters of reference indicate corresponding parts in all the views, and in which—

Figure 1 is a front elevation of an embodiment of my invention having parts broken 95 away and in cross section, and showing the same in the normal, inclined and operative position; Fig. 2 is a longitudinal section on the line 2—2 of Fig. 1; and Fig. 3 is a cross section on the line 3—3 of Fig. 1.

Before proceeding to a more detailed de- 100 scription of my invention, it should be

clearly understood that while the same is particularly useful in connection with phonographs or talking machines employing disk records, it can also be advantageously applied to similar machines using cylinder or other records. Certain details of construction shown and described for example, herewith, form no part of my invention, but can be varied in accordance with individual preference or special conditions, without departing from the underlying spirit of the invention. For example, the nature of the diaphragm, the manner of attaching the stylus bar thereto, the means for connecting the sound box to the sound tube, and other details, can be altered as desired.

In the sound boxes in common use the stylus bar is mounted to rock transversely of the plane of the diaphragm and is movably supported by knife edges or fulcrum points, which lie in line or lines at substantially right angles to the length of the stylus bar. As the most efficient operative position of a sound box is at an angle to the horizontal, preferably an angle of 45°, the pressure due to the weight of the box upon the needle point causes an unequal or unbalanced strain on the fulcrum points or edges, as the upward pressure is at an angle with the line of engagement of the relatively movable parts. For instance, if the stylus bar is arranged to swing on two knife edges, one at each side of the bar, and both lying in a line at right angles to the bar, the weight of the sound box, when it is supported by the needle point upon the record and is at an angle with the horizontal, tends to force the bar into close engagement with the upper knife edge and to move it from engagement with the lower one, whereby a decided, unbalanced and torsional strain is produced. The pressure or resistance to gravitational action is upward, and therefore, I have found that the fulcrum points of contact should be so arranged that regardless of the inclination of the sound box the weight of the same causes an evenly distributed pressure upward on these points; that is, the bar should be mounted in such a manner that it can swing transversely of the plane of the diaphragm, while the direction of pressure upon the bar, due to the weight of the box, is substantially vertical when the box is in an inclined operative position.

With the manner of mounting the stylus bar used in the ordinary sound boxes, the inclination of the device when it is in operation necessitates the employment of strong resilient pressure to hold the stylus bar in position, and this pressure frequently interferes with the proper operation of the parts, and is usually disposed at some distance from the line of oscillation as a corrective

of the evil, which finds further expression at the center of the diaphragm, this being exhibited in a shifting of the diaphragm on its seat, placing one side under greater tension than the other, and in the enlargement of the central hole therein, and in the rupture of the connection with the stylus bar.

Referring more particularly to the drawings, I provide a casing 10 substantially cylindrical in form and having a back 11 and an annular rim 12. The back has the usual substantially central opening there-through, surrounding which is a tubular extension 13 by means of which the box can be connected with the sound tube of the machine. At the inner edge, the rim 12 has an annular cut away portion or seat 14, adapted to receive an inwardly projecting annular member or retaining ring 15. A gasket 16, preferably of circular section, is arranged within the casing, adjacent to the rim and the back. The diaphragm 17 is positioned upon the gasket 16 and is held in place by a second gasket 18. The latter in turn is secured in place by the retaining ring 15. Screws 19 having the heads partly cut away and fitting in suitable openings of the rim, engage the retaining ring to secure it in place. By turning the screws so that the cut away parts of the head are inwardly disposed it is possible to withdraw the retaining ring to permit the diaphragm to be removed.

Inside of the diaphragm and adjacent to the back 11 of the casing is a back plate 20 having a central opening adapted to register with the opening of the back, and having a grooved periphery 21 in engagement at the inside of the gasket 16. The face 22 of the back plate, adjacent to the diaphragm is inwardly tapered toward its central opening so that the diaphragm can oscillate freely. When the diaphragm swings toward the back plate the inward taper of the same prevents any interference with the movement of the diaphragm, and at the same time this inward taper results therein that the face of the back plate is substantially parallel to the diaphragm face as the latter is distorted, and when swinging, assumes the shape of a flat cone.

I employ a stylus bar 23 having a lower cylindrical portion or barrel 24, at the upper end of which is located a stylus yoke or cross bar 25 preferably integral therewith. The stylus bar arm 26, rigid and preferably integral with the yoke, extends upwardly from the same and forms a continuation of the barrel. The upper end 27 of the arm is enlarged and engages with the diaphragm near the center of the same. A screw 28 or any other suitable means serves to attach the stylus arm to the diaphragm in the conventional manner.

At each side of the arm the yoke 25 has a tapered recess or seat 29, which receives a fulcrum point 31 carried by an extension 30 rigid with the casing of the box. The extensions are outwardly and laterally disposed as is shown most clearly in Fig. 1, and the points 31 are so formed that they extend at angles of substantially 45° with a line drawn from a point intermediate the points 31 to the center of the casing; that is, at angles of 45° with the length of the stylus bar. The tapered recesses 29 are similarly inclined at angles of 45° . Consequently, when the sound box is arranged in its operative position, which, too, is at an angle of preferably 45° with the horizontal, the pressure of the yoke against the fulcrum points is upward; that is, in a substantially vertical direction, owing to the inclination of the fulcrum points and the seats therefor with respect to the length of the stylus bar. It will of course, be understood that the angle of inclination and the angles which the fulcrum points make with the length of the stylus bar need not be exactly 45° , and these angles may be between 40° and 50° with substantially no difference in the operation and efficiency of the device. Hereafter, where I refer to this angle as being " 45° " it will be understood that this value is approximate, and may be varied somewhat with special conditions and under different circumstances.

The yoke 25 may be curved, for example as shown in the drawings, to render it artistic in appearance and at the same time to provide end faces 32, which are outwardly and downwardly disposed. The end faces have recesses forming seats 33 and adapted to receive spherical rollers or bearing balls 34. Substantially S-shaped resilient members or springs 35, are secured upon the sound box casing at opposite sides of the stylus bar and may be mounted in place by any suitable means, for example, by the use of screws 36. At the free ends, the keepers are enlarged to terminate in sockets 37 having recesses 38 which engage the balls 34. The springs thus serve to hold the stylus bar in place and to maintain the yoke in suitable movable engagement with the fulcrum points 31, to permit the bar to rock or oscillate freely, transversely of the plane of the diaphragm. The springs, owing to their form, cause an inward and upward pressure for maintaining the stylus bar operatively on position against the fulcrum points. The engagement of the spring keepers with the stylus bar is a movable one, owing to the provision of the ball and socket joints, and allows the parts to adjust themselves automatically to variations in pressure and position. The engagement engenders little friction and thus does not tend to interfere with the freedom of movement of

the stylus bar. The balls 34 may be fashioned from any suitable material preferably from glass or the like, though of course if so desired, they may consist of steel balls. The fulcrum points 31 may be of hardened steel but are preferably of some non-metallic substance such as agate or quartz. The back plate 20 is preferably too, of a non-metallic substance and is cemented in position. The recesses 29 may be lined with a suitable non-metallic substance similar to that forming the fulcrum points 31. The springs owing to their S-shape cause an inward and upward pressure.

The barrel has a longitudinal recess 39 therein and which is formed to receive the reproducing points or needles 40 of a recording tool. The barrel has a second opening therethrough and arranged transverse of the recess 39, and intersecting the same. A locking bolt or member 42 is movably arranged in the opening 41 and has a threaded end 43 upon which is mounted a thumb nut 44. The opposite end of the member 42 projects from the barrel and has an opening 45, in to which extends the end of a curved spring 46, the latter being secured in place upon the yoke by means of a screw 47 or in any other convenient manner. The member 42 has a notch 48 adapted to engage the shank of the needle to jam the same against the side of the recess 39 when the bolt is suitably positioned for this purpose by means of the jam nut 44. The cylindrical form of the nut permits the spring 46 to move the member 42 across the recess 39 so that the needle point can be easily withdrawn. A partial turn of the thumb nut which draws the member 42 along the opening 41 against the tension of the spring 46, instantly clamps in place in the barrel, a needle point, which engages the notch 48.

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

1. In a sound box, a diaphragm, a stylus bar controlling said diaphragm and having a yoke at substantially right angles thereto, and a fulcrum engaging said yoke, whereby said bar is mounted to swing transversely of the plane of said diaphragm, said fulcrum being at an acute angle with the direction of the length of said bar, said bar lying in a plane substantially parallel to that of said diaphragm.

2. In a sound box, a casing, a diaphragm therein, a stylus bar lying in a plane substantially parallel to that of said diaphragm, a fulcrum point at each side of said bar and rigid with said casing, said stylus bar having seats adapted to receive said points, said seats and said points having the directions of their lengths at angles of 45° with the

direction of the length of said bar, and resilient members engaging said stylus bar at both sides thereof to hold the same in engagement with said points, said points lying
5 on a line at substantially right angles with the length of said bar.

3. In a sound box, a casing having rigid laterally inclined fulcrum points, a stylus bar intermediate said points and having a
10 laterally extended yoke at substantially right angles to said bar and presenting seats adapted to receive said points, said seats being laterally inclined, a diaphragm in said casing, a stylus arm secured to said
15 diaphragm and rigid with said stylus bar, and resilient members engaging said stylus bar whereby an inward and upward pressure is exerted thereagainst, said bar lying in a plane substantially parallel to that of said
20 diaphragm.

4. In a sound box, a casing, a stylus bar pivotally carried by said casing, a diaphragm within said casing and controlled by said stylus bar, a resilient keeper carried by said
25 casing, and a member loosely positioned between said keeper and said stylus bar and engaging both of the same.

5. In a sound box, a casing, a diaphragm therein, a stylus bar pivoted upon said casing and having lateral extensions, spring
30 keepers carried by said casing and each having an end adjacent to the end of one of said extensions, and rollers between said extensions and said keepers and engaging the same whereby said stylus bar is loosely
35 held in place.

6. In a sound box, a casing, a diaphragm therein, laterally inclined fulcrum points rigid with said casing, a stylus bar having a
40 transverse yoke and a stylus arm rigid therewith, said arm controlling said diaphragm, said yoke having seats adapted to receive said points, said yoke at the ends having farther seats, spring keepers mounted upon
45 said casing and terminating in sockets, each adjacent to one of said further seats of said yoke, and a roller in each of said further seats and in engagement with one of said sockets.

7. In a sound box, a casing, a diaphragm within said casing, and a stylus bar controlling said diaphragm, said casing at the back of said diaphragm having a plate tapered to a point substantially opposite the
55 center of said diaphragm.

8. In a sound box, a casing having a back, a diaphragm within said casing, rings for mounting said diaphragm in place, and a stylus bar controlling said diaphragm, said
60 casing at the back having a plate tapered from the periphery toward the center, said plate and said casing having registering openings.

9. In a sound box, a casing having a back,

a gasket within said casing adjacent to said
65 back, a diaphragm on said gasket, means for holding said diaphragm in position upon said gasket, and a back plate between said back and said diaphragm and tapered from the periphery toward the center.
70

10. In a sound box, a casing having a back provided with a central opening, a gasket within said casing adjacent to said back, a
diaphragm on said gasket, a second gasket on said diaphragm, means for holding said
75 second gasket in position, and a back plate secured to said back and engaging said first gasket at the inside thereof, said back plate having an opening registering with said first opening and being tapered from the periph-
80 ery to said opening.

11. In a sound box, a stylus bar having a barrel provided with an opening, a longitudinal recess adapted to receive a needle
point, said barrel having a transverse open-
85 ing intersecting said recess, a locking bolt movable in said transverse opening and having a projecting threaded portion, a nut upon said threaded portion, said locking
bolt having a notch adapted to engage a
90 needle point, and a resilient member engaging said locking bolt at the end remote from said notch and tending to move said bolt longitudinally of said opening.

12. In a sound box, a casing, a diaphragm
95 therein, rigid, laterally extending fulcrum points carried by said casing and disposed in the plane of the diaphragm, a stylus bar intermediate said points and having a laterally extending yoke provided with a face
100 transverse of the length of said stylus bar, said face being provided with seats adapted to receive said points, said seats being laterally inclined in directions diagonal to that of the length of said stylus bar, and resilient members engaging said yoke, where-
105 by an inward and upward pressure is exerted thereagainst, the face of said yoke lying in a plane transverse to the length of said stylus bar, said bar lying in a plane
110 substantially parallel to that of said diaphragm.

13. In a sound box, a diaphragm, a stylus bar controlling said diaphragm and having
a yoke at substantially right angles thereto,
115 and a radially extending fulcrum engaging said yoke at a face thereof transverse to said bar, whereby said bar is mounted to swing transversely of the plane of said diaphragm, said fulcrum lying in the plane of said dia-
120 phragm and at an angle with the directions of the lengths of said yoke and said bar, said bar being in a plane substantially parallel to that of said diaphragm.

14. In a sound box, a casing, a diaphragm
125 therein, a stylus bar controlling said diaphragm, a radially directed fulcrum point at each side of said stylus bar and rigid with

said casing, a stylus bar having a yoke, and
seats therein adapted to receive said points,
said seats and said points having the direc-
tions of their lengths radially disposed at an
5 angle of 45° with the length of said bar, and
movable members engaging at the ends of
said yoke, and a resilient member engaging
each of said members at the ends of said
yoke, to hold the same in engagement with
10 said yoke, and to hold said yoke in engage-

ment with said points, said points lying in a
line at substantially right angles to the
lengths of said bar.

In testimony whereof I have signed my
name to this specification in the presence of 15
two subscribing witnesses.

WILLIAM ALBERT CHAPMAN.

Witnesses:

H. C. STEADMAN,

J. E. MOORE.