

A. N. PIERMAN.
SOUND REPRODUCER.
APPLICATION FILED APR. 13, 1907.

1,034,031.

Patented July 30, 1912

Fig. 1

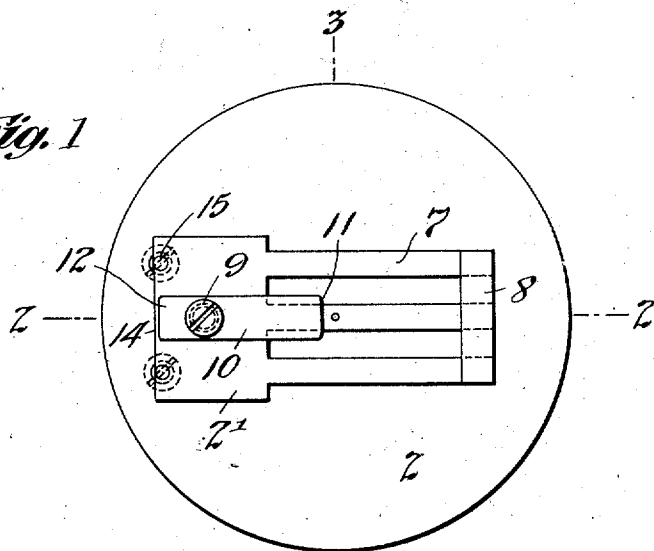


Fig. 2

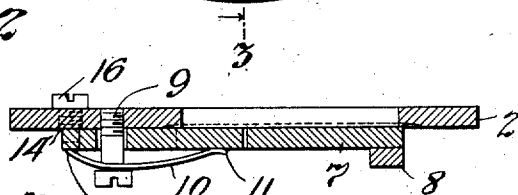


Fig. 3

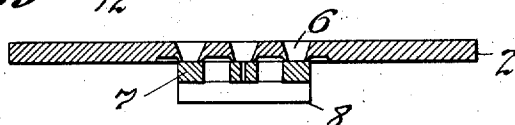
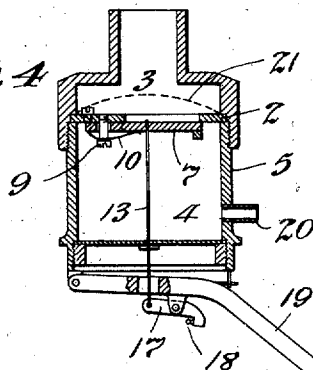


Fig. 4



Witnesses:
Frank D. Lewis
H. H. Dyke

Inventor:
Alexander A. Pierman
by Frank L. 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.

SOUND-REPRODUCER.

1,034,031.

Specification of Letters Patent.

Patented July 30, 1912.

Application filed April 13, 1907. Serial No. 367,917.

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 Sound-Reproducers, of which the following is a description.

My invention relates to sound reproducers of the fluid pressure operated type, and has for its object the provision of means whereby improved results in the reproduction of sounds will be secured.

My invention consists of an improved form of valve for varying the rate of flow of elastic fluid through the ports by which the resonating and equalizing chambers of the reproducer communicate, and in improved means for supporting the valve referred to, and in the parts, improvements and combinations which are hereinafter pointed out and claimed.

In order that my invention may be better understood attention is called to the accompanying drawings forming a part of this specification, wherein—

Figure 1 is a bottom plan view of the port plate; Fig. 2 is a cross section on the line 2—2 of Fig. 1; Fig. 3 is a cross section on line 3—3 of Fig. 1 and Fig. 4 is a vertical cross section of a reproducer embodying my invention.

Throughout this specification and in all the figures of the drawings, the same numerals of reference are used to designate corresponding parts.

The port plate or partition 2 is interposed between the resonating chamber 3 and the equalizing chamber 4 of the reproducer 5, which is designed to be borne upon the carrying arm of the phonograph. In this plate are formed ports 6 whose walls preferably converge toward the lower face of the said plate. The improved valve has the form of a preferably rigid plate the greater part of whose length is slotted to form parallel tongues 7 the number of which corresponds with the number of ports in the port plate 2 with which the valve plate coöperates. The ends of the tongues 7 are connected by a bridge 8 which is secured thereon preferably by shellac or cement. This bridge keeps the valve plate flat and prevents separate vibrations in the individual

valve tongues. The valve plate and bridge are preferably made of a light metal, as aluminum. I have obtained very favorable results by the use of valves having three tongues of the relative proportions illustrated. In my former pending applications above identified the valve plate is shown rigidly attached to the port plate and operated to open and close the ports by flexing. In the valve disclosed herein I have done away with the rigid fastening of the valve to the port plate and with the flexure of the valve and the resistance which is due thereto. The present valve has all the advantages of a hinged valve or a flexible valve without the disadvantage of the friction which is necessarily present in a hinged or a flexible valve. To this end I provide positioning means so that the valve will always remain in position on the face of the port plate, and I also provide resilient supporting means to press the valve against the port plate, and these resilient supporting means are so positioned and proportioned that the valve is pressed against the port plate more forcibly toward the end thereof opposite the tongue 7 than elsewhere. The valve being supported in this manner when it is opened by the pressure of elastic fluid thereon and by the pull of the stylus, will turn upon its end opposite the tongues 7 as a fulcruming line.

The particular means which is illustrated in the drawings for resiliently supporting the valve plate is the following: A headed screw 9 is passed through an opening in a leaf spring 10 and is then passed loosely through an opening in the valve plate 2, and secured in a threaded opening in the port plate 2. As shown, the opening in the spring 10 is formed at one side of the middle thereof and the opening in the valve plate through which the screw passes is close to that end of the valve opposite the tongues 7. When the parts are thus assembled the ends of the spring bear against the valve plate and press it against the port plate. The end 11 of the spring which is longer than the end 12, may, if desired, be made to press against one of the tongues 7 of the valve plate as shown. An opening is made in one of the tongues 7 for the reception of the link 13 which connects the valve with the stylus lever. As will be evident from Figs. 1 and 2

of the drawings, the upward pressure of the spring 10 while applied to the entire surface of the valve which contacts with the port plate, is greatest toward the left hand end of the valve plate, and when downward pressure is applied to the valve by the link connected to the stylus lever and by air pressure thereon, the valve will be depressed and will turn on the line 14 at its left hand edge as a fulcruming line, and the only friction or flexure will be in the spring 10 which is initially adjusted by means of the screw 9 to counterbalance the pressure due to gravitation and atmospheric pressure.

Any form of positioning means to keep the valve plate and the port plate in the same relative position may be used. I preferably provide one of the said plates with projections and the other with apertures in which the said projections are received. These positioning means I place as near as possible to the fulcruming line 14 where the motion of the valve plate is least. The positioning means which I have shown in the drawings comprises studs 15 formed on screws 16 which screws pass through the port plate 2, the studs 15 projecting therebelow and fitting into openings in the valve plate 2'. These openings are made slightly larger in diameter—about .001"—than the studs 15, and with the studs serve to position the valve plate upon the port plate, but do not attach it thereto. In order to avoid cushioning of the valve plate upon the port plate, I cut away the material around the slots 6 leaving only knife edges for the valve to rest upon.

As shown in Fig. 4, the link 13 passes through the bottom of the equalizing chamber 4, and is connected to the stylus lever 17 carrying the stylus 18. The stylus lever is pivoted upon the floating weight 19. A nipple 20 is attached at the side of the equalizing chamber and a tube leading to a suction apparatus may be connected thereto. A dirt screen 21 is provided to prevent dust and dirt from getting into the valve.

Of course pressure instead of suction may be utilized for operating the valve, and if pressure greater than atmospheric pressure were used, the port plate 2 and the valve plate 2' assembled as shown will be reversed so as to be properly actuated by pressure within the chamber 4, as will be understood.

I claim—

1. In a sound reproducer a port plate, a valve plate in contact with the said port plate, resilient means for pressing the said valve plate against the port plate, said means constituting the sole means of attachment between said plates, and a stylus connected to said valve plate, substantially as set forth.

2. In a sound reproducer a port plate, a valve plate in contact with the said port plate, resilient means for pressing the said

valve plate against the port plate more forcibly at one end of the said valve plate than elsewhere, said resilient means constituting the sole means of attachment between said plates, and a stylus connected to said valve plate, substantially as set forth.

3. In a sound reproducer, a port plate, a valve plate bodily movable away from the said port plate, means for positioning the one plate with respect to the other, resilient means for holding the plates in contact, said means constituting the sole means of attachment between said plates and a stylus connected to said valve plate, substantially as set forth.

4. In a sound reproducer, a port plate, a valve plate, and means for resiliently supporting the valve plate in contact with the port plate so that it may turn bodily upon one of its edges, substantially as set forth.

5. A sound reproducer comprising a resonating chamber and an equalizing chamber communicating through ports, a bodily movable valve normally closing said ports, and resilient means for supporting the valve in contact with its seat so that it may turn bodily upon one of its edges, substantially as described.

6. In a sound reproducer, a port plate, a valve plate contacting the same, means for positioning the one plate with respect to the other, an adjusting screw carried by the port plate and passing loosely through an opening in the valve plate, and a leaf spring interposed between the head of said screw and the valve plate, said screw and spring constituting the sole means of attachment between said plates.

7. In a sound reproducer, the combination of a body formed with resonating and equalizing chambers, a port plate interposed between said chambers, a valve plate in contact with said port plate, resilient means for pressing said valve plate against said port plate, said means constituting the sole means of attachment between said plates, and means for operating said valve, substantially as set forth.

8. In a sound reproducer, the combination of a body formed with resonating and equalizing chambers, a plate having ports therein interposed between said chambers, a valve plate provided with tongues covering said ports and contacting said first named plate, means for positioning the one plate with respect to the other, and resilient means for holding the valve plate in contact with the port plate, said last named means constituting the sole means of attachment between said plates, substantially as set forth.

9. In a sound reproducer, a plate having ports therein, a valve plate provided with tongues covering said ports and contacting said first plate, means for positioning the

one plate with respect to the other, and resilient means for holding the valve plate in contact with the port plate with greater force at one end of said valve plate than
5 elsewhere, said last named means constituting the sole means of attachment between said plates, substantially as set forth.

This specification signed and witnessed this 11th day of April 1907.

ALEXANDER N. PIERMAN.

Witnesses:

FRANK L. DYER,
FRANK D. LEWIS.

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

Correction in Letters Patent No. 1,034,031.

It is hereby certified that in Letters Patent No. 1,034,031, granted July 30, 1912, upon the application of Alexander N. Pierman, of Newark, New Jersey, for an improvement in "Sound-Reproducers," an error appears in the printed specification requiring correction as follows: Page 1, line 81, for the word "tongue" read *tongues*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 17th day of September, A. D., 1912.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.

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