Dec. 1, 1959 R. W. BEALL, JR 2,915,224

VENTED VALVE

Filed Oct. 2, 1956

FIG. 2.

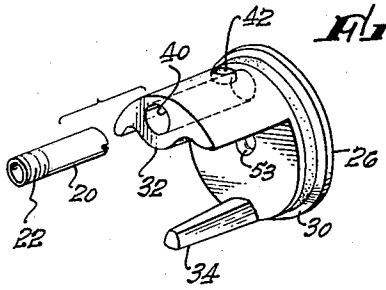



FIG. 1.




FIG. 3.

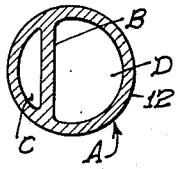



FIG. 4.

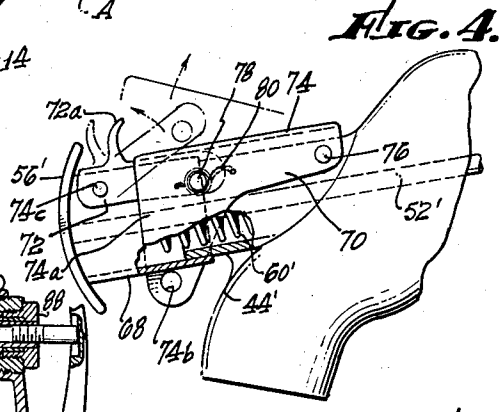



FIG. 5.

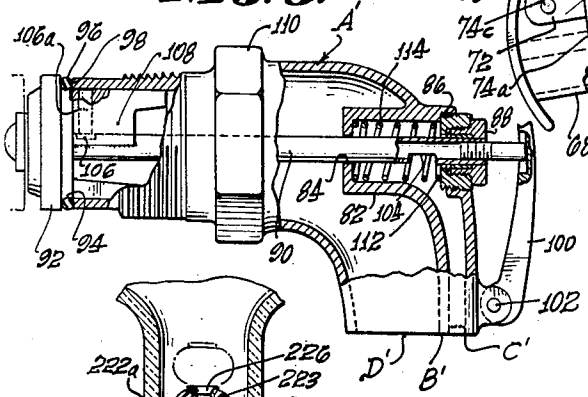



FIG. 6.

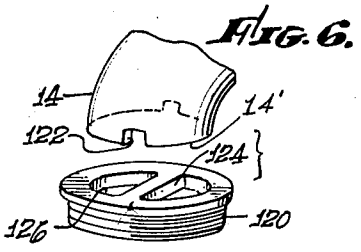
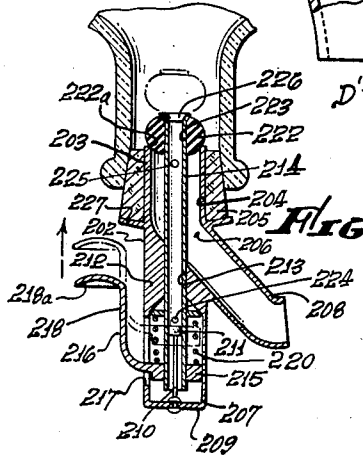



FIG. 7.




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2,915,224

# VENTED VALVE

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Application October 2, 1956, Serial No. 613,584

7 Claims. (Cl. 222—153)

The present invention relates generally to valves, and more particularly to a vented valve adapted to permit smooth, uninterrupted flow of liquid from a container. This application is a continuation-in-part of pending application Serial No. 384,376 entitled Fluid Dispensing Devices filed October 6, 1953, now Patent No. 2,779,517, dated Jan. 29, 1957.

The primary purpose in devising the present invention is to provide a vented valve that may be removably mounted in the liquid discharge opening of a drum or other vessel whereby fluid may be dispensed therefrom in a smooth, uninterrupted flow without the necessity of removing the venting plug normally provided in such containers.

Other major objects of the invention are to provide a valve that permits gravitational dispensing of volatile, inflammable liquids from drums with a minimum of danger from fire or explosion, that is of a simple mechanical structure, can be fabricated from standard commercially available materials, is easy and safe to operate, and can be inserted or removed from a drum or container with a minimum of physical effort.

Another object of the invention is to provide a valve that may be utilized in the removal of a bung closure, as well as a valve in which the actuating mechanism thereof may be locked in an inoperative position to prevent unauthorized removal of liquid from the drum or container on which the device is mounted.

These and other objects and advantages of the invention will become apparent from the following description of preferred and alternate forms of the device, and from the drawings illustrating those forms in which:

Figure 1 is a combined side elevational and vertical cross-sectional view of the preferred form of the valve;

Figure 2 is a perspective view of the valve disc, the tubular air vent insert extension, and the guides which slidably support the disc within the confines of the valve body;

Figure 3 is a transverse cross-sectional view of the view of the valve body taken on line 3—3 of Figure 1;

Figure 4 is a side elevational view of the valve shown in Figure 1 illustrating a locking device that may be associated therewith;

Figure 5 is a combined side elevational and vertical cross-sectional view of a first alternate form of the invention;

Figure 6 is a framentary perspective view of the forward extremity of the valve showing means provided thereon for unscrewing the bung closure from a drum; and,

Figure 7 is a vertical, cross-sectional view of a second alternate form of the invention.

Referring to Figures 1, 2 and 3 for the general arrangement of the preferred form of the invention, it will be seen to include a downwardly and forwardly extending valve body A, the interior of which is divided by a wall B to define an air vent passage C and a liquid discharge passage D. The rearward end of valve body A is formed with external threads E that are adapted to removably engage a tapped liquid discharge opening F of the type normally found in the head G of an industrial fifty gallon liquid container or drum H such as used for shipping gasoline, paints, lacquers, or the like.



Specifically, the valve body A includes a rearwardly disposed portion **10** on which the threads E are formed, and the forward end of this portion develops into an intermediate portion **12** of greater transverse cross section, which intermediate portion in turn develops into a downwardly extending portion **14**. Liquid discharge passage D is preferably smaller in transverse cross section in portion **14** than it is in the intermediate portion **12**, for reasons which will hereinafter be explained in detail.

The wall B extends longitudinally through the interior of valve body A and terminates in the upper rearward portion thereof in a heavy wall section **16** in which a tapped bore **18** is formed that communicates with the air passage C. A tubular insert **20** is provided that has threads **22** formed on one end thereof that engage bore **18** and removably support the insert **20** with the desired portion thereof situated within the confines of valve body A. The rear face of body A defines a valve seat **24**, as can best be seen in Figure 1.

A circular valve disc **26** is provided that has a circumferentially extending groove **28** formed therein which receives a resilient ring **30**. The size of disc **26** is such that when in the position shown in Figure 1, the ring **30** is placed in fluid-sealing contact with valve seat **24**. Two guides **32** and **34** project forwardly from valve disc **26**, which guides are slidably supported in a bore **36** that extends forwardly from the rear end of valve body A, and the upper portion of this bore terminates in a body shoulder **38** defined by the rear face of the heavy wall portion **16**. The upper guide **32**, as can best be seen in Figure 2, is of tranverse circular segmental shape and has a bore **40** extending rearwardly therein that is in comunication with a transverse port **42** formed in the guide. Bore **40** is of such diameter that the tubular insert **20** is slidable within the confines thereof. An elongate boss **44** extends forwardly from the upper intermediate portion of valve body A and a bore **46** is formed in this boss that is in coaxial alignment with a forwardly disposed counterbore **48** of larger transverse cross section also formed in the boss, which bore and counterbore define a body shoulder **50** at their junction.

An elongate rigid member **52** such as a solid rod or the like is slidably mounted in bore **46**, and a forwardly disposed portion **52***a* of this member projects beyond the boss **44** and a rearwardly disposed portion **52***b*. The rear extremity **52***c* of portion **52***b* is of smaller transverse cross section and threads are formed on the exterior thereof. Threaded extremity **52***c* extends through a centrally disposed bore **53** formed in valve disc **26**, and this threaded extremity is engaged by a nut **54** to rigidly hold the disc on the elongate member **52**. A handle **56** of appropriate shape and design is mounted on the forward end of portion **52***a*, by which handle a rearwardly directed force may be applied to member **52** to move the valve disc **26** rearwardly from seat **24**. Rearward movement of disc **26** permits fluid to discharge through passage D and air to enter drum H through passage C to replace liquid as it is discharged from within the confines of the drum. As shown in Figure 1, handle **56** defines a rearwardly situated body shoulder **58** against which one end of a compressed helical spring **60** abuts when the spring is disposed in an encircling position about member **52**. The rearwardly disposed portion of spring **60** is situated within the confines of counterbore **48**, with the rear end of the spring contacting the face

of body shoulder 58. When handle 56 is subjected to inward force, member 52 and valve disc 26 are moved rearwardly to the position shown in phantom line in Figure 1 whereby liquid may be dispensed from drum H.

To permit downward and forward positioning of valve body A as shown in Figure 1 without danger of liquid seepage from the confines of the drum between threads E and F, it is highly desirable that a rigid interiorly threaded ring 62 be provided that engages threads E. A circular resilient packer 64 is mounted on the threaded portion 10 to the rear of ring 62, which packer is compressed to provide a fluid seal when ring 62 is rotated to cause it to move rearwardly and compress packer 64 between it and the surface of head G adjacent the discharge opening F. The packer 64 is preferably disposed in a circumferentially extending groove 65 formed in portion 10, and is forced in fluid-tight engagement therewith when the packer is compressed. Groove 65 is so located in portion 10 as to be just forwardly of drum face 67 when the valve is threaded into the discharge opening as shown in Figure 1.

In Figures 1 and 2 it will be noted that the port 42 is situated forwardly a short distance from disc 26, and as a result air cannot enter the confines of drum H through passage C until the disc has been moved rearwardly a predetermined distance. Location of the port 42 in this manner is highly desirable, for liquid starts to flow from the drum through passage D immediately upon separation of disc 26 from seat 24. This flow of liquid from the drum in which the invention is mounted momentarily creates a negative pressure within the confines thereof. As further inward movement of the disc and guides 32 and 34 takes place, air moves rearwardly through passage C to replace the displaced liquid, and due to this rearward air movement there is little or no tendency for liquid to drain from the air vent. When a rearwardly directed force is removed from handle 46, the compressed spring 60 immediately tends to return valve disc 26 to the position shown in solid line in Figure 1 where the ring 30 is in fluid-sealing contact with seat 24.

As this forward movement of disc 26 and guides 32 and 34 occurs, the admission of air into the confines of the drum through passage C is first cut off due to the fact that port 42 seals with the interior face 66 of valve body A prior to contact between the resilient ring 30 and seat 24. This operation of the valve develops a negative pressure within the confines of the drum before the sealing ring 30 contacts seat 24, and accordingly there is little or no tendency for liquid to seep from drum H between threads E and F.

In the prefered form of the invention it will particularly be noted that the liquid passage portion in the intermediate portion 12 of valve body A is of larger transverse cross section than that of the lower extremity 14, which enlarged passage portion insures the availability of a liquid surplus for discharge through the lower passage whereby there will be no tendency for air to flow upwardly through passage D rather than through passage C. This construction eliminates the possibility of an uneven flow of liquid from the valve such as would occur if air were to enter the lower extremity of passage D. It will be particularly noted that while threaded portion 10 is disposed in a horizontal plane, the bore 36 formed therein slopes downwardly and forwardly at substantially a 6° angle with the horizontal. This angulation of bore 36 assures a downward flow of liquid from the container H, as well as effecting a slight elevation inside the container for the vent opening.

A modified form of the invention is shown in Figure 4 which is identical in construction to the above-described device except that a boss 44' that is somewhat larger in diameter than boss 44 is provided and is slidably engaged by a cylindrical dust shield 68 which projects rearwardly from handle 56'. Shield 68 and boss 44' serve to house the helical spring 60' and completely conceal same. A toggle locking mechanism 70 is provided which includes a first member 72 that is pivotally connected on the forward end thereof by a pin 74c to shield 68. A trigger 72a projects upwardly from member 72 as shown in Figure 4. A second toggle member 74 is pivotally connected by a pin 76 to housing 44'. The adjacent overlapping end portions of the first and second members are pivotally connected to one another by a pin 78, and a spring 80 at all times tends to hold these members slightly below horizontal alignment as shown.

Two laterally separated legs 74a extend downwardly from second member 74, and an opening 74b is formed in the lower portion of each leg positioned below the dust shield 68. Two openings 74b serve to receive a U-shaped portion of a padlock or other locking means (not shown) to maintain the toggle members 72 and 74 in the horizontal position shown in Figure 4 where inward movement of the elongate rod 52' is impossible and actuation of the valve disc 26 is thereby prevented. Exertion of force on trigger 72a in a counter clockwise direction (Figure 4) pivots the trigger and first toggle member 72 to the position shown in phantom line, together with the second toggle member 74 whereby handle 56 may then be pressed rearwardly to separate disc 26 from seat 24. It will be apparent that prior to such movement of the toggle mechanism that the padlock or other locking mechanism (not shown) must be removed from openings 74b.

Referring to Figure 5 for the detailed structure of the first alternate form of the invention it will be seen to include an L-shaped valve body A' in which a longitudinally extending wall B' separates the body interior into an air inlet passage C' and a liquid discharge passage D'. Wall B' extends upwardly and develops into a cylindrical housing 82 that has a bore 84 formed in the rearward end portion thereof, and a tapped bore 86 formed in the forward end thereof. Bore 86 removably supports a packing assembly referred to generally as 88 that slidably engages a rigid tubular member 90 which extends rearwardly through bore 84. Member 90 continues rearwardly and supports a valve disc 92 on the rear end portion thereof.

Disc 92 is formed with a circumferentially extending groove 94 in which a resilient packer ring 96 is mounted that is of such size as to engage a circular seat 98 formed on the rear extremity of the valve body A'. Tubular member 90 (Figure 5) extends forwardly beyond the packer assembly 88 and is adapted to be moved rearwardly by a handle 100 that is pivoted by a pin 102 on valve body A'. A first port 104 is formed in the forward portion of member 90 which is situated within the confines of the compartment 82, and this port communicates with the air inlet passage C'. Member 90 also has a second port 106 formed in the rearward portion thereof that is in communication with a bore 106a which leads upwardly through a guide 108 of transverse circular segmental cross section that is affixed to or an integral part of disc 92. Guide 108 is slidable within the confines of the rear portion of valve body A'. For convenience in mounting valve body A' in a tapped bung opening, a nut 110 is integrally formed in the body and preferably situated at a midpoint on the exterior thereof. Member 90 has a protuberance 112 on the exterior thereof which is situated within the confines of compartment 82. A compressed helical spring 114 is disposed within the compartment 82 with one end abutting against the protuberance and the opposite spring end resting against the rear face of the compartment. This spring at all times tends to maintain the valve disc 92 and packer 96 in a fluid-sealing position with seat 98 as shown in Figure 5.

The first alternate form of the valve is, of course, used in dispensing liquid from a closed drum in the

same manner as the preferred form of the invention. After the first alternate form of valve is installed in a tapped bung opening, liquid is dispensed by exerting pressure on the handle **100** to pivot it in a counter clockwise direction to separate the sealing member **96** from the seat **98**. Liquid immediately starts to discharge forwardly through fluid passage D' and air enters inlet passage C' to flow rearwardly through port **104**, tubular member **90**, port **106**, bore **106***a* to enter the confines of the drum and replace the liquid which has been discharged therefrom. Upon release of pressure from handle **100**, the compressed helical spring **114** tends to expand and return the valve disc **92** and sealing member **96** to the position shown in Figure 5 where the sealing member is in fluid-sealing contact with seat **98**. This alternate form of the invention, with the exception of the structure above described, operates in the same manner as the preferred form of the device.

Upon occasion it may be desirable to employ either the preferred or the alternate form of the valve as a tool to remove a bung closure **120** from a container and to facilitate such use the lower extremity **14** or **14'** of the valve may be provided with two oppositely disposed slots **122**. Slots **122** are of such size and depth as to removably engage the cross member **124** normally provided in the recessed portion **126** of a conventional bung closure **120**.

A second alternate form of the invention is shown in Figure 7 which, rather than being screwed into a tapped bung opening, is frictionally inserted within the confines of the bung hole in either a drum, bottle, or a like container. For purposes of illustration the second alternate form of the invention is shown installed in a bottle neck.

In this figure it will be seen that this alternate form of fluid dispenser includes a tubular body **202** having a primary tubular pouring spout **203** extending downwardly through a centrally disposed bore **204** formed in a frusto-conical stopper **205**. The stopper may be formed from cork, rubber or other resilient material not adversely affected by fluid contained in the bottle with which it is associated. At an intermediately located junction **206**, the primary pouring spout **203** branches into an upwardly extending tubular member **207** and an angularly disposed secondary pouring spout **208**. The upper end of tubular member **207** is closed by a plate **209** from which a centrally disposed stem depends that supports an annular packer **211** on the lower end thereof.

That portion of member **207** directly above junction **206** is sealed by a plug **212** in which a longitudinally extending bore **213** is formed. An elongate air tube **214** is mounted in bore **213** and is vertically slidable therein. Stem **210** projects downwardly into tube **214** and maintains packer **211** in slidable sealing contact with the interior surface thereof. A collar **215** is mounted on the upper portion of tube **214**, which collar is disposed within the confines of tubular member **207** and in slidable contact with the interior wall surface thereof. A handle **216** projects from collar **215** and passes through a vertical slot **217** formed in tubular member **207**. Handle **216** may take a variety of shapes, but that of a generally L-shape is preferable. This L-shaped handle includes a stem **218** which supports a concave pressure plate **218***a* at its lower end, which plates may be of any desired shape.

In Figure 7 it will be seen that an annular valve member **222** is provided through which a bore **223** extends to permit mounting thereof on the lower extremity of tube **214**. Valve member **222** is at all times urged upwardly due to the compression on spring **220** whereby member **222** seats in fluid-sealing contact with the lower edge **222***a* of tube **214** as shown in solid line. Tube **214** is provided with a first air vent **224** which is so located that when the invention is in a non-dispensing position the vent may be seen above packer **211**. A second air vent **225** is formed in the lower portion of tube **214** situated above valve member **222**. A plug **226** or other conventional sealing means closes the lower end of tube **214**. A flange **227** projects from primary spout **203** which limits the distance the spout may move downwardly relative to stopper **205**. Flange **227** is also of assistance in forcing the stopper **205** downwardly into the mouth **200** of the bottle or container with which the invention is associated.

Operation of the second alternate form of the invention is extremely simple. When it is desired to dispense fluid from a container on which the device is mounted, the container is inverted and the handle **216** moved upwardly. Downward movement of the handle causes tube **214** to move relative to packer **211** whereby the air vent **224** is moved from the position shown in solid line to that indicated in phantom line. Downward movement of tube **214** also breaks the fluid sealing contact between member **222** and seat **222***a* by causing member **222** to assume the position shown in phantom line.

Fluid may then flow into the primary spout **203** from where it is directed into the secondary spout **208**. A constant air pressure is maintained within bottle **201** due to the fact that air is immediately substituted for fluid as discharged. When fluid is discharged from the bottle **201**, air enters tube **214** through air vent **224** and flows through tube **214** to enter the bottle through air vent **225**. After the desired amount of fluid has been discharged from bottle **201**, pressure is released from handle plate **218***a*, and compressed spring **220** returns tube **214** to the position shown where valve member **222** is in fluid-sealing engagement with seat **222***a* and there is no communication between vents **224** and **225**. In practice it has been found desirable for the internal diameter of secondary spout **208** to be somewhat less than the internal diameter of the primary spout **203** as this positively assures filling of the secondary spout with fluid whereby there is no tendency for air to pass upwardly therethrough.

Although the forms of the invention herein shown and described are fully capable of achieving the objects and providing the advantages hereinbefore mentioned, it is to be understood that they are merely illustrative of the presently preferred embodiment thereof and that I do not mean to limit myself to the details of construction herein shown and described other than as defined in the appended claims.

I claim:

1. A vented valve adapted to be removably mounted in the liquid discharge opening in the end of a shipping drum to discharge liquid therefrom when said drum is horizontally disposed, including: a valve disc; a rigid guide that projects forwardly from said disc, said guide having an air conducting passage formed therein that is located forwardly from said disc; a forwardly and downwardly extending valve body that defines separate liquid discharge and air vent passages within the confines thereof, said body having a rearward internal portion in which said guide is slidably disposed with said air conducting passage at all times communicating with said air vent passage, said body terminating in a transversely positioned valve seat on the rearward end thereof that may be sealingly contacted by said valve disc; a rigid elongate member extending forwardly from said disc, said member slidably supported in a bore formed in said body intermediate the upper and lower extremities thereof, said bore being in communication with said air vent passage; means to removably affix said body to said liquid discharge opening in such a forwardly and downwardly extending position that any liquid entering said air vent passage will drain therefrom adjacent the position at which said liquid flows from said liquid discharge passage; a handle disposed on the exterior of said body that

can be moved through a fixed path relative thereto, which handle when moved rearwardly moves said elongate member and said disc, with said disc when first separated from said seat permitting flow of said liquid from said drum through said liquid discharge passage, but venting of the interior of said drum only being initiated after said elongate member and disc have been moved rearwardly a sufficient distance to move at least a portion of said air conducting passage out of said valve body, with venting of said interior terminating prior to the return of said disc to a sealing position on said seat; and spring means that at all times urge said elongate member forwardly to place said disc in a sealing position on said seat.

2. A vented valve as defined in claim 1 wherein a rearwardly extending tubular member is provided which is supported in a fixed position in the rear confines of said body and is at all times in communication with said air vent passage, said guide having a bore which slidably engages sad tubular member, said air conducting passage extending from said bore to the exterior of said guide, with said air passage, bore, tubular member and air vent passage establishing communication between the interior of said drum and the ambient atmosphere after said disc is moved rearwardly a predetermined distance relative to said seat.

3. A vented valve as defined in claim 1 wherein a rearwardly extending tubular member having a threaded forward end portion is removably supported in a fixed position in the rear confines of said body, which body has threads formed on the rearward portion of said air vent passage that are engaged by said threads formed on said tubular member, said guide having a bore formed therein which slidably engages said tubular member, said air conducting passage extending from said bore to the exterior of said guide, with said air passage, bore, tubular member and air vent establishing communication between the interior of said drum and the ambient atmosphere after said disc is moved rearwardly a predetermined distance relative to said seat.

4. A vented valve as defined in claim 1 wherein the forward extremity of said body terminates in a ring-shaped surface from which two diametrically opposed recesses extend upwardly in the body of said valve, which recesses are capable of engaging a portion of a stopper which normally closes said liquid discharge opening, and said stopper when so engaged being susceptible of rotation by use of said body as a lever prior to connection of said valve body to said discharge opening.

5. A vented valve as defined in claim 1 wherein said body is formed with a forwardly extending tubular boss in communication with said liquid discharge opening through which said rigid elongate member extends, with said handle being affixed to the forward extremity of said member, and said spring means comprises a compressed helical spring having the forward end thereof abutting against said handle and the rearward end abutting against an interior surface portion of said boss to at all times tend to maintain said valve disc in pressure contact with said seat.

6. A vented valve as defined in claim 1 wherein said handle is affixed to the outer extremity of said elongate member and an outwardly pivotal toggle mechanism is connected to said body and to said handle at a fixed position relative thereto, said toggle mechanism when said disc is disposed on said seat being substantially parallel to said elongate member, and pivotal locking means is provided which when in a first position prevent outward pivoting of said toggle mechanism to permit said handle and elongate member to be moved rearwardly to disengage said disc from said seat, with said locking means when in a second position allowing said toggle mechanism to pivot outwardly to permit said disc to be moved rearwardly from said seat when a rearwardly directed force is manually applied to said handle.

7. A vented valve as defined in claim 1 wherein said air vent passage extends upwardly from the forward extremity of said body and develops into a housing situated within the confines thereof, said housing having a rearwardly disposed bore formed therein in coaxial alignment with said intermediately disposed bore formed in said body, said elongate member is of tubular construction and slidably supported in said bores with the end portions of said tubular member being sealed, said elongate member has a first port formed therein that is at all times disposed within the confines of said housing and in communication with said air vent passage, which port permits the flow of air through said tubular member to a second port formed therein that is in communication with said port formed in said guide, which elongate member has a forwardly projecting end portion, and pivotal means is provided that support said handle from the forwardly disposed portion of said body, said handle being of elongate shape and having a longitudinally extending section that slidably engages the forward extremity of said elongate member as said handle is pivoted rearwardly toward said valve disc to cause removal thereof from said seat.

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