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 94, 95, 565

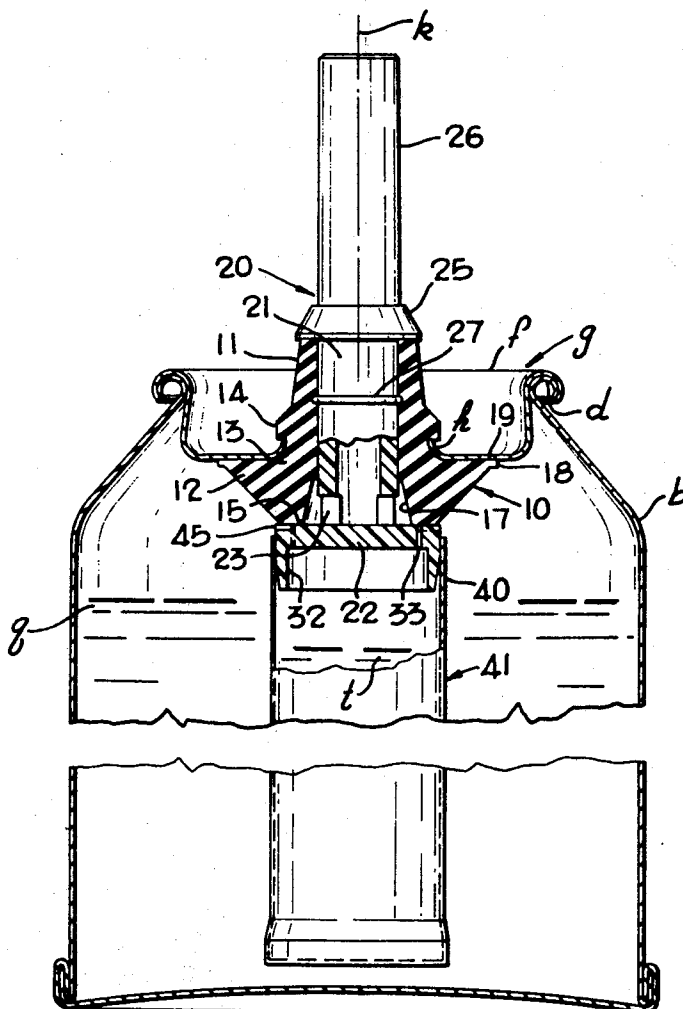
[56] **References Cited**
UNITED STATES PATENTS
 3,372,839 3/1968 Hayes..... 222/94
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[54] **TILT VALVE FOR PROPORTIONED
 CODISPENSING OF TWO FLUIDS**
 3 Claims, 4 Drawing Figs.

[52] U.S. Cl..... 222/94,
 222/565

[51] Int. Cl..... B65d 35/28

ABSTRACT: Precisely proportionate codispensing of two fluids, maintained separate within the same dispensing container, is achieved by improvements to that type of hollow stem tilt valve in which the valve head, perforated and carrying a bag containing a concentrated fluid, opens by sweeping laterally across the sealing face of a rubber grommet. Feed grooves, parallel to the parting plane of the molded valve, lead the principal fluid inward adjacent to each of the perforated ports, so the inner ends of the grooves are uncovered simultaneously with the ports through which the concentrate is discharged.



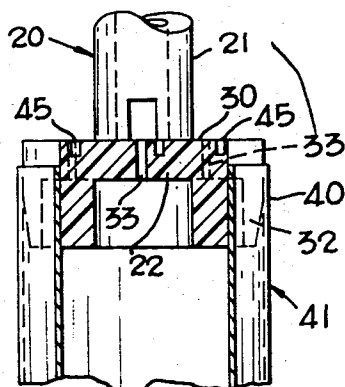


FIG. 3

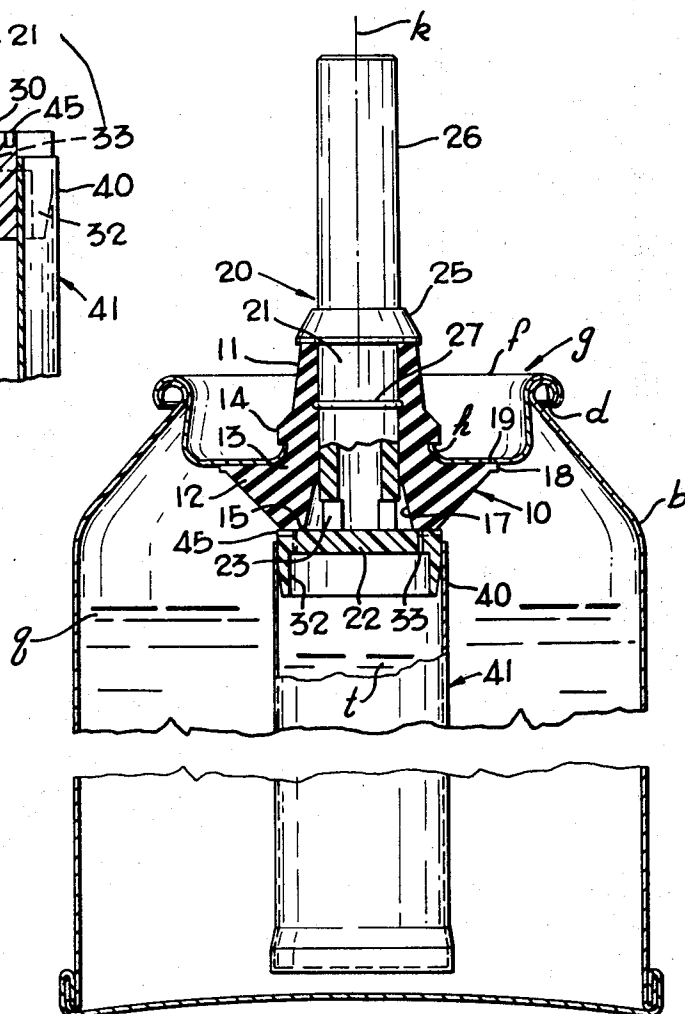


FIG. 1

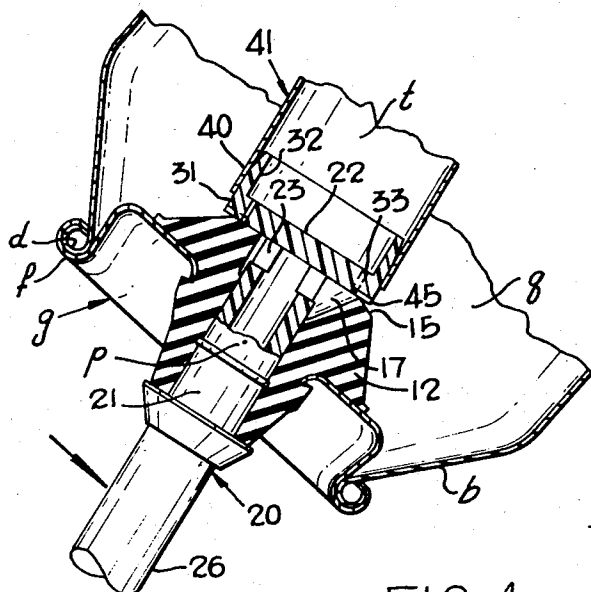


FIG. 4

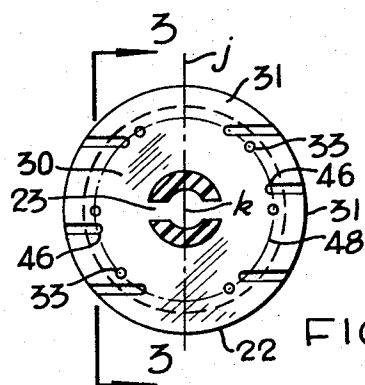


FIG. 2

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TILT VALVE FOR PROPORTIONED CODISPENSING OF TWO FLUIDS

REFERENCE TO RELATED APPLICATIONS

This application is a continuation in part of U.S. Pat. application Ser. No. 677,589 filed October 24, 1967, entitled "Valve for Proportioned Codispensing of Two Fluids" now U.S. Pat. No. 3,462,047. The disclosure of that application to the extent applicable hereto is hereby incorporated by reference; and the benefit of its filing date is claimed.

BACKGROUND OF THE INVENTION

This invention relates to valves for the codispensing of two fluids, usually a principal fluid and a concentrated additive; and particularly to the type of valve which is inverted prior to tilt opening, and whose valve head bears a bag containing a second or concentrated fluid, which is intended to be dispensed at the same time as the principal or first fluid.

A simple codispensing valve, of generally similar type, is shown in U.S. Pat. No. 3,326,416 to Hayes. With this type of valve a collapsible bag is sealed about the head of a rigid valve member having an annular seating surface perforated by a plurality of ports. When the valve head is closed against the annular seat of an elastic seal, the ports are closed, so that neither the fluid within the bag nor the principal fluid in the container surrounding it can escape. The intended mode of operation of such a valve is that when the valve stem is tilted, the valve head will partially open from the seal, permitting flow of the concentrate through one or more of the ports in the valve head, and also permitting flow of the principal fluid across the annular seating surface of the valve head. With such intended operation, the fluid within the bag attached to the valve head will thus be dispensed simultaneously with fluid in the dispenser around it. However, in that patented construction, little attention was paid to assuring proportioned codispensing of the two fluids.

In practical operation, difficulties have been encountered which interfere with codispensing in desired proportions. While the valve and its head are rigid, the valve seal is elastic; and the level at which it is mounted in the container top establishes a center about which the valve pivots when it is tilted, for opening. As the valve is tilted, its rigid head sweeps laterally across the face of the elastic seal, with the pressure inside the container being still applied to it. As a result, as lateral movement of the valve head may bare one or more ports for discharge of the concentrated fluid from the bag, yet the elastic seal may still retain sealing contact around the periphery of the valve head, and not permit flow of the principal fluid. Even if some part of the periphery of the head opens from the seal at relatively small degrees of tilt corresponding to slow discharge, a disproportionately large portion of the concentrated fluid may be discharged.

In our copending application above referred to, a different type of tilt valve is disclosed and illustrated, utilizing provisions which cause the valve head to open by pivoting at the same level as the seat of the seal, avoiding any such lateral sweeping movement. In that embodiment, feed grooves are disclosed, formed approximately radially inward from the outer periphery of the valve head to points adjacent to the ports, so that when any port is open to discharge the concentrate from the bag, the adjacent feed grooves will also be open to permit simultaneous flow of the principal fluid.

Where the valve member is to be manufactured by molding, it may be advantageous to form the stem portion and the portion of the head adjacent in a split mold, using mold cavity portions which meet at a parting plane in which the axis of the stem portion lies. If such parts are to be used, forming radial feed grooves adjacent to more than two ports would add manufacturing complications.

SUMMARY OF THE INVENTION

This invention adapts the familiar type of codispensing valve, much as described in the Hayes U.S. Pat. No. 3,326,416, for precisely proportioned codispensing of two fluids, even at very slow rates of discharge, at degrees of tilt at which the greater part of the periphery of the valve head may remain sealed.

Familiar elements utilized include a container top, a rigid tiltable dispensing valve having a head about which is sealed the upper margin of a collapsible bag, and a resilient elastic tubular seal which mounts the stem of the valve in the container top. The seal has a portion beneath the container top which is radially enlarged around its bore, and includes an annular seat against which closes an annular closing surface on the head of the rigid valve. A plurality of ports lie in a circle and extend through the head, penetrating its closing surface. One or more of the ports will open to discharge a fluid, such as a concentrate, contained within the bag, whenever the valve is tilted sufficiently to open and discharge a principal fluid across the closing surface and to the bore.

Since the valve head tends to sweep laterally across the annular seat when the valve is tilted, provisions are made in the present invention to assure proportionality of dispensing, most important for those smaller degrees of opening just sufficient to open a head port to the bore. Parallel flow grooves lead inwardly from the peripheral edge of the head, to inner groove ends in the circle of ports. At least one groove is located closely adjacent to each of the ports. Displacement of the head, attendant to tilting the stem portion, opens a flow groove and its adjacent port simultaneously, thereby to achieve proportioned codispensing of the fluid within the bag and the principal fluid within the dispensing container outwardly of the bag.

Since the parallel flow grooves are all perpendicular to a plane in which lies the axis of the valve stem, the stem portion and the portion of the head adjacent to it may be readily molded, by using mold cavity portions which part at such plane.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view, principally in section, of valve apparatus embodying the present invention, shown assembled and sealed onto a dispensing container, in normal closed position.

FIG. 2 is an enlarged fragmentary sectional view of the valve member of FIG. 1 taken along line 2-2 thereof.

FIG. 3 is a fragmentary sectional view taken along line 3-3 of FIG. 2.

FIG. 4 is a fragmentary view of the assembly of FIG. 1, inverted and with the valve member displaced to a slight angle of tilt.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Single use pressure dispensers conventionally employ a container or a can *b* terminating in a mouth *d* onto which is sealed the rim *f* of a container top generally designated *g*, sometimes referred to as a mounting cup. The top illustrated has a central upwardly flanged aperture *h*. In it is mounted an elastic tubular seal generally designated 10, having a sealing sleeve portion 11 meeting a radially enlarged seal body portion 12 at a juncture 13 beneath a flange 14, which engages the flanged aperture *h* of the container top *g*. The lowermost surface of the body 12 of the seal 10 is an annular seat surface 15, surrounding a tapering bore 17 which rises to merge with the inner surface of the sleeve portion 11. Outwardly of the seal seat surface 15, an outer body wall 18 extends upwardly and outwardly to a flat annular upper body surface 19. This surface 19 is sealed by gas pressure within the container *b* against the undersurface of the container top *g*.

A substantially rigid valve member generally designated 20 has two principal portions, a hollow stem portion 21 and a head 22. A plurality of stem ports 23 penetrate the hollow

stem portion 21, immediately adjacent to its juncture with the head 22; in the present embodiment the stem ports 23 are formed by molding perpendicular to a mold parting plane *j*, hereafter described and shown in FIG. 2, in which plane lies the central axis *k* of the stem portion 21. Outwardly of the stem ports 23, the stem portion 21 has a cylindrical exterior surface, sealedly grasped by the sleeve portion 11 of the seal 10. The stem portion 21 may have a shoulder 25, against which the upper edge of the sleeve 11 abuts, and a manipulative tip portion 26 outwardly thereof, against which the user presses his finger to tilt the valve to actuate it. A ring like bead 27, formed on the exterior of the cylindrical stem portion 21 above the level of the top aperture *h*, provides additional security against leakage upwardly within the seal sleeve portion 11, as may otherwise occur when the stem portion 21 is tilted to extreme angles.

The valve head 22 has a substantially flat upper closing surface 30 surrounding its juncture with the stem portion 21, which closing surface 30 extends to a peripheral edge 31 from which projects a downward and upward tapered rim 32. On the rim 32 is mounted the upper margin 40 of a collapsible bag, generally designated 41 formed of a plastic capable of containing a fluid. Inwardly adjacent to the rim 32, the valve head 22 is penetrated by a plurality of head ports 33 which, as shown in FIG. 1, extend through the seal closing surface 30. These are sealed when the valve is in closed, untilted position as shown in FIG. 1, against the annular seat surface 15 of the seal 10.

In the closed position shown in FIG. 1, gas pressure within the container *b* presses the valve member 20 outward, somewhat compressing the body portion 12 of the seal 10 and flattening the seat surface 15. The configuration of the seal body portion 12 and seat surface 15, as molded, is shown at the right side of FIG. 4, which illustrates the valve member 20 tilted slightly, by pressure applied to the tip portion 26 in the direction shown by the arrow. In its configuration as molded, the annular seat 15 is tapered upward and outward at an angle of roughly 10° from horizontal, so that the closing surface 30 of the valve head 22 may slide substantially laterally across it, although angular movement is likewise present. The valve member 20 will be forced to rotate about a point designated *p* at approximately the level at which the seal 10 is mounted in the container top aperture *h*. This rotation is typical of valves in which a seal 10 grasps sealedly against the exterior of the hollow stem portion 21 within and at the level of a container aperture *h* and outwardly of the stem ports 23.

From prior art, it is known that a first or principal fluid, designated *q*, such as shaving lather, may be filled within the container *b* and a second fluid, *t*, such as a concentrate containing hydrogen peroxide, may be filled through the bag bottom, its margin 40 being sealed onto the valve head 22; and on mounting the valve assembly by sealing the container top *f* onto the container mouth *d* and applying gas in the head space above the first fluid *q*, a product will have been created in which the first or principal fluid *q* and the second fluid or concentrate *t* may be dispensed simultaneously, merely by inverting the container and tilting the valve member 20. In its intended mode of operation, actually achieved at relatively high rates of flow accompanying tilting the valve member beyond the position shown in FIG. 4, the valve head 22 will open from the seat surface 15; and the first fluid, which surrounds the peripheral edge 31 when the container *b* is inverted, will flow to the seal bore 17 as the second fluid emerges from one or more head ports 33 and flows to it.

A significant problem of the prior art, however, is how to maintain proportionality of the two fluids, if dispensed at slow rates of flow. On examination of FIG. 4, it will be apparent that as a force is applied to the manipulative tip portion 26, to tilt the valve member 20, causing the head 22 to slide almost laterally across the seat 15, the pressure on the seal body 12 will be relieved at one side (the right side as shown in FIG. 4) and there the seat surface 15 will elastically resume its molded configuration. As it does so, it tends to continue, during the in-

itial tilting rotation, to maintain contact against the closing surface 30. The substantially lateral sliding movement of the valve head 22 may thus bare a head port 33 to the seal bore 17, permitting discharge from the bag 41 of the second fluid *t*; while continued contact of the tapered seat surface 15 against the closing surface 30 may prevent any discharge of the first fluid *q*. Even if a small opening should be created between the seat 15 and the closing surface 30, the first fluid *q* may flow therethrough from the peripheral edge 31 to the seal bore 17, at a rate which is disproportionately small, compared to the discharge of the second fluid *t* through a head port 33.

To remedy this problem of the discharge of the second fluid *t* alone or at a rate disproportionate to that of the first fluid *q*, we provide a plurality of spaced apart flow grooves 45. As best shown in FIGS. 2 and 3, the flow grooves 45 are substantially parallel to each other and, like the stem ports 23, molded substantially perpendicular to the parting plane *j*. Each of the flow grooves 45 leads from the peripheral edge 31 of the valve head 22 to a flow groove end 46. Conventionally, the head ports 33 are located at more or less equal angular distances from each other in a circle 48 concentric with the axis *k*, each being an equal radial distance inward from the peripheral edge 31. The new flow grooves 45 are so located that their ends 46 lie in the circle 48, one end 46 being closely adjacent to each of the head ports 33, but spaced therefrom so that both the grooves 45 and the head ports 33 are sealed by the seat surface 15 in the erect FIG. 1 position. A desired proportionality is established between the cross sections of each port 33 and its adjacent flow groove 45. This proportionality may be established by trial and error; and will fairly well establish a proportionality in flow rates of the two fluids.

Referring again to FIG. 4, even though the valve head 22 is so slightly tilted that the tapering seat 15 of the seal 10 maintains contact against the closing surface 30 of the valve head 22, the end 46 of a flow groove 45 will be open to the bore 17 as soon as the sliding displacement of the valve head opens the adjacent head port 33. This will occur regardless of the angle, relative to the parting plane *j*, through which the valve stem 26 may be tilted.

The flow grooves 45 thus serve to provide inflow from the peripheral edge 31 to the seal bore 17, which inflow would normally be considered as radial. However, the grooves 45 are molded not radially but parallel to each other, and perpendicular to the parting plane *j*, as are the stem ports 23. This makes it feasible to manufacture the valve 20 inexpensively, which is a requirement for use of such valves with dispensers *b* of the single use or throw-away type. Persons with knowledge of the problems of plastic molding will appreciate that in order to form the valve stem portion 21 to include a shoulder 25 and a bead 27, it is desirable to provide two cavity-forming members, not illustrated, to meet or part along the parting plane *j*. Projections on such cavity members may extend inward, to bear against a core pin, not illustrated, provided along the axis *k* and thus to mold stem ports 23. With such conventional construction, it would not be feasible to mold flow grooves to extend radially adjacent to the multiplicity of head ports 33.

The flow grooves 45, being perpendicular to said plane and parallel to each other, may readily be formed by ridges on such cavity forming members. Thus, the parallel flow grooves 45 are a substitute for providing radial inflow from the peripheral edge 31 to the circle 48; from this circle inward, both fluids *q*, *t* flow radially to the seal bore 17.

One alternative which suggests itself is providing two flow grooves adjacent to each head port 33; in such case the cross section of each flow groove would be reduced to preserve proportionality of flow capacity as desired for the particular product.

We claim:

1. Valve apparatus for the proportioned codispensing a first fluid within a dispensing container and a second fluid maintained separate therefrom within the container, comprising: an assembly of the type including an apertured container top, an elastic tubular seal mounted therein having a radi-

ally enlarged portion beneath the top and including an annular seat surrounding a central bore, and rigid valve tiltably mounted in the seal;

the valve including a stem portion having an axis and a head including a peripheral edge, whereby when the container is inverted, the peripheral edge is in flow communication with such first fluid, the valve head having an annular closing surface inward of the edge and presented against and in registration with the annular seat of the seal when the valve is in normally closed position;

said assembly further including a collapsible bag having an upper margin attached to the valve head adjacent to its peripheral edge, whereby to contain a second fluid separate from the first fluid;

the valve head having a plurality of ports extending therethrough and penetrating to the closing surface;

said ports being located spaced apart from each other in a circle a constant radial distance inward from the peripheral edge;

together with a plurality of spaced-apart flow grooves, substantially parallel to each other and substantially perpendicular to a plane in which said axis lies, each leading inwardly from the peripheral edge of the head to an end located substantially in the circle in which the ports are

located.

2. A valve apparatus as defined in claim 1, wherein: the valve stem portion is hollow and a port through the stem is located adjacent to and outwardly of the head, and wherein;

the seal is of the type which sealedly grasps the exterior of the hollow stem within and at the level of the container aperture and outwardly of the port, thereby to establish a point of rotation on tilting;

whereby substantially lateral sliding of the valve head attendant to such rotation, will cause a flow groove to open to the bore substantially simultaneously with the opening of a port.

3. A valve apparatus as defined in claim 1, wherein: each flow groove end is located spacedly adjacent to one of the ports;

the cross sections of each port and its adjacent flow groove are of the same proportion; and

whereby displacement of the annular closing surface of the head out of registration with the annular seal, attendant to tilt opening of the valve, opens said flow groove and its adjacent port substantially simultaneously, thereby to achieve proportioned co-dispensing of the two fluids.