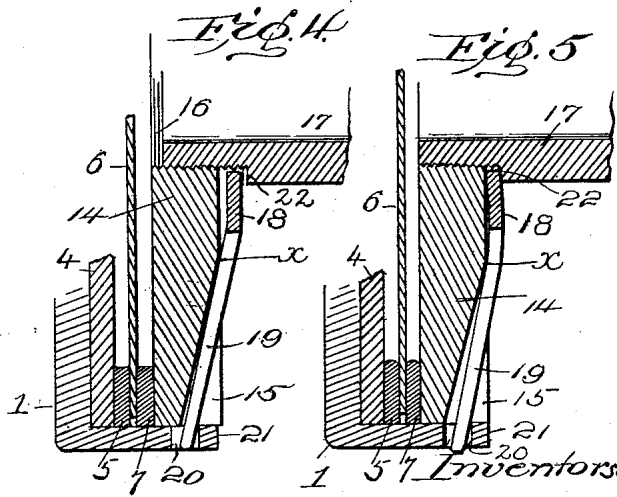
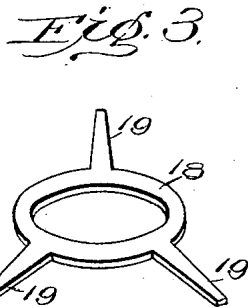
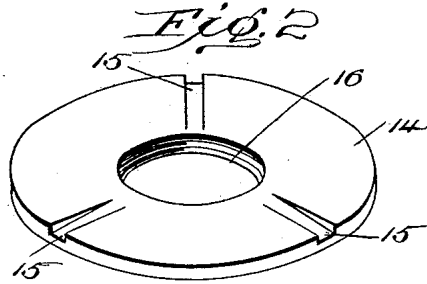
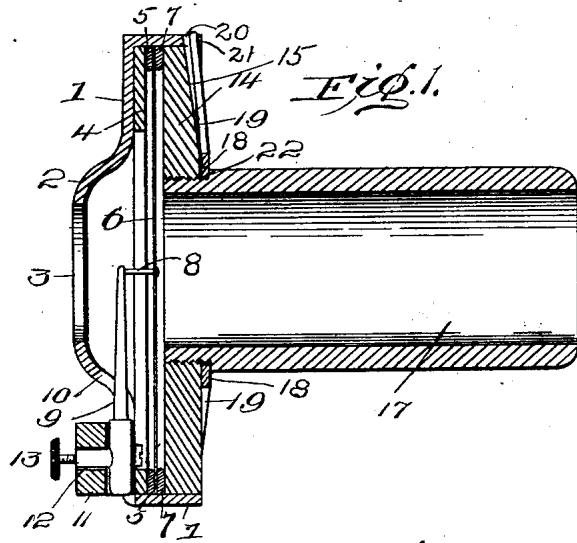


E. BERLINER & J. SANDERS.
SOUND BOX FOR RECORDING AND REPRODUCING APPARATUS.

(Application filed Sept. 6, 1902.)

(No Model.)



Witnesses:
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UNITED STATES PATENT OFFICE.

EMILE BERLINER AND JOSEPH SANDERS, OF WASHINGTON, DISTRICT OF COLUMBIA.

SOUND-BOX FOR RECORDING AND REPRODUCING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 715,003, dated December 2, 1902.

Application filed September 6, 1902. Serial No. 122,332. (No model.)

To all whom it may concern:

Be it known that we, EMILE BERLINER and JOSEPH SANDERS, citizens of the United States, and residents of Washington, in the District of Columbia, have invented certain new and useful Improvements in Sound-Boxes for Recording and Reproducing Apparatus, of which the following is a specification.

Our invention has reference to improvements in sound-boxes for gramophones or other sound recording and reproducing apparatus. In sound-boxes of this general character a diaphragm is mounted between soft-rubber gaskets, which are clamped together and to the sound-box by a metal ring, which either fits into the sound-box frictionally and is forced down upon the rubber gaskets, and thus clamps the diaphragm between them and to the sound-box, or else the metal ring is secured to the sound-box ring by screws which are properly tightened. In either case the edge of the diaphragm is held between the rubber gaskets in the sound-box under a certain definite pressure, which is requisite to dampen it against its own fundamental notes and to prevent the rattling of the diaphragm, particularly when loud sounds are uttered against it. Now it has been found in practice that it requires considerable skill to clamp the diaphragm in this manner with that definite pressure which is requisite in order to obtain the best effects, and it has further been found that if the diaphragm is once properly clamped between its damping rings or gaskets the original state of pressure under which the edge of the diaphragm is held is not maintained indefinitely, but becomes weaker and weaker as the rubber gaskets become older, since soft rubber loses its elasticity gradually by age. So it happens that a diaphragm which is properly mounted at one time is found after a while to be comparatively loose between the gaskets, and it now requires again the exercise of considerable skill either to tighten the clamping-ring by the screws provided for this purpose, or otherwise, or else to remove the diaphragm and the aged rubber gaskets and to again mount the diaphragm between fresh gaskets. It will be seen from this that

it is difficult, if not impossible, to mount the diaphragms in a number of sound-boxes with the same pressure between the rubber rings, so that each of a number of sound-boxes will give different results.

It is the object of our invention to overcome these difficulties and to provide means whereby any number of diaphragms can be mounted in sound-boxes with the same damping-ring pressure in such manner that the initial clamping-pressure is maintained for a long time, if not indefinitely, notwithstanding the unavoidable aging of the rubber. For this purpose we so construct the sound-box that the clamping-ring holds the diaphragm and rubber gaskets in the sound-box by elastic pressure, so that a loss of elasticity of the rubber by age is compensated by the continued elastic pressure exerted upon the clamping-ring. All this will more fully appear from the following detail description with reference to the accompanying drawings, in which—

Figure 1 represents an axial vertical section of our improved sound-box. Fig. 2 is a perspective view of the diaphragm-clamping ring. Fig. 3 is a perspective view of the spring which provides the elastic pressure upon the clamping-ring; and Figs. 4 and 5 are vertical axial sections of a portion of the sound-box, illustrating the function of the spring.

Like numerals of reference indicate like parts throughout all the drawings.

The case or shell 1 of the sound-box is here shown as formed with a dome 2 in its center and with a rather wide central opening 3 in the dome. This construction is not essential, since it only serves as a protection to the style and diaphragm, so that the sound-box may be laid on its face without harm to the diaphragm or to the connection between the diaphragm and style-holder. Against the inner face of the shell 1 is secured an annular ring 4, and upon this ring are placed in succession a soft-rubber gasket 5, the diaphragm 6, and a soft-rubber gasket 7. To the center of the diaphragm is secured a pin 8, the outer end of which is fastened to the style-holder 9, which extends parallel with the diaphragm through a slot 10 in the face of the case 1 and

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through a slot in a block 11, which is fastened to the case. This block 11 has also a central perforation through which a nipple 12 projects laterally from the style-holder, and in this nipple passes the set-screw 13, which removably secures the style in the style-holder.

All the parts so far described are old and do not constitute a part of our invention.

Our clamping-ring 14, which loosely fits into the case and rests against the gasket 7, is a rather solid piece of metal, as shown, and has formed in its exposed outer surface three uniformly-spaced radial grooves 15 15 15, which are deepest at the periphery of the ring and become shallower toward the center, and finally merge into the outer surface of the clamping-ring, as is best illustrated in Fig. 2. This clamping-ring has a central screw-threaded opening 16, adapted to receive the screw-threaded end of the sound-conveying tube 17. Against the outer face of the clamping-ring is fitted the clamping-spring 18, which is best shown in Fig. 3, and is an annulus with three uniformly-spaced radially-extending arms 19 19 19. The annular portion of this spring is flat, so that when laid upon the clamping-ring 14 the annular portion of the spring will be substantially parallel with the face of the clamping-ring. The radial arms of the spring are bent angularly, so that they will fit and partly descend into the grooves 15 of the clamping-ring. This spring is made rather thin and is either of steel or other spring metal. In the drawings, however, for the sake of clearness of illustration this spring is shown rather thick. In the cylindrical flange of the case 1 are formed three slots 20, near the edge of the flange and equally spaced like the grooves 15 of the clamping-ring and the radial arms 19 of the clamping-spring, and the arms 19 of this spring are sufficiently long that when the spring is placed against the clamping-ring, with the arms 19 in the grooves 15, these arms may be depressed into the grooves until they engage and snap into the slots 20 and are there held by the webs 21. When in this condition and before the sound-conveying tube is screwed into the clamping-ring, the arms 19 at points near the annular portion of the spring abut against those points of the grooves 15 which just merge into the general surface of the ring. This condition of affairs is shown in Fig. 4, and the point of contact between one of the spring-arms and the clamping-ring is marked by the letter *x*. In this condition the spring-arms pressing at the three points *x* upon the clamping-ring holds the latter with moderate pressure against the gasket 7 without perceptibly compressing the gaskets. If now the sound-conveying tube 17 is screwed into the clamping-ring, the ledge 22 of this tube bears down upon the annular portion of the spring 18, and the spring-arms 19 at the points *x* force the clamping-ring more strongly against the gasket and compress the

same, and thus clamp the diaphragm elastically in the sound-box. This condition is illustrated particularly in Fig. 5 on a large scale, but is also shown in Fig. 1.

It will now be seen that with the diaphragm mounted and clamped as described it will be held between its rubber gaskets with uniform pressure, even if by age the rubber should lose its elasticity entirely, since any loss of pressure due to such deterioration of the rubber would be compensated by the clamping-spring 18, which would follow up and press the clamping-ring 14 against the gaskets with practically undiminished force.

Since the springs 18 are in practice stamped out of uniform sheets of spring metal, these springs will all have practically the same resiliency, and therefore the diaphragms in ever so many sound-boxes will all be held under practically the same pressure.

In the assembling of the gaskets, diaphragm, clamping-ring, clamping-spring, and sound-conveying tube no tools are required and no skill has to be exercised, so that injured parts can be taken off and other duplicate parts inserted without requiring special and renewed adjustment of the apparatus.

It will be understood that we are not limited to the identical construction of clamping-ring and clamping-spring herein described, since these forms may be departed from in various ways without departing from our invention.

Having now fully described our invention, we claim and desire to secure by Letters Patent—

1. A sound-box for recording and reproducing apparatus having a diaphragm damped around the edge and an elastic clamp bearing upon the damping device to hold the diaphragm in its seat, substantially as described.

2. In a sound-box for sound recording and reproducing machines, a diaphragm mounted at the edges between elastic gaskets, in combination with a spring-clamp securing the diaphragm in place and bearing upon the gaskets with spring-pressure, substantially as described.

3. A sound-box for recording and reproducing apparatus composed of a case, a diaphragm between rubber gaskets, a clamping-ring and a spring holding the clamping-ring against the gaskets and diaphragm, substantially as described.

4. A sound-box for recording and reproducing apparatus composed of a case, a diaphragm damped around the edge seated in the case, a ring-clamp bearing upon the damped edge of the diaphragm and a three-armed spring bearing upon the clamping-ring at equidistant points, substantially as described.

5. A sound-box for recording and reproducing apparatus comprising a case, a diaphragm damped around its edge seated in the case, a clamping-ring bearing upon the clamped edge of the diaphragm and having three radial

grooves in its outer surface, and a three-armed spring having its free ends locked in the case so as to engage the grooves and bearing with its arms on the clamping-ring, so as to hold the latter with uniform yielding pressure against the damped edge of the diaphragm, substantially as described.

6. A sound-box for recording and reproducing apparatus comprising a case, a diaphragm damped around its edge seated in the case, a clamping-ring bearing upon the damped edge of the diaphragm, an annular three-armed spring bearing with its arms upon the clamping-ring at equidistant points, and a sound-conveying tube screwing into the clamping-

ring and pressing the spring against the latter, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of the subscribing witnesses.

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JOSEPH SANDERS.

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