EUROPEAN PATENT SPECIFICATION

EXPANSION TANK FOR THE COOLING SYSTEM OF AN INTERNAL COMBUSTION ENGINE
EXPANSIONSTANK FÜR EIN KÜHLSYSTEM EINER BRENNKRAFTMASCHINE
RESERVOIR D'EXPANSION POUR UN SYSTEME DE REFROIDISSEMENT D'UN MOTEUR A COMBUSTION INTERNE

Designated Contracting States: DE FR GB

Priority: 20.09.1991 SE 9102716

Date of publication of application: 06.07.1994 Bulletin 1994/27

Proprietor: AB VOLVO S-405 08 Göteborg (SE)

Inventor: THEORELL, Gunnar S-443 30 Lerum (SE)

Representative: Hammond, Andrew David et al Albihn West AB, P.O. Box 142 S-401 22 Göteborg (SE)

References cited:
DE-A- 3 517 715
DE-A- 3 533 095

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).
Description

TECHNICAL FIELD:

The present invention relates to a combined storage tank and expansion tank arrangement for a water-cooled internal combustion engine cooling system, whereby the storage tank which is provided with a filler opening and the expansion tank are housed in a common container tank made from two moulded plastic parts, with the storage tank and expansion tank internally connected via a vertically disposed overflow channel.

BACKGROUND OF THE INVENTION:

The above-described cooling system with a storage tank for the cooling liquid and a separate expansion tank for the expansion of the liquid during warming-up is used for example on heavier trucks and buses where very high functional safety requirements are imposed.

Where the available height is restricted, it has been usual to use separate tanks which are mounted by brackets and connected together by means of tubes and tube clamps. This implies that a relatively large number of components have to be stored and assembled during the production of a vehicle. Since it is desirable to reduce the number of assembly components, combined storage tanks and expansion tanks forming a common container tank are now becoming available. This rationalization is most effective if the container tank is made from two injection-moulded plastic halves which are welded together to form a finished unit with all necessary functions integrated within the two halves.

Such a container tank is shown in DE OS 35 33 095, whereby the storage tank and the expansion tank are connected via a centrally located overflow channel. A disadvantage with this arrangement, i.e. that leakage can arise between the two chambers, has been solved by the provision of a double walled partition wall between the two chambers, whereby infiltration is indicated by leakage of liquid through overflow holes in the double walled cavity.

TECHNICAL PROBLEM:

An object of the present invention is thus to provide a container tank for cooling liquid with minimal installation dimensions, with which the cooling system can be tested in a more reliable manner using pressurized air.

SOLUTION:

This object is achieved according to the invention by means of the overflow channel being integral with and connected to the filler opening of the storage tank. By means of this arrangement a hermetical test can be easily performed after affixing a test instrument in the filler opening instead of to the filler cap. In this manner the cooling system can be pressure-tested with the exclusion of the expansion tank. Thereafter the connection to the expansion tank can be opened and the entire system can then be pressure-tested.

Advantageous embodiments to the invention will be apparent from the dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS:

An embodiment of the invention will now be described in more detail with reference to the attached drawings, in which:

Fig. 1 is a side view of a container tank according to the invention with a partially sectioned wall,

Fig. 2 is a corresponding end view of the container tank,

Fig. 3, 4 show in broken plan views the interior of the cover and base of the container tank.

BEST MODE OF CARRYING OUT THE INVENTION:

The container tank shown in the drawings is assembled from two tank halves 10, 11 with the joint line 12 extending in a horizontal plane. The two halves 10, 11 are suitably made by injection-moulding of a propene plastic and are joined together by heat welding.

The container tank is provided with moulded brackets 13 for direct mounting in the engine compartment of a vehicle and includes two separate chambers, each having an opening 14 and 15. The one chamber 16 forms the storage tank for the cooling liquid in the cooling system and is connected to the not shown cooling system via a base outlet 17 and two breather pipes 18. The other chamber 19 forms an expansion tank for the storage tank 16 and is connected thereto via an overflow channel 20 which extends between the upper portion of the storage tank 16 and the lower portion of the expansion tank 19.

As best shown in Figs. 1 and 2, the overflow channel 20 is in the form of a flattened pipe 22 which extends between an opening 21 in the throat of the filler opening 15 of the storage tank 16 down to an opening 23 which is located below the level of the bottom of the tank in a narrow trough compartment 24. The compartment 24 extends upwardly into the container tank between two side walls 25 which, together with the tube 22 and a transverse wall 26, form the partition wall between the storage tank 16 and the expansion tank 19. Further inner longitudinal and transverse walls 27 in the storage tank 16 and the expansion tank 19 serve as anti-surge walls and reinforcement.

When the container tank is functionally connected to the cooling system, the above described overflow channel will then serve as an evacuation path for air from the storage tank to the expansion tank 19. For this purpose the opening 14 to the expansion tank is provided with a special cap which is not shown in the drawings but
is well known to the skilled man. Such a cap serves as a back valve, i.e., it prevents reduced pressure from arising within the expansion tank 19 by admitting atmospheric air from outside via a valve passage 28. At the same time the cap prevents air from being evacuated from the container tank except when in an extreme situation the pressure exceeds a predetermined level.

When the temperature in the cooling system rises the volume of the cooling liquid will expand which results in a compression of the air in the expansion tank 19. This compression normally continues until the storage tank 16 is totally emptied of air. This is possible by placing the opening 21 to the overflow channel 20 at a high location in the throat of the filler opening 15. With further heating from the motor, the cooling liquid and air is forced from the storage tank to the expansion tank via the overflow channel 20.

When the temperature in the cooling system drops once again, the volume of the cooling water will reduce. When the pressure drops the cooling liquid in the expansion tank 19 will be drawn/pushed back to the storage tank 16 by means of a siphoning effect via the overflow channel 20. Since the overflow channel 20 opens into a narrow trough at the base of the container tank, the quantity of cooling liquid which cannot be transferred back to the storage tank 16 will be very little. This means that the cooling liquid in the system is utilized to the full.

A hermetical test of the entire cooling system can easily be performed after affixing a test instrument in the filler opening 15 instead of to the filler cap. The test instrument is suitably so shaped that it sealingly abuts both the opening 15 and the opening 21. In this manner the cooling system can be pressure-tested independently of the expansion tank 19. Thereafter a connection to the expansion tank via the opening 21 can be opened and the entire system can then be pressure-tested. If during the first pressure testing the cooling system can withstand a considerably higher pressure than the maximum pressure for the expansion tank, it can be concluded that there is no leakage between the storage tank and the expansion tank. It is therefore very simple to perform a functional test even if the container tank has become opaque due to dirt and aging.

Although a specific embodiment to the invention has been shown in the drawings it is to be understood that further alternatives and modifications are possible within the scope of the claims.

**Claims**

1. Combined storage tank (16) and expansion tank (19) arrangement for a water-cooled internal combustion engine cooling system, whereby the storage tank (16) which is provided with a filler opening (15) and the expansion tank (19) are housed in a common container tank made from two moulded plastic parts (10, 11), with the storage tank and expansion tank internally connected via a vertically disposed overflow channel (20), characterized in that the overflow channel (20) is integral with and connected to the filler opening (15) of the storage tank.

2. Arrangement according to claim 1, characterized in that the filler opening (15) is centrally placed on the container tank.

3. Arrangement according to claim 1 or 2, characterized in that the lower part of the overflow channel opens out into a trough (24) in the lower wall of the container tank.

4. Arrangement according to claim 1 or 2, characterized in that the upper part of the overflow channel (20) opens out at a level above the upper wall of the container tank.

5. Arrangement according to claim 1 or 2, characterized in that the lower part of the overflow channel opens out into a partitioning delimited by two vertical walls (25) which extend upwardly on either side of the trough (24).

6. Arrangement according to claim 1 or 2, characterized in that the filler opening (15) is formed with an upper primary sealing surface and a secondary sealing surface arranged therebelow, against which secondary sealing surface a pressure-testing instrument may be sealingly placed to pressure-test the storage tank and other parts of the cooling system with the exception of the expansion tank.

**Patentansprüche**


2. Anordnung nach Anspruch 1, dadurch gekennzeichnet, daß die Füllöffnung (15) mittig auf dem Tankbehälter angeordnet ist.

3. Anordnung nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß der untere Abschnitt des Über-
strömkanals in einer Wanne (24) in der unteren Wand des Tankbehälters mündet.

4. Anordnung nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß der obere Abschnitt des Überströmkanals (20) nach außen in einer Höhe oberhalb der oberen Wand des Tankbehälters mündet.

5. Anordnung nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß der untere Abschnitt des Überströmkanals in eine Trennschnitt mündet, der von zwei vertikalen Wänden (25) begrenzt ist, welche sich an jeder Seite der Wanne (24) nach oben erstrecken.

6. Anordnung nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die Füllöffnung (15) mit einer oberen Primärdichtfläche und einer darunter angeordneten Sekundärdichtfläche gebildet ist, wobei gegen die Sekundärdichtfläche ein Druckprüfinstrument für das Drucktesten des Vorratstanks und anderer Abschnitte des Kühl systems mit Ausnahme des Expansionstanks dichtend plazierbar ist.

Revendications

1. Ensemble combiné formant réservoir de stockage (16) et réservoir de dilatation (19) pour circuit de refroidissement d'un moteur à combustion interne refroidi par circulation d'eau, dans lequel le réservoir de stockage (16) qui comporte une ouverture de remplissage (15) et le réservoir de dilatation (19) sont logés dans un récipient commun formé de deux parties de matière plastique moulée (10, 11), le réservoir de stockage et le réservoir de dilatation étant raccordés intérieurement par un canal de débordement (20) qui est disposé verticalement, caractérisé en ce que le canal de débordement (20) est solidaire de l'ouverture (15) de remplissage du réservoir de stockage et est raccordé à cette ouverture.

2. Ensemble selon la revendication 1, caractérisé en ce que l'ouverture de remplissage (15) est placée au centre sur le récipient.

3. Ensemble selon la revendication 1 ou 2, caractérisé en ce que la partie inférieure du canal de débordement débouche dans une cloison délimitée par deux parois verticales (25) qui dépassent vers le haut de part et d'autre de la rigole (24).

4. Ensemble selon la revendication 1 ou 2, caractérisé en ce que la partie supérieure du canal de débordement (20) débouche à un niveau supérieur à celui de la paroi supérieure du récipient.

5. Ensemble selon la revendication 1 ou 2, caractérisé en ce que la partie inférieure du canal de débordement débouche dans une cloison délimitée par deux parois verticales (25) qui dépassent vers le haut de part et d'autre de la rigole (24).