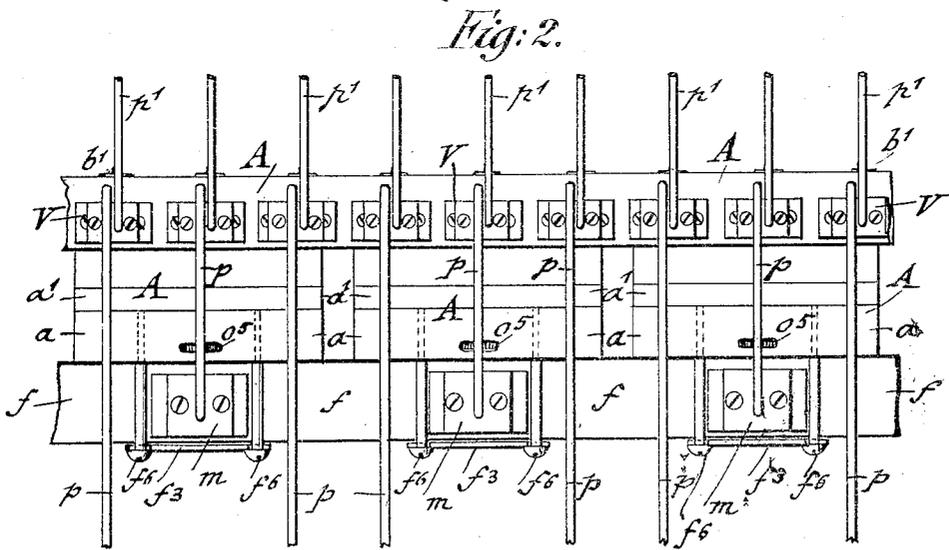
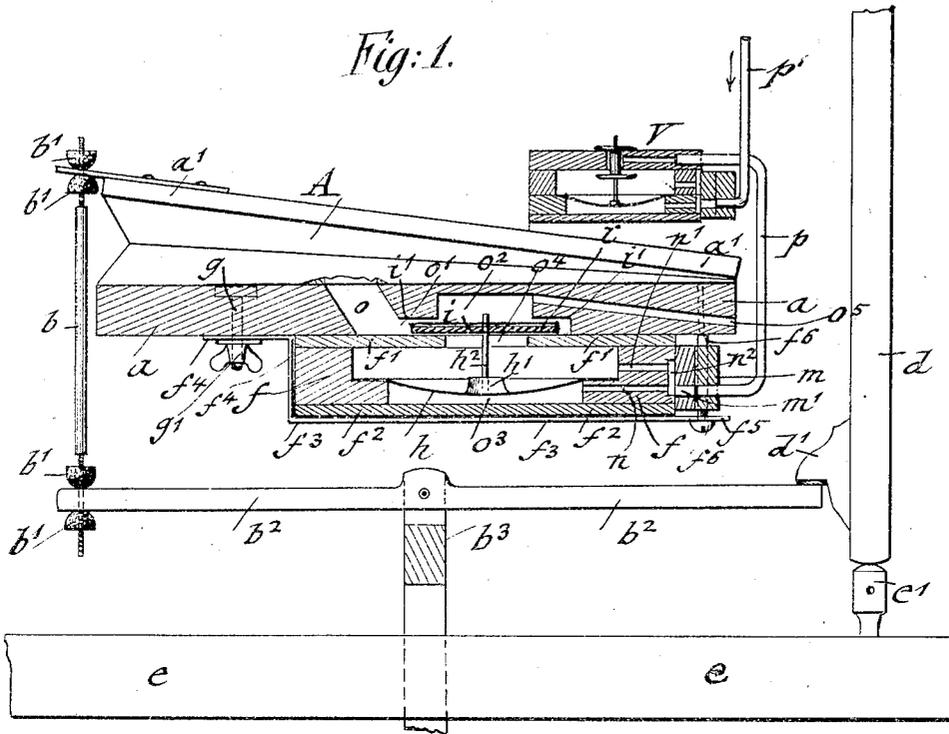


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 PNEUMATIC VALVE ACTION.  
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# UNITED STATES PATENT OFFICE.

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PNEUMATIC VALVE-ACTION.

1,013,259.

Specification of Letters Patent.

Patented Jan. 2, 1912.

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To all whom it may concern:

Be it known that I, FRANK L. YETTS, a subject of the King of Great Britain, residing in New York, in the borough of Manhattan, county and State of New York, have invented certain new and useful Improvements in Pneumatic Valve-Actions, of which the following is a specification.

This invention relates to an improved pneumatic valve-action for piano-players and other mechanical musical instruments, which, by the arrangement of some of the ducts and valve-seats in the stationary member of the pneumatic, furnishes a simple construction of the action, permits the convenient removal of the pneumatic from the suction-chest for inspection and repairs, and which can be made at a considerably lower cost than the pneumatic valve-actions heretofore in use.

The invention consists of a pneumatic valve-action in which the stationary member of the actuating pneumatic is provided with a suction-duct and seats for an admission-valve actuated by a diaphragm which is located in a recess in the bottom of the suction-chest, the stationary member of the pneumatic being also provided with a duct leading to the suction-chest and a channel communicating with the atmosphere, the space below the diaphragm communicating by a channel and pipe with one of the primary chests connected with one of the tracker-channels and by a vent-channel and duct with the suction-chest. A strap having an angular extension, is attached by screws to opposite ends of the stationary member of the pneumatic for permitting the removal of the latter from the suction-chest for inspection and repairs.

The invention consists further of certain details of construction which will be fully described hereinafter and finally pointed out in the claims.

In the accompanying drawings, Figure 1 represents a vertical longitudinal section through my improved pneumatic valve-action and through a primary valve connected with the same and the tracker, and Fig. 2 is a front elevation of a plurality of pneumatic valve-actions arranged side by side.

Similar letters of reference indicate corresponding parts in the figures of the drawings.

Referring to the drawings, *a* represents the stationary member of a bellows or pneu-

matic A of the usual construction and *a*<sup>1</sup> the movable member of the same, which is connected at its outer end by a vertical rod *b* provided with felt-buttons *b*<sup>1</sup> at its upper and lower ends, the lower end being connected with an intermediate lever *b*<sup>2</sup> which is fulcrumed to a lug *b*<sup>3</sup> supported in a suitable manner in the casing of the piano. The opposite end of the lever *b*<sup>2</sup> engages a projection *d*<sup>1</sup> on the upstroke or abstract *d* of the piano-action. The lower end of the upstroke or abstract *d* rests on a stud *e*<sup>1</sup> at the rear-end of the key-lever *e* of the piano-action.

The stationary member *a* of the pneumatic A is supported on the metallic top-plate *f*<sup>1</sup> of a suction-chest *f* which is supported at its ends by the side-walls of the piano-case and closed at its lower part by a bottom-plate *f*<sup>2</sup>. The pneumatic A is held in position by a metallic strap *f*<sup>3</sup>, which is provided with an angular extension *f*<sup>4</sup> at one end and which is provided with recesses *f*<sup>5</sup> at its opposite end, the angular extension lapping under the underside of the stationary member *a* and being connected thereto by a screw-bolt *g* and thumb-nut *g*<sup>1</sup>, while the opposite straight and recessed end of the strap *f*<sup>3</sup> is attached to the opposite end of the stationary member *a* by screw-posts *f*<sup>6</sup> that are applied to the opposite end of the stationary member *a*. The suction-chest *f* supports a plurality of pneumatics A which are arranged in a row or tier thereon. Any individual pneumatic A can be readily removed from the top of the suction-chest *f* by unscrewing the thumb-nut *g*<sup>1</sup> at the angular end of the retaining strap *f*<sup>3</sup>, removing the latter, and then lifting the opposite end of the pneumatic so that it can be removed with the fastening screws *f*<sup>6</sup> over the top-plate of the suction-chest for permitting the inspection and repair of the pneumatic and by removing all the pneumatics the inspection and repair of the suction-chest and the valves located thereon.

The stationary member *a* of the pneumatic A is provided with an inclined duct *o* which communicates by a short channel *o*<sup>1</sup> with a transverse recess *o*<sup>2</sup> in the stationary member. Vertically below the recess *o*<sup>2</sup> is arranged a recess *o*<sup>3</sup> in the bottom of the suction-chest which recess is covered by a diaphragm *h* that carries at its center, by means of a socket *h*<sup>1</sup>, a valve-stem *h*<sup>2</sup>, which latter passes through an opening *o*<sup>4</sup> in the

top-plate of the suction-chest into the recess  $o^2$  of the stationary member  $a$ . A valve  $i$  is attached to the upper end of the valve-stem  $h^2$ , and preferably formed of a plate  
 5 of aluminum which is faced on both sides with leather in the usual manner. The valve  $i$  rests when in its lower position on the top-plate  $f^1$  and in its upper position on a seat  $i^1$  formed around the recess  $o^2$  in the  
 10 stationary member. The top-plate  $f^1$  of the suction-chest  $f$  serves as a support for the pneumatics of all the valve-actions arranged thereon and as a seat for all the valves  $i$ . From the interior recess  $o^2$  of the stationary  
 15 member  $a$  extends an inclined channel  $o^5$  through the solid end of the stationary member by which communication with the atmosphere is established, the channel  $o^5$  being made wide enough so as to permit the  
 20 free ingress of the air when the valve  $i$  is to be returned to its normal position of rest. The suction-chest as well as the space below the diaphragm  $b$  of the pneumatic valve-action are connected by small channels  $n$ ,  $n^1$   
 25 with a vent-channel  $n^2$ , the vent-channel being closed by a small block  $m$  that is screwed onto the front-end of the suction-chest below the end of the stationary member  $a$ , as shown in Figs. 1 and 2, said block being provided  
 30 with a channel  $m^1$  into which a flexible pipe  $p$  is inserted, which is connected with a primary valve  $V$  that is arranged above each pneumatic and which is made of the usual construction, and by a second pipe  $p^1$  with  
 35 the corresponding tracker-channels. My improved pneumatic valve-action is operated as follows: As soon as one of the perforations in the music-sheet passes over one of the channels in the tracker, the pneumatic valve-action connected therewith is  
 40 called into action. The atmosphere passes through the pipe  $p^1$ , the primary valve  $V$  and the pipe  $p$ , into the space below the diaphragm, so that the latter is lifted and simultaneously therewith the valve  $i$  raised,  
 45 so that it is moved away from its normal position of rest on its seat on the top-plate of the suction-chest onto the seat  $i^1$  around the recess  $o^2$ . The lifting of the valve places  
 50 the interior of the pneumatic into communication with the suction-chest by the duct  $o$  and opening  $o^4$  and channel  $o^1$  and produces the instant collapsing of the pneumatic and the operation of the piano-action by the intermediate lever connection described. Simultaneously the valve  $i$  closes the recess  $o^2$   
 55 in the stationary member and shuts off the communication by the inclined channel  $o^5$  with the pneumatic. As soon as the tracker-channel is closed again by the non-perforated portion of the music-sheet, the ingress

of air is interrupted, and the air in the space below the diaphragm is sucked over into the suction-chest through the channel  $n$  the connecting vent-channel  $n^2$  and channel  $n^1$ , so  
 65 that the diaphragm is returned into its lower position, together with the valve, which latter is returned to its normal position on its seat on the top-plate of the suction-chest and shuts off the connection of the suction-chest  
 70 with the pneumatic and establishes again the connection with the atmosphere through the channel  $o^5$ . The pneumatic is thereby enabled to expand to its normal condition, while the parts connected with its movable  
 75 member, are returned to their normal position of rest.

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

1. The combination, with a suction-chest, of a diaphragm arranged in the same, a top-plate for the suction-chest provided with an opening above the diaphragm, a stem on the diaphragm, a valve connected to said stem  
 85 and resting on the top-plate of the suction-chest, a pneumatic the stationary member of which is supported on the suction-chest and provided with a duct for establishing communication with the suction-chest and with  
 90 a second duct for establishing communication with the atmosphere, a metallic strap extending around the suction-chest, and fastening screws for connecting said strap with the stationary member of the pneumatic.

2. The combination, with a suction-chest, of a diaphragm arranged in the same, a top-plate for the suction-chest provided with an opening above the diaphragm, a stem on the diaphragm, a valve connected to said stem  
 100 and resting on the top-plate of the suction-chest, a pneumatic the stationary member of which is supported on the suction-chest and provided with a duct for establishing communication with the suction-chest and with  
 105 a second duct for establishing communication with the atmosphere, said valve controlling said ducts, a metallic strap extending around the suction-chest, and fastening screws for connecting said strap with the  
 110 stationary member of the pneumatic, the plane of parting between said stationary member and said top-plate being coincident with the lower face of the valve when the valve is in its lowest position.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

FRANK L. YETTS.

Witnesses:

PAUL GOEPEL,  
 FANNIE FISK.