

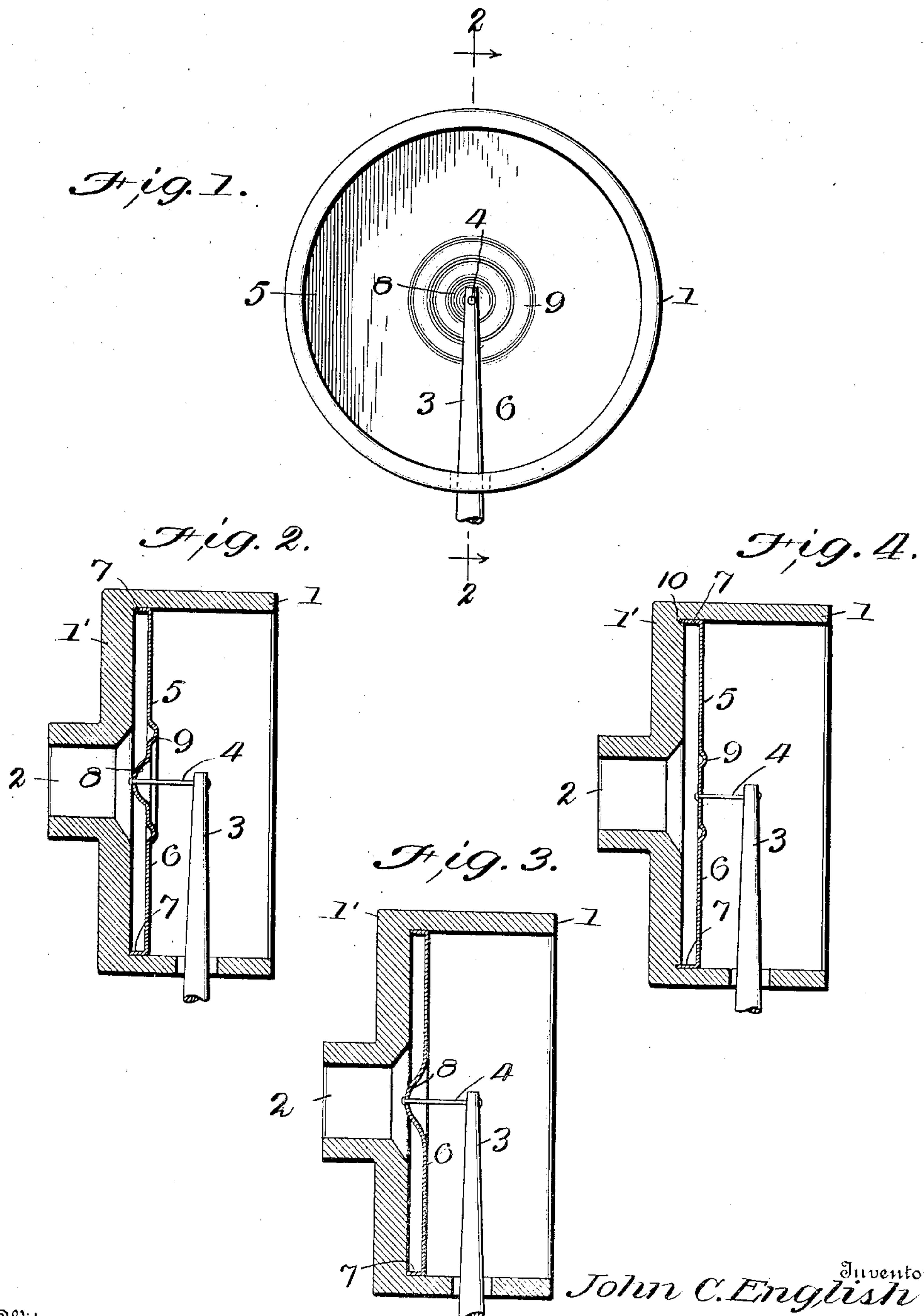
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J. C. ENGLISH.

SOUND BOX FOR MACHINES FOR RECORDING AND REPRODUCING SOUND.

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UNITED STATES PATENT OFFICE.

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SOUND-BOX FOR MACHINES FOR RECORDING AND REPRODUCING SOUND.

No. 898,201.

Specification of Letters Patent.

Patented Sept. 8, 1908.

Application filed March 27, 1906. Serial No. 308,224.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of the city of Camden, State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes for Machines for Recording and Reproducing Sound, of which the following is a full, clear, and complete disclosure.

My invention relates to the sound box for use in machines for recording and reproducing sound and particularly to the diaphragm of such sound boxes and to the means for positioning or adjusting, and for securing the same within the sound box.

The object of my invention is to provide a diaphragm for a sound box in which no special care or skill is required to accurately position or adjust the diaphragm in its proper position within the sound box and to secure the diaphragm in such adjusted position without the use of gaskets or elastic rings or similar means.

A further object of my invention is to construct a diaphragm of such a shape that the same is not liable to become distorted and subjected to unevenly distributed strains when placed within the sound box, but to stiffen the same both at the edges or periphery and also at the center thereof in order to more accurately and faithfully transmit the vibrations of sound or speech, and to improve the quality and quantity of the sound or speech reproduced from a recording surface.

Further objects of my invention will appear in the following specification and claims.

In the drawings accompanying this specification and forming a part thereof, Figure 1 is an end view of a sound box provided with my improved diaphragm; Fig. 2 is a transverse longitudinal section thereof on the line 2—2 of Fig. 1; Fig. 3 is a similar sectional view of a modified form of diaphragm and Fig. 4 is also a longitudinal sectional view of a modified form of the diaphragm and of the manner of securing the same within the sound box.

Similar numerals in the different figures represent corresponding parts.

1 indicates a sound box of any suitable type provided on its back side with a short sound conveying tube 2 by which it may be secured in a suitable manner to the swinging

sound conveying tube of a sound recording or reproducing machine.

3 represents the upper end of a stylus bar of any suitable description and 4 the connection between the stylus bar and the diaphragm.

The diaphragm 5 consists of a disk 6 provided with an integral cylindrical flange 7 extending from the periphery of said disk normal to the plane of the diaphragm. The diaphragm may be described as being in the form of a shallow cup shaped body having cylindrical sides. I may make this diaphragm of any suitable metal, such as steel, phosphor bronze or German silver and I may form the same either by the use of dies, or by spinning the edges of a planchet or disk to form the cylindrical flanges. The diaphragm so formed is inserted within the inner bore of the sound box so that the edge of the flange or side of the cup shaped body rests against the back 1' of said sound box, the outer diameter of the said cylindrical flange fitting snugly within said sound box and holding the diaphragm securely in position. In order, however, to make sure that there will be no space between the outer surface of the flange 7 and the inner surface of the sound box which might result in the production of undesirable sounds due to the vibrations of the flange and its consequent intermittent contact with the walls of the sound box, I may place a small quantity of suitable cement within the sound box and adjacent the back wall 1' thereof before the diaphragm is pressed down into position within the sound box.

A diaphragm made, in the manner described, is not liable to become distorted or lose its shape either before or after it is placed within the sound box, the cylindrical flange operating to stiffen the edge of the same in addition to forming a sufficient surface by which the diaphragm may be retained within the sound box.

By accurately determining the depth of flange 7, the proper distance between the disk like portion 6 of the diaphragm and the back 1' of the sound box may be made uniform and of a distance found by actual experiment to be suited for the production of the best results. No special care need be taken in assembling the sound box to adjust

the plane of surface of the diaphragm at the proper distance from the back of the sound box since the flange 7 of itself by its contact with the back of the sound box determines the said distance.

The diaphragm may be provided with a stiffened center by pressing or spinning the depressed portion 8 at the center thereof. Said depressed portion preferably extends in a direction away from the end of the stylus bar in order that the connection 4 may be made as long as possible to secure elasticity in the same. Such a diaphragm is shown in Figs. 2 and 3. I may, moreover, stiffen the center of the diaphragm by pressing or spinning concentric rings 9 in the body of the diaphragm, thus rendering the diaphragm insensible to those vibrations which are not true harmonic curves and are caused by the inaccurate action of the stylus bar and to the frictional contact between the bottom or sides of the sound groove and the stylus.

In order to obtain a firmer and more rigid connection between the flange of the diaphragm and the sound box, I may provide the back of the sound box with a circular channel 10 and within which the flange 7 accurately fits, as plainly shown in Fig. 4, and a suitable cement may be placed in said groove or on the adjacent surface of the sound box before the diaphragm is inserted.

I am aware that attempts have been made to use diaphragms with concentric rings adjacent to the outer periphery for stiffening the outer edge and also that metallic diaphragms have been made having concentric rings above and below the central line or axis thereof for the purpose of giving amplitude to the center of the diaphragm and that later in order to produce the best results, it has been found necessary to stiffen the center of the diaphragm instead of making the center highly elastic. I have found, however, that by providing the diaphragm with a stiffening flange at the periphery thereof and by making such flange of a sufficient depth to accurately position the disk like portion of the diaphragm in the back of the sound box and for securing and retaining contact between the outer cylindrical surface of the said flange and the inside of said sound box, that a diaphragm so produced, transmits vibrations more accurately and faithfully than any of the forms above referred to and moreover, enables me to dispense entirely with the usual gaskets or retaining rings formed of rubber or other changeable or perishable material. In this way sound boxes may be produced with substantially uniform recording and reproducing qualities and without parts which are liable to deteriorate.

While I have described one way in which my invention may be put into effect, I do not wish to be confined to the exact form or arrangement of parts, since my invention con-

sists broadly of providing any diaphragm with an integral peripheral stiffening flange.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent of the United States, is:—

1. In a sound recording and reproducing machine, the combination with a sound box, of a diaphragm provided with an integral cylindrical flange the said diaphragm being retained in said sound box by the engagement between said flange and said sound box and having the end of said flange engaging the rear wall of said sound box.

2. In a sound box having a cylindrical bore, and a circular channel opening into said bore, a diaphragm provided with a cylindrical flange at the periphery thereof tightly fitting within said bore and extending into said channel.

3. In a sound box having a cylindrical bore, and a circular channel opening into said bore and concentric therewith, a diaphragm provided with a cylindrical flange at the periphery thereof tightly fitting within said bore and filling said channel.

4. In a sound box the combination with that part of sound box provided with a sound conveying opening and having a circular channel concentric therewith, of a diaphragm provided with a cylindrical flange fitting tightly within said channel.

5. In a sound box having a groove with side walls extending longitudinally of the box, a diaphragm having a flange at its periphery fitting tightly within said groove.

6. In a sound box provided with a bore, a groove in said bore, a diaphragm having a flange inclined to the plane of the diaphragm and fitting tightly within said groove.

7. In a bored sound box provided with a bore, a groove in said bore, a diaphragm having a flange inclined to the plane of the diaphragm and fitting tightly within said groove, the inclined side of said flange fitting tightly within the bore of said box.

8. In a sound box, the combination with a casing having a cylindrical bore therein, said bore opening in the face of said casing, of a diaphragm provided with a cylindrical flange at the periphery thereof snugly fitting within said bore.

9. In a sound box, the combination with a casing having a cylindrical bore opening in the face thereof, of a diaphragm provided with an inwardly extending cylindrical flange at the periphery thereof snugly fitting within said bore, the inner edge of said flange being in contact with the back of said casing.

10. In a sound box, the combination with a casing having a cylindrical bore, of a diaphragm provided with an inwardly extending cylindrical flange at the periphery thereof snugly fitting within said bore, the inner edge of said flange being in contact with a portion of said casing.

11. In a sound box, the combination with a casing having a bore opening in the face thereof, of a diaphragm having a flanged edge fitting snugly within said bore.

5 12. In a sound box, the combination with a casing having a bore opening in the face thereof, of a diaphragm having an inwardly flanged edge snugly fitting within said bore, the inner edge of said flanged edge being in
10 contact with a portion of said casing.

13. In a sound box, the combination with a hollow casing, of a diaphragm having a flanged edge fitting snugly within said casing, and a stylus bar phonetically connected
15 to said diaphragm, said diaphragm being unrestrained between said flanged edge and the point of connection with said stylus bar.

14. In a sound box, the combination with a casing having a cylindrical bore, of a diaphragm having a cylindrical flange integral therewith at the edge thereof fitting snugly within said bore and a stylus bar phonetically connected to said diaphragm, said diaphragm being unrestrained between said
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flanged edge and the point of connection with said stylus bar. 25

15. In a sound box, the combination with a casing having a cylindrical bore, of a diaphragm having a cylindrical flange at the periphery thereof fitting snugly in said bore, said diaphragm being in contact with a portion of said casing extending inwardly from the cylindrical surface of said bore to position said diaphragm. 30

16. In a sound box, the combination with a casing having a bore opening in the face thereof, of means carried by said diaphragm and extending laterally therefrom for holding said diaphragm snugly in position in said bore. 35

In witness whereof, I have hereunto set my hand this twenty-sixth day of March, A. D. 1906. 40

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Witnesses:

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