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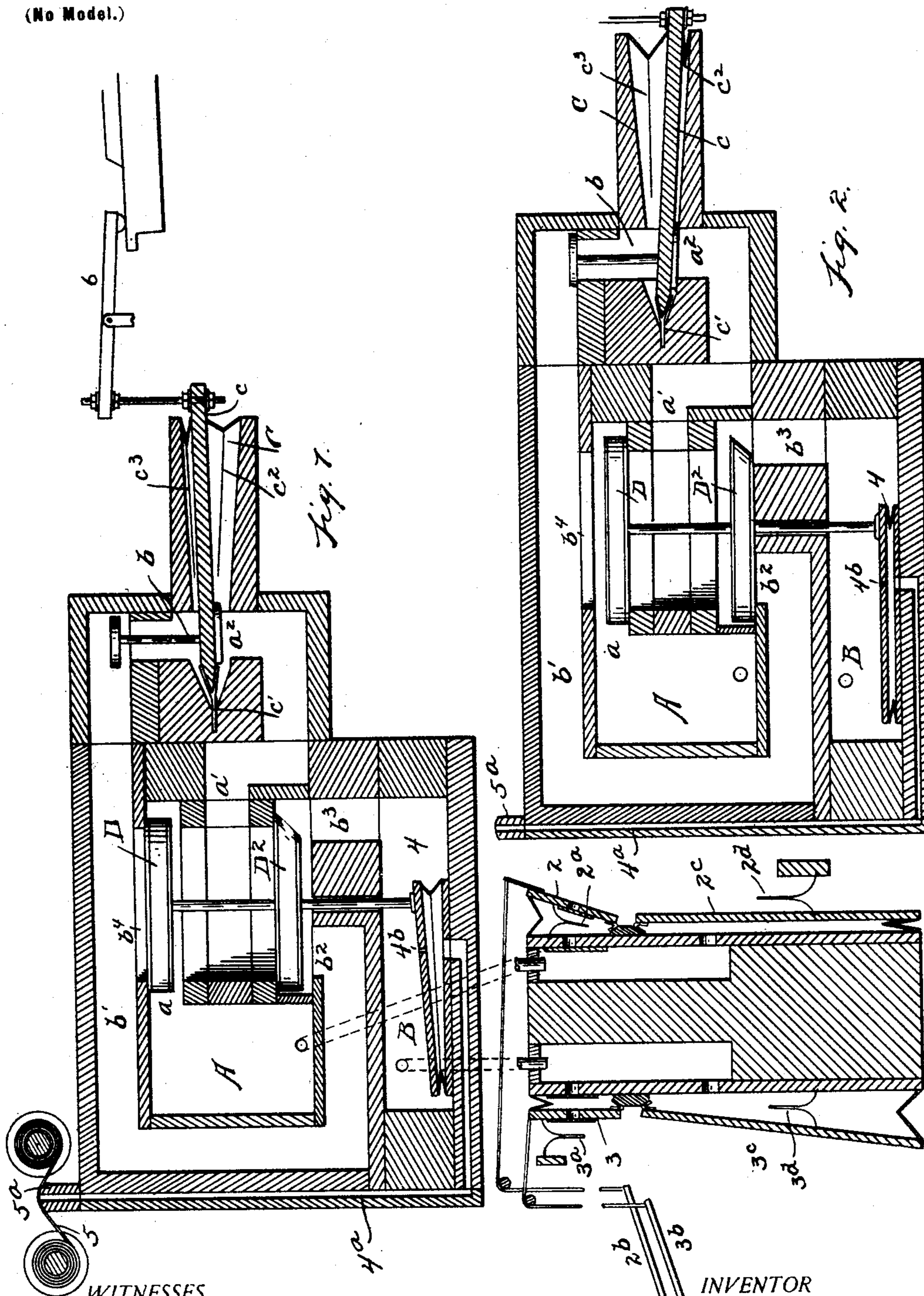
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PNEUMATIC SELF ACTUATOR FOR MUSICAL INSTRUMENTS.

(Application filed May 31, 1900.)

(No Model.)



WITNESSES
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PNEUMATIC SELF-ACTUATOR FOR MUSICAL INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 671,239, dated April 2, 1901.

Application filed May 31, 1900. Serial No. 18,494. (No model.)

To all whom it may concern:

Be it known that I, HENRY SCHWESINGER, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Pneumatic Self-Actuators for Musical Instruments; and I 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 pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to automatical musical instruments, and has for its object an improvement in that class of auxiliary appliances which are used to actuate the sound-producing parts of a musical instrument.

In the class of instruments to which the invention applies the key of a musical instrument is actuated or struck by a hammer that is itself actuated by a movable bellows-board, and the bellows-board is actuated by impulses given to it by air forced into the bellows from a primary actuating-bellows, to which motion is given by any suitable instrumentality. The instrumentality used for producing the blast of air may be the foot, the hand, or power-actuated mechanism. The blast of air is common to a large number of the minor bellows that actuate the hammer and is admitted to the minor bellows through an opening fitted with a valve, which is actuated, and the opening is closed at times and open at other times to produce the strokes of the hammer properly for the sounding of the musical note that corresponds to the particular hammer. The opening and closing of the valve is regulated by an air impulse that is either forced or drawn through a perforated sheet of paper, the perforations in which are properly located to cause the valves of the complete instrument to respond in order and in time to induce the proper musical vibrations of the instrument.

In the drawings, Figure 1 is a sectional elevation of a single one of a number of hammer-actuating devices which are assembled to produce the complete instrument. In connection with Fig. 1 is shown, on a smaller scale, the main actuating-bellows, which is shown in this case as arranged to be actuated by pedals.

Fig. 2 shows in sectional elevation the same hammer-actuating parts which are shown in Fig. 1; but the position of the parts is different.

In this improvement both blast and suction forces are utilized at the same time, the blast being arranged to engage one side of the bellows-board, and the draft or suction bellows empties the other side, so that the blast is not resisted by being compelled to drive air from the chamber at the opposite side of the board, and the actions are quicker and stronger.

In the drawings, A indicates an air-trunk which is common to all the hammer-actuating or secondary bellows, and B indicates a second air-trunk, also common to all of the hammer-actuating or minor bellows.

C indicates the minor or hammer-actuating bellows, of which the bellows-board c is movable, swinging on a hinge c' between substantially air-tight bellows folds c^2 and c^3 . From the air-tank A there is a passage that leads out through the casing of the air-trunk at a past the valve D. This passage may lead in either of two directions past the valve D. When the valve is up in the position shown in Fig. 1, the air coming from the trunk A, to which it is driven by the foot-bellows, leads under the valve D, through the passage a' , and into the chamber a^2 under the bellows-board c . At the same time by the action of the foot-bellows air is drawn from the chamber b , through the passage b' , under the valve D^2 , through the passage b^3 , and into the chamber B. When the positions of the valves D and D^2 are reversed, the blast passes from the air-trunk A over the valve D, through the passage b^4 , into the chamber b above the bellows-board, while the exhaust-air now draws from the chamber a^2 , through the passage a' , over the valve D^2 , through the passage b^3 , into the chamber B. In the first case the passage b^4 is closed by the valve and the passage over the valve D^2 into the passage b^3 is closed by the valve D^2 . In the second position of the valve the passage a under the valve D is closed and the passage b^2 under the valve D^2 is closed.

The main actuating-bellows (shown in the lower part of Fig. 1) consists of two bellows, one for each pedal, one of which, 2, is normally

held open by a spring 2^a and which is closed by the pedal 2^b. The closing of it forces a blast into the trunk A. It also forces a portion of the air that is expelled from the bellows 2 into an expansible storage-tank 2^c, that is normally pressed in a closing direction by the spring 2^d. The bellows and the tank together form a source of supply for the pressure of air in the trunk A. An exhaust-bellows 3 is connected with the pedal 3^b and is normally held shut by the spring 3^a, and its forcible expansion or distension by means of the pedal exhausts air from the trunk B and also from an expansible chamber 3^c, that corresponds with the storage-tank 2^c, but is normally held open by a spring 3^d and furnishes a chamber that aids in exhausting the trunk B. The main bellows are furnished with the proper valves, which in the blast-bellows are arranged to prevent the egress of air that has once entered and in the exhaust-bellows are arranged to prevent the entrance of air, but permit its egress.

The valves D and D² are actuated by an air impulse acting on a small bellows 4, that has its inlet-opening in communication with the passage 4^a, and the passage 4^a leads to a tracker board or channel 5^a, over which the music-sheet passes. The music-sheet 5 is provided with holes through which the air may pass at proper times into the passage 4^a. The bellows in which the inner end of the passage 4^a terminates is in the exhaust B, and an impulse of air is drawn down through the passage 4^a whenever an opening into the music-sheet registers over the open mouth of the passage 4^a. The impulse of air expands the little bellows 4, lifts the valves D and D², and gives the blast-impulse from the trunk A an opportunity to actuate the bellows-board c and lift its free end. The bellows-board c is linked to a hammer 6, which strikes the key of the musical instrument. As soon as the opening in the music-sheet 5 has passed out of register with the passage 4^a whatever air there is in the passage and in the bellows escapes through the little passage 4^b, the bellows 4 collapses, and the valves D and D² drop by gravity. Instantly the free end of the bellows-board c drops, because the blast has now been shifted to the upper side and the exhaust to the lower side.

This form of appliance for actuating the playing parts of a musical instrument, sometimes called a "pneumatic actuator," may be applied to any or most any class of instrument in which the musical note is produced by striking a string or a cord or in opening a passage for the flow of a current of air to pass a reed. It is here shown as applied to the keyboard of a piano; but it is entirely independent of the instrument to which it is applied and requires to be changed only in regard to the hammer part of it to adapt it to any one of several musical instruments.

What I claim is—

1. In a pneumatic actuator, in combination with means for producing a blast-current and an exhaust-current, a hammer-actuating bellows-board, a casing provided with suitable passages and valves, whereby the bellows-board may be actuated simultaneously on one side by the blast action, and on the other side by the exhaust action, substantially as described.

2. In a pneumatic actuator, in combination with a blast-trunk and an exhaust-trunk, a chamber, passages leading to said chamber from the blast-trunk, passages leading from said chamber to the exhaust-trunk, a bellows-board in said chamber arranged to be actuated simultaneously by blast on one side and exhaust on the opposite side, substantially as described.

3. In a pneumatic actuator, in combination with a suitable casing, a blast-trunk and an exhaust-trunk, a passage arranged to register with the holes in the music-sheet, and communicating with the exhaust-trunk, a valve-actuator arranged to be itself actuated by an impulse of air drawn through the music-sheet and said passage, a chamber, a bellows-board therein and passages leading into said chamber from the said blast-trunk and from the said exhaust-trunk, valves controlled by said actuator and arranged to shift the blast and exhaust currents from one side to the other of said bellows-board, substantially as described.

4. In a pneumatic actuator, the combination of a blast-trunk, and means for producing a constant blast-pressure therein, an exhaust-trunk and means for producing a constant exhaust therefrom, a chamber connected by suitable passages with both the blast-trunk and the exhaust-trunk, a bellows-board arranged in said chamber, valves arranged to shift the direction of movements of air-current from one side to the other of said bellows-board, and to bring either side of said bellows-board into operative engagement with blast-pressure air, or with exhaust-pressure air, substantially as described.

5. In a pneumatic actuator, the combination of a blast-trunk, and means for producing pressure therein, an exhaust-trunk and means for drawing air therefrom, a chamber communicating by means of valve-controlled passages with both said trunks, a bellows-board forming a diaphragm across said chamber, and passages arranged to shift the air-pressure and exhaust-pressure from one side to the other side of said bellows-board contemporaneously with the movement of said valves, substantially as described.

6. In a pneumatic actuator, in combination with means for producing a blast-current and an exhaust-current, a chamber divided by a hammer-actuating bellows-board, a casing provided with passages leading from the said chamber to the exhaust and blast trunks,

valves arranged to control said passages, and to bring each side of said chamber alternately into communication with the blast and exhaust passages, substantially as described.

5 7. In a pneumatic actuator, in combination with a suitable casing, a blast-trunk and an exhaust-trunk, a chamber divided by a vibratile bellows-board, passages leading from each side of said chamber, valves arranged
10 to control said passages, and to place each side of said chamber in communication alternately with the blast-trunk and the exhaust-

trunk, a tracker-board, an air-passage leading through said tracker-board, a valve-actuator arranged to be itself actuated by an impulse of air through said passage, substantially as described. 15

In testimony whereof I sign this specification in the presence of two witnesses.

HENRY SCHWESINGER.

Witnesses:

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