March 7, 1933. A. C. ROWLEY 1,900,764

SEALING AND RELEASE DEVICE FOR CARBON DIOXIDE FIRE SYSTEMS

Filed Oct. 29, 1929

Fig. 1.

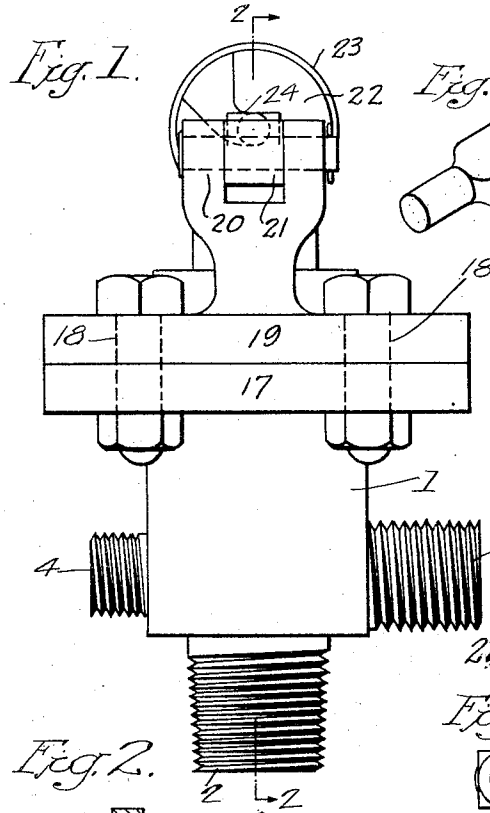


Fig. 5.

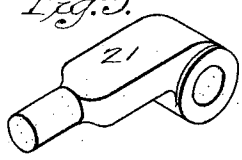


Fig. 3.

Fig. 4.

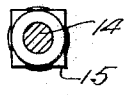


Fig. 2.

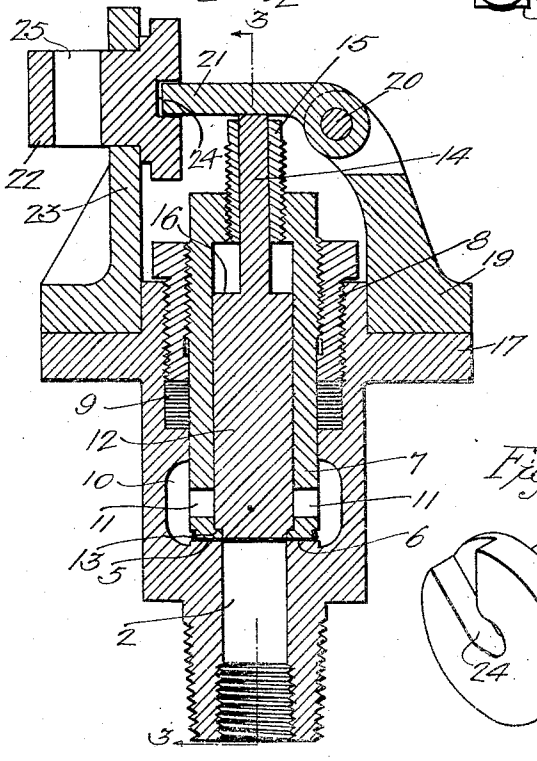


Fig. 7.

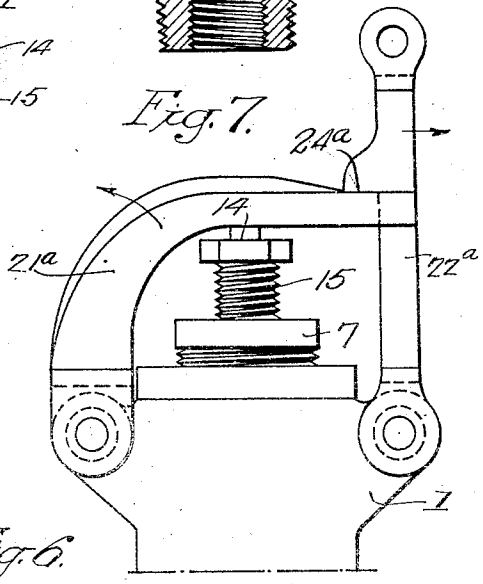
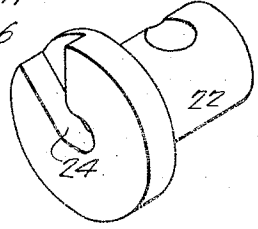


Fig. 6.



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UNITED STATES PATENT OFFICE

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SEALING AND RELEASE DEVICE FOR CARBON DIOXIDE FIRE SYSTEMS

Application filed October 29, 1929. Serial No. 403,233.

This invention relates to improvements in carbon dioxide and like fire extinguishing apparatus, and more particularly to improvements in sealing and release devices for use with the CO_2 or other containers as a means for releasing the gas when required for fire extinguishing purposes.

An object of the invention is to provide a device of the stated character which shall be substantially leak-proof, and whose action in opening shall be both positive and rapid.

Another object of the invention is to provide a device of the stated character having a positive locking means such as to preclude the possibility of accidental release under given conditions, said means being releasable to permit control of the valve through the medium of a more readily releasable valve retaining means better adapted to the requirements of the normal operating conditions.

The invention further resides in certain novel and advantageous, mechanical and structural features hereinafter more specifically set forth and illustrated in the attached drawing, in which:

Figure 1 is a front elevation of a valve made in accordance with my invention;

Fig. 2 is a sectional view on the line 2—2, Fig. 1;

Fig. 3 is a sectional view on the line 3—3, Fig. 2;

Fig. 4 is a fragmentary sectional view on the line 4—4, Fig. 3;

Fig. 5 is a view in perspective of the locking lever;

Fig. 6 is a view in perspective of the lever retaining and release bushing, and

Fig. 7 is a fragmentary elevational view showing a modification within the scope of the invention.

With reference to the drawing, my device, in a preferred embodiment, comprises a body 1, having at the lower end an intake port 2, discharge port 3, and associated with the former, an exhaust vent 4. At its inner end the port 2 terminates in a seat 5 against which is normally held, by means of a bushing 7 and in a manner to seal the port, a fragile disc or diaphragm 6. The diaphragm, which preferably is of a non-corrodible material, such as silver inert to CO_2, is carried by the bushing 7, the peripheral edge of the diaphragm being crimped around the extremity of the bushing, the sides of which may be slightly under cut to afford a firm hold. The bushing 7 is threaded into a nut 8 which in turn is threaded into the upper end of the body. By means of the nut 8, suitable packing 9 is compressed in the body recess around the bushing 7, thereby effectively preventing leakage between the body and the said bushing. In that portion, which lies within the chamber 10 of the body, the bushing 7 is provided with one or more apertures 11, the function of which will be made clear hereinafter.

As illustrated, the interior of the bushing 7 constitutes a cylindrical chamber for a plunger 12, this plunger normally seating upon a shoulder 13 in the bottom of the bushing. The plunger, however, extends below the shoulder 13 and the lower end surface thereof forms with the lower end surface of the bushing 7, a substantially flat and continuous plane surface abutting the upper surface of the diaphragm 6.

At its upper end, the plunger 12 is provided with a stem 14 which projects upwardly through a bushing 15, threaded into the upper end of the bushing 7. The bushing 15 may be adjusted into engagement with the shoulder 16 of the plunger 12 whereby the plunger is immobilized with respect to the bushing 7 and is held down upon the bushing shoulders 13. When, however, the bushing 15 is adjusted into an elevated position, as shown in Figs. 2 and 3, the plunger 12, in the absence of the other retaining means, is free to move upwardly in the bushing 7.

Other and more readily releasable means is provided for normally retaining the plunger 12 in the depressed position following elevation of the lock bushing 15. The body 1 has at its upper end a flange 17 to which is secured by means of bolts 18, a top member 19. In the member 19 is a pin 20 upon which is pivoted a lever 21, this lever, as shown in the drawing, being adjustable into a position directly overlying the upper end of the plunger 12. Means is also provided for

releasably retaining the lever 21 in this adjusted position in engagement with the upper end of the plunger 12, the latter thereby being retained in the depressed position.

The lever-retaining means consists in the present instance of a bushing 22 rotatively mounted in an extension 23 of the top member 19. The bushing 22 as best shown in Fig. 2 is provided in its inner face with a cam-shaped recess 24, in which the end of the lever 21 is engaged and which functions as the bushing 22 is rotated in one direction to first force the lever firmly down upon the upper end of the plunger and thereafter to hold the lever in the piston-retaining position as illustrated. The cam recess 24 is such, however, that a predetermined rotary movement in the opposite direction of the bushing 22 results in a release of the lever 21 whereby the plunger 12 is left free to move upwardly under a sufficient impelling force. The bushing 22 is provided also with an aperture 25 for reception of a lever for manual rotation of the bushing 22 or for operative connection to said bushing of suitable thermally actuated or released operating means.

A modified form of locking lever and lever-retainer is shown in Fig. 7. In this instance the lever 21*a* is pivoted directly to the body 1 and the retaining means takes the form of a latch 22*a* also pivoted to the body 1 and having a shoulder 24*a* which in the upright position of the latch overlies and retains the lever extremity. In this case, a simple retraction of the latch in the direction of the arrow releases the lever and permits actuation of the valve as described.

The exhaust vent 4 is closed normally by a disc 26 which is held in position at the outer end of the vent passage by a cap 27. This cap has an inner chamber 28, the inner wall of which is formed by the disc 26, and has also apertures 29 extending from the chamber to the outside of the cap. The disc 26 is adapted to rupture or shear under a predetermined maximum pressure in the vent interior and thereby constitutes a pressure relief or blow-off means.

In practice, the body is secured through the medium of the lower threaded extension in the containers in which the highly compressed CO_2 is confined, and the construction permits filling of the containers with the device in position. The bushing 7 and plunger 12 are first withdrawn to permit attachment to the bushing of the breakable disc or diaphragm 6. Thereafter the parts are reinserted in the body but with the lower end of the bushing 7 and the diaphragm carried thereby elevated from the seat 5. Gas may now be admitted to the container through the discharge port 3, the bushing 7 eventually being turned down to seat the disc 6 and to seal the port 2. In this operation the bushing 15 is in the inner adjusted position holding the plunger to its seat upon the shoulder 13 whereby the pressure of the gas within the container is prevented from rupturing the disc 6.

The container may now be shipped or transferred to the place where it is to be used as an element of a fire extinguishing system and after being properly mounted and connected in the system through the discharge port 3, the bushing 15 is adjusted upwardly to release the plunger, the lever 21 having previously been moved to an operative position engaging the upper end of the plunger stem 14 and having been locked in this position by adjustment of the bushing 22. The device is now in condition for operation, the fire-extinguishing medium being releasable by simple manipulation of the release bushing 22 as previously set forth.

Release of the lever 21 permits the pressure within the container to shear the now unreinforced central portion of the diaphragm 6, thereby clearing the port 2 and permitting flow of gas from the container through the ports 11 and the port 3 to the system. The shear is complete and instantaneous, the entire center part of the diaphragm corresponding in size to the end surface of the plunger being displaced, thereby affording an immediate maximum discharge from the container. Following exhaustion, the container may be refilled and the device reset as described above.

I claim

1. In a device of the character described, a body member having a port, said port terminating in a seat, a fragile disc, a bushing threaded into said body and normally confining the disc on the seat, thereby closing the port, a plunger operative in the bushing to reinforce the disc against fluid pressure exerted from the other side thereof, readily releasable means for retaining the plunger in the disc reinforcing position, and a lock bushing threaded into the bushing first named and adapted in an adjusted position to independently lock the plunger in the disc-reinforcing position.

2. In a device of the character described, a body member having a port, a fragile disk normally sealing said port and capable of being ruptured by fluid pressure in the port, a movable element adapted to reinforce the disk at one side to prevent rupture thereof by pressure exerted from the opposite side, and a plurality of means independently operative to retain the said element in normal operative position, one of said means constituting a positive lock for and another being readily releasable to free said element.

3. In a device of the character described, a body member having a port, a fragile disk normally sealing said port and capable of being ruptured by fluid pressure in the port, a movable element adapted to reinforce the

disk at one side to prevent rupture thereof by pressure exerted from the opposite side, and a plurality of independently operative means for retaining the element in normal operative position, one of said retaining means comprising a readily releasable latch and another comprising a threaded element constituting a positive lock for said element.

4. In a device of the character set forth, a body member having a port, a fragile disk normally sealing said port and capable of being ruptured by fluid pressure in the port, a movable element adapted in an operative position to reinforce the disk at one side to prevent rupture thereof by pressure exerted from the opposite side, threaded means for securing said element in the operative position, and a readily releasable latch operative independently to lock the element in the operative position.

5. In a device of the character described, a body member having a port, a fragile diaphragm adapted to overlie and seal the port, a bushing for retaining the diaphragm in the port-sealing position, said diaphragm being attached to and movable with the bushing, a plunger movable in the bushing and adapted in a predetermined adjusted position to engage one side of the diaphragm to prevent rupture of the diaphragm by pressure exerted thereon from the opposite side, and interengaging shoulders on the bushing and the plunger limiting the movement of the plunger toward the diaphragm to said predetermined adjusted position.

6. In a device of the character described, a body member having a passage terminating at opposite ends in admission and discharge ports respectively, a fragile disk adapted to close said passage intermediate its ends, a bushing in said body adapted to retain the diaphragm in the passage-closing position, said bushing having ports communicating with the discharge port of said passage, a plunger mounted in said bushing and adapted to reinforce the diaphragm against pressure exerted through said admission port, said plunger normally closing said bushing ports and being movable to a position clear of said diaphragm and uncovering the said bushing ports to permit rupture of the diaphragms by said pressure and escape of fluid through the bushing ports to the discharge port of the body, and releasable means for normally holding the plunger in the diaphragm reinforcing position.

7. In a device of the character described, a body member having a passage terminating at opposite ends in admission and discharge ports respectively, a fragile disk adapted to close said passage intermediate its ends, a bushing in said body adapted to retain the diaphragm in the passage-closing position, said bushing having ports communicating with the discharge port of said passage, a plunger mounted in said bushing and adapted to reinforce the diaphragm against pressure exerted through said admission port, said plunger normally closing said bushing ports and being movable to a position clear of said diaphragm and uncovering the said bushing ports to permit rupture of the diaphragm by said pressure and escape of fluid through the bushing ports to the discharge port of the body, releasable means for normally holding the plunger in the diaphragm-reinforcing position, and pressure-relief means associated with the admission end of said passage.

ARTHUR C. ROWLEY.