C. ALTER.

PNEUMATIC ACTION.

APPLICATION FILED JAN. 25, 1910.

1,051,304. Patented Jan. 21, 1913.

Fig. 1.

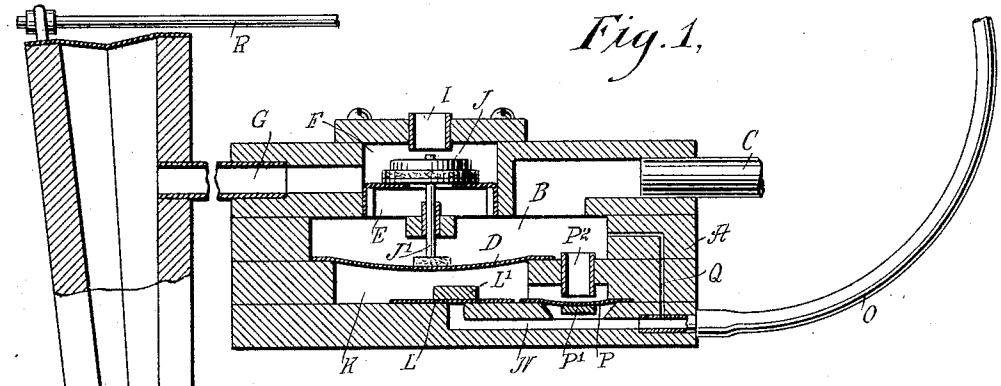


Fig. 2.

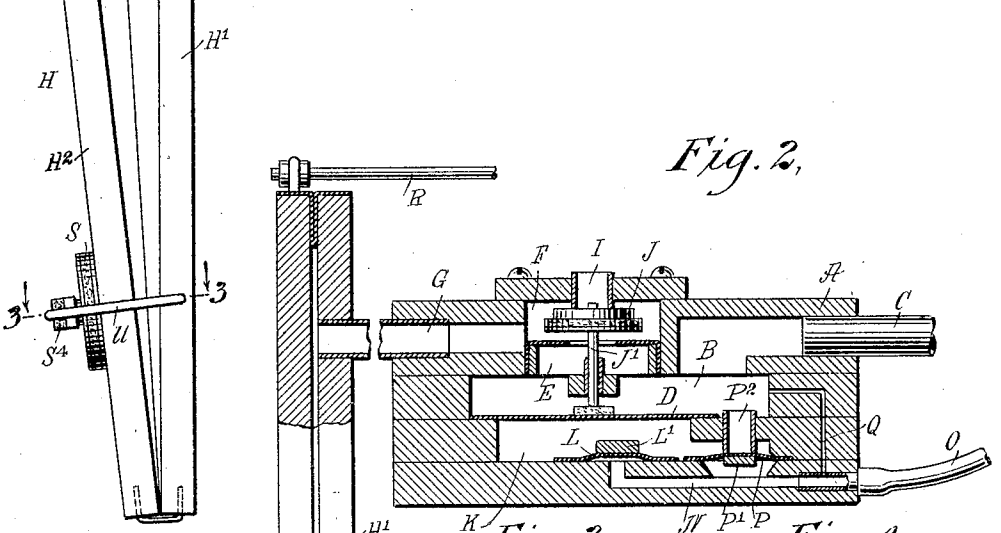
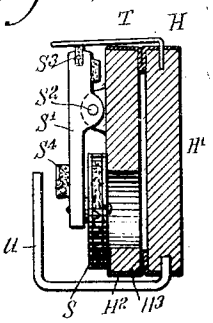
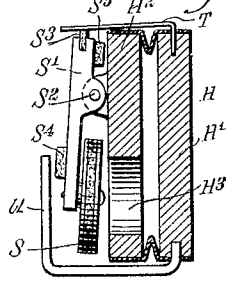


Fig. 3.

Fig. 4.

Fig. 5.





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PNEUMATIC ACTION.

1,051,304. Specification of Letters Patent. Patented Jan. 21, 1913.

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To all whom it may concern:

Be it known that I, CHRISTIAN ALTER, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Pneumatic Action, of which the following is a full, clear, and exact description.

The invention relates to player pianos, piano players and like instruments having pneumatics, and its object is to provide a new and improved pneumatic action, which is exceedingly sensitive and insures a quick deflating and refilling of the pneumatic and thus allows sounding of the same note in quick succession.

For the purpose mentioned, use is made of an initial inflating device for starting inflation of the pneumatic, and of a main inflation device actuated on the return stroke of the movable member of the pneumatic to complete the inflation thereof.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a sectional side elevation of the pneumatic action, showing the parts in position when the pneumatic is inflated; Fig. 2 is a similar view of the same, showing the parts in position when the pneumatic is deflected; Fig. 3 is a sectional plan view of the pneumatic on the line 3—3 of Fig. 1; Fig. 4 is a similar view of the same on the line 4—4 of Fig. 2; Fig. 5 is a like view of the same, showing the air admission valve open during the return stroke of the movable member of the pneumatic; and Fig. 6 is a cross section of part of the pneumatic action on the line 6—6 of Fig. 2.

The casing A of the pneumatic action is provided with a main suction chamber B, connected by a pipe C with a suitable suction device, to draw the air out of the chamber B. In the bottom of the chamber B is arranged a diaphragm D, and the top of the chamber is provided with a valve seat E leading to a chamber F having a pipe connection G with the fixed member H′ of the pneumatic H, and the said chamber F is provided with an air admission port I, for admitting air to the pneumatic H for starting the latter, as hereinafter more fully described. The valve seat E and the port I are controlled by a valve J, having a valve stem J′ seated on the diaphragm D, so that the valve J is normally seated on the valve seat E, to disconnect the suction chamber B from the pneumatic H and to connect the latter with the atmosphere by way of the open port I. When the diaphragm D moves upward the valve J is raised and seated on the port I, while the valve seat E is opened to connect the interior of the pneumatic H with the suction chamber B, to deflate the pneumatic H.

Underneath the diaphragm D is arranged an air chamber K, connected by a valve L with a channel N, connected by a flexible tube O with a corresponding tracker board opening, so that when the latter is uncovered by the note sheet, then air passes into the channel N and by way of the valve L into the air chamber K, to move the diaphragm D upward for lifting the valve J as before mentioned. The channel N opens onto the under side of a diaphragm P, provided with a weight P′, and adapted to open and close a valve seat P^2, preferably in the form of a pipe, connecting the air chamber K with the suction chamber B. When the parts are in normal position, as shown in Fig. 1, the weight P′ holds the diaphragm P in a lowermost open position, so that the air chamber K is connected with the suction chamber B, and consequently air is drawn out of the air chamber K. The valve L is held normally closed by a weight L′ on top of the said valve. A bleed hole Q connects the suction chamber B in the usual manner with the channel N, to allow the air to pass from the said channel into the suction chamber after the tracker board opening is closed by the note sheet.

The movable member H^2 of the pneumatic H is connected in the usual manner by a rod R with the part to be actuated by the pneumatic, and in the said movable member H^2 is arranged a large port H^3 (see Figs. 3, 4 and 5), adapted to be closed by a valve S, held on a lever S′, fulcrumed at S^2 on the movable member H^2, and the said lever S′ is provided with a flexible terminal S^3, of felt, leather or like material, engaging the free end of a flat spring T, secured to the fixed member H′ of the pneumatic H. On the lever S′ are arranged felt cushions S^4, S^5 of which the latter is adapted to be seated on the movable member H^2, while the cushion S^4 is adapted to engage a stop U, secured on the fixed member H′ of the

pneumatic H, to limit the swinging movement of the lever S, as hereinafter more fully described. Now when the several parts are in the position as illustrated in Figs. 1 and 3, then the pneumatic H is inflated by atmospheric air, the valve S being closed. Now when the tracker board opening closing the pipe P^2, the air in the channel N, to move the diaphragm P upward, thus closing the pipe P^2, the air in the channel N also passing by way of the valve L into the air chamber K, so that the diaphragm D is moved upward, and in doing so lifts the valve J, to raise the same off the seat E and to close the port I. The air in the pneumatic H is now exhausted by way of the pipe G, chamber F, seat E and suction chamber B, to collapse the pneumatic H. As soon as the tracker board opening is closed the diaphragm P moves into open position and the valve L into closed position, so that the air is exhausted from the chamber K by way of the pipe P^2 and the suction chamber B, thus allowing the valve J to drop back onto the seat E, thus uncovering the port I. When this takes place, atmospheric air passes by way of the port I, chamber F and pipe G into the pneumatic H, to inflate the same, that is, to move the movable member H^2 outward. Now when this takes place, the friction between the flat spring T and the flexible terminal S^3 of the lever S′, is sufficient to hold the said terminal S^3 stationary during part of the outward movement of the movable member H^2, so that a swinging motion is given to the lever S′ to move the valve S, thereby uncovering the large air admission port H^3, thus allowing a large quantity of air to pass into the pneumatic H to quickly inflate the same. Prior to the movable member H^2 passing to full open position, the cushion S^4 comes in contact with the stop U, so that a return swinging movement is given to the lever S′ during the final opening of the movable member H^2, whereby the valve S is moved back to its seat, thereby closing the admission port H^3.

From the foregoing, it will be seen that the inflation of the pneumatic H is started by air admitted by way of the port I, chamber F and pipe G, and as soon as the movable member H^2 begins to swing outward into open position, then the large valve S is automatically opened, to allow a large amount of air to pass quickly into the pneumatic H, to completely inflate the same, and the said valve S closes immediately prior to the movable member H^2 reaching its final return position.

It is understood that the suction in the main suction chamber B (see Fig. 1) produces a suction in the air chamber K as long as the diaphragm P is in open position relative to the tube or seat P^2, and the said diaphragm cannot close the tube P^2 quickly as long as the valve L is open as some of the air from channel N would pass by way of valve L into air chamber K and by way of the tube P^2 to the main suction chamber B. Thus the diaphragm P cannot move quickly into closed position unless valve L is first closed. Likewise the diaphragm P cannot open quickly without the valve L being closed (see Fig. 2) as otherwise the pressure will be equal on both faces of the diaphragm P and the latter would be held in closed position by the suction in chamber B and tube P^2 and it would only drop after the diaphragm had moved into lowermost position. With the arrangement described the valve L is closed at the time the diaphragm D begins to move downward and the slight pressure now produced by the downward movement of the diaphragm D in the chamber K acts on top of the diaphragm P and forces the same instantly downward and hence the diaphragm P moves into open position before the diaphragm D reaches its lowermost position. The valve L is provided with the weight L′ to keep the valve L normally closed, and when the valve J moves downward and with it the diaphragm D then the latter exerts a slight pressure on the air in the chamber K and consequently on the top of the diaphragm P to move the latter downward and thus open the tube P^2.

It is further understood that when the tracker board opening is uncovered and air passes into the channel N then the air lifts the valve L into an open position and thus allows the air to pass into the chamber K to lift the diaphragm D as before explained.

By the arrangement described, the pneumatic action is rendered exceedingly sensitive, and a quick deflating and refilling of the pneumatic takes place, thus allowing sounding of the same note in quick succession.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A pneumatic, a valve for controlling the exhaust of the air from the said pneumatic and controlling the admission of sufficient air to start the pneumatic, means for pneumatically controlling the said valve, a main air admission valve on the movable member of the pneumatic and controlling the final inflation of the pneumatic, and means for controlling the said main air admission valve by the movable member of the pneumatic on the return stroke of the said movable member.

2. A pneumatic having a main air admission port, a valve for controlling the exhaust of the air from the said pneumatic

and controlling the admission of sufficient air to start the pneumatic, means for pneumatically controlling the said valve, a main air admission valve controlling the said main air admission port, a lever carrying the said main air admission valve and fulcrumed on the movable member of the pneumatic, and a spring arm secured to a fixed member engaging the said lever.

3. A pneumatic having a main air admission port, a valve for controlling the exhaust of the air from the said pneumatic and controlling the admission of sufficient air to start the pneumatic, means for pneumatically controlling the said valve, a main air admission valve controlling the main air admission port, a lever carrying the said main air admission valve and fulcrumed on the movable member of the pneumatic, the said lever being provided with a flexible terminal, and a flat spring attached to the fixed member of the pneumatic and engaging the said flexible terminal.

4. A pneumatic having a main air admission port, a valve for controlling the exhaust of the air from the said pneumatic and controlling the admission of sufficient air to start the pneumatic, means for pneumatically controlling the said valve, a main air admission valve controlling the main air admission port, a lever, carrying the said valve and fulcrumed on the movable member of the pneumatic, the said lever being provided with a flexible terminal, a flat spring attached to the fixed member of the pneumatic and engaging the said flexible terminal, and a stem fixed on the said fixed member and adapted to be engaged by the said lever.

5. A pneumatic, a main suction chamber, connections between the said pneumatic and the said suction chamber, and between the said pneumatic and the atmosphere, a valve controlling the said connections, a diaphragm in the said suction chamber controlling the said valve, an air chamber underneath the said diaphragm, a valve seat connecting the said air chamber with the suction chamber, an air admission channel for connection with the tracker board and having a connection with the said air chamber, the connection having a valve, and a diaphragm valve over the said air channel for controlling the said valve seat.

6. A pneumatic, a main suction chamber, connections between the said pneumatic and the said suction chamber and between the said pneumatic and the atmosphere, a valve controlling the said connections, a diaphragm in the said suction chamber controlling the said valve, an air chamber underneath the said diaphragm, a valve seat connecting the said air chamber with the suction chamber, an air admission channel for connection with the tracker board and having a connection with the said air chamber, the connection having a valve, a diaphragm valve over the said air channel for controlling the said valve seat, a main air admission valve on the said pneumatic, and means adapted to open the said air admission valve on the return stroke of the movable member of the pneumatic.

7. A pneumatic, a main suction chamber, connections between the said pneumatic and the said suction chamber and between the said pneumatic and the atmosphere, a valve controlling the said connections, a diaphragm in the said suction chamber controlling the said valve, an air chamber underneath the said diaphragm, a valve seat connecting the said air chamber with the suction chamber, an air admission channel for connection with the tracker board and having a connection with the said air chamber, the connection having a valve, and a diaphragm valve over the said air channel for controlling the said valve seat, the said diaphragm valve having a weight for returning the diaphragm valve to normal position.

8. A pneumatic, a suction chamber, a valve for controlling the admission and exhaust of air to and from the said pneumatic, a diaphragm in the said suction chamber, an air chamber below the said diaphragm, a valve seat connecting the said air chamber with the said suction chamber, an air admission valve for the said air chamber, and a weighted diaphragm valve for controlling the said valve seat.

9. A pneumatic, a suction chamber, a valve for controlling the admission and exhaust of air to and from the said pneumatic, a diaphragm in the said suction chamber, an air chamber below the said diaphragm, a valve seat connecting the said air chamber with the said suction chamber, an air admission valve for the said air chamber, a weighted diaphragm valve for controlling the said valve seat, and an air admission channel common to the said air admission valve and the said weighted diaphragm valve.

10. A pneumatic having a movable member, a large air admission port on the said movable member, and a smaller air admission port, a valve for controlling the admission and exhaust of air to and from the said pneumatic by way of the said small port, a second valve for controlling the said large admission port, and means controlled by the said movable member and connected with the said second valve.

11. The combination with a bellows, provided with a port for connection to the wind chest or the atmosphere and with an auxiliary port through which direct communication may be established between the interior of the bellows and the atmosphere, of a

valve to control said auxiliary port, a lever mounted on that member of the bellows in which the port is formed, and a friction arm mounted on the other member of the bellows and coöperating with said lever to open the valve as the movement of the bellows commences.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHRISTIAN ALTER.

Witnesses:
THEO. G. HOSTER,
JOHN P. DAVIS.