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D E C I S I O N
of 5 December 2000

Case Number: T 0449/99 - 3.2.1

Application Number: 93901424.7

Publication Number: 0616574

IPC: B60K 15/035

Language of the proceedings: EN

Title of invention:
A vent device for a fuel supply pipe

Patentee:
AB VOLVO

Opponent:
Mannesmann VDO AG

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
"Novelty (yes)
"Inventive step (yes)"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0449/99 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 5 December 2000

Appellant: (Opponent)
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Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office posted 22 March 1999 concerning maintenance of European patent No. 0 616 574 in amended form.**

Composition of the Board:

Chairman: F. A. Gumbel
Members: J. Osborne
J. H. van Moer

Summary of Facts and Submissions

I. The opponent's appeal is against the interlocutory decision of the Opposition Division that the patent No. 0 616 574 when amended according to an auxiliary request, and the invention to which it related, satisfied the requirements of the EPC.

II. The patent had been opposed on the grounds that the subject-matter of the claims lacked novelty and/or inventive step (Article 100(a) EPC) and that the patent failed to disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Article 100(b) EPC). The following evidence was taken into account during the opposition proceedings:

D1: DE-A-2 254 892

D2: EP-B-0 223 931

D3: US-A-4 700 864

D4: US-A-4 759 458

D5: DE-C-1 243 591

D6: GB-A-2 233 636

D7: DE-C-1 175 097

D8: DE-C-28 29 489.

III. The decision of the Opposition Division was posted on 22 March 1999. Notice of appeal together with payment of the appeal fee was received on 26 April 1999 and the reasons for appeal were received on 13 July 1999. Only the grounds according to Article 100(a) EPC were pursued during the appeal procedure.

IV. In an oral proceedings held on 5 December 2000 the appellant requested that the decision of the Opposition Division be set aside and that the patent be revoked in its entirety. The respondent requested that the appeal be dismissed and that the patent be maintained in amended form according to the auxiliary request which had been found by the Opposition Division to be allowable.

V. The patent as amended according to the respondent's request contains, in addition to Claim 1, dependent Claims 2 to 4 which relate to preferred embodiments of the subject-matter of Claim 1.

Claim 1 reads as follows, whereby the amendment made during opposition to the claim as granted (and originally filed) is indicated in bold text:

"Vent arrangement for fuel filler pipes (11) in motor vehicles, which arrangement comprises a vent passage (12) between a fuel tank's (10) upper part and the upper part of the fuel filler pipe (11), which passage comprises a chamber (16), the volume of which exceeds the fuel volume which can be forced upwards in the passage during filling, whereby the chamber (16) is formed as a widening of the passage (12) and the passage beneath the chamber forms a combined riser and vent tube (12a) in relation to the fuel tank (10),

whereby the passage above the chamber forms a vent tube (12b), characterized in that the combined riser and vent tube (12a) has its orifice a small way inside the chamber (16) and in that said tube presents a drainage hole (18) proximate the inside of the chamber wall, **said drainage hole (18) being arranged for allowing return of fuel which has collected in the chamber (16) between the part of the riser and vent tube (12a) which projects inwardly into the chamber (16) and the inside of the chamber (16)**".

VI. The arguments of the appellant (opponent) can be summarised as follows:

D6 discloses a vent arrangement as defined in the preamble of Claim 1 of the patent-in-suit. Although the figures of D6 appear not to be accurate, Figure 2 shows that the inlet pipe portion of the vent tube extends beyond the base and into the chamber. This is not shown by Figure 5 but the skilled person would appreciate the need for the inlet pipe portion to extend above the base as shown in Figure 2 and therefore also that a hole must be provided to allow fuel collected in the chamber to drain back to the tank. The subject-matter of Claim 1 of the patent-in-suit therefore lacks novelty compared with D6.

In the alternative, D6 discloses only the features of the preamble of Claim 1 together with the feature that the inlet pipe portion extends a small way into the chamber. The vent passage of the patent-in-suit serves not only to allow fuel vapour to escape from the tank during filling but also to permit air to flow towards the tank during emptying. D5 discloses a fuel filler arrangement in which no separate vent pipe is provided

but in which the chamber arranged near the filler pipe opening has holes which perform the same function of allowing flow towards the tank. The skilled person therefore would combine D6 with D5 and thereby arrive at the subject-matter of Claim 1 of the patent-in-suit.

In an alternative approach D3 is the closest prior art and discloses all features of the preamble of Claim 1 of the patent-in-suit. The skilled person would recognise that the hydraulic valve arrangement in the overflow would be necessary also in the vent chamber to ensure its correct functioning, thereby arriving at the subject-matter of Claim 1 of the patent-in-suit.

VII. The respondent (patent proprietor) argued in respect of novelty that Figure 5 of D6 does not show the top of the inlet pipe extending above the base of the chamber.

In respect of inventive step the respondent essentially argued that the problem to be solved arises from liquid being trapped in a vent passage having its lowest point situated between the tank and the filler opening. Vapour escaping from the tank during filling forces the trapped liquid through the riser and vent tube, resulting in the need to separate the liquid from the vapour in order to avoid premature cut-off of a fuel filling nozzle. This is achieved by allowing the liquid to separate from the vapour and to collect in the chamber, below the orifice of the riser and vent tube. In the arrangement according to D5 there is no separate vent tube and the fuel filler pipe orifice, through which venting takes place, is outside of the chamber.

Reasons for the Decision

1. The appeal is admissible.

2. *Interpretation of Claim 1*

2.1 Claim 1 requires that the volume of the chamber "exceeds the fuel volume which can be forced upwards in the passage during filling." This is a feature already known from the prior art (D1, D3 and D6) and is an essential feature if liquid fuel trapped in the riser and vent tube 12a is not to be forced beyond the chamber into the vent tube 12b. As the result of the greater cross-section of the widened chamber in comparison with the riser and vent tube 12a the vapour would be able to bubble through the liquid. This is clearly derivable from the drawings and description in D3. However, the question arises whether the location of the orifice of the riser and vent tube "a small way" (Claim 1 of the patent-in-suit) into the chamber is also of relevance in respect of the separation of liquid and vapour in the chamber.

2.2 According to confirmed case law of the Boards of Appeal at the EPO the claims of a patent-in-suit are to be interpreted in the light of the description, according to which the problem is to arrive at a vent arrangement which can be used in modern car construction and which avoids difficulties with premature cut-off of a fuel filling nozzle (column 2, lines 13 to 16). According to the original application and the patent as granted this same problem was solved by adding the features of the combined riser and vent tube having its orifice a small way inside the chamber and having a drainage hole proximate the inside of the chamber wall (see the published application page 2, line 29 to page 3, line 2). The feature added during opposition, on the

other hand, serves only to clarify the location of the drainage hole and does not influence the separation effect achieved by the claimed features. It follows that, according to the description, the "small way" defined in the claim is relevant to the separation of liquid from vapour.

2.3 Figure 2 of the patent-in-suit shows a situation in which a quantity of fuel is trapped in the chamber beside the upper end of the riser and vent tube. This would represent a situation in which liquid fuel has been expelled from, but has not yet drained back into the riser and vent tube and as a result, vapour would be able to escape from the riser and vent tube unhindered by having to pass through liquid. The Board therefore considers that the "small way" defined in Claim 1 of the patent-in-suit is to be interpreted as being a length such that the volume of the fuel expelled from the riser and vent tube is contained within the chamber below the orifice of the riser and vent tube. This interpretation corresponds to the submissions made by both the appellant and the respondent and is also consistent with the definition in Claim 1 of the patent-in-suit that the volume of the chamber should "exceed" the volume of expelled fuel.

3. *Novelty*

3.1 The Board agrees with the appellant that D6 discloses the features of the preamble of Claim 1 of the patent-in-suit. A vent passage 8 is connected between the upper part of a fuel tank 6 and the upper part of the fuel filler pipe (page 3, lines 4 to 10). A chamber 11 is provided in the vent passage and has a volume which exceeds the volume of fuel which can be forced upwards

in the riser and vent portion 9 of the passage during filling (sentence bridging pages 4, 5). The top portion 12 of the vent passage acts only as a vent tube. The chamber is formed as a widening of the passage since it forms part of the passage and it has a larger cross-section than does the remainder of the passage. The matter of novelty primarily hinges on the interpretation of the disclosure of D6 in respect of the location of the orifice of the riser and vent tube in the chamber, i.e whether the inlet pipe portion 17' extends above the inner surface of the chamber.

3.2 Both upper and lower portions of the chamber are moulded from plastic (page 4, third paragraph) and an outlet pipe portion 17, to which the vent tube connects, is illustrated in Figure 2 in a sectional view as extending only externally of the chamber but no sectional view is given of the inlet pipe portion 17'. The only indication of the construction of the inlet pipe portion 17' states that both the inlet and outlet pipe portions "extend integrally from" the chamber (page 4, second paragraph). Figure 2 is generally a side view on the chamber and shows some hidden detail in dashed lines including a generally rectangular shape immediately above the inlet pipe portion 17'. However, the chamber is mounted onto the filler pipe by a clamp arrangement (page 4, fourth paragraph; Figure 5) which in the view of Figure 2 is closer to the viewing position than is the inlet pipe portion 17'. It therefore cannot be excluded that the rectangular shape represents hidden detail of the clamp arrangement, particularly as the upper left of the rectangular shape appears to include a lip. In Figure 5, which is a cross-section along V-V in Figure 2 and so shows the inner surface of the lower portion of the chamber, a single full line is shown, representing the bore of the inlet pipe portion 17'. Two further concentric lines are dashed and so represent hidden detail. It follows that Figure 5 contains no information to convey to the skilled person that the inlet pipe portion extends into the interior of the chamber.

3.3 According to jurisprudence of the Boards of Appeal the teaching of a document is to be considered as a whole and the impression given by a single figure does not represent the disclosure of the document. The Board therefore is satisfied that, even if the skilled person

were to understand from Figure 2 of D6 that the inlet pipe portion extends into the chamber, the document when taken as a whole does not directly and unambiguously teach that the riser and vent tube has its orifice spaced from the edge of the chamber. In the absence of this feature there can be no implicit disclosure of a drain hole. The characterising features of Claim 1 of the patent-in-suit therefore are not disclosed in D6.

3.4 The other cited documents also fail to disclose all features of Claim 1 of the patent-in-suit, the subject-matter of which, together with that of Claims 2 to 4, therefore is regarded as being novel (Article 54(1), (2) EPC).

4. *Inventive step*

4.1 In the opinion of the Board the closest prior art for consideration of inventive step is that known from D3 and the Board agrees with the parties that this document discloses the features of the preamble of Claim 1 of the patent-in-suit. The subject-matter of Claim 1 of the patent-in-suit therefore differs from that of D3 by the characterising features.

4.2 D3 relates to the problem of venting overpressure in the tank when it is already full of fuel but it describes the operation of the chamber 9 in the vent passage in separating the vapour from the liquid fuel whereby bubbles 20 pass up through the liquid contained in the chamber (column 3, lines 1 to 4; Figure 1). However, the chamber of D3 suffers from the disadvantage that the vapour is forced to escape through the liquid throughout the filling process until

the fuel level rises into the chamber (Figure 3). As discussed under Point 2.3 above, the accommodation of the volume of fuel forced out of the vent passage during filling of the tank below the orifice of the riser and vent tube has the effect of a separation of the liquid from the passage of the vapour and so solves the problem of more effectively preventing premature cut-off of a fuel filling nozzle. The provision of the drainage hole permits the collected fuel to return to the tank such that the collection volume below the orifice is empty when the tank is next filled.

4.3 The arrangement according to D3 includes an expansion chamber 2 intended to allow the level of liquid in the filler pipe to drop after filling and which operates together with a check valve arrangement 16 to 19 located in an expanded portion 13 of a pipe 12. It appears from the drawings that the check valve includes a fitting 19 close to the base of the expanded pipe portion which serves to ensure that a float 18 remains spaced from the connection with the pipe 12 but there is no description of this feature. It follows that there is no clear disclosure that the check valve contains any feature contained in the characterising portion of Claim 1 of the patent-in-suit. The check valve arrangement functions to allow liquid to pass through an inlet pipe 15 into the expanded pipe portion 13 during a first phase of filling (column 2, line 63 to column 3, line 4; Figure 1), to close the inlet pipe during second, third and final phases of filling and whilst the tank is full (column 3, lines 8 to 11; Figures 2 to 5) and to open the inlet pipe again to allow air to flow into the tank during emptying (column 3, lines 42 to 51; Figure 6). Expansion of the fuel when the tank is full results in vapour bubbling

up from the pipe 12 through the expanded pipe portion 13 and escaping to air whilst the check valve remains closed and whilst the chamber 9 is filled with liquid fuel (column 3, lines 30 to 41; Figure 5). However, there is no hint that the check valve serves to reduce splashing caused by the bubbles escaping through the liquid fuel. It follows that there is no hint in the explanation of its function which would lead the skilled person to add any such feature to the chamber 9 in the vent passage.

4.4 D5 relates to a filler arrangement for a tank wherein the filler pipe 2 is connected to the highest point of the tank and has neither a separate vent passage nor a lowest point between the tank and the filler opening. The problem of fuel being trapped in the vent passage therefore does not exist in D5. D5 relates to the need to allow the liquid level in the filler pipe to drop after the tank has been filled (column 1, lines 1 to 8), which is fulfilled in D3 by the expansion chamber 2. In D5 a chamber 4 is provided at the top of the filler pipe, adjacent to the filler opening. The chamber surrounds the filler pipe and communicates with it via a series of holes 5 near the base of the chamber and via a series of smaller holes 6 near the top of the chamber. Upon completion of the filling of the tank the level of liquid may rise to the top of the filler pipe. Subsequent to the fitting of the fuel filler cap 3 the level in the fuel filler pipe can fall due to transfer of liquid through the holes 5 into the chamber 4 together with transfer of vapour from the chamber through the holes 6 into the fuel filler pipe (column 2, lines 39 to 44). Although the drop in the level of the liquid in the filler pipe is permitted by venting from the chamber into the top of the filler

pipe, this is not comparable with the function of the vent passage in the patent-in-suit during emptying of the tank. Emptying of the tank both in the arrangement according to the patent-in-suit and according to D5 involves the introduction of air from outside and the chamber of D5 serves no purpose in this respect. Moreover, since the size of the holes 6 in D5 is such as to prevent fuel from filling the chamber 4 during filling of the tank, it is implicit that the flow through them would be insufficient to cope with the flow of vapour through the vent passage of the patent-in-suit during filling of the tank. The Board is therefore of the opinion that D5 offers no hint to the skilled person to modify the arrangement of D3 in such a way as to arrive at the subject-matter of Claim 1 of the patent-in-suit.

4.5 In the opinion of the Board the chamber according to D6 does not exhibit the same degree of risk of liquid fuel being carried into the vent pipe as does that of D3 because the inlet and outlet pipe portions are offset (Figure 1). Nevertheless, the characterising features of Claim 1 of the patent-in-suit would serve further to reduce the risk because of the substantial elimination of splashing caused by the vapour passing through a layer of liquid in the base of the chamber. The analysis of inventive step set out under Points 4.1 to 4.4 above therefore applies equally to a combination of D6 and D5.

4.6 The other cited documents, which the appellant did not use to attack the inventive step of Claim 1 of the patent-in-suit, are less relevant than those discussed. It follows that the subject-matter of Claim 1 and therefore also of Claims 2 to 4 of the patent-in-suit

is not rendered obvious by the cited prior art and so involves an inventive step (Article 56 EPC).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

S. Fabiani F. Gumbel