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**PRESSURE DISPENSER VALVE HAVING  
 GAS INLET**

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This invention relates to improvements in valves for pressure dispensers, and more particularly in such valves having separate inlet and outlet passages.

Pressure dispenser valves for many types of products, and particularly spray valves, have one or more restrictions in their flow passages to obtain desired results during dispensing. Prior to the present invention, it has been difficult to insert gas under pressure into such dispensers quickly through the valve, leading some to "cold fill" the gas prior to final assembly of the valve onto the container.

A principal purpose of this invention is to provide a valve for pressure dispensers having a passage for admitting gas separate from the dispensing passage. A further purpose is to provide such a valve in which restricting orifices in the outlet passage may be made to whatever size is most desirable for dispensing results without affecting the gassing operation. A further purpose is to provide such a valve suitable for quick gassing after final assembly. A further purpose of this invention is to provide a gas inlet passage which may be opened by application of external pressure but which is held closed by internal pressure. A further purpose of this invention is to provide such a valve which may be dispensed by either tilting or depressing the valve stem. Still further purposes will be apparent from this specification.

These purposes are here accomplished, in a general sense, by positioning a resilient seal having a central opening beneath a container wall having a larger central opening, mounting a tubular dispensing member sealedly within the seal opening so as to extend spacedly through the container wall opening, mounting the outer portion of the seal against the container wall with seal-mounting means, and providing a plurality of apertures penetrating the seal intermediate the seal mounting-means and the container wall opening. Spring means is provided to resist downward movement of the tubular dispensing member.

When gas pressure is applied between the apertured container wall and the tubular dispensing member, the inner portion of the resilient seal is forced away from the container top wall, exposing the apertures through which gas pressure is admitted. When the gas pressure is released the apertures are sealed against the top wall by gas pressure within the container. Depressing the tubular dispensing member permits dispensing without unsealing the apertures.

In the accompanying drawings:

FIGURE 1 is a side sectional view of a valve assembly embodying the present invention, shown in closed position, with an actuator shown in dashed lines;

FIGURE 2 is a side view, largely in section, of the valve assembly during gassing with the gas inlet passage shown by arrows.

FIGURE 3 is a plan view of the resilient washer utilized in said valve assembly;

FIGURE 4 is a side view in section of the valve assembly shown open as for dispensing, with the outlet passage shown by arrows; and

FIGURE 5 is a side view in section of an alternate embodiment of the invention.

FIGURE 6 is a plan view of the resilient washer utilized in the said alternate embodiment of invention illustrated in FIGURE 5.

The gassing and dispensing valve assembly in FIGURE 1 comprises a container top wall generally designated 10 adapted for mounting on a pressure dispenser, not shown, a tubular valve stem generally designated 20, a rubber-like sealing washer generally designated 30, a hollow, annular-rimmed nipple member generally designated 40, a spring 50, a dip-tube 60 and an actuator A.

The tubular valve stem 20 comprises a substantially rigid outlet valving spout having an upper dispensing spout 21, a lower valving head 22, an annular recess 23 upwardly adjacent said valving head, an orifice 24 at the site of said recess, and a spring-mounting peg 25 depending from said valving head.

The container top wall 10 may be a conventionally valve-mounting cup, which has a central opening 11 larger than the outer diameter of the dispensing spout 21, which opening penetrates the center of a substantially flat inner surface 12 at the top of a central, nearly cylindrical dome portion 13. The container top wall 10 is disposed spacedly about the dispensing spout 21, which extends through a central opening 11.

The washer 30 serves as the valve seal and is formed of rubber-like material. Said washer 30 is positioned beneath the container top wall 10 adjacent the inner surface 12. It includes a central opening 31 generally concentrically located with respect to the wall opening 11 through which the dispensing spout 21 extends. The washer 30 includes an inner perimeter edge 32 surrounding the opening 31 and sealedly and slidably grasping the spout 21. The washer 30 further includes an annular valve seat portion 33 adjacent said perimeter edge and having an upper surface 34; an annular outer mounting portion 35; and an annular intermediate portion 36 between the seat portion 33 and the outer portion 35. The seat portion 33 is upwardly adjacent the valving head 22 and its upper surface 34 partially bears against the container wall inner surface 12 and is partially exposed between the container top wall 10 and the dispensing spout 21. The thickness of the washer 30, and consequently the height of the inner perimeter edge 32, is greater than the height of the recess 23 so the spout 21 will slide downward through the washer opening 31 without deflecting the washer 30 substantially downward. A plurality of gas-inlet valving slits 37, each having a pair of normally contiguous side surfaces 38, penetrate through the intermediate portion 36 radially outward the wall opening 11 and the valving head 22. Said slits are shown in FIGURE 3 to extend radially.

The annular rimmed nipple member 40 is disposed with its rim radially outward of said slits 37 and mounts the washer 30 sealedly against the wall inner surface 12 by clamping the washer outer portion 35 thereagainst. The said nipple member 40 includes an outer shoulder 41 projecting from a cylindrical wall portion 42 which terminates in a base 43 having an inlet nozzle 44. Crimping the dome portion 13 inward, as at the crimp 14, against the shoulder 41 holds the rimmed nipple member 40 securely in position sealedly against the annular outer mounting portion 35 of the washer 30. Said nipple member 40 has within its base portion 43 a plurality of inward-and-upward projections 45, which support the lower coil of the spring 50 and, together with the peg 25, retain said spring centered within said member 40. To the inlet nozzle 44 is mounted the dip-tube 60. Said rimmed nipple member 40 may also be provided with a sharp edge 46 for projecting into the washer outer portion 35 to clamp the washer 30 against the wall inner surface 12 with greater security.

The valve assembly in FIG. 1 may be assembled by positioning the washer 30 against the container top wall 10 inside the dome 13, inserting the dispensing spout 21 through the washer opening 31 and the wall opening 11

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so that the valving head 22 comes into contact with the washer seat portion 33, placing the spring 50 around the peg 25, placing the rimmed nipple member 40 into position so that the spring 50 is seated upon and between the projections 45, pressing said rimmed nipple member 40 against the washer outer portion 35 and crimping the dome wall 13 to hold it securely in place. The dip-tube 60 may be mounted on the inlet nozzle 44 before or after said rimmed nipple member is placed into position.

A dispensing actuator A, not novel of itself, here is shown in FIGURE 1 in dashed lines. It may be of a type suitable for actuation by either depressing or tilting, and may be of the spring or non-spring type. It is preferably attached to the dispensing spout 21 after gassing.

After the mounting cup with the valve assembly has been mounted to a container or pressure dispenser, the container may be gased quickly by passing the gas through the space between the container top wall opening 11 and the dispensing spout 21, thence radially outward over the washer seat portion 33 and through the slits 37. A gasser head, such as is designated B and shown in dashed lines in FIGURE 2, may be placed over the dispensing spout 21 and the dome 13, with its gasket seal C in sealing engagement with the container top wall 10. The pressure of the gas coming from such gasser head is forced against the exposed part of the washer seat portion upper surface 34. The washer 30 is deflectable downward against the valving head 22, which is thereby also forced downward or which may be independently depressed by a central pin D in such gasser head B. The downward deflection of the washer 30 exposes the slits 37 whose normally contiguous side surfaces are forced apart by such gas pressure to admit the gas into the container. This downward deflection of the washer 30 and the opening of the slits 37 is permitted by the resilience of the rubber-like material of which the washer 30 is formed. When the gas pressure from the gasser head is released, the gas pressure within the container presses the washer 30 into sealing engagement against the inner surface of the container top wall 10 and also compresses said washer, thereby increasing the natural tendency of the slit side surfaces 38 to return to their normally contiguous relationship. Substantially simultaneously the spring 50 returns the valving head to its uppermost position, thereby compressing the washer seat portion 33 between said valve head and the container top wall 10, so as to retain the sealing engagement between said valve head and said seat portion and aid in retaining the washer 30 in its normally flat sealed relationship against the wall inner surface 12.

With suitable actuator means provided, this valve assembly may be used as a foam-dispensing valve or a spray-dispensing valve and may be actuated either by tilting or by depressing the valve stem 20. When a downward force is applied to the valve stem 20, the dispensing spout 21 slides downward through the washer opening 31, thereby moving the valving head 22 out of sealing engagement with the washer 30 and bringing the orifice 24 into communication with the interior of the container. The contents of the container under pressure then pass through the dip-tube 60 and the orifice 24 and out through the dispensing spout 21, as illustrated by the arrows in FIGURE 4. A similar effect is obtained when a sideward force is applied to the valve stem 20. Throughout the dispensing operation, the washer 30 is held in sealing engagement with the container wall inner surface 12 by the gas pressure within the container. When the force applied to the valve stem 20 is released, the spring 50 returns the valve stem 20 to its uppermost position, forcing the valving head 22 into sealing engagement with the washer valve seat portion 33, thereby sealing off the orifice 24.

The alternate embodiment shown in FIGURE 5 includes a container top wall generally designated 10'; which may be a conventional valve-mounting bottle cap, having

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a central opening 11' corresponding to the central opening 11 of the previously described embodiment and a depending skirt portion 14'; a tubular valve stem generally designated 20' generally similar to the stem 20 in the previously described embodiment as illustrated, said stem 20' having a downward-facing annular shoulder 26 projecting outwardly from the stem 20' and disposed outwardly from the container top wall 10'; a washer generally designated 30' having arcuate slits 37' as shown in FIGURE 6 and which is otherwise identical to the washer 30 previously described; a helical coil spring 50' disposed outwardly of the top wall 10' and compressed between said top wall and the stem shoulder 26; a container such as a bottle, only the upper portion of which is shown, having a rimmed container mouth generally designated 40', said mouth having an upper annular rim portion 46' mounting the washer 30' sealedly against the wall inner surface 12', the mouth 40' further having a plurality of annular external ridges 47 about which the depending skirt portion 14 is securely fastened. A valve actuator A' is press-fitted over the tip of the stem 20'.

The valve assembly of FIGURE 5 is assembled by positioning the washer 30' against the wall inner surface 12', inserting the dispensing spout 21' through the washer opening 31' and the wall opening 11' so that the valving head 22' comes into contact with the washer seat portion 33', placing the spring 50' over the spout 21' and forcing said spring over the spout shoulder 26 so that it is compressed between the top wall 10' and the shoulder 26. After the container is filled with the substance to be dispensed, and before the gas is inserted, the valve assembly is secured over the bottleneck 40' by securely fastening the skirt portion 14 thereabout as by rolling or crimping onto the ridges 47.

The operation of the valve assembly shown in FIGURE 5 during gassing is similar to the previously described embodiment. Its operation during dispensing is similar to that of the previously described embodiment except that, since no dip-tube means has been provided, it is necessary to invert the container for dispensing.

The present invention may be employed upon and in connection with other types of dispensers and other types of dispensing valves. In the claims which follow, it has been necessary to select certain language to describe spatial and directional relationships which can obviously be varied. Such discharge valves are usually in the top wall of a dispenser, with the washer 30 in a horizontal plane, and with the tubular valve stem 20 vertical when in closed position. It is convenient to think of a central axis about which the washer 30, 30' may be considered to be formed. Thus in the claims the term "upward," or sometimes "outward," refers to a direction taken along such axis from within the container outward through the top wall opening 11, 11', whereas "radially outward" means perpendicular to such axis. The other terms of direction used in the claims will be understood as relating to these which have been defined. However, the claims cover the same structural relationships even though valves may be installed sidewardly or slantingly, or in some container wall other than the top wall.

Variations will suggest themselves to those skilled in the art; accordingly, this invention is not to be construed narrowly, but rather fully coextensive with the claims.

We claim:

1. For use in pressure dispensers, a gassing and dispensing valve assembly comprising a tubular valve stem having an upper dispensing spout, a cylindrical wall portion therebeneath, and a lower valving head, a container top wall having a central opening larger than the diameter of the cylindrical wall portion of said spout, said top wall being imperforate except for said central opening, an annular rim member beneath said top wall spaced radially outward from said head, and a rubber-like sealing washer having an inner perimeter edge sealedly and slidably grasping the cylindrical wall portion of said spout, an

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annular seat portion disposed between said top wall and said valving head, and an annular outer portion clamped between said top wall and said rim member, said sealing washer further having an annular intermediate portion presented flatwise unsupported against the top wall and radially between the seat portion and the clamped outer portion, and a plurality of gas-inlet valving slits penetrating through said intermediate portion.

2. The valve assembly as defined in claim 1, said top wall opening disposed spacedly radially outward of said spout, and said washer seat portion having an upper surface exposed between said top wall opening and said spout, whereby said washer is deflectable downward by gas pressure attendant gassing upon said stem being depressed, and said gas-inlet valving slits are thereby exposed to such gas pressure.

3. The valve assembly as defined in claim 1, said valve

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stem cylindrical wall portion having adjacent said valving head an annular recess of lesser height than the thickness of said sealing washer.

4. The valve assembly as defined in claim 1, each of said inlet valving slits having a pair of side surfaces which are contiguous when the washer-shaped seal remains flat against the top wall but which open from each other when the seal is deflected downwardly from the top wall.

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