

A. N. PIERMAN.
 PHONOGRAPH REPRODUCER.
 APPLICATION FILED SEPT. 18, 1909.

991,361.

Patented May 2, 1911.

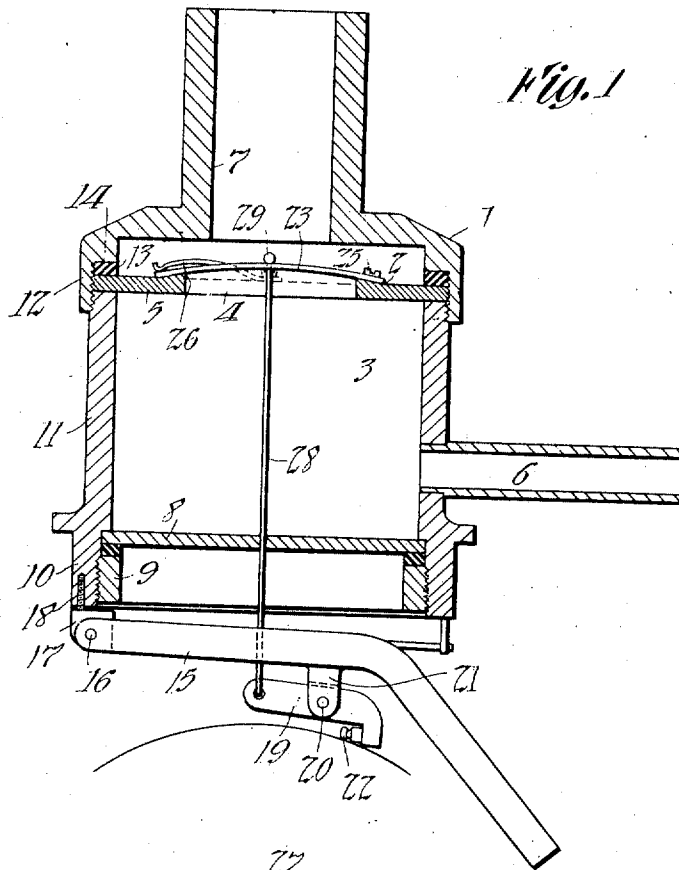
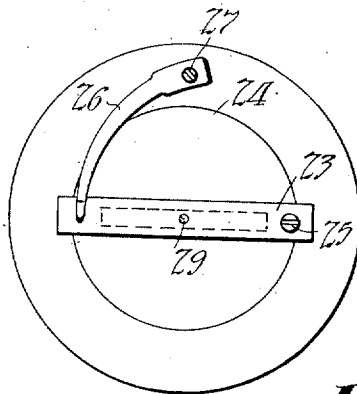


Fig. 2



Witnesses:

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 by Frank T. Dyer
 Atty.

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.

991,361.

Specification of Letters Patent.

Patented May 2, 1911.

Application filed September 18, 1909. Serial No. 518,413.

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.

The object of my invention is to improve the quality of sound reproduction of a device of this character by the production of a novel valve structure, the valve being extremely thin, very flexible, and of inconsiderable weight, so that defects due to momentum and inertia of parts are avoided and a more faithful reproduction obtained.

Other objects of my invention are the construction of parts and combinations of elements necessary or desirable for the attainment of the above mentioned object, as more particularly pointed out in the following specification, and claimed in the appended claims.

Reference is hereby made to the accompanying drawings forming part of this specification, illustrating a preferred embodiment of my invention, in which—

Figure 1 is a central vertical section through a phonograph reproducer embodying my invention, certain parts being shown in side elevation; and Fig. 2 is a plan view of the port plate with the valve mounted thereon and covering the port.

Referring to the drawings, the sound box 1 may be formed with two chambers 2 and 3 communicating through the port 4, in the port plate 5, air being conducted into the chamber 3 by means of a conduit 6 and escaping from the chamber 2 through the reproducer neck 7. The chamber 3 is closed by the closure 8 which is secured in position against a shoulder formed in the circular wall of the chamber 3 by means of the ring 9 which is screwed into the depending flange

10 of the cylinder 11 which is screwed within the depending flange 12 formed integral with the reproducer neck 7. The port plate 5 is secured in position between the upper surface of cylinder 11 and gasket 13, which is forced into close contact with shoulder 14 within flange 12 when members 11 and 12 are screwed together. The floating weight 15 is pivotally mounted at 16 to the block 17, which is mounted as by screw 18 on the lower surface of the depending flange 10. The stylus lever 19 is pivotally mounted at 20 to the lugs 21 depending from the floating weight 15 and the said stylus lever is provided with stylus 22, all of the above mentioned parts being common.

The port 4, which is preferably in the form of a lengthened slit as shown, is normally closed by means of the valve member 23 seated upon the port plate 5 to cover the port 4. The valve member 23 is extremely thin, being preferably formed of any suitable sheet metal rolled to a thickness of from one to two one-thousandths of an inch. I have found it impossible to cause material of such excessive thinness to lie evenly upon a flat surface, since the tendency to curl or become deformed locally out of contact with the surface upon which it is placed is unavoidable. Such a thin film or sheet can, however, be placed upon a convexly curved surface and can be stretched or held under pressure upon the same so that it will conform closely to the curved surface and fit accurately upon the same without deformation throughout its whole area. I have applied this principle to the thin valve member of my present invention, and am enabled thereby to make use of a valve member having the characteristics above described. Accordingly, the port plate 5 is formed upon its upper surface with a regularly curved convex surface 24, this curved surface preferably having the periphery of a circle, the slit or lengthened port 4 having its upper orifice located within the same and extending along the diameter of the circle. The valve member 23 is secured to the port plate at one of its ends by any suitable means, as the screw 25 which is located at one edge of the swelling or curve 24. The other end of valve 23 rests upon the curved surface 24 beyond the end of port 4, yielding means as the spring 26 secured to port plate 5 by any suitable means as the screw 27 being em-

played to press upon this end of valve 23 and normally retain the same in position upon its seat. Spring 26 tends to counter-balance the pressure of the air or other fluid admitted into chamber 3 from conduit 6, so that when the fluid is admitted the valve is raised slightly from its seat to allow a slight normal leak of the fluid from the port. Spring 26 also performs the function of overcoming the tendency of the thin material of which valve 23 is formed to curve or become distorted, and holds the same accurately in contact throughout its length with its curved seat. Valve 23 is connected by means of link 28 to the tail of stylus lever 19, whereby the movements of stylus 22 in tracking the sound record to be reproduced are accurately reproduced by the vibration of valve 23, the extent of the opening of port 4 being varied according to undulations impressed upon the current of fluid moving through port 4, these undulations corresponding faithfully with the undulations of the record groove being tracked by the stylus 22.

In the construction shown, link 28 extends through a central orifice in valve 23 and is connected thereto by the ball or upset end 29 on the top of link 28, forming a one-way connection, although it is obvious that link 28 might be rigidly connected to valve 23 if desired. With the construction shown, the movement of stylus 22 over elevations in the sound record results in the depression of valve 23 against the fluid pressure, while the movement of stylus 22 in tracking depressions in the sound record permits the fluid pressure upon the lower surface of valve 23 to raise the same to the greatest extent permitted by ball 29.

It is obvious that, if desired, suction might be employed instead of compression for carrying the moving fluid through the sound box, in which case, curved surface 24 would be located upon the lower surface of plate 5 and valve 23 seated thereupon. It is also obvious that, if desired, a plurality of ports 4 might be employed, each with its corresponding valve 23.

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

1. In a phonograph reproducer, the combination with a body containing chambers communicating through a port, of a port plate in which said port is formed, a portion of one surface of said plate adjacent to an opening of said port being curved, an extremely thin valve member of elastic material seated snugly upon said curved surface and covering said port, and means for

vibrating said member to uncover the said port to a greater or less extent in accordance with sound vibrations, substantially as described.

2. In a phonograph reproducer, the combination of a port plate having a regularly curved surface and having a port extending therethrough with one orifice thereof situated in said surface, and a valve member seated upon said port and conforming closely to said surface, substantially as described.

3. In a phonograph reproducer, the combination with a body containing chambers communicating through a port, of a port plate in which said port is formed, a portion of one surface of said plate being regularly curved, one orifice of said port being situated in said curved surface, an extremely thin valve member of elastic material seated upon said surface and conforming closely thereto when at rest, and covering said port, and means for flexing said member to uncover said port to a greater or less extent in accordance with sound vibrations, substantially as described.

4. In a phonograph reproducer, the combination with a body containing chambers communicating through a port, of a port plate in which said port is formed, a portion of one surface of said plate being regularly curved, one orifice of said port being situated in said curved surface, an extremely thin valve member of elastic material seated upon said surface and conforming closely thereto when at rest, and covering said port, means for introducing fluid under pressure within one of said chambers, means tending to hold said valve on its seat against the pressure of said fluid, and means for flexing said member to uncover said port to a greater or less extent in accordance with sound vibrations, substantially as described.

5. In a phonograph reproducer, the combination of a port plate having one surface formed with a regularly curved portion and having a port extending therethrough with one orifice thereof situated in said curved surface, an extremely thin flexible valve member seated upon said port and conforming closely to said surface, means securing said member in position, and yielding means tending to hold said member on its seat, substantially as described.

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

ALEXANDER N. PIERMAN.

Witnesses:

DYER SMITH,

JOHN M. CANFIELD.