

1,024,697.

Patented Apr. 30, 1912.

Fig. 1

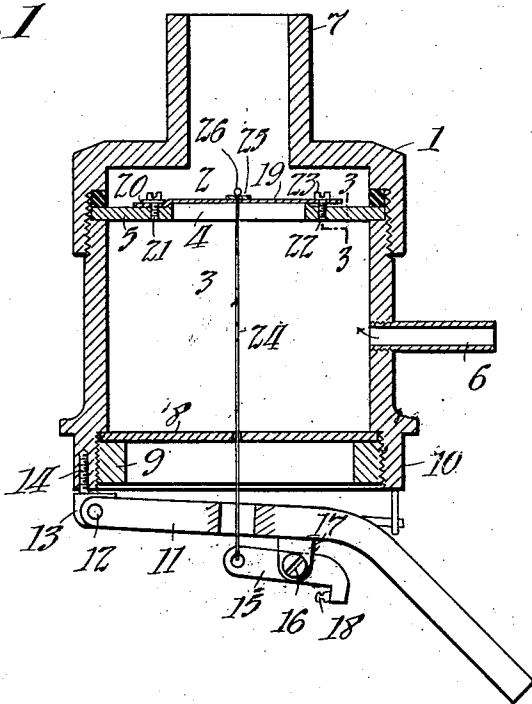


Fig. 2

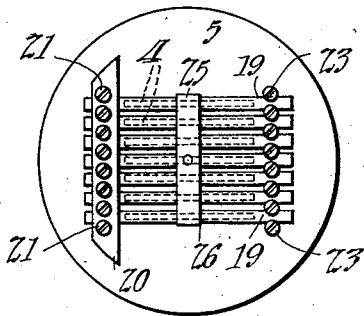
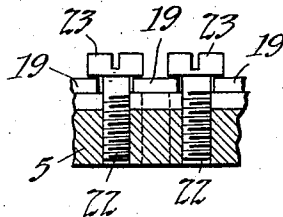


Fig. 3



Witnesses:

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by Frank L. Brey
Att.

UNITED STATES PATENT OFFICE.

ALEXANDER N. PIERMAN, OF NEWARK, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THOMAS A. EDISON, INCORPORATED, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH-REPRODUCER.

1,024,697.

Specification of Letters Patent.

Patented Apr. 30, 1912.

Application filed September 18, 1909. Serial No. 518,415.

To all whom it may concern:

Be it known that I, ALEXANDER N. PIERMAN, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonograph-Reproducers, of which the following is a description.

My invention relates to phonograph reproducers of the pneumatic type, or, generally speaking, of the type in which undulations corresponding to sound waves are impressed upon a current of any suitable moving fluid by the operation of a suitable valve through which the fluid is allowed or caused to pass, the valve being operated in accordance with the sound waves as by connection with a reproducing stylus tracking a record groove. I filed in the United States Patent Office an application Serial No. 493,281 on May 1, 1909 in which I disclose and claim broadly a phonograph reproducer of this general type in which the valve or vibratory member or members were of minimum mass, whereby defects due to inertia and momentum of parts are largely avoided. In the application referred to, thin, reed-like members are interposed in the path of the moving fluid current and are vibrated in accordance with sound vibrations to be reproduced to set up corresponding undulations in the moving fluid current passing through the sound box. Specifically, in the application referred to a port plate is provided having one or more slit-like ports therein upon which are seated the thin, reed-like members which are placed under tension and secured rigidly to the port plate at both ends. These members are joined together and flexed by connection with the stylus to vary the extent of opening of the ports to a greater or less extent.

My present invention constitutes an improvement upon the invention of the application referred to, the improvement residing in the manner of mounting the elastic reed-like members upon the port plate.

The object of my invention is to improve the quality of sound reproduction of a device of this character.

Reference is hereby made to the accompanying drawings forming part of this specification, in which the same reference

numerals are used throughout to denote corresponding parts, and in which—

Figure 1 is a side elevation, partly in section, of a sound reproducer embodying my invention. Fig. 2 is a plan view of the port plate with the valve members secured thereto. Fig. 3 is an enlarged cross section on line 3—3 of Fig. 1.

Referring to the drawings, the sound-box 1 may be formed with the two chambers 2 and 3 communicating through the ports 4 in the port plate 5, air being conducted into the chamber 3 by means of a conduit 6 and escaping from chamber 2 through the reproducer neck 7. The chamber 3 is closed by the closure 8 which is secured in position against the shoulder of the circular wall of the chamber 3 by means of the ring 9 which is screwed into the depending flange 10 of the sound box to hold the closure 8 tightly in position. The floating weight 11 is pivotally mounted at 12 to the block 13 which is mounted as by screw 14 on the lower surface of the depending flange 10. The stylus lever 15 is pivotally mounted at 16 to the lugs 17 depending from the floating weight, and the said stylus lever is provided with stylus 18. All of the above mentioned parts are common.

The ports 4, which are preferably in the form of lengthened slits are normally closed by means of the flexible reed-like members 19 seated upon the same. These members are very thin and preferably are formed of a light metal such as aluminium. These reeds are secured in position on the port plate by the following means:—Preferably, the strip 20 is placed transversely across the ends of reeds 19 beyond one extremity of the ports 4 and screws 21 are screwed through the strip 20 and into the port plate 5, the shanks of the screws extending between the reed-like members 19 and the heads of the screws each overlapping one of the said reeds 19 on each side of the same. These screws are screwed down tightly to secure the reeds 19 rigidly to the port plate at that end of the said reeds. By this means a very secure connection is made which is at the same time detachable. It is, of course, obvious that members 19 might be secured permanently to the plate 5 at one end by any other suitable means, as by soldering the

same at that end to the port plate. At the other end of the reeds 19 screws 22 are screwed in to the port plate 5 in the same relation to the reeds 19 as are the screws 21 at the other end of the same; that is to say, each reed 19 has one screw 22 on each side of the same, the heads 23 of the screws 22 each overlapping one of the said reeds 19 on each side of the same. Screws 22, however, are not screwed in sufficiently far to bind reeds 19 rigidly to port plate 5 at their end of the reeds. Instead, screws 22 are so adjusted that reeds 19 may slip or move somewhat longitudinally under heads 23 of screws 22 when the said reeds 19 are flexed.

Stylus 18 is connected to reeds 19 by any suitable means, as the link 24, which is connected at its lower end to the tail of stylus lever 15, and at its upper end to the reeds 19. Preferably, reeds 19 are fastened together as by means of strip 25 which is soldered or otherwise secured to the same transversely of the same midway between screws 21 and 22. Link 24 is secured to this strip 25. I prefer to use the construction shown in the drawings in which link 24 passes through a hole in strip 25 and is provided on the upper side thereof with a button or head 26 so that the upward movement of stylus 18 in tracking the record groove pulls the reeds 19 downwardly at their central points, the pressure of air or other fluid passing from chamber 3 through ports 4 into chamber 2 tending to constantly keep the reeds 19 flexed upwardly. In the operation of the device, reeds 19 operate entirely by flexure in accordance with the sound vibrations to be reproduced, the reeds being held rigidly at the one end and slipping slightly forward and back under screw heads 23 at the other end, the reeds flexing symmetrically under the opposing forces of the current fluid and the central pull of the link 24 on the same.

It is obvious that the proportions of parts as shown could be changed without departing from the spirit of the invention, and that, if desired, the direction of flow of the fluid could be reversed and the valve seated upon the opposite side of port plate 5 from that indicated with appropriate connection to the stylus lever, and that also, if desired, the reed-like members could be seated upon the lower side of port plate 5 instead of upon the upper side as indicated in the drawings.

Where, in the claims, I have referred to members seated upon the ports, it is to be understood that I do not limit myself to the seating of the members upon the upper surface of the port plate merely.

The valve as constructed is exceedingly sensitive and copies the vibrations of the stylus with amplification and with great faithfulness. Any desired number of ports

and corresponding reeds may be used, the loudness of the sound reproduced varying with the number of reeds employed.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

1. In a sound reproducer, the combination of a hollow body containing chambers communicating through a plurality of ports, members of elastic material seated upon said port, means for holding rigidly one extremity of said members, means located at the other extremity of said members for preventing all except longitudinal movement of said extremity, and permitting longitudinal movement, and means for flexing the said members in accordance with sound vibrations, substantially as described.

2. In a sound reproducer, the combination of a hollow body containing chambers communicating through a port, a member of elastic material seated upon and covering said port, means for holding rigidly one extremity of said member, means located at the other extremity of said member for restricting all movement of said extremity to movement in the plane normally occupied by said member and means for flexing said member in accordance with sound vibrations, substantially as described.

3. In a sound reproducer, the combination with a sound box and means for conveying a fluid therethrough, of a vibratory thin strip interposed in the path of said fluid and held rigidly at one end, means located adjacent the other end of said strip for restricting all movement of said end to movement in the plane normally occupied by said strip, and means for flexing said strip in accordance with sound vibrations to be reproduced, to produce corresponding undulations in said fluid, substantially as described.

4. In a sound reproducer, the combination with a sound box and means for conveying a fluid therethrough, of a vibratory thin strip interposed in the path of said fluid, means holding said strip rigidly at one end, means located adjacent the other end of said strip for restricting all movement of said strip to movement longitudinal of said member, and means acting upon said strip substantially midway between said holding and restricting means for causing the same to flex in accordance with sound vibrations to be reproduced, to produce corresponding undulations in said fluid, substantially as described.

5. In a sound reproducer, the combination with a sound box and means for conveying a fluid therethrough, of flexible means interposed in the path of said fluid for producing undulations therein by its flexure, means permitting slip of said flexible means at one end thereof in the plane normally occupied

by said flexible means, but preventing all other movement of said end, and means for flexing the said flexible means in accordance with sound vibrations, substantially as described.

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6. In a sound reproducer, the combination with a port plate provided with a port, of a thin flexible strip seated upon and covering said port, means holding said strip adjacent the ends constructed to permit longitudinal movement of said strip past said holding means during flexure but to prevent all other movement of said strip adjacent its ends, and means for flexing said strip in accordance with sound vibrations, substantially as described.

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7. In a sound reproducer, the combination with a port plate provided with a port, of a thin reed-like member of elastic material, seated upon and covering said port, means for securing said member rigidly at one end, means for preventing the lifting of the other end of said member from its seat but permitting longitudinal movement thereof past

said preventing means, and means for flex- 25
ing said member in accordance with sound vibrations, substantially as described.

8. In a sound reproducer, the combination with a port plate provided with a port, of a thin reed-like member of elastic material, 30
seated upon and covering said port, means for securing said member rigidly at one end, a headed body inserted in said port plate adjacent the other end of said member and having its head bearing upon said member 35
with sufficient force to prevent lifting of the same from its seat, but to permit longitudinal movement thereof under said head, and means for flexing said member in accordance with sound vibrations, substantially as de- 40
scribed.

This specification signed and witnessed this 16th day of September 1909.

ALEXANDER N. PIERMAN.

Witnesses:

DYER SMITH,

JOHN M. CANFIELD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."