May 22, 1962
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3,035,605
PROTECTING, ACTUATING, AND SEALING DEVICES FOR VALVES IN RECEPTACLES FOR CASEOUS MEDIA AND THE LIKE
Filed Dec. 18, 1958
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FIG. 5

FIG. 7

FIG. 6

FIG. 8

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The present invention relates to receptacles for compressed and liquefied fluids, and more particularly to improvements in means for protecting, sealing, locking and opening the valves of such receptacles, as well as to means for suspending the receptacles in upright position.

An important object of the invention is to provide a protecting or shielding device for the valve of a metallic receptacle for highly compressed or liquefied gaseous media which need not be removed from the receptacle when the valve is opened either to permit entry of gases into, or to permit discharge of gases from, the receptacle, and which thus constitutes a permanent cover or cap for the valve.

Another object of the invention is to provide a combined valve protecting, opening and locking device which can be applied to different types of receptacles for compressed or liquefied gaseous media.

A further object of the invention is to provide a combining or protecting device for valves in receptacles for gaseous media which is so combined with valve locking means that the latter cannot be actuated during transportation or storage of the receptacle.

A concomitant object of the present invention is to provide a means for alternately locking and opening the valve as to be adapted for use with receptacles for compressed or liquefied gaseous media in which the discharge of gases occurs at an angle to the longitudinal axis of the receptacle.

A further object of my invention is to provide a valve protecting or shielding device for use in connection with receptacles or bottles of the above described character which need not be removed when the receptacle is refilled, and which is combined with means for facilitating the suspension of receptacle during transportation, refilling and storage.

An additional object of the invention is to provide a protecting, locking and opening device for the valves in receptacles for compressed and liquefied gaseous media combined with novel means for suspending the receptacle and for maintaining same in vertical position during transportation and, thereby, making it unnecessary to suspend the valve in some cases when it is in an upright position.

Another object of the present invention is to provide a protective device for valves in receptacles for gaseous media which is so constructed as to permit access to the discharge opening of the valve without requiring prior removal from the receptacle or changes in its position with respect to the valve.

The above and certain other objects of the invention are attained by the provision of a valve protecting or shielding device in the form of a cap or a stirrup which is preferably releasably connected to the apertured end of a receptacle in which the receptacle filling and evacuating valve is mounted. The protecting device is permanently or releasably connected with the valve actuating means, such as a swingable lever or a combination lock nut and bolt which may also serve as a means for maintaining the valve in closing position when the receptacle is in storage, at the filling station, or in transit from one to another location, e.g., to the locale of actual use.

If the valve actuating means is a swingable lever, it is so mounted on the valve protecting or shielding device that it may open, or that it may permit opening of, the valve in one of its positions and prevents opening of the valve in another position. Means, either connected to the lever or removable to the nipple of the valve, are provided to retain the lever in valve-closing position. Such lever retaining or locking means preferably assumes the shape of a nut which may be connected to the lever by a short flexible element, and which may be screwed onto the nipple of the valve to seal the same and to simultaneously lock the lever in valve-closing position or, alternately, to maintain the lever in such position as to ensure the valve to automatically block the discharge of gases from the receptacle.

The length of aforementioned flexible element, e.g., a chain, which connects the lever with the retaining or locking means therefor, is preferably so selected that the lever cannot be moved into a position to open, or to permit opening of, the valve before the lever-locking and valve-sealing means are removed from the nipple. The valve is preferably radially disposed with respect to the axis of the receptacle or bottle, e.g., a metallic cylinder containing oxygen, hydrogen, carbon dioxide, or another highly compressed or liquefied gaseous medium; and the valve is usually opened or closed by movements of its stem in the axial direction of the receptacle.

The protecting means for the valve is preferably formed with openings or cutouts for permitting observation of the valve, for enabling the nipple to extend therethrough, and for receiving that end of the actuating lever about which the lever pivots and which is preferably formed as a cam for opening or closing the valve when the lever is swung into a given position. Thus, the protecting means or cap need not be removed from the receptacle or cylinder when the valve is actuated, or when the cylinder is refilled. All valve opening, locking and sealing devices may be permanently or releasably connected with the cap to prevent losses or misplacing of parts, and the means for connecting the cap to the cylinder usually comprises studs, eyelets or like projections to which a special receptacle-suspending device may be attached which latter, in turn, may be suspended from a conveyor, a crane or the like, to maintain the receptacle in upright position.

Since the cylinders or bottles for highly compressed gaseous media are usually filled in a fully automatic manner, the filling stations operate with conveyors or similar types of receptacle transporting apparatus. Smaller receptacles are transported in upright position on roller conveyors. However, the steel cylinders for oxygen and other highly compressed or liquefied gases, e.g., carbon dioxide, are of such dimensions that they cannot be left unsupported in upright position and, therefore, are conveyed in horizontal or nearly horizontal position to be moved into vertical position at the filling station, and to be thereupon returned into horizontal position for removal to storerooms or to locales of actual use. The novel suspending means preferably assumes the form of interconnected hooks one or each of which engages one or more studs or eyelets on the cylinder and at least two of which engage the aforementioned studs or eyelets which latter are connected to the re-
ceptacle and/or to the protecting means. This arrange-
ment renders it unnecessary to maintain the cylinders in
horizontal position and constitutes a great convenience
as well as a time- and labor-saving device.

As before explained, a very important feature of the in-
vention is in that the valve protecting or shielding means,
be it a cap or a stirrup-shaped device, need not be re-
moved during the filling of receptacles or during the
vacuation of gaseous media, because it is so formed as
to permit access to the nipple and because it supports
the valve opening and locking device which latter can
thus be reached and actuated without requiring separa-
tion from the valve protecting means and without requir-
ing any changes in the latter's position with respect to the
receptacle.

Other features of the invention reside in the provision
of means for varying the position of actuating lever in
which the latter causes opening of the valve; in the provision
of a specially shaped actuating lever whose operating or
handgrip end is hidden in the protecting cap when in valve-locking position; and in the provision
of specially constructed valves which may either seal or
open in a fully external way when not engaged by the
actuating means.

The novel features which are considered as characteris-
tic for the invention are set forth in particular in the
 appended claims. The invention itself, however, both as
to its construction and its method of operation, together
with its functional objects and advantages thereof, will be
best understood from the following description of certain
specific embodiments when read in connection with the
accompanying drawings, in which:

FIG. 1 is a longitudinal central section through one
form of the improved valve sealing, protecting, locking
and actuating device shown in valve sealing and locking
position at the apertured end of a metallic cylinder;

FIG. 2 is a side elevational view of the device as seen
in the direction of arrow A shown in FIG. 1;

FIG. 3 is top plan view of the assembly shown in FIGS.
1 and 2;

FIG. 4 illustrates the device in a sectional view similar
to that of FIG. 1 in which the valve actuating means is
in operative position and the valve nipple is unsealed;

FIG. 5 is longitudinal central section through a modi-
fied sealing, protecting, locking and actuating device ap-
plied to a valve different from that shown in FIGS. 1 to 4;

FIG. 6 is a view similar to that of FIG. 5 in which the
valve is in open position;

FIG. 7 shows in side elevation a different embodiment
of the novel device comprising modified valve actuating
and locking means;

FIG. 8 is top plan view of the assembly shown in
FIG. 7;

FIG. 9 is side elevational view of a further embodiment
with a modified protecting cap;

FIG. 10 is part sectional and part elevational view of
the embodiment shown in FIG. 9, the section through the
valve protecting cap being taken on line 10--10 of
FIG. 9;

FIG. 11 is part sectional and part elevational view of
an additional embodiment with a modified valve actuating
and sealing device, the valve being shown in open posi-
tion and

FIG. 12 shows in perspective view one end of a metallic
cylinder with the device of FIGS. 7 and 8 applied thereto,
and further showing a device from which the cylinder may
be suspended during transportation, refilling or storage.

Referring now in greater detail to the illustrated em-
bodiments, and first to that shown in FIGS. 1 to 4, the
combined valve actuating, protecting, locking and sealing
device is installed at the end of a metallic cylinder 10 of

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circular shape, such as are customarily employed for
transportation and storage of oxygen, hydrogen, carbon
dioxide, or any other highly compressed or liquefied gase-
ous medium. The illustrated end of receptacle or cylinder
a closed transverse slot 58 which divides the closed end of member 55 into two spaced portions supporting a transverse pivot axle or pin 59 which latter spans the slot 58 and swingably supports a valve opening and locking lever 60. The enlarged end portion or head 61 of valve actuating lever 60, which is traversed by the pin 59, is preferably slightly out of round (see FIGS. 1, 4 and 5) and is eccentrically mounted on the member 59. The cam-shaped portion 62 of head 61 may be brought into or out of contact with the head of bolt 53 when the actuating lever 60 is swung about pin 59 between the positions shown in FIG. 4 and FIGS. 1 to 3, respectively. That end of actuating lever 60 from which the head 61 comprises a curved or inwardly bent portion or section 60a and a flat end portion which is bifurcated, i.e. it forms two rather widely spaced prongs 64. The bifurcated end portion of lever 60 is movable by hand into an open cut-out 66 formed in the cover 55. As best shown in FIG. 2, the cut-out 66 is provided in the flat side wall 86 or the cover 55 and is of such width as to accommodate with certain amount of play not only the pipe connection or nipple 23 and a sealing-locking nut 70, but also the prongs 64 of actuating lever 60 when the latter is in idle position of FIGS. 1 to 3.

In the actuating lever 60 shown in FIGS. 1 to 3, the cylinder or receptacle 10 is ready for transportation or storage in that the forked end portion of lever 60 surrounds the pipe connection or nipple 23 and is prevented from swinging about its pivot axle 59 by the aforementioned sealing-lock nut 70 which is screwed tight onto the threads of nipple 23 and is in the path of prongs 64. In addition, cut-out 66 also seals the channel or bore 24 from the surrounding atmosphere. When it is desired to open the valve element 18, the nut 70 is removed from its nipple or pipe connection 23, i.e. from the path of prongs 64, and the actuating lever 60 is swung about pin 59 into the position of FIG. 4. The cam-shaped portion 62 of head 61 abuts against the head of bolt 53 which latter is axially displaced with the valve tappet 40 in a direction toward the cylinder 10. Valve stem 41 follows such movements of members 40 and 53 against the force of resilient means 45, whereby its free end engages the valve disk 28 and opens the valve against the force of spring 28a. The fluid medium is now free to flow through the opening in cylinder 10, through the zones 21a, 21b and 21d of bore 21, into the channel 24, and into a discharge line (not shown) which may be releasably attached to the nipple 23, e.g. by meshing together external threads 25 as is shown for the locking nut 70 in FIGS. 1 to 3.

The valve 60 may also, but need not, assume the extreme position of FIG. 4 when the cylinder 10 is refilled with a fluid medium. Thus, if the gas introduced through the channel 24 and into the bore 21 is under sufficient pressure, it will open the valve disk 28 without it being necessary that the cam 62 actually depresses the head of bolt 53.

In the modified system of FIGS. 5 and 6 a somewhat different valve 78 is maintained in sealing position by the cam 62a of the lever 60A against the expanding force of a gaseous medium filling the cylinder 10. Thus, the gaseous medium, instead of constantly tending to seal the valve as in the embodiment of FIGS. 1 to 4, constantly tends to open and actually opens the same when the lever 60A is in the position of FIG. 6 which corresponds to the position of lever 60 shown in FIG. 4. Valve stem 41A is fitted at its head or end with a cam section 42 which is reciprocable in the zone 21e of bore 21A and abuts against a shoulder or seat between the zone 21e and the smaller-diameter bore section 21f when the lever 60A is in the position of FIG. 5. It will be noted that the cam 61a is displaced through approximately 180 degrees with respect to the cam 62 shown in FIGS. 1 or 4, i.e. it depresses the parts 40, 41A, 42 and 53 against the force of spring 45 when the lever 60A is in locking position. The underside of the valve head 42 has a recess receiving a sealing element or gasket 43 which tightly seals the section 21f from adjacent zone 21e of bore 21A when the stem 41A is in the position of FIG. 5.

When the lever 60A is swung into the position of FIG. 6, its cam 62a is turned away from the head of bolt 53 and enables the spring 45 to move the elements 40, 41A, 42, 43 and 53 in a direction away from the cylinder 10. The expanding force of spring 45 is assisted by the expanding force of gaseous medium in the cylinder or bottle.

By rotating the bolt 53 with respect to the valve tappet 49, the axial position of member 53 may be adjusted to vary the position of actuating lever 60 or 60A in which the latter's cam 62 or 62a, respectively, causes movements of valve stem 41 or 41A. In this manner, the opening or closing of valve 18 or 78 may be brought about in various positions of the actuating lever 60 or 60A different from those shown in FIGS. 1 and 4 or 5 and 6. In addition, the axially movable bolt 53 allows for necessary adjustments, e.g. when the cam 62 or 62a is replaced by one of slightly different contour. Member 53 thus constitutes an adjustable extension of valve stem 41 or 41A in the axial direction of cylinder 10.

In FIGS. 7 and 8 illustrate a modified actuating lever 80 whose end distant from the pivot axle 59 is connected with one end of a short flexible element in the form of chain 89. The other end of chain 89 is connected to a locking-sealing nut 88 whose purpose is analogous to that of member 70 shown in FIGS. 1 to 6. Elongated slot or opening 85a in the closed end of shielding cover or cap 85 is parallel with the latter's side wall 86; therefore, the lever 80 is turned in the member 85 through ninety degrees with respect to the previously described lever 60 or 60A. The length of chain 89 is so selected that the lever 80 cannot be swung into valve-actuating position without first removing the locking nut 88 from the nipple. This arrangement prevents unintentional opening of the valve protected by cap 85; the construction of the valve utilized in the assembly of FIGS. 7 and 8 may be identical with that of valve 18 shown in FIGS. 1 to 4 or with that of valve 78 shown in FIGS. 5 to 8.

Tapered side wall 86 of cap 85 is formed with a cutout or opening analogous with the cutout 66 to permit passage of the nipple (not shown) which receives the locking-sealing nut 88. When the latter is removed, the lever 80 may be swung into valve-opening position. An additional advantage of chain 89 is that it permanently connects the lever 80 with the locking nut 88 and thus prevents displacing or losing of the latter when the valve is in open position.

The protecting cover or cap 91, shown in FIGS. 9 and 10, is U-shaped, i.e. it has the form of a stirrup consisting of two substantially parallel legs 92 and 93 and a base or web 94. Parts 92 to 94 define an open space or recess 95 which receives the valve 18 when the outwardly extending flanges 96 at the free ends of legs 92, 93 are engaged by the collar 76 of holding means 75. Only the flange of leg 93 is shown in FIG. 10. Pipe connection or nipple 23 extends from the open recess 95 which latter is of such width as to permit the application of nut 88 to the externally threaded member 23. As in the embodiment of FIGS. 7 and 8, the lever 80 is connected with locking nut 88 by means of a short flexible element or chain 89 which prevents swinging movements of the lever into valve opening position when the nut 88 is fastened to the nipple 23. The chain 89 may be replaced or supplemented by a screw 98 which is shown in phantom lines in lever-locking position in FIG. 9, i.e. it is screwed into the leg 92 of protecting cover or cap 91. A locking screw similar to the member 98 may also be provided in the embodiment of FIGS. 7 and 8; it may be received in an internally threaded bore (not shown) in the flat portion of lever 89 and may mesh with internal threads provided in an aligned bore formed in the cover or cap 85.

A still further modification of the combined shielding system 605,605.
locking, sealing and actuating means for the valve 18 is shown in FIG. 11. Cap 101 is releasably connected to the cylinder or bottle 10 by means of the holding ring 75 in a manner previously described in connection with ring 75 and any one of covers 55, 85 or 91. At its right-hand side, the cap 101 is formed with an open cutout 66 for the passage of the nipple 23, and at its left-hand side with the previously described opening 57 to permit observation of valve 18. The closed end 102 of cap or cover 101 comprises a reinforced zone 103 defining an internally threaded bore which receives the externally threaded stem 106 of valve actuating and sealing element 105 in the form of a combined bolt and lock nut whose head is formed with an internally threaded blind bore of such diameter as to mesh with external threads 25 on the nipple 23, this position of member 105 being shown in phantom lines. When the nipple sealing and valve actuating element 105 is in its full-line position and is rotated relative to the cap 101 in such direction as to engage the head of, and depress, the bolt 53, the disk 28 of valve 18 (see FIGS. 1 and 4) opens the valve and permits discharge of gaseous medium from the cylinder 10 through the nipple 23. When the member 105 is rotated in opposite direction, spring 28a returns the disk 28 into sealing position.

When it is completely removed from the cap 101, the member 105 may be screwed onto the nipple or pipe connection 23, as is shown in phantom lines, and then seals the sole exit from the valve 18.

FIG. 12 illustrates the cylinder 10 combined with a cap 85 of the type shown in FIGS. 7 and 8, together with a lifting or suspending device 110 by means of which the cylinder may be attached to a conveyor system, a crane or the like, not shown. Suspending device 110 comprises a discoid member 111 connected at its underside with a pair of grab hooks or clamps 112 whose arcuate ends 113 engage with the projections or studs 77 of holding ring 75. The upper side of discoid member 111 is connected to a hook 115 by means of which the assembly 110 together with the cylinder 10 may be suspended for storage, during refilling or during transportation.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic and specific aspects of this invention. It will therefore, such modifications and adaptations not hereinafter claimed as are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A device of the character described comprising, in combination: a receptacle having an opening; valve means connected to the receptacle for controlling said opening, said valve means comprising a pipe connection; valve protecting means connected to the receptacle and at least partially surrounding said valve means, said protecting means having an opening through which said valve extends; valve actuating means connected to said protecting means for movements with respect thereto; and means comprising a nut threadable onto said nipple for sealing same and for simultaneously locking said actuating means to said protecting means.  

2. A device of the character described comprising, in combination: an elongated metallic receptacle having an axis, an end, and defining an opening at said end; an externally threaded annular member connected to the end of said receptacle; a valve connected to the end of said receptacle for controlling said opening; a protecting cap at least partially surrounding said valve; a retaining ring for releasably connecting said cap to the end of said receptacle, said ring having a threaded portion meshing with said annular member and a plurality of projections extending therefrom; means releasably engageable with said projections for suspending said receptacle; and valve actuating means connected to said cap for movements with respect thereto.
ing a highly compressed gaseous medium, the cylinder having an axis, an end, and an opening at said end through which the medium may be filled into and evacuated from said cylinder; a valve connected to the end of said cylinder and extending into said opening for controlling the passage of the medium therethrough, the valve having a reciprocable stem coaxial with said cylinder and a nipple disposed substantially at right angles to the axis of said cylinder; a protecting cap connected to the end of said cylinder and at least partially surrounding said valve, the cap having a cutout through which said nipple extends; a lever connected to said cap for swinging movements with respect thereto whereby to reciprocate said stem; a nut releasably connectable to said nipple for sealing same; and a flexible element connecting said lever with said nut, the length of said flexible element being such as to prevent swinging movements of the lever when the nut is connected to said nipple.

8. A device of the character described comprising, in combination: an elongated metallic cylinder for receiving a highly compressed or liquefied gaseous medium, the cylinder having a longitudinal axis, an end, and an opening at said end through which the medium may be filled into or evacuated from said cylinder; a valve connected to the end of said cylinder for controlling the passage of the medium through said opening, the valve having a reciprocable stem coaxial with, and an externally threaded nipple disposed substantially at right angles to, the axis of said cylinder; a protecting cap surrounding said valve, the cap having a cutout through which said nipple extends and a closed slot at a point distant from said cylinder; retaining means for releasably connecting the cap to the end of said cylinder; a lever having a cam-shaped end extending into said closed slot and pivotally connected to said cap whereby the lever is swingable with respect to the cap in a plane passing through the axis of said cylinder and said cam shaped portion reciprocates said stem, the lever having a second end which is adjacent to said cap when the lever is swung into an extreme position with respect to said cap; a nut adapted to be screwed onto said nipple for sealing same; and a screw for releasably connecting the lever with said nut at a point distant from said cam-shaped end thereof whereby to maintain the lever in said extreme position.

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