June 15, 1926. 1,589,080

E. P. KYLE

VALVE MECHANISM

Filed Oct. 3, 1925 2 Sheets-Sheet 1

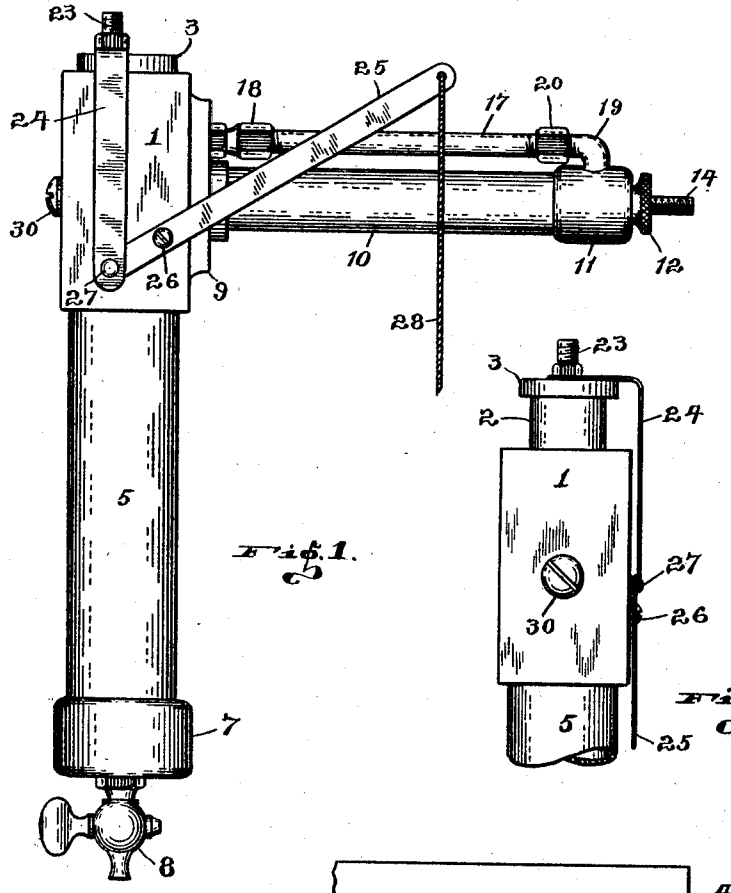


Fig. 1.

Fig. 2.

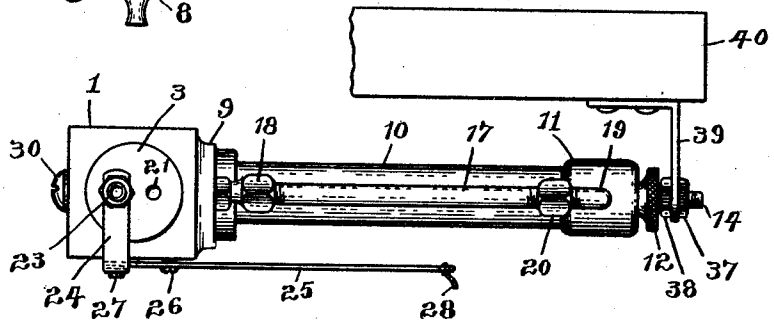


Fig. 3.

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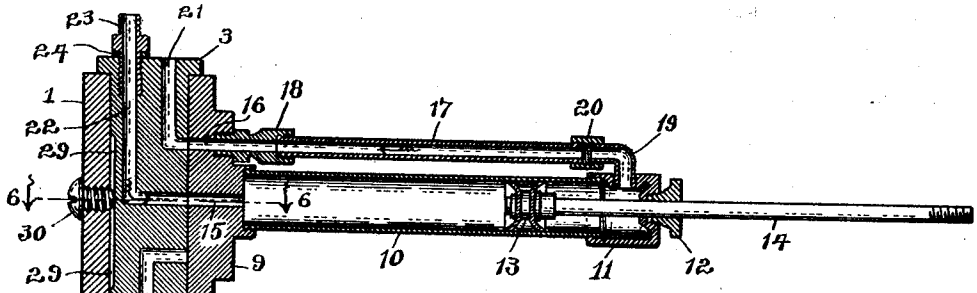


Fig. 4.

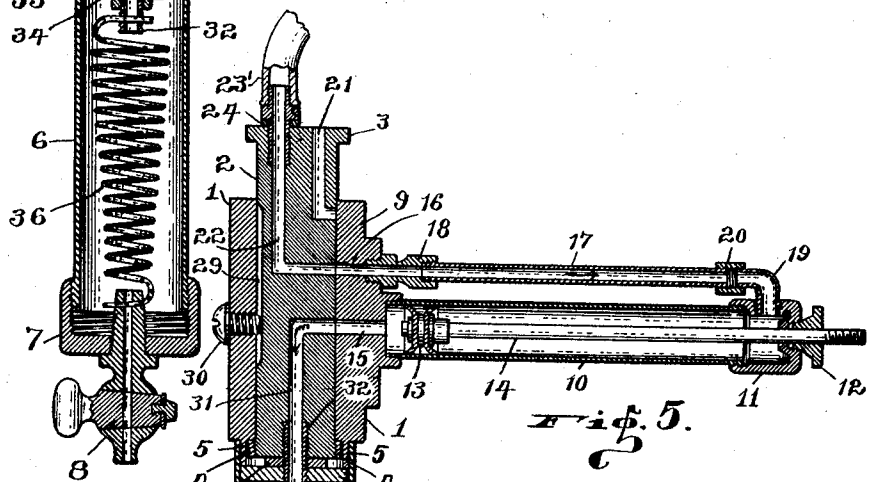


Fig. 5.

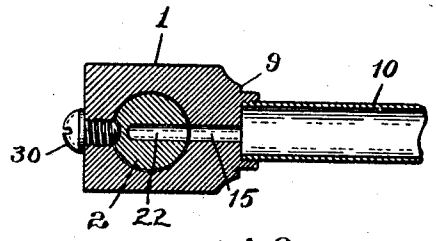


Fig. 6.

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UNITED STATES PATENT OFFICE.

ERNEST P. KYLE, OF NEAR ELDORADO, OHIO.

VALVE MECHANISM.

Application filed October 3, 1925. Serial No. 60,343.

The object of this invention is, primarily, to provide a pneumatic valve mechanism intended to afford means for the operation of other instrumentalities, such for instance as sliding doors or the like. And further to provide a construction for the purposes set forth herein, which construction is simple in character, strong and durable in its several parts, practically automatic in its operation, and which can be manufactured, sold, and installed at a comparatively low price.

Other objects and particular advantages of this invention will be brought out in the course of the following description, and that which is new and useful will be correlated in the appended claims.

The preferred means for carrying out the principles of my invention in a practical and efficient manner is shown in the accompanying two sheets of drawings, in which—Figure 1 is a side elevation of my complete mechanism. Figure 2 is a side elevation of the upper portion of the device, taken at right angles to Fig. 1. Figure 3 is a top plan view of the device. Figure 4 is a central longitudinal section of the device, showing the interior mechanism thereof, and showing the plunger at its downward limit of movement. Figure 5 is the same as Figure 4, except that the plunger is shown at its upper limit of movement. And Figure 6 is a detail horizontal section, as taken on the line 6—6 of Figure 4.

Similar indices denote like parts throughout the several views.

In order that the construction, the operation, and the several advantages of the invention may be more fully understood and appreciated I will now take up a detailed description thereof, in which I will set forth the same as comprehensively as I may.

In the drawings numeral 1 denotes the body of the valve, which in this instance is in the nature of a substantially square block. The said body has a central aperture formed therethrough to receive slidably therein the plunger 2, which is adapted to extend therebeyond at each end thereof. Formed integral with the upper end of the plunger 2 is the head 3 which is adapted to project out onto the upper end of the body 1 forming a stop. The lower end of the plunger 2 is threaded, to receive the nut 4, which is adapted to engage with the lower end of the body 1 to form a stop.

Thus it will be seen that while the plunger is slidable endwise that both its lower and its upper movements are limited by the head 3 and the nut 4, respectively, for the purposes hereinafter stated.

Formed integral with and extending down from around the lower end of the plunger-aperture in the body 1, is an exteriorly threaded flange 5, which is adapted to receive the upper end of the exhaust cylinder 6. The lower end of the cylinder 6 is provided with a screw cap 7. Threaded into the cap 7 is the pet-cock 8.

One of the sides of the body 1 is formed of an increased thickness from that of the other sides, as shown at the right in the drawings, to provide the reinforcement 9, which is integral with the body 1.

Threaded into the reinforcement 9 is the actuating cylinder 10, which is at right angles to the cylinder 6. Threaded onto the outer end of the cylinder 10 is the elongated cap 11, which has an aperture through its center in which is threaded the packing nut 12.

Operative in the cylinder 10 is the piston 13, which is secured to the connecting-rod 14, the latter projects out through the nut 12, for the purposes hereinafter stated.

Formed through the reinforcement 9, and the side of the body 1, is a duct 15, the same being concentric with and opening into the cylinder 10, and it leads to the aperture in which operates the plunger 2. Likewise, located above and parallel with the duct 15, is the duct 16, which also leads into the aperture in which operates the plunger 2, and its outer end is connected with the tube 17 by means of the coupling 18.

An elbow 19 is threaded into the side of the cap 11, connecting with the interior thereof, and the outer end of the tube 17 is connected with said elbow by the coupling 20.

Numeral 21 denotes an L-shaped duct formed in the plunger 2, with its upper end leading out through the head 3, with its lower end turned outward and adapted to register with the duct 16, when the plunger 2 is down to its limit of movement, as in Fig. 4.

Numeral 22 denotes an L-shaped duct formed in the plunger 2, with its upper end leading out through the head 3, with its lower end turned outward and adapted to register with the duct 15, when the plunger 2 is down to its limit of movement, as shown

in Fig. 4; or to register with the duct 16 when the plunger is up to its limit, as shown in Fig. 5.

Numeral 31 denotes an L-shaped duct, formed in the plunger 2, with its lower end opening through the center of the lower end of the plunger and into the cylinder 6, and with its upper end extending outward and adapted to register with the duct 15 when the plunger 2 is at its upper limit of movement, as in Fig. 5.

A nipple 23 extends from the duct 22 outward, where it is adapted to have a flexible air or fluid line 23' attached thereto, to lead from a source of power, as compressed air or the like.

Numeral 24 denotes an L-shaped arm, the horizontal portion of which is secured on top of the head 3 by means of the nipple 23 which extends therethrough and clamps it in position as shown. The vertical portion of the arm 24 extends down near one side of the body 1.

Numeral 25 denotes a lever, which is fulcrumed on the screw 26 which is secured in the body 1, as shown. The shorter end of the lever 25 is connected with the lower end of the arm 24 by a pivot 27; and a cord or chain 28 is secured in an aperture in the outer end of the lever 25, for operating said lever at a distance.

From the above it can be seen that the plunger 2 may be raised by means of the cord or chain 28.

Formed vertically in the periphery of the plunger 2 is a channel 29, and directly opposite thereto a screw 30 is threaded through the wall of the body 1, with the end of said screw adapted to enter the channel 29 in order to prevent the plunger from turning but not interfering with its vertical movements.

The lower portion of the duct 31 is enlarged and threaded, in order to permit the tubular conduit 32 to be screwed thereinto, the interior diameter of the conduit 32 being such as to equal the diameter of the duct 31. Said conduit 32 projects some distance below the lower end of the plunger 2. Threaded on the lower projecting portion of the conduit 32 are the nuts 33 and 34, between and by which is secured the piston 35 which fits slidably in the cylinder 6, and it may be formed of leather or the like as desired.

Numeral 36 denotes a helical spring, one end of which is secured in the lower end of the conduit 32 and the other end thereof is secured, under tension, to the inwardly projecting stem of the pet-cock 8.

Threaded on the outer end of the rod 14 are the nuts 37 and 38, between which is clamped one member of the angular bracket 39; the other member of said bracket is secured to the element to be operated by my device, as for instance the door 40.

The operation of my device may now be easily followed: We will assume that the nipple 23 is connected with a source of compressed air, it is apparent that normally the plunger 2 is down, as in Fig. 4, this being caused both by gravity and by the pull of the spring 36. In the said down position the pressure entering through the nipple 23 will pass through the ducts 22 and 15 into the cylinder 10, and by the pressure so admitted it is evident that the piston will be forced positively outward to its limit, thereby eventuating in locating the door in what for convenience of description we will term "closed position", the position in which the door is shown in Fig. 3 being the opposite to the above, that is "open position". Desiring now to move the door to open position, one has only to pull downward on the cord 28, to move the plunger 2 upward to the position in which it is shown in Fig. 5. Moving the plunger up to said position will connect the duct 22 with the duct 16, at the same time connecting the duct 31 with the duct 15, therefore the pressure entering through the duct 22 will pass through the tube 17, into the cap 11, thereby forcing the piston 13 to the left, and as the piston 13 moves to the left it is evident that the air in the cylinder 10 will be forced through the ducts 15 and 31, and the conduit 32, into the cylinder 6.

By means of the pet-cock 8, or other means, a small exhaust of pressure may be permitted therethrough, whereby the door 40 may be retained open a longer or a shorter length of time, depending on the time required for the plunger to move down to its limit in the body 1.

Also the speed at which the air is permitted to leak through the pet-cock will control the downward movement of the plunger 2 for it can not move down until the pressure in the cylinder 6 has decreased to less than the pull of the spring 36, plus the natural gravity of the plunger.

It will now be seen that as soon as the air in the cylinder 6 permits the plunger to move down to the position shown in Fig. 4, then three things will transpire simultaneously: The connection between the cylinders 6 and 10 will be cut off; the connection between the duct 22 and the cylinder 10 will be reestablished; and an exhaust channel will be established from the interior of the cap 11 out through the duct 21, thereby permitting the pressure to force the piston 13 to the right, thereby closing the door 40. I desire to call attention to the fact that one of the essential features of this construction is that of the timing feature: Whereby the door may be caused to stay open just the time required by simply setting the leakage through the pet-cock to that desired, and the door will not begin to close until the plunger has

moved down to position where the duct 22 will register with the duct 15 to permit the air to enter, thereby finally closing the door almost instantly.

While the device herein set forth is applicable to various operations and for many purposes, it is more especially intended to operate doors, particularly to operate doors in booths connected with tellers' windows in banks, and other establishments.

It is to be understood that various changes and variations may be made in the construction herein set forth in order to adapt it to various conditions and for various purposes, without departing from the spirit of the invention and without sacrificing any of the advantages thereof which are new and useful.

Having now fully shown and described my invention, what I claim and desire to secure by Letters Patent of the United States, is—

1. A valve mechanism comprising a body, a plunger slidable vertically in said body, an actuating cylinder extending laterally from said body, a piston slidable in said cylinder, a connecting-rod connected to the piston, means for manually operating said plunger in one direction, an exhaust cylinder extending down vertically from said body, means for adjusting the exhaust of pressure from said exhaust cylinder, there being ducts for conducting pressure into and from said plunger into the actuating cylinder and from the actuating cylinder into the exhaust cylinder, with means for changing the flow of pressure by raising or lowering said plunger.

2. A valve mechanism comprising a body, a plunger slidable in the body, means for limiting the movement of the plunger in each direction, there being a pressure inlet duct and an outlet duct formed in the plunger and opening through one side thereof, also an outlet duct in the lower portion of the plunger and opening through one side and the lower end thereof, there also being two ducts formed through the wall of the body which are adapted to register with the said ducts in the plunger by the operation of the plunger, an actuating cylinder connected with one of the upper ducts in the wall of the body, a tube connected with the other upper duct in the wall of the body with the other end of said tube leading into the outer end of the said cylinder, a piston operative in said cylinder with the exhaust from said cylinder, on one side of the piston, being through said tube, and from the other side of the piston the exhaust being through said duct in the lower portion of the plunger, an exhaust cylinder secured to said body and surrounding the lower end of the plunger with the said lower duct leading thereinto and adapted to discharge thereinto, a spring located in the exhaust cylinder for pulling the plunger resiliently downward, and means for adjusting the exhaust from the exhaust cylinder.

ERNEST P. KYLE.