T. WINANS.

Pneumatic-Action for Organs.

No. 162,450. Patented April 20, 1875.

Fig. 1

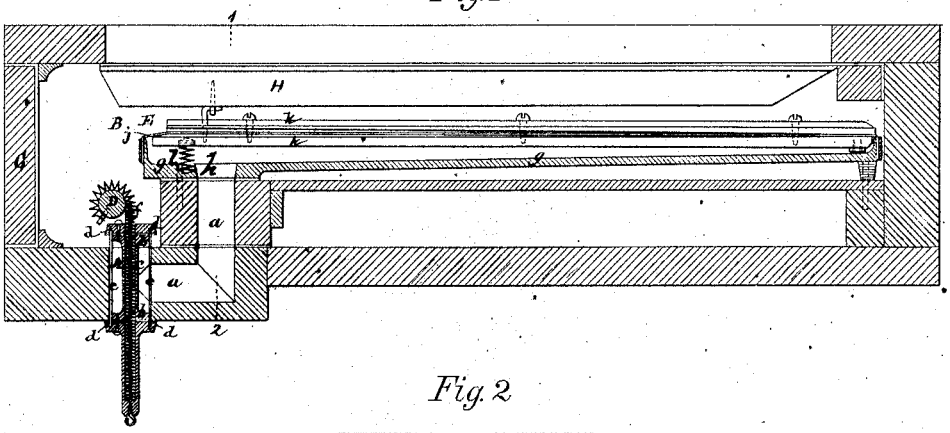


Fig. 2

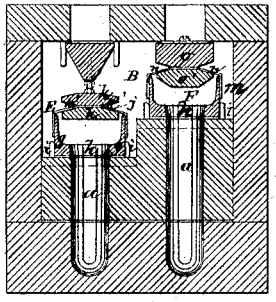
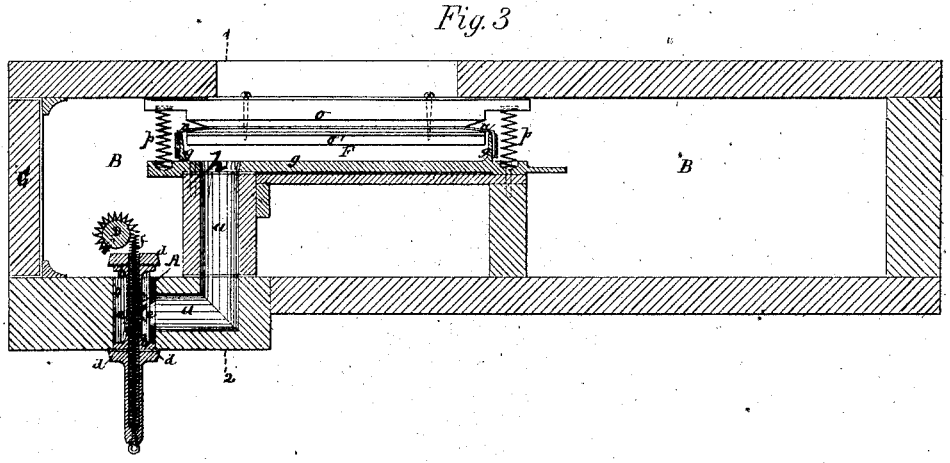


Fig. 4

Fig. 3



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THOMAS WINANS, OF BALTIMORE, MARYLAND.

IMPROVEMENT IN PNEUMATIC ACTIONS FOR ORGANS.

Specification forming part of Letters Patent No. **162,450**, dated April 20, 1875; application filed March 26, 1875.

To all whom it may concern :

Be it known that I, THOMAS WINANS, of Baltimore, Maryland, have invented certain new and useful Improvements in Pneumatic Actions for Organs, of which the following is a specification :

These improvements, relating to pneumatic actions for organs, are directed, first, to the construction of the valves which admit the air to and exhaust it from the pneumatic devices which control the admission of air to the pipes ; and, secondly, to the construction of the said pneumatic devices.

The nature of my improvements and the manner in which the same are or may be carried into effect can best be explained and understood by reference to the accompanying drawing, in which—

Figure 1 is a transverse vertical section of the wind-chest of a sound-board constructed on the slider principle. Fig. 3 is a like section of a similar wind-chest, with a modified form of the pneumatic pallet-action. The section in each figure is through the center of the air admission and exhaust valve, to which the first of my improvements relates. Fig. 2 is a section on the line 1 2, Figs. 1 and 3. Fig. 4 is a plan of the valve.

A is the valve-chamber, communicating at one end with the source of compressed-air supply, which, in this instance, is the wind-chest B, and at the opposite end with the external atmosphere. Leading from said chamber at a point intermediate between its two ends is the air-duct *a*, which communicates with the interior of the pneumatic device, or with the space below the vertically-moving top of the same. When the air-induction end of the valve is open, and the exhaust or eduction end is closed, compressed air will pass through the air-duct *a* into the space below the top of the pneumatic device, and the said top will thereby be raised by a light spring. When, on the other hand, the induction end of the valve-chamber is closed, and the eduction end is open, the space below the top of the pneumatic device is thrown in communication with the atmosphere, and cut off from the source of compressed-air supply. The superior air-pressure above consequently acts to force down the top of the pneumatic device, and the air below the same escapes through the eduction end of the chamber.

This mode of operating a pneumatic bellows or other pneumatic device is, broadly considered, not new with me ; but in the valve arrangement heretofore devised for this purpose the valve and valve-chamber have been so constructed and arranged that the valve, in moving either to supply air to or exhaust it from the pneumatic device, occupies, during a certain portion of its movement, a position in which there is direct communication between the induction and eduction ends of the valve chamber, so that during this time the air can pass directly from the wind-chest to the external atmosphere. This leakage and disagreeable noise attending the same it is my object to prevent. To this end I construct the valve as shown in the drawing. It is a double-plug valve, or a valve with two plugs or heads, *b*, connected by a central stem, *c*. The heads fit the bore of chamber A, within which they are adapted to move. The one essential condition with respect to the valve is, that the distance between the interior apposite faces of the two heads *b* at the edges shall equal or not exceed the length of the valve-chamber A, so that when the upper head rises far enough to open the induction-end of the chamber the lower head will close the eduction or exhaust end of the chamber, and vice versa, thus preventing the passage *a*, under any and all conditions, from being thrown into communication with more than one open end of the valve-chamber at any time. In this way it is obvious that the difficulty above alluded to is practically obviated.

The valve at top and bottom has, on the outer faces of the heads, a disk or laterally-projecting flange, *d*, of larger diameter than the head, which serves to close tightly the valve when at its extreme play either way. Guide-rods *e* extend between the heads, and serve to assure the valve in place during its movements.

The valve may be upheld by any suitable spring arrangement, this being its normal position. A desirable arrangement for the purpose is shown in the drawing. It consists in making the stem *c* hollow, and, preferably, prolonging it below the bottom of the valve,

where great length of spring is desired, its lower end being closed. In this hollow stem is secured, by its lower end, a spring, *f*, whose upper end extends up above the valve, and is fixed to some stationary point in the wind-chest. The prolongation of the stem is for the purpose of receiving a spring of sufficient length to insure delicacy and ease of action and of touch in cases when there is want of space to let it extend above.

Inasmuch as all the springs of the various manuals are under tension, it follows that when two or more manuals are coupled there will be a greater resistance offered to the depression of a key than when only one manual is in operation; or, in other words, the touch will vary according to the number of manuals coupled. It is, of course, very desirable that the touch should remain about the same, whether one manual or several manuals are used. To attain this result I attach the springs *f* of the valves to a rotary shaft, D, which can be turned to increase or decrease the tension of the springs at pleasure. This shaft may be operated separately by a suitable stop or lever arrangement, or, by suitable mechanism, it can be connected with the coupler, so as to be operated thereby.

In case several shafts are used for the different manuals they may be obviously arranged in many ways to be operated separately or collectively, as the case may be, either by the couplers, or by a distinct mechanism.

I would here remark that the upper flange *d* of the valve can be dispensed with, in which case the valve can readily be removed from below at any time desired by first unhooking or releasing the upper end of the spring.

The second portion of my improvement relates to the pneumatic device or valve-worker for regulating admission of air to the pipes. In Letters Patent No. 153,143, dated July 14, 1874, I have described and claimed for this purpose a flexible diaphragm operated to rise and fall by differences in the air-pressures above and below the same, and, by its movement, causing a corresponding rise and fall of the valve connected with or carried by it. My present improvements embody the same principle, and in the main are directed to the application of this principle to sound-boards constructed on the slider principle.

One feature of my improvements is the application of the diaphragm-valve worker in an oblong form to sound-boards of this class. Another feature is making the diaphragm-supporting case or frame of metal, so that by its weight it will make a close joint between it and the base or seat upon which it rests. It thus requires no positive connection or fastening to secure it in its seat, and can be removed and replaced with great facility, and with little loss of time.

One form of the diaphragm-valve lifter is shown at E in longitudinal vertical section, Fig. 1, and transverse vertical section, Fig. 2. The case or frame *g* of the valve is made of metal, with bottom and sides cast in one piece, and is oblong in shape. In the bottom of the case is formed a hole, *h*, at the point where the frame, when in position, comes over the passage *a*. The under side of the bottom at this point is provided with a flat face to rest on the seat surrounding the upper end of the passage *a*, which flat face is covered by a piece of sheep-skin or other material, to make a tight joint between the frame and the seat. The frame rests by its gravity on the seat, being slipped back into position through the front of the wind-chest, which, for this purpose, is provided with a removable front, G. The frame is directed to its proper place by guide-pins *i*, between which it passes. The top of the frame or case is closed by the flexible diaphragm *j*, which has a certain looseness to allow the proper up-and-down play. The greater portion of the upper and under surfaces of this diaphragm is covered by two disks or plates, *k*, the one above, the other below, the diaphragm. The two are fast to each other and to the diaphragm intermediate between them, and a certain portion of their contiguous faces is, near the outer boundaries of the same, beveled or rounded off, or equivalently formed, as shown at *k'*. This diaphragm-valve lifter is shown here in conjunction with the ordinary pallet H of a slider sound-board. The two are connected by a hook on top of outer disk *k*, which, when the frame or case slides back into place, enters an eye extending from the under side of the pallet, at or near its free end.

Air from the wind-chest normally enters the case through passage *a*, thus equalizing pressure above and below the diaphragm, and allowing the spring *l* within the case to elevate the forward part of the diaphragm, and consequently the disk *k* to close the pallet H. When, on the other hand, by the movement of the double-plug valve hereinbefore specified, the passage *a* is thrown into communication with the external atmosphere, the air exhausts from case *g*, and the diaphragm is depressed, thus opening the pallet H.

Another form of diaphragm-valve lifter is shown at F, in longitudinal vertical section, Fig. 3, and tranverse vertical section, Fig. 2.

This valve-lifter consists of a short oblong case, *m*, substantially similar in construction to the case *g* in Figs. 1 and 3. The diaphragm *n* is provided with upper and under disks *o* *o'*, substantially the same as the disks *k k*, before described.

This device differs, however, from the one hereinbefore described, in that the lifting-disks move vertically, and the same distance at each end, instead of rising only at one end, as in Fig. 1.

To this end lifting-springs *p p* are provided, one at each extremity of the valve, or a light spring in the center can be used.

The upper disk or plate *o*, in this instance, acts as a valve or pallet proper, to close the opening in the sound-board, and for this pur-

pose is formed and arranged as shown in Fig. 3; but this short vertically-moving diaphragm-valve lifter can, if desired, be arranged to operate an ordinary pallet in the same manner as is the valve-lifter in Fig. 1.

Having now described my invention, and the manner in which the same is or may be carried into effect, what I claim, and desire to secure by Letters Patent, as improvements in pneumatic actions for organs, is—

1. In combination with the valve-chamber and the air-passage to the pneumatic device, the double-plug valve, arranged to play in said chamber, and so formed that the distance between the interior opposite faces of its heads at their outer edges shall not practically exceed the distance between the induction and eduction openings of the valve-chamber, substantially as shown and set forth.

2. The double valve, consisting of two heads, adapted to fit in the valve-chamber, a central intermediate connecting-stem, and a flange or disk of larger diameter applied to the outer face of the eduction or exhaust head, substantially as set forth, with or without a like flange or disk on the exterior opposite face of the induction-head.

3. The hollow or tubular valve-stem, in combination with the valve-operating spring contained in said stem, substantially as set forth.

4. In combination with the plug-valve, the tubular central stem, prolonged below the outer head, and the valve-operating spring, received and secured in said stem, substantially as set forth.

5. In combination with the valve-operating spring or springs, a tension-regulating shaft, by whose rotation the tension of the spring or springs can be increased or decreased at will, substantially as and for the purpose set forth.

6. The pneumatic valve-lifter, for operating the pallets of slider sound-boards, consisting of an oblong case or frame, whose top is formed of a flexible diaphragm and piston disks or plates, as described, adapted to engage the pallet, and to operate the same, substantially as set forth.

7. A pneumatic valve-lifter, consisting of a case or frame, formed with an aperture in its bottom for air admission and exhaust, and closed at its top by a flexible diaphragm embraced between two piston disks or plates, the outer one of which carries or engages with the air-admission pallet or valve, or constitutes in itself the pallet or valve, substantially as set forth.

8. The case or frame of the pneumatic valve lifter or worker for slider sound-boards, formed of metal, so that it will, by its weight, make a tight joint with the air-duct, whereby other fastenings can be dispensed with, and the ready removal and replacement of the device is provided for, substantially as set forth.

In testimony whereof I have hereunto signed my name this 25th day of March, A. D. 1875.

THOMAS WINANS.

Witnesses:
W. S. WILKINSON,
GEORGE E. SAVILLE.