

12 **EUROPEAN PATENT APPLICATION**

21 Application number: 83303216.2

51 Int. Cl.³: **F 01 P 11/02**

22 Date of filing: 03.06.83

30 Priority: 22.06.82 GB 8217975

43 Date of publication of application:
04.01.84 Bulletin 84/1

84 Designated Contracting States:
DE FR GB IT

71 Applicant: Unipart Group Limited
Unipart House Garsington Road
Cowley Oxford OX4 2PG(GB)

72 Inventor: Price, Henry Clifford Rees
Penylon Llanfynydd Road
Carmarthen Dyfed(GB)

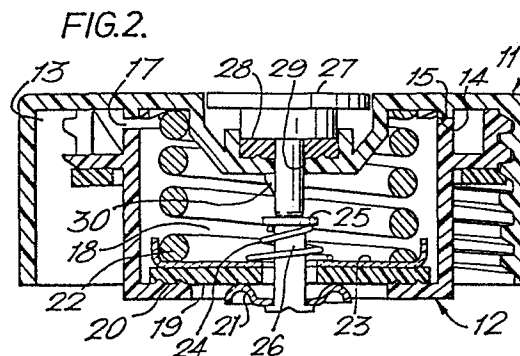
72 Inventor: Lardner, Graham Gerald
115 Hill Top Swiss Valley
Llanelli Dyfed(GB)

74 Representative: Waters, Jeffrey et al,
ARG Patent Department Cowley Body Plant
Cowley Oxford OX4 5NL(GB)

54 **Pressure cap.**

57 A pressure cap for a vehicle cooling system consists of a cap member 11 and a container member 12 which is secured to the cap member 11 and which carries over and under-pressure relief valves. The cap is threaded to a filler neck on a radiator or on an expansion tank and seals against it by means of an annular seal. When the cooling system is over-pressurised, seal 19 lifts off seal 20 against coil spring 22 and air escapes to the atmosphere via chamber 18, cut-outs 17 and lobes 13. When the cooling system is under-pressurised, vent valve 21 is sucked inwards away from seal 19 and against conical spring 24. Accordingly one seal is used for both the pressure and vacuum relief springs 22, 24.

A vent button 27 is provided to enable the vehicle user to manually open the seal 19 to equalise the cooling system pressure with atmospheric pressure, prior to removal of the pressure cap.



PRESSURE CAP

This invention relates to pressure caps, and particularly to pressure caps for use with vehicle cooling systems.

It is normal practise for vehicles incorporating liquid-cooled internal combustion engines to employ a pressure cap which is usually located on a filler neck either on the radiator or on an expansion tank. Such pressure caps commonly employ pressure relief valves which permit the passage of fluid, for example air or water vapour, when the pressure exceeds a given under- or a given over-
10 pressure. In this way, the cooling system is maintained in a sealed condition while the system pressure is within its normal limits.

Further, it is known to include in the cap means for venting the under- or over-pressure in the systems. One
15 known means employs a twist action cam which acts on the over-pressure valve to lift it clear of its seat, thus breaking the seal. Because of the typical strength of springs employed in such over-pressure valves, the means provided for venting the system has necessarily been quite
20 complex and massive, and has moreover required substantial operating force. Another proposal (UK Patent Number 1 034 986) has a vent member which co-operates with a catch to retain the vent member in a depressed position and a vent valve open when the vent member is depressed.

The invention provides a pressure cap for use with a vehicle cooling system which pressure cap includes a vent member which can be manually depressed to open a valve in the cap to bring the system pressure to atmospheric pressure characterised in that an elastomeric or rubber washer surrounds the stem of the vent member, which washer seals against the stem to prevent the escape of gas or vapour to the region of the vent member, and is compressed on depression of the vent member tending to return the vent member to its starting position.

The elastomeric or rubber washer performs the dual function of eliminating the possibility of water vapour or air escaping around the stem of the vent member onto the hand of the user and of providing a restoring force for returning the vent member to its starting position. The invention avoids the inconvenience of the prior proposal (UK Patent Number 1 034 986) where the cap has to be removed each time the vent member is operated in order to re-set it. It may be desirable to operate the vent member by depressing it briefly several times in succession and this would not be possible with the prior proposal.

Advantageously, the valve is an under-pressure valve which opens when the system exceeds a given under-pressure.

Preferably, the seal member of the under-pressure valve is also the seal member of an over-pressure valve which opens when the system pressure exceeds a given over-pressure.

- 5 An embodiment of the invention will be described by way of example and with reference to the accompanying drawings, in which:

Figure 1 is a plan view of a pressure cap in accordance with the invention; and

- 10 Figure 2 is a cross section taken on the line II-II of Figure 1; and

Figure 3 is a side view of the cap member.

- The drawings show a pressure cap for use on the coolant radiator or the coolant expansion tank of a motor vehicle,
15 constructed in accordance with the invention. The cap is made largely out of plastics, and consists of a cap member 11, a container member 12, and a number of components concerned with sealing the cap assembly to a filler neck (not shown) and with breaking the seal when the under-
20 or over-pressures within the seal system exceed predetermined values.

The cap member 11 is screw threaded internally to engage with a corresponding external thread on the filler neck. The cap member has four lobes 13 whose external shape enables the cap to be more readily gripped, and whose
5 internal shape constitutes a break in the screw thread to permit flow of gas or vapour through the cap in circumstances to be described hereinafter. Container member 12 has an external thread similar to that of the filler neck and which likewise engages the internal
10 thread of the pressure cap 11. The thread on the container member 12 is broken at points corresponding to the positions of the lobes 13 to permit a continuation of the internal passages defined by the lobes. The container member is assembled to the cap member by screwing
15 it into the cap until an annular surface 14 on the container member engages a corresponding annular surface 15 on the cap member. Surfaces 14 and 15 each have complementary sloped teeth 16 which permit the container to be screwed into the cap member but prevent dissassembly, thus
20 providing a totally mechanical joining of the components.

The annular surface 14 on the cap is interrupted at intervals by cut-outs 17 at locations corresponding to the breaks in the screw thread, to permit communication with the interior of the chamber 18 defined by the cap
25 and container. Communication between the chamber 18 and

the interior of the filler neck is normally prevented by a seal member 19. Seal member 19 constitutes a common seal member for both a valve having a seat 20 for the relief of over-pressure in the filler neck and a vent valve 21 for permitting the inflow of air to the filler neck in the event of an excessive under-pressure in the cooling system. In its role as an over-pressure valve, the common seal 19 lifts off the valve seat 20 against the action of a coil spring 22 acting on a spring plate 23. Vent valve 21 is biased into its closed position by a conical compression spring 24 which acts between spring plate 23 and a flange 25 on a rivet 26 which retains the vent valve 21.

A vent button 27 is located in a recess in the upper surface of the cap member 11. The vent button is biased upwardly by an elastomeric washer 28 which also constitutes a seal against the escape of gas or vapour attempting to pass through a hole 29 in the cap through which the vent button extends. The vent button is retained in place by a projection 30 from the shaft of the vent button, which projection is resiliently biased radially outwardly of the shaft and which is so shaped that upon assembly of the button to the cap it automatically retracts into the shaft until it has passed through the hole 29, at which point it springs outwardly to prevent disassembly of the button from the cap.

In use of the cap, the spring forces are arranged to ensure that the cap maintains a suitable seal on the filler neck over a pre-determined range of working pressures of the cooling system. Prior to removing the cap at any given
5 time it is desirable to ensure that the pressure in the filler neck is the same as atmospheric pressure to ensure that there will be no uncontrolled release of hot vapour and coolant liquid. The cooling system may be vented by the illustrated cap by depressing the vent button 27. This
10 unseats the vent valve 21 communicating the interior of the filler neck with the chamber 18 and thus by way of the lobes 13 to atmosphere. Any escaping vapour or liquid is thus deflected downwardly through the lobes away from the users hand which need only be in contact with the vent button.
15 Owing to the relatively small size of the vent valve it is readily possible for the user to lift it from its seat against any over-pressure in the filler neck.

It will be appreciated that there has been described and illustrated a pressure cap which is simple, and therefore
20 cheap, to produce, and which provides a readily usable means for venting the cooling system prior to removal of the pressure cap. The use of a common seal member reduces the number of components present and simplifies assembly.

It will be appreciated however, that numerous modifications to the illustrated cap are possible within the scope of the invention. For example, the vent button could be replaced by other suitable external means which are operable on
5 the vacuum relief valve of the cap to vent the cooling system. For example the cap could be provided with a deformable top which could be pressed inwardly to engage the rivet 26 and displace the vent valve.

Moreover, while the container member 12 effects a multiple
10 role in so far as it acts as a housing for the components of the cap, as a seat for the over-pressure relief valve, and as a seat for the seal onto the filler neck, it need not provide all of these functions to gain benefit from its mode of retention by the screw threads of the cap
15 member 11, and by its mechanical retention against disassembly.

CLAIMS

- 1 A pressure cap for use with a vehicle cooling system
which pressure cap includes a vent member (27) which
can be manually depressed to open a valve (21) in the
cap to bring the system pressure to atmospheric pressure
5 characterised in that an elastomeric or rubber washer
(28) surrounds the stem of the vent member, which
washer (28) seals against the stem to prevent the
escape of gas or vapour to the region of the vent
member (27), and is compressed on depression of the
10 vent member tending to return the vent member to its
starting position.
- 2 A pressure cap according to claim 1, characterised in
that the valve (21) is an under-pressure valve which
opens when the system exceeds a given under-pressure.
- 15 3 A pressure cap according to claim 2, characterised in
that the seal member (19) of the under-pressure valve
(21) is also the seal member of an over-pressure
valve (20) which opens when the system pressure exceeds
a given over-pressure.

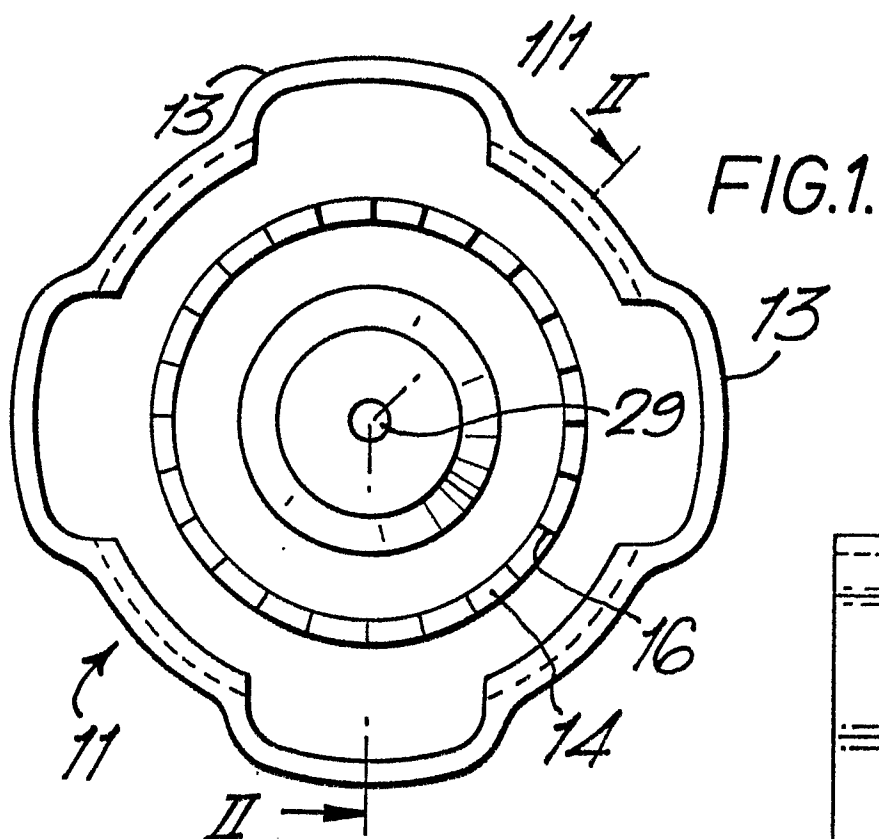


FIG. 3.

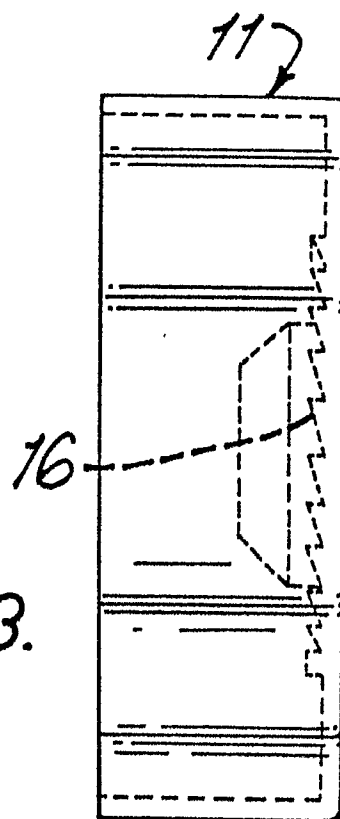
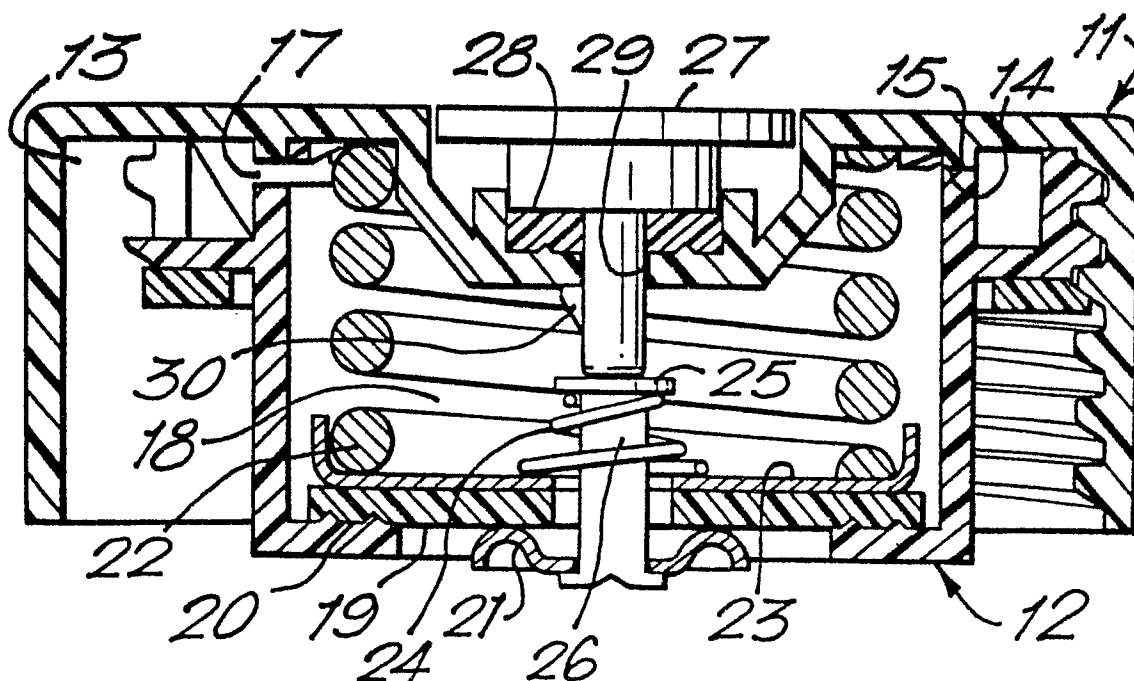


FIG. 2.





DOCUMENTS CONSIDERED TO BE RELEVANT			EP 83303216.2
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
X	US - A - 3 830 398 (SHANKLIN) * Totality; especially column 3, line 62 - column 4, line 2 *	1-3	F 01 P 11/02
	--		
X	US - A - 3 111 239 (IVINS) * Totality; especially column 3, line 51 - column 4, line 15 *	1-3	
	--		
X	US - A - 3 086 677 (KONCHAN) * Totality *	1-3	
	--		
D,A	GB - A - 1 034 986 (THE DOLE VALVE COMPANY) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
			F 01 P 11/00
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 24-08-1983	Examiner PIPPAN
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	