United States Patent

Stephenson et al.

[15] **3,650,438**

[45] **Mar. 21, 1972**

[54] REMOTE DELIVERY NOZZLE AND PRESSURIZED CONTAINER ASSEMBLIES

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[22] Filed: **Dec. 9, 1969**

[21] Appl. No.: **883,551**

[52] **U.S. Cl.** **222/402.22**

[51] **Int. Cl.** **B65d 83/14**

[58] **Field of Search** 222/402.11, 402.13, 402.14, 222/529, 144.5, 320, 505, 506, 402.22, 402.21, 402.27, 394

[56] **References Cited**

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2,731,298	1/1956	Green	222/402.22 X
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[57] **ABSTRACT**

A pressurized container, incorporating a tiltable upstanding valve stem in a top release valve, is provided with a rotatable cap having an eccentric camming aperture aligned to cause tilting and re-erection of a mating eccentric sleeve telescopingly mounted on the tiltable valve stem, and thereby arming and disarming a remote release nozzle by supplying pressure from the pressurized container through an elongated length of flexible tubing to the remote release nozzle upper command. The remote release nozzle is provided with a manual actuator tip for sensitive manual control of the pressurized gas delivered therethrough.

7 Claims, 7 Drawing Figures

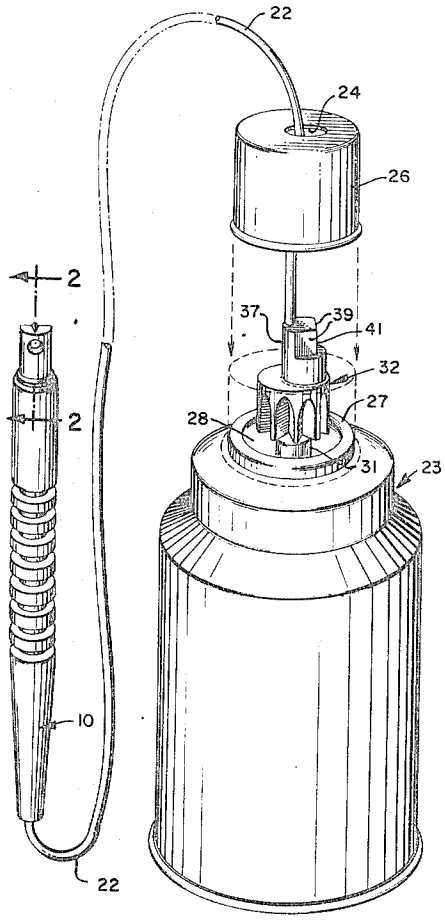


FIG. 1

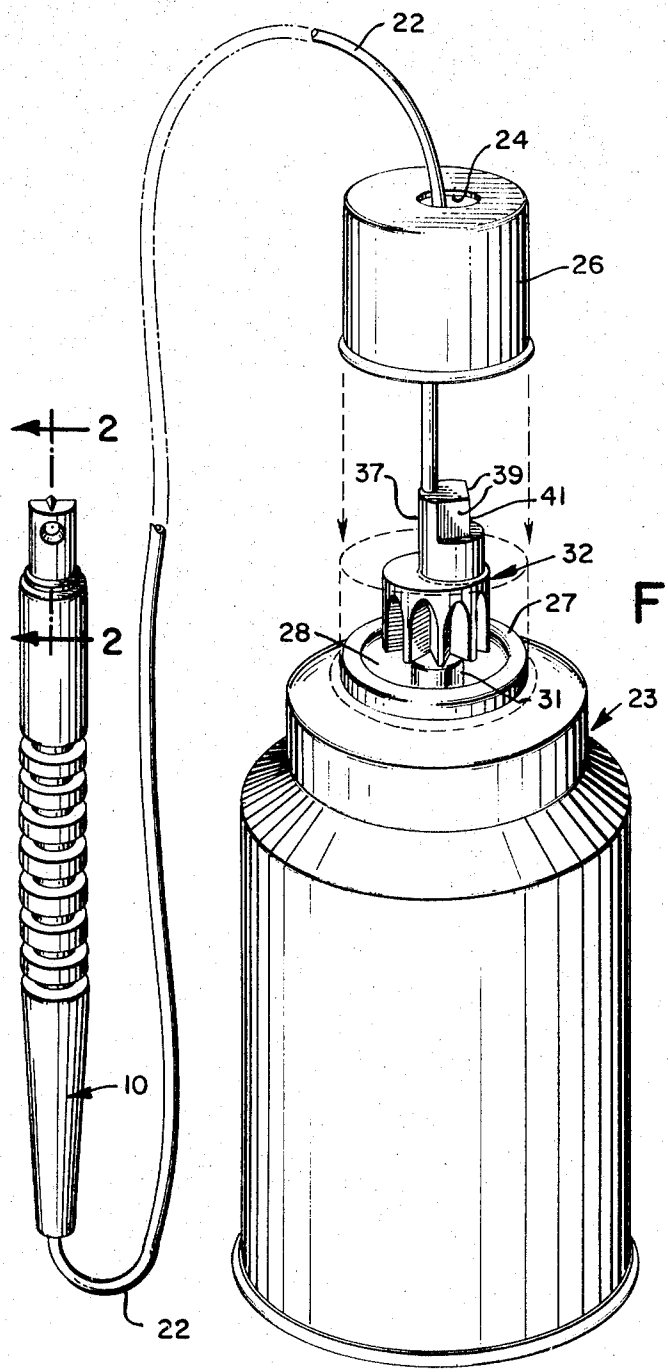


FIG. 2

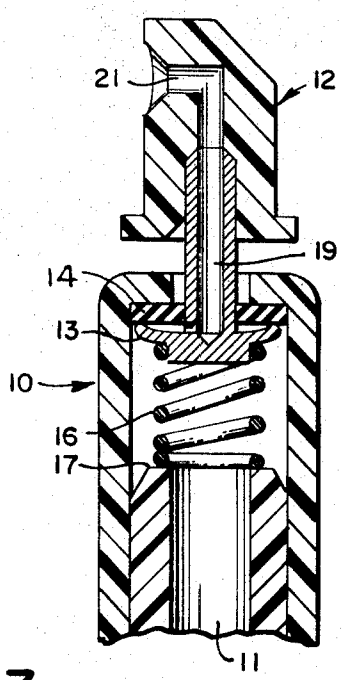
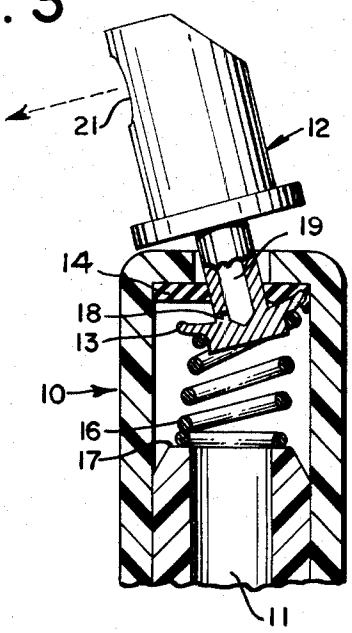


FIG. 3



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FIG. 4

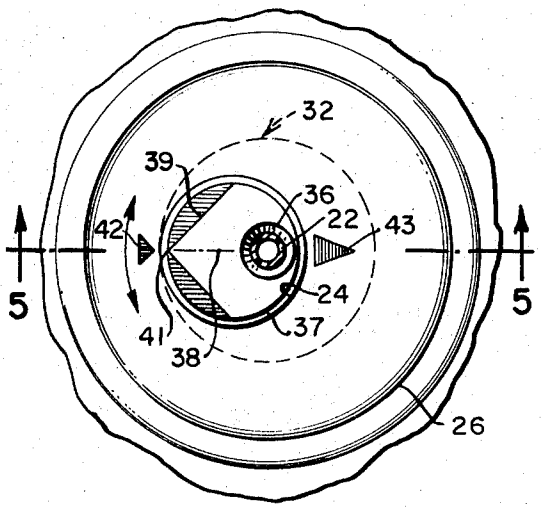


FIG. 6

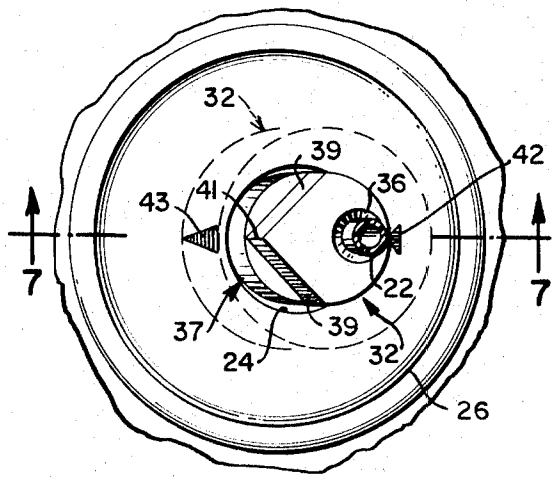


FIG. 5

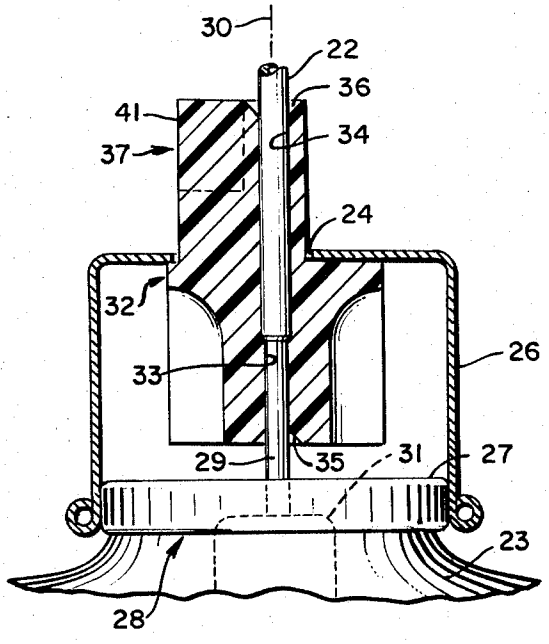
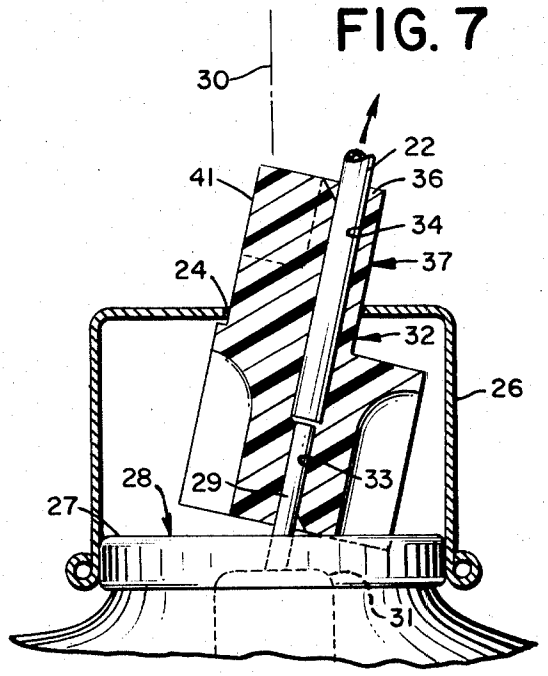


FIG. 7



REMOTE DELIVERY NOZZLE AND PRESSURIZED CONTAINER ASSEMBLIES

BACKGROUND OF THE INVENTION

Space limitations often prevent the use of portable pressurized containers such as pressurized aerosol cans at the workstation point where the pressurized container contents are required. For example, in removing dust particles from cameras, projectors and optical lenses, in cleaning film gates, tape recording heads and tape deck rollers and reels, in cleaning intricate internal parts of electric motors, switch mechanisms and other electrical components, in cleaning the type bars of typewriters or in removing dust and foreign particles from intricate mechanisms such as sewing machines, gear trains and other minute precision assemblies, the manipulation of a pressurized container of solvent or compressed gaseous cleaning agents is often impossible.

In addition, the weight and awkwardness of manually holding a pressurized container such as an aerosol can for long periods of time often proves fatiguing to those engaged in close delicate work.

For these reasons there has been a significant unfilled need for practical and convenient pressurized containers providing remote delivery of the pressurized container contents.

In such remote delivery nozzle assemblies, local manual control at the remote delivery station is required to avoid wasting the pressurized gas, and overriding "arming" and "-disarming" control is required at the pressurized container to avoid the loss of escaping pressurized gas from the flexible conduit or the connecting fittings, which are thereby relieved of internal pressure loads except when remote delivery operations are required. Several devices have been proposed to provide this dual release valve capability. U.S. Pat. Nos. 3,410,492 and 3,428,224 both show complex and expensive, multiple-part, container valve actuating mechanisms providing the desired overriding shut-off control of the pressurized fluid at the pressurized container itself. These complex and expensive devices are not well adapted for cooperation with conventional aerosol cans, and they involve serious risk of leakage losses of pressurized contents.

SUMMARY OF THE INVENTION

The present invention utilizes an economical and readily fabricated override pressure control assembly mounted at the top of the pressurized container, cooperating most effectively with a conventional aerosol release valve stem, such as the tiltable valve stem shown in the drawings. This control assembly preferably employs an eccentric valve stem coupling joining the valve stem to the elongated flexible tubing employed to conduct the pressurized fluid to the remote release nozzle.

Cooperating with the eccentric sleeve coupling is an eccentrically-apertured, rotatable container cap. Rotation of this cap by the user cams the eccentric sleeve coupling and thus tilts the valve stem to a pressure release position and then back to an erect, closed position, thus supplying "arming" pressure from the pressurized container upon command through the flexible tubular conduit to the manually actuated remote release nozzle, and disconnecting this supply pressure from the remote release nozzle whenever the remote delivery operation is completed.

Accordingly, the principal object of the present invention is to provide convenient and economical pressurized container assemblies incorporating remote release nozzles.

Another object of the invention is to provide such assemblies with highly effective arming and disarming control of pressure supplied through an elongated length of flexible tubing to the remote release nozzle by means of an easily actuated control device associated with the pressurized container.

A further object of the invention is to provide such remote pressure release nozzle assemblies incorporating pressurized aerosol containers having tiltable release valves switchable from their armed mode to their disarmed mode by rotation of a container cap mounted on the pressurized container.

Still another object of the invention is to provide such remote release pressurized container assemblies wherein an eccentric container cap aperture cooperates with an eccentric valve stem sleeve to achieve arming and disarming switching of the container control valve upon manual twisting actuation by the user.

Other and more specific objects will be apparent from the features, elements, combinations and operating procedures disclosed in the following detailed description and shown in the drawings.

THE DRAWINGS

FIG. 1 is a perspective view of a remote release nozzle and pressurized container assembly incorporating a preferred embodiment of the present invention, showing the container cap raised above its normal, installed position to expose the operative arming control mechanism.

FIG. 2 is an enlarged fragmentary cross-sectional elevation view taken along the plane 2—2 of FIG. 1, showing the tiltable manual release valve incorporated in the tip of the remote release nozzle shown in FIG. 1, illustrated in its erect, "off" position;

FIG. 3 is a similar enlarged fragmentary cross-sectional elevation view of the same portion of the device, showing the tiltable valve actuator in its tilted, "on" position;

FIG. 4 is a fragmentary top plan view of the pressurized container and control cap in its disarmed mode;

FIG. 5 is a fragmentary cross-sectional elevation view of the control cap assembly of FIG. 4 taken along the plane 5—5 of FIG. 4.

FIG. 6 is a fragmentary top plan view of the pressurized container of the control cap assembly of FIG. 4, rotated to its "armed" mode position; and,

FIG. 7 is a fragmentary cross-sectional elevation view of the same assembly taken along the plane 7—7 of FIG. 6.

In the remote release nozzle and pressurized container assembly shown in FIG. 1, a remote nozzle **10** is formed as an elongated, hollow wand-like device having an internal bore **11** (FIGS. 2 and 3) communicating at the end of nozzle **10** with a release valve **12**. This valve **12** may be a tiltable aerosol-can type release valve of the kind illustrated in FIGS. 2 and 3, employing an inverted mushroom-shaped valve stem having an enlarged underlying flange **13** upturned around its edge and maintained in sealing contact with the underside of an elastomer washer **14** by a helical coil spring **16** compressed between the flange **13** and an internal shelf **17** formed within the bore **11** inside nozzle **10**. Depression or tilting of release valve **12** separates the flange **13** from the elastomer washer **14** by deforming the resilient spring **16**, thereby connecting the bore **11** within nozzle **10** through a lateral metering orifice **18** to the delivery bore **19** of the release valve **12**. When the internal bore **11** of remote release nozzle **10** is supplied with pressurized gas, actuation of valve **12** releases this pressurized gas for delivery through a delivery orifice **21**, in the manner illustrated in FIG. 3.

The length of flexible tubing **22** sealingly joined to the lower end of bore **11** of release nozzle **10** connects the release nozzle with a pressurized container, such as the aerosol can **23** illustrated in FIG. 1. Tubing **22** extends through an eccentric aperture **24** formed in the upper portion of a rotatable cap **26** dimensioned to fit snugly around the rolled edge **27** of a can closure disk **28** forming the top of the aerosol container **23** and provided with a conventional tilt type release valve having a tiltable valve stem **29** shown in FIGS. 5 and 7, and mounted within an upstanding embossed projection **31** formed in the can closure disk **28**.

In the normal vertical position of the valve stem **29**, projecting upwardly along the axis of the pressurized container **23** as shown in FIGS. 4 and 5, the tiltable valve is closed, operating in much the same manner as the valve assembly **12–13–14** in FIGS. 2 and 3 or the tiltable aerosol container valve shown in U.S. Green Pat. No. 2,731,258. When the valve stem **19** is tilted angularly relative to the axis **30** of the pressurized con-

tainer aerosol can 23, as shown in FIGS. 6 and 7, the tiltable valve assembly within the embossed projection 31 of can closure disk 28 is placed in its delivery discharge mode, in the same manner as the tiltable valve assembly of FIGS. 2 and 3, illustrated in its delivery mode FIG. 3.

The tiltable release valve incorporated in embossed projection 31 is normally closed by an internal spring not shown in the drawings, urging valve stem 29 toward its normal closed upstanding mode shown in FIG. 5, in a manner similar to the valve assembly 12, by helical cooperating with compression coil spring 16 and normally maintained thereby in its vertically upstanding closed mode shown in FIG. 2. Arming and disarming operation of the valve assembly 29–31 mounted at the top of the pressurized container or aerosol can 23 is achieved by the cooperation of a sleeve coupling 32 with the eccentric aperture 24 formed in cap 26. Sleeve coupling 32 is shown in the perspective view of FIG. 1 and in the enlarged fragmentary cross-sectional elevation views of FIGS. 5 and 7.

Sleeve coupling 32 is a vertically elongated integral unit preferably formed of molded polymer plastic material such as linear polyethelene and is provided with a central bore joining a bottom valve stem portal 33 to a top outlet tubing portal 34. In the illustrated embodiment of the invention, the valve stem portal end of this central bore is dimensioned precisely to receive in tight, sliding, telescoping engagement the upstanding open end of valve stem 29, and is approximately 0.113 inches in inside diameter, opening in a chamfered or countersunk portal rim 35 designed to facilitate quick and convenient installation of the coupling 32 in telescoping engagement on valve stem 29. The outlet tubing portal 34 is likewise precisely dimensioned for tight, telescoping engagement over the end of flexible tubing 22, and similarly opens in a chamfered portal rim 36 for easy installation. When the valve stem 29 and the flexible tubing 22 are both telescopingly engaged within the bore of coupling 32 connecting the portals 33 and 34, the coupling 32 forms a pressuretight sealed connection joining the interior of pressurized container 23 in communicating with the interior bore 11 of remote release nozzle wand 10, via valve stem 29 and hollow flexible tubing 22.

Tilting force applied as a horizontal force attempting to overturn or laterally deflect sleeve coupling 32 from the vertically upstanding closed position shown in FIG. 5 to the laterally tilted, valve-open position shown in FIG. 7 releases the pressure from inside pressurized container 23 to fill flexible tubing 22, thus arming the remote release valve stem with the full pressure contained in pressurized container 23.

When the lateral tilting force is removed from coupling 32, the release of pressure through remote release valve 12 exhausts the pressure head contained within flexible tubing 22 and bore 11 of the nozzle 10 is equalized with the atmosphere while the closed valve within projection 31 effectively seals pressurized container 23 against release of further pressurized contents into tubing 22 through sleeve coupling 32.

The upper end of sleeve coupling 32 is provided with a vertically upstanding sleeve 37 protruding upward, above pressurized container 23, and extending through eccentric aperture 24 in container cap 26, as shown in the drawings. The internal bore extending axially through coupling 32 is positioned close to the external wall of eccentric sleeve portion 37 at one point, as shown in FIG. 4, and tubing portal 34 and the telescopingly interfitted flexible tubing 22 engaged therewith are thus secured in coupling 32 at a point substantially coinciding with its central axis 30. Horizontal line 38 in FIG. 4 is a projection of the diametral plane passing through this central axis 30, forming the plane 5—5 along which the cross-sectional view of FIG. 5 is taken. This plane is the plane of "maximum eccentricity" of the eccentric sleeve portion 37 relative to the longitudinal axis of coupling 32 and tubing portal 34. Therefore, as viewed in FIGS. 4 and 5, axial tubing portal 34 is much closer to the right hand wall surface of sleeve 37 in FIG. 5 than to the left hand surface bounding eccentric sleeve portion 37.

The tight, interfitting relationship between valve stem 29 and valve stem portal 33 at the lower end of coupling 32 effectively prevents relative rotation of coupling 32 and pressurized container 23. The present invention takes advantage of this resistance to relative rotation by utilizing the eccentrically apertured cap 26 as a relatively rotatable actuating member. As shown in FIG. 4, the eccentric aperture 24 in cap 26 is correspondingly offset for engagement over eccentric sleeve portion 37 of coupling 32 when cap 26 is properly aligned and lowered to be installed upon container 23, as illustrated by the exploded perspective view of FIG. 1. The aligned and cooperating eccentricities of sleeve 37 and aperture 24 are illustrated in FIGS. 4 and 5. As there shown, sleeve 37 may be provided with a pair of raked surfaces 39 meeting in a sharp corner indicator edge 41, terminating the diametral plane 38 of eccentric sleeve portion 37 remote from axis 30, and tubing portal 34. A mark or indicium 42 indicating the "off" or "disarmed" position of the assembly may be imprinted or embossed on the upper surface of cap 26 beside eccentric aperture 24, at the point where the aperture 24 is closest to the edge of cap 26 for aligned coincidence with indicator edge 41 in the "disarmed" position of the assembly shown in FIGS. 4 and 5.

When the user desires to "arm" the device in order to open the container valve 29–31 to supply pressurized gas from the container 23 through tubing 22 to remote release nozzle 10, a quick twist of cap 26 through approximately 180° in either direction. This half-turn rotation brings to the position shown in FIG. 6, with the eccentric aperture 24 in opposition to the eccentric sleeve portion 37 of coupling 32, thus placing the edge of eccentric aperture 24 into laterally interfering relationship with indicator edge 41 of coupling 32.

This increasing interference during relative rotation of cap 26, switches the cooperating eccentric elements 24 and 37 from the non-interfering "diarmed" position of FIG. 4 to the interfering, tilting displaced "armed" position of FIG. 6. This progressively increasing eccentric interference of aperture 24 and eccentric sleeve portion 37 causes coupling 32 to tilt laterally from the disarmed mode in FIG. 5 to the armed mode of FIG. 7, resulting in tilting angular displacement of valve stem 29 and opening the valve within projection 31, by the time coupling 32 has reached its terminal angular position in the tilted, off-axis "armed" mode shown in FIGS. 6 and 7. An "armed" indicium 43 printed or embossed on the upper surface of cap 26 beside aperture 34 diametrically opposite from the "disarmed" indicium 42 aids the user in rotating cap 26 to the maximum interference angle point where the "armed" indicium 43 is directly aligned juxtaposed to indicator edge 41 in the manner illustrated in FIG. 6. The indicia 42 and 43 thus allow the user to align indicator edge 41 quickly and easily with the selected indicium desired in order to change the assembly from the "armed" mode to the "disarmed" mode and back, with maximum convenience.

Unlike the complex, bulky and awkward arming devices illustrated in U.S. Douglas Pat. No. 3,410,492 and U.S. Eberhardt Pat. No. 3,428,224, employing many separate parts, telescoping prongs, latches and costly formed or molded assemblies, the unitary eccentric sleeve coupling 32 cooperating with the eccentrically apertured cap 26 in the arming assembly of the present invention provides an economical, foolproof and highly effective arm-disarm control, placing convenient remote release pressurized assemblies within the reach of all potential users on a practical and economical basis.

The twisting relative rotation of cap 26 with respect to can 23 to disarm and arm the assembly, as shown in FIGS. 4–7, is easily explained to the new user with a minimum of instruction. Indeed, the "diarmed" indicium 42 and the "armed" indicium 43 may comprise merely the words "off" and "on", providing all the instruction required by many users.

The sealed pressuretight coupling connection provided by eccentric coupling 32 assures the sealing of the overall assembly against leaks, and preserves the operating pressure of

loaded pressurized container 23 for full utilization at the remote release nozzle wand 10 at the workstation. Tubing 22 is preferably from four to 6 feet in length, permitting container 23 to be placed out of the way on the floor or on a convenient shelf removed from the workstation, where intricate, delicate work is in progress.

In the "armed" mode of the device the remote release nozzle 10 may be placed conveniently beside a work place, to be picked up and utilized by the operator merely by thumb pressure, producing the relative tilt of release valve 12 with respect to wand 10, whenever a blast of pressure is required at the workstation.

Release and closing of valve 12, to the position shown in FIG. 2, effectively seals the flexible tubing 22 and bore 11 against leakage or escape of pressure between discharges. When the remote release operation is concluded, a 180° twist of cap 26 disarms the assembly until the next use is required.

As shown in FIGS. 1, 2 and 3, the slim, wand-like shape of nozzle 10 cooperates with the small diameter of the thumb button release valve 12 to produce a pressurized gas "source" no larger than a pencil. Wand 10 may thus be placed conveniently at the workstation, and may be picked up, aimed and actuated by the user with utmost convenience. The small size of this remote release nozzle and the ease of its "relative tilt" actuation of thumb button valve 12 with respect to wand (10 FIG. 3) thus provides a high convenience tool requiring no more muscle-power than retracting the tip of a ballpoint pen by thumb button actuation. This tool is useful in many industries and service operations, supplying pressurized gas with pinpoint accuracy to the workstation, while removing the actual pressure reservoir, container 23, to a nearby, out-of-the-way storage location.

Since the foregoing description and drawings are merely illustrative, the scope of the invention has been broadly stated herein and should be liberally interpreted to secure the benefit of all equivalents to which the invention is fairly entitled.

What is claimed is:

1. A remote-release, pressurized-container assembly comprising:

A. A pressurized container provided with an upstanding container rim concentrically surrounding an upstanding tiltable hollow valve stem for the release of pressurized contents therefrom in response to tilting movement of the valve stem relative to the container from a normally upright disarmed mode position to a tilted armed mode position;

B. An associated remote pressure release nozzle wand terminating in a manually actuatable pressure release valve closing an internal bore therein;

C. An elongated conduit sealingly connecting the internal bore of the remote pressure release nozzle wand to the hollow interior of the tiltable valve stem projecting upward from the pressurized container;

D. A sleeve coupling, sealingly joining the valve stem to the conduit having a part with an eccentric cross section to transmit lateral actuating force tilting the valve stem to its armed mode position from its disarmed mode position relative to the pressurized container; and

E. Manually movable container cap means

1. encircling the sleeve coupling

2. having an offcenter hole securing the valve stem and a flange provided with a container rim-engaging lip

3. and movable between a first "armed mode" position and a second "disarmed mode" position,

whereby movement of the container cap means to its "armed mode" position tilts said sleeve coupling and said upstanding tiltable valve stem from its normally upright disarmed mode position to its tilted "armed mode" position, and movement of the cap means to its "disarmed mode" position allows the tiltable valve stem to return to its normally upright "disarmed mode" position.

2. The assembly defined in claim 1 wherein the sleeve coupling is asymmetrical and is provided with an axial bore for telescoping interfitting engagement with the hollow valve stem at the lower end of the coupling and for telescoping interfitting engagement with the flexible tubing at the upper end of the coupling, and wherein the coupling is provided with an eccentric sleeve projection surrounding its axial bore and interferingly engageable with a corresponding eccentric aperture formed in the container cap means, whereby relative rotation movement of the cap means with respect to the pressurized container increases the interfering juxtaposition of the eccentric aperture and the eccentric sleeve, causing the cap to apply lateral force against the eccentric sleeve, producing angular tilting movement of the coupling and of the valve stem engaged therewith to move the valve stem from a first closed position to an angularly-tilted open position, arming the assembly by connecting the pressurized fluid within the pressurized container via the flexible tubing to the internal bore of the remote release nozzle wand.

3. The assembly defined in claim 1 wherein the container cap and the eccentric sleeve are provided with cooperating indicia identifying the relative angular positions of maximum and minimum juxtaposed interference therebetween corresponding to the closed and open positions of the valve stem.

4. The assembly defined in claim 1 wherein the elongated conduit is a length of flexible tubing.

5. The assembly defined in claim 1 wherein the remote release valve and the pressurized container valve stem are both actuated to opened positions by lateral angular tilting movement from normal axial closed positions, and wherein the terminating release valve of the remote pressure release nozzle wand forms a short axial extension of the wand normally resiliently biassed toward a substantially coaxial sealed position and actuated by lateral tilting force into an angularly tilted delivery position relative to the wand.

6. A remote-release, manually-armed and actuated pressurized-container assembly comprising:

A. A pressurized container;

B. An associated remote pressure release nozzle wand terminating in a manually actuatable pressure release valve closing an internal bore therein;

C. An elongated flexible conduit having a remote end sealingly connected to the internal bore of the remote pressure release nozzle wand;

D. A laterally tiltable upstanding closure valve stem mounted on the container top and secured to the opposite end of the conduit, connecting the container interior to the conduit in a tilted "armed" mode of the valve stem and disconnecting the container interior from the conduit in a nontilted "disarmed" mode thereof, and

E. A manually-movable eccentric arming unit incorporating a sleeve coupling sealingly joining the valve stem to the conduit, and an eccentric coupling-tilter positioned to impart tilting translation movement to the sleeve coupling, said coupling-tilter having an offcenter hole encircling the valve stem and being interferingly engageable between the container top and the tiltable valve stem sleeve to maintain the valve stem in its tilted "armed" mode by applying lateral tilting force to the tiltable valve stem and being disengageable to release the valve stem to its nontilted "disarmed" mode, and

F. With the wand pressure release valve forming an axial extension of the remote pressure release nozzle wand which is normally resiliently biased toward a first substantially coaxial, closed position by resilient spring means within the internal wand bore, and which is actuated by manual force overriding the resilient biasing force of said spring means directed to displace the pressure release valve relative to said wand to a second, open position.

7. The assembly defined in claim 6 wherein the release valve incorporates a tubular valve conduit:

A. Protruding from an aperture formed in the hollow remote pressure release nozzle wand;

B. Having a lateral metering orifice positioned inside the wand bore near its inward end;

C. Terminating in a blind internal end inward of the lateral metering orifice;

D. Provided with a radial cupped flange underlying the metering orifice;

and wherein the assembly further includes

E. A resiliently deformable elastomer washer surrounding the valve conduit above the metering orifice and sealing the wand aperture;

F. And said resilient spring means being positioned in the wand bore and normally biasing the valve conduit's cupped flange toward the elastomer washer blocking passage of gas through the metering orifice in the closed position of the release valve,

whereby manual force displacing the release valve deforms the spring means to open the metering orifice and released pressurized gas from the wand bore for delivery through the tubular valve conduit.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,650,438 Dated March 21, 1972

Inventor(s) George M. Stephenson and Charles A. Soriano

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Abstract, Line 8, "upper" should be -- upon --

Column 2, Line 38, after "remote" insert -- release --

Column 3, Line 39, after "communicating" insert -- relationship --

Column 4, Line 70, "diarmed" should be -- disarmed --

Signed and sealed this 1st day of August 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334