March 14, 1950 J. H. STROOP 2,500,214

PRESSURE RELEASE DEVICE

Filed Dec. 30, 1944

Fig 3

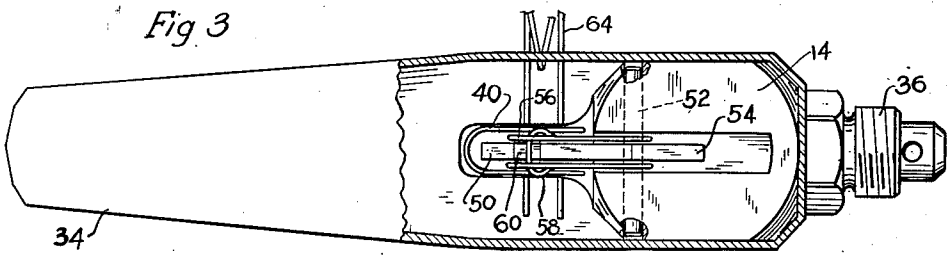


Fig 1

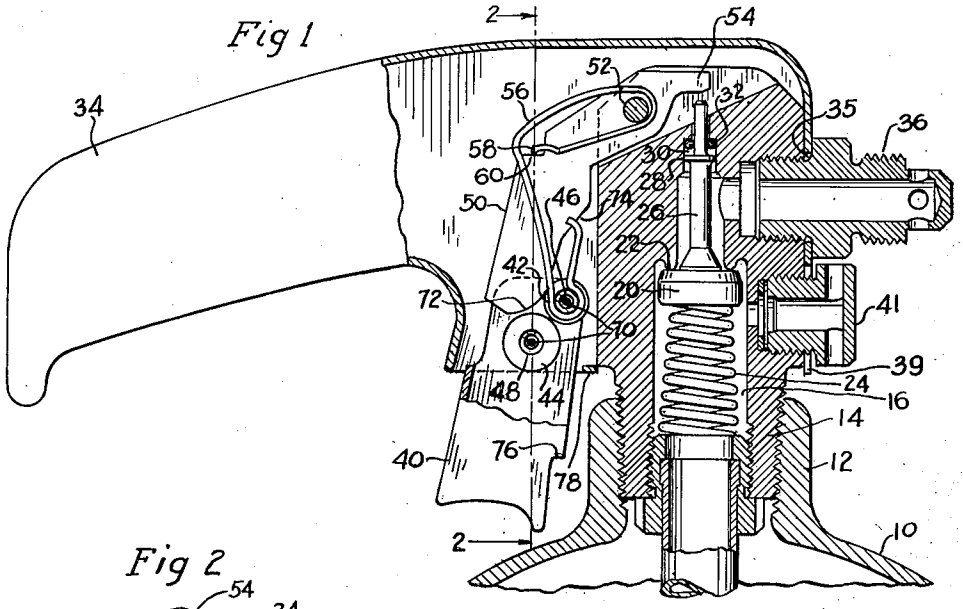


Fig 2

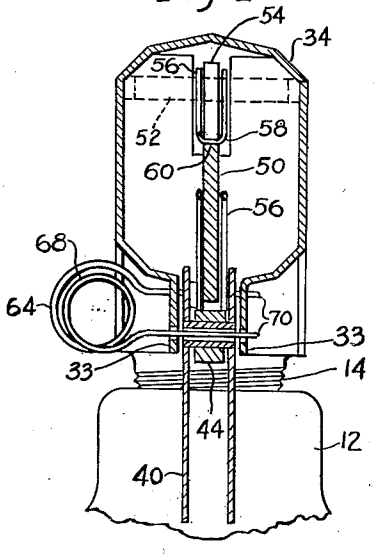
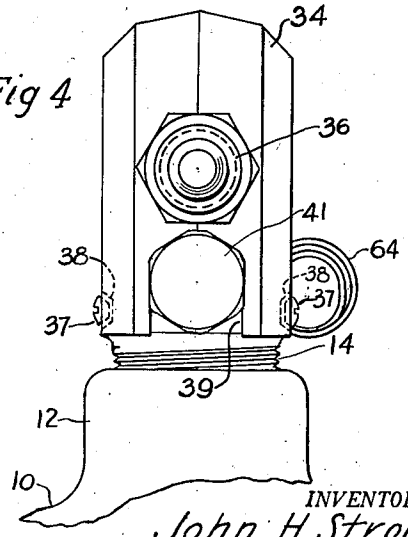


Fig 4



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Patented Mar. 14, 1950 2,500,214

UNITED STATES PATENT OFFICE

2,500,214

PRESSURE RELEASE DEVICE

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Application December 30, 1944, Serial No. 570,713

8 Claims. (Cl. 251—134).

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This invention relates to improvements in pressure medium release devices used, for example, in connection with fire extinguishers wherein a fire extinguishing medium is stored under pressure and a valve mechanism is provided for effecting release of the medium.

More specifically, the invention is directed to improved valve mechanism and valve operating mechanism particularly adapted for portable fire extinguishers.

In small light weight portable extinguishers of the trigger operated type, the handle is substantially parallel with the vertical axis of the container, and the trigger for actuating the valve opening means is conveniently located for ready operation by one finger of the operator in the form of a pistol grip. While this type of mechanism has been found very satisfactory for small extinguishers, the same type handle and trigger mechanism are not readily adaptable to, or convenient for use with, larger and heavier portable extinguishers. Accordingly heavy portable extinguishers have heretofore been provided with a hand wheel or other valve opening mechanism not as readily operable as a trigger mechanism.

An other object of the present invention resides in the provision of trigger mechanism which requires comparatively little effort to operate in opening a valve.

Another object of the invention resides in the provision of means for amplifying the force applied to the trigger to effect cracking and full opening of the valve.

Another object of the invention resides in the provision of means for transmitting a valve opening force from linear to rotary and back to linear motion.

Another object of the invention resides in the provision of conveniently actuated means for latching the trigger mechanism in a position to retain the valve open.

Another object of the invention resides in the provision of a valve and valve actuating trigger, each of which, is moved in paths substantially parallel with the vertical axis of the container.

A further object of the invention resides in the provision of a heavy portable fire extinguisher with trigger mechanism of the foregoing type for opening the valve of the extinguisher to discharge the fire extinguishing medium.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

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A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawing, forming a part of the specification, wherein:

Figure 1 is a vertical sectional view of the outlet portion of a fire extinguisher embodying the present invention;

Figure 2 is a sectional view taken substantially on line 2—2 of Figure 1;

Figure 3 is a top plan view thereof, partly in section; and

Figure 4 is a right hand elevational view thereof.

Referring to the drawing in detail, a container 10 is provided for fire extinguishing medium under pressure, such as carbon dioxide, for example. This container is provided with a reduced end forming a neck 12 which is threaded to receive a valve body 14.

A bore 16 is formed in the valve body 14 to provide a valve chamber accommodating a valve member 20 which is normally held on a valve seat 22 by means of a spring 24 aided by the pressure of the fluid in the container acting on the underside of the valve member. The valve member 20 has a valve stem 26, extending to the outside of the valve body and provided with a shoulder 28 fitting within a valve stem packing chamber 30. Within this chamber the valve stem supports an annular packing 32 intermediate the shoulder 28 and the outer end of the chamber. The packing 32 is circular in cross section and is of the type known as a "doughnut" packing.

A carrying handle 34 is provided for the device which extends substantially at right angles to the vertical axis of the container. This handle is in the form of a channel member extending over and about the top of the valve body and secured thereto by means of screws 37 and a hose attaching fitting 36 having a portion serving as a locking nut, the handle being provided with an aperture 35 on its forward end to accommodate a portion of the fitting 36 threaded into the valve body. The handle also has a notch or recess 39 cut therein to slip over a safety plug 41, and also has a pair of positioning bosses 38 which cooperate with depressions in the valve body for positioning the handle thereon. The bosses receive the screws 37 which are threadedly secured to valve body (Figure 4). The handle also serves as a housing or casing for a valve opening mechanism for actuating the valve in a manner about to be described. As will be seen

from Figure 2 the sides of the handle which encloses the valve opening mechanism are bent inwardly to form depending flanges 33.

The valve opening mechanism comprises a trigger 40 slidable between the flanges 33 of the handle and carrying a low amplification roller 42 and a high amplification roller 44. These rollers are freely rotatable on hollow shafts 46 and 48, respectively, carried by the trigger 40, and are adapted to contact cam surfaces on a wedge shaped lever or trigger arm 50. The trigger arm is pivotally mounted on a pin 52 in the valve body and has a finger 54 extending over the free, or outwardly extending end of the valve stem 26, so that upon rotation of the arm about its pivot the finger 54 will engage the valve stem whereby to unseat the valve in a manner to be described presently. It will be noted that the finger 54 normally is spaced slightly from the valve stem to provide a tolerance gap.

A spring 56 is provided for holding the trigger and trigger arm in operative relation. This spring is in the form of spring wire having a loop 58 substantially midway of its free ends and in engagement with a shoulder 60 on the trigger arm 50. The strands of the wire pass from the loop about the pivot pin 52 on each side of the arm 50, thence rearwardly a predetermined distance where they are bent downwardly substantially at right angles and have their free ends hooked about the hollow shaft 46 of the low amplification roller 42.

A removable locking pin 64 is provided to lock the parts of the trigger mechanism in non-operative position to prevent accidental operation and to discourage unauthorized operation thereof and consequent discharge of the fire extinguishing medium from the container. This pin has a loop 68 and substantially parallel legs or prongs 70. The handle 34 has a pair of holes in at least one wall thereof, in registry with the hollow shafts 46 and 48 when the parts are in valve closed position. When it is desired to lock the parts in non-operative or valve closed position, the prongs of the locking pin are inserted through the holes in the handle and into the hollow shafts 46 and 48. When the pin is in place, as just described, there can be no movement of the trigger mechanism to open the valve, as will be readily understood. Upon removal of the pin, the trigger 40 is cocked into operating position by being urged upward between and against the trigger arm 50 and valve body 14 by means of the spring 56 to condition the parts of the trigger mechanism for immediate operation of the valve.

When force is applied to the trigger 40, by the finger of the operator, a slight movement thereof in a clockwise direction, as viewed in Figure 1, brings the high amplification roller 44 into engagement with high amplification cam surface 72 of the lever or trigger arm 50 causing the arm to rotate on its pivot 52 to bring its finger 54 into engagement with the end of the valve stem 26. Further upward movement of the trigger 40 in substantial parallel alignment with the vertical axis of the container will carry the high amplification roller 44 along the face of the arm 50 to cause further rotation of the trigger arm 50 whereby the valve will be cracked or unseated. Continued movement of the trigger 40 will cause the low amplification roller 42 to engage low amplification surface 74 of the trigger arm 50 whereby further rotation of the arm 50 is effected to effect complete opening of the valve against the action of the spring 24 to permit the

fire extinguishing medium to be discharged from the container through the hose outlet 36.

The action of trigger 40 is a combination of a wedge being pressed between trigger arm 50 and the adjacent portion of valve body 14, and a lever with fulcrum at the point where the surface of idler 42 contacts the surface of the valve body 14, both actions tending to rotate the trigger arm 50 about its pivot 52.

Upon release of pressure from the trigger 40 the valve spring 24 will return the valve 20 to its seat 22 and cut off the flow of the fire extinguishing medium. Should it be desired to continue the discharge of the medium, the trigger may be rotated in a counterclockwise direction whereby to bring a notch 76 formed on the trigger into engagement with a lip or projection 78 on the handle 30, whereby the trigger mechanism may be latched in position to retain the valve unseated.

It will be seen from the foregoing that the present invention provides a trigger operated fire extinguisher particularly well adapted for heavy portable extinguishers. The handle 34 extends substantially at right angles to the vertical axis of the container, the trigger 40 is positioned within easy reach of the index finger of the operator, and all of the operating parts with the exception of the operating end of the trigger are protected by the handle.

The force applied to the trigger provides a two-stage amplification to crack the valve and a low stage amplification immediately following providing a full opening of the valve. In practice it has been found that the initial resistance force of the valve is from 100 to 300 pounds, while the last stage offers only the stem end area pressure of about 10 pounds. The amplification provided by the mechanism of the present invention is ample to overcome this resistance without any undue effort on the part of the operator. The high amplification is effected by the trigger 40 acting on the trigger arm 50 through the wedge and roller combination described; the applied force acting outside of the pivotal point of resistance causing rotation of the trigger as a lever having a ratio of three to one. This ratio is transmitted through roller 44 to the cam surface 72 with at least a two and one half to one ratio. The first ratio of the trigger arm being a minimum of three to one, the ultimate ratios are between twenty and twenty-five to one, making the trigger force requirements, for any normal operation, five to ten pounds, the most excessive required pull being about fifteen pounds.

In the mechanism of the present invention the high amplification need only be applied to crack the valve five to ten thousandths of an inch, inasmuch as when the resistance drops the low amplification roller immediately contacts the low amplification surface of the trigger arm and throws the valve completely open.

As various changes may be made in the form, construction and arrangement of the parts herein, without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in any limiting sense.

It is also to be understood that the following claims are intended to cover all the generic and specific features of the invention herein described, and all statement of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim:

1. A release device for fluid under pressure comprising a valve body having a track surface at one side thereof, a valve seat in said valve body, a valve member for said seat, a stem for moving said valve member off its seat having an end extending outwardly of said valve body, a lever pivotally mounted on said valve body having an arm for engaging said stem and having a second arm provided with a cam surface adjacent said track surface, a trigger constructed and arranged for movement in a substantially longitudinal direction with respect to said second lever arm, and means on said trigger cooperating with said cam surface and said track surface upon linear movement of said trigger to effect pivotal movement of said lever to cause said stem to unseat said valve member.

2. A release device for fluid under pressure comprising a valve body having a track surface at one side thereof, a valve seat in said valve body, a valve member for said seat, a stem for moving said valve member off its seat having an end extending outwardly of said valve body, a lever pivotally mounted on said valve body having an arm for engaging said stem and having a second arm provided with a cam surface adjacent said track surface, a trigger constructed and arranged for movement in a substantially longitudinal direction with respect to said second lever arm, and a pair of rollers on said trigger each cooperating with said cam surface and at least one of said rollers cooperating with said track surface upon linear movement of said trigger to effect pivotal movement of said lever to cause said stem to unseat said valve member.

3. A release device for fluid under pressure comprising a valve body having a track surface at one side thereof, a valve seat in said valve body, a valve member for said seat, a stem for moving said valve member off its seat having an end extending outwardly of said valve body, a lever pivotally mounted on said valve body having an arm for engaging said stem and having a second arm adjacent said track surface provided with a cam surface having an upper and lower contour, a trigger constructed and arranged for movement in a substantially longitudinal direction with respect to said second lever arm, and a pair of rollers on said trigger, one of said rollers cooperating with said upper contour and said track surface and the other of said rollers cooperating with said lower contour upon linear movement of said trigger to effect pivotal movement of said lever to cause said stem to unseat said valve member.

4. A release device for fluid under pressure comprising a valve body having a track surface at one side thereof, a valve seat in said valve body, a valve member for said seat, a stem for moving said valve member off its seat having an end extending outwardly of said valve body, a lever pivotally mounted on said valve body having an arm for engaging said stem and having a second arm provided with a cam surface adjacent said track surface, a latching projection on said valve portion, a trigger constructed and arranged for movement in a substantially longitudinal direction with respect to said second lever arm, and means on said trigger cooperating with said cam surface and said track surface upon linear movement of said trigger to effect pivotal movement of said lever to cause said stem to unseat said valve member, said trigger having a shoulder adapted to engage said projection to latch said trigger and lever in valve member unseating position.

5. A release device for fluid under pressure comprising a valve body having a track surface at one side thereof, a valve seat in said valve body, a valve member for said seat, a stem for moving said valve member off its seat having an end extending outwardly of said valve body, a lever pivotally mounted on said valve body having an arm for engaging said stem and having a second arm provided with a cam surface adjacent said track surface, a trigger constructed and arranged for movement in a substantially longitudinal direction with respect to said second lever arm, means on said trigger cooperating with said cam surface and said track surface upon linear movement of said trigger to effect pivotal movement of said lever to cause said stem to unseat said valve member, and resilient means connecting said lever and trigger.

6. A release device for fluid under pressure comprising a valve body having a track surface at one side thereof, a handle on said valve body having apertures therein, a valve seat in said valve body, a valve member for said seat, a stem for moving said valve member off its seat having an end extending outwardly of said valve body, a lever pivotally mounted on said valve body having an arm for engaging said stem and having a second arm provided with a cam surface adjacent said track surface, a trigger constructed and arranged for movement in a substantially longitudinal direction with respect to said second lever arm, rollers on said trigger cooperating with said cam surface and said track surface upon linear movement of said trigger to effect pivotal movement of said lever to cause said stem to unseat said valve member, hollow shafts for mounting said rollers on said trigger, and a locking member having legs extending through said apertures and said hollow shafts to lock said trigger.

7. A device for releasing fluid under pressure comprising a valve body, a valve seat in said valve body, a valve member for said valve seat, a stem for moving said valve member off its seat having an end extending outwardly of said valve body, a lever pivotally mounted on said valve body having an arm for engaging said stem, a latching projection on said valve body, and a trigger carried by said lever and constructed and arranged to effect pivotal movement of said lever to cause said arm to engage said stem and move the same to unseat said valve member, said trigger having a shoulder adapted to engage said projection to latch said trigger and lever in valve member unseating position.

8. A device for releasing fluid under pressure comprising a valve body, a handle on said valve body having a latching projection, a valve seat in said valve body, a valve member for said valve seat, a stem for moving said valve member off its seat having an end extending outwardly of said valve body, a lever pivotally mounted on said valve body having an arm for engaging said stem, a latching projection on said valve body, and a trigger carried by said lever constructed and arranged to effect pivotal movement of said lever to cause said arm to engage said stem and move the same to unseat said valve member, said trigger having a shoulder adapted to engage said projection to latch said trigger and lever in valve member unseating position.

JOHN H. STROOP.

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