

903,758.

Patented Nov. 10, 1908.

3 SHEETS—SHEET 2.

Fig-6-

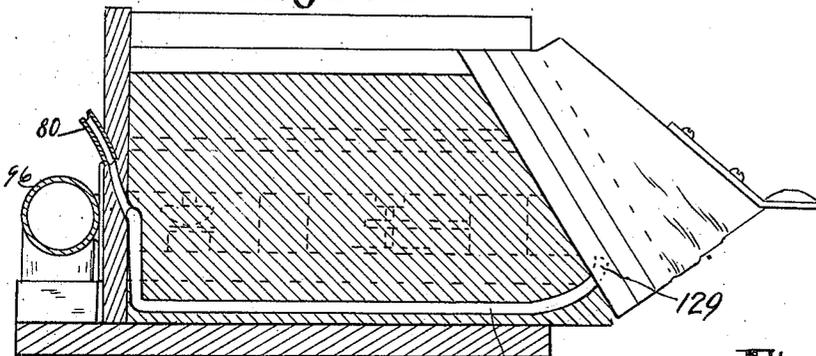


Fig-7-

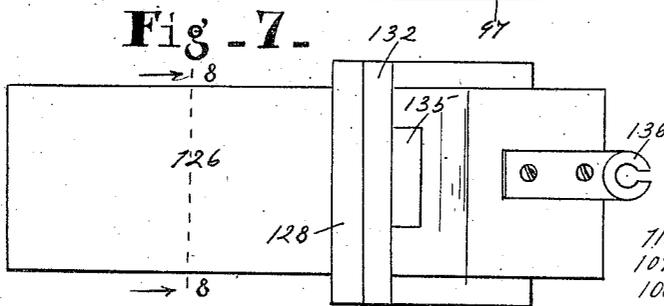


Fig-8-

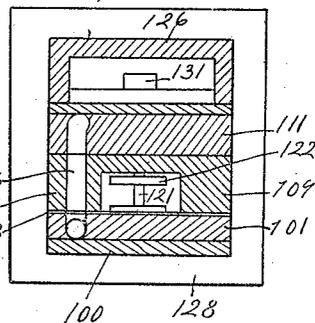


Fig-9-

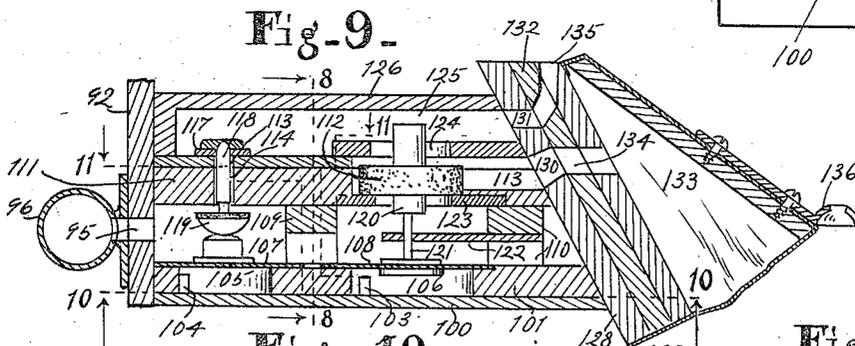


Fig-10-

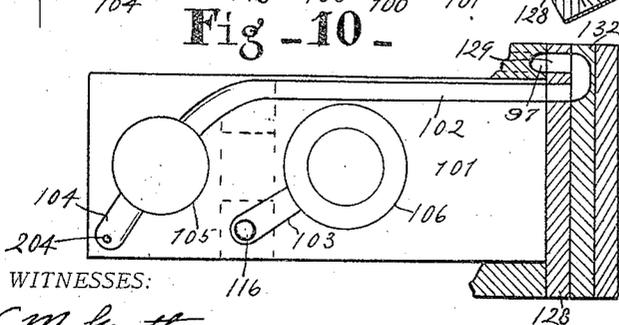
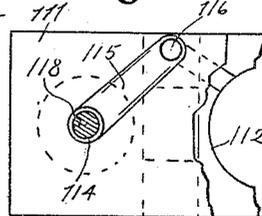


Fig-11-



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PNEUMATIC PIANO.

No. 903,758.

Specification of Letters Patent.

Patented Nov. 10, 1908.

Application filed June 13, 1907. Serial No. 378,705.

To all whom it may concern:

Be it known that I, AUGUST NORDEEN, of Newcastle, county of Henry, and State of Indiana, 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, in which like letters refer to like parts.

One feature of this invention consists in providing a cell for each individual pneumatic action into which said action is inserted and from which it is readily removed. There is one cell and pneumatic action for each key so that in repairing or otherwise treating the device it need not all be taken apart but only the part associated with one key or string.

Another feature of the invention consists in the novel means for registering and holding in registration each group of tubes from the tracker board with the corresponding tubes leading to the pneumatic action, whereby these groups may be readily separated or united.

Another feature of the invention consists in so mounting the pneumatic action that it may be readily moved and swung away to get at the strings for repairing purposes.

Another feature consists in the use of a single means, especially a spring for engaging the sides of two adjacent actions for holding the same in place.

These and the other features of my invention will be understood from the accompanying drawings and the following description and claims.

In the drawings Figure 1 is a vertical section through a portion of a pneumatic piano provided with my improvements, said section being on a line immediately in front of the tracker board and music sheet, parts being broken away and only one row of the power pneumatics being shown. Fig. 2 is a vertical section through the means for connecting a series of pneumatic tubes from the tracker board with a series of tubes that lead to the power pneumatics. Fig. 3 is the same as Fig. 2 with the wooden blocks removed and the metal portions in process of being united. Fig. 4 is a vertical section substantially on the upper part of line 14—14 Fig. 12 through the key bed and means for supporting the power pneumatics, only one series of power pneumatics being shown and

the whole centrally broken away. Fig. 5 is a horizontal section on the line 5—5 of Fig. 4. Fig. 6 is a vertical section through a power pneumatic on the line 6—6 of Fig. 4. Fig. 7 is a plan view of a portion of a power pneumatic removed from its cell. Fig. 8 is a transverse section of the same on the line 8—8 of Fig. 7. Fig. 9 is a central vertical section of an entire power pneumatic longitudinally thereof. Fig. 10 is a horizontal section on the line 10—10 of Fig. 9. Fig. 11 is a horizontal section on the line 11—11 of Fig. 9. Fig. 12 is a vertical section through a piano provided with my improvements, the casing of the piano being indicated by dotted lines and the parts shown in their idle position. Fig. 13 is a section through the piano action with the parts in position when a key is actuated. Fig. 14 is a section on the line 14—14 of Fig. 12 through the central portion of the piano, as shown in Fig. 12, with a series of power pneumatics swung forward out of the way while tuning the piano. Fig. 15 is a central vertical section through the rear portion of the lost motion lever and the sticker above to show their action, parts being broken away.

There is shown in the drawings a key bed 21 with a sounding board 45 at the back of it and on said key bed there is secured a key frame 22 with a balance rail 231 having a center pin 25 on which the piano key 26 is mounted. 24 is a front rail carrying a front pin 27 for guiding the key at the front. On the inner end of the key there is a capstan screw 28. A pair of action brackets 29 are mounted vertically upon said key bed. Near the lower end of said brackets a flange rail 30 is secured transversely and from it the flange 31 extends downward and to said flange the rocker 32 for the lost motion lever is pivoted at its rear end, said rocker extending forward and resting normally upon the capstan screw 28. The lost motion lever 33 is pivoted at its rear end to the forward end of said rocker 32 and said lever at its forward end rides loosely upon the lost motion bar 65 mounted and supported by means hereinafter explained. The action rail 38 is secured transversely of said brackets 29 and a flange 36 extends downwardly from it to which the rocker 35 for the jack is pivoted near its rear end. To the forward end of said rocker the sticker 34 is pivoted and extends downward and rides upon a pad 114

that is secured upon the lost motion lever 33. A pin 113 extends downward from the lower end of said sticker and works in the hole in the lost motion lever so as to hold and guide
5 said sticker in its rocking movements. The lower end of said sticker is made convex towards the front so as to form a grooved foot as it were to rest upon the pad 114 firmly and give to the lower end of the sticker a smooth
10 rocking movement as the forward end of the lost motion lever is operated by the pianissimo mechanism of the piano.

The damper flange 39 extends rearwardly from the upper part of the action rail 38 and
15 on it the damper sticker 40 is fulcrumed between its ends in a vertical position so that its lower end will be engaged and actuated by the damper spoon 41. The damper spring 42 tends to throw the upper end of the damper
20 sticker 40 rearward. The damper wire 43 extends upward from said damper sticker and carries on its upper end a damper 44 that is adapted to engage the piano string 144 mounted on the sounding board 45, in the
25 usual way.

A jack flange 61 extends upward from the rocker 35 and has mounted in it a jack 59 which is spring pressed by the jack spring 60. Said jack engages and actuates the hammer
30 butt 52 which is fulcrumed in the hammer flange 53 that is secured to the action rail 38. The hammer shank 51 extends upward from said hammer butt 52 and carries a hammer 50. The hammer is held normally
35 away from the piano string by the hammer spring 54 that at its lower end is mounted in connection with the hammer butt 52 and at its upper end with the bar 152. A back check 48 is mounted on the back check wire 49
40 which extends upward from the rocker 35 for the jack and when said rocker is actuated engages the knuckle 55 on the knuckle shank 56 that extends forward from the hammer butt 52. Said knuckle has an opening
45 in its lower end through which the bridle strap 57 extends from the hammer butt 52 to the bridle strap wire 58 that projects upward from the rocker 35 for the jack.

A button rail 62 is carried on arms 162
50 that extend forward from the action rail 38, and said button rail carries the regulating screw 64 to the lower end of which the regulation button is secured that stops and regulates the action of the jack 59 by engaging
55 the forwardly extending projection from said jack to the under side of which the jack spring is connected.

The lost motion bar 65 is carried by a rod 63 pivoted to the brackets 29. From said
60 bar the lost motion rod 165 extends up to the hammer rail 66 carried on the hammer rods 67 that are likewise fulcrumed in said brackets 29. Forward extensions 129 from said brackets serve as stops for said hammer
65 rail 66.

The means for operating the foregoing described piano action pneumatically will now be described. The usual tracker bar 70 for automatic pianos is secured transversely of the bars 71 that extend upward from the
70 tracker rail 73. The tracker tubes 72 are arranged in two groups, one for each half of the piano and each group enters an upper connecting head 74 that has a plurality of holes in it, one for each tube, and each tube
75 enters one of said holes. This head is surrounded by a flanged ring 75. A lower connecting head 76 corresponding with the upper connecting head is mounted on a bracket or plate 77 secured to the key bed 21 and it
80 has holes in it corresponding exactly with the holes in the upper connecting head and it also has a threaded ring 78 on which the union nut 79 screws that engages a flange on the ring 75 and whereby said connecting
85 heads are drawn and held tightly together with the holes of the two properly corresponding with each other. From the lower connecting head tubes 80 extend, one to each individual pneumatic action.
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The groups of parts constituting each individual pneumatic action are secured to the bottom of the key bed by the grooved support blocks 81 thereon and the screws 82. The series of individual pneumatic actions
95 is provided with end pieces 83 having at their front ends the catches or laterally projecting pins 84 that extend into the grooves of the blocks 81. There is also a vertically slotted block 85 secured to the outside of
100 each end piece 83. With this construction the entire series of pneumatic actions can be slipped into place and held by the grooved blocks 81 and screws 82 and it can be slipped out of engagement with said screws 82.
105 Between the end pieces 83 the pneumatic key 86 is mounted on the key rail 87 having a center pin 88 extending upward therefrom. The key rail is secured to the top board 89 and both extend nearly the
110 length of the piano. The board 89 carries a flat spring 90 for acting on said pneumatic key to return it to its unoperated position. This key operates the pneumatic key rod 91 that extends up through the key
115 bed 21 and engages the under side of the rocker 32 for the lost motion lever and actuates the same all in the same way as the capstan screw 28 on the key 26. Said pneumatic key is stopped by the upper part of a
120 back board 92 of the cell 93. The means for actuating this pneumatic key will hereafter appear.

The air-tight suction cell 93 is secured to the back board 92 and at its rear end has a
125 suction slot 95 whereby air is drawn from said cell by the foot pedal bellows, not shown, through the suction tube 96. The lower air tube 80 enters the air passage 97 leading through the bottom of the cell near
130

its forward end to the inclined front face thereof.

The pneumatic action which is insertible in the cell just described is constructed as follows: There is a bottom board 100 secured to the pouch board 101. The pouch board has air passages 102, 103 and 104 along its lower side and also the bleed hole 204 which connects the passage 104 with the exhaust chest. It also has a small, circular, primary pouch hole 105 and a larger secondary pouch hole 106. These pouch holes are covered by leather pouches 107 and 108 respectively which are in the nature of diaphragms as they are flexible. Upon the pouch board 101 are space blocks 109 and 110, one on each side of the secondary pouch hole and both blocks being centrally open. Upon said spacing blocks the valve board 111 is secured. This pouch board has a large opening for the secondary valve 112 and also a horizontal groove or air passage 113 leading to the front and relatively wide. This pouch board also has a small hole 114 for the stem of the primary valve and a horizontal air passage 115 therefrom that connects with the passage 116 extending downwardly through the rear spacing block 109 and which passage 116 registers with the air passage 103 in the pouch board and enters the secondary pouch hole 106.

The primary valve 117 is on the upper end of the stem 118 the lower end of which rests on the valve that is secured to the primary pouch 107. When the valve 117 is pushed up it opens the air passage 114 leading to the air passage 115. Said valve is limited in its upward movement by a second valve 119 which when the valve is elevated closes from below the opening through which the stem passes.

The secondary valve 112 has a central pin 120 that rests upon the metal pin 121 that is secured centrally to the secondary pouch and is guided by the arm 122 secured to the spacing block 110. Said valve is limited in its downward movement by the ring or seat 123. In its upward or actuated position it closes the port 124 leading into the longitudinal air passage 125 in the cover plate 126. The primary valve 117 extends into said longitudinal air passage 125 in the cover plate and said passage 125 communicates with the hole through which the stem of valve 117 extends.

The forward end of the pouch board 101, the valve board 111 and the cover plate 126 are beveled or inclined and to them the front plate 128 is secured. The plate 128 has a small air passage 129 communicating with the air passage 97 in the bottom board 100 and the air passage 102 to the primary pouch in the pouch board 101. There is also a port 130 registering with the air passage 113 in the valve board 111 and above it another

port 131 registering with the air passage 125 in the cover plate 126. To said front plate what I term the power pneumatic is secured. It consists of a base plate 132 which is secured to the front plate 128 and to it a small bellows 133 is secured. In the plate 132 there is a lower port 134 entering the bellows chamber and registering with the lower air port 130 in the front plate 128. In said plate 132 there is also an upper port 135 registering with the upper air port in the front plate 128 and communicating with the outside air. To the lower or actuating end of the bellows a slotted plate or arm 136 is secured which engages the lower end of the pneumatic key actuating rod 137, in such a manner that when air is exhausted from the bellows the actuating end thereof is drawn down, which through the rod 137 draws down the forward end of the pneumatic key and actuates the same.

The operation of the pneumatic action is as follows: When air enters a hole in the sheet of music 200 and tracker board 70 and passes through the tube 72, connecting heads 74 and 76, tube 80, air passages 97, 129 and 102, all of which constitute really one unbroken air passage, the primary pouch 107 will be raised and the primary valve 117 be elevated which opens the upper part of the hole 114 through which the valve stem extends and lets in outside air through the air passage 115 in the valve board 111, air passage 116 in the spacing block 109 and air passage 103 in the pouch board to a point below the secondary pouch 108. This atmospheric air elevates the secondary pouch and consequently the secondary valve 119 closes the port 124 leading to the air passage 125, thus shutting off communication with the outside air through the ports 135 and 131 and air passage 134 to the bellows. When this occurs the bellows is actuated or collapsed by reason of suction exerted on the bellows through ports 134 and 130 and air passage way 113, the port through the valve seat 123, the space between the pouch board 101 and the valve board 111, suction slot 95 at the rear of the cell and suction tube 96 from which the air is drawn by pedal bellows, not shown. When this suction occurs and the bellows 133 actuated, the pneumatic key will be actuated thereby.

When the hole in the tracker board is closed by the music sheet 200, the air passages leading to the primary and secondary diaphragm pouches are vented, the primary through the bleed and the secondary through the ducts 14, 15 and 16, and the suction cannot act on the bellows because, while the secondary pouch valve is down to seat, the bellows chamber is in communication with the outside air, and it is not in communication with the suction tube 96.

It is observed from the foregoing that 130

there is an individual cell and pneumatic action for each string of the piano. The pneumatic actions for the several strings are side by side and adjacent each other and I provide a single means for securing the adjacent edges of the pneumatic actions in place in their cells. This consists of a spring plate 138 which overlaps the edges of two adjacent base plates 132 of the bellows and said spring plate is held in place by a single screw entering the inclined face of one of the cells. By removing two of these spring plates, or the two screws holding them, one can withdraw the pneumatic action from the cell and the adjacent pneumatic actions can be removed if desired by merely removing one spring plate for each. This makes the manipulation of the mechanism very simple and quick and yet holds the parts securely in place during the operation.

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

1. In a pneumatic piano, a plurality of pneumatic actions, and a separate suction cell in which each pneumatic action is secured.

2. In a pneumatic piano, piano strings a pneumatic action for each string of the piano, and a separate suction cell in which each pneumatic action is removably secured.

3. In a pneumatic piano, a plurality of pneumatic actions, a series of cells in which said pneumatic actions are individually secured, and a suction tube that communicates with said cells.

4. In a pneumatic piano, a suction cell with a suction opening at one end thereof, and a pneumatic action insertible into said cell through the other end thereof.

5. In a pneumatic piano, a plurality of pneumatic actions, a separate suction cell for each pneumatic action, said suction cells being above each other in series, and a single means for securing the adjacent edges of two pneumatic actions to the partition between the cells.

6. In a pneumatic piano, a plurality of pneumatic actions, a suction cell for each pneumatic action, said suction cells being beside each other in series, and a spring plate and screw for securing adjacent edges of two pneumatic actions to the partitions of the cells.

7. In a pneumatic piano, the combination with a key bed, of a pneumatic mechanism, means at the forward end thereof for pivotally connecting the same with the under side of the key bed, and means for removably supporting the rear part of said pneumatic mechanism to said key bed.

8. In a pneumatic piano, the combination with a key bed provided on the under side with a pair of oppositely located channels extended from front to rear, of a pair of headed screws to the rear of said channels,

a pneumatic mechanism, pins secured to the forward portion of said pneumatic mechanism that project into said channels on the under side of the key bed, and channeled parts connected with said pneumatic mechanism to the rear of said pins in position to be engaged by said screws, whereby the pneumatic mechanism may be slipped forwardly and disengage said screws and be suspended by said pins, substantially as set forth.

9. In a pneumatic piano, a pneumatic action including a horizontally disposed valve box with a beveled front end, a power pneumatic secured to such front end and in communication with the chambers of the valve box, a pneumatic key above the power pneumatics, and a connection between the forward lower end of the power pneumatic and the pneumatic key above, whereby the latter is actuated substantially as set forth.

10. In a pneumatic piano, a pneumatic action including a substantially horizontal valve box with a beveled front end, a power pneumatic secured to such beveled front end and communicating with the chambers of the valve box, a pneumatic key, a rod depending from the key, and means connected with the lower front end of the power pneumatic for detachably engaging the lower end of said key rod whereby when the power pneumatic is contracted, the key will be actuated.

11. In a pneumatic piano, a pneumatic action including a substantially horizontal valve box with a beveled end, and chambers with two outlet openings at the front end, a power pneumatic secured to said front end, a passageway from one of the openings in said valve box through the power pneumatic to the open air, and a passageway from the other opening in the valve box to the chamber within the power pneumatic, substantially as set forth.

12. In a pneumatic piano, a pneumatic action including a suction cell, an air tube connected therewith, a valve box insertible in said cell with a passageway leading from said tube to the forward end, a power pneumatic secured to the forward end of said valve box with a passage therethrough, a primary pouch in said valve box with a bleed hole outlet therethrough, and a passageway to said primary valve pouch from said passageway of the power pneumatic.

13. In a pneumatic piano, a series of stationary suction cells in vertical and horizontal rows, a valve box removably insertible in each cell, a power pneumatic secured to the forward end of each valve box, a pneumatic key for each power pneumatic, and connections whereby each power pneumatic actuates its corresponding pneumatic key.

14. In a pneumatic piano, a series of suc-

tion cells located side by side with an air port at the rear of each, a single suction tube for said series of cells, a valve box removably insertible in each cell, a power pneumatic secured to the front end of each valve box, a pneumatic key for each power pneumatic, and connections whereby the power pneumatic operates its corresponding key.

In witness whereof, I have hereunto affixed 10 my signature in the presence of the witnesses herein named.

AUGUST NORDEEN.

Witnesses:

N. ALLEMONG,
OLIVE BREEDEN.