Feb. 27, 1940. R. S. FRANTZ 2,191,614

RADIATOR FILLER CAP

Filed Nov. 6, 1936

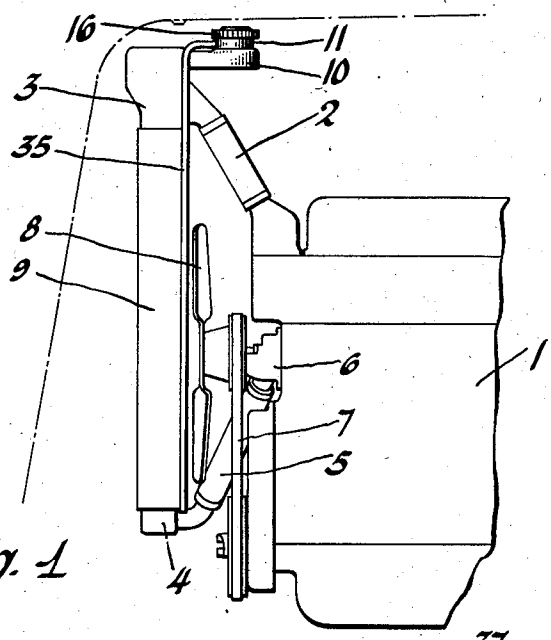


Fig. 1

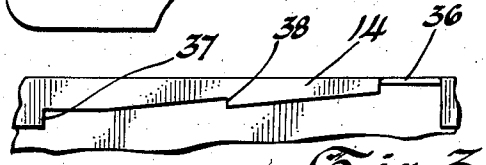


Fig. 3

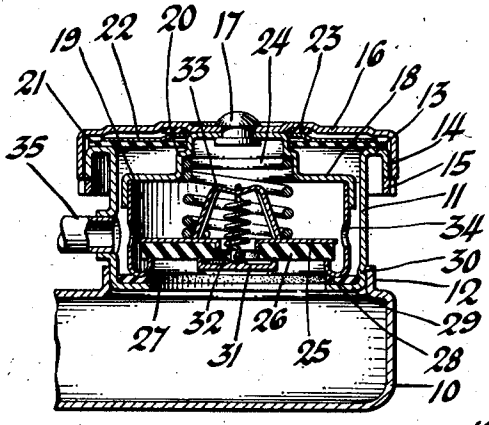


Fig. 2

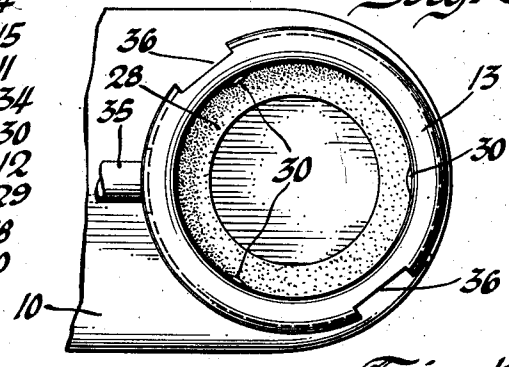


Fig. 4

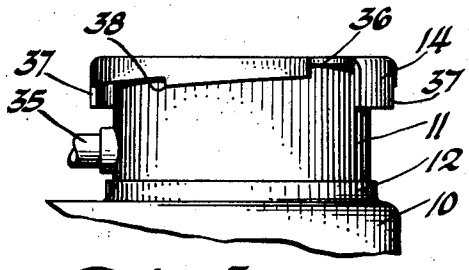


Fig. 5

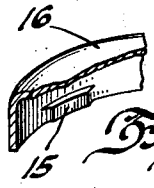


Fig. 6

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2,191,614

RADIATOR FILLER CAP

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Application November 6, 1936, Serial No. 109,466

1 Claim. (Cl. 220—44)

This invention relates to a detail improvement in automobile radiator filler devices of the type wherein the removable closure cap has as a unit therewith a valve structure which cooperates with the filler spout in closing the cooling system to the overflow vent. Devices of this sort as exemplified by Karmazin Patent No. 1,761,396 afford a simple and convenient arrangement for converting an ordinary open system to one which is sealed for operation under a predetermined internal pressure, generated upon thermal expansion of the cooling medium in the liquid circulating system. As ordinarily designed for present day cooling systems the pressure regulating valve blows off automatically at three or four pounds pressure to prevent bursting of the radiator assembly and leakage through the hose connections and such internal pressures are equivalent to raising the boiling point of water approximately fifteen degrees. Consequently, increased cooling efficiency and conservation of the liquid are had. An additional valve may be incorporated in the assembly for the relief of subatmospheric pressure incident to contraction of the cooling system contents.

As heretofore constructed it has been deemed necessary to connect the detachable closure cap to the spout by screw threads to guard against quick removal of the cap assembly when internal pressures are present. With sudden uncapping the hot liquid under pressure will gush out of the system and injury by scalding or otherwise is likely, but by slowly turning the cap through a large number of revolutions the assembly is raised and the dependent valve cage is lifted from its seat on the spout to unseal the system and relieve pressure through the overflow pipe prior to complete removal of the cap. To eliminate expensive threading operations in manufacture and the slow tedious turning of the cap through several revolutions in both its application and removal during use is one of the objects of the present invention.

More particularly, it is proposed to employ a bayonet type connection for application and removal of the cap by only a partial rotation, with camming abutments to lower and raise the valve cage as the cap is turned, there being a special cam profile whereby an intermediate station or stop is provided to arrest movement and locate the parts in a safety position in which the cage is unseated for the full relief of internal pressure prior to complete removal of the cap assembly.

The invention will be best understood upon reference to the accompanying drawing wherein Figure 1 is a side elevation showing a fragment of an engine and the radiator assembly of the engine cooling system; Figure 2 is a vertical sectional view of the radiator filler device; Figure 3 is a view showing a development of the cam profile; Figure 4 is a top plan view of the filler spout with the cap removed; Figure 5 shows a filler spout in side elevation and illustrates the application of the cam development shown in Figure 3, and Figure 6 is a detail perspective view showing the cam abutment on the removable cap.

Referring to the drawing, the engine 1 has the outlet from its cooling jacket connected by the hose 2 with the inlet header 3 of the radiator assembly, the outlet header 4 being connected by a hose 5 with the suction side of an engine driven pump 6 which forces water through the cooling jacket. The pump shaft is driven by a belt 7 from the engine crankshaft and also mounts the fan 8 which upon engine operation draws air through the radiator core 9 connecting the top and bottom tanks 3 and 4, for the extraction of heat from the cooling liquid flowing through the radiator. The construction as described constitutes the conventional cooling system.

The filling spout, which is located under the hood of the car, is associated with a rearward extension 10 at the top of the upper tank and consists essentially of a tube 11 fitted and soldered within an annular flange 12 defining an opening in the upper wall of the tank extension 10. At its upper end the tube is reversely folded to form an outturned flange 13 and a dependent skirt 14, the lower edge of which constitutes a camming abutment for a retainer boss or offset 15 on the cylindrical wall of the pressed metal cap 16. The cap 16 has secured thereto by a rivet 17 or the like, a valve cage to extend downwardly into the filler spout and which for convenience may include a domed cup-shaped stamping 18 and a cylindrical shell 19 fitted thereto. The domed portion of the stamping 18 has an inwardly shoulder offset 20 in which is located loosely a gasket 21, a spring metal backing plate 22 and a gasket ring 23. The gasket 23 provides a seal between the cap and the central portion of the spring plate 22 and the gasket 21 provides a seal between the periphery of the spring plate and the flange or seat 13 at the top of the spout. The shouldered offset 20 also affords a seat for one end of a coil spring 24 located interiorly of the cage and active on a backing plate 25 for a sealing washer 26 which bears against the inturned or curled edge 27 at the bottom of the shell 19. This curled portion 27 of the cage in the closed

position of the cap seats on a sealing gasket ring 28 resting on the internal flange 29 at the lower end of the spout 11. Indented lugs 30 on the spout serve to hold the sealing ring in place. Centrally of the seal 26 and backing plate 25 is an aperture or opening normally closed by a plate valve 31 which is suspended and held in position by a light spring 32 mounted on a bridge 33 carried by the plate 25.

With the parts positioned as shown in Figure 2 the interior of the spout is sealed at the top by the gaskets 21 and 23 and at the bottom is sealed from the cooling system by reason of the valve cage bearing on the sealing ring 28, the interior of the cage being closed by the spring pressed valves 26 and 31. The valve 26 will be held on its seat unless internal pressure exceeds the preselected force of the coil spring 24 in which case the valve opens outwardly. Excess pressure internally of the system is relieved from the interior of the cage through openings 34, or the like leading into the spout which in turn has extending laterally therefrom an overflow vent pipe 35 which is of sufficient length to project down the side of the radiator assembly for discharge at a low point removed from the filler spout. The valve 31 opens in the reverse direction for communicating the interior of the system with the vent to prevent subatmospheric pressures within the system.

Outward movement of the cage with the cap upon cap detachment breaks the seal between the curled bottom portion 27 of the cage and the gasket 28 to communicate the system with atmosphere through the overflow pipe 35. However, until the cap is completely removed the seal afforded by the gaskets 21 and 23 remains effective, by reason of the resiliency of the disc 22, to prevent venting of the spout around the edges of the cap. This inward and outward movement of the assembly upon cap rotation is had by reason of the inclined ramps formed on the lower edge of the skirt 14 and engaged by the diametrically oppositely disposed inwardly depressed lugs 15 on the cap.

As best seen in Figure 3 each camming edge terminates at one limit at the entrance groove 36 and at the other end in a final seating position defined by the downwardly projecting shoulder 37. Between the opposite limits the bottom edge of the skirt 14 is formed with an inclined ramp on which rides the abutment lug 15 for raising or lowering the cap assembly in its rotation. This cam according to the present invention, is of stepped formation to provide a ratchet or stop 38 at some convenient point between the opposite limits of the ramp. As will be obvious the lug 15 rides down the ramp without any interference from the stop 38 so that the application of the cap may be readily and quickly made. However, on reverse rotation of the cap, the lug 15 moves away from the shoulder 37 and upwards on the cam until its movement is arrested by engagement with the stop 38. In this upward movement of the assembly the seal between the cage and the spout is broken for the relief of internal pressure and before complete removal of the cap can be effected the assembly must be pressed downwardly to enable the lug 15 to clear the stop 38. The stop serves to resist continued riding out of the lug on the cam under internal pressure and the accidental blowing off of the cap. It also interferes with the free outward movement under manual effort and gives a warning that the cap should be left undisturbed until pressure is completely relieved. A further warning in this respect will be given by the noise of pressure fluid passing out the overflow.

I claim:

A valved closure device of the character described including an attaching cap for removable mounting on a filler spout, a valve enclosing cage having a lower cylindrical part to seat on the spout and to seat a valve and an upper cupped part in sleeved relation to the cylindrical part, said upper cupped part having a centrally domed portion directly riveted to the cap and provided with an inward offset cooperating with the cap in affording an annular retaining recess, a spout sealing diaphragm loosely fitted in and retained by said recess, a spring ring bearing at its periphery on said diaphragm and a sealing ring interposed between the cap and the central margin of the spring ring.

RALPH S. FRANTZ.