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GASOLINE TANK SEALING CAP

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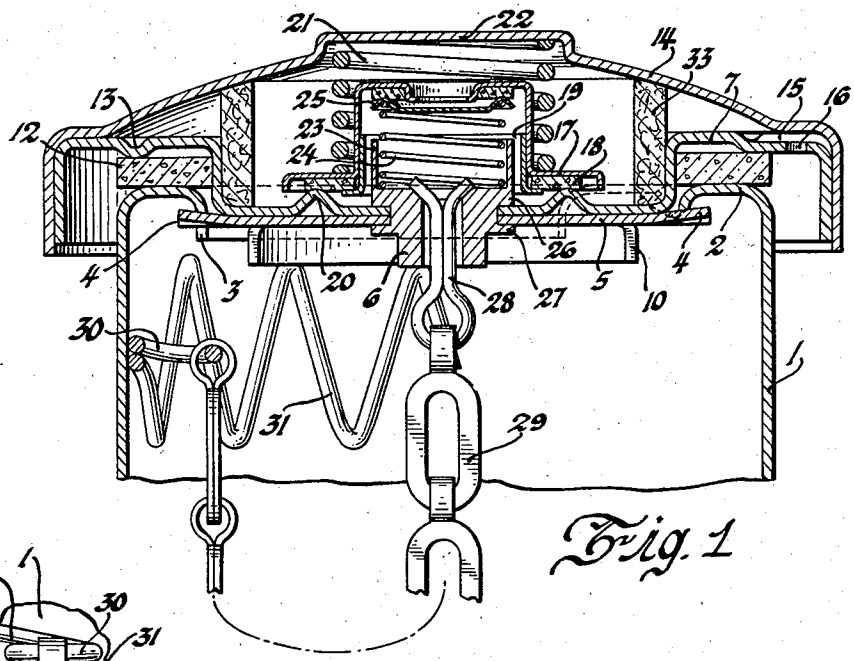



Fig. 1

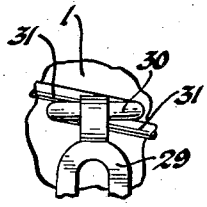



Fig. 3

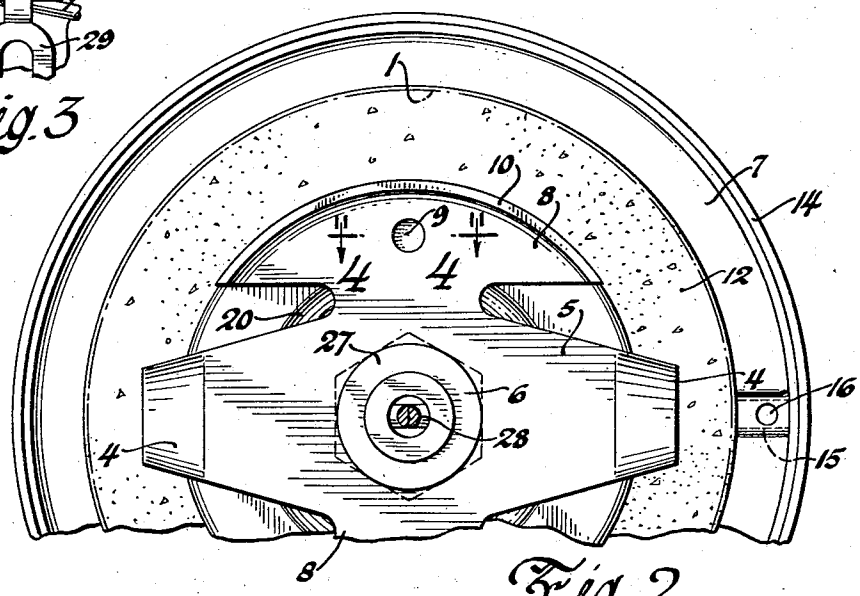



Fig. 2

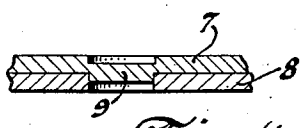



Fig. 4

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## GASOLINE TANK SEALING CAP

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9 Claims. (Cl. 220—44)

This invention relates to storage tank closures and is especially adapted for use on fuel storage tanks for vehicles subject to hard usage and operation over rough terrain, as, for example, military tanks, transport trucks and the like.

It is among the objects of the invention to provide an easily removable filled spout cap anchored against loss and misplacement and which in closed position affords a seal against accidental spillage of inflammable liquid during maneuvers not only to prevent loss of fuel but more particularly to reduce fire hazard.

A further object of the invention is to provide a valved cap which can be applied to current types of fuel filler spouts in substitution for the conventional open vent caps and thereby eliminate costly changeovers either in existing equipment or in manufacturing tools and procedures for turning out future additional equipment. The valved cap embodies an inwardly opening check valve as well as an outwardly opening pressure relief valve, the former enabling entrance of air to replace withdrawn fuel and the latter serving to prevent bursting strain on the storage tank due to excessive internal pressures which otherwise might build up with evaporation and expansion of the tank contents under certain conditions.

Another object is to provide a removable valved closure of compact and simple design so as to be inexpensive to manufacture and tamperproof and reliable in use.

Additional objects and advantages will become apparent from the following specification having reference to the accompanying drawing wherein Figure 1 is a vertical sectional view of a filler spout and removable cap embodying the invention; Figure 2 is a bottom plan view of the cap assembly; Figure 3 is a fragmentary elevation showing a detail of the cap anchoring parts and Figure 4 is a detail sectional view taken on line 4—4 of Figure 2.

In the drawing, 1 represents a conventional gasoline tank filler spout terminating in an inwardly extending gasket seating flange 2. For the usual bayonet type detachable connection with a closure cap the flange 2 has diametrically opposite entrance openings and downturned walls 3 between the openings affording camming edges engageable by a cap locking bar. In the instant cap the spout engaging ears or terminal portions 4 are on a locking bar 5 fixed by a centrally disposed hollow stud 6 on the underside of a cupped stamping 7 constituting the main or inner wall of the removable cap. To prevent relative rotation between the locking bar and cap, the locking bar has a laterally extending tab 8 on each side, which, in radially spaced relation to the axis of the attachment stud 6, is doweled or otherwise fastened to the inner stamping 7. A convenient interconnection for this purpose may consist of a depressed boss 9 formed in the stamping 7 and fitted to an aligned opening in the locking bar ear 8 as best seen in Figure 4. At their peripheral edges the ears 8 terminate in dependent flanges 10, which not only stiffen the assembly but afford guiding skirts for cooperation with the dependent internal skirt portions 3 on the spout.

Peripherally surrounding and fitting the centrally depressed boss in the stamping 7 is a gasket ring 12 which is held in place as a part of the cap subassembly by the locking bar terminal portions 4 which extend beyond the wall of the cupped depression in the stamping 7. This gasket ring 12 engages the end flange 2 of the spout to provide the seal between the spout and cap. To insure a good seal the underside of the cupped stamping 7 is formed with a circular bead 13 to engage the top of the gasket near its outer marginal edge.

The inner stamping 7 is peripherally secured to an outer cupped stamping 14 preferably through the pressed fit of the outer marginal skirt portions of the stampings. Throughout the central regions the stampings 7 and 14 are spaced apart and provide a hollow chamber to house protectively the operating mechanism of the control valving. This chamber is vented to atmosphere as by means of a radially extending groove 15 formed by a depression in the edge portion of the stamping 7 and leading to a breather port 16 directed downwardly into the space between the spout wall and outer cap wall. To close the chamber of the hollow cap from the interior of the spout the hollow stud 6 is capped by a valve assembly, including a centrally domed metal stamping 17 to the underside of which is secured a gasket ring 18 by a flanged tube 19 press fitted interiorly of the domed valve member 17. A raised annular rib 20 on the stamping 7 affords a seat for the gasket 18 and the valve is held resiliently on its seat by a coil spring 21 telescopically fitted at one end to the central dome of the valve and held in centered relation within the hollow chamber by having its opposite end seated and retained within an upward hollow boss 22 formed centrally in the outer cap member 14. The central dome of the valve 17 in turn is centered and telescopically fitted to an upstanding wall or skirt 23 on the hollow attachment stud 6. Pocketed within the interior space of the guide

skirt 23 is one end of a coil spring 24 which serves to seat an inwardly opening valve 25 over an opening in the base of the domed valve 17.

Advantage is thus taken of the hollow stud to communicate the vented cap chamber with the storage tank, to center and locate the valve parts and to hold the cap locking bar in position. For this last mentioned purpose the stud projects through aligned openings in the stamping 7 and locking bar 5 and is provided with an annular groove to receive the inner marginal edge of these parts. This annular groove is afforded by an intermediate shoulder 26 preformed on the stud and by an outturned flange 27 axially spaced from the shoulder 26 and struck out during the assembly of the parts from the inner end of the attachment stud. The attachment stud furthermore is utilized for swivelly mounting the cap anchoring device by means of which the cap may be removed from the spout but tied against displacement. The swivel connection includes a hairpin member 28 projecting upwardly and loosely through the hollow stud and having its ends expanded or bent outwardly to overlie a tapered seat on the inner face of the stud. Fastened to the eye of the swivel pin 28 is one end of a flexible tie or linked chain 29 contained within the spout with its opposite end connected to an intermediate loop 30 of an expansible spout engaging anchoring ring 31. This ring extends throughout more than half the internal circumference of the spout and is formed of spring wire bent to zigzag outline in the legs extending oppositely from the intermediate attachment loop 30. The undulations in the wire provide recurring lengths extending axially of the spout to increase the bearing surface of the ring and they engage the internal surface of the spout under the gasket seating flange 2 so as to be retained against accidental removal.

In the assembly of the parts the locking bar 5 first is secured to the inner stamping 7 by the attachment stud 6 and the swivel pin 28 on the end of the anchor chain is then applied. Thereafter in succession the spring 24 is fitted interiorly of the skirt 23 with its valve 25 fitted to the domed valve 17, which latter is then fitted to the outside of the skirt 23 and after the spring 21 is telescoped on the dome of the valve 17 the outer cap member 14 is applied to the assembly and peripherally press fitted to the inner cap member 7. In use the gasket 12 and the internal valving seal the spout from outside atmosphere with the relatively light spring 24 enabling the valve 25 to open to relieve subatmospheric conditions in the tank as the fuel is drawn off. Internal pressures within limits will be of advantage in conserving fuel supply by reducing evaporation of the more volatile fractions and assisting fuel withdrawal but excessive pressures are avoided and automatically relieved through the operation of the outwardly opening valve 17 which communicates the vented cap chamber with the tank through the hollow attachment stud 6 and the space between the domed valve and its guiding skirt 23.

The incorporation in the cap of an air filter may be found desirable. Such filter may consist of a suitable screen 33 in the form of a cylindrical wall interposed between the cupped elements 7 and 14 and of a diameter to fit the cylindrical wall of the central depression in the inner element 7. Woven material cut to length from tubular wick stock or cut from strip and rolled or wound on itself will afford a satisfactory filter. The foraminous character of the filter enables air to pass from the tank to the outside or in the reverse direction depending upon conditions. In summer driving very little air will come in from the outside due to the build-up of gasoline vapor within the tank which takes care of the displacement of gasoline used by the engine. In winter driving less vaporization of gasoline occurs and more outside air is drawn into the tank. For any inward movement of air the filter strains out entrained dirt.

We claim:

1. A valved closure cap for the filler spout of a liquid storage tank or the like, including a pair of cupped stampings peripherally secured together with their central wall portions spaced apart to afford a chamber and one of the stampings having a chamber vent port therein, a centrally domed outwardly opening valve housed in the chamber and seated over an opening in the inner cap wall, a hollow stud in said opening securing a cap attaching member to said wall and having an upstanding skirt projected within the central dome of the valve to center the same, a coil spring centered within the skirt and an inwardly opening valve seated by said spring over an opening in the base of the dome of the outwardly opening valve.

2. In a hollow valve enclosing spout cap having spaced inner and outer walls, pressure actuated valving housed between said walls, a tubular stud having a valve controlled breather passage therethrough and projecting through the inner cap wall with an intermediate shoulder seated interiorly of the inner wall, an upstanding guide for said valving carried by the stud at its end within the hollow cap, a spout engaging locking member on the underside of the cap in embracing relation to the tubular stud and a laterally projected portion struck from the opposite end of the tubular stud to secure the stud and the locking member to said inner cap wall.

3. In a valved closure of the character described, a pair of interfitted stampings having oppositely projected centrally disposed hollow bosses affording an enlarged space therebetween, a hollow stud projected through the boss on the inner stamping and secured thereto with an upstanding skirt extending into said space, a valve housed within the space and seated on the inner stamping with a central dome telescopically fitted to and guided by said upstanding skirt and a coil spring telescopically fitted exteriorly to said dome with one end seated on the valve and its opposite end telescopically fitted within and seated by the boss on the outer stamping.

4. In a valved closure of the character described, a pair of interfitted stampings having oppositely projected centrally disposed hollow bosses affording an enlarged space therebetween, a hollow stud projected through the boss on the inner stamping and secured thereto with an upstanding skirt extending into said space, a valve housed within the space and seated on the inner stamping with an apertured central dome telescopically fitted to and guided by said upstanding skirt, an inwardly opening valve seated over the dome aperture by a spring housed within said hollow skirt and a coil spring for seating the main valve having one end interiorly fitted to the boss of the outer stamping and its other end exteriorly fitted to the domed portion of the valve.

5. A detachable spout closure comprising a chambered cap having spaced apart inner and outer walls, a tubular breather stud projected through the inner wall of the cap and secured thereto with a guide portion projecting interiorly of the cap chamber, a valve seat surrounding the stud interiorly of the chambered cap, and a spring seated valve engaging said seat and having a central dome telescopically fitted to and guided by the interiorly projecting portion of said tubular breather stud.

6. A detachable spout closure comprising a hollow cap having spaced inner and outer walls, a hollow breather stud projected through the inner wall of the cap and secured thereto with an upstanding valve guide portion extending into the hollow cap, and a spring seated breather closing valve housed within the enclosed space of the hollow cap and telescopically fitted to the extended guiding portion of the stud.

7. In a detachable valved closure, a hollow cap having inner and outer walls forming an enclosed space vented to the outside, a spout engaging locking member on the underside of the cap, a hollow stud having an intermediate shoulder bearing on the interior face of the inner cap wall with one end projecting through both the wall and the locking member and being provided with fastening means to secure the locking member and stud to the inner wall, said stud terminating at its opposite end in a valve guiding extension within the hollow cap, and a pressure actuated valve housed between said walls and slidably fitted to said guide extension to close the opening through the hollow stud.

8. In a detachable spout closure, a hollow cap having spaced inner and outer walls, a spout engaging locking bar on the underside of the cap, a stud securing the locking bar to the cap inner wall and terminating interiorly of the cap in a valve guiding extension, said stud having a passage therethrough for communicating the cap interior space with the spout, a passage controlling valve housed between said walls and telescopically fitted to said extension a flexible anchor having an end pin projected through said passage in the stud and secured thereto and a spout engaging split ring fastened to the opposite end of said flexible anchor.

9. The structure of claim 8 wherein the spout engaging split ring comprises a spring wire having an intermediate anchor attaching loop and oppositely extending legs which follow a general arcuate path with undulations substantially parallel to the arcuate axis.

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