

[54] **PROTECTIVE CAP AND FLUID CYLINDER ASSEMBLY**
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[21] Appl. No.: **188,152**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 93,668, Nov. 30, 1970, abandoned.

[52] U.S. Cl. **220/40 R, 137/382, 220/85 P**

[51] Int. Cl. **B65d 41/06**

[58] Field of Search 220/40 R, 85 P, 40 S; 137/382

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[57] **ABSTRACT**

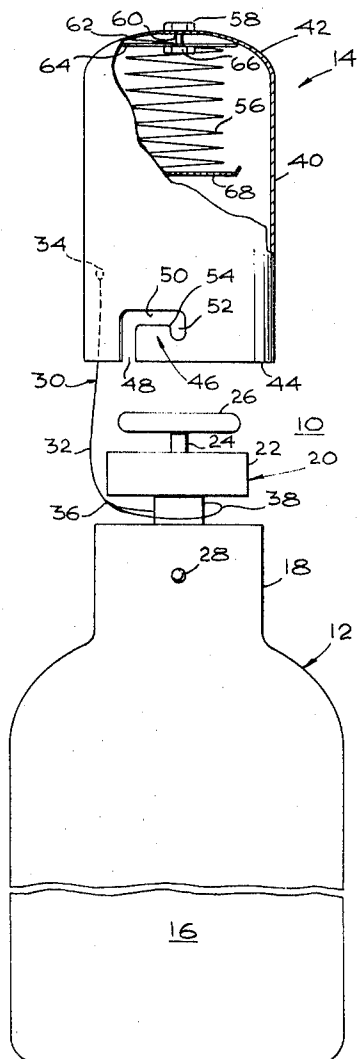
A fluid cylinder body is provided with a protective cap. The cap fits over the cylinder valve handle and has a notch to receive a retainer pin carried on the cylinder. A spring is centrally disposed within the cap and bears against the handle through a pusher plate to releasably secure the pin in the notch and also protect the handle. The pusher plate may be configured to aid in centering the cap around the handle. A second spring may be provided to help bias the pin against a notch detent.

8 Claims, 6 Drawing Figures

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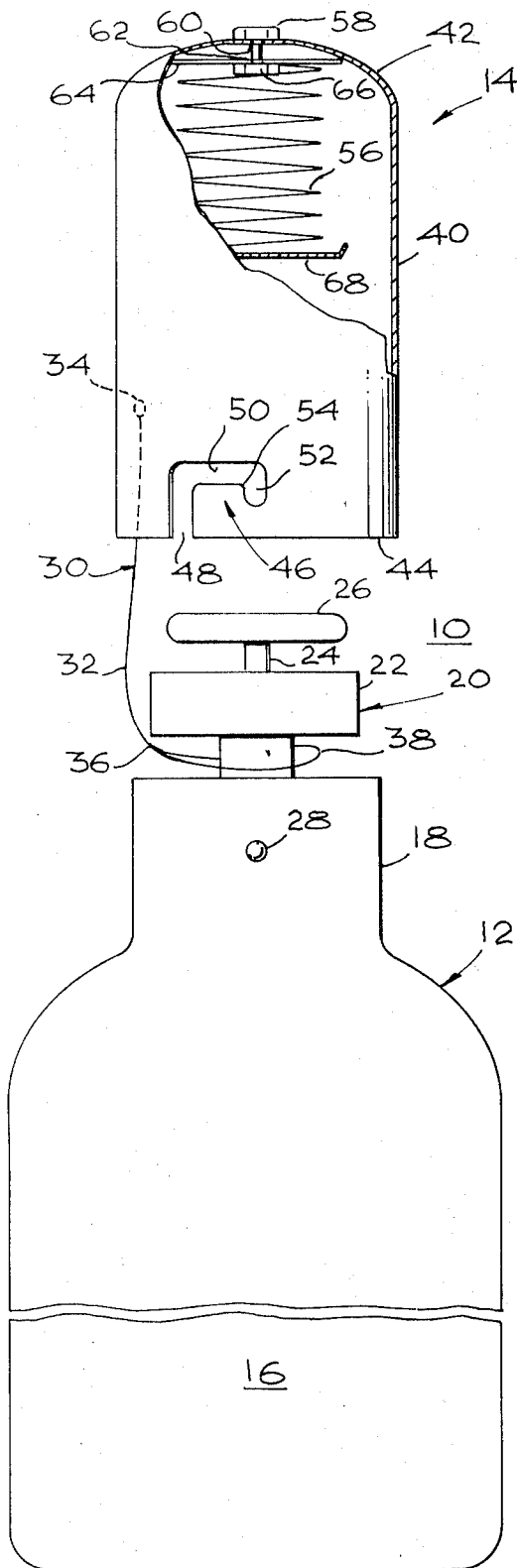


Fig. 1

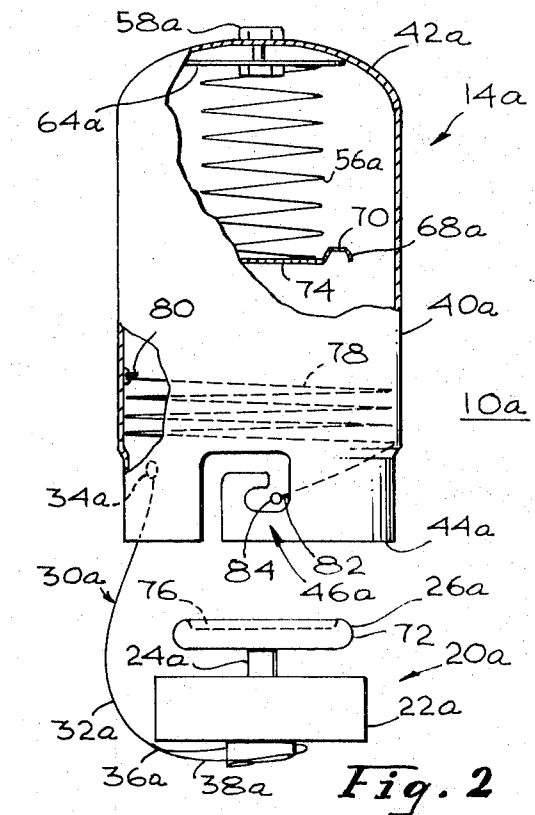


Fig. 2

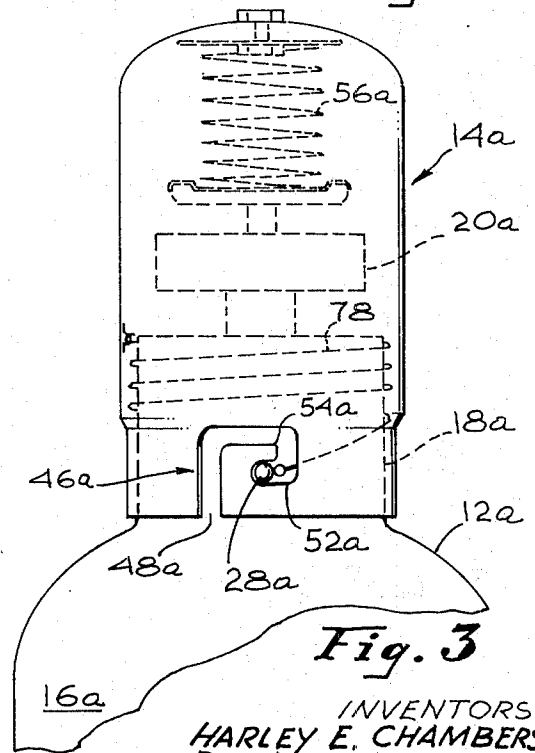


Fig. 3

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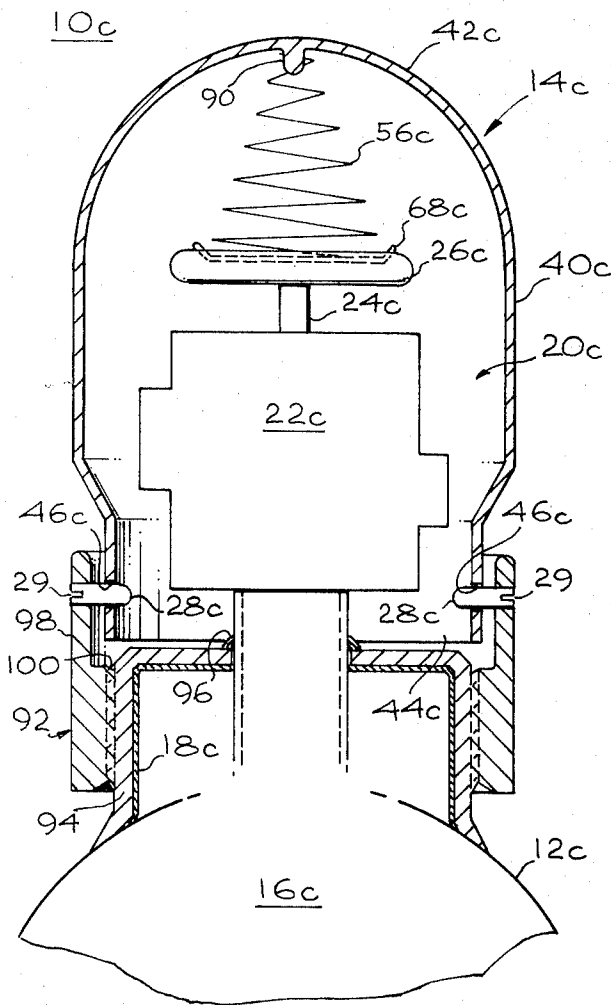


Fig. 4

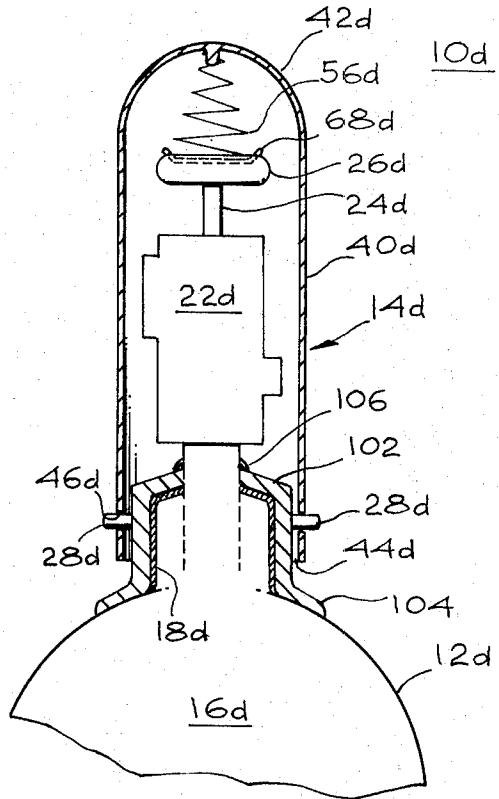


Fig. 5

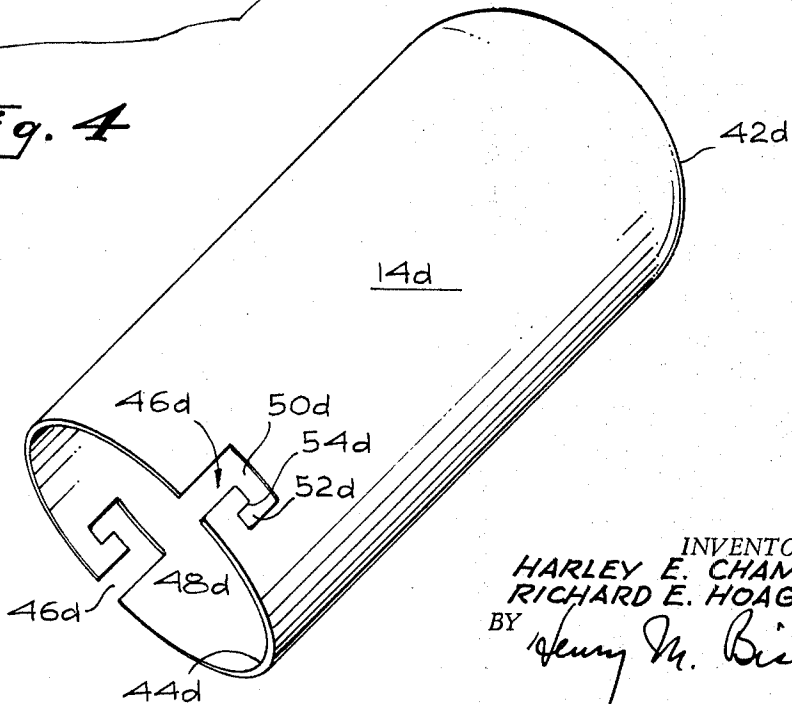


Fig. 6

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PROTECTIVE CAP AND FLUID CYLINDER ASSEMBLY

CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of application Ser. No. 93,668, filed Nov. 30, 1970, now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to valve protective means for fluid cylinders and to cylinders incorporating such means.

2. Description of the Prior Art

Various devices have been used to protect valve handles, valve stems and couplings on fluid cylinders, such as compressed gas cylinders, against damage. In the main, such devices are usually expensive and complicated and/or are time-consuming to make and use. For example, threaded protective caps have been employed, but damage often occurs to the threads, rendering the caps unusable. The threads are likely to corrode, making removal of the caps difficult. Moreover, screwing the caps in place is time-consuming; since both the cap and the cylinder body must be threaded, special machining operations increase the cost of such devices. Accordingly, there is a need for a simple, inexpensive, quickly attachable and detachable protective cap for fluid cylinder valve assemblies.

SUMMARY OF THE INVENTION

The present invention is generally as set forth in the Abstract and extends to both an improved valve-protecting fluid cylinder cap and to the improved cylinder assembly which includes the cap. The cap contains a generally centrally aligned spring which extends towards the cylinder handle. A second spring can be disposed adjacent the inner surface of the shell so as to enclose the handle and valve coupling when the cap is in place. Such a cap is simple and inexpensive to construct, and is particularly easy and rapid to secure in place and also to remove. In securing the cap in place, the retainer pin carried on the cylinder is positioned in the notch in the cap and then the cap is turned to lock the pin in the notch. The pusher plate helps center the cap around the valve handle during this process and the spring(s) hold(s) the cap locked in place by biasing the pin in the notch against the detent defined by the notch. The spring connected to the pusher plate also aids in cushioning the valve (through its handle) from shock damage, and since the cap is spaced outwardly from the handle, additional protection is provided against valve damage. The pin-notch retention system is also much more resistant to damage than are threaded retention systems, does not jam in use, and is much easier and quicker to remove and replace.

BRIEF DESCRIPTION OF THE DRAWINGS

A better understanding of the present invention may be had from a consideration of the following detailed description, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a schematic side elevation of a first embodiment of the improved cylinder assembly of the invention, with the improved valve-protective cap thereof

removed from the cylinder body and with portions broken away to illustrate certain internal features thereof;

FIG. 2 is a schematic side elevation of a second embodiment of the improved cylinder assembly of the invention, again with the cap thereof removed from the cylinder body, and with portions broken away to illustrate certain features thereof;

FIG. 3 is a schematic side elevation of the assembly of FIG. 2, but with the cap in place, certain features being illustrated in phantom outline;

FIG. 4 is a side cross-sectional view of a third embodiment of the improved cylinder assembly of the invention with the cap in place;

FIG. 5 is a side cross-sectional view of a modified form of the embodiment of FIG. 1; and

FIG. 6 is a perspective view of a cap for use in the modified embodiment of FIG. 5.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Now referring to FIG. 1, a side elevation is schematically illustrated of a first preferred embodiment of the improved valve-protective fluid cylinder assembly of the invention. Thus, an assembly 10 is shown which includes a fluid cylinder 12, such as for compressed gas, and a valve cap 14. The cylinder 12 includes a main shell or body 16, having a neck 18 adjacent one end thereof and valve means 20 disposed in neck 18. Means 20 comprises a valve coupling 22, valve stem 24 and valve handle 26 extending outwardly from cylinder 12 in an unprotected position. Neck 18 is shown with at least one pin 28 projecting outwardly therefrom adapted to cooperate with means on cap 14 for releasably securing the cap 14 to the neck 18. A pair or more of the pins 28 are typically provided. Assembly 10 is also provided with connector means 30 which comprises a cord 32 with one end 34 attached to cap 14 and the other end 36 formed into a loop 38 disposed around coupling 22 so as to loosely secure cap 14 to cylinder 12 when the cap 14 is not in use. Obviously cord 32 can be of any suitable material, such as wire, cloth, sisal, etc. and cylinder 12 is of conventional construction.

In assembly 10, however, the cap 14 is of special shape and construction. In this regard, cap 14 comprises a hollow, generally cylindrical shell 40 having a closed end 42 and an opposite open end 44. Shell 40 can be fabricated of any suitable self-supporting durable material such as plastic, metal, wood, ceramic or the like, preferably metal, and can be other than cylindrical in shape, if desired, but in any event is dimensioned to fit over means 20 and be spaced outwardly therefrom. End 44 of shell 40 defines a bayonet-type notch 46, although any other suitable configuration for notch 46 can be used. Thus, notch 46 includes an initial, upwardly directed vertical portion 48 and a second, shorter downwardly directed vertical portion 50 separated by a transverse portion 52, whereby a detent 54 is provided to releasably lock retainer pin 28 in place, i.e., lock cap 14 to neck 18 through pin 28 and notch 46.

A generally centrally disposed, vertically extending helical spring 56 of any suitable construction is secured to the inner surface of shell 40 adjacent end 42, as by a bolt 58 extending through an opening 60 in end 42 and through a hole 62 in a plate 64 disposed within shell 40. A nut 66 secures plate 64 in place against the

adjacent surface of shell 40 and the upper end of spring 56 is secured, as by welding or the like, to plate 64. The lower opposite end of spring 56 is secured to a generally centered pusher plate 68 adapted to bear against handle 26 when cap 14 is in place around means 20. The spring 56 is dimensioned so as to exert enough force via the plate 68 to aid in holding the pin 28 in fixed position in the notch 46 when the cap 14 is in place and to securely seat the valve stem 24 in the coupling 22.

In rapidly releasably securing the cap 14 to the cylinder 12, portion 48 of notch 46 is aligned with pin 28 and then the cap 14 is pushed down until pin 28 reaches portion 50. The cap 14 is then turned to move notch 46 so that pin 28 is aligned with portion 52, after which cap 14 is released and pin 28 seats in the bottom of portion 52 against detent 54 so as to inhibit further movement of cap 14. When in place, cap 14 totally encloses means 20 and is spaced outwardly therefrom. End 44 closely overlies the adjacent surface of neck 18 and spring 56 maintains force on handle 26 through plate 68 to cushion it from shocks transmitted to handle 26 through cap 14 and/or body 16 or neck 18, and also to securely seat stem 24 in coupling 20 against movement, including rotation. Thus, cap 14 is easily and rapidly yet firmly secured in place and, once it is so secured, fully protects means 20 from physical damage.

Cap 14 can be easily and rapidly removed from cylinder 12 by reversing the described procedure. It will be understood that a pair of pins 28 with matching notches 46 can be and preferably are employed in assembly 10 and, if desired, three or more such sets of pins and notches can be used to facilitate the attachment to and removal of cap 14 from cylinder 12.

In FIG. 2, a second embodiment of the assembly of the invention, including the novel protective cap, is schematically illustrated in side elevation. In FIG. 2, components identical to those illustrated in FIG. 1 are identified by the same numbers as used in FIG. 1, but succeeded by the letter a. Thus, as shown in FIG. 2, an assembly 10a includes a cylinder 12a having a cylinder main body 16a and neck 18a and also valve means 20a (including a coupling 22a, stem 24a and handle 26a), a plurality of retainer pins 28a (one of which is shown) and a connector 30a comprising a cord 32a having end 34a secured to cap 14a and end 36a, particularly loop 38a, around coupling 20a. Cap 14a includes shell 40a with closed end 42a and opposite open end 44a containing a plurality of notches 46a (each comprising portions 48a, 50a and 52a defining detent 54a). A vertical spring 56a is secured to shell 40a at end 42a by bolt 58a (through hole 60a of shell 40a and hole 62a of plate 64a) and nut 66a. Pusher plate 68a is secured to the opposite end of spring 56a and includes an arcuate peripheral portion 70 corresponding to the rim 72 of valve handle 26a and a recessed central portion 74 corresponding to recessed portion 76 of handle 26a. Plate 68a is dimensioned to loosely fit over handle 26a so as to aid in seating cap 14a on cylinder 12a over protecting means 20a.

Cap 14a further includes an annular generally horizontally extending spring 78 disposed within shell 40a adjacent the lower end thereof and abutting the inner surface thereof. The upper end 80 of spring 76 is fixedly connected to the inner surface of shell 40a while the lower free end 82 is provided with a pusher

bar 84 extending through a notch 46a, particularly the transverse portion 50a thereof. Spring 78 aids in biasing pin 28a against a particularly shaped detent 55 in notch 46a and thus cooperates with spring 56a to releasably lock pin 28a against that detent 55.

Cap 14a is releasably secured to cylinder 12a in the same manner as described for cap 14 and cylinder 12. When secured in place, cap 14a is positioned with respect to cylinder 12a as shown schematically in FIG. 3 in side elevation. The internal components of cap 14a and means 20a are shown in phantom outline in FIG. 3. It will be readily understood that cap 14a is as easily and as rapidly secured to and removed from cylinder 12a as cap 14 is with respect to cylinder 12. Spring 78, however, additionally protects against inadvertent twisting and removal of cap 14a. Moreover, the particular configuration of plate 68a aids, as do the plurality of pins 28a and notches 46a, in more easily and rapidly aligning the cap 14a with 12a for attachment thereto.

In FIG. 4, a third embodiment of the assembly of the invention, including the novel protective cap, is illustrated in side cross-sectional view. In FIG. 4, components identical to those illustrated in FIG. 1 are identified by the same numbers as used in FIG. 1 but succeeded by the letter c. Thus as shown in FIG. 4, an assembly 10c includes a cylinder 12c having a cylinder main body 16c and neck 18c. The cylinder 12c also comprises a valve 20c (including a coupling 22c, stem 24c and handle 26c), and a pair of retainer pins 28c. Although not shown, it is to be understood that the connector 30 can also be used in this embodiment. The cap 14c includes a shell 40c with a top 42c and an open end 44c containing a plurality of notches 46c. A conical spring 56c is secured to the shell 40c, as by crimping the upper end thereof in a depending projection 90. Alternatively, the arrangement of FIG. 1 may be employed. A pusher plate 68c is located beneath the lower end of the spring 56c to bear against the handle 26c.

In the particular embodiment of FIG. 4, the neck 18c is provided with an upwardly extending collar member 92 which, as shown, is threadably secured to a threaded member 94 having an inverted, generally U-shaped cross-section closely abutting the neck 18c and suitably secured thereto such as by peening the upper part of the neck 18c at point 96. The collar 92 has an upwardly extending flange portion 98, generally circular in transverse cross-section and having an internal diameter sufficient to receive the reduced diameter open-end portion 44c of shell 40c. The notches 46c are configured like those in FIG. 1 but the pins 28c extend radially inward to engage with notches 46c. The pins 28c of this particular embodiment are provided with slotted end portions 29 and can be, for example, threaded studs inserted through threaded apertures in the flange portion 98 for ease of replacement. At the juncture of the inside of the flange portion 98 with the threaded member 94, the surfaces of both are tapered downwardly to form a trough portion 100 having a width greater than the thickness of the shell 40c and a depth greater than the vertical portion 52c of slot 46c. This permits the open end 44c of shell 40c to be depressed into the trough 100 and then rotated and released for securing the cap 14c to the collar 92. In this particular embodiment, certain advantages are achieved by having the pins 28c protected against accidental shearing by being

mounted flush with the outer surface of the flange portion 98.

In FIGS. 5 and 6 there is shown a modified form of the embodiment of FIG. 1 to accommodate gas bottles having a narrow neck diameter. In FIG. 5, components corresponding to those illustrated in FIG. 1 are identified by the same numbers as used in FIG. 1 but succeeded by the letter *d*. In this configuration, the cap 14*d* is an elongated cylindrical member having an upper end 42*d* and a lower, open end 44*d*. As better illustrated in FIG. 6, the cap has a pair of diametrically opposed bayonet type notches 46*d* having the generally inverted J-shaped openings shown in the valve cap of FIG. 1. More than two such notches may be provided if desired to match corresponding pins such as 28*d* (FIG. 5).

In the modification as shown in FIG. 5, the neck 18*d* is provided with a collar 102 of inverted generally U-shaped cross-section having an enlarged outwardly extending flange portion 104 for engaging the cylinder 12*d* outer surface adjacent the neck 18*d*. The collar 102 is suitably secured, such as by welding or peening at 106. The collar 102 is provided with radially outwardly extending pins 28*d* for engagement with notches 46*d* as previously discussed. Moreover, the collar 102 is so configured as to be useable with either outwardly extending pins in the cylinder configuration of FIG. 5 or inwardly extending pins mounted in a flanged adaptor, as in FIG. 4.

Accordingly, an improved valve protection system for fluid cylinders is provided. Such system may include the cylinder with protective cap and employs easily obtainable, inexpensive and durable components, readily fabricated and assembled. Such system protects the cylinder in an improved manner over conventional means by spring cushioning the valve against physical shocks, while enabling more rapid and foolproof securing of the protective cap to the cylinder. Other advantages are as set forth in the foregoing. Such modifications, alterations, additions and changes as are within the scope of the appended claims are intended to form a part of the present invention.

What is claimed is:

1. An improved fluid cylinder assembly which comprises, in combination:

a fluid cylinder body having a plurality of retainer pins extending outwardly from said cylinder body at spaced intervals and at least a portion of a valve, including a valve handle, extending outwardly therefrom, wherein said handle is secured to said cylinder body through a valve coupling external of said body;

a valve cap disposed around and releasably enclosing said valve handle, said cap comprising a self-supporting hollow shell spaced outwardly of said valve handle and open at one end thereof, said one end abutting said cylinder body in the region of said valve handle, and defining a matching set of configured notches for releasably receiving corresponding ones of said retainer pins, a spring generally centrally disposed within said shell adjacent the opposite end thereof and extending towards said open end, spring retaining means securing one end of said spring to said shell at said opposite end and a valve handle pusher plate secured to the free end of said spring, whereby said cap is releasably

retained centered around said valve handle to protect the same from damage; and

a second spring generally annularly disposed within said shell adjacent the inner surface thereof and around said valve coupling, one end of said annular spring being secured to said shell and the opposite end thereof being disposed in said notch in abutting relation to at least one of said retainer pins.

2. The improved assembly of claim 1 wherein said notch is of the bayonet type and defines a pin detent and wherein said first and second springs cooperate to releasably lock said retainer pin against said detent to releasably hold said cap against said cylinder body.

3. An improved fluid cylinder assembly which comprises, in combination:

a fluid cylinder body having at least a portion of a valve, including a valve handle, extending outwardly therefrom;

a valve cap disposed around and releasably enclosing said valve handle, said cap comprising a self-supporting hollow shell spaced outwardly of said valve handle and open at one end thereof, said one end abutting said cylinder body in the region of said valve handle, and defining a plurality of configured notches disposed about and communicating with the open end of the cap;

the valve cap further including a spring generally centrally disposed within said shell adjacent the opposite end thereof and extending toward said open end, spring retaining means securing one end of said spring to said shell at said opposite end and a valve handle pusher plate secured to the free end of said spring; and

a collar member attached to said cylinder body and encircling said valve portion, the collar member including an upwardly extending flange portion shaped to receive the valve cap therein and supporting a plurality of said retainer pins extending inwardly therefrom to releasably engage corresponding ones of said notches, whereby said cap is releasably retained centered around said valve handle to protect the same from damage.

4. The improved assembly of claim 3 wherein said flange portion has a trough portion therein, said trough portion being so configured and having a depth sufficient to receive said valve cap during attachment thereof to the collar member.

5. The improved fluid cylinder assembly of claim 3 wherein the cylinder body has a threaded neck portion, and wherein the collar member has at least a portion of the inner surface thereof threaded for matingly engaging said threaded neck portion.

6. An improved protective cap for a fluid cylinder containing a valve handle extending outwardly from the cylinder body, which cap comprises:

a self-supporting hollow shell adapted to be releasably secured around said handle in spaced relation to protect the same, said cap being open at one end thereof and defining at said open end a configured notch adapted to releasably receive a retainer pin in a member attached to the cylinder body;

a first spring generally centrally disposed within said shell adjacent the opposite end thereof and extending towards said open end;

spring retaining means securing one end of said spring to said shell;

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valve handle pusher means secured to the free end of said spring and adapted to releasably secure said cap to said cylinder through said pin and notch; and

a second spring generally annularly disposed within said shell adjacent the inner surface and said open end thereof, with one end of said second spring secured to said shell and the opposite end disposed in said notch, whereby said two springs cooperate to releasably lock said pin in place in said notch when said cap is secured around said handle.

7. An improved fluid cylinder assembly which comprises, in combination:

a fluid cylinder body having a threaded neck portion and at least a portion of a valve, including a valve handle, extending outwardly therefrom;

a collar member having at least a portion of the inner surface thereof threaded and matingly engaging said neck portion, said collar member encircling the valve portion and having a flange portion extending upwardly from said neck portion, and flange portion having a plurality of inwardly extending retainer pins secured thereto;

a valve cap disposed around and releasably enclosing said valve handle, said cap comprising a self-supporting hollow shell spaced outwardly of said valve handle and open at one end thereof, said one end having a plurality of configured notches for releasably receiving corresponding ones of said retainer pins, said one end being configured to be received within said flange portion, a spring generally

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centrally disposed within said shell adjacent the opposite end thereof and extending towards said open end, and spring retaining means securing one end of said spring to said shell at said opposite end, the free end of said spring being adapted for engaging said valve to releasably retain said cap centered around said valve handle to protect the same from damage.

8. Protective apparatus for a pressurized fluid cylinder having a valve mechanism extending outwardly from the cylinder body adjacent a threaded neck portion thereof, said apparatus comprising in combination;

an adapter for affixing to the cylinder body, said adapter comprising a circular collar having interior threads for engaging the threaded neck portion, the collar encircling the valve mechanism and including an upwardly extending flange portion supporting a plurality of inwardly extending retainer pins for releasably retaining a protective cap thereon; and

a protective cap for releasably attaching to said adapter comprising a self-supporting hollow shell open at one end and defining thereat a plurality of configured notches for releasably engaging corresponding ones of said retainer pins, said cap also containing a biasing spring for bearing against the cylinder and urging the cap outwardly from the cylinder against the retaining means in a locked position.

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