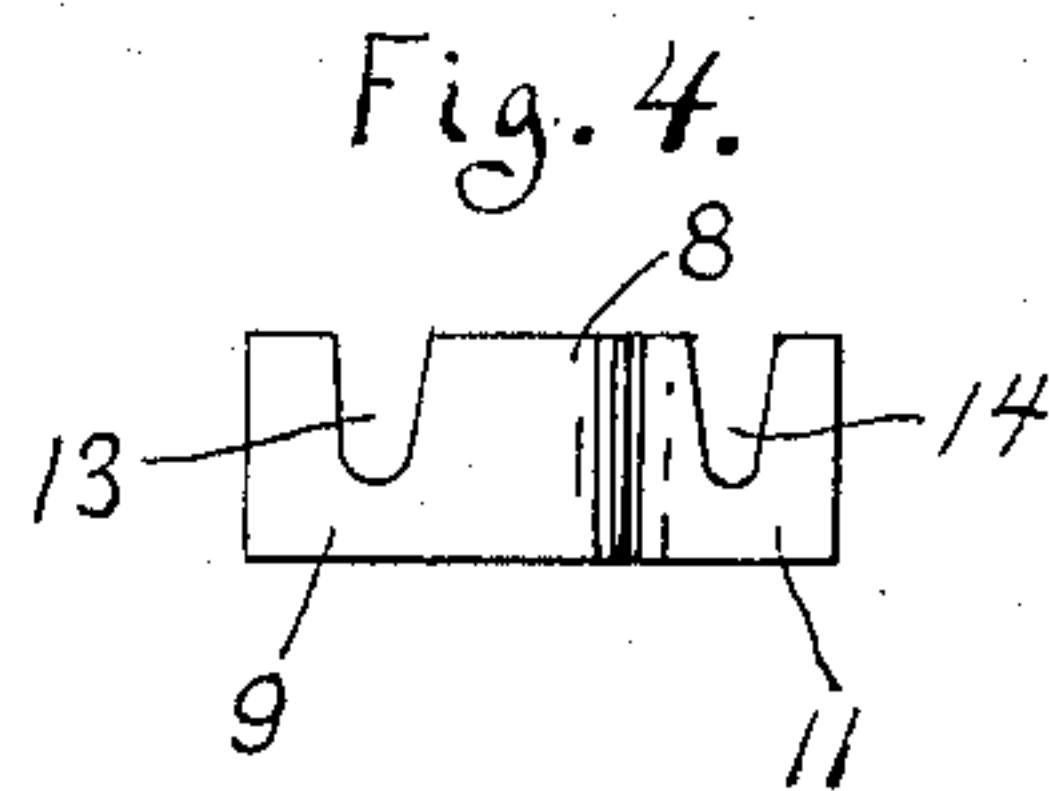
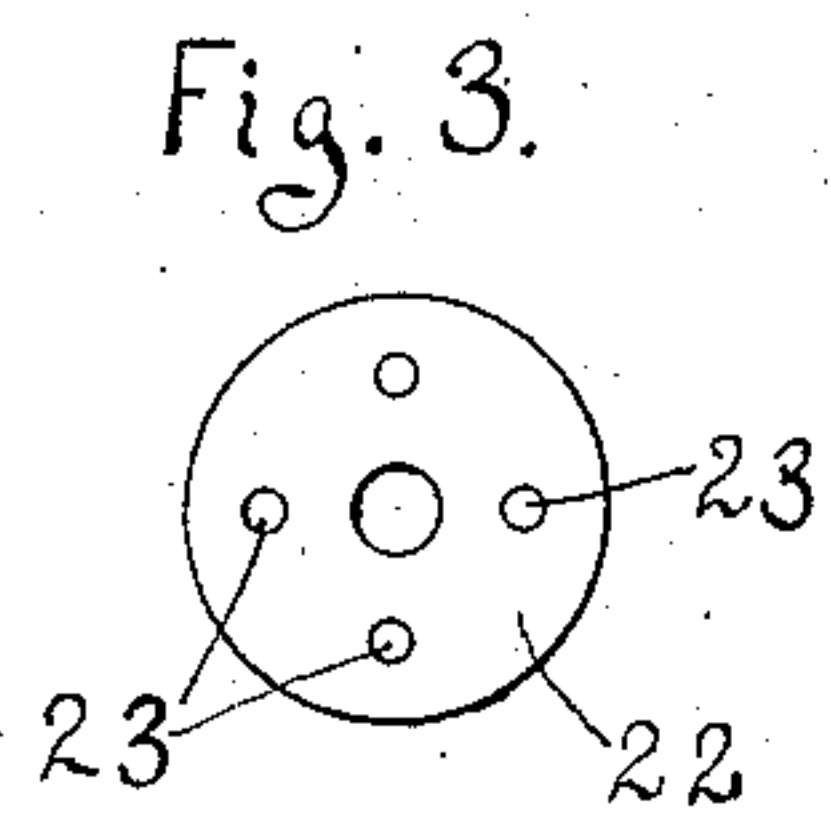
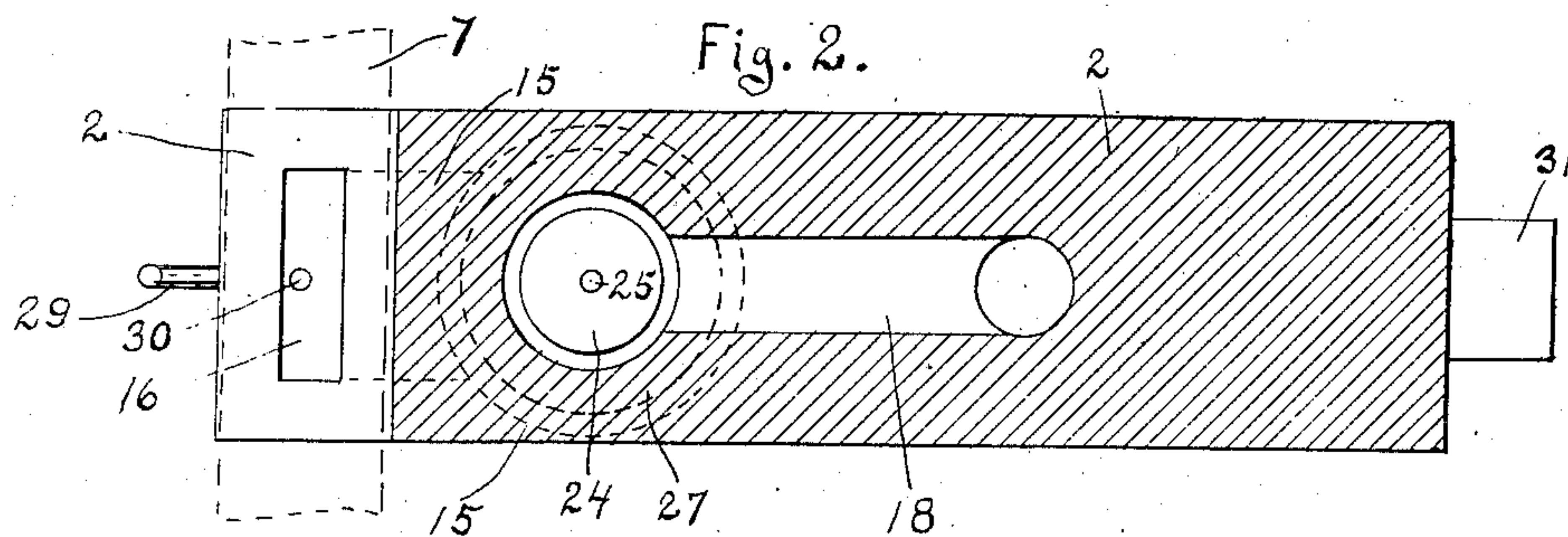
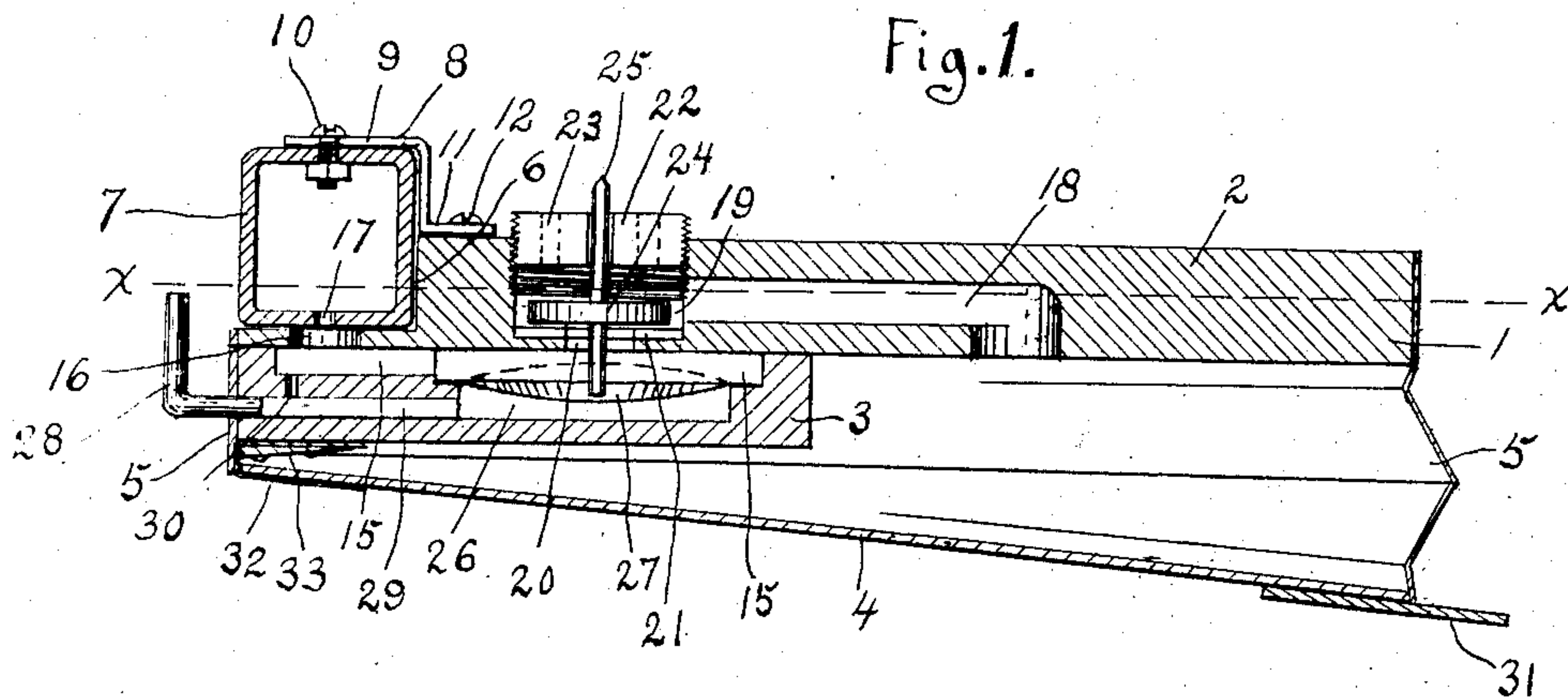


H. M. BROD.
PNEUMATIC FOR AUTOMATIC PIANO PLAYERS.
APPLICATION FILED JAN. 6, 1908.

914,549.

Patented Mar. 9, 1909.



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UNITED STATES PATENT OFFICE.

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PNEUMATIC FOR AUTOMATIC PIANO-PLAYERS.

No. 914,549.

Specification of Letters Patent.

Patented March 9, 1909.

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To all whom it may concern:

Be it known that I, HERBERT M. BROD, a citizen of the United States, residing at Dixon, in the county of Lee and State of Illinois, have invented certain new and useful Improvements in Pneumatics for Automatic Piano-Players; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention has reference to automatic piano players, and relates more particularly to a novel and improved construction of the pneumatics by which the keys of the instrument are operated.

On account of the limited amount of space to be occupied by the automatic mechanism, especially when such mechanism is located within the piano, it is desirable to have the actuating devices formed in as compact a manner as possible, and the chief purpose of my invention is to produce a pneumatic or motor which will occupy a minimum amount of space, and in which the parts which control the action of the pneumatic are located therein.

The construction, arrangement and operation of the mechanism used in my device will be hereinafter more fully set forth.

In the drawings: Figure 1 is a vertical, longitudinal section of my invention. Fig. 2 is a horizontal section through the upper board 2, along the line $x-x$ of Fig. 1. Fig. 3 is a plan view of the plug 22. Fig. 4 is a plan view of the bracket 8.

Similar characters refer to similar parts throughout the several figures.

1 represents the pneumatic, which consists primarily of an upper board 2, a diaphragm-box 3, secured to the lower face of the board 2, a bottom-board 4, hingeably secured to the box 3, and a bellows 5, uniting said top and bottom boards.

At the hinge end of the pneumatic the upper board 2 is provided with a recess 6, to accommodate an air pipe or chamber 7, which is in communication with the main bellows or exhauster of the machine. The pipe 7 is common to all of the pneumatics, except in instruments where such pneumat-

ics are arranged in rows or tiers, in which case one of such air chambers would be provided for each tier.

The pneumatic is attached to the pipe 7 by means of a bracket 8, having an upper plate 9, secured to the pipe 7 by means of a bolt 10, and a lower plate 11 secured to the board 2 by a screw 12. The plate 9 has a transverse slot 13, and the plate 11 is provided with a similar slot 14. This not only permits a lateral adjustment of the pneumatic with reference to the pipe 7, but each pneumatic is independently connected with the pipe, and can be readily detached therefrom by loosening the bolt 10 and screw 12, and slipping the bracket 8 to one side. By reversing the operation the pneumatic can be returned to its former position.

In the upper part of the diaphragm-box 3 is a compartment 15, communicating with the air-pipe 7 through an opening 16 in the upper board 2 and vent 17 in the pipe 7. The opening 16 is of sufficient length to enable the vent 17 to register therewith throughout a considerable lateral adjustment of the pneumatic. The interior of the bellows 5 is also in communication with the compartment 15, through a passage 18 and valve-chamber 19 in the board 2, and opening 20 in a valve-seat 21 between the compartment 15 and chamber 19. The upper part of the valve-chamber 19 is threaded to accommodate a similarly threaded plug 22, having vertical perforations 23. Beneath the plug 22 is a valve 24, provided with a stem 25, the upper part of which has vertical play centrally of the plug 22. The valve 24 is normally supported on the seat 21, closing the opening therein.

Beneath the compartment 15 is a recess 26, in which is supported a diaphragm 27, said recess communicating with a small pipe or nipple 28 through a passage 29. A small vent 30 connects the passage 28 with the compartment 15. The pipe 28 is connected by a tube or pipe with one of the openings in the tracker-board of the device in the usual manner, such last-named parts not being shown in the drawings herein. To the movable end of the lower board 4 is secured a finger 31, positioned so as to actuate the key, or other sound-producing device of the instrument, upon the upward movement of the board 4.

A preferred method of hinging the lower

board to the diaphragm-box is shown in Fig. 1. A hinge 32, which is preferably formed of canvas or similar material, is first secured to the lower face of the box 3 by a cleat 33, and the hinge is then turned downwardly and secured to the lower face of the board 4. The rubber cloth or other fabric of which the bellows 5 is formed unites the boards 2 and 4, by being fastened to the edges of such boards, a portion of such cloth covering the joint of the hinge, and reinforcing the same. By this construction any danger of the hinge tearing loose at the joint is obviated.

In operation, the exhausting devices are actuated to form a partial vacuum in the air-chamber 7, the collapse of the bellows 5 being prevented by the valve 24, closing the opening 20. Upon the opening of the aperture in the tracker-board which corresponds with the pipe 28, atmospheric air is admitted through such pipe and the passage 29 to the recess 26, the pressure of such air raising the diaphragm 27 into the compartment 15, as shown in broken lines in Fig. 1. The upward movement of the diaphragm operates to raise the valve-stem 25, lifting the valve 24 from the seat 21 and seating it against the lower face of the plug 22, closing the openings therein. The exhaust mechanism then operates through the passage 18 to cause the collapse of the bellows 5, drawing the board 4 upwardly, and producing the desired musical sound. Upon the opening in the tracker-board being again closed, the pressure of the air below the diaphragm is relieved through the vent 30, and the diaphragm and valve supported thereby fall to their former positions. Communication between the air-chamber and bellows is thus cut off again, and outside air admitted to the bellows through the plug 22, causing such bellows to extend. It will be obvious that no outside air can be admitted to the bellows 5 while the air-chamber is in communication therewith, by reason of the simultaneous closing of the openings in the plug 22. By reason of the plug 22 being threaded and vertically adjustable in the chamber 19, the seating of the valve 24 against such plug may be hastened or retarded.

It will be seen that my device, including the controlling parts thereof, occupies little more space than the bellows itself has taken up.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is

1. In a device of the class named, an air chamber; a bellows; a central compartment, within said bellows, communicating with said air-chamber in one direction, and in the opposite direction with said bellows; substantially as shown and described.

2. In a device of the class named, an air-

chamber; a bellows; a central compartment, within said bellows, communicating in one direction with said air-chamber, and in the opposite direction with the bellows; and means for interrupting the communication between said compartment and the bellows, substantially as described.

3. In a device of the class named, an air-chamber, a bellows; a central compartment, within said bellows, communicating with said air-chamber in one direction, and in the opposite direction with said bellows; means for interrupting the communication between said compartment and the bellows; and means for admitting outside air to said bellows, substantially as shown and set forth.

4. In a device of the class named, an air-chamber; a bellows; a central compartment, within said bellows, and communicating therewith; means of communication between said compartment and said air-chamber; means for normally closing the communication between said compartment and said bellows; and means for automatically opening said communication, substantially as shown and for the purpose named.

5. In a device of the class named, an air-chamber; a bellows; a central compartment, within said bellows, and communicating therewith; means of communication between said compartment and said air-chamber; means for supplying outside air to said bellows; means for interrupting the communication between said compartment and the bellows; and means for opening the communication between said compartment and bellows, and simultaneously shutting off the supply to said bellows of outside air, substantially as described.

6. A device of the class named, comprising an air chamber a bellows; a compartment, located within said bellows, and adapted to communicate with said air-chamber; a valve-chamber, communicating with said compartment; means for admitting outside air to said valve-chamber; a valve, normally closing the communication between said compartment and valve-chamber; a passage, connecting said valve-chamber with said bellows; and means for suitably actuating said valve, to open the communication between said compartment and the valve-chamber, and simultaneously shut off the supply to said valve-chamber of outside air, substantially as shown and set forth.

7. A device of the class named, comprising an air chamber a bellows; a compartment, located within said bellows, and adapted to communicate with said air-chamber; a valve-chamber, communicating with said compartment, and provided with an inlet for outside air; a valve, normally closing the communication between said compartment and the valve-chamber, and adapted

to simultaneously open said communication and close the inlet for admission of outside air to the valve-chamber; a passage, connecting said valve-chamber with the bellows; a diaphragm, adapted to actuate said valve, to open and close the same; and means for suitably operating said diaphragm, substantially as shown and for the purpose mentioned.

8. A device of the class named, comprising an upper board 2; a diaphragm-box 3, secured to the lower face thereof; a lower board 4, hingeably attached to the box 3; and a bellows 5, uniting the boards 2 and 4; substantially as described.

9. A device of the class named, comprising an air chamber an upper board 2; a diaphragm-box 3, secured to the lower face thereof; a lower board 4, hingeably attached to the box 3; a bellows 5, uniting the boards 2 and 4; and means for removably attaching the board 2 to the air-chamber, substantially as shown and for the purpose mentioned.

10. In a device of the class named, the combination with an air-chamber of an upper board 2, adapted to be attached thereto, and provided with a valve-chamber 19 and passage 18; a diaphragm-box 3, secured to the lower face of the board 2, and provided with a compartment 15, communicating with said valve-chamber, and also communicating with said air-chamber; a lower-board 4, hingeably secured to the box 3, and provided with a finger 31; and a bellows 5, uniting

the boards 2 and 4, substantially as shown and described.

11. In a device of the class named, the combination with an air-chamber of an upper board 2, adapted to be attached to said air-chamber, and provided with a valve-chamber 19 and passage 18; a diaphragm-box 3, secured to the lower face of the board 2, and provided with a compartment 15, communicating with said valve-chamber, and adapted to be connected with said air-chamber; a lower board 4, hingeably secured to the box 3, and provided with a finger 31; a bellows 5, uniting the boards 2 and 4; a perforated plug 22, supported in the upper part of the chamber 19, so as to be vertically adjustable therein; a valve 24, in the valve-chamber 19, normally closing the communication between said valve-chamber and the compartment 15, and adapted to open such communication and simultaneously close the openings in the plug 22; a diaphragm 27, in the bottom of the compartment 15, adapted to actuate the valve 24; and means for introducing outside air beneath said diaphragm, substantially as shown and for the purpose named.

In testimony whereof, I affix my signature, in presence of two witnesses.

HERBERT M. BROD.

Witnesses:

W. N. HASKELL,
T. M. FARLEY.