Dec. 5, 1939. J. E. ESHBAUGH 2,181,969

RADIATOR PRESSURE CAP

Filed Dec. 17, 1936

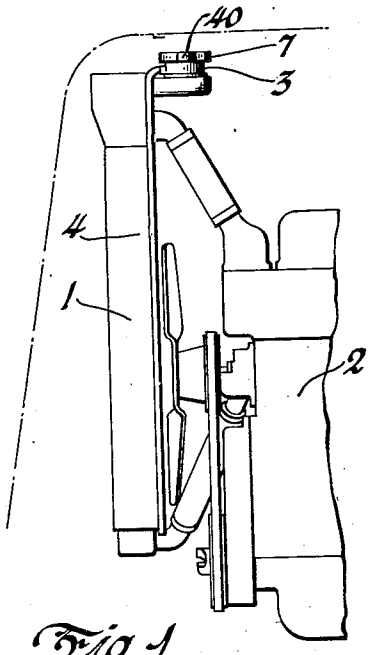


Fig. 1

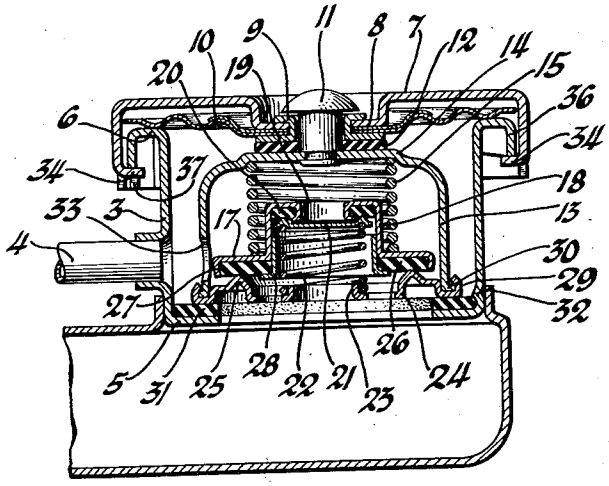


Fig. 2

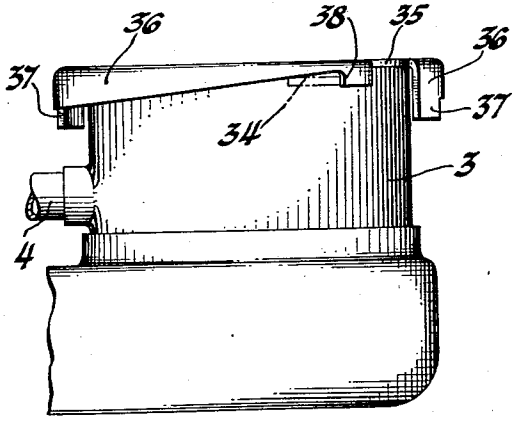


Fig. 3

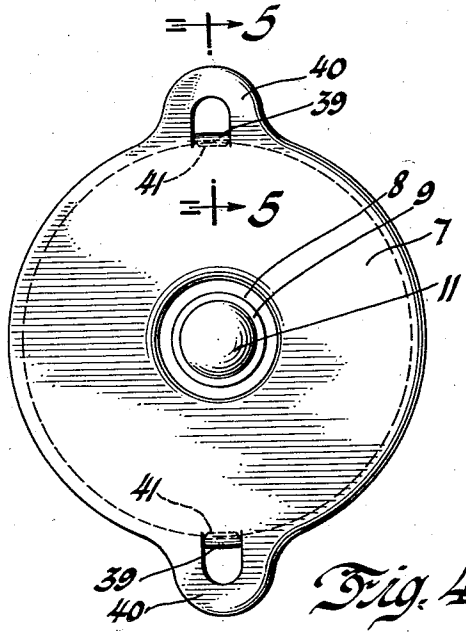


Fig. 4

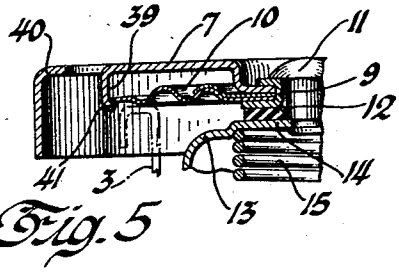


Fig. 5

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RADIATOR PRESSURE CAP

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4 Claims. (Cl. 220—44)

This invention relates to certain detail improvements in radiator filler structures.

Many automobile engine cooling systems are provided with a special filler spout and cap assembly incorporating pressure valves which close the system vent below internal pressures of three or four pounds with a resultant increase in cooling efficiency. The present invention deals primarily with simplicity of design to facilitate economical manufacture with regard to minimizing machine operations, reducing excess waste of material and promoting ease of assembly.

A further object of the invention is to provide a structure which in use will be positive in action, free from complicated adjustments and care and resistant to breakdown and wear.

A preferred embodiment is illustrated in the accompanying drawing wherein Figure 1 shows in side elevation the front portion of an engine cylinder block, the cooling radiator and other parts which constitute a part of the liquid circulating system; Figure 2 is an enlarged vertical sectional view of the filler spout closure structure; Figure 3 is an elevation of the filler spout with the cap removed; Figure 4 is a top plan view of the cap and Figure 5 is a detail sectional view taken on line 5—5 of Figure 4.

The cooling system illustrated in Figure 1 is conventional and involves a radiator assembly 1 having suitable connection with a jacketed cylinder block 2 for the circulation of liquid. Associated with the inlet tank of the radiator is a filler spout 3 having an overflow or vent pipe 4 leading therefrom and on opposite sides of the vent a pair of spaced seats defined by the internal flange 5 at the bottom and the outturned flange 6 at the top. Closing the system from the overflow and nested within the spout is a valve cage forming a unit with the closure cap 7. This cap is shown with a centrally depressed and apertured boss 8 to which is secured by a hollow rivet 9 the central portion of a flexible diaphragm or spring disc 10 containing annular ribs or corrugations to increase flexibility, the free rim of which seats against the flange 6 to seal the outer end of the spout. Extending through the hollow rivet 9 is a solid stud or rivet 11 by which the valve cage is swivelly secured to the cap with a sealing washer 12 therebetween.

The valve cage includes a cupped stamping 13, the base of which has an offset or annular shoulder 14 to locate a coil spring 15 within the cup. At its opposite end the spring 15 acts against a domed plate 17 whose dome 18 projects upwardly inside the coils of the spring 15 and has in its top wall an opening defined by a dependent flange 19. In the annular groove provided by the side wall of the dome 18 and the flange 19 is a resilient washer or ring 20 held in place by an outturned lip at the lower end of the flange 19. This ring 20 affords a seat for an annular rib pressed into the plate valve 21 for closing the opening. The formation of the ribs affords on the underside of the plate 21 an annular groove for seating one end of a coil spring 22 extending upwardly into the domed portion 18 of the plate 17. The other end of the coil spring 22 is located by an upturned flange 23 on a stamped metal plate 24 which closes the open end of the valve cage and serves to hold the parts in assembled relation. The plate 24 is centrally apertured and beyond the openings therein is formed with a raised annular ridge 25 which provides a seat for a sealing ring 26 carried by the plate 17. Downwardly projected and inwardly inclined members 27 integral with the outer edge of the plate and consisting of either an annular flange or a series of dependent tongues extend beside the outside margin of the ring 26 while a flanged sleeve 28 press fitted or otherwise secured interiorly of the dome 18 passes through the central opening in the ring to engage and hold the inner edge against displacement and incidentally serves also as a seal to prevent the ring being blown away from the plate by the action of pressure therebehind. The dependent flange 27 strengthens the plate 17 and is inclined inwardly to avoid its being caught on the cage in which the plate floats. A slight clearance between it and the edge of the gasket 26 is desirable to allow room for gasket swell in service. For the same reason clearance should be provided between the periphery of the gasket 20 and the dome 18.

As will be understood, the plate 17 and the gasket rings 20 and 26 are a subassembly unit and the cage enclosed parts designed for compactness, are assembled through the open end of the cup 13 in succession, the spring 15, the subassembled plate 17, the plate 21 and the spring 22 being introduced and thereafter the cover 24 being applied by having its rim rolled or peened over as at 29 about the outturned rim 30 at the bottom of the cupped casing 13. In the application of the cover 24 both valve springs are compressed and their action in seating the respective valves is in opposite directions.

It may be here pointed out that the gasket rings 20 and 26 and the cage seating gasket 31 positioned on the internal flange 5 by one or

more indentations 32, for convenience and economy of manufacture, may be all cut by a single operation from the same piece of rubber or other suitable sealing material. To this end the dimensions of the parts are such that the outside diameter of the ring 26 substantially corresponds with the inside diameter of the ring 31 and its inside diameter substantially corresponds with the outside diameter of the ring 20.

One or more ports 33 in the cup 13 communicates the interior of the valve cage with the spout so that the system is vented through the pipe 4, whenever internal system pressure exceeds the force of the spring 15 and lifts the domed plate 17 or whenever internal system pressure is below atmospheric pressure and causes the valve 21 to open against its spring 22, until balance is established.

A seal between the spout and the cage is effected by seating the rim of the closure plate 24 on the gasket 31. In order to avoid scoring or scrubbing wear between these parts the edge 29 may be peened or rolled over loosely at a number of points for a free swivel connection. Alternately the whole of the cage may be swivelly joined to the rotatable cap through the rivet 11 as previously described. In either event rotation of the cap for its application to or removal from the spout may occur without relative rotation of the cage and sealing gasket 31.

To save time and avoid the tedious and slow rotation of the removable cap through several turns it is proposed to avoid a screw threaded connection between the spout and cap and use a simple bayonet type of connection. For this purpose the cap 7 is provided at the lower edge of its skirt and at diametrically opposite points with inturned ears 34 for passage through openings 35 in the top flange 6 of the spout and engagement with camming surfaces on the lower edge of the downturned rim 36 of the flange. The two camming surfaces are identical in profile and as seen in Figure 3 each extends from the entrance opening 35 to a stop 37 defining the final position for the inturned locking ear 34. As the ear rides down the cam upon cap rotation the whole assembly moves into the spout causing the cage to seat on the gasket 31 and the spring diaphragm 10 to seat on the flange 6. Intermediate the entrance opening 35 and the final seating station at 37, the cam is formed with an abutment shoulder 38 in the form of a ratchet tooth which offers no interference to the application of the cap but does serve as a safety stop during reverse rotation. The resistance offered by the stop to removal of the cap acts as a warning against sudden removal and the liability of injury should internal pressures exist. With the ear 34 engaged with the stop 38 the relation of the parts is such that the cage is lifted from the gasket 31 for venting the system and allowing excess pressure to escape through the overflow pipe 4. After a suitable delay to allow a reduction in internal pressure the cap may be depressed so that the ear 34 clears the stop 38 for further movement up the inclined ramp to the opening 35.

To give an additional warning of the presence of internal pressure a tongue 39 is struck down out of the region of each of the radial projections or handles 40 in the cap and is provided with an inturned end 41 to engage with the underside of the spring disc 10 at its periphery and thereby lift or unseat the disc from the flange 6 when the cap is turned to the safety position afforded by engagement of the ear 34 with the stop shoulder 38. Thus the end 41 limits distention of the disc 10 away from the cap 7 but full advantage of spring pressure is had to maintain a seal at the top of the spout when the parts are in final interlocked position. By positively breaking the upper seal as illustrated in Figure 5, the spout not only vents through the overflow 4 but also under the cap to a slight extent and the resultant hiss or visual indication of escaping pressure fluid may be observed and precaution taken to delay complete removal for the short interval necessary for the full relief of pressure.

I claim:

1. In a valved sealing closure for a filler spout, a cap adapted for detachable spout engagement, an inverted cup secured on the underside of the cap, a valve seating member secured over the open end of the cup, an outwardly opening valve seated on said member and provided with a central dome portion, a valve seating spring telescopically fitted to said dome portion and seating at opposite ends on the cap and valve, an inwardly opening valve housed and guided by said dome portion and seated over an opening in the end wall thereof and a seating spring interposed between and bearing at opposite ends on said inwardly opening valve and said valve seating member.

2. In a pressure cooling system, a valve cage assembly comprising a cupped casing, a valve seating spring enclosed within the casing in bearing engagement with the base of the casing, an outwardly opening valve acting against said spring and having a central dome nested within the spring, an inwardly opening valve seated against the top of the dome over an opening therein, a spring seating the inwardly opening valve and housed within said dome, a closure plate for the open end of the casing to retain the valves and springs therein, a seating formation on the plate to seat the first mentioned valve and a seating formation on the plate to seat the last mentioned spring.

3. In a pressure cooling system, a valve cage, a sealing ring therein forming a part of an outwardly opening valve, a domed backing plate for the ring having a dependent peripheral flange in locating engagement with the rim of the ring, a central retainer sleeve for the ring projected through the ring and carried by the plate, a dependent flange in the top wall of the dome defining an opening through the plate and terminating in an outturned lip, and a sealing ring surrounding said flange and being retained by said lip to provide a valve seat around the opening.

4. A filler spout and closure assembly, including a filler spout having a pair of spaced seats, a valve cage engaging one of said seats, a flexible diaphragm engaging the other seat, a detachable cap rotatably engaged with the spout, a hollow rivet securely fastening together the cap and flexible diaphragm, and a fastening element passing loosely through said hollow rivet and swivelly joining the valve cage to the cap.

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