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2,949,129

SAFETY DEVICE

Filed April 15, 1957

2 Sheets-Sheet 1

FIG. 1.

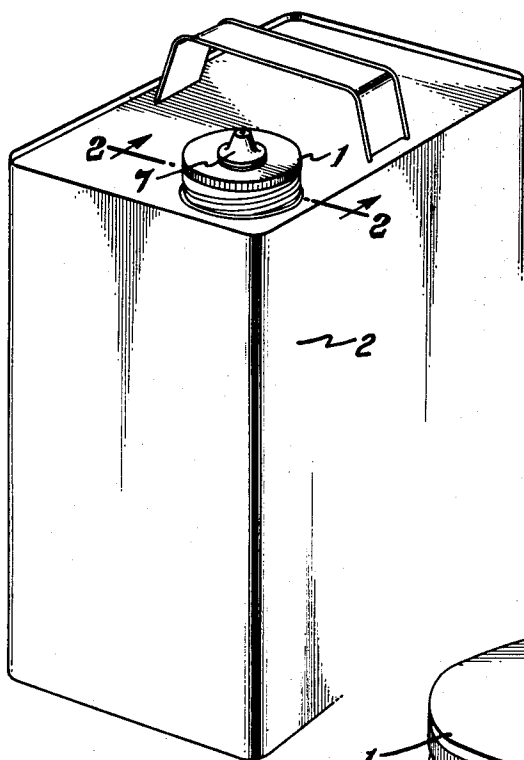


FIG. 3.

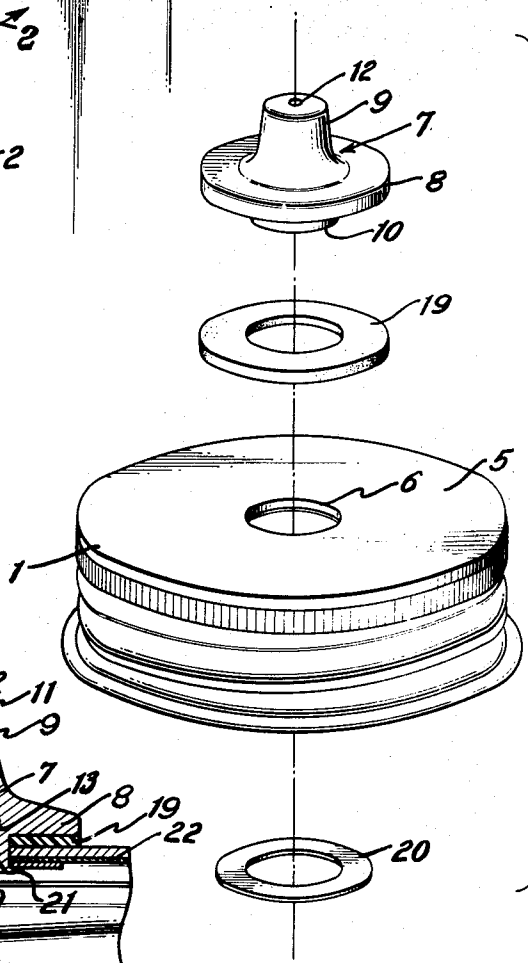
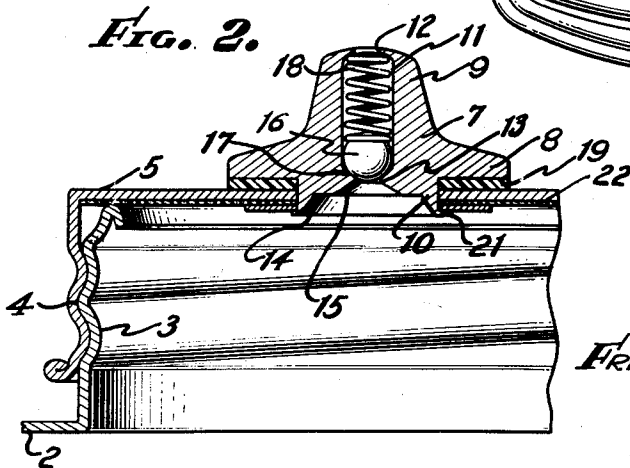


FIG. 2.



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FIG. 4.

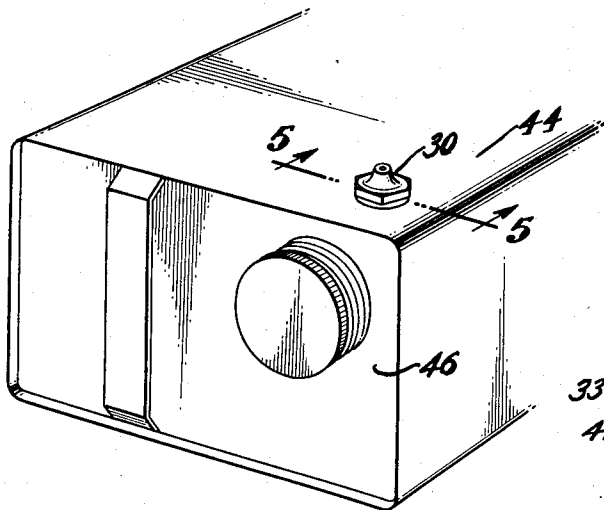


FIG. 6.

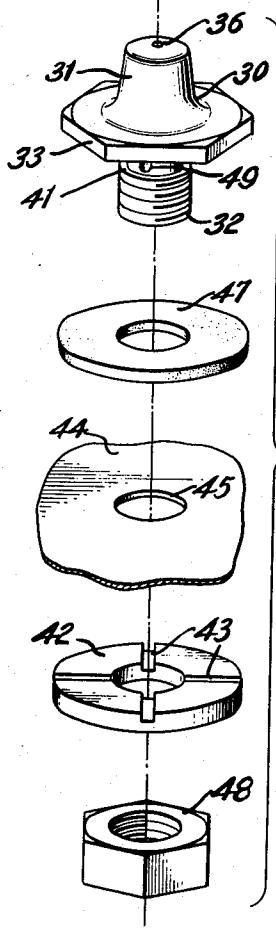


FIG. 5.

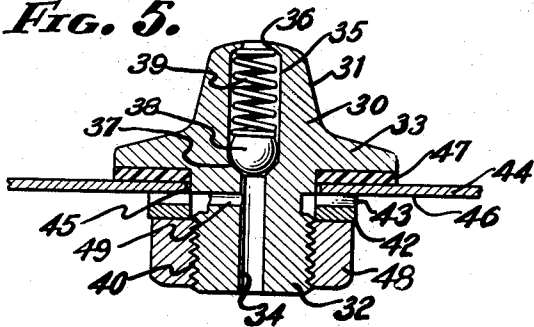
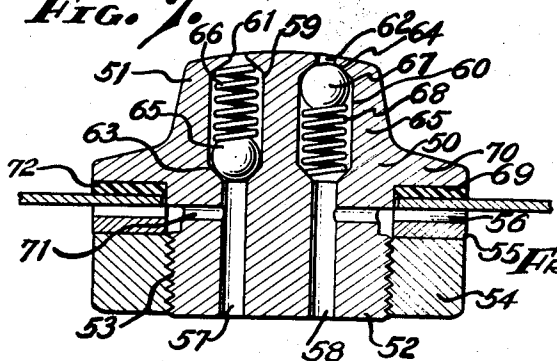


FIG. 7.



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2,949,129

SAFETY DEVICE

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1 Claim. (Cl. 137—539)

The present invention relates to a safety device for use on cans or tanks containing combustible or volatile fluids, such as, for instance, gasoline.

The device of the invention is so constituted and arranged as to permit its incorporation in a cap structure normally used for closing the outlet of a can or it may be incorporated directly in the can body. The device is adapted to automatically permit the can or tank to breathe, and likewise to relieve dangerous pressures which may occur in the can, resultant upon vaporization of a volatile fluid therein due to temperature.

The invention has directly applicability to cans of the gallon size which are often carried within a motor vehicle and which hold fluid, such as gasoline, oil, etc. The invention permits the can to vent vapors therefrom which might cause an explosion or bursting of the can while the can is either in upright position or lying on its side. The invention so functions that vapors which condense in the safety cap are directed back into the can so that there is a minimum of fluid loss.

The device of the invention in its several embodiments is of simple structure, automatic in its operation, inexpensive in cost of manufacture, and readily adaptable to various cans and tanks.

With the above mentioned and other objects in view, the invention consists in the novel and useful provision, formation, construction, association, and relative arrangement of parts, members and features, all as shown in certain embodiments in the accompanying drawings, described generally, and more particularly pointed out in the claim.

In the drawings:

Figure 1 is a fragmentary perspective view of a can having a cap, the said cap incorporating one form of invention,

Figure 2 is a fragmentary sectional view taken on the line 2—2 of Figure 1, and on an enlarged scale,

Figure 3 is a detached parts view of the structure shown in Figures 1 and 2, and on an enlarged scale from the showing of Figure 1,

Figure 4 is a fragmentary perspective view of a can incorporating a modified form of the invention and directly associated with a side wall of the can,

Figure 5 is a fragmentary sectional view on the line 5—5 of Figure 4, and on an enlarged scale,

Figure 6 is a detached parts view of the invention shown in Figures 4 and 5, and on an enlarged scale from the showing of Figure 4, and,

Figure 7 is a cross sectional view of a further modified form of safety device incorporating the invention.

Referring now with particularity to the drawings, and specifically to Figures 1 to 3, inclusive, the safety device is shown as incorporated in a cap 1 for a container 2 as shown in Figure 2. The container has a threaded neck 3 and the cap is threaded at 4 for engagement with the threaded neck. The top 5 of the cap is provided with an

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axial bore 6 and the safety device of the invention is secured to said cap top 5 in said bore 6. The safety device includes a body 7 having an enlarged external circular flange 8 between upper and lower boss portions 9 and 10. The boss 9 is provided with a central enlarged bore 11, which bore is in communication with a reduced diameter top bore 12 and a reduced diameter bore 13. The boss 10 is provided with an enlarged conical bore 14 communicating with the base of the boss, and with a smaller conical bore 15 which leads to the reduced diameter bore 13. The two conical bores are in communication. Positioned within the enlarged bore 11 is a ball valve 16 engaging a tapered ball seat 17. The ball valve is urged to seated position by a coil spring 18, also positioned within the enlarged bore. In assembling the safety device on the cap 1, the boss 10 is adapted to be passed through the bore 6 in the cap. A soft washer 19 is externally positioned on the boss 10 and bears against the bottom surface of the flange 8. The boss 10 is then passed through the bore 6 so that the soft washer 19 rests upon the top surface of the cap. Thereafter, a second washer 20 is placed on the boss 10 and the edge of the boss is flanged, as shown at 21, so as to hold said washer in engagement with the usual gasket disk 22 carried within the cap.

It will be specifically noticed that the conical bores in boss 10 lead to the valve seat 17, which valve seat, in the present arrangement, is above the top of the cap 1. Hence, when the can 2 is filled with a volatile fluid, such as a gasoline, the can being carried within the trunk compartment of a motor vehicle, any excessive heat which would cause the gasoline to vaporize and create a pressure within the can which is sufficient to overcome the pressure exerted against said ball by the spring 18, will lift the ball 16 from valve seat 17 and allow the vapors to escape through the bore 12. However, if the vapors condense upon striking the ball valve, the condensate will flow back into the can. It is to be observed that the body 7 is external the can cap 1 and insulated from the cap by the soft washer 19 and the gasket 22. As a consequence, the body 7 may be at a different temperature from that of the contents of the can 2. The arrangement is such that any splashing of the fluid within the can will not allow escape therefrom through the said safety device. The ball valve 16 is at all times seated in a plane which is above the top of the cap 1.

In the form of the invention shown in Figures 4 to 7, inclusive, it may be desirable, in certain instances, to provide a safety device which is located in the side wall of the container and not in the cap. An instance of this is when the can is laid on its side, as shown in Figure 4. The safety device takes two forms, to-wit, the one shown in Figures 4 to 6, inclusive, and the other in Figure 7.

In the showing of Figure 5, I provide a body 30 which includes an upper boss 31 and a lower boss 32, with a substantially intermediate external flange at 33. The lower boss 32 is provided with an axial bore 34 and the upper boss is provided with an enlarged axial bore 35 communicating with bore 34. A reduced diameter bore 36 leads from the top of the boss 31 to the bore 35. A valve seat is provided at 37 at the joiner of the bores 34 and 35 and, as before, a ball valve 38 rests on said seat, being urged to a seated position by a coil spring 39 within the bore 35. The boss 32 is externally screw-threaded at 40 for a portion of the length of said boss, the said boss having a reduced diameter unthreaded portion at 41. Adapted to surround the boss 32 in the zone of the unthreaded portion 41 is a washer 42 provided with radial grooves 43 on its top surface.

In the use of this form of safety device, the side wall 44

of a can is provided with a bore 45 adjacent the top wall 46 of the can. A soft washer 47 is placed against the base of flange 33, whereupon the lower boss 32 is passed through the bore 45, the soft washer engaging the outer surface of side wall 44 of the can in the manner shown in Figure 5, whereupon the washer 42 is so placed that the radial grooves 43 lie adjacent the inner surface of the side wall 44, with the assembly secured by a nut 48 in engagement with the threads 40 of the boss 32.

The modification of the device of Figure 5 as shown in Figure 7, consists in the use of a body 50 having an upper boss 51 and a lower boss 52, the lower boss being externally threaded for a portion of its length, as shown at 53, for the reception of a nut 54, together with a washer 55, the top surface of which is provided with radial grooves 56, the said boss 52 likewise provided with a pair of separated bores 57 and 58 which separately communicate with coaxial counter-bores 59 and 60, the bores 59 and 60, in turn, communicating with reduced diameter bores 61 and 62, leading to the external surface of boss 51. Seat portions are provided at the juncture between bores 57 and 59, as shown at 63, and for bores 58 and 60, as shown at 64. Within the bore 59 is a ball valve 65, adapted to be urged to its seat 63 by a coil spring 66, while a ball valve 67 is urged to engage seat 64 through the medium of spring 68. Thus, the ball valve 65 opens upwardly while ball valve 67 opens downwardly. As before, the can side or top is provided with a bore for passage of the boss 52 therethrough and a soft neoprene washer 69 is placed under flange 70 and engages the outer surface of either a can side or a can top while the washer 55 is so positioned that the radial grooves 56 are adjacent the inside surface of either the can top or side, the entirety being held in assemblage by the nut 54 when engaging the threads 53 of the boss 52. In addition, the said boss 52 is provided with radial bores 71 which communicate with the unthreaded area 72 of the said boss and with the bores 57 and 58. It is obvious from the showing of Figure 7 that said radial bores 71 are in communication with the radial grooves in the washer 55 due to the unthreaded area or annular groove 72. In this respect, the structure of Figure 7 closely follows the structure of Figure 5, in that the unthreaded area 41 of the boss 32 is provided with radial bores at 49, and these bores 49 are in direct communication with the grooves 43.

The operation, uses and advantages of the form of the invention shown in Figures 4, 5 and 6 resides in the fact that any excess vapor pressure, such as might be generated in the can by temperature elevation, permits the vapor to pass into bore 34 and raise the ball valve 38 from its seat against spring pressure, to escape to the atmosphere through bore 36. Any splash or condensate in the can, however, which strikes the inner surface of wall 44 in the zone of the safety device will pass through the grooves 43, bores 49 into bore 34 and back into the can. In this respect, it is to be observed that the ball valve 38 is situated above the radial bores 49 in the lower boss 32. As the radial grooves 43 and the bores 49 are directly adjacent the inner surface of the side wall 44 of the can, any splash of the fluid within the can would quite naturally pass through these grooves and bores into the main bore 34 without disturbing the ball valve 38 or

tending to raise the same from its seat to permit escape of the fluid. On the other hand, any increase of vapor pressure will lift the ball valve from its seat and allow this vapor under pressure to escape from the can.

In the form of the invention shown in Figure 7, the ball valve 65, together with the radial bores 71, the grooves 56 in the washer 55, and the bore 57, all function in the same manner as shown for the device of Figure 5. However, the ball valve 67 is urged upwardly so as to seat and close entrance through bore 62 into bores 68 and 58. The device of Figure 7 performs a double function, in that, in case of a vacuum condition within the can, which might be incurred in numerous ways, such as by temperature change, altitude, imposed pressure change, air is permitted to enter the can upon displacement of the ball valve 67 from its seat 64. Thus, ball valve 65 functions as a vent relief for vapor under pressure, and ball valve 67 acts to break a vacuum within the can. The device of Figure 7 permits any splashing liquids within the can to pass through the radial grooves 56 and the radial bores 71 into bores 57 and 58, thence returning to the can. At the same time, the ball valves 65 and 67 prevent any of said liquid or fluid from escaping through the bores 61 and 62 outwardly of the device and the said can. For the reasons given in the statement of operation of Figure 5, the ball valves 65 and 67 are above the return bores 71 which lead to the bores 57 and 58.

I claim:

A valve construction adapted to be secured to a container for relieving vapor pressure from within the container to the atmosphere, said valve including: a body provided with an external flange, axially aligned bosses on both sides of said flange, one of said bosses being screw threaded for reception of a nut; said screw threaded boss formed with an annular groove adjacent one surface of the flange, an inlet bore in the screw threaded flange, and an inlet counterbore in the other boss; a spring pressed valve and its seat within the counterbore and normally closing the bore against passage therethrough by opening when excess pressure occurs, the screw threaded boss provided with radial ports extending between the inlet bore and the annular groove, a washer provided with radial facial grooves carried upon the screw threaded boss with the radial grooves in communication with the ports communicating with the annular groove and the inlet bore in the boss whereby sudden splash flow past said inlet bore is received by said washer grooves, annular groove and radial ports and conducted thereby back down through said inlet bore without unseating the valve.

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