Feb. 28, 1939. G. A. APPLEGARTH 2,148,891

PLUNGER VALVE

Filed Aug. 25, 1937

Fig. 1.

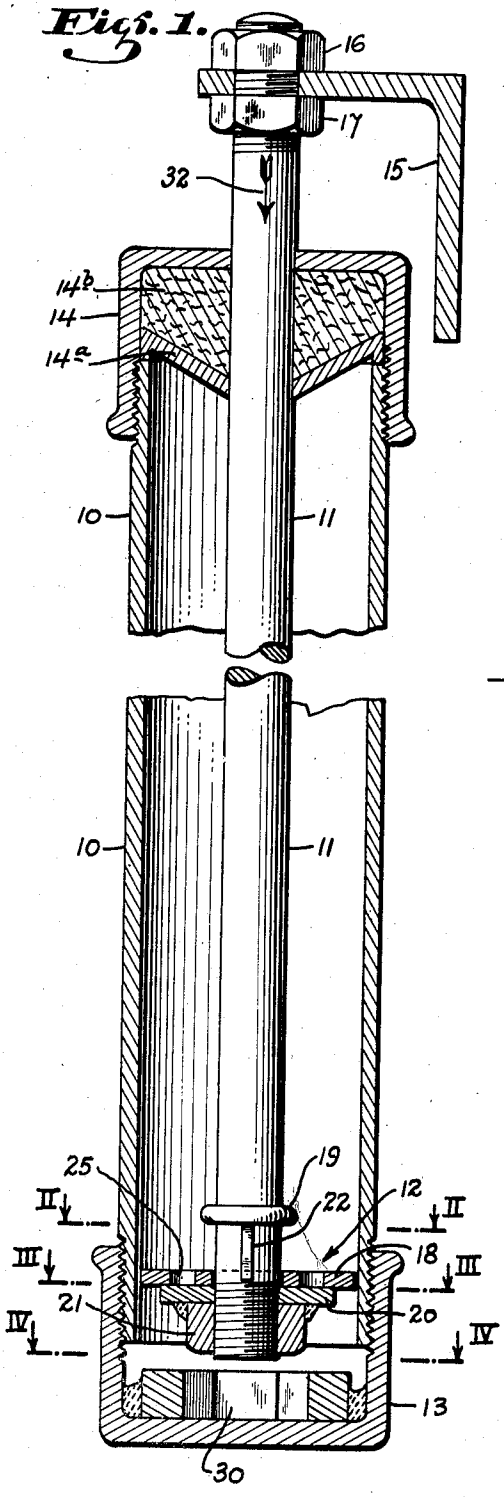


Fig. 2.

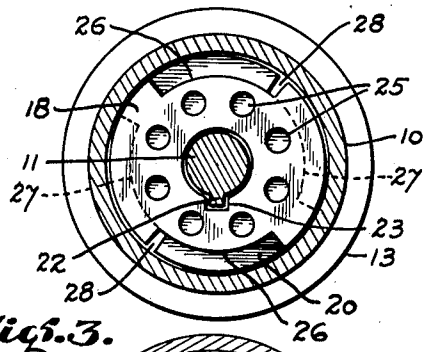


Fig. 3.

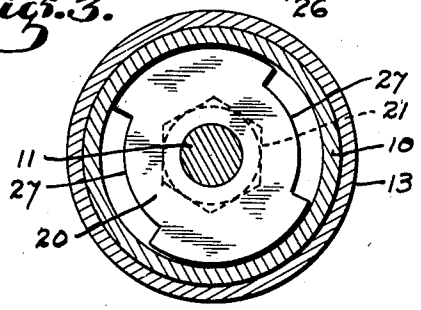
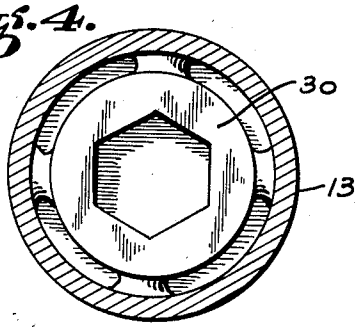


Fig. 4.



INVENTOR,
George A. Applegarth.
BY
Chas. E. Townsend
ATTORNEY.

Patented Feb. 28, 1939 2,148,891

UNITED STATES PATENT OFFICE

2,148,891

PLUNGER VALVE

George A. Applegarth, San Francisco, Calif.

Application August 25, 1937, Serial No. 160,897

2 Claims. (Cl. 188—96)

This invention relates to a plunger valve, and particularly to a valve especially adapted for use in dashpot plungers.

In Patent No. 2,084,303, entitled "Fire escape", issued to me on June 22, 1937, there is disclosed a device for lowering a ladder from a fire escape balcony to the ground. The ladder of this device is normally held in a position above the ground by a latch, and when the latch is released the ladder descends. One method for controlling the descent of such ladders includes the use of a dashpot. Where this method is employed, the descent of the ladder is controlled by a plunger in a cylinder of oil or other fluid which acts as a dashpot to limit the speed of its downward travel, for safety purposes. For practical reasons, this dashpot must be of inexpensive construction, and the cylinder is usually made of iron pipe that is more or less rough on its inner surface. It is desirable, also, for the plunger to be of the type to permit the plunger to be raised more easily and quickly than it is lowered; and it is desirable, for reasons that will be set forth hereinafter, that the plunger include a valve to permit adjustment of the speed of fluid passing it, and thereby vary the speed of descent of the ladder.

It is the object of the present invention to provide a plunger valve that is simple and inexpensive in construction, and capable of adjustment to a fine degree, yet positive in operation and not likely to become out of adjustment. Further objects and advantages of the invention are set forth in the following specification, wherein reference is made to the accompanying drawing, which illustrates a preferred form of the invention.

In the drawing, Fig. 1 is a vertical sectional view of a dashpot cylinder having a valve therein constructed in accordance with the invention;

Fig. 2 is a section taken on the line II—II of Fig. 1, showing the construction of the top valve plate;

Fig. 3 is a section on the line III—III of Fig. 1, showing the construction of the bottom valve plate; and

Fig. 4 is a sectional view taken on the line IV—IV of Fig. 1, showing the construction of the bottom wall of the dashpot cylinder.

Referring in detail to the drawing, an elongated cylinder which serves as a dashpot is illustrated at 10. A plunger rod 11 is reciprocably mounted with relation to the cylinder, and carries the plunger valve generally indicated at 12 at its lower end. A cap 13 closes the lower end of the cylinder 10, and a cap 14 closes the upper end of the cylinder, the cap 14 being centrally perforated to permit passage of the plunger rod 11, and serving to secure in place a packing gland 14a and suitable packing as illustrated at 14b.

In the application of the device to a fire escape ladder, the cylinder 10 is welded or otherwise secured to a ladder not shown, and the plunger rod 11 is secured to a stationary bracket 15 which may be carried by a part of the building or by a higher fire escape balcony by means of a pair of lock nuts 16 and 17 threaded to the upper end of the rod 11. The position of the balconies is clearly illustrated in the patent referred to above, and for the purpose of illustrating the present invention it will suffice to state that upon release of a latch which holds the ladder in a raised position, the ladder moves downwardly until its lower end contacts the ground, making possible the descent of anyone trapped in the building by fire. As the ladder moves downwardly, it carries with it the cylinder 10. This cylinder is filled with a fluid which may either be liquid or air, but which is preferably an inexpensive grade of oil, and the downward movement of the ladder causes the fluid, most of which is contained above the plunger valve 12, to pass the plunger valve into the part of the cylinder below the same. The rate at which the fluid is permitted to pass the plunger valve 12 therefore controls the speed of descent of the ladder, rendering the descent sufficiently slow to avoid damage to the ladder or injury to persons below. Consequently, when it is desired to return the ladder to its raised position, the fluid must be forced from the lower part of the cylinder 10 to the upper part, passing the plunger valve during the upward movement of the cylinder. The plunger valve comprises a floating valve plate 18 which surrounds the plunger rod 11 and which is limited in its upward movement by a collar 19 which may be welded to the plunger rod, and limited in its downward movement by a valve plate 20 which is welded to a nut 21 threaded to the lower end of the plunger rod. The nut is fitted with a snug thread, so that accidental turning thereof due to vibration and the like will not occur. Rotational movement of the floating valve plate 18 is prevented by means of a key 22 welded to the plunger rod and extending longitudinally thereof between the collar 19 and the valve plate 20, and fitting within a slot 23, best shown in Fig. 2, of the valve plate 18. Upon downward movement of the cylinder 10, the fluid in the

upper portion of the cylinder passes the plunger valve in a downward direction, and its flow is confined to the space between the peripheral edge of the valve plates 18 and 20 and the inner wall of the cylinder 10. However, to facilitate upward movement of the ladder to replace it after it has been used, the floating valve plate 18 is provided with a plurality of ports, as indicated at 25, and as the fluid, moving from the lower part of the cylinder to the upper part of the cylinder, contacts the edges of the plate, it raises the plate, opening the ports 25, which are normally closed by the valve plate 20. Thus the fluid is free to flow not only past the periphery of the valve plate 18 but through the ports 25 as well.

It is desirable that the rate of flow of the fluid during descent of the ladder be variable, for the following reasons: the internal diameter of pipes of a given nominal size may vary slightly, and therefore, if the plunger valves are made to an exact size they will operate differently in different pieces of pipe. Furthermore, the viscosity of oil, which is the fluid most commonly used, is different, and it may be desirable, because of the price of different types of oil in different localities or because of variation in viscosity of oils due to seasonal temperature changes, to adjust the valves so that they will operate uniformly at all times and places. Such an adjustment is effected through the construction of the valve plates 18 and 20, as they are illustrated in Figs. 2 and 3 respectively. The valve plate 18 is provided with a pair of oppositely disposed marginal recessed portions 26, and the valve plate 20 is provided with similar recessed portions 27, so that upon relative rotation of the plates 18 and 20, openings of variable size may be effected, such openings being illustrated at 28 in Fig. 2. If an oil of high viscosity is to be used, the valve plates 18 and 20 are rotated to effect a relatively large opening at 28, while if a low-viscosity oil, which will flow freely, is being used, the size of the opening is reduced, or if desired the opening is closed altogether. The exact rate of speed at which the ladder will descend under given conditions is best determined by actual operation, and in order that it will not be necessary to disassemble the entire dashpot for the purpose of making an adjustment, a socket illustrated at 30 in Figs. 1 and 4 is firmly secured, as by welding, into the cap 13 which forms the bottom wall of the cylinder 10, the socket 30 being hexagonally recessed to receive the nut 21 to which the valve plate 20 is welded. In the normal operation of the device, the upward movement of the cylinder will not be sufficient to cause the nut 21 to be engaged by the socket 30; however, when it is desired to vary the openings 28 of the plunger valve, the lock nut 16 at the upper end of the plunger rod is loosened to permit rotation of the rod. The ladder is then raised slightly, or the plunger rod lowered, until the nut is received by the socket 30. When the nut is so received, a wrench may be applied to the upper end of the rod 11 to rotate the rod in the nut 21. Rotation of the rod 11 will effect rotation of the valve plate 18, by means of the key 22, and consequently will vary the size of the openings 28, due to the fact that the nut 21 and the valve plate 20 are being held stationary by means of the socket 30. In order to indicate the relative positions of the valve plates and the approximate size of the openings 28, the upper end of the plunger rod 11 may be marked with an arrow, as indicated at 32, and a corresponding arrow or suitable marking may be placed on the top surface of the cap 14. Thus, if the device is assembled with the arrows in alignment and with the openings 28 fully closed, the position of the arrows will indicate at any time the degree to which the setting of the valve plates has been varied. If the lock nut 16 is retightened after adjustment, without rotating the plunger rod, the position of the nut 21 at the lower end of the rod will always be such as to permit its entry into the socket 30 for further adjustment when desired.

Having thus described and illustrated my invention, what I claim and desire to secure by Letters Patent is:

1. In a dashpot comprising a cylinder and a plunger rod, a plunger valve comprising a valve plate secured to a nut threaded to the end of the plunger rod, a second valve plate slidably and non-rotatably connected to the rod, said valve plates normally lying face to face and having relieved sections at their marginal edges to provide a fluid passage that is adjustable upon relative rotation of the plates, and a socket in the end of the cylinder adapted to receive said nut and hold it and the valve plate secured to it against rotation while the plunger rod and the other valve plate are rotated to adjust the valve plates.

2. In a dashpot, comprising a cylinder and a plunger rod, a plunger valve comprising a valve plate secured to a nut threaded to the end of the plunger rod, a second valve plate slidably and non-rotatably connected to the rod, said valve plates normally lying face to face and having registering fluid passages which may be regulated upon relative rotation of the plates, and a socket in the end of the cylinder adapted to receive said nut and hold it and the valve plate secured to it against rotation, while the plunger rod and and the other valve plate are rotated to adjust the valve plates.

GEORGE A. APPLEGARTH.