

A. C. DIEHL.  
 SOUND BOX FOR TALKING MACHINES.  
 APPLICATION FILED MAY 31, 1916. RENEWED JAN. 17, 1920.

1,350,596.

Patented Aug. 24, 1920.

Fig. 1.

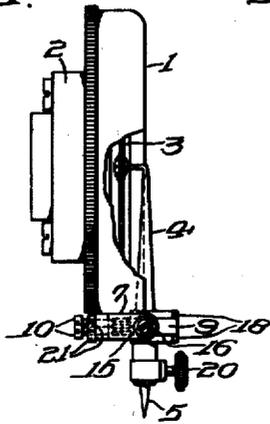
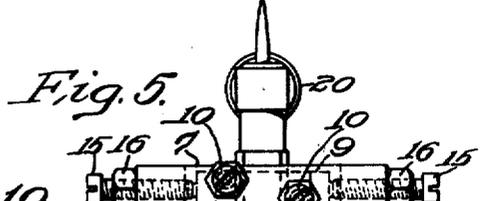
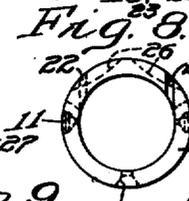
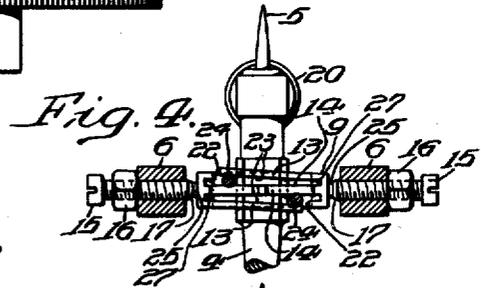
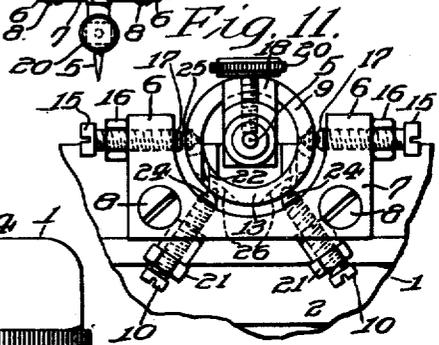
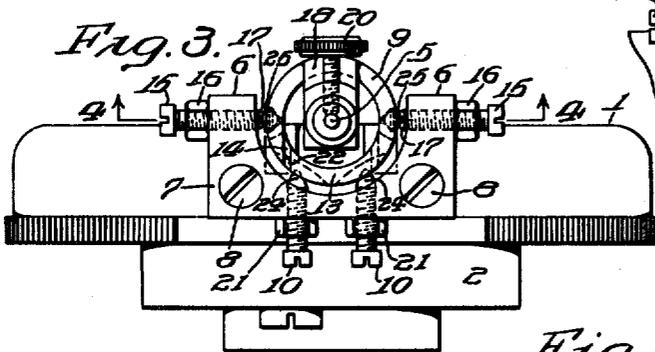
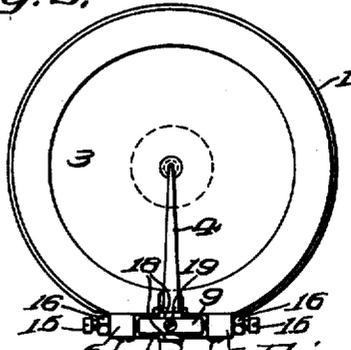


Fig. 2.



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# UNITED STATES PATENT OFFICE.

ALBERT C. DIEHL, OF PENSAUKEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

## SOUND-BOX FOR TALKING-MACHINES.

1,350,596.

Specification of Letters Patent. Patented Aug. 24, 1920.

Application filed May 31, 1916, Serial No. 100,880. Renewed January 17, 1920. Serial No. 352,233.

*To all whom it may concern:*

Be it known that I, ALBERT C. DIEHL, a citizen of the United States, residing at Pensauchen, in the county of Camden, State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a specification.

My invention relates to that type of sound boxes, comprising a diaphragm and stylus, adapted more especially to reproduce recorded sounds from a disk record whereon such sounds have been recorded as laterally undulating sound grooves; such disk record being operatively rotated, for reproduction purposes, in a horizontal plane, while the sound box, including its stylus, is operatively positioned relatively thereto, in a vertical plane.

My improvements in such a sound box, have for their object the provision of means to adjust the relative tensioning of the diaphragm and the spring mounting of the stylus bar coacting therewith; and then to fixedly lock such mounting, when such adjustment has been obtained, to the end that the tonal quality of the sound produced thereby may be regulated and controlled; and these objects are attained by substantially fixedly positioning the tensioning spring members on the stylus bar mounting and avoiding the usual sliding contact between said spring members and the parts coacting therewith; reducing such contacting surface to a minimum; providing facility of adjustment of the elements which regulate the spring controlled stylus bar; and locking the combined and coacting elements in fixed operative position after the proper adjustment has been effected.

In the accompanying drawings illustrating my invention, Figure 1 is a side elevation of my improved sound box; Fig. 2 is a front elevation thereof; Fig. 3 is an enlarged bottom plan view, illustrating the mounting of the stylus bar and the means to adjust it; Fig. 4 is a section on line 4-4 of Fig. 3, showing the spring under action of the regulating member; Fig. 5 is a side elevation of part of the sound box, broken away; Fig. 6 is a side elevation partly in section of a form of mounting encircling the stylus bar; Fig. 7 is a plan view thereof and Fig. 8 is a like view of Fig. 6 showing the reverse side of the ring member of the

mounting; Fig. 9 is a section on line 9-9 of Fig. 7 and Fig. 10 is another section of Fig. 7 on line 10-10 thereof; and Fig. 11 is a bottom plan view of the stylus bar mounting in a slightly modified form from that shown in Fig. 3.

In all sound boxes of the general character shown in the drawings above referred to, it is generally necessary to adjust the pitch or tone of the same before they are marketed, because, every diaphragm has a natural or inherent period of vibration differing from that of almost every other diaphragm. When mounted in a sound box casing, it is more or less under tension and when struck gives a sharp or flat tone as compared with the tone obtained from a so-called standard sound box. My improvements enable me to adjust the tonal effect or pitch of a diaphragm from sharp to flat, or vice versa; to provide in connection therewith, a certain spring tensioning of the stylus bar; and to lock the stylus bar mounting in adjusted position when the proper relative adjustment of the elements has been obtained. These results may be effected with facility and accuracy, and without liability of subsequent derangement.

The sound box comprises a casing 1 in which is mounted a diaphragm 3; the rear of the sound box consisting of the back 2 by means of which it may be connected in the usual manner to a talking machine. The stylus bar 4 is connected at its upper end to the outer face of the diaphragm 3 and at its lower end is pivotally mounted as hereinafter described. A stylus or needle 5 is held within a socket in the lower end of the stylus bar by means of the thumb screw 20.

Upon the lower edges of the sound box there is fastened, by the screws 8-8, a plate 7 with lugs or wings 6-6 which conform to and partially surround the ring member 9. An extension on the lower portion of the stylus bar is provided with lugs 18 which clamp the ring member between them, and, coacting with the screw 19 in the counter-sunk hole 12, rigidly secure the ring to the stylus bar.

In the lugs 6 of the plate 7, two set screws or studs 15 are oppositely positioned in alinement with each other, and on these screws are the usual lock nuts 16. The free tapered ends 17 of the studs or screws 15 are cupped and the cupped portions thereof are

adapted to engage respectively with the small hardened steel balls 25 positioned in the recesses 11 of the steel ring 9. These steel balls 25 protrude slightly from their recesses 11. When the studs 15 are properly adjusted, the ring member, stylus bar, balls, and studs or screws are all in alignment with the axis upon which the stylus bar oscillates, and all the parts are in firm contact with adjacent parts, but the stylus bar is free to oscillate smoothly upon substantially pivotal bearings between the cupped ends 11 of the screws 15 and the balls 25. This direct, firm, positive contact between the ring 9 and the steel balls seated therein, and between the steel balls and the cupped ends of the set screws 15 is readily obtained, because any desired degree of pressure may be applied to them through the balls 25 to the resilient ring 9 by suitably adjusting the set screws 15. Thus, while movement of the stylus bar upon its axis is smooth and uniform, there is no looseness between the parts which might introduce undesirable local vibration. Moreover, any wear which might occur from the continued use of the sound box may be compensated for by the set screws 15.

The construction and form of the steel ring 9 in other respects is clearly illustrated in Figs. 4 to 8 inclusive. Fig. 7 shows the two cuts 23—23 extending through the ring 9. These cuts 23 form at this place in the ring, two outer portions 13—13 and an inner or intermediate portion 14. Each of the outer portions 13 is provided with a cut 22 extending through to the adjacent recess 23 and these cuts 22 are respectively adjacent the opposite extremities of the intermediate web or member 14. The intermediate web 14 is not so cut or severed, however, and forms a resilient portion of the main ring, but of less cross-sectional area than the adjacent full section portions 9—9 integral with said intermediate portion 14. The full-section portion of the ring 9—9 substantially terminates at the ends 27—27 of the slots or cuts 23. The operation involved in making the cuts or apertures 23 and the cuts 22 is one of milling machine practice. Similarly, by means of a milling cutter, portions of the intermediate web 14 are removed to form substantially peripheral depressions 26 therein for the purpose of providing clearance space for the conical ends of the adjusting screws 10, as will more clearly appear below. After the ring 9 has been suitably cut in the manner above described, it is tempered; the parts or members 13 become flat springs and the ring 9 itself becomes a resilient spring ring.

In Fig. 4, the ring 9 is shown in position between the lugs 6 with the tapered ends of the set screws 10 in operative position. As shown in Fig. 5, the set screws 10 are preferably arranged in a somewhat staggered relation to position them respectively relatively

adjacent the springs 13. The set screws 10 are so positioned as to outwardly displace the free ends of the springs 15 when the tapered portions of the set screws are forced inwardly against the inner edge of the spring members 15. If the middle web 14 of the ring 19 were not provided with the recess or cutaway portions 26, the tapered ends 24 of the adjusting screws 10 might contact with the web 14, wedge between the webs 13 and 14, and prevent the ring from oscillating upon the axis provided by the set screws or studs 15.

When a diaphragm is mounted in a sound box of the kind above indicated and the stylus bar is in place with tension applied to the mounting 9, the adjusting of the tone or pitch of the diaphragm is effected as follows: The workman first ascertains whether or not the diaphragm so mounted is sharp or flat; that is to say, whether its tone, when so mounted, is above or below that which should be obtained from a standard sound box. If it be found that the tone is not correct, the proper set screw 10, is forced further inwardly against the coating spring 13 to exert a greater tension on the stylus bar, tending to throw the upper end of the stylus bar toward or away from the plane of the diaphragm. If the tonal effect or pitch of the diaphragm is sharp, he adjusts one of the screws 10. If it is flat, he adjusts the other of the screws 10, until the correct or desired note or tone or pitch is attained. The change in the pitch of the diaphragm may be intentionally carried to excess; that is to say, if the tone be flat, the proper adjusting screw 10 may be forced inwardly until the tone finally obtained is sharp, whereupon the other set screw 10 is then adjusted inwardly to bring the pitch back to that which is desired or standard. After this is done, the set screws 10 are locked in position by the lock nuts 21. In this manner, the adjusting screws 10 cooperate to move the diaphragm into its true note position, and, after that is done, the parts are locked in proper position.

It is believed from the above that the steps by which the pitch of the diaphragm is corrected has been made plain; one set screw or adjusting screw, 10, will correct sharpness when screwed inwardly and vice-versa, the other adjusting screw 10 will correct flatness when screwed in. The kind of adjustment necessary is ascertained by a proper test and the proper set screw is then adjusted. If an overcorrection is obtained by screwing inwardly one set screw, then the other set screw is similarly moved inwardly to bring the tone or note or pitch of the diaphragm back to the proper or desired one.

From Fig. 4 it will be seen that as the stylus bar is vibrated upon the axis of the set screws 15 by the needle 5 positioned in

a sound record groove, the tapered ends 24 of the set screws 10 are fixed in position and the edges of the spring portions 13 of the spring member 9 are in contact with the tapered portions 24 of the set screws 10 at theoretically a single point of contact only. The tapered ends 24 of the set screws engage the free ends of the spring portions 13 at the free ends of the said spring portions and on the inner edges only.

In Figs. 3 and 11, are illustrated two ways of positioning the set screws 10. Fig. 11 shows the preferred form because the action of the conical ends 24 of the screws 10 against the springs 13 is a little more of a direct action than that present in the construction shown in Fig. 3.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. A sound box comprising in combination a casing, a diaphragm therein and a stylus bar attached thereto, means for operatively mounting the stylus bar including a continuous member surrounding the stylus bar and having a plurality of independent spring elements disposed in opposite relation to each other, and means secured to said casing to vary the tension of said spring elements, said means comprising adjustable members each having a wedge-like portion adjacent one of said spring elements, said means coacting with said spring elements to tension said stylus bar in opposite directions.

2. A sound box comprising in combination a diaphragm, and a connected stylus bar, a mounting for said stylus bar including a continuous member surrounding the stylus bar, pivot members forming a bearing for said member, said member having a plurality of spring members integral therewith and coacting tensioning members for said spring members adapted to be adjustably positioned.

3. A sound box for sound reproducing machines, comprising in combination a casing, a diaphragm therein, a stylus bar connected thereto, a ring connected to and encircling said stylus bar, pivot members for said ring and secured to said casing and tension adjusting members, said ring being continuous and having a plurality of integral spring members, each of which is free at one end and in contact adjacent said end with one of said tension adjusting members.

4. A sound box for sound reproducing machines, comprising in combination a casing, a diaphragm therein, a stylus bar connected thereto, a ring connected to and encircling said stylus bar and having retaining sockets, a ball in each of said sockets, axially adjustable pivot members secured to said casing and cooperative with said balls, and tension adjusting members, said ring

being continuous and having a plurality of integral spring members each of which is free at one end and in contact adjacent said end with one of said tension adjusting members.

5. A sound box comprising in combination a diaphragm and a stylus bar connected therewith, a mounting for said stylus bar comprising a ring member encircling said stylus bar, pivot members forming a bearing for said ring member, said ring member being split and two of its sections cut at opposite peripheral points respectively to provide a plurality of independent spring elements integral with said member and coacting tension members for said spring elements adapted to be independently and adjustably positioned.

6. A sound box comprising in combination a casing, a diaphragm therein, a stylus bar connected at one end with said diaphragm, a mounting for said stylus bar adjacent its opposite end comprising a split ring member, means for connecting said member and said stylus bar, means for supporting said split member having adjustable tensioning means therein, said split ring member being split to form three independently relatively movable portions, the outer portions being free at one end and adapted to be oppositely displaced by said adjustable tensioning means.

7. A sound box comprising in combination a casing, a diaphragm therein and a stylus bar attached thereto, means for operatively mounting a stylus bar, including a continuous member surrounding said stylus bar and having a plurality of spring elements disposed in opposite relation to each other and means secured to said casing to vary the tension of said spring elements, said means comprising adjustable members each engaging one of said spring elements and coacting with said spring elements to tension said stylus bar in opposite directions.

8. In a sound box for sound reproducing machines, the combination of a sound box casing, a diaphragm mounted therein, a stylus bar, a resilient ring forming a mounting for and surrounding said stylus bar, said ring being provided with a pair of resilient members integral therewith, means to pivotally mount said ring on said casing, and to subject said ring to transverse compression, and means to apply pressure to said resilient members to tension said stylus bar.

9. A mounting for a stylus bar for a sound reproducing machine, comprising a resilient member adapted to be attached to and to surround a stylus bar, and provided with a pair of diametrically oppositely positioned recesses and with a pair of springs integral with said member and located be-

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tween said recesses and adapted to be respectively flexed to tension said stylus bar.

5 10. In a sound box for sound reproducing machines, the combination of a sound box casing, a stylus bar, a substantially annular mounting for said stylus bar, means mounted on said casing to pivotally support and diametrically compress said mounting, said mounting being provided with a pair of  
10 resilient members integral with the body portion of said mounting and located on one side of a line passing through the pivotal axis of said ring, and adjustable means to flex said members respectively in opposite  
15 directions.

11. A mounting for a stylus bar for a sound reproducing machine, comprising a resilient member adapted to be attached to and to surround the stylus bar and provided with diametrically opposite  
20 surfaces upon which said member is adapted to be pivotally supported for vibration, said ring being also provided with a pair of springs integral with said member and adapted to be respectively flexed in opposite  
25 directions to tension the stylus bar.

In witness whereof I have hereunto set my hand this 29th day of May, 1916.

ALBERT C. DIEHL.

It is hereby certified that in Letters Patent No. 1,350,596, granted August 24, 1920; upon the application of Albert C. Diehl, of Pensauken, New Jersey, for an improvement in "Sound-Boxes for Talking-Machines," an error appears in the printed specification requiring correction as follows: Page 3, line 130, and page 4, line 1, claim 9, strike out the words "and located between said recesses"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 28th day of September, A. D., 1920.

[SEAL.]

M. H. COULSTON,  
*Acting Commissioner of Patents.*