

980,747.

Patented Jan. 3, 1911.

Fig - 1 -

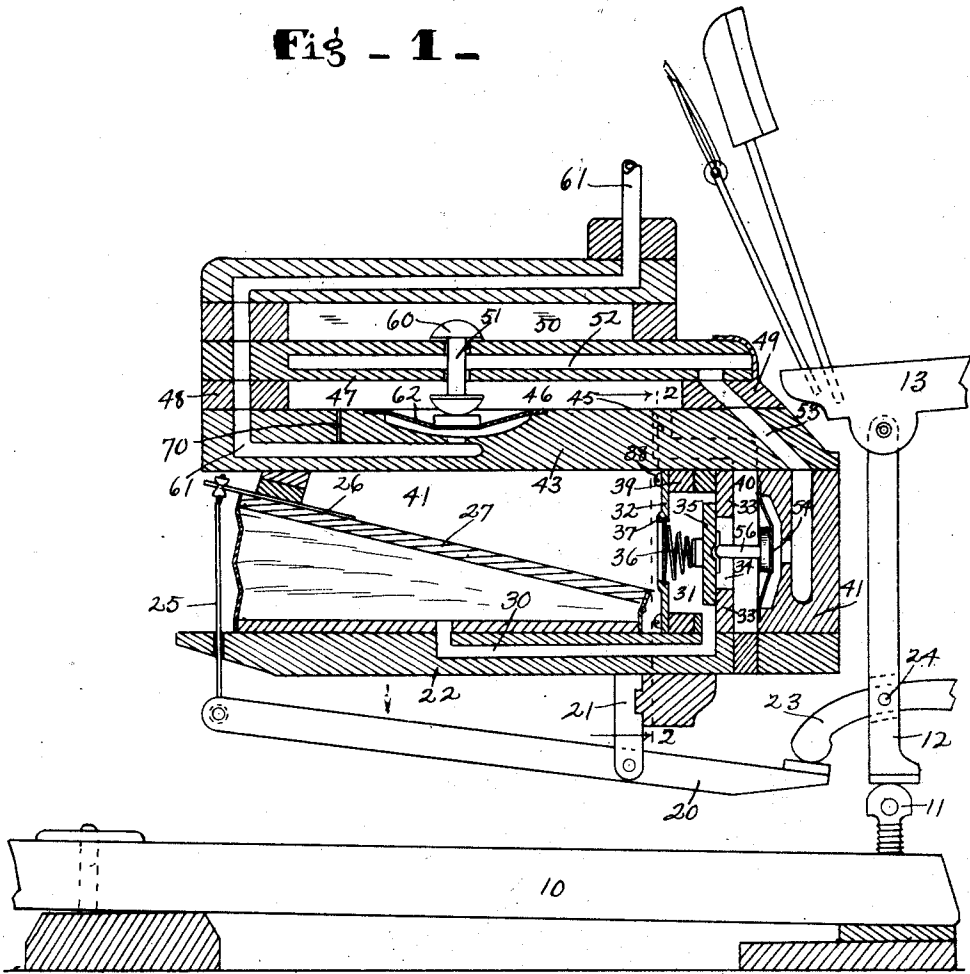


Fig - 2 -

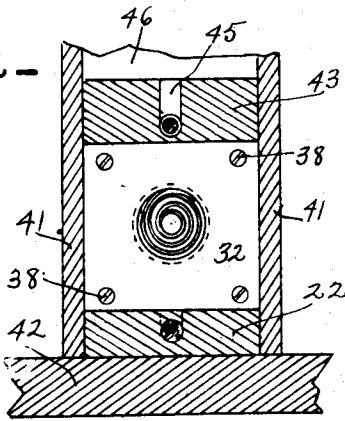
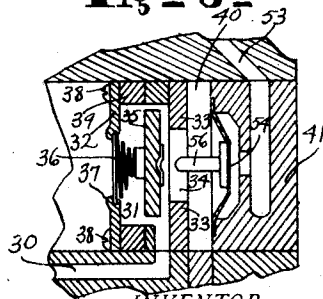


Fig - 3 -



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UNITED STATES PATENT OFFICE.

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PNEUMATIC PIANO

980,747.

Specification of Letters Patent.

Patented Jan. 3, 1911.

Application filed November 18, 1909. Serial No. 528,689.

To all whom it may concern:

Be it known that I, WILLIAM G. BETZ, of Steger, county of Cook, and State of Illinois, have invented a certain new and useful Pneumatic Piano; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings.

The object of this invention consists in providing the individual pneumatic elements of a pneumatic piano with a vertically disposed secondary valve held by a spring which retracts as the valve moves to an open position, the valve being opened by the longitudinal movement of a suitable pouch pin. Said spring is preferably insertible and held in a metallic plate so that it is accessible and readily removable. This renders the spring and valve readily accessible and removable, so that the valve will never get out of order or act sluggish, but the chief advantage is the very rapid vibratory movement of the valve that is possible with this construction.

The nature of the invention will be understood from the accompanying drawings and the following description and claims.

In the drawings Figure 1 is a central vertical section through a pneumatic element and associated parts, some parts being broken away. Fig. 2 is a section on the line 2-2 of Fig. 1. Fig. 3 is a section like what is shown in the right-hand part of Fig. 1 with the secondary valve open instead of closed, and the other parts in their position when the machine is not in operation.

In the drawings herein 10 represents the key of a piano-forte having a capstan screw 11, extending upwardly therefrom, which is engaged by a sticker 12 that is pivoted at its upper end to a wippen, which actuates the piano hammer. The sticker 12 is actuated by the lever 20 that is fulcrumed between its ends to the lower end of the bar 21, which extends down from the cross bar 42. One end of said lever actuates the sticker through the mediation of a bar 23 pivoted between its ends at 24 to the sticker. The other end of the lever is depressed by a rod 25 that is connected with the arm 26 on the bellows 27 that is mounted upon the plate 22 on bar 42. The bellows is actuated by the air being withdrawn therefrom through the passageway 30 that extends partially through the plate 22 to the chamber 31 between the metal plate 32 and the wall 33. This wall

has an opening or port 34 through it which is closed by a secondary valve 35, supported by a helical spring 36. The spring tends to open the valve. The apex of the helical spring is secured to and carries the valve 35, while the other end of the spring rests in an annular seat 37 in the plate 32. The plate 32 is secured by screws 38 to the parts 39, so that by removing said screws the plate 32, spring 36 and valve 35 can be readily withdrawn. The port 34 brings the chamber 31 in communication with the chamber 40 which lies between the wall 33 and the end wall of casing 41. The casing 41 rests upon the bottom 22 and it has secured upon its top a plate 43. Said plate 43 is also secured upon the part 39, see Fig. 1 and the partition plate 32, so as to form a valve chamber at one end and a bellows chamber at the other end. The chamber 40 communicates through a passageway 45, shown by dotted lines in Fig. 1 and full lines in Fig. 2, with a suction chamber 46 that is formed by the plate 47 and pieces 48 and 49 and the plate 43. Above the plate 47 there is an open air chamber 50 and the port 51 leads therefrom to a passageway 52 in said plate 47 that communicates with the passageway 53 leading therefrom into the wall 41 and in communication with the pouch 54 that carries a pin 55 that bears against the secondary valve 35 to push said valve open, when external air enters the passageway 53. Then the air will be withdrawn from the bellows through the suction chambers 40 and 46, which are in communication with some suitable air exhausting means not shown.

The air for actuating the pouch 54 is admitted through the port 51 by the primary valve 60, which closes said port 51 normally. This valve is opened by air coming through the tracker board, not shown, by way of the passageway 61 to a point beneath the pouch 62, so that when the opening in the tracker board is exposed for the admission of air, it will enter the passageway 61 and elevate the pouch 62 to open the valve 60 and let air into the passageway 53 to actuate the pouch 54 to open the valve 35 to permit the exhaust of air from the bellows 27 and thereby actuate the lever 20 and operate the sticker 12.

There is a bleed hole 70 through the plate 43 and in communication with the suction

chamber 46 in the tracker board passageway 61, so that when the tracker board end of the passageway 61 is closed, the air therein will be somewhat withdrawn through the bleed hole into the suction chamber 46, and that permits the pouch 62 to descend so that the valve 60 closes the port 51. Then the pressure of the air in the passageway 53 diminishes as the air from the passageway 52 is drawn into the suction chamber somewhat through the port having the stem of the valve 60 extending through it, which permits the pouch 54 to return from the actuated position to the position shown in Figs. 1 and 3. The suction through the port 34 will cause atmospheric pressure to close the valve 35 against the action of the spring 36, but this effect is diminished by the pull of the spring, so that when air enters the passageway 53 and actuates the pouch 54, the pin 56 readily pushes the valve to the open position, which is the same as the position of the valve shown in Fig. 3, but in Fig. 3 the pouch and pin have returned to their inoperative position.

When the device is idle the parts are in the position shown in Fig. 3, the spring 36 holding the valve 35 open. When the device is in use suction through port 34 and chamber 40 normally holds the valve 35 closed, as shown in Fig. 1, in spite of the pull of the spring 36. When air enters the tracker board slot and passageway 61, it actuates the pouch 54 so that the pin 56 will push the valve 35 open in spite of the suction which tends to close it, and then suction will draw the air out of the bellows and actuate the lever 20 and the sticker. In this operation of opening the valve 35 the

spring 36 cooperates with the pin 56 so as to lessen the task of the air-pushed pin 56, rendering the device sensitive.

What I claim as my invention and desire to secure by Letters Patent is:

1. In a pneumatic piano, a pneumatic element including a valve, a retractile spring secured at its end centrally to said valve and tending to hold the valve open, and a removable plate provided with an opening with a grooved wall in which the other end of said spring is seated, substantially as set forth.

2. In a pneumatic piano, a pneumatic element including a valve, a spring for supporting said valve which tends to hold it in an open position, a pouch adapted to be acted upon by air pressure, and a pin extending from the pouch toward said valve for cooperating with the spring in opening the valve when the pouch is actuated.

3. In a pneumatic piano, a pneumatic element including a bellows, means having a suction passageway therefrom through a suction port, a valve for closing said suction port, a spring for supporting and tending to hold said valve in open position and adapted to yield during the closing thereof, a pouch, a pin extending from the pouch to said valve for opening the same, and means for conveying air under atmospheric pressure to said pouch for actuating the same.

In witness whereof, I have hereunto affixed my signature in the presence of the witnesses herein named.

WILLIAM G. BETZ.

Witnesses:

G. H. BOENK,
O. M. McLAUGHLIN.