

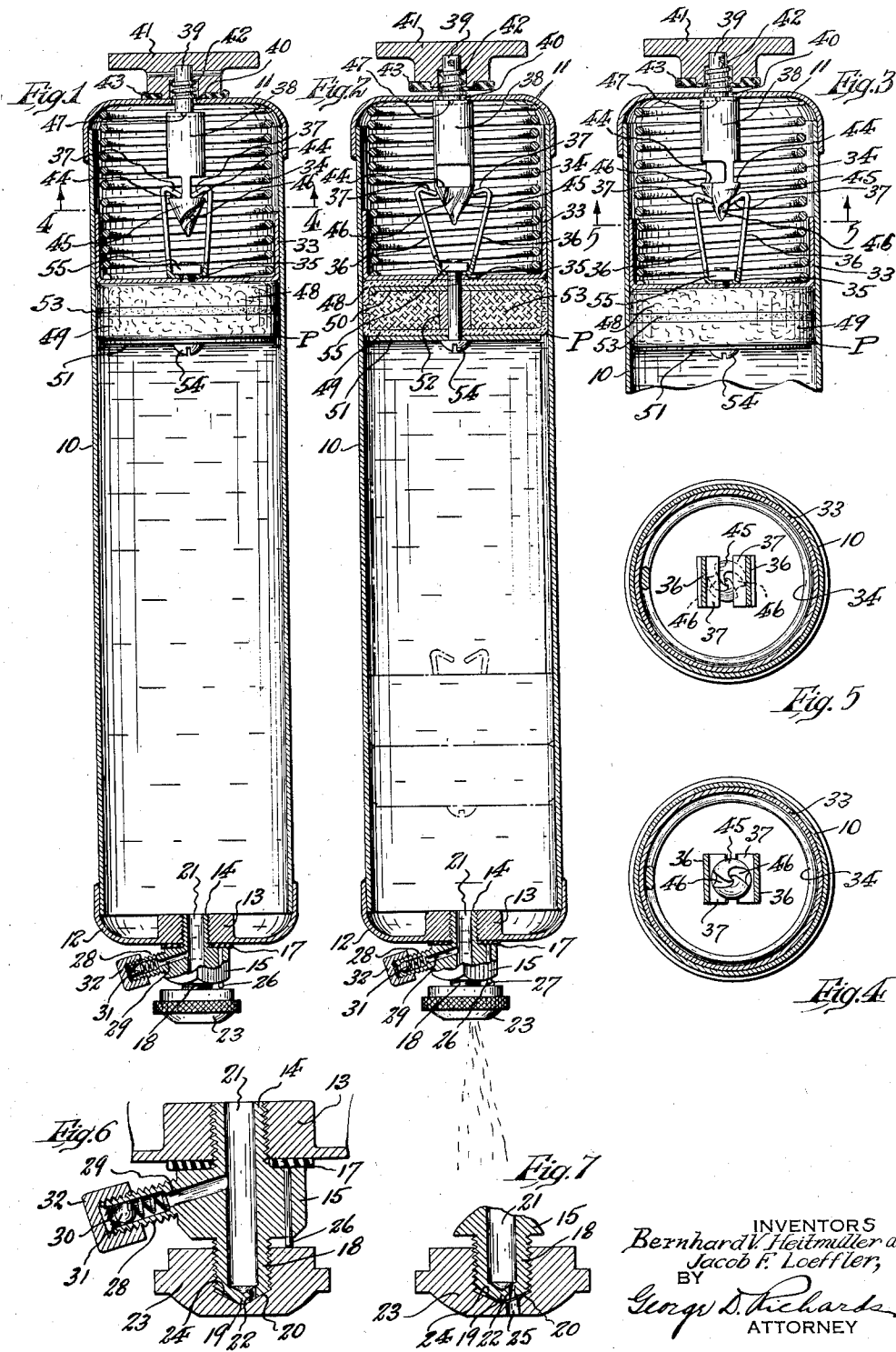
Aug. 28, 1934.

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1,971,450

FIRE EXTINGUISHER AND OTHER PUMP LIKE DEVICE

Filed Oct. 21, 1932



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1,971,450

FIRE EXTINGUISHER AND OTHER PUMP-
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Application October 21, 1932, Serial No. 638,922

10 Claims. (Cl. 299—92)

This invention relates to improvements in fire extinguishers, pumps, syringes and similar devices in which a desired movement of a fluid is controlled by a piston means.

This invention has for its principal object to provide in a fire extinguisher, pump, syringe or the like a novel form and construction of plunger or piston therefor which is back-pressure leak-proof, and one which is adapted to resist deteriorating or damaging effects of chemical fluids such as carbon tetrachloride especially.

This invention has for a further object to provide a novel construction of portable fire extinguisher provided with a spring-actuated plunger or piston, and a novel self-locking but manually releasable detent means for retaining said plunger or piston normally immovable under the tensional thrust of the actuating spring therefor.

This invention has for a further object to provide in a portable fire extinguisher a novel discharge nozzle therefor, and also a novel means through which the extinguisher may be refilled after use.

Other objects of this invention, not at this time more particularly enumerated, will be understood from the following detailed description of the same.

An illustrative embodiment of the present invention is shown in the accompanying drawing, in which:—

Fig. 1 is a sectional view of a fire extinguisher according to this invention, the novel piston structure being shown in side elevation and as normally subjected to the restraining action of detent means therefor; Fig. 2 is a similar view, showing the piston in vertical section, and also showing the detent means released to subject the piston to thrust of its actuating spring; Fig. 3 is a fragmentary sectional view illustrating the self-locking operation of said detent means in progress; Fig. 4 is a horizontal section, taken on line 4—4 in Fig. 1 showing the detent means locked; Fig. 5 is a horizontal view, taken on line 5—5 in Fig. 3; Fig. 6 is an enlarged vertical sectional view of the discharge nozzle of the extinguisher as closed; and Fig. 7 is a fragmentary view of the nozzle in open condition.

Similar characters of reference are employed in the above-described views, to indicate corresponding parts.

Referring to said drawing, the reference character 10 indicates the cylinder or casing of the device, the same being closed at its top by an upper end cap 11 and at its bottom by a lower end cap 12. Said lower end cap 12 is provided

with a central boss 13 provided with an internally screw-threaded opening to receive the externally threaded stub 14 of a nozzle body 15. Around the stub 14, and between the external side of said lower end cap 12 and said nozzle body 15 is interposed a resilient packing washer 17 to render the joint between the latter parts leak-proof. Said nozzle body 15 is provided at its lower free end with an externally screw-threaded neck 18 having a closed terminal wall 19. The exterior surface of said terminal wall 19 is of eccentrically formed conical contour having a high off-set side 20. Extending through said stub 14, nozzle body 15 and into said neck 18 is an axial discharge passage 21, and provided in and through the high off-set side 20 of said terminal wall 19 is a discharge orifice 22 which communicates with said discharge passage 21. Threaded onto said neck 18 is a closure member 23 having an internal conical seat 24 to cooperate with said terminal wall 19 of said neck 18. Formed in said closure member 23 is a centrally off-set discharge port 25, which by turning said closure member 23 may be brought into alignment with said discharge orifice 22, the alignment of said orifice and port being assured by the engagement of cooperating stop pins 26 and 27 respectively carried by said nozzle body 15 and said closure member 23. When said closure member 23 is turned to screw upwardly upon said neck 18 from the normal open position in which the port 25 thereof is aligned in communication with said discharge orifice 22, not only are said openings moved out of alignment, but the conical seat 24 is brought into tight sealing relation to the high off-set side 20 of the terminal wall 19 in which is located the discharge orifice 22 by a wedging action which effectively and securely stops off the latter against escape of liquid from the interior of the cylinder of casing 10. Projecting from the side of said nozzle body 15 is an externally screw-threaded extension 28 having a passage 29 therethrough which communicates with the discharge passage 21 of said nozzle body 15. At the outer end of said passage 29 is a port 30 normally closed by a spring-pressed inwardly opening ball or check-valve 31. A removable sealing cap 32 is engaged on the outer end of said extension 28.

The reference character P indicates generally a piston or plunger member which is movable axially within the interior of said cylinder or casing 10, the detail character and construction of which will be hereinafter more particularly set forth. Connected with the upper side of said piston is a seating cup 33 in which is engaged the lower end of a compression spring 34 which is

arranged within the upper end of the cylinder or casing 10 between the piston and the end cap 11, and which, when free to react, operates to move the piston or plunger downwardly through the cylinder or casing 10 with discharging effect upon the fluid with which the interior of the latter, below the piston, is charged.

Secured centrally within the seating cup 33 to extend upwardly therethrough and outwardly from the upper open end thereof is a coupling member comprising, a base 35 and a pair of laterally spaced oppositely and outwardly yieldable spring arms 36, respectively provided at their upper free ends with in-turned and preferably somewhat downwardly inclined catch-lugs or lips 37. A detent means to cooperate with said coupling member is connected with the upper end 11 of the cylinder or casing 10. This detent means comprises a detent pin 38 having at its upper end a shank 39 of reduced diameter. Said shank 39 extends upwardly and outwardly through a central opening in said upper end cap 11, which opening is provided at its margin with notches 40 providing air passages or vents. Suitably secured to the exteriorly projecting end of said shank 39 is a knob 41, and arranged between said knob and the end cap 11 is a light compression spring 42, which, when the detent pin is free or disengaged from the piston coupling member lifts the same axially to raise a sealing disc 43 carried at the lower end of the knob 41 out of closing and sealing relation to the air passages or vents 40 of the end cap 11. Said detent pin 38 is rotatable about its longitudinal axis. Adjacent to its lower or inner end, said detent pin is provided on opposite sides with recesses to receive the catch-lugs or lips 37 of said piston coupling member, whereby the latter may engage retaining shoulders 44 located at the lower sides of said recesses. Below said retaining shoulders 44, the lower extremity of said detent pin is formed to provide an inverted conical spreader member 45. Formed on opposite sides of said spreader member 45 are helical or ascending spiral rotator guides 46 respectively leading to the respective retaining shoulders 44.

When the cylinder or casing 10 is charged with a suitable fire extinguishing liquid, such, for example, as carbon tetrachloride, the piston P occupies an upwardly raised position within the cylinder or casing, with the spring 31 fully compressed between said piston and the cap 11, and with the catch-lugs or lips 37 of the piston coupling member engaged by the retaining shoulders 44 of the detent pin 38, as shown in Fig. 1. Under such conditions, the powerful tension of the compression spring 34, transmitted through the piston and its coupling member to the detent pin 38, exerts a strong downward pull upon the latter, overcoming the tensional reaction of the relatively weak spring 42, whereby the knob 41 is pulled down to tightly press the sealing disc 43 into closing engagement with the air vents 40, as is also shown in Fig. 1.

When it is desired to discharge the fire extinguisher liquid from the cylinder or casing, the piston P is released from the detent means, so as to free the compression spring 34 so that its stored tension may operate to move downward the piston against the body of liquid below the same upon opening the nozzle at the discharge end of the cylinder or casing. To release the detent means, the knob 41 is given a half turn, thereby rotating the detent pin 38 so as to spread apart the catch-lugs or lips 37 of the piston coupling member, while at the same time removing

the retaining shoulders 44 from beneath the latter, whereupon said piston coupling member may slip downwardly off of the detent pin, as shown in Fig. 2. When the detent pin is thus released, its spring 42 operates to lift the detent pin and knob 41 to carry the sealing disc 43 away from the air vents 40, so that atmospheric air may enter the cylinder or casing interior above the piston during the descent of the latter, thereby breaking any vacuum which might tend to impede the discharging movement of said piston. In order to assure inward passage of air beyond the vents 40 unimpeded by the shoulder of the detent pin formed at the juncture of the shank 39 therewith, said shoulder is provided with suitably disposed grooves or channels 47 through which ingoing air may pass.

After the content of the cylinder or casing is discharged, the piston may be returned to normal initial raised position with the spring 34 compressed behind the same, and thereupon again operatively engaged with the detent means preparatory to refilling the device with fire extinguishing liquid. One method of performing these operations is as follows:

The discharge nozzle being closed, the cap 32 is removed from branch extension 28 thereof, and the latter is suitably coupled in communication with a source of compressed air. The air under pressure is thereupon admitted past the check-valve 31 through the passage 29 and thence into the interior of the cylinder or casing below the piston P. The pressure of the air thus introduced drives upwardly the piston P with recompressing effect upon the spring 34. The air above the piston is displaced from the cylinder or casing interior through the channels 47 and open air vents 40. As the piston approaches the upper limit of its movement within the cylinder or casing, the lugs or lips 37 of its coupling member come into contact with spreader member 45, the point of which enters therebetween. As these lugs or lips 37 ride upwardly upon the diverging sides of said spreader member 45 the same will be spread apart under the outward yielding of the spring arms 36 which carry the same. As the lugs or lips 37 ride upwardly they will be carried into engagement with said spiral rotator guides 46 along which they will travel. The inward pressure of said lugs or lips against the guides as they travel upwardly in contact therewith will produce a rotative movement of the detent pin, whereby the latter will be turned to align its retaining shoulders 44 in the path of said lugs or lips, so that by the time the latter pass beyond the spreader member 45 the recesses bounding the retaining shoulders 44 will be positioned to receive the same, and consequently said lugs or lips under the tension of the spring arms 36 will snap over said retaining shoulders 44 and into retained or coupled engagement therewith whereby the piston is normally held in raised position against the tension of spring 34.

After the piston is reset as above described, the interior of the cylinder or casing may be refilled with liquid. This is accomplished by unscrewing and removing the discharge nozzle, and thereupon introducing the liquid through the bore of the boss 13 of the lower end cap 12, after which the nozzle is replaced.

Instead of using air to drive back the piston P, the refilling liquid may be driven under pressure through the branch passage 29, thus simultaneously resetting the piston and refilling the cylinder or casing.

In the past considerable difficulty has been

experienced in the use of carbon tetrachloride in plunger discharged fire extinguishers, due to the fact that this substance quickly attacks leather, rubber and like washers commonly employed in the piston or plunger structures; with the result that not only is the effectiveness of the piston or plunger impaired, but its resistance to back-pressure is quickly overcome with consequent undesired leakage of the liquid past the piston or plunger. It is, therefore, one of the most important objects of this invention to provide a piston or plunger structure per se which is effectively resistant to deteriorating attacks of carbon tetrachloride, whereby the operative life of the piston is of substantially unlimited duration, and whereby the piston maintains during its life a strong leak-proof engagement with the walls of the cylinder or casing in which it is arranged. It will be obvious that a piston or plunger of this character is not only highly desirable for use in fire extinguishers generally and of the kind above described, but is also useful in any type of similar pump or syringe-like device desired to operate upon a carbon tetrachloride liquid.

The novel piston or plunger structure, according to this invention, comprises a pair of flanged felt washers 48 and 49 spaced apart and arranged with their peripheral flanges in opposed relation and adapted to firmly engage the interior sides of the cylinder or casing walls. The bodies of said washers are respectively reenforced and supported along their downwardly facing or under sides by the respective steel discs 50 and 51, and the washers and discs are maintained in vertically spaced relation by a spacing sleeve 52 centrally disposed therebetween. In the space between the opposed washers 48-49 is disposed a resilient body of filler material 53 comprising, broadly, a mixture of gelatin, glycerine and graphite coagulated to provide a form retaining mass. The washers and their flanges are themselves likewise impregnated with a mixture of gelatin and glycerine to render the bodies of the same impervious to liquid carbon tetrachloride. To retain the elements of the piston structure in operative mutually assembled relation, and likewise in assembled connection with the seating cup 33 and the coupling member which is cooperative with the detent means of the above described fire extinguisher device, a tie bolt 54 is passed upwardly and centrally through the washers and discs and through the intermediate spacing sleeve, and thence through the body of the seating cup 33 and the base 35 of said coupling device, a retaining nut 55 being engaged on the projecting threaded end of said tie bolt and screwed home to thereby tightly bind the specified parts together.

For the production of the body of filler material 53, we use substantially the following formula:—

About 15% of gelatin is dissolved in 10% of water, and to this is added 45% of glycerine and 30% of graphite. The mixture is thoroughly agitated to intermix these ingredients, and then poured in a mold for coagulation and shaping to the desired body conformation. When removed from the mold, the body produced furnishes a resilient mass of a consistency somewhat resembling soft vulcanized rubber. When the body so constituted and formed is assembled in the piston structure, it is not only efficiently resistant to deterioration or alteration in the presence of carbon tetrachloride, but is sufficient-

ly resilient as to be readily responsive to squeezing pressure whereby its peripheral surfaces are firmly pressed against the sides of the cylinder or casing walls to form a leak-proof contact therewith past which the carbon tetrachloride cannot force itself; the more pressure exerted the tighter will be such contact. In the composition gelatin provides the bodying material, the glycerine prevents the mixture from hardening, and the graphite provides a lubricating element.

In order to render the washer elements themselves impervious to or impenetrable by liquid carbon tetrachloride, the same are impregnated with a solution of 30% gelatin dissolved in 25% of water, to which is added 45% of glycerine.

The above proportions of ingredients for the filler material and for the washer impregnating solution are merely illustrative, and are subject to more or less variation within reasonable limits. With respect to the filler material, the graphite may be omitted in cases where its lubricating functions is not deemed necessary.

Piston or plunger constructed in accordance with the above description thereof are of great durability, are adequately resistant to back pressure leakage, and will not deteriorate in contact with carbon tetrachloride, therefore rendering the same especially useful in plunger discharged fire extinguishers and other pump-like devices desired to operate with tetrachloride liquid.

We are aware that many changes could be made and many apparently widely different embodiments of this invention could be produced without departing from the scope thereof, and consequently it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

We claim:—

1. In a device of the kind described, the combination with a cylinder having a discharge nozzle at one end and adapted to contain a fluid to be discharged, of a piston for discharging said fluid, spring means for actuating said piston, a rotatable detent pin at the opposite end of said cylinder, a resilient bifurcate coupling means carried by said piston, said pin and coupling means being adapted to interlock in one angular position of said pin and not to interlock in another angular position of said pin, conical spreader means on said detent pin having rotator guides engageable by said coupling means for automatically rotating said pin to operative holding position when said coupling means is moved into contact therewith, and manipulatable means for manually rotating said detent pin to releasing position.

2. In a device of the kind described, the combination with a cylinder having a discharge nozzle at one end and adapted to contain a fluid to be discharged, of a piston for discharging said fluid, spring means for actuating said piston, a rotatable detent pin within the opposite end of the cylinder, said detent pin having a shank journaled in and extending through said opposite end of the cylinder, a knob on the external end of said shank, a sealing disc carried by said knob, said cylinder end having air vent means closable by said sealing disc, a coupling means carried by said piston, means on the interior end of said detent pin engageable by said piston coupling means for automatically rotating said pin to operative holding position when said piston coupling means is moved into contact therewith, and

spring means between said knob and cylinder end to outwardly move said detent pin with said knob and sealing disc to open said air vent means when said detent pin is released from said piston coupling means.

3. In a device of the kind described, the combination with a cylinder to contain a fluid to be discharged, a discharge nozzle at one end of said cylinder having means to open and close the same, a piston movable in said cylinder, spring means for actuating said piston toward the discharge end of said cylinder, said nozzle having an inwardly entering branch passage for delivering fluid under pressure into said cylinder whereby said piston may be moved against its actuating spring toward the opposite end of said cylinder, an outwardly closing check-valve in said branch passage, a detent means for holding said piston at said opposite end of the cylinder, said detent means comprising a rotatable detent pin, a resilient bifurcate coupling means, said pin and coupling means being adapted to interlock in one angular position of said pin and not to interlock in another angular position of said pin, a conical spreader means on said detent pin having rotator guides engageable by said coupling means, and manipulatable means for releasing said detent means.

4. In a device of the kind described, a cylinder having a discharge means at one end, a piston, spring means for moving said piston toward the discharge end of said cylinder, a detent means for holding said piston at the opposite end of said cylinder, said detent means comprising a rotatable detent pin, a resilient bifurcate coupling means, said pin and coupling means being adapted to interlock in one angular position of said pin and not to interlock in another angular position of said pin, a conical spreader means on said detent pin having rotator guides engageable by said coupling means, and manipulatable means for releasing said detent means.

5. In a device of the kind described, the combination with a cylinder to contain a fluid to be discharged, a discharge nozzle at one end of said cylinder having means to open and close the same, a piston movable in said cylinder, spring means for actuating said piston toward the discharge end of said cylinder, said nozzle having an inwardly entering branch passage for delivering a fluid under pressure into said cylinder whereby said piston may be moved against its actuating spring toward the opposite end of said cylinder, an outwardly closing check-valve in said branch passage, a rotatable detent pin within said opposite end of the cylinder, said detent pin having a

shank journaled in and extending through said opposite end of the cylinder, a knob on the external end of said shank, a sealing disc carried by said knob, said cylinder end having air vent means closable by said sealing disc, a coupling means carried by said piston, means on the interior end of said detent pin engageable by said piston coupling means for automatically rotating said pin to operative holding position when said piston coupling means is moved into contact therewith, and spring means between said knob and cylinder end to outwardly move said detent pin with said knob and sealing disc to open said air vent means when said detent pin is released from said piston coupling means.

6. A device of the kind described as defined in claim 1, wherein the piston comprises spaced oppositely facing flexible washers, relatively rigid discs for supporting and reenforcing said washers, and a resilient filler body intermediate said washers comprising a coagulated mixture of gelatin and glycerine.

7. A device of the kind described as defined in claim 1, wherein the piston comprises spaced oppositely facing flanged felt washers impregnated with a mixture of gelatin and glycerine, relatively rigid discs for supporting and reenforcing said washers, and a resilient filler body intermediate said washers comprising a coagulated mixture of gelatin and glycerine.

8. A device of the kind described as defined in claim 1, wherein the piston comprises spaced oppositely facing flanged felt washers impregnated with a mixture of gelatin and glycerine, relatively rigid discs for supporting and reenforcing said washers, and a resilient filler body intermediate said washers comprising a coagulated mixture of gelatin, glycerine and graphite.

9. In a device of the kind described as defined in claim 2, wherein the piston comprises spaced oppositely facing flanged felt washers impregnated with a mixture of gelatin and glycerine, relatively rigid discs for supporting and reenforcing said washers, and a resilient filler body intermediate said washers comprising a coagulated mixture of gelatine, glycerine and graphite.

10. In a device of the kind described as defined in claim 5, wherein the piston comprises spaced oppositely facing flanged flat washers impregnated with a mixture of gelatin and glycerine, relatively rigid discs for supporting and reenforcing said washers, and a resilient filler body intermediate said washers comprising a coagulated mixture of gelatine, glycerine and graphite.

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