

E. R. JOHNSON.
SOUND BOX FOR TALKING MACHINES.

(Application filed May 2, 1901.)

(No Model.)

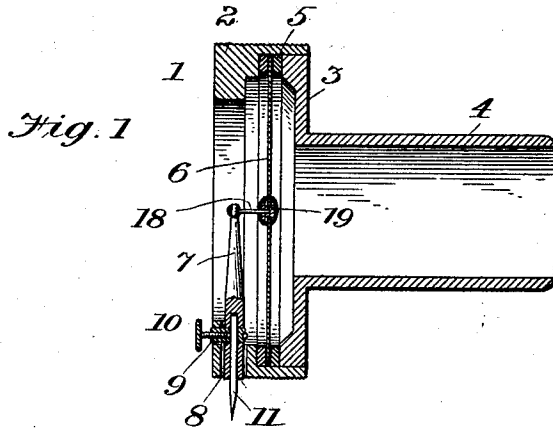


Fig. 1

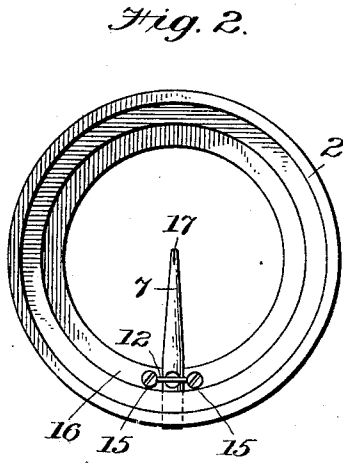


Fig. 2.

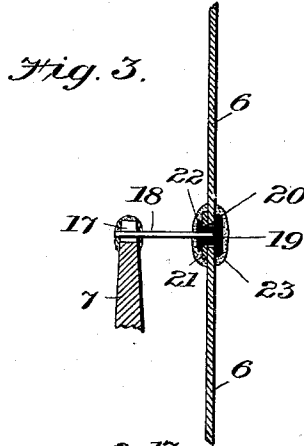


Fig. 3.

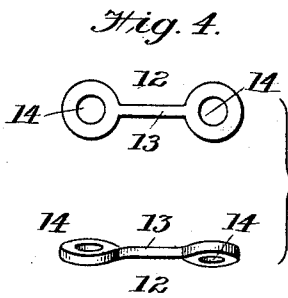


Fig. 4.

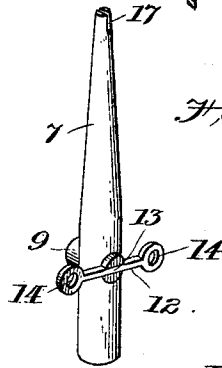


Fig. 5.



Fig. 6.

Witnesses:
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UNITED STATES PATENT OFFICE.

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SOUND-BOX FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 679,896, dated August 6, 1901.

Application filed May 2, 1901. Serial No. 58,459. (No model.)

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to certain improvements in talking-machines, and particularly to an improved construction of sound-box for use on sound-reproducing machines.

The object of the present invention is to provide an improved form of sound-box whereby the volume and quality of tone of the reproduction in machines of this character are rendered much clearer and more distinct, and natural than heretofore. In order to accomplish this object and to produce the advantages arising therefrom, I have found it necessary to provide a very delicate connection between the diaphragm and the stylus-bar, also to provide an extremely-sensitive mounting for the stylus-bar, so that the said bar will readily yield under the action of the most minute vibrations of the stylus-point and transmit said vibrations to the diaphragm. I have also found that the adjustment of the diaphragm in the sound-box frame must be very accurate in order to produce the finest results, and although this diaphragm must be free to vibrate throughout its entire area at the same time it must not be loose; otherwise during the reproduction it would rattle, and thereby produce a hollow or unnatural sound. So in order to remedy or provide against this defect I have confined the diaphragm between two yielding gaskets and constructed the sound-box frame in two sections, one fitting within the other, and these two sections are preferably driven together by machinery, confining the diaphragm and gaskets between them with a very fine adjustment. This construction practically renders the two sections of the sound-box frame integral, so that they cannot be disengaged by hand, and therefore the proper adjustment of the diaphragm cannot be disturbed.

My invention resides mainly in the above-mentioned features and in the general ar-

rangement and combination of the various parts, such as more fully described hereinafter and specifically pointed out in the claims made hereto.

In the accompanying drawings, Figure 1 is a sectional elevation of a sound-box embodying my invention. Fig. 2 is a rear elevation of the front section of the sound-box frame having the diaphragm removed and stylus bar or holder in position. Fig. 3 is an enlarged detail section illustrating the connection between the stylus-holder and the diaphragm. Fig. 4 illustrates the spring which holds the stylus-bar under tension in plan view and side elevation on an enlarged scale. Fig. 5 is an enlarged perspective view of the stylus-bar and its spring detached from the sound-box frame. Fig. 6 is a detail view illustrating another way of securing the spring to the stylus-bar.

Referring to the said drawings, 1 designates the sound-box frame, which comprises two sections 2 and 3. The section 3 has formed thereon the usual tubular section 4 for attachment to the horn and supporting-arm of the reproducing-machine. The section 2 is provided with a seat or shoulder for the reception of the circular gaskets 5, which are placed on each side of the diaphragm 6, and the disk portion of the section 3 bears against the outer gasket, thus confining the peripheral edges of the diaphragm between these two gaskets without clamping the same, as the said diaphragm should be free to vibrate throughout its entire area, though to quite a minute degree. - These two gaskets must be very nicely adjusted with relation to the diaphragm, because if the said diaphragm is too loose at its edges a rattling and unnatural sound will be produced, or if the said diaphragm is too tightly confined between these gaskets the vibrations of the same will be retarded or dampened to such an extent as to decrease or impair the volume and quality of tone of the reproduction. In order that the proper adjustment of the diaphragm may be effected, I preferably drive the sections 2 and 3 of the sound-box together by a special machine designed for this purpose, so that after they are properly put together this adjustment cannot be disturbed by handling or by the carelessness of the user.

The stylus-bar 7 is mounted loosely in an aperture 8, formed in the section 2 of the frame 1. This aperture 8 should be somewhat larger than the said stylus-bar, so as to permit of the vibrations of said bar. A boss 9 is welded or brazed in the bar 8, having a threaded aperture extending into the style-socket for the reception of the set-screw 10, which holds the style 11 in position. This boss 9 extends through a slightly-enlarged aperture formed in the face of the sound-box section, as illustrated in Fig. 1 of the drawings.

The spring 12 is secured to the rear of the stylus-bar 7, preferably by inserting the central portion of the same in a recess formed in the stylus-bar and then brazing or soldering the same, so as to hold it securely to the said bar. This spring 12 is made of finely-tempered steel, having a central portion 13, which is preferably of equal thickness, the proportion being about one-fiftieth of an inch. Each end is provided with an enlargement having apertures 14 for the reception of the securing-screws 15. Each end of the spring 12 is twisted or bent in opposite directions, as illustrated in the side elevation, Fig. 4, of the drawings, this view being exaggerated for the purpose of more clearly showing the twist.

Instead of making the spring 12 of flat steel and securing the same to the stylus-bar 7 on one side thereof it can be made of steel wire about one-fiftieth of an inch in diameter, having each end shaped to form a loop for the reception of the securing-screw 15, as shown in Fig. 6 of the drawings. When this construction is used, I preferably secure it to the stylus-bar by drilling a hole through said bar and passing the steel wire therethrough before forming the eyes 14. I then braze the same to the stylus-bar, form the eyes 14, and then spring or twist the extending ends or fingers in opposite directions in the same manner as with the flat spring before described. If the spring should pass through the style-socket, it could be drilled out after brazing, as only the projecting fingers of said spring would have any function to perform when this manner of securing is used.

After the spring 12 is secured to the stylus-bar and the said bar is adjusted in its aperture 8 the two ends are secured to the cut-out or shouldered portion 16 of the sound-box casing by means of the screws 15. When these screws 15 are screwed in tightly, the said spring is straightened out, which renders its intermediate portion extremely sensitive and under a high tension, and by reason of its connection with the stylus-bar 7 this said bar becomes neutralized and extremely sensitive to the most minute vibrations of the stylus-point.

The upper end of the stylus-bar 7 is provided with a slit 17, in which rests the end of a thin copper wire 18. After inserting the wire 17 in the slit said slit is clenched together and a coating of wax applied around the joint. The other end of the wire 18 is secured in a

head 19, composed of solder or platinum, the said head passing through an aperture formed in the center of the diaphragm 6. A flange 20 is formed on the head 19, which bears against the inner face of the diaphragm. On the other side of the head is placed a thin metal washer 21, which bears against the diaphragm and is held in position by upsetting the end of the said head 19 to form a flange 22, thus providing a connection such as illustrated on an exaggerated scale in Fig. 3 of the drawings. After the connection is thus formed a coating of wax, as 23, is preferably placed over the same on each side of the diaphragm for more securely sealing the connection.

I have found the above-described connection to produce the finest results when used in connection with the delicately-mounted stylus-bar, the tones of the reproduction being devoid of all harshness, and very clear, distinct, and sharp and far superior to any reproduction of sound heretofore produced in my experience.

By placing or mounting the stylus-bar inside of the casing I obviate any danger of breaking the connection with the diaphragm should the sound-box be dropped or rested upon its face. This is a decided advantage, as I have been frequently called upon to repair a great many sound-boxes where this connection has been broken by careless handling and where the diaphragm has been cracked or permanently injured in the same manner. If the box should be dropped on the point of the stylus, the connection between the stylus-holder is strong enough to resist this, and the wire 18 will yield slightly upwardly without in any manner affecting the said connection.

While I have described the diaphragm as being practically free at its edges, it is clear that while this construction of adjustment is preferable my improvements herein described and claimed are applicable to constructions wherein the diaphragm may be clamped at its edges. It is also clear that I do not limit myself to the exact constructions herein described, as modifications might be made without departing from the spirit and scope of the features of my invention as hereinafter claimed.

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

1. In a sound-box, a spring-mounting for the stylus-bar, comprising a thin piece of tempered steel having its ends twisted in opposite directions, and secured to the sound-box casing, and its intermediate portion secured to the stylus-bar.

2. In a sound-box, a spring-mounting for the stylus-bar comprising a strip of tempered steel having screw-holes provided in each end and the said ends twisted or sprung in opposite directions so as to render the intermediate portion extremely sensitive, the said in-

intermediate portion being rigidly secured to the stylus-bar, and the end portions to the sound-box casing, thereby rendering the stylus-bar sensitive, for the purpose described.

5 3. The combination with the sound-box casing, a diaphragm mounted therein, a stylus-bar mounted in an opening formed in the lower wall of the casing, a tempered-steel spring secured to the said stylus-bar, having
10 its ends twisted in opposite directions and secured to the sound-box casing on each side of the stylus-bar.

4. In a sound-box for talking-machines, a spring-mounting for the stylus-bar comprising
15 tempered-steel fingers extending from each side of the stylus-bar transversely thereto, and the free ends of said fingers adapted to be secured to the sound-box casing.

5. In a sound-box for talking-machines, a
20 spring-mounting for the stylus-bar comprising small tempered-steel fingers extending from each side of the stylus-bar transversely thereto, each of said fingers being twisted or sprung in opposite directions and having their
25 free ends rigidly secured to the sound-box casing.

6. In a sound-box for talking-machines, an annular casing having a radially-disposed aperture provided in its wall, a stylus-holder
30 adapted to pass through said aperture, small tempered-steel fingers extending from the said stylus-bar on each side thereof, each of said fingers being bent or sprung in opposite directions, and having their free ends secured
35 to the sound-box casing, for the purpose described.

7. The combination with the sound-box casing, a diaphragm mounted therein, a stylus-bar mounted in an opening formed in the
40 lower wall of the casing, a wire connection rigid in the direction of its length secured to the diaphragm and to the stylus-bar, a tempered-steel spring secured to the said stylus-bar having its ends twisted in opposite direc-
45 tions, and secured to the sound-box casing on each side of the stylus-bar.

8. The combination with the sound-box casing, a diaphragm mounted therein, a stylus-bar mounted in the casing, a wire connection rigid in the direction of its length secured
50 at one end to the stylus-bar, a head formed on the other end of said wire adapted to an opening in the diaphragm, means for securing said head to the diaphragm, and a tempered-steel spring secured to the stylus-
55 bar having twisted ends, the said twisted ends being secured to the sound-box casing on each side of the said stylus-bar.

9. The combination with the sound-box casing, a diaphragm mounted therein, a stylus-bar mounted in the casing, a wire connection rigid in the direction of its length secured at
60 one end to the stylus-bar, a head formed on the other end of said wire adapted to an opening in the diaphragm, means for securing said head to the diaphragm, a film or seal of wax applied over the said connection and a

tempered-steel spring secured to the stylus-bar having twisted ends, the said twisted ends being secured to the sound-box casing
70 on each side of the said stylus-bar.

10. The combination with the sound-box casing, a diaphragm mounted therein, a stylus-bar mounted in the casing, a wire connection rigid in the direction of its length secured at
75 one end to the stylus-bar, a head formed on the other end of said wire adapted to an opening in the diaphragm, a flange formed on the outer end of said head, a washer secured on said head adapted to bear against the oppo-
80 site face of the diaphragm, a film or seal of wax applied over the said connection for preventing the same from rattling, and a tempered-steel spring secured to the stylus-bar having twisted ends, the said twisted ends
85 being secured to the sound-box casing on each side of the said stylus-bar.

11. The combination with the sound-box casing, a diaphragm mounted therein so as to be free to move throughout its entire area, a
90 stylus-bar loosely mounted within the casing, a wire connection rigid in the direction of its length secured to the stylus-bar, a head formed on the opposite end of said wire, means for positively connecting this head to the dia-
95 phragm, a seal of wax applied over said connection, and a thin twisted spring secured at its middle portion to the stylus-bar and having its twisted ends secured to the sound-box casing on each side of said stylus-bar, for the
100 purpose described.

12. In a sound-box, the combination with the diaphragm, a stylus-bar mounted on the sound-box casing, a wire connection rigid in the direction of its length secured at one end
105 to the stylus-bar, a head formed on the other end of said wire adapted to an opening in the diaphragm; and means for securing said head to the diaphragm.

13. In a sound-box, the combination with
110 the diaphragm and stylus-bar, of a connection between the two comprising a metallic rod or wire rigidly secured to the stylus-bar, a head formed on the other end of said wire adapted to an opening in the center of the
115 diaphragm, a flange formed on the outer end of said head, and a washer secured on said head adapted to bear against the opposite face of the diaphragm, substantially as described.

14. In a sound-box, the combination with
120 the diaphragm, a stylus-bar mounted on the sound-box casing, a wire connection rigid in the direction of its length secured at one end to the stylus-bar, a head formed on the other end of said wire adapted to an opening in the
125 diaphragm, means for securing said head to the diaphragm and a film or seal of wax applied over the said connection.

15. In a sound-box, the combination with the diaphragm and stylus-bar, of a connection
130 between the two comprising a metallic rod or wire rigidly secured to the stylus-bar, a head formed on the other end of said wire adapted to an opening in the center of the

diaphragm, a flange formed on the outer end of said head, a washer secured on said head adapted to bear against the opposite face of the diaphragm, and a film or seal of wax applied over the said connection for preventing the same from rattling.

16. A sound-box for talking-machines comprising a casing made in two sections adapted to fit one within the other the said two sections being driven or shrunk together, a diaphragm confined at its periphery between the two sections, yielding gaskets provided on each side of the said diaphragm, the said parts being adjusted so as to prevent the said diaphragm from rattling yet leaving it free to vibrate throughout its entire area, a stylus-bar

mounted within the casing, a tempered-steel spring having twisted ends which are secured to the casing on each side of the diaphragm, and having its intermediate part secured to the stylus-bar, a wire connection permanently secured to the stylus-bar at one end and to the diaphragm at its other, and a wax seal applied over the connection to the diaphragm, substantially as described.

In witness whereof I have hereunto set my hand this 1st day of May, A. D. 1901.

ELDRIDGE R. JOHNSON.

Witnesses:

CHARLES H. SPECKMAN,
CHAS. K. BENNETT.