

UNITED STATES PATENT OFFICE.

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PNEUMATIC ACTION FOR PLAYER-PIANOS.

1,325,912.

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To all whom it may concern:

Be it known that I, JESSE P. ROGERS, a citizen of Russia, residing at Bluffton, in the county of Wells and State of Indiana, have invented a new and useful Pneumatic Action for Player-Pianos, of which the following is a specification.

This invention has reference to pneumatic actions for player pianos, and its object is to simplify the action and to avoid liability of warping and the renewal of parts because of such warping.

In accordance with the invention, the pneumatics making up the action are each provided with a strip carrying the bellows of the pneumatic and including a cap for the portion of the valve and pouch boards individual to the pneumatic. This materially lessens the number of parts and because of the small size of the one-piece strips and caps the cost is decreased and the liability of warping and consequently imperfect action is practically eliminated.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawing forming part of this specification, with the understanding, however, that the invention is not confined to any strict conformity with the showing of the drawing, but may be changed and modified so long as such changes and modifications mark no material departure from the salient features of the invention as expressed in the appended claims.

In the drawing:—

Figure 1 is a sectional view with some parts in elevation of the pneumatic action.

Fig. 2 is a sectional plan view of the pneumatic action on the line 2—2 of Fig. 1.

Fig. 3 is an elevation of the action with some parts in vertical section in the plane of the valves.

Fig. 4 is a section on the line 4—4 of Fig. 1.

The action comprises a suitable number of pneumatics indicated generally at 1. In a player piano equipped with the invention eighty-eight pneumatics are laid out in three layers, one above the other, and each pneumatic controls a respective key 2 of the player piano but in no wise interferes with the use of the piano in the ordinary way, that is, the piano may be played by hand if the operator so desires.

Each pneumatic 1 comprises an elongated

flat strip or board 3 of suitable thickness, across one face of which midway of the length of the strip there is secured a hinge block 3^a. Secured to the hinge block 3^a by a hinge strip 4 is another strip 5 forming the movable member of a bellows, of which bellows the corresponding end of the strip 3 forms the base or fixed member, said bellows being completed by a bellows fabric 6 hermetically secured to the boards 3 and 5 and the hinge strip 3^a. The fabric 6 may be and usually is rubberized cloth, and this cloth is also carried about the end of the bellows where the strip 5 joins the block 3^a so that leakage of air at such point is avoided.

The end of the board 3 remote from the bellows 6 constitutes a cap 7 having a port 8 therethrough and with the face on the bellows side of the pneumatic provided with a lining 9 of leather or other suitable packing material, such as is customarily used in musical instruments. That face of the strip 3 provided with the lining 9, at a point between the port 8 and the bellows, is provided with another port 10 which may be elongated widthwise of the strip 3. At a point to enter the interior of the bellows 6 the strip 3 has a port or opening 11. Joining the ports 10 and 11 is a channel or recess 12 formed in that face of the strip 3 remote from the bellows, and covering the channel or recess 12 is a strip 13 of air-proof cloth glued or otherwise securely attached to the outer face of the strip 3.

The cap 7 is secured by screws 14, of which two are shown, to a valve board 15 having a recess 16 therein for each pneumatic 1 and accommodating the head of a valve 17, and leading through the board from each recess is a corresponding passage 18, said recess passing a valve stem 19. Secured to the board 15 and separated therefrom by blocks or spacers 20, or in any other suitable way, is another board 21 carrying pouches 22, one for each valve 17, and to each pouch is fixed a presser plate 23 in position to engage the end of the stem 19 remote from the head of the valve 17. The pouch boards 21 have passageways 24 therein each communicating with a respective recess 25 formed in the pouch board to accommodate a corresponding one of the pouches 22. The space between a valve board and a pouch board separated from it by the blocks 20 constitutes a channel 26, which

at the ends opens into hollow blocks 27 registering with the openings 28, 29 through the end portions of the valve and pouch boards, and each combined valve and pouch board is
 5 connected to the next in order by hollow spacers, whereby there are formed ducts 30, one at each end of the action, connected by pipes 31 to a suction means, (not shown), such as used in player pianos. The side of
 10 the upper combined valve and pouch strip remote from the bellows is provided with a bleeding strip 32 held thereto by screws 33 and having passageways 34, one for each passageway 24 in the pouch board 21. Each
 15 passageway 34 is provided at its outer end, which is its upper end, with a nipple continuation 35 for the attachment of one end of a respective one of numerous tubes 36, which may be in the form of rubber tubes. The
 20 other end of each tube 36 is attached to a nozzle 37 individual to the tube and forming one of a battery of nozzles carried by a tracker plate 38 over which the usual perforated music strip 39 passes. Leading from
 25 the upper channel 26 into each passage 34 adjacent thereto is a vent cup 40 provided with a vent opening 41. Extending through the outer wall of the bleeding strip 27 opposite each vent cup 40 is a screw 42 permitting
 30 access to the vent opening of the vent cup for the purpose of enlarging said opening, should it prove too small, without the necessity of removing the bleeding strip. The channels 26 are closed on those faces
 35 toward the bellows by air proof cloth 43 and on opposite faces or those remote from the bellows are closed by the vent strip for the upper one and by air proof cloth 44 for the lower one.

40 The movable board 5 of the bellows has an ear 45 fast to the end thereof remote from the hinge 4 and pivotally connected to the ear is a rod 46 passed through a guide strip 47^a which may or may not be common
 45 to all of the pneumatics, and each rod 46 terminates in a head 47 in position to actuate a respective key 2 of the piano action individual to the pneumatic.

50 The other pipes 36, beside the pipes leading to the uppermost set of pneumatics lead to other nipples 48 entering other passages 35 extending entirely through the vent board and connected by pipes 49, 50, to elbows 51 entering the lower passageways 24. Each
 55 pipe 36 has a vent nipple 40 in the vent board 32.

Assuming that vacuum conditions are existent in the channels 26 above the pouches and that the nozzles 37 are closed by solid
 60 portions of the perforated music sheet 39, the valves 17 are seated by atmospheric pressure over the passages or ports 18 and as no air can at the time enter the pipes 36 the pouches are seated in the bottoms of the
 65 recesses 25. The capacity of the suction

pipes 31 is far greater than that of the vents 41 in the caps 40 so that what little leakage may occur through the vents is immaterial, such leakage, however, reducing the air in
 70 the pipes 36 to thereby maintain a partial vacuum. When a perforation in the music sheet passes a nozzle 37 air finds free access to the pipe 36, permitting the rising of the pouch 22, thus forcing the valve 17 open and this valve thereupon seats against the pack-
 75 ing strip 9 and closes the port 8. Now, the suction is active to the interior of the bellows 6 by way of the port 10, recess 12 and port 11. The vacuum conditions thus produced cause a collapse of the bellows 6 and
 80 a rise of the board 5 with such force and rapidity that the key 2 is moved in the proper direction and at the proper speed to cause a note to be sounded on the appropriate string of the piano. As soon as the perforation in
 85 the strip 39 again closes the nozzle 37 the vent 40 permits the establishment of vacuum conditions, causing a drop of the pouch and a corresponding drop of the valve 17, assisted by atmospheric pressure upon the head
 90 of the valve 17. This closes the passage 18, allowing free access of air through the port 8 to the port 10 and by way of the recess 12 and port 11 to the bellows 6, whereupon, the bellows expand and the head or button 47
 95 drops away from the key 2, permitting the latter to fall.

What is claimed is:—

1. In a pneumatic action for player pianos, a pneumatic mechanism comprising a
 100 valve box and a pneumatic, an elongated one-piece board or strip constituting the base member of the bellows of the pneumatic, a channel strip and a valve box cap in the order named in the direction of the
 105 length of the strip.

2. In a pneumatic action for player pianos, a pneumatic mechanism comprising an elongated one-piece board or strip forming
 110 at one end the basic portion of the bellows of the pneumatic, at the other end a cap and intermediately a channel strip, and a pouch and valve unit from which the pneumatic is separate and to which the cap end of the
 115 strip is made fast and capable of ready removal therefrom.

3. In a pneumatic action for player pianos, a pneumatic mechanism comprising a valve box and a pneumatic, a strip constituting the basic portion of the pneumatic,
 120 another strip hinged to the first-named strip, and a bellows connecting the hinged strip and the basic portion, said first-named strip being elongated in a direction away from the bellows and formed with a channel and
 125 also into a cap piece, on the side of the channel remote from the bellows.

4. In a pneumatic action for player pianos, a pneumatic mechanism comprising a
 130 valve box, a pneumatic, a strip constituting

the basic portion of the pneumatic, another strip hinged to the first-named strip, and a bellows connecting the hinged strip and the basic portion, said first-named strip being
 5 elongated in a direction away from the bellows and formed with a channel and also into a cap piece, on the side of the channel remote from the bellows, for other parts, said channel having ports at opposite ends
 10 and a cover between the ports, whereby the channel constitutes an air duct from one port to the other.

5. In a pneumatic action for player pianos, a pneumatic provided with an elongated flat strip having a bellows at one end, and a separately formed pouch and valve structure fast to the other end of the pneumatic and communicating with the bellows.
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6. In a pneumatic action for player pianos, a pneumatic comprising an elongated strip, a bellows at one end of the strip, and a separately constructed combined pouch and valve board at the other end of the strip and to which said base is fast, the
 20 strip having a recess in the face remote from the bellows with ports at the ends of the recess opening into said bellows and board, and a cover, for the recess, of air-tight material, whereby the recess is converted into
 25 an air duct.
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7. In a pneumatic action for player pianos, a pneumatic having a bellows at one end, a combined pouch and valve structure at the other end connected to the bellows,
 35 and a vent strip connected to the pouch portion of the pouch and valve structure and having means whereby the vent strip may be connected to the part of the action controlled by the music sheet.

8. In a pneumatic action for player pianos, a pneumatic having a bellows at one end, a combined pouch and valve structure at the other end connected to the bellows, and a vent strip connected to the combined
 40 pouch and valve structure and having means whereby the vent strip may be connected to the part of the action controlled by the mu-

sic sheet, said vent strip having a vent cup communicating with the pouch and valve structure on the valve side of the pouch, and
 50 also having a passage to permit access to the vent cup and provided with a removable closure therefor.

9. In a pneumatic action for player pianos, a pneumatic having a strip constituting a base, a cap and an intermediate portion, with a channel formed in one face and provided at the ends with ports opening through the other face, and a covering of
 55 air-tight material on the channeled face whereby the channel is converted into an air-duct extending from one port to the other.
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10. In a pneumatic action for player pianos, a pneumatic having a strip constituting a base with an intermediate portion formed on one face with a channel terminating at the ends in ports opening through the other face, and a covering of air-tight material for the channel hermetically joined
 70 to that face of the base in which the channel is formed, whereby the channel constitutes an air-duct from one port to the other.

11. In a pneumatic action for player pianos, a pneumatic having a strip constituting a base for the attachment at one end of bellows and at the other end of a valve box, said strip having a channel formed in one face intermediate of the ends of the strip, and a covering for the channel of air-proof
 80 cloth hermetically joined to that face of the strip in which the channel is formed and said channel having ports at opposite ends, whereby the channel with its covering constitutes a duct in the basic member connect-
 85 ing the ports.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature.

JESSE PETER ROGERS.

Witnesses:

CHAS. FULLER,
 BYRON RICHARDS.