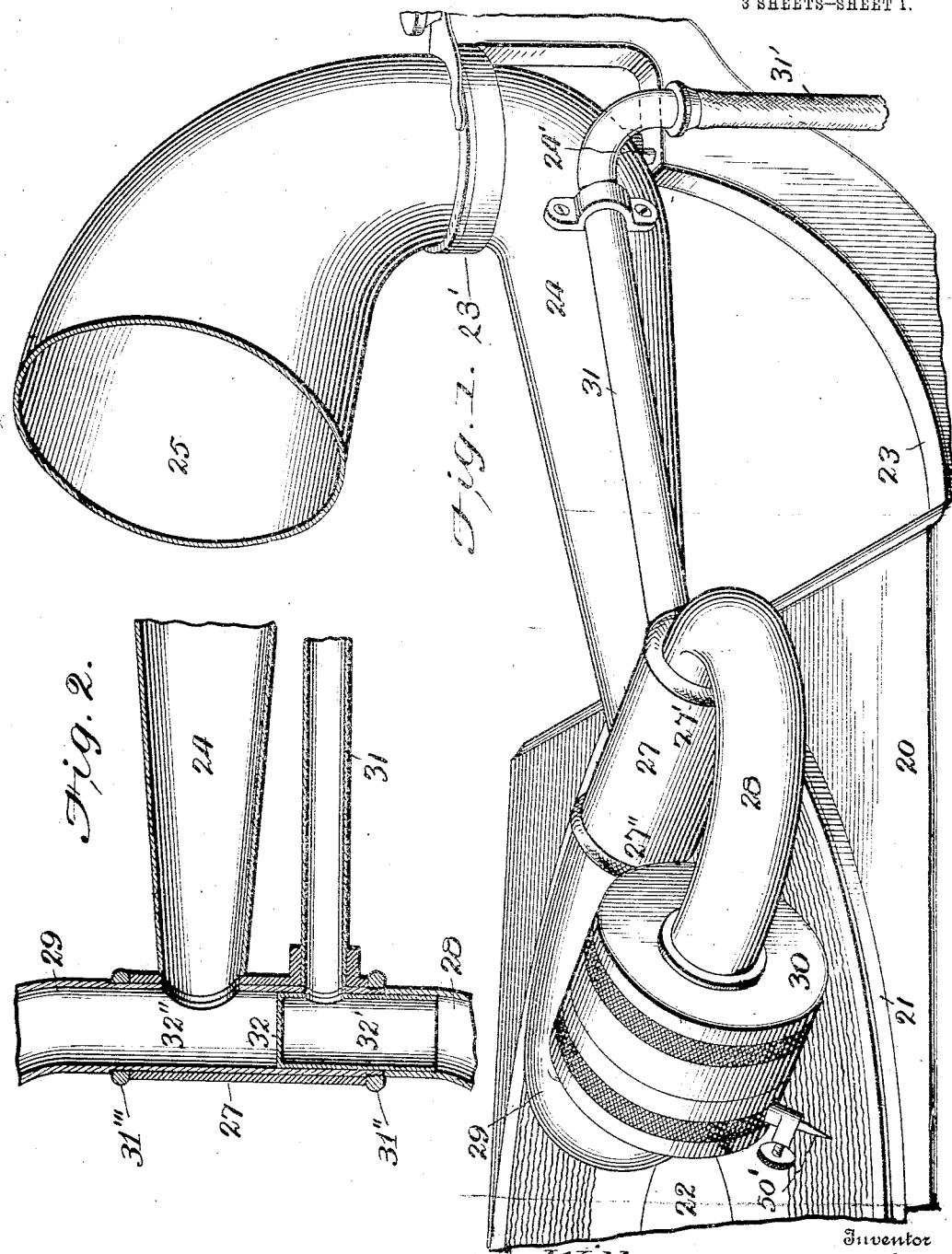


1,060,235.

W. N. DENNISON.
TALKING MACHINE.
APPLICATION FILED MAR. 8, 1906.

Patented Apr. 29, 1913.

3 SHEETS-SHEET 1.



Witnesses

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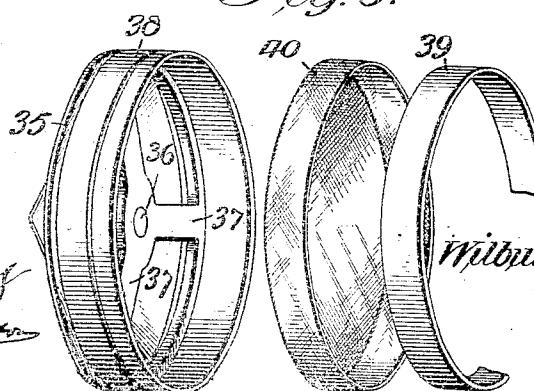
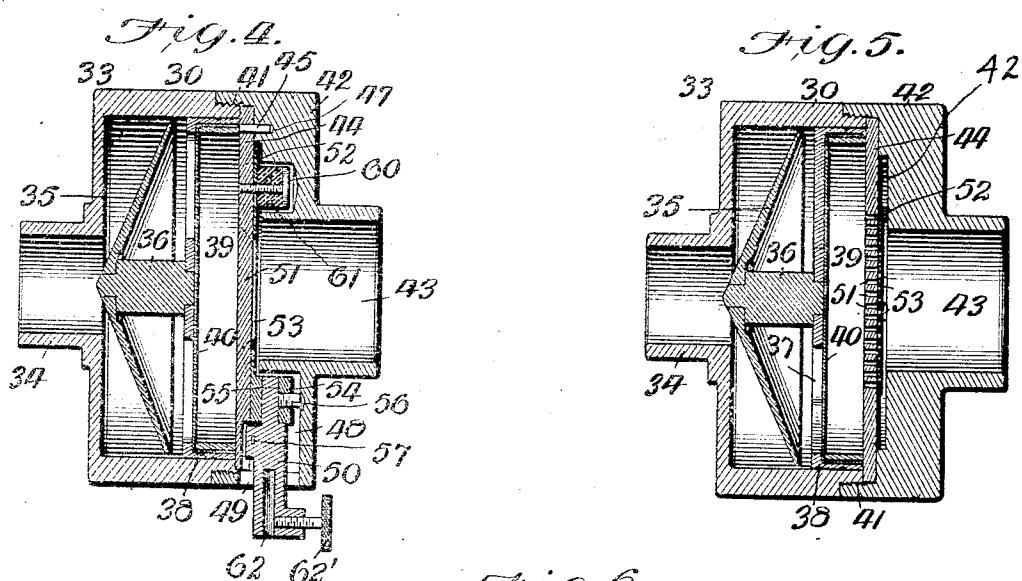
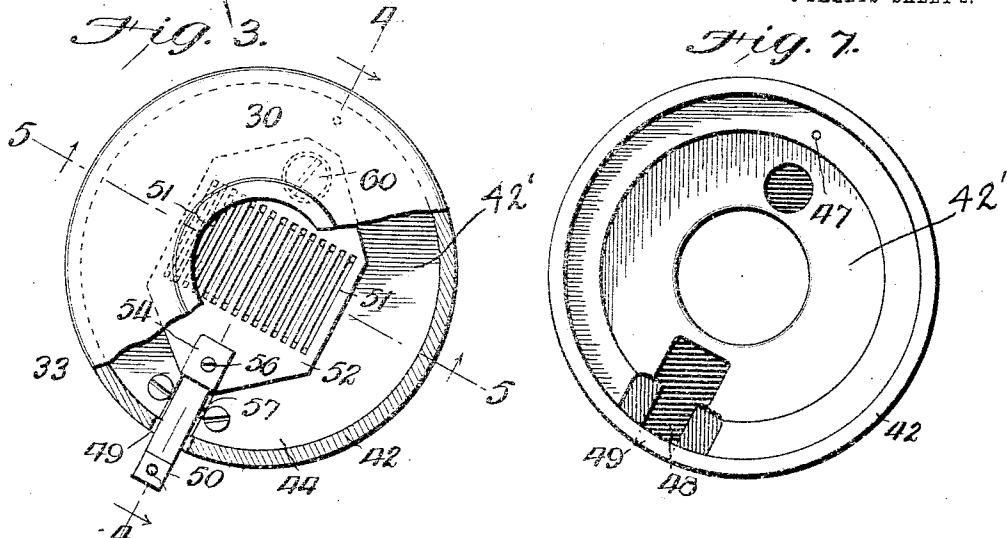
TALKING MACHINE.

- APPLICATION FILED MAR. 8, 1906.

1,060,235.

Patented Apr. 29, 1913.

3 SHEETS—SHEET 2.



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1,060,235.

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3 SHEETS—SHEET 3.

Fig. 8.

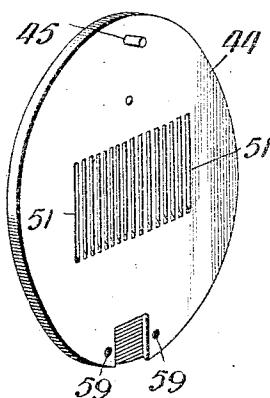


Fig. 9.

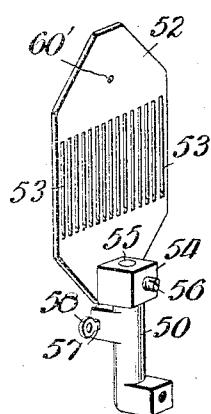


Fig. 10.

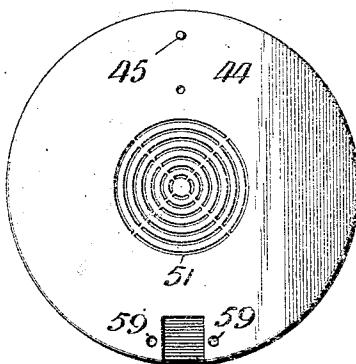


Fig. 11.

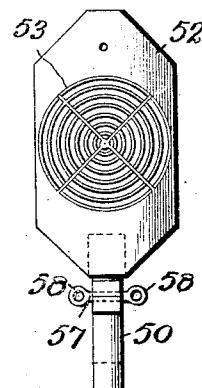
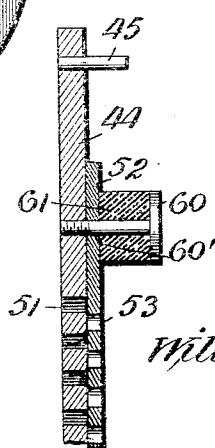


Fig. 12.



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UNITED STATES PATENT OFFICE.

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TALKING-MACHINE.

1,060,235.

Specification of Letters Patent.

Patented Apr. 29, 1913.

Application filed March 8, 1906. Serial No. 304,836.

To all whom it may concern:

Be it known that I, WILBURN N. DENNISON, a citizen of the United States, and a resident of the borough of Merchantville, 5 State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a full, clear, and complete disclosure.

This invention relates to talking machines 10 of the type commonly known as pneumatic, and in which sound waves are impressed upon a fluid current by means coöperating with a sound record.

The main objects of this invention are, to 15 provide an improved pneumatic talking machine, simple and durable in construction and highly efficient in operation; to provide in a pneumatic talking machine an improved sound box or sound reproducer, and 20 an improved mounting therefor; to provide in a pneumatic sound box an improved valve and means for balancing the same; to provide in a pneumatic sound box means for delicately and accurately controlling the 25 flow of a fluid current therethrough; and to provide other improvements as will appear hereinafter.

In the accompanying drawings, Figure 1 is a fragmentary perspective view of a talking machine constructed in accordance with 30 this invention; Fig. 2 a fragmentary central sectional view of a portion of the same; Fig. 3 a fragmentary end view of an improved sound box forming part of this invention; Fig. 4 a sectional view taken on the line 4—4 of Fig. 3; Fig. 5 a sectional view taken on line 5—5 of Fig. 3; Fig. 6 a perspective view showing parts of the same separated from each other; Fig. 7 an 35 end view of a detail of the sound box; Figs. 8 and 9 are perspective views of details of the same; Figs. 10 and 11 are elevations of details of a modified form of this invention; and Fig. 12 is an enlarged sectional view of 45 the parts illustrated in Figs. 10 and 11, assembled in operative relation.

Referring to the drawings, one embodiment 50 of this invention comprises a cabinet 20, upon which is mounted the usual or any suitable turn-table 21, for carrying the usual, or any suitable sound record 22, the turn-

table being rotated by the usual driving mechanism (not shown), mounted in the cabinet 20.

Projecting rearwardly and upwardly from 55 the cabinet 20 is a bracket 23, secured to the upper end of which and projecting inwardly therefrom is a horizontal ring or annular support, 23'. Depending from the ring 23', is the larger end of a tapering hollow sound box arm or tone arm 24, which is mounted to swing in a horizontal plane about a vertical pivot 24', carried by the outer portion of the bracket 23 and engaging the under portion of the larger end of 60 the tone arm. Projecting upwardly from the ring 23', and carried thereby, is a sound amplifying horn 25, communicating with the tone arm 24.

For supporting a sound box in communication with the smaller free end of the tone arm 24, and for supplying the sound box with a fluid current, the smaller end of the tone arm terminates in a transverse tubular horizontal connection or support 27, 70 rigidly secured thereto. The free end of the tone arm 24 is open and registers with an opening provided therefor through the wall of the transverse tubular support 27. Projecting laterally in opposite directions 75 from the ends 27' and 27" of the support 27, are two U-shaped oppositely disposed tubes, 28 and 29, the inner ends of which are coaxial with the tubular support 27, and the outer ends of which are coaxial with and 80 firmly attached to the opposite ends respectively of a sound box 30. One, 28, of these U-shaped tubes forms a supply tube for the sound box 30, and the other, 29, U-shaped tube forms a discharge pipe for the sound 85 box. The U-shaped supply tube 28 communicates with a supply pipe 31, which extends rearwardly from the tubular support 27 substantially parallel to the sound box arm 24. The front end of the supply 90 pipe 31 is open and is secured in an opening provided therefor in the wall of the tubular support 27, this end of the pipe 31 being flush with the inner surface of the support 27. The rear portion of the supply pipe 31 95 is rigidly secured to the larger end of the tone arm 24, curves downwardly, and termi- 100

nates in communication with a piece of rubber or other flexible tubing 31', secured thereto and by which it is connected to a suitable fluid compressor or other source of fluid supply (not shown).

For connecting the U-shaped tubes 28 and 29 rotatably to the tubular support 27, the inner portion of the U-shaped tube 29, forming the discharge passage between the sound box and the tone arm, is reduced in diameter and is extended entirely through the tubular support 27, fitting snugly but rotatably therein, and held against longitudinal movement therein by means of a collar 31'', threaded over the projecting end of the U-shaped tube 29 and abutting against the adjacent end of the tubular support 27, and a collar 31''' surrounding the reduced portion of the U-shaped tube 29 and engaging upon its outer side against the shoulder between the reduced inner portion of the U-shaped tube 29 and its main portion, and upon its inner side against the adjacent end of the tubular support 27.

The inner end of the U-shaped tube 28 abuts against the inner end of the U-shaped discharge tube 29, and is rigidly connected thereto by means of a short tube, one end, 32, of which is closed and fits snugly within the end of the U-shaped discharge tube 29, and the other end of which is open and fits snugly in the inner end of the U-shaped supply tube 28. The closed end 32 of this short tube is arranged between the free end 35 of the tone arm 24 and the adjacent end of the supply pipe 31, dividing the interior of the tubular support 27 into two chambers, 32' and 32'', one, 32', of which communicates with the adjacent end of the supply pipe 31 through a substantially circular opening through the cylindrical walls of the short tube 32 and containing tube 29, which registers with a corresponding opening leading through the tubular support 27, when the sound box is in operative position. The other, 32'', of these chambers communicates with the open free end of the tone arm 24 through a substantially circular opening provided through the cylindrical wall of the U-shaped tube 29, which registers with the opening in the end of the tone arm 24 when the sound box is in operative position. By this construction the sound box 30 is free to oscillate in a vertical plane about the longitudinal axis of the tubular support 27, and also may swing laterally across the record about the vertical pivot 24' of the tone arm 24.

One form of pneumatic sound box constructed in accordance with this invention comprises (see Figs. 3 to 9) a cylindrical casing 33, open at its inner end and closed at its outer end, and provided at its closed end with a projecting tubular portion 34, coaxial therewith and telescoping tightly

within the outer end of the U-shaped supply tube 28 and forming an inlet for the sound box when the sound box is in operation.

For spreading and distributing the fluid current in the sound box, there is arranged within the casing 33, and coaxial therewith, a conical deflector 35, the apex of which faces toward the inlet of the sound box formed by the tubular projection 34. This conical deflector is slightly less in diameter than the internal diameter of the casing 33, and is mounted upon a stud 36, coaxial therewith and projecting inwardly therefrom, and the inner end of which is supported by a spider comprising arms 37, projecting radially from the stud 36, and the outer ends of which are integral with or secured to a cylindrical ring 38, which fits snugly within the interior of the casing 33.

For filtering the fluid current as it passes through the sound box, and for equalizing its pressure, there is provided a foraminated diaphragm 40, preferably consisting of a piece of closely woven silk fabric, the margin of which is clamped between the inner cylindrical surface of the ring 38, supporting the deflector 35, and the outer cylindrical surface of a second cylindrical ring 39, telescoping therein, the rear edges of the two rings being preferably flush.

The open end of the casing 33 is reduced externally in diameter and the reduced portion is provided with screw threads 41, which engage corresponding internal threads of a cap or cover 42. The cap or cover is provided with a cylindrical tubular extension 43, projecting outwardly therefrom, coaxial therewith, and of less diameter than the cap, and which telescopes tightly within the U-shaped discharge tube 29, forming an outlet for the sound box.

For impressing sound waves on a fluid current passing through the sound box, there is provided a flat circular valve seat 44, which is arranged coaxially with and in a plane perpendicular to the longitudinal axis of the sound box, and between the diaphragm 40 and the inner surface of the cover 42. The marginal portion of this valve seat is clamped in an annular internal groove provided therefor between the sound box casing 33 and its cover 42. The valve seat is held in a predetermined position with respect to the cover by means of a positioning pin 45, projecting through and rigidly secured to the valve seat and engaging in an opening 47 in the inner side of the cover, and the valve seat is thus prevented from rotating with respect to the cover as the cover is being rotated into position upon, or is being removed from, the casing 33.

The valve seat 44 is provided centrally with one or more openings or ports. When

a plurality of ports are used, they may be in the form of a series of parallel narrow slits or openings 51, which preferably extend over an area somewhat greater than the 5 transverse sectional area of the opening through the tubular extension 43 forming the outlet of the sound box, for a purpose hereinafter explained.

Coöperating with the valve seat 44, and 10 between the valve seat and the adjacent inner surface of the cover 42 of the sound box casing, is a valve 52, which is actuated by a stylus bar 50, actuated by a stylus 50', which 15 engages in the usual socket 62 of the stylus bar and which is held in place therein, as usual, by a set-screw 62', and which coöperates with a sound record 22, as described hereinafter. The valve 52 is preferably in 20 the form of a thin, flat plate or sheet of metal, preferably flexible, in which is arranged a series of slits or openings 53, similar to the openings 51 in the valve seat 44, and so arranged that when the valve is in 25 operative position the bridges between the openings of the one register with and normally cover the openings of the other. To provide a suitable space to receive the valve and the stylus bar, the inner surface of the 30 cover 42 is provided with a shallow recess or depressed portion 42', adapted to receive the valve, and in which is located a recess 48 extending radially with respect to the cover and adapted to receive the inner end of the 35 stylus bar 50 and communicating with a radially extending opening 49 through the cylindrical wall of the cover, and through which the stylus bar projects outwardly from the sound box casing.

For securing the stylus bar 50 to the valve 40 52, the valve is preferably provided with a lug 54, brazed or otherwise secured thereby, and provided with an aperture 55, within 45 which the inner end of the stylus bar 50 is snugly fitted and also secured by a set-screw 56 extending through the lug and engaging the stylus bar.

The stylus bar 50 is mounted to oscillate upon a tension spring 57, which passes transversely through the stylus bar and which is 50 provided at its opposite ends with ears 58, which are secured to the valve seat 44 by means of screws threaded as at 59 into the valve seat, thus securing the spring 57 to the valve seat.

55 To prevent displacement of the valve in its own plane, there is attached to the valve seat a screw 60, which passes through an opening 60' provided therefor in the valve, and to hold the valve yieldingly against its 60 seat the screw 60 may be provided with a head and a spring or rubber washer 61 may be interposed between the head of the screw and the outer surface of the valve. When 65 the stylus bar is oscillated by coöperation with the sound record, the valve will be

flexed between the tension spring 57, upon which it is mounted, and the outer end of the valve, the flexed portion being slightly lifted from its seat and permitting the fluid current to pass through the valve. The 70 screw 60 and washer 61 may, however, be dispensed with and the valve be permitted to vibrate freely upon the tension spring 57.

In the above described construction the inner surface of the cover 42 is spaced from 75 the opposite outer surface of the valve 52 only a sufficient distance to permit of the free oscillation of the valve, and to provide a narrow passage for the fluid current between the valve and the wall of the cover. 80 In practice the distance between the valve and the adjacent wall of the cover, when the valve is in contact with its seat, is preferably only about 3/1000 of an inch. The object of this construction is to trap air passing 85 between the valve and the cover to form a cushion for the valve, thus obviating the use of springs or other mechanical devices for balancing the valve, the construction of the valve seat, valve and other parts of the 90 sound box being identical in other respects with the construction hereinbefore described.

Instead of forming the openings or ports in the valve seat and valve, as hereinbefore described, concentric openings may be provided in the valve seat and corresponding concentric openings provided in the valve, so that the bridges between the openings in one of these members will cover the openings in the other member when the two members are 100 in operative position. (See Figs. 10, 11 and 12.)

In the operation of any of the several forms of this invention hereinbefore described, air or any other suitable fluid is 105 conducted through the flexible tube 31', supply pipe 31, chamber 32' and curved supply tube 28 into the interior of the sound box casing 33, where the air impinges against the convex surface of the conical deflector 110 35, by which it is spread and directed toward the cylindrical wall of the sound box casing. The air then passes between the cylindrical wall of the sound box casing and the outer edge of the deflector 35 and 115 is delivered radially inwardly against the diaphragm or screen 40, striking the outer portions of the screen first. The air then passes through the screen 40 into the openings or ports 51 in the valve seat 44. The 120 deflector 35 therefore acts in coöperation with the screen 40 to insure a uniform distribution of the air through the ports of the valve seat. If some such provision were not made for spreading or distributing the 125 air in the sound box, the air would impinge directly upon the inner side of the valve seat and would pass through the various openings in the valve seat and valve at varying speed, more air passing through the 130

middle of the valve than through the outer portions thereof. After passing through the valve seat, some of the air then passes through the corresponding openings 53 of the valve; the remaining portion of the air, however, passing through the space between the valve seat and the valve as the valve is oscillated and flexed, and around the margin of the valve and between the valve and the inner surface of the cover 42. The portion of the air which passes through the central portion of the valve will continue directly out through the tubular outlet 43 of the sound box, and the portions of the air which pass around the valve or through the outer openings of the valve will first be deflected by the inner surface of the cover 42 to cushion the valve, and will then pass out through the tubular outlet 43 of the sound box, mingling with the air that has passed through the central portion of the valve. From the tubular outlet 43 of the sound box, the air passes through the U-shaped discharge tube 29 and through the circular opening in the inner portion of the tube and into the tone arm 24, from whence it is delivered from the device through the amplifier 25. It is therefore evident that the amount of air which is permitted to pass through the sound box will be constantly varied by the oscillations of the valve, actuated when in operation by the stylus bar and stylus oscillated in accordance with a sound record, and that vibrations corresponding to the sound waves recorded on the record will be set up in the air passing through the sound box by this oscillation of the valve. It is also evident that the sound box may be inverted from an operative position with its stylus in contact with a record, into an inoperative position where it will rest upon the free end of the tone arm 24, and that by thus inverting the sound box, the opening in the free end of the tone arm 24 and the opening in the corresponding adjacent end of the supply pipe will be closed and the flow of current through the sound box will be stopped. This inversion of the sound box therefore effects the double function of moving the sound box into an inoperative position, and of stopping the flow of the fluid current therethrough, or, in other words, when the sound box is inverted into an inoperative position, the flow of the fluid current through the sound box is automatically stopped and a waste of power is prevented.

This invention is not limited in its application to the particular construction hereinbefore described, but may be applied in other forms to meet various conditions, without departing from the spirit of this invention or the scope of the appended claims.

Having thus described my invention,

what I claim and desire to protect by Letters Patent of the United States is:

1. In a sound box, the combination with means for conveying a fluid, of a valve for producing sound waves in said fluid, and means for causing said fluid to balance said valve. 70

2. In a sound box, the combination with a vibratory valve, of means for conveying a fluid through said valve, means for vibrating said valve in accordance with sound waves, and means for causing the fluid permitted to pass through the valve to balance said valve. 75

3. The combination in a sound box provided with an inlet opening forming a valve port, and with an outlet opening, and a depression surrounding said outlet opening, of a valve located between said openings and within said depression, covering said inlet port and having its outlet side in close proximity to the wall of said depression, whereby part of the fluid passing through said port will be deflected to balance said valve. 80 85

4. In a sound box, the combination with a casing providing means for conveying a fluid and having an outlet, of a valve having a plurality of passages for fluid, said valve being located close to the wall of said casing and over said outlet, and means to actuate said valve in accordance with sound waves, the area of the portion of said valve containing said passages being greater than the area of said outlet. 90 95

5. In a sound box, the combination with a casing provided with an outlet, of a valve seat provided with a series of openings located adjacent one side of said casing and in alignment with said openings, a movable valve located between said valve seat and said side of said casing and just out of contact with said side, and means to actuate said valve in accordance with sound waves, the construction being such that when the fluid is passed through said openings, some 100 of the fluid will be deflected by the said side of said casing to balance said valve. 105 110

6. In a sound box, the combination with a hollow casing for conveying a fluid, of a valve arranged to impress sound waves upon said fluid, and means for deflecting the fluid toward the inner walls of said casing before permitting the fluid to pass into contact with said valve. 115

7. In a sound box, the combination with a hollow casing for conveying a fluid, of a valve for impressing sound waves on said fluid, means for actuating said valve in accordance with a sound record, and means for deflecting said fluid toward the inner walls 120 125 of said casing before said fluid is permitted to pass into contact with said valve.

8. In a sound box, the combination with a hollow casing for conveying a fluid, of means for impressing sound waves upon 130

1. said fluid, and tapering means arranged to deflect said fluid toward the inner walls of said casing before said fluid is permitted to pass into contact with the said first mentioned means.

2. 9. A sound box provided with a passage for a fluid, said passage terminating in oppositely disposed openings, means interposed in said passage between said openings and substantially coaxial with said passage and tapering longitudinally thereof for deflecting said fluid, and means to impress sound waves upon said fluid.

3. 10. In a sound box, the combination with a casing having an inlet and an outlet and providing a conduit connecting said inlet and said outlet, of means for impressing sound waves upon a fluid passing through said conduit, and means for causing said fluid to be deflected away from the central portion of said conduit.

4. 11. In a sound box, the combination with a hollow casing provided with an inlet and with an outlet, of a deflector located in said casing for directing a fluid against the walls of said casing, and means for impressing sound waves on said fluid.

5. 12. In a sound box, the combination with a hollow casing provided with an inlet and with an outlet, of a deflector arranged in said casing and tapering toward said inlet for directing a fluid toward the inner walls of said casing, and means for impressing sound waves upon said fluid.

6. 13. In a sound box, the combination with a hollow casing provided with an inlet and with an outlet and forming a conduit connecting said inlet and said outlet, of a deflector for directing a fluid toward the inner walls of said conduit, and a valve between said deflector and said outlet for impressing sound waves on said fluid.

7. 14. In a sound box, the combination with a casing provided with an inlet and with an outlet and forming a conduit for a fluid connecting said inlet and said outlet, of a valve adjacent said outlet for impressing sound waves upon said fluid, and means in said conduit between said valve and said inlet for equalizing the flow of said fluid toward said valve.

8. 15. In a sound box, the combination with a casing providing a passage for a fluid and having an inlet and an outlet, of a valve provided with a plurality of openings and arranged in said passage between said inlet and said outlet for impressing sound waves on said fluid, and means between said valve and said inlet to distribute said fluid equally through said openings.

9. 16. In a sound box, the combination with a casing providing a passage for a fluid, said passage having an inlet and an outlet, of a valve for impressing sound waves upon said fluid, and means between said valve and said

10. inlet for deflecting said fluid outwardly toward the inner walls of said passage, and then causing the same to be delivered to said valve at substantially equal velocities.

11. 17. In a sound box, the combination with a casing including two separable portions, of a valve seat arranged between said portions and dividing the interior of said casing into a plurality of compartments, said seat being provided with a port, a valve arranged within said casing to control said port, and sound reproducing means mounted upon said seat and arranged to vibrate said valve in accordance with sound waves.

12. 18. In a sound box, the combination with sound reproducing means, of a fluid deflector and equalizer comprising an outer ring, an inner ring, a screen having its edges clamped between said rings, and a deflector secured to said outer ring.

13. 19. In a sound box for talking machines, the combination with means for conveying a fluid, of a flexible valve movably restricted at spaced points and arranged to oscillate as a whole about a predetermined axis, for impressing vibrations corresponding to sound waves upon said fluid, and means to flex and to oscillate said valve in accordance with a sound record.

14. 20. A sound box for talking machines comprising a stationary member, a flexible valve co-operating with said stationary member, yielding means restraining said flexible valve at spaced points, and sound reproducing means arranged to flex said flexible valve between said points in accordance with a sound record.

15. 21. Sound reproducing means comprising a relatively stationary member, a flexible member movably secured to said stationary member at spaced points and arranged to flex between said points, and to oscillate as a whole about a predetermined axis, and means arranged to be actuated by a sound record to flex said flexible member between said points and to oscillate said member about said axis in accordance with said record.

16. 22. In a sound box, a stationary member having an inlet valve port, a valve covering said port, means for vibrating said valve to impress sound waves on a fluid passing through said port, and means on the outlet side of said valve for deflecting part of said fluid after it has passed through said port, to balance said valve.

17. 23. In a sound box, the combination with a casing provided with an outlet in one side thereof, of a plate provided with an inlet port opposite said side, a valve controlling said port, and means to vibrate said valve in accordance with a sound record, said valve extending beyond the boundary of said outlet into the space between the said side and said port plate, and almost in contact with

with the inner wall of said side, whereby when a fluid is forced through the said port, part of the said fluid will be deflected after it has passed through said port to balance the said valve.

24. In a sound box, the combination with a casing provided with a central outlet in one side thereof, of a flat plate provided with an inlet port opposite said outlet opening and a flat valve over said inlet port, and means to vibrate said valve in accordance with a sound record, said valve extending beyond the boundary of said outlet into the space between the said side and said port plate, and almost in contact with the inner wall of said side, whereby when a fluid is forced through the said casing part of said fluid will be deflected to balance the said valve.

25. In a sound box, means for impressing sound waves on a fluid, said means comprising a stationary member, and a valve mounted to oscillate about an axis adjacent one end thereof and yieldingly secured adjacent its opposite end to said stationary member.

26. In a sound box, means for impressing sound waves on a fluid, said means comprising a stationary member, and a flexible valve mounted to oscillate about an axis located adjacent one end thereof and yieldingly secured adjacent its opposite end to said stationary member.

27. In a sound box, means for impressing sound waves on a fluid, said means comprising a stationary member, a valve mounted upon said stationary member to oscillate about an axis located adjacent one end of said valve, and yielding means connecting the opposite end of said valve to said stationary member.

28. In a sound box, means for impressing sound waves on a fluid, said means comprising a stationary member, a valve, a headed projection passing through said valve and carried by said stationary member, and a yielding washer between the head of said projection and said valve for holding said valve yieldingly in position.

29. In a sound box, means for impressing sound waves on a fluid, comprising a stationary member and a movable member, secured at one end and having an adjustable yielding connection at its other end to the said stationary member.

30. In a sound box, a valve comprising a stationary member, having an aperture, and a flexible movable member adapted to normally cover said aperture, said flexible member being secured on opposite sides to said stationary member, and means mounted upon said stationary member to flex said movable member in accordance with a sound record to impress sound undulations upon a fluid passing through said aperture.

31. A sound box for talking machines,

comprising a casing including two separable portions united to form an internal groove, a valve seat mounted in said groove, a valve arranged to coöperate with said seat, and means mounted upon said seat to actuate said valve in accordance with a sound record.

32. A sound box for talking machines, comprising a casing including two separable portions connected together to form an internal groove, a valve seat mounted in said groove and provided with a port, a valve arranged to control said port, and means mounted upon said seat for actuating said valve in accordance with a sound record.

33. A sound box for talking machines, comprising a casing including two separable portions united to form an internal groove, a valve seat mounted in said groove and provided with a port, a valve arranged in said casing to control said port, and means mounted to oscillate upon said seat and connected to said valve to actuate said valve in accordance with a sound record.

34. A sound box comprising two directly connected separable portions, provided with an internal groove between said portions, a valve seat removably secured in said groove, means for positioning said valve seat with respect to said groove when the parts are being assembled, and means secured to said valve and projecting outwardly from said sound box for actuating said valve in accordance with a sound record.

35. A sound box comprising two separable portions provided with an internal groove between said portions, a valve seat removably secured in said groove, a pin for positioning said valve seat with respect to said groove when the parts are being assembled, and a stylus bar rigidly secured to said valve and projecting outwardly from said box for actuating said valve in accordance with a sound record.

36. In a sound box, the combination with sound reproducing means of an equalizer, comprising an outer ring, an inner ring, and a screen having its edges clamped between said rings.

37. In a sound box, the combination with a hollow casing, of sound reproducing means, a deflector arranged in said casing, and radial arms supporting said deflector.

38. In a sound box, the combination with a hollow casing provided with an inlet and with an outlet, of sound reproducing means, a deflector arranged in said casing and tapering toward said inlet, radial arms supporting said deflector, a ring supporting said arms and carried by said casing, a ring within said first-mentioned ring, and a screen having its edges clamped between said rings.

39. In a sound box, the combination with a hollow casing having an inlet and an outlet, of sound reproducing means arranged in

said casing, a deflector in said casing between said sound reproducing means and said inlet, and a screen between said sound reproducing means and said deflector.

5 40. In a sound reproducer, the combination of a hollow body provided with an inlet chamber having flat parallel walls situated close together, a set of ports in one of said walls, a valve for varying the extent of 10 opening of said ports, and means for vibrating said valve in accordance with sound waves.

15 41. In a sound reproducer, the combination with a hollow body containing chambers communicating through a port, of a stylus bar carried by and mounted to oscillate with respect to said body, and a plate of elastic material carried by said bar and forming a valve arranged to control said port.

20 42. In a sound reproducer, the combination with a casing containing chambers communicating through a port, of a plate of elastic material seated over said port, yielding means restraining said plate at spaced 25 points, and means arranged to flex said plate between said points in accordance with sound waves.

30 43. Sound reproducing means comprising a valve seat provided with a port, a valve arranged to control said port, and means mounted upon said seat for actuating said valve in accordance with a sound record.

35 44. Sound reproducing means comprising a plate provided with a port, a valve arranged to control said port, and oscillatory means mounted upon said plate to actuate said valve in accordance with a sound record.

40 45. In a sound reproducer, the combination with a hollow body provided with chambers communicating through a port, of a plate of elastic material seated upon said port, yielding means pressing on said plate to force it toward a closed position, and means for flexing said plate in accordance with sound waves to vary the extent of opening of said port.

45 46. A sound reproducer comprising a hollow casing, a valve seat provided with a port and dividing the interior of said casing into two compartments communicating through said port, a flexible valve arranged in one of said compartments to control said port, and means mounted upon said seat to actuate said valve in accordance with a sound record.

50 47. In a sound reproducer, the combination of a body having a port, a plate of elastic material seated over said port, yielding means pressing on said plate, means for varying the pressure of said yielding means, and means for flexing said plate in accordance with sound waves to vary the extent of opening of said port.

55 48. In a sound box, the combination with a valve seat provided with a port, of a flexible valve arranged to coöperate with said seat, yielding means arranged to restrain said valve at two points upon opposite sides respectively of said port, and means arranged to flex said valve between said points in accordance with a sound record. 95

60 49. In a sound box, the combination with a valve seat provided with a port, of a flexible valve arranged to coöperate with said seat, and yielding means arranged to restrain said valve at two points upon opposite sides respectively of said port, and a stylus bar connected to said valve and arranged to flex said valve between said first 75 mentioned points in accordance with a sound record. 80

65 50. In a sound box, the combination with a casing provided with an outlet, of a movable valve mounted in said casing adjacent said outlet, said valve being apertured over an area greater in extent than the transverse sectional area of said outlet, and means to actuate said valve in accordance with a sound record. 90

70 51. In a sound box, the combination with a casing provided with an outlet, of a valve extending in said casing adjacent said outlet, the area bounded by the margin of said valve being greater than the transverse sectional area of said outlet, and means to actuate said valve in accordance with a sound record. 95

75 52. In a sound box, the combination with a valve seat provided with a port, of a valve mounted to oscillate about an axis toward and away from said seat and controlling said port, means arranged to oppose the movement of said valve away from said seat at a point spaced from said axis, and means to oscillate said valve in accordance with sound waves, said port being arranged between said axis and said point. 100

80 53. In a sound box, the combination with a valve seat provided with a port, of a valve mounted to oscillate about an axis toward and away from said seat and controlling said port, yielding means arranged to oppose the movement of said valve away from said seat at a point spaced from said axis, and means to oscillate said valve in accordance with sound waves, said port being arranged between said axis and said point. 110

85 54. In a sound box, the combination with means providing a passage for a fluid, of a valve coöperating therewith for producing sound waves in said fluid, said valve being arranged to be balanced in its action by said fluid. 115

90 55. In a sound box for talking machines, the combination with means for conveying a fluid, of a flexible oscillatory valve coöperating therewith, and means for oscillating 120

95 125

said valve as a whole about an axis in accordance with a sound record for impressing sound waves upon said fluid.

56. In a sound box, the combination with 5 a casing providing a passage for a fluid, said passage having an inlet and an outlet, of a valve arranged in said casing close to a wall of said passage and in alignment with said outlet, the area of said valve being greater than the area of said outlet, and means to vibrate said valve to produce sound waves.

57. In a sound box, the combination with 10 a casing providing a passage for a fluid and having an inlet and an outlet, of a valve 15 provided with a plurality of openings and located in said casing adjacent said outlet and close to a wall of said passage, the area of the portion of said valve containing said openings being greater than the area of said outlet, and means to vibrate said valve to produce sound waves.

58. In a sound box, the combination with 20 a casing providing a passage for a fluid and having an inlet and an outlet, of a valve seat 25 provided with a port arranged in said casing, a valve located between said seat and said outlet and close to but spaced from a wall of said casing, and means to vibrate said valve to produce sound waves, the arrangement being such that when a fluid is forced through said valve seat some of said fluid will be deflected by said wall to balance said valve.

59. In a sound box, the combination with 30 a casing providing a passage for a fluid, of a vibratory valve arranged in said casing for impressing sound waves on said fluid, means for vibrating said valve in accordance with a sound record, and means arranged in said passage for deflecting the fluid toward the walls of said passage before permitting the fluid to pass into contact with said valve.

60. In a sound reproducer, the combination with 35 a flexible valve yieldingly restrained at one point and mounted to oscillate as a whole about an axis spaced from said point, of means arranged to oscillate said valve about said axis by and in accordance with a sound record.

61. In a sound reproducer, the combination with 40 a flexible valve yieldingly restrained at one point and mounted to oscillate as a whole about an axis spaced from said point, of means arranged to flex said valve between said point and said axis and to oscillate said valve about said axis by and in accordance with a sound record.

62. In a sound box, the combination with 45 sound reproducing means, of a fluid deflector and equalizer comprising an outer ring, an inner ring, a screen having its edges clamped between said rings, and a conical deflector secured to said outer ring.

63. In a sound box, the combination with 50 a hollow casing, of sound reproducing means carried thereby, a deflector arranged in said casing, a ring supporting said deflector and carried by said casing, a second ring, and a screen clamped between said rings.

64. In a sound box, the combination with 55 a hollow casing, of sound reproducing means carried thereby, a ring removably mounted in said casing, a deflector carried by said ring, and a screen carried by said ring.

65. In a sound box, the combination with 60 a hollow casing provided with an inlet and with an outlet, of sound reproducing means arranged within said casing, a ring mounted in said casing between said sound reproducing means and said inlet, a deflector carried by said ring, and a screen carried by said ring.

66. In a sound box, the combination with 65 a hollow casing provided with an inlet and with an outlet, of sound reproducing means arranged within said casing, a ring mounted in said casing between said sound reproducing means and said inlet, a deflector carried by said ring, and a screen carried by said ring.

67. In a sound box, the combination with 70 a hollow casing having an inlet and an outlet, of sound reproducing means in said casing, a deflector in said casing between said sound reproducing means and said inlet and tapering toward said inlet, and a screen between said sound reproducing means and said deflector.

68. In a sound box, the combination with 75 means providing a passage for a fluid, of a flexible valve co-operating therewith for producing sound waves in said fluid, said valve arranged to be balanced in its action by said fluid.

69. In a sound box, the combination with 80 a valve seat provided with a port, of a flexible valve mounted to oscillate about an axis toward and away from said seat and controlling said port, yielding means arranged to oppose the movement of said valve away from said seat at a point spaced from said axis, and means to oscillate said valve in accordance with sound waves, said port being arranged between said axis and said point.

70. A sound box comprising a valve seat provided with a port, a flexible valve arranged to control said port and restrained at points upon opposite sides respectively of said port, and means to flex said valve between said points in accordance with a sound record.

71. A sound box comprising a valve seat 125 provided with a port, a flexible valve mounted to oscillate about an axis and restrained at a point spaced from said axis to produce sound waves, and means to limit the oscillation of said valve.

72. A sound box comprising a valve seat provided with a port, a flexible valve mounted to oscillate about as axis to produce sound waves, and yielding means arranged to engage said valve at a point spaced from said axis to limit the oscillation of said valve.

In witness whereof I have hereunto set my hand this 7th day of March, A. D., 1906.

WILBURN N. DENNISON.

Witnesses:

ALSTON B. MOULTON,
ALEXANDER PARK.