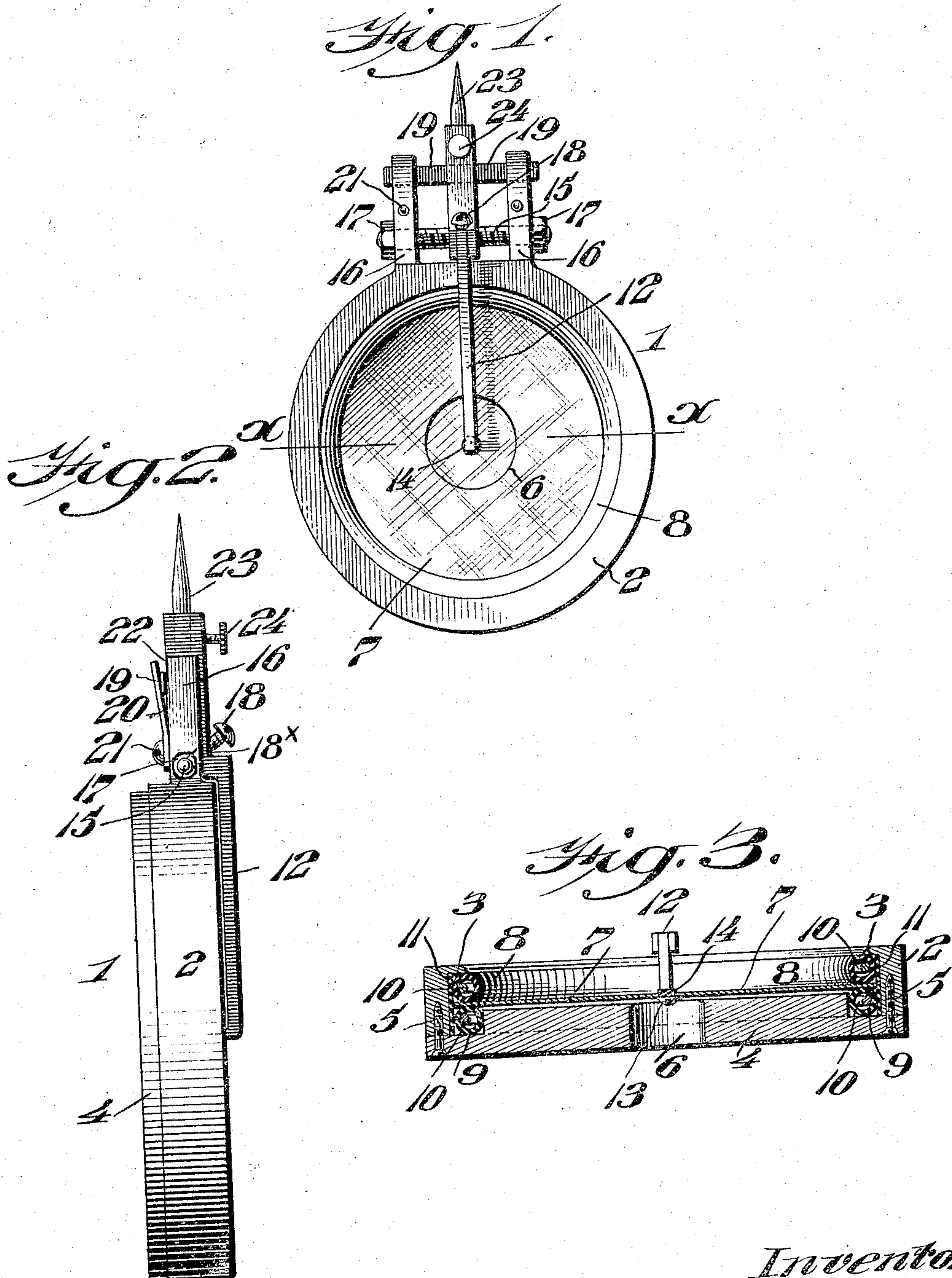


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 SOUND BOX FOR RECORDING AND REPRODUCING MACHINES.  
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930,715.



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# UNITED STATES PATENT OFFICE.

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## SOUND-BOX FOR RECORDING AND REPRODUCING MACHINES.

No. 939,715.

Specification of Letters Patent.

Patented Aug. 10, 1909.

Application filed March 3, 1909. Serial No. 481,002.

*To all whom it may concern:*

Be it known that I, WILLIAM W. ZACKEY, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Sound-Box for Recording and Reproducing Machines, of which the following is a specification.

This invention relates to sound recording and reproducing machines and more particularly to that portion of sound recording and reproducing machines known as the sound box.

In sound boxes for recording and reproducing machines, as heretofore constructed, the regulation and control of the vibrating member or diaphragm has not been such as to insure the production of the clearest, purest tones and the reproduction of perfect articulation and the like, while at the same time maintaining a desirable volume of sound. Even a near approach to a pure tone has only been accomplished by sacrificing sound volume and vice versa.

In my present invention I have devised a novel stylus supporting means and diaphragm securing devices whereby tone volume and tone quality have a direct relation one to the other and in which the stylus and its adjuncts may be manipulated as desired for a minimum or maximum volume while the tone quality is appreciably affected.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

For the purpose of illustrating my invention, I have shown in the accompanying drawings one form thereof which is at present preferred by me, since the same has been found in practice to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

Figure 1 represents a front elevation of a sound box embodying my invention. Fig. 2 represents a side elevation of the same. Fig. 3 represents a section on line  $x-x$ , Fig. 1.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings:—1 designates the sound box of a sound recording and reproducing machine preferably of ordinary shape and size and in the present instance consisting of an annular ring 2, provided with an overhanging rim 3 whereby a shouldered recess is formed, adapted to receive the adjuncts of the sound box.

Coöperating with the ring 2 is a cap 4, secured thereto by screws 5 or equivalent devices, and provided with an aperture 6 preferably at the center thereof in order to conduct sound vibrations as transmitted. These sound vibrations are received upon a diaphragm 7 suitably mounted within the box out of contact with the material of the box and in the present instance being secured by tubes 8 and 9 of rubber or like yielding material which are respectively located on opposite sides of the diaphragm 7. In order to maintain these tubes fixedly in position, I preferably employ a spring wire 10, interiorly disposed in each tube and of small relative diameter so that sufficient space is provided to permit free yielding of the tube under a vibratory movement. It is well known that the quality of the sound produced depends largely upon the mounting of this diaphragm and its being free from contact with metallic or other hard surfaces which tend to produce a grating or undesirable sound. As here shown, I employ a strip of cork 11 within the annular ring 2 and in a position to prevent contact of the diaphragm 7 with the ring 2, though, of course, any material having similar characteristics may be used.

12 designates a stylus bar of usual construction, which, in the present instance, I secure to the diaphragm 7 by a screw 13 between which and the diaphragm 7 itself, in the present instance, I employ a bushing 14 of yielding material in order that the metallic portions may not come into direct contact with the said diaphragm. The stylus bar 12, as herein disclosed, is provided with a threaded aperture for pivotal movement upon a threaded spindle 15 which latter is suitably secured in ears 16 connected in any suitable manner to the box 1. Suitable nuts 17 may be employed to prevent movement of the spindle 15 during the oscillating of the stylus bar 12. Special attention is directed



to the mounting of the stylus bar 12 upon the screw threaded spindle 15, since thereby a firm bearing is provided, free from undesirable lost motion and incident metallic vibrations and a clear full perfect tone may be produced.

18 designates a set screw passing through a suitable threaded aperture 18<sup>x</sup> in the stylus bar 12 into contact with the spindle 15 whereby an adjustment is provided, which makes it possible to regulate and control the oscillation of the stylus bar. That is to say, if it is desired to reproduce the full vibratory effect of the diaphragm 7 resulting in the maximum of the sound, the set screw 18 is adjusted to have no bearing whatsoever upon the spindle 15. If, however, it is desired to tone down the sound and reduce the loud effect, the set screw is tightened somewhat upon the spindle 15 thereby limiting more or less the oscillation of the stylus bar 12. Of course it will be understood that some means are necessary to make a complete vibration of the diaphragm 7 possible, that is to return it to normal position after a sound wave has been transmitted thereto and for this purpose I preferably provide a flexible spring 19, suitably mounted on the ears 16 and in a position to be placed under stress when a sound wave is received and react to return the stylus bar to normal position at the end of the sound wave. In the present instance, this spring 19 is held in place by clips 20 adjustably mounted on the ears 16 by screws 21 or equivalent devices, whereby it is possible, by loosening the said set screws, to change the position of the spring 19 and move the same over nearer to the spindle 15 thereby diminishing the leverage or moving it farther away increasing the leverage as the case may be. It will be understood, for perfect working of the sound box, that the diaphragm 7 should always normally be in neutral position and in order that the spring 19 may have no tendency to deflect the diaphragm from such position, each ear 16 is provided with a slight taper 22 to allow for the thickness of the spring.

23 designates the usual reproducing needle, the same being secured in any well known detachable manner to the stylus bar 12, as here shown, it is secured by a set screw 24.

Attention is directed to the securing means for the diaphragm 7, since by my novel fastening interiorly of the tubes 8 and 9 the life and cushioning effect thereof is prolonged indefinitely and the tubes do not become hard and non-resilient as when cemented or fastened by similar means.

It will be readily seen that the variable leverage obtained by the movable spring 19 is a very desirable feature as thereby an absolute control over the vibrating diaphragm is obtained so that the quantity of sound may

be regulated to a nicety. This feature combined with the adjustability of the stylus bar screw 18 renders it absolutely possible to control the tone quality and sound quantity to obtain the perfect result.

It will now be apparent that I have devised a complete unitary structure capable of producing in a sound recording and reproducing machine a tone rich in quality and variable as to quantity with the entire elimination of metallic, grinding or scratchy sounds so common in instruments of this class.

In so far as I am aware, I am the first in the art to provide a single stylus bar support performing the function of a pivot for correctly permitting oscillating movement of the stylus bar in such a manner as to eliminate all sounds tending to detract from the natural, full, clear tone.

I am aware that sound boxes have been variously devised and arranged in attempts to overcome defects of tone and the like and that it is well known practice to provide a number of knife-edge pivots for the stylus bar, but these, owing to the large wearing surface, soon develop lost motion and render the sound box practically useless and by my invention I have overcome all of such defects.

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

1. In a sound recording and reproducing machine, a sound box, a diaphragm therein, a threaded spindle mounted on said sound box, a stylus bar secured to said diaphragm having a threaded opening therein for cooperation with said spindle, and adjusting means for regulating movement of said stylus bar.

2. In a sound recording and reproducing machine, a sound box having a diaphragm therein, a spindle mounted on said sound box, a stylus bar pivotally mounted on said spindle and secured at one end to said diaphragm, a spring mounted on said sound box for engagement with the free end of said stylus bar, and means for varying the point of engagement of the spring with the stylus arm.

3. In a sound recording and reproducing machine, a sound box having a diaphragm therein, a threaded spindle mounted on said sound box, a stylus bar carried by said spindle and secured at one end to said diaphragm, a spring mounted on said sound box for engagement with the free end of said stylus bar, and means for varying the point of engagement of the spring with the stylus arm.

4. In a sound recording and reproducing machine, a sound box having a diaphragm therein, a spindle mounted on said sound box, a stylus bar pivotally mounted on said spindle and secured at one end to said dia-



phragm, a spring mounted on said sound box for engagement with the free end of said stylus bar, means for varying the point of engagement of the spring with the stylus arm and means to regulate the movement of said stylus bar.

5. In a sound recording and reproducing machine, a sound box having a diaphragm therein, a spindle mounted on said sound box, a stylus bar pivotally mounted on said spindle and secured at one end to said diaphragm, ears extending from said sound box on opposite sides of said stylus bar, and a spring adjustably secured to said stylus bar and said ears.

6. In a sound recording and reproducing machine, a sound box, a diaphragm therein, sound deadening material encircling said diaphragm, a tube on each side of said dia-

phragm and means in each tube to maintain the same in operative position. 20

7. In a sound recording and reproducing machine, a sound box comprising an annular ring, having a shouldered recess therein, a diaphragm in said recess, a tube on each side of said diaphragm, a cap secured to said annular ring and means interior of each tube to maintain said tubes in contact with the walls of said recess. 25

8. In a sound recording and reproducing machine, a sound box, a diaphragm therein, a tube on each side of said diaphragm, and means in each tube to maintain the same in operative position. 30

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