

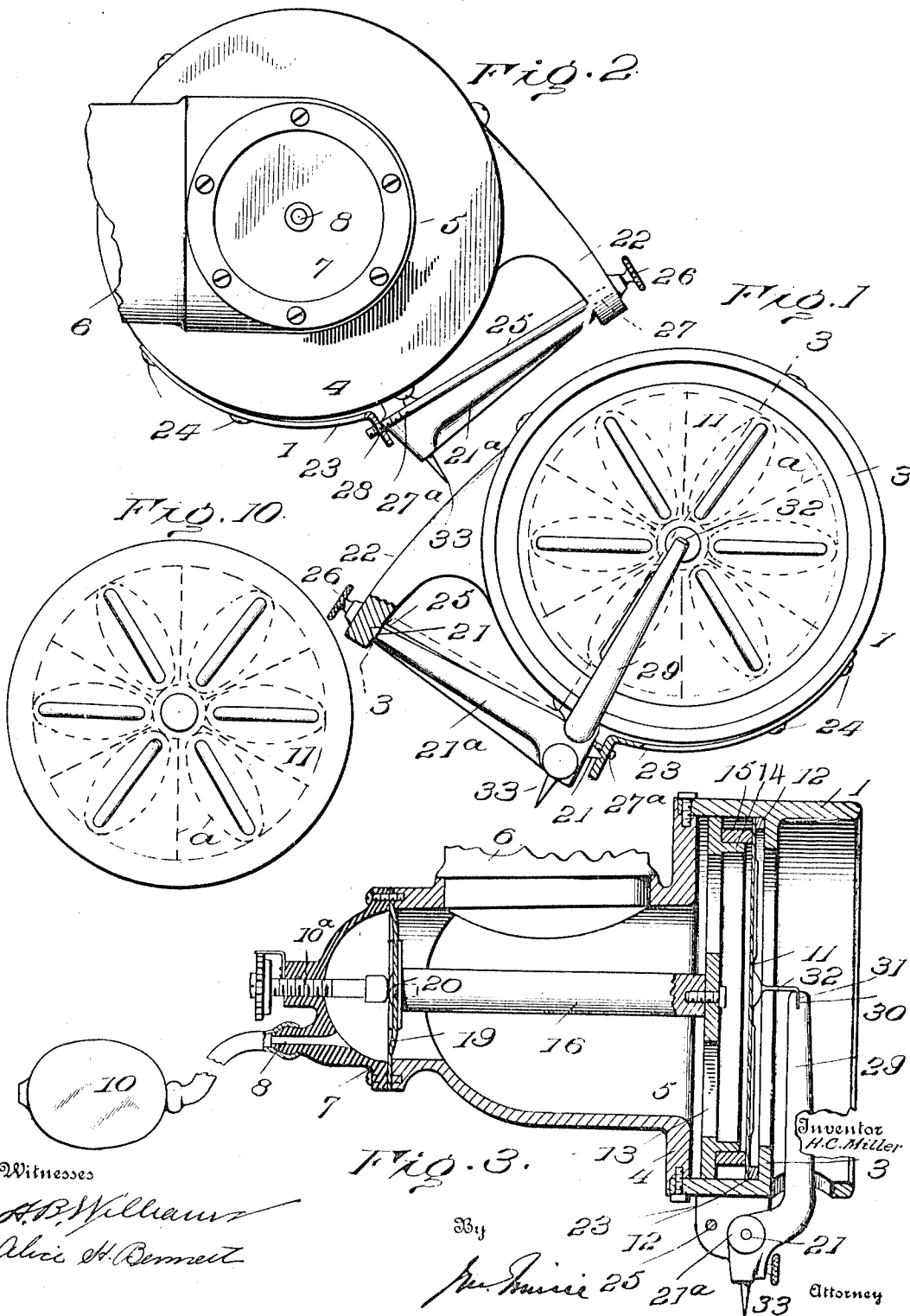
H. C. MILLER.
SOUND BOX.

APPLICATION FILED JUNE 2, 1906. RENEWED OCT. 4, 1912.

1,063,823.

Patented June 3, 1913.

3 SHEETS—SHEET 1.



Witnesses

A. B. Williams

Alice H. Bennett

By

J. Miller

Inventor
H. C. Miller

Attorney

H. C. MILLER.
SOUND BOX.

APPLICATION FILED JUNE 2, 1906. RENEWED OCT. 4, 1912.

1,063,823.

Patented June 3, 1913.

3 SHEETS—SHEET 2.

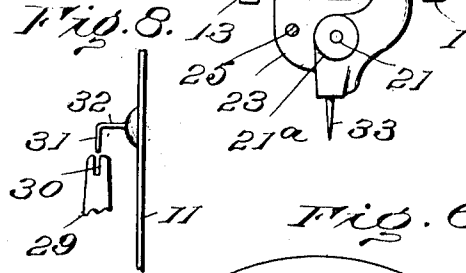
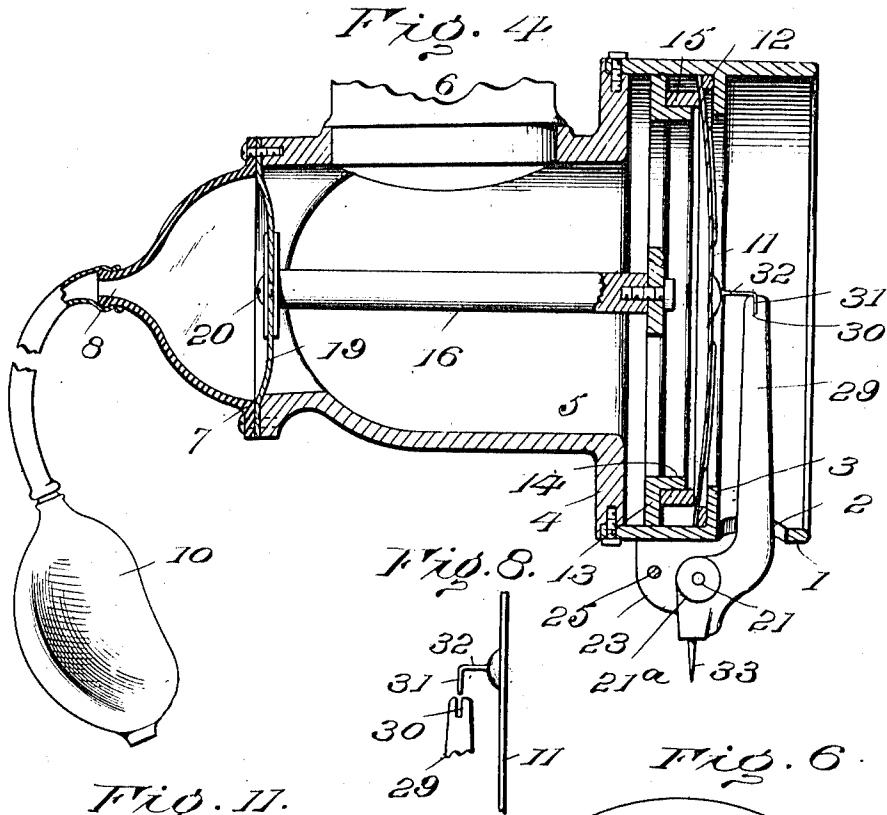


Fig. 11.

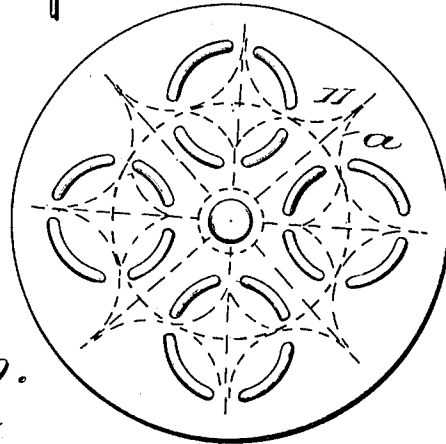
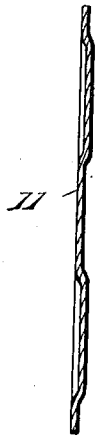
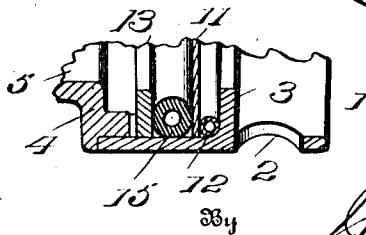


Fig. 9.



Witnesses

A. B. Williams
Alice H. Bennett.

Inventor
H. C. Miller.

By *McMinn*
Attorney

H. C. MILLER.
SOUND BOX.

APPLICATION FILED JUNE 2, 1906. RENEWED OCT. 4, 1912.

1,063,823.

Patented June 3, 1913.

3 SHEETS-SHEET 3.

Fig. 5.

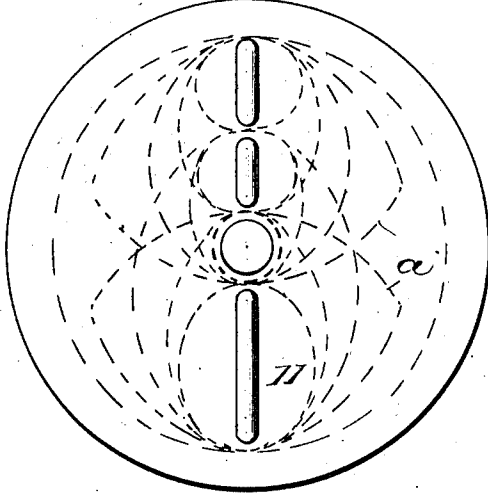


Fig. 7.

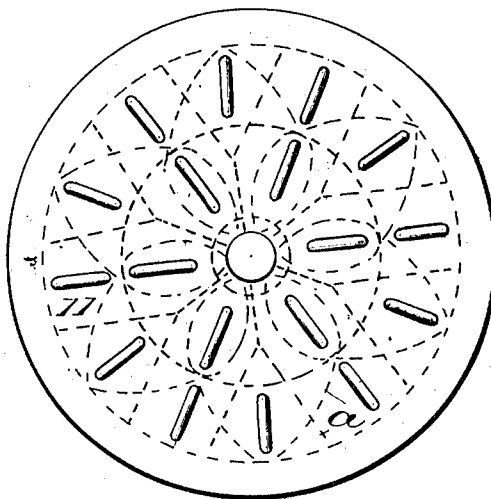
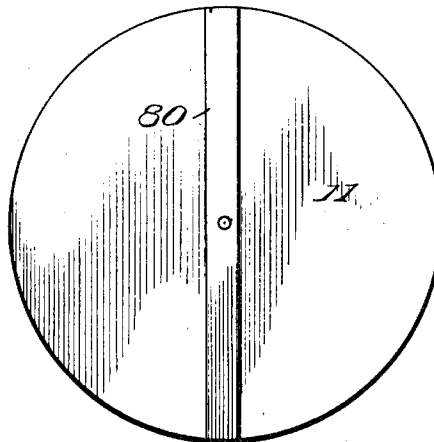
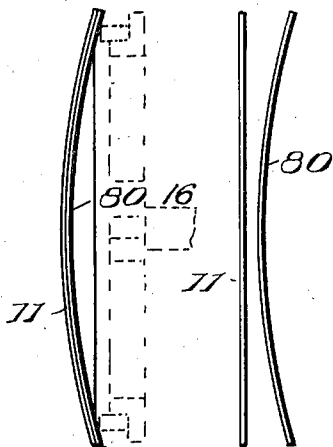


Fig. 12.

Fig. 13.

Fig. 14.



Inventor

H. C. Miller

Witnesses

L. B. Williams
Alice H. Bennett.

By

W. H. Miller
Attorney

UNITED STATES PATENT OFFICE.

HENRY C. MILLER, OF WATERFORD, NEW YORK.

SOUND-BOX.

1,063,823.

Specification of Letters Patent.

Patented June 3, 1913.

Application filed June 2, 1906, Serial No. 319,934. Renewed October 4, 1912. Serial No. 723,998.

To all whom it may concern:

Be it known that I, HENRY C. MILLER, a citizen of the United States, residing at Waterford, in the county of Saratoga and State of New York, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a specification.

This invention relates to improvements in sound boxes of the type shown and described in my pending application for patent Serial No. 314,654, filed May 1, 1906.

The object of the invention is to provide a sound box having a diaphragm whose shape may be altered, or in other words dishd for raising the pitch, in combination with means operating on said diaphragm with or without stopping the machine, or the necessity of being in close proximity to the machine. The diaphragm on the sound box is normally in what might be stated zero position, and its shape is susceptible of being altered to change the pitch by a pneumatic arrangement, the pitch being entirely under control of the operator during operation of the machine to bring out the salient features of a particular record being reproduced.

In the above mentioned application I have described, and claimed modifying elements attached to the diaphragm, and I find from experiments that better results are obtained by making these elements in disconnected series to permit the free vibration of the diaphragm in all directions. It is essential in order to obtain the very best results that the lines of vibration be free on the diaphragm, for which reason I have found it desirable as above stated, to make the modifying elements spaced from and in line with each other.

A further object of the invention is to provide means for taking up wear of the stylus bar, during the reproduction of a record.

In the drawings—Figure 1 is a front elevation of my improved sound box. Fig. 2 is a rear view of the same. Fig. 3 is a vertical section on the line 3—3 of Fig. 1. Fig. 4 is a view similar to Fig. 3, but showing the diaphragm convexed to alter its tone. Figs. 5, 6, and 7, are views of diaphragms showing different means of applying my improved modifying elements. Fig. 8 is a detail view of the connection between the stylus lever and diaphragm. Fig. 9 is

a view similar to Fig. 3 of a slight modification. Fig. 10 is a view of a diaphragm showing the modifying elements radially disposed, as shown applied in Fig. 1. Fig. 11 is a detail section of a diaphragm having the modifying elements embossed therein. Figs. 12 and 13 are views of a different form of diaphragm modifying means. Fig. 14 is a face view of the same.

The numeral 1, indicates a sound box formed with an opening 2, in its periphery, and an internal flange 3. To the rear of the sound box is attached a plate 4, formed with a hollow extension 5, to which the usual horn 6, may be attached. Attached to the open end of the extension 5, is a cap-plate 7, formed with an opening 8, connected by a tube 9, with a bulb 10.

The diaphragm 11, is located in the sound box and bears on a preferably rubber ring washer or flange 12, seated against the flange 3. Between the extension 5, and the diaphragm, and moving freely within the sound box, is a spider frame 13, formed with a reduced annular flange 14, which extends inwardly toward flange 3. Mounted on flange 14, and projecting slightly beyond the same is a preferably rubber washer 15, the outer periphery of which is slightly within the inner diameter of the washer 12, its inner face bearing directly on the rear of the diaphragm 11. The spider 13, is connected by a rod 16, with a flexible diaphragm 19, as by washers and a screw 20. The outer ends of said diaphragm 19, being clamped between the cap-plate 7, and the extension 5.

The conical journals 21, of the stylus bar 21^a, are mounted, one in a bearing 22, which is fixed to and extends outwardly from the sound box, and the opposite journal is supported in a bearing in an L shaped spring plate 23, secured to the sound box as at 24; the normal tendency of said spring plate being to spring away from bearing 22. The spring plate 23, is connected by a screw 25, having a knurled head 26, and passes through an opening 27, in the fixed bearing 22, the lower threaded end 27^a, engaging a threaded opening 28, in said spring bearing 23. By turning the screw rod 25, spring plate 23, may be drawn toward bearing 22, to take up wear of the conical journals 21, the thrust as previously stated being toward the fixed bearing.

By the arrangement described, I am also

enabled to take up wear of the parts without stopping the motor of the talking machine to compensate for any irregularity of the stylus bar when playing a record, as will be very readily understood.

The stylus lever 29, is preferably formed with the stylus bar, and extends upwardly through opening 2, to a point approximately opposite the center of and spaced from the diaphragm, the upper end of the stylus lever being split at 30, to receive the bent end 31, of a flat spring connecting device 32, the opposite end of which is attached to the diaphragm 11, and to the opposite end of the stylus lever is attached the usual stylus, indicated at 33. The spring connecting device 32, may be in the form of a round wire spring, and its outer end passed through an opening drilled in the stylus lever.

I have fully and minutely set forth the advantages of a modifying element applied to a diaphragm in my pending application, No. 314,654 filed May 1, 1906 and for a complete understanding of this feature it is necessary to refer to it. In my present application, and while I have carried out substantially the same theory, the modifying elements are differently applied to permit the diaphragm having as much flexibility as possible, in order that the greatest surface may be vibrated to properly transmit the sound waves produced by the records.

Assuming the diaphragm to be in the position illustrated in Fig. 3, and a record is being reproduced which requires a different pitch, the operator squeezes bulb 10, and the air acting on the flexible diaphragm 19, forces in the spider 13, and the washer 15, bears on the diaphragm and compresses or dishes it as shown on an exaggerated scale in Fig. 4. The location of the washers 12 and 15, causes the washer 15, to act circumferentially on the diaphragm inside the inner diameter of washer 12, and produces the result shown in Fig. 4, which prevents buckling.

By the construction described the edge of the diaphragm is free, and when the spider is operated it dishes the entire area of the diaphragm, without pulling or stretching the material, and the quality of the diaphragm is therefore maintained irrespective of its shape.

In the practical operation of the sound box, the diaphragm is necessarily dished comparatively little in order to change the tone, so that the outward movement at the center does not affect the stylus lever to any great degree; the spring connection 32, allowing the stylus bar to operate in any of the positions free enough so as not to injure the record.

It will be understood that the washers or flanges 12, and 15, may be of any material and if necessary can be formed with flange

3, and spider 13, respectively, and may also be corrugated if desired.

The spaces between the tuning elements are of micrometer distances, but are made larger so as to show the travel of the sound waves between them, the waves being shown in dotted lines *a* as before set forth.

In Fig. 5, I have shown a slightly different arrangement of tuning elements, the latter being placed in line with each other, and when used in connection with a wooden diaphragm, these modifying elements are placed lengthwise of the grain. It is obvious that the tuning elements may be arranged on the diaphragm to accomplish the best results. For instance the arrangement illustrated in Fig. 1, wherein the modifying elements are disposed radially, excellent results are obtainable with diaphragms constructed from certain materials. The diaphragm may be formed of metal, with the modifying elements embossed therein, as will be readily understood. The modifying elements may be placed on one or both faces of the diaphragm, depending somewhat on the conditions, and the washers for dishing the diaphragm may be reversed without affecting the sound adjusting quality.

As disclosed in Figs. 12 to 14, the modifying means consists of an arched strip 80, extending entirely across the diaphragm, and fastening it to the edge of the latter, the same results may be accomplished as with the disclosures herein before indicated. Or if the modifying element is placed in the sound box with the arch toward the diaphragm, and then moving it by the operating means 16, it will be apparent that the sound will be altered.

I may combine with the pneumatic means for altering the sound, a manual means indicated at 10^a, in Fig. 3. This construction is identical with that shown in the application referred to, and is designed to be used to set the position of the diaphragm, or when it is undesirable to use the pneumatic means, the latter being of course inoperative where the manual means is brought into operation. The manual means may be operated to set the diaphragm, and then the pneumatic means operated as described, independently of the operation of said manual means.

What I claim is—

1. A sound box provided with a substantially flat diaphragm, and means bearing near its edges for dishing the diaphragm throughout its entire area to alter its pitch.
2. A sound box comprising a casing having an annular flange, a normally flat diaphragm within the casing and seated on the annular flange, and means acting on an annular line within the margin of the annular flange on the casing to dish said diaphragm in concavo-convex form throughout its en-

tire area to alter the pitch of the sound transmitted by said diaphragm.

3. A sound box comprising a diaphragm, a washer on which the diaphragm is seated, a washer acting on an annular line on the opposite side of the diaphragm to dish the latter in concavo-convex form throughout its entire area, and means operating the latter washer.

4. A sound box comprising a substantially flat diaphragm, a flange on which the outer edge of one surface of the diaphragm rests, means acting near the edge of the diaphragm to dish the diaphragm throughout its entire area, and means for operating the latter means.

5. A sound box comprising a diaphragm, means for dishing the same, and a pneumatic device which may be operated during the operation of the machine without interference therewith for operating said means.

6. A sound box comprising a substantially flat diaphragm, means engaging the surface of the diaphragm for dishing the latter throughout its entire area, and means for operating the latter means.

7. A sound box comprising a diaphragm, means acting on the surface of the latter to dish it, and pneumatic means for operating said latter means.

8. A sound box comprising a flange on which the edge of one face of a diaphragm rests, a diaphragm, an operating flange acting on a line inside the flange of the sound box for dishing the diaphragm, a spider supporting the operating flange, and means operating on the center of the spider for operating the same.

9. A sound box comprising a flange on which the edge of one face of a diaphragm rests, a diaphragm, an operating flange acting on a line inside of the aforesaid flange for dishing the diaphragm, a spider on which the operating flange is supported, and pneumatic means which may be operated during the operation of the machine without interference therewith for operating the spider.

10. A sound box comprising a substantially flat diaphragm free on one side, a flange, one face of the diaphragm near one edge resting on the flange, an operative washer of smaller area than the aforesaid flange and bearing on the surface of the diaphragm, and means for operating the operative washer to cause the edge of the diaphragm to leave the flange and dish said diaphragm throughout its entire area.

11. A sound box comprising a diaphragm, cooperating means for dishing said diaphragm, an air compression chamber extending from the sound box, a flexible diaphragm in said chamber, means connecting the latter diaphragm and the diaphragm

dishing means, and means for regulating the supply of air in the compression chamber.

12. A sound box comprising a diaphragm, means for dishing the diaphragm, an extension on the sound box, a pneumatic device formed in the extension for operating the dishing means, and means for regulating the supply of air for operating the dishing means.

13. A sound box, comprising a diaphragm, means for dishing the same, and extension on the sound box, pneumatic means in the extension for operating the dishing means, and a horn opening formed in the extension between the diaphragm and the pneumatic means.

14. A sound box having a stationary bearing extending therefrom, a spring member secured to said sound box and having its free end formed in a bearing turned to be in alinement with the stationary bearing, a stylus lever mounted in the stationary bearing and the bearing formed in the end of the spring member, and a screw connecting the two bearings to adjust the tension of the spring bearing toward or from the stationary bearing.

15. A sound box comprising a diaphragm, means for dishing the same including a pneumatic device comprising a bulb and a piston.

16. A sound box formed with an extension, a diaphragm, means partially within the extension for altering the pitch of the diaphragm including a reciprocating element and operatively positioned to change the shape of the diaphragm, and pneumatic means for operating the reciprocating element without interrupting the operation of the machine.

17. A sound box provided with a substantially flat diaphragm, a flange against which one face of the diaphragm rests, and means for dishing the diaphragm, said means in operation causing the circumference of the diaphragm to be moved from the flange to dish the entire area of the diaphragm.

18. A sound box having a diaphragm, modifying elements attached to said diaphragm, means located near the outer edge of the diaphragm for dishing it throughout its entire area, and means for operating the dishing means.

19. A sound box comprising a stylus lever a diaphragm having modifying elements attached thereto and spaced from each other, between the edge of said diaphragm and said stylus lever, the modifying elements being alined with respect to each other, means for dishing the diaphragm throughout its entire area, and means for operating the dishing means.

20. A sound box comprising a diaphragm, a stylus lever formed with a notch, and an L shaped connector having one end attached

to the diaphragm and its opposite end engaging the notch in the stylus lever.

21. A sound box comprising a diaphragm, means for altering the sound of the diaphragm, and pneumatic means which may be operated during the operation of the machine without interference therewith for operating the sound altering means.

22. A sound box comprising a diaphragm, means for altering the sound of the diaphragm, pneumatic means for operating the sound altering means, and a manual means for operating the sound altering means the two latter means being operable independently of the other.

23. A sound box comprising a diaphragm, means for altering the sound of the diaphragm, pneumatic means for operating the sound altering means, and manual means for operating the sound altering means, the latter means adapted to be operated to set the diaphragm, independently of the pneumatic means.

24. A sound box comprising a casing, a diaphragm, a stationary washer, a movable washer of a different diameter, a spider on which the movable washer is fastened, means for moving the latter to dish the diaphragm throughout its entire area, and releasing the pressure on said diaphragm to allow the straightening of the same, the movable washer actuating means extending through the rear of the casing.

25. A sound box comprising a casing, a diaphragm, a stationary washer, a movable washer and spider, means acting on the center of the spider for causing variable pressure on the outer edge of the diaphragm to dish the latter throughout its entire area and for withdrawing same to release the pressure from the diaphragm.

26. A sound box comprising a casing, a diaphragm, a stationary washer, a movable

washer of different diameter than the stationary washer and fastened on a movable spider, means for causing pressure on the center of the spider for dishing the diaphragm throughout its entire area, and a pivoted stylus acting on the dished diaphragm.

27. A sound box, comprising a diaphragm, means for altering the pitch of the diaphragm, and a pneumatic device for operating on the aforesaid means during the operation of the machine without interference therewith.

28. A sound box comprising a casing having an annular flange on the inside, a substantially flat diaphragm, the flange forming an abutment for the diaphragm and the latter being free at its edge, and means acting on a circumferential line on one side of the diaphragm to alter the pitch of the latter, the free edge of the diaphragm serving to permit the latter means to be operative.

29. A sound box comprising a diaphragm having its edge free to move, means acting on a circumferential line at a point distant from the edge of the diaphragm for dishing the latter, and a centrally located stem extending through the sound box for operating the dishing means.

30. A sound box comprising a casing, a diaphragm, and modifying elements attached to the diaphragm, said modifying elements being arranged in separated groups, each element being attached throughout one of its entire surfaces to the surface of the diaphragm.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY C. MILLER.

Witnesses:

WM. F. PALMER,
JNO. IMIRIE.