

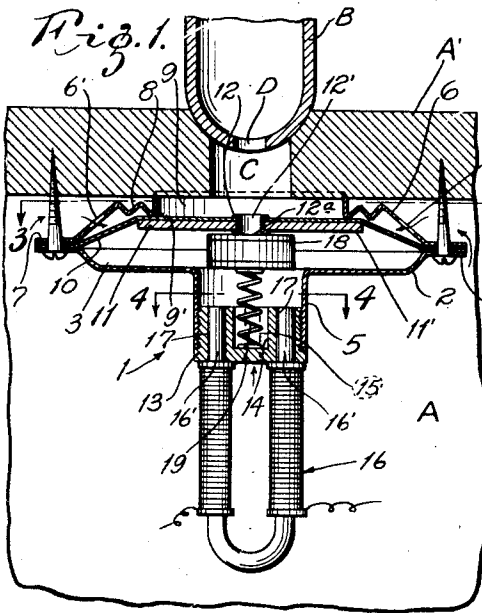
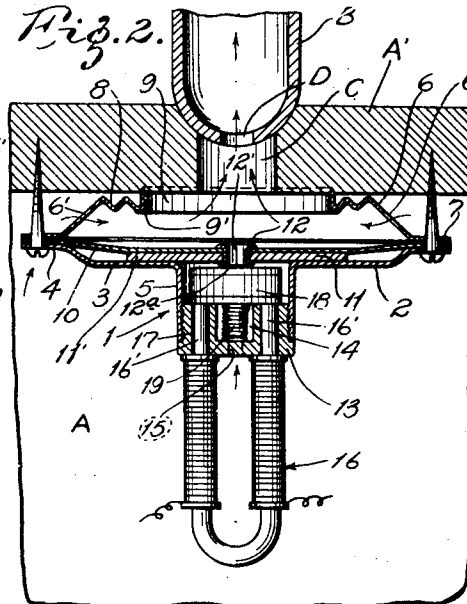
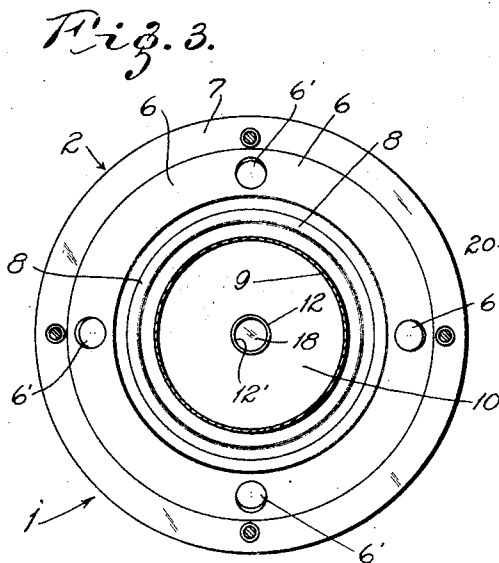
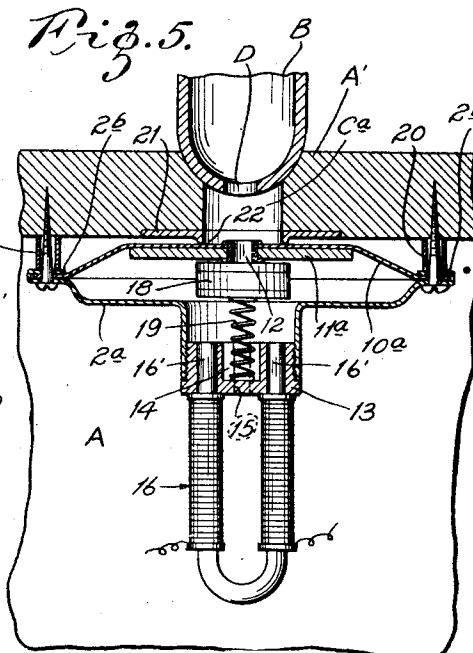
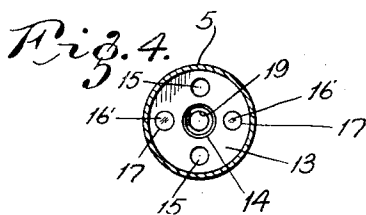
April 10, 1928.

1,665,868

H. F. WATERS

VALVE ACTION FOR PIPE ORGANS

Filed Feb. 19, 1927



INVENTOR:
HARRY F. WATERS.

By *Elliott & Harrington*
ATTORNEYS

UNITED STATES PATENT OFFICE.

HARRY F. WATERS, OF ST. LOUIS, MISSOURI.

VALVE ACTION FOR PIPE ORGANS.

Application filed February 19, 1927. Serial No. 169,466.

This invention relates generally to pipe organs, and particularly to an improved valve action therefor, the predominant object of the invention being to produce an improved valve action of the direct or blowing type as differentiated from the indirect or exhausting type, which will function in a highly efficient manner.

Another object of the invention is to produce a simple valve action of this type which is made in the form of a unit. One of my improved valve actions which is complete and self-contained in every respect is associated with each individual pipe of the organ and its unitary structure is such that it may be removed as a unit from its position within the wind chest of the organ at the minimum expense of time and trouble for the purpose of repair or replacement, or for any other purpose.

Other novel and advantageous features of construction in connection with my improved valve action will be apparent from the description hereinafter given.

Figure 1 is a vertical section of my improved valve action, portions of the wind chest and a pipe of the organ being associated with said valve action;

Figure 2 is a view similar to Fig. 1 but showing the parts of the valve action in moved positions;

Figure 3 is a cross-section on line 3—3 of Fig. 1;

Figure 4 is a cross-section on line 4—4 of Fig. 1;

Figure 5 illustrates a modified form of my invention.

In Figs. 1 and 2 of the drawing, which illustrate one embodiment of my invention, A designates the wind chest of an organ and B, a pipe thereof, said wind chest and pipe being of the usual construction and the pipe being supported in the ordinary manner. The top wall A' of the wind chest A is provided with an air passageway C formed therethrough and the toe portion of the pipe B is provided with an orifice D which communicates with said passageway C, whereby air which passes through said passageway C may pass into said pipe through the orifice D.

My improved valve action, which is designated generally in the drawing by the reference character 1, is made in the form of a unit and may be introduced into or removed from the wind chest of the organ

as such, and said valve action comprises a support for the parts of the valve action, which support in Figs. 1, 2 and 3, takes the form of a housing 2, but it is obvious that this support may be in other forms. The housing 2 is composed of a dished lower portion 3 provided with a circumferential horizontal flange 4 and a downwardly extended centrally located tubular portion 5 having internal screwthreads at its lower end. The upper portion of the housing 2 includes an annular upwardly inclined wall 6 provided with apertures 6' formed therethrough, a circumferential horizontal flange 7 similar to the flange 4 of the lower portion of the housing, and a crimped top wall 8. Centrally of the top wall 8 of the housing, the material thereof is bent upwardly to form a vertical annular wall which surrounds an air passageway 9 extending through the top wall of the housing and communicating with the interior thereof. When the housing 2 is arranged in place within the wind chest of the organ, said housing is so located that the passageway 9 thereof will surround the lower end of the air passageway 3 in the top wall A' of the wind chest, as clearly shown in Figs. 1 and 2, and the top edge of the vertical annular wall surrounding the passageway 9, which is more or less sharp due to said vertical wall being formed of thin material, will be caused to bite into the material of said top wall A' of the wind chest, whereby a relatively tight joint between said parts is obtained. The lower annular edge of the vertical annular wall of the housing top is located at a point below the lower edge of the crimped portion of the top wall of said housing, and said lower edge of said annular wall provides a valve seat 9', the function of which will be hereinafter set forth.

Located within the housing 2 of the valve action is a hollow receptacle, or a pneumatic pouch as it is called in this art, which is capable of being inflated and which is adapted to function as a valve to control passage of air from the wind chest of the organ to the associated pipe thereof, said pouch being formed by the lower portion of the housing 2 which functions also as the lower portion of the pouch and a flexible upper wall 10 formed of leather or other suitable material. The marginal edge portion of the flexible upper wall 10 has secured to it a gasket in the form of an annular strip of

paper or other suitable material, and said marginal edge of said flexible wall is interposed and clamped between the circumferential flanges 4 and 7 of the lower and upper portions, respectively, of the housing 2, whereby a fluid-tight joint is provided at this point. The flanges 4 and 7, the marginal edge portion of the flexible wall 10 and the gasket are provided with registering apertures, and when the housing 2 is secured in place within the wind chest, screws or other fastening devices are passed through said registering apertures and are extended into the top wall A' of the wind chest, as shown in Figs. 1 and 2, whereby said housing is retained in place, and the upper edge of the vertical annular wall already referred to is caused to bite into the material of the top wall of the wind chest, as previously described.

Secured to the flexible wall 10 of the pouch is a disk 11 of leather or other suitable material. This disk is secured, preferably by means of glue, to the flexible wall 10 at the lower face thereof. However, it is obvious that it may be secured to the upper face of said flexible wall if desired, and said disk provides said flexible wall with a relatively stiff wall portion which functions as a valve head and which hereinafter will be referred to as the valve 11', which valve is movable into and out of engagement with the valve seat 9', at the lower end of the air passageway 9. Extended through the disk 11 and through the adjacent portion of the flexible wall 10 is a tubular member 12, the upper and lower edges of which are turned over against the outer faces of the disk 11 and the wall 10, whereby said tubular member is retained in place and a fluid-tight joint is obtained between said parts. The opening through the tubular member 12 provides an air passageway 12' through the valve 11', and it is obvious in the absence of any obstruction thereto, that air may pass from the interior of the pouch through said passageway 12' and through the passageways 9, C and orifice D into the organ pipe B.

13 designates a plug which is introduced into the downwardly extended portion 5 of the lower portion of the housing 2, preferably by being screwed into the lower screw-threaded end thereof, said plug being provided with a recess 14 located at the approximate center thereof and being provided with one or more air passageways 15 formed therethrough. 16 designates an electro-magnet which is supported by the plug 13, the upper end portion of the U-shaped core 16' thereof being forced into openings 17 formed through said plug so that friction between the walls of the openings 17 and the core portions will rigidly connect the electro-magnet to the plug. The windings of the coils of the electro-magnet

16 are connected as is usually the case to a feed wire and ground wire (not shown) located within the wind chest, whereby electrical energy may be conducted to the electro-magnet.

Interposed between the top face of the plug 13 and the disk 11 associated with the flexible wall 10 of the pouch is an armature 18, said armature preferably being formed of a disk of Swedish metal provided at its top and bottom faces with layers of paper or other suitable material. The armature 18 functions as a floating valve, and said armature has a coil spring 19 associated with it which tends to force same upwardly, the upper end of said coil spring being in contact with the lower face of the armature and the lower portion of said coil spring being extended into the recess 14 in the plug 13 and is in contact with the base of said recess.

In the operation of the valve action illustrated in Figs. 1, 2 and 3, assuming that the electro-magnet 16 is de-energized, the pouch will be inflated with the result that the valve 11' will be in firm contact with the valve seat 9' at the lower end of the air passageway 9 formed through the upper wall of the housing 2. Also, the armature-valve 18 will be in firm contact with the valve seat 12' at the lower end of the air passageway formed through the valve 11' due to the exertion of the coil spring 19 and the pressure exerted by the air within the pouch acting against the lower face of said armature-valve, which air enters said pouch from the wind chest A through the air passageways 15 in the plug 13. It will be noted also that because of the apertures 6' in the inclined portion of the upper portion of the housing 2 through which air may pass from the wind chest, the air pressure per square inch exerting a downward pressure against the flexible wall 10 beyond the circumferential edge of the disk 11 will be the same as the air pressure per square inch within the pouch. It is plain, however, that because the valve 11' is in firm contact with the valve seat 9', the air within the housing 2 and above the flexible wall 10 may not pass into the air passageway 9 leading to the organ pipe B, and also because the armature-valve 18 is in firm contact with the valve seat 12', air from within the pouch may not pass through the air passageway 12' to the organ pipe. Assume with the parts positioned as described and as shown in Fig. 1 that the organ key associated with the valve action is depressed, this will complete an electric circuit to the electro-magnet 16, whereupon the armature-valve 18 will be attracted by the electro-magnet and drawn downwardly to the position in which it is shown in Fig. 2. When the armature-valve 18 has been drawn away from the valve seat 12' as de-

scribed, the air within the pouch will be permitted to pass therefrom through the passageway 12' to the organ pipe B, and as the armature-valve 18 is drawn into close contact with the top face of the plug 13, passage of air from the wind chest A through the passageways 15 and into the pouch, is prevented. When the air within the pouch is permitted to pass therefrom and passage of additional air into said pouch is prevented as described, it is plain that the pressure per square inch of the air acting against the top face of the flexible wall 10 beyond the circumferential edge of the disk 11 will be considerably greater than the pressure per square inch of the air within the pouch. Consequently, the flexible wall will be forced downwardly and the valve 11' will be carried away from the valve seat 9', with the result that air from the wind chest of the organ may pass freely through the apertures 6' into the housing 2 and through the passageways 9, C and orifice D into the organ pipe B, whereby said organ pipe will be caused to speak.

It has been found in practice that the operation of the valve action disclosed herein is very rapid, the movement of the armature-valve 18 and the valve 11' being almost simultaneous. In connection with the operation of my improved valve action, it is pointed out that all of the air which passes from the wind chest flows into the organ pipe, and there is, therefore, no loss of air, as is the case in the operation of valve actions of the indirect or exhaust type where some of the air is exhausted to the atmosphere.

In the form of the invention shown in Fig. 5, I do not employ a housing such as that shown in Figs. 1 and 2, but merely provide a support 2^a which supports the parts of the valve action. The support 2^a which is similar in shape to the lower portion of the housing 2 shown in Figs. 1 and 2 is fixed to the top wall of the wind chest A^a of the organ and I employ spacers 20, preferably in the form of tubular members, which surround the fastening devices by means of which the support 2^a is fixed in place, whereby said support is maintained the desired distance from the top wall of the wind chest. The flexible wall 10^a in the structure shown in Fig. 5 is held in place by having its circumferential edge portion clamped by the turned-over marginal portion 2^b of the support 2^a, and this flexible wall 10^a is subject to the air pressure within the wind chest. In the form of the invention shown in Fig. 5, I prefer to use a centrally-apertured plate 21 which is secured to the top wall of the wind chest adjacent to the air passageway C^a formed therethrough, said plate being provided with a downwardly extended annular portion 22 which functions as a valve seat against which the valve

11^a associated with the flexible wall 10^a acts.

The operation of the valve action shown in Fig. 5 is the same as the operation of the action shown in Figs. 1 and 2, and because the operation of the last mentioned action has been described, this operation will not be repeated in connection with the action shown in Fig. 5.

I claim:

1. A valve mechanism for pipe organs comprising a valve in the form of a hollow receptacle into which air may be introduced to inflate same, a portion of said hollow receptacle being movable into and out of contact with a valve seat to control passage of air to an organ pipe associated with said valve mechanism, the interior of said hollow receptacle being in communication with said organ pipe whereby air within said hollow receptacle may pass to said organ pipe, a second valve movable into and out of contact with a valve seat to control the passage of air from the interior of said receptacle to said organ pipe, and means whereby operation of one of said valves may be effected.

2. A valve mechanism for pipe organs comprising a valve in the form of a hollow receptacle into which air may be introduced to inflate same, a portion of said hollow receptacle being movable into and out of contact with a valve seat to control passage of air to an organ pipe associated with said valve mechanism, the interior of said hollow receptacle being in communication with said organ pipe whereby air within said hollow receptacle may pass to said organ pipe, a second valve located within said hollow receptacle and movable into and out of contact with a valve seat to control the passage of air from the interior of said hollow receptacle to said organ pipe, and means whereby operation of one of said valves may be effected.

3. A valve mechanism for pipe organs comprising a valve in the form of a hollow receptacle into which air may be introduced to inflate same, a portion of said hollow receptacle being movable into and out of contact with a valve seat to control passage of air to an organ pipe associated with said valve mechanism, said hollow receptacle being provided with an air passageway formed through a wall thereof by means of which the interior of said receptacle is placed in communication with said organ pipe, a second valve movable into and out of contact with a valve seat adjacent to said air passageway to control passage of air through the air passageway in the wall of said hollow receptacle, and means whereby operation of one of said valves is effected.

4. A valve mechanism for pipe organs comprising a pneumatic pouch, a portion of said pneumatic pouch being movable into and out of contact with a valve seat to con-

5 trol the passage of air to an organ pipe associated with said valve mechanism, said pouch being provided with an air passageway formed through a wall thereof by means
 10 of which the interior of said pouch is placed in communication with said organ pipe, a second valve arranged within said pouch and being movable into and out of contact with a valve seat to control the passage of
 15 air through the passageway in the wall of said pouch, and means whereby operation of said second valve may be effected.

20 5. A valve mechanism for pipe organs comprising a housing having an air passageway formed through a wall thereof and arranged in communication with an organ pipe, a valve seat at said air passageway, a
 25 pneumatic pouch within said housing, a portion of said pneumatic pouch being movable as a valve into and out of contact with said valve seat whereby passage of air to said organ pipe may be controlled, said pouch
 30 being provided with an air passageway formed through a wall thereof by means of which the interior of said pouch is placed in communication with said organ pipe, a valve within said pouch movable into and out of contact with a valve seat to control the passage of air through the passageway
 35 formed through the wall of said pouch, and means whereby the operation of the second mentioned valve may be effected.

40 6. In an organ, the combination with an organ pipe and a wind chest, of a unitary valve action comprising a housing having
 45 an air passageway formed through a wall thereof and arranged in communication with said organ pipe, said housing being located within said wind chest and being provided with an aperture in a wall thereof through which air may pass from said wind chest into said housing, a valve seat adjacent to the air passageway formed through a wall of said housing, a pneumatic pouch within
 50 said housing the interior of which is in communication with said organ pipe, a portion of said pneumatic pouch being movable as a valve into and out of contact with said valve seat whereby passage of air from said wind chest to said organ pipe may be controlled, a second valve movable into and out of contact with a valve seat to control the passage of air from the interior of said pouch to said organ pipe, said housing being
 55 provided with an air passageway through which air may pass from said wind chest into said pouch, and means whereby the operation of said second valve may be effected.

60 7. In an organ, the combination with an organ pipe and a wind chest, of a unitary valve action comprising a housing having an air passageway formed through a wall thereof and arranged in communication with said organ pipe, said housing being located with-

in said wind chest and being provided with an aperture in a wall thereof through which air may pass from said wind chest into said housing, a valve seat adjacent to the air passageway formed through a wall of said
 70 housing, a pneumatic pouch within said housing the interior of which is in communication with said organ pipe, a portion of said pneumatic pouch being movable as a valve into and out of contact with said
 75 valve seat whereby passage of air from said wind chest to said organ pipe may be controlled, a second valve arranged within said pouch and movable into and out of contact with a valve seat to control the passage of
 80 air from the interior of said pouch to said organ pipe, said housing being provided with an air passageway through which air may pass from said wind chest into said pouch, and means whereby the operation of
 85 said second valve may be effected.

8. In an organ, the combination with an organ pipe and a wind chest, of a unitary valve action comprising a housing having
 90 an air passageway formed through a wall thereof and arranged in communication with the said organ pipe, said housing being located within said wind chest, a valve seat adjacent within said air passageway formed through a wall of said housing, a pneumatic
 95 pouch within said housing, a portion of said pneumatic pouch being movable as a valve into and out of contact with said valve seat, said pouch being provided with an air passageway formed through a wall thereof by means of which the interior of said pouch is placed in communication with said organ pipe, a valve within said pouch and movable into and out of contact with a valve seat to control the passage of air through the
 100 passageway formed through the wall of said pouch, said housing being provided with an air passageway through which air may pass from said wind chest into the interior of said pouch and an air passageway through which
 105 air may pass from said wind chest into said housing and outside of said pouch, and means whereby operation of said second valve may be effected.

110 9. In an organ, the combination with an organ pipe and a wind chest, of a unitary valve action comprising a pneumatic pouch provided with means whereby air may pass thereinto from said wind chest, a portion of
 115 said pneumatic pouch being movable as a valve into and out of contact with a valve seat to control passage of air from said wind chest to said organ pipe, said pouch being provided with an air passageway formed through a wall thereof by means of which
 120 the interior of said pouch is placed in communication with said organ pipe, a valve within said pouch movable into and out of contact with a valve seat to control the passage of air through the passageway formed
 125 through a wall thereof by means of which the interior of said pouch is placed in communication with said organ pipe, a valve within said pouch movable into and out of contact with a valve seat to control the passage of air through the passageway formed
 130

through the wall of said pouch and the passage of air into said pouch from said wind chest, the outer surface of said pouch being subject to the air pressure within the wind chest whereby said pouch will be de-
5 flated upon movement of the second valve to an open position, whereby air from said wind chest will be permitted to pass into said organ pipe.

10 10. A valve mechanism for pipe organs comprising a housing, a valve within said housing, a second valve within said housing, said valve being independently operable and each thereof being adapted on movement to
15 an open position to permit air to pass thereby directly to an organ pipe associated with

said valve mechanism, a plug inserted through a wall of said housing, and an electrical device supported by said plug and adapted to actuate one of said valves, said
20 plug and said electrical device being removable from the housing without necessitating access to the interior thereof.

11. A valve action for pipe organs including a pouch into which air may be intro-
25 duced to inflate same and provided with an air passageway leading from the interior thereof to an organ pipe.

In testimony whereof, I have hereunto set my hand.

HARRY F. WATERS.