Nov. 3, 1953 A. J. FAUSEK ET AL 2,657,704

VALVE

Filed Dec. 29, 1947

FIG. 1

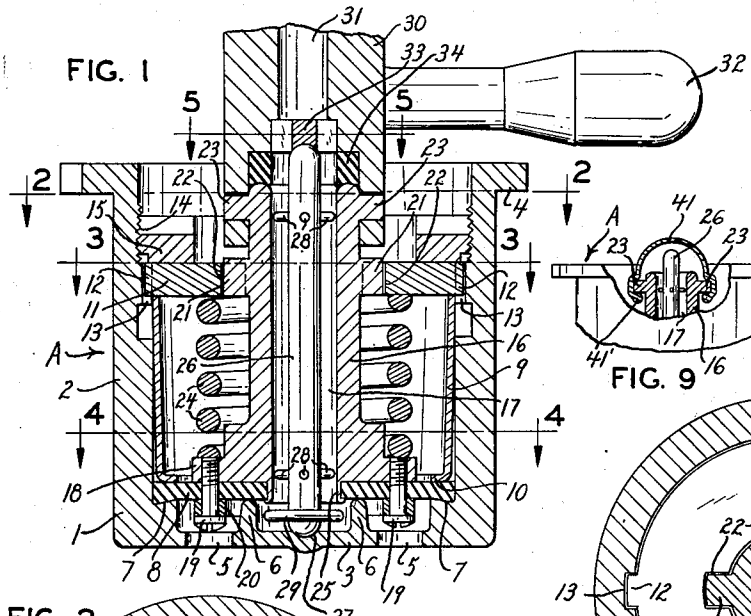


FIG. 6

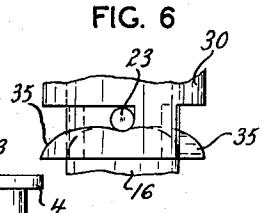


FIG. 9

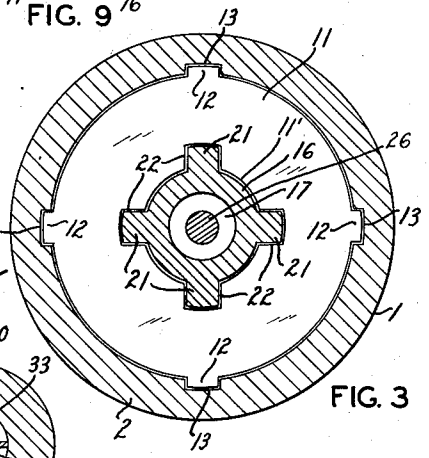
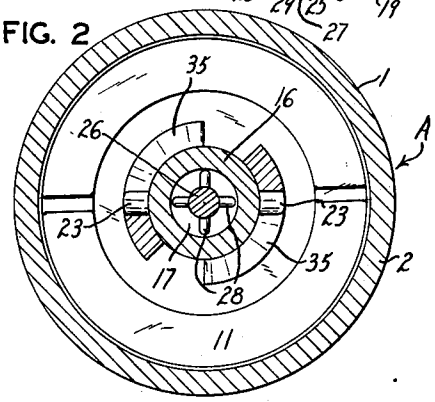


FIG. 3

FIG. 2



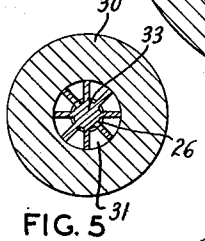


FIG. 5

FIG. 4

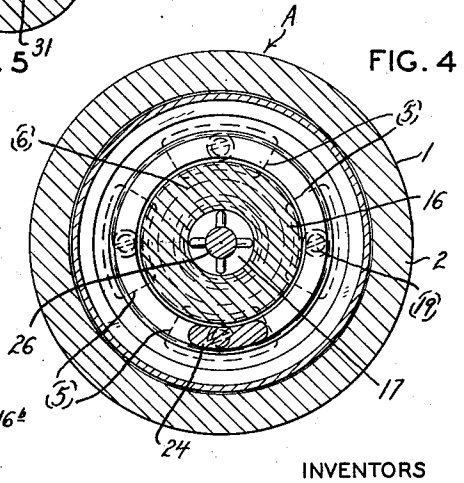


FIG. 7

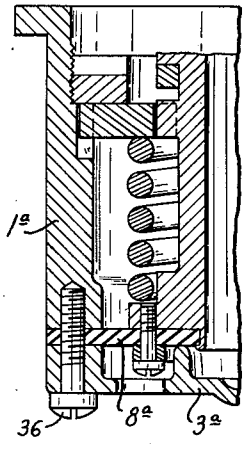
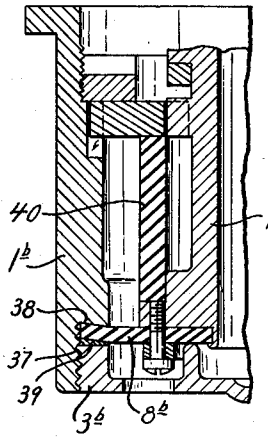


FIG. 8



INVENTORS

ARTHUR J. FAUSEK

IRWING F. FAUSEK

BY Ernest Harrington,

ATTORNEY

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VALVE

Arthur J. Fausek and Irwing F. Fausek,
Clayton, Mo.

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7 Claims. (Cl. 137—321)

1

This invention relates generally to valves and more specifically to valves adapted primarily for use with containers wherein pressure may vary because of expansion of material contained in the containers, such expansion, with consequent increased pressure within the containers, being due, for instance, to temperature rise, or fermentation or chemical reaction of the material itself, or because of the admittance of increased pressure from an outside source, the predominant object of the invention being to provide a valve adapted for the use referred to above which because of its improved construction and arrangement is capable of performing its intended function in an improved and highly efficient manner.

Another important object of this invention is to provide an improved valve which is of such improved construction and arrangement that it may serve, as is mentioned above, as a pressure relief and safety valve for a container, and also as a pressure inlet valve for facilitating introduction of pressure into a container with which the valve is associated.

Fig. 1 is a vertical section taken through the improved valve of this invention.

Fig. 2 is a horizontal section taken on line 2—2 of Fig. 1.

Fig. 3 is a horizontal section taken on line 3—3 of Fig. 1.

Fig. 4 is a horizontal section taken on line 4—4 of Fig. 1.

Fig. 5 is a horizontal section taken on line 5—5 of Fig. 1.

Fig. 6 is a fragmentary elevational detail of a part of a fitting which is employed in the use of the valve of the present invention.

Fig. 7 is a fragmentary vertical sectional view illustrating a modified form of the invention.

Fig. 8 is a fragmentary vertical sectional view illustrating another modified form of the invention.

Fig. 9 is a fragmentary view partly in elevation and partly in vertical section showing a closure which may be employed with the valve of this invention under certain circumstances.

In the drawing, wherein are shown for purposes of illustration, merely, several embodiments of the invention, A designates the improved valve generally. The valve A comprises a body portion 1 which is provided with a circumferential wall 2 and a bottom wall 3, said body portion being provided with an annular, outstanding flange 4 at its upper end. The bottom wall 3 of the body portion 1 has formed therethrough a plurality of apertures 5, said apertures preferably, though not necessarily being shaped as is shown by dotted lines in Fig. 4. Also, extended upwardly from the bottom wall of the body portion 1 is an annular valve seat 6. The body portion 1 of the valve A has formed within

2

the lower portion thereof an annular shoulder 7 which inclines outwardly and downwardly, as is shown to good advantage in Fig. 1.

Supported in the lower portion of the body portion 1 of the valve A is a closure member which is in the form of a circular diaphragm 8, said diaphragm having a flared outer marginal portion whose lower outwardly and downwardly inclined, annular face contacts with the annular shoulder 7 within the lower portion of the valve body portion. The outer portion of the diaphragm is secured in place by a cylindrical shell 9 which is disposed within the body portion 1 above said diaphragm, said shell having an inturned, annular flange 10 which contacts with a marginal portion of the top face of the diaphragm 8. The top edge of the circumferential wall of the shell 9 is contacted by a member 11 which is substantially circular in shape (see Fig. 3) and said member has projections 12 extended outwardly from the marginal edge thereof which are received in recesses 13 formed in the inner face of the circumferential wall of the valve body portion 1. The upper portion of the body portion 1 of the valve A is internally screwthreaded, as is indicated at 14 in Fig. 1, and this screwthreaded portion screwthreadedly receives a spanner nut 15, said spanner nut being screwed downwardly into forcible contact with the top face of the member 11 whereby the shell 9 is moved downwardly so as to tightly grip the marginal portion of the diaphragm 8 between the lower flange 10 of said shell and the shoulder 7 within the lower portion of the valve body portion.

Disposed centrally within the body portion 1 of the valve A and extended vertically thereof is an elongated element 16 which has a passageway 17 formed therethrough from end to end thereof. The element 16 is provided at its lower end with an outwardly extended, annular flange 18 and the lower face of said element 16 contacts with the top face of the diaphragm, the lower face of the diaphragm normally contacting with the upper edge of the annular valve seat 6. The element 16 is secured to the diaphragm by suitable fastening devices 19, the shanks of said fastening devices extending through openings that are formed through a ring 20 whose top face contacts with the bottom face of the diaphragm, and through openings formed through the diaphragm which are alined with the openings of the ring, with the heads of the fastening devices contacting with the bottom face of said ring 20. The member 11 is provided with a centrally located opening 11' formed therethrough through which the element 16 extends, said element being provided with outwardly extending projections 21 which are received in recesses 22 formed in the marginal face

of said opening 11' so as to prevent axial rotation of the elongated element 16. Also, the element 16 is provided, at points adjacent to the upper end thereof, with pin-like projections 23 which are alined transversely of said element and extend outwardly in opposite directions.

Arranged in embracing relation with respect to the element 16 is a coil spring 24, said coil spring being under compression and contacting at one end with the top face of the flange 18 of said element 16 and at its opposite end with the bottom face of the member 11. The coil spring 24 tends to move the element 16 in a downward direction and as a result of this situation the bottom face of the diaphragm 8 is forced into close, sealing contact with the top edge of the annular valve seat 6, the projections 21 of said element 16 moving within the recesses 22 of the member 11 and serving to guide said element 16 for movement longitudinally of the valve body portion 1. At the extreme lower end of the element 16 a tubular, thin walled, downwardly projected extension 25 is provided (Fig. 1). This extension projects through an opening formed centrally through the diaphragm 8 and the lower end portion of said extension is peened outwardly so as to clamp the portion of the diaphragm at the margin of the centrally located opening thereof to the element 11.

Disposed within the passageway 17 of the element 16 is a stem 26 which is provided with rounded opposite ends, the rounded lower end of said stem being seated in a depression 27 formed in the bottom wall of the body portion 1 of the valve A. The stem is provided with pins 28 which extend radially from said stem and contact at their outer ends with the wall of the passageway 17 of the element 16 so as to maintain said stem centrally within said passageway. The stem 26 is provided with an annular flange 29 which is located adjacent to the lower end thereof and is of greater diameter than the passageway 17 through the element 16 so as to prevent unintended displacement of said stem from said passageway.

As an example, merely, of a use to which the improved valve of this invention may be put it will be assumed that the valve is used in association with a beer barrel. As is well known to persons familiar with such matters, it frequently happens that the beer is not entirely withdrawn from a beer barrel, when it is discarded as empty, nor is the CO_2 pressure entirely exhausted therefrom. In such a case a rising pressure is produced within the barrel due to warming of the gas and chemical reaction and fermentation of the beer remaining in the barrel, and this pressure may rise to a point where it would become hazardous. However, in the use of the improved valve of the present invention with a beer barrel in which internal pressure becomes excessively high, the pressure moving through the apertures 5 and acting against the lower face of the diaphragm 8 will deflect the inner portion of the diaphragm upwardly away from the annular valve seat 6 against the opposing force of the coil spring 24, and thus permit the pressure to be exhausted through the passageway 17.

The improved valve of this invention may be employed as an inlet valve for admitting CO_2, or other gas, from an outside source, into a beer barrel in order that sufficient pressure may be present in the barrel to force its contents through an associated distribution system. When the improved valve is subjected to such use a fitting 30 is employed to which is connected a hose, or other conductor (not shown) which leads to the fitting from a source of supply of the gas. The fitting 30 has a passageway 31 formed therethrough through which gas passes, and said fitting is provided with a handle 32 which facilitates rotating the fitting. The fitting 30 has set into a recess provided therefor a spider 33 which is adapted to contact with the top of the stem 26 when the fitting 30 is applied to the valve A, said spider being provided with a curved depression which receives the rounded top portion of the stem 26.

The lower portion of the fitting 30 provides a socket which fits over the upper portion of the element 16, there being a body of packing material 34 disposed within the upper portion of said socket with which the upper, rounded end of the wall of the element 16 contacts for providing a fluid-tight joint between the fitting 30 and said element 16. The fitting 30 is provided with opposed cam portions 35 which, when the fitting is applied to the upper portion of the element 16 and is rotated in the proper direction, will move beneath the projections 23 of said element 16 and cam said projections and said element upwardly against the force exerted by the coil spring 24 so as to raise the inner portion of the diaphragm 8 away from the annular valve seat 6. With the inner portion of the diaphragm so raised from the annular valve seat 6 gas may flow from a source of supply through the passageway 31 of the fitting 30 into the barrel by way of the passageway 17 through the element 16 and the apertures 5 in the bottom wall of the body portion 1 of the valve. It is to be noted that in the event highly excessive pressure were accidentally introduced into a barrel provided with the improved valve of this invention in the manner described immediately above, such highly excessive pressure would rupture the diaphragm and escape into the upper portion of the valve body portion and would be exhausted therefrom through spaces between the member 11 and adjacent parts of the upper portion of the valve.

The valve of the present invention may also be employed as a discharge valve for withdrawing the fluid contents of a container. When the valve is so employed a tapping fitting constructed and arranged in accordance with the fitting 30 is applied to the valve and is operated as has been previously explained herein to move the diaphragm 8 away from the annular valve seat 6. This will permit fluid to flow from the container through the apertures 5 of the body portion 1 of the valve, through the passageway 17 of the element 16, through the passageways of the fitting and a hose connected to said fitting and to a distribution system to which the hose is connected.

Fig. 7 illustrates a modified form of the invention in accordance with which the bottom wall 3a of the valve body portion 1a is a separate and independent part which is secured to the circumferential wall of said body portion by fastening devices 36. When constructed as is shown in Fig. 7 the marginal portion of the diaphragm 8a is clamped between the top face of a portion of the bottom wall 3a of the body portion 1a and the lower face of the circumferential wall of said body portion 1a, the fastening devices passing through openings formed through said diaphragm.

Fig. 8 illustrates another modified form of the

invention according to which the circumferential wall of the body portion 1b of the valve is provided with a screwthreaded cavity 37 at its lower end, this screwthreaded cavity screwthreadedly receiving the removable bottom wall 3b of the valve body portion which is externally screwthreaded. The marginal portion of the diaphragm 8b of the structure illustrated by Fig. 8 is clamped between an annular, inclined shoulder 38 formed within the valve body portion 1b and an annular washer 39 which is of wedge-shape cross-sectional shape. Instead of employing a coil spring for urging the element 16b downwardly, as in Fig. 1, a tubular member 40 formed of rubber, or other resilient material, is employed for this purpose in Fig. 8.

By referring to Fig. 9 it will be noted that a cap 41 may be employed to cover the outer end of the passageway 17 of the element 16 so as to exclude foreign matter from said passageway. This cap may be formed of rubber, plastic, or other suitable resilient material, and said cap is provided with a lower, annular portion 41' which snaps under the projections 23 of the element 16 to retain the cap in place on said element 16.

We claim:

1. A valve comprising a body portion provided with a circumferential wall and a bottom wall, said bottom wall having an aperture formed therethrough, an annular upstanding valve seat projected from said bottom wall, a diaphragm closure member secured at its margin and disposed within said body portion and making sealing contact with said valve seat, an elongated element disposed within said body portion and attached to said diaphragm closure member, said elongated element having a passageway formed therethrough which is maintained out of communication with said aperture by contact of said diaphragm closure member with said valve seat, a coil spring which tends to move said elongated element so as to cause said diaphragm closure member to tightly engage said valve seat, said diaphragm closure member being movable out of contact with said valve seat so as to cause said aperture to communicate with the passageway through said elongated element, guiding means for guiding said elongated element for movement longitudinally of said body portion, said guiding means comprising a member supported within said body portion in contact with said coil spring and having an opening formed therethrough through which said elongated element extends for straight-line sliding movement, projections on said member which are received in recesses formed in said circumferential wall of said body portion, projections on said elongated element which are received in recesses formed in the wall of said opening of said member, and means screwthreadedly related to such circumferential wall of said body portion for engaging said member and maintaining it in position, and a shell within said body portion which is engaged at its top by said member and which engages the marginal portion of said diaphragm closure member at the bottom of said shell for clamping said marginal portion of said diaphragm closure member in place within said body portion.

2. A valve comprising a body portion provided with a circumferential wall and a bottom wall, said bottom wall having an aperture formed therethrough, an annular upstanding valve seat projecting from said bottom wall, a diaphragm closure member secured at its margin and disposed within said body portion and making sealing contact with said valve seat, an elongated element disposed within said body portion and attached to said diaphragm closure member, said elongated element having a passageway formed therethrough which is maintained out of communication with said aperture by contact of said diaphragm closure member with said valve seat, a coil spring which tends to move said elongated element so as to cause said diaphragm closure member to tightly engage said valve seat, said diaphragm closure member being movable out of contact with said valve seat so as to cause said aperture to communicate with the passageway through said elongated element, guiding means for guiding said elongated element for movement longitudinally of said body portion, said guiding means comprising a member supported within said body portion in contact with said coil spring and having an opening formed therethrough through which said elongated element extends for straight-line sliding movement, projections on said member which are received in recesses formed in said circumferential wall of said body portion, projections on said elongated element which are received in recesses formed in the wall of said opening of said member, and means screwthreadedly related to said circumferential wall of said body portion for engaging said member and maintaining it in position, and a shell within said body portion which is engaged at its top by said member and which is provided with a flange that engages the marginal portion of said diaphragm closure member at the bottom of said shell for clamping said marginal portion of said diaphragm closure member in place within said body portion.

3. A valve comprising a body portion provided with a side wall and a bottom wall, said bottom wall having an aperture formed therethrough, a valve seat projected from said bottom wall, a diaphragm closure member secured at its margin and disposed within said body portion and making sealing contact with said valve seat, an elongated element disposed within said body portion and attached to said diaphragm closure member, projections formed on said elongated element, said elongated element having a passageway formed therethrough which is maintained out of communication with said aperture by contact of said diaphragm closure member with said valve seat, resilient means which tends to move said elongated element so as to cause said diaphragm closure member to tightly engage said valve seat, and a fitting which is operable to elevate said elongated element relative to the body portion of the valve so as to raise said diaphragm closure member from said valve seat and thereby place the passageway through said elongated element and said aperture in communication with each other, and an elongated member disposed in the passageway formed through said elongated element which engages the bottom wall of said body portion at one end and is adapted to be engaged at its opposite end by said fitting, said fitting being provided with cam faces which engage said projections of said elongated element and elevate said elongated element on movement of said fitting.

4. A valve comprising a body portion provided with a side wall and a bottom wall, said bottom wall having an aperture formed therethrough, a valve seat projected from said bottom wall, a diaphragm closure member secured at its margin and disposed within said body portion and mak-

ing sealing contact with said valve seat, an elongated element disposed within said body portion and attached to said diaphragm closure member, projections formed on said elongated element, said elongated element having a passageway formed therethrough which is maintained out of communication with said aperture by contact of said diaphragm closure member with said valve seat, a coil spring which tends to move said elongated element so as to cause said diaphragm closure member to tightly engaged said valve seat, a fitting which is operable to elevate said elongated element relative to the body portion of the valve so as to raise said diaphragm closure member from said valve seat and thereby place the passageway through said elongated element and said aperture in communication with each other, and a stem disposed in the passageway formed through said elongated element which engages the bottom wall of said body portion at one end and is adapted to be engaged at its opposite end by said fitting, said fitting being provided with cam faces which engage said projections of said elongated element and elevate said elongated element on movement of said fitting.

5. A valve comprising a body portion provided with a side wall and a bottom wall, said bottom wall having an aperture formed therethrough, a valve seat projected from said bottom wall, a diaphragm closure member secured at its margin and disposed within said body portion and making sealing contact with said valve seat, an elongated element disposed within said body portion and attached to said diaphragm closure member, projections formed on said elongated element, said elongated element having a passageway formed therethrough which is maintained out of communication with said aperture by contact of said diaphragm closure member with said valve seat, a coil spring which tends to move said elongated element so as to cause said diaphragm closure member to tightly engaged said valve seat, a fitting which is operable to elevate said elongated element relative to the body portion of the valve so as to raise said diaphragm closure member from said valve seat and thereby place the passageway through said elongated element and said aperture in communication with each other, a stem disposed in the passageway formed through said elongated element which engages the bottom wall of said body portion at one end and is adapted to be engaged at its opposite end by said fitting, and means for centering said stem within the passageway in which it is disposed, said fitting being provided with cam faces which engage said projections of said elongated element and elevate said elongated element on movement of said fitting.

6. A valve comprising a body portion provided with a side wall and a bottom wall, said bottom wall having an aperture formed therethrough, a valve seat projected from said bottom wall, a diaphragm closure member secured at its margin and disposed within said body portion and making sealing contact with said valve seat, an elongated element disposed within said body portion and attached to said diaphragm closure member, projections formed on said elongated element, said elongated element having a passageway formed therethrough which is maintained out of communication with said aperture by contact of said diaphragm closure member with said valve seat, a coil spring which tends to move said elongated element so as to cause said diaphragm closure member to tightly engage said valve seat, a fitting which is operable to elevate said elongated element relative to the body portion of the valve so as to raise said diaphragm closure member from said valve seat and thereby place the passageway through said elongated element and said aperture in communication with each other, a stem disposed in the passageway formed through said elongated element which engages the bottom wall of said body portion at one end and is adapted to be engaged at its opposite end by said fitting, and means for preventing said stem from being unintendedly displaced from the passageway in which it is disposed said fitting being provided with cam faces which engage said projections of said elongated element and elevate said elongated element on movement of said fitting.

7. A valve comprising a body portion provided with a side wall and a bottom wall, said bottom wall having an aperture formed therethrough, a valve seat projected from said bottom wall, a diaphragm closure member secured at its margin and disposed within said body portion and making sealing contact with said valve seat, an elongated element disposed within said body portion and attached to said diaphragm closure member, projections formed on said elongated element, said elongated element having a passageway formed therethrough which is maintained out of communication with said aperture by contact of said diaphragm closure member with said valve seat, a coil spring which tends to move said elongated element so as to cause said diaphragm closure member to tightly engage said valve seat, a fitting which is operable to elevate said elongated element relative to the body portion of the valve so as to raise said diaphragm closure member from said valve seat and thereby place the passageway through said elongated element and said aperture in communication with each other, a stem disposed in the passageway formed through said elongated element which engages the bottom wall of said body portion at one end and is adapted to be engaged at its opposite end by said fitting, and means comprising a flange on said stem for preventing said stem from being unintendedly displaced from the passageway in which it is disposed, said fitting being provided with cam faces which engage said projections of said elongated element and elevate said elongated element on movement of said fitting.

ARTHUR J. FAUSEK.
IRWING F. FAUSEK.

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