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**Datasheet for the decision
of 13 January 2016**

Case Number: T 1318/12 - 3.2.01

Application Number: 99934270.2

Publication Number: 1056624

IPC: B60R21/26

Language of the proceedings: EN

Title of invention:
ADAPTIVE OUTPUT INFLATOR

Patent Proprietor:
Autoliv ASP, Inc.

Opponents:
Mordhorst, Wolfgang
TRW Airbag Systems GmbH

Headword:

Relevant legal provisions:
EPC Art. 100(c), 123(2), 123(3), 84, 54(2), 56
RPBA Art. 13(1)

Keyword:

Amendments - added subject-matter (no)

Claims - clarity (yes)

Novelty - (yes)

Inventive step - (yes)

Late-filed argument - admitted (no)

Decisions cited:

G 0003/14

Catchword:



Beschwerdekammern
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European Patent
Office
D-80298 MUNICH
GERMANY
Tel. +49 (0) 89 2399-0
Fax +49 (0) 89
2399-4465

Case Number: T 1318/12 - 3.2.01

D E C I S I O N
of Technical Board of Appeal 3.2.01
of 13 January 2016

Appellant: Mordhorst, Wolfgang
(Opponent 1) Verdener Strasse 50
28205 Bremen (DE)

Representative: Appelt, Christian W.
Boehmert & Boehmert
Anwaltspartnerschaft mbB
Patentanwälte Rechtsanwälte
Pettenkoferstrasse 20-22
80336 München (DE)

Respondent: Autoliv ASP, Inc.
(Patent Proprietor) 3350 Airport Road
Ogden,
Utah 84405-1563 (US)

Representative: Johnstone, Douglas Ian
Baron Warren Redfern
Cambridge House
100 Cambridge Grove
Hammersmith
London
W6 0LE (GB)

Party as of right: TRW Airbag Systems GmbH
(Opponent 2) Wernher-von-Braun-Strasse 1
84544 Aschau/Inn (DE)

Representative: Prinz & Partner mbB
Patent- und Rechtsanwälte
Rundfunkplatz 2
80335 München (DE)

Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted on
11 April 2012 concerning maintenance of the
European Patent No. 1056624 in amended form.

Composition of the Board:

Chairman G. Pricolo
Members: W. Marx
O. Loizou

Summary of Facts and Submissions

- I. The appeal of opponent 1 (appellant) stems from the interlocutory decision of the Opposition Division posted on 11 April 2012 maintaining European patent No. 1 056 624 in amended form.
- II. In the decision under appeal the Opposition Division considered that the ground for opposition under Article 100(c) EPC did not prejudice the maintenance of the patent, that the amendments made were allowable under Article 84, 123(2) and (3) EPC, and that the claimed subject-matter was novel and inventive having regard to common general knowledge and to the following prior art:

E1: DE 196 20 758 A1

E2: WO 97/34784

E3: US 5 564 743 A1

E5: DE 195 41 584 A1

E6: US 5 582 428 A1

E7: EP 0 787 630 A1.

Additionally the following document:

E15: DE 296 12 781 U1

was mentioned in section "Facts and submissions" as one of the documents cited in opposition proceedings.

III. The notice of appeal was received at the EPO on 11 June 2012 and the appeal fee was paid simultaneously. The statement setting out the grounds of appeal was received at the EPO on 3 August 2012.

IV. Oral proceedings, at the end of which the decision of the Board was announced, took place on 13 January 2016.

The appellant and the party as of right (opponent 2) requested that the decision under appeal be set aside and that the patent be revoked.

The respondent (patent proprietor) requested that the appeal be dismissed and the patent be maintained in the amended form allowed by the Opposition Division.

V. Independent claims 1 and 10 read as follows:

"1. An airbag inflator (10) comprising: a housing (12) having a flattened, disc-shaped circular cylinder form and defining a first chamber (34) which in an at rest state contains a quantity of a first gas generant material (36) ignitable to produce first combustion products, said inflator (10) also including a second chamber (82) which in an at rest state contains a quantity of a second gas generant material (86) ignitable to produce second combustion products, said second chamber (82) including an exit orifice (104) adapted to open to place the second combustion products in fluid communication with the contents of the first chamber (34); a first igniter device (62) operatively associated with the first chamber (34); a second igniter device (90) operatively associated with the second chamber (82), and a single filter assembly (42) for the filtration of inflation products of the first and second chambers (34, 82), characterised in that the second

chamber (82) is housed within the first chamber (34) and an auto-ignition insulator barrier (106) covers the exit orifice (104) and is disposed about the second chamber (82) to avoid auto-ignition of the second gas generant material (86) contained within the second chamber (82) upon thermal contact therewith by the first combustion products."

"10. A method of operating an airbag inflator (10) which includes: a housing (12) having a flattened, disc-shaped circular cylinder form and defining a first chamber (34) which in an at rest state contains a quantity of a first gas generant material (36) ignitable to produce first combustion products, said inflator (10) also including a second chamber (82) which in an at rest state contains a quantity of a second gas generant material (86) ignitable to produce second combustion products, said second chamber (82) including an exit orifice (104) adapted to open to place the second combustion products in fluid communication with the contents of the first chamber (34); a first igniter device (62) operatively associated with the first chamber (34); and a second igniter device (90) operatively associated with the second chamber (82); a single filter assembly (42) for the filtration of inflation products of the first and second chambers (34, 82), characterised in that the second chamber (82) is housed within the first chamber (34) and the method includes the step of preventing auto-ignition of the second gas generant material (86) contained within the second chamber (82) upon thermal contact therewith by the first combustion products by means of an auto-ignition insulator barrier (106) disposed about the second chamber (82) and covering the exit orifice (104)."

VI. The arguments of the appellant and of the party as of right can be summarized as follows (since the appellant and the party as of right agreed on their mutual positions during oral proceedings, for ease of reference the appellant only will be mentioned hereinafter):

Claim 1 included the feature according to which the housing had a "flattened, disk-shaped circular cylinder form". This feature was taken in isolation from a combination of features disclosed in the application as filed for a specific embodiment (not only referring solely to the specific length to diameter ratio). This amounted to an inadmissible intermediate generalization.

The feature according to which the second chamber was "housed within" the first chamber was unclear and did not exclude sharing of one or further side walls (see the embodiment as shown which had one common side wall).

Furthermore, claim 1 was amended to include the feature according to which the auto-ignition barrier was "disposed about the second chamber". The wording of this feature was unclear as it could be interpreted in different ways. Certainly it could not be interpreted in a narrow sense as done by the Opposition Division, allegedly interlinked with the functional requirement of the avoidance of auto-ignition, namely as implying a closed loop for the auto-ignition barrier ("completely surrounding"). A "closed loop" barrier could not prevent an auto-ignition when it was not required that the "closed loop" had a certain height. In any case, there was no support in the application as filed for a closed loop. A correct interpretation of this feature would render the claimed subject-matter not novel or at least not inventive.

Claim 1 as granted recited that the auto-ignition insulator barrier covered the exit orifice to prevent auto-ignition of the second gas generant material by the first combustion products. According to the description of the application as filed (see page 10), the auto-ignition feature was disclosed only in combination with the insulator barrier insulating the wall of the second chamber ("surrounding feature") to avoid heat transfer due to the thermal contact with the reaction products of the first chamber, whereas auto-ignition at the exit orifices - covered by the insulator barrier ("covering feature") - was never disclosed, but claimed according to claim 1 as granted. Although still reciting that the auto-ignition insulator barrier covered the exit orifice, claim 1 as amended no longer required that the covering of the exit orifice had the function of preventing auto-ignition. This resulted in added subject-matter and in an extension of the scope of protection, contrary to the requirements of Articles 123 (2) and (3) EPC.

Moreover, the preamble of granted claim 1 contained the feature according to which "said inflator also includes" a second chamber, while the original claim 1 disclosed only a "first chamber also containing" a second chamber.

The subject-matter of claim 1 was not novel over E1. This document disclosed a lower chamber and an upper chamber separated by an intermediate wall. A first chamber could be identified as a chamber defined by the external walls of the lower and upper chambers, and a second chamber could be identified as the chamber defined by the external walls of the upper chamber and the intermediate wall. Claim 1 in fact did not exclude that one or more sidewalls of the first and second chambers were shared sidewalls. Accordingly, said second chamber was housed within said first chamber. Moreover,

the ring-shaped insulator barrier according to E1 was "disposed about", i.e. disposed "on the outside" and around, the second chamber, leading to an insulation between the first and the second chamber.

In any case, the subject-matter of claim 1 did not involve an inventive step when starting from E1. As regards the feature relating to a second chamber housed within a first chamber, it represented an obvious design possibility for the skilled person, which was moreover disclosed in documents E6 and E7. As regards the feature of the auto-ignition barrier being disposed about the second chamber, it would be obvious for the skilled person to provide an improvement of the insulating effect by reducing the heat transfer from the first chamber to the second chamber. An obvious solution would consist in disposing the insulator barrier all around the second chamber. Moreover, according to the case law of the Boards of Appeal, said feature - not specifying how much of the interface area was covered by the insulator barrier - could not support inventiveness because it did not achieve the alleged effect. Alternatively, claim 1 was not inventive in view of a combination of E1 with E2, E3, E5, E6 or E7.

Starting from E7, which represented an alternative starting point, and which disclosed one chamber of an airbag inflator housed within a second chamber, a circular shield wall separating both chambers, and insulator barriers in the form of burst disks covering the exit orifices of the first and second chambers, the skilled person would obviously consider providing an insulator barrier about the second chamber (i.e. onto the shield wall), as taught by E2 and E3, in order to provide a better thermal insulation thereof and thus reducing the risk of auto-ignition.

E6 also represented an appropriate starting point: it specifically related to a hybrid airbag inflator, but the patent in suit covered all kinds of airbag inflators. The inflator according to E6 was provided with first and second chambers separated by a barrier taking the general form of a dome. Although the known inflator had the shape of a sphere, it would be obvious for the skilled person to modify it such that it had a flattened, disc-shaped circular cylinder form. Such shape was particularly suited for use in a vehicle steering wheel, as generally known and disclosed in particular by E1, E2 and E7. Moreover, the skilled person would also consider it as obvious to provide an insulating barrier around the dome separating the first and second chamber - thereby also covering the exit orifice - in order to provide a better thermal insulation, as taught e.g. by E3, in particular when providing an adaptive inflator with an alternative mechanism for gas generation by burning gas generant material. Alternatively, the dome could be regarded as the auto-ignition insulator barrier, and the barrier shell housing the heating device as defining the second chamber. It would be obvious to provide the barrier shell with an exit orifice to define a specific exit point for the gases.

E5, which represented (see Fig. 2) a further starting point, disclosed an adaptive airbag inflator with first and second chambers used separately or in combination (which implies an auto-ignition barrier), but no exit orifice adapted to open to place the second combustion product in fluid communication with the contents of the first chamber. However, it would be obvious to provide such exit orifice in order to define a specific exit for the second chamber, as in E3, E1 and E2.

Finally, E3 disclosed an airbag inflator including an elongated cylindrical housing divided into two separated chambers by an intermediate wall comprising an insulator barrier to prevent auto-ignition. Analogously to E1, a first chamber could be seen as being formed by the housing, and a second chamber by a portion of the housing and the intermediate wall. With the obvious modification of giving the housing a flattened, disc-shaped form, and of providing the insulation barrier about the second chamber, the skilled person would arrive in an obvious manner at the subject-matter of claim 1.

The above also applied to independent claim 10, which was a method claim reciting features that were analogous to that of claim 1.

The line of argumentation filed with letter of 11 December 2015 by opponent 2 as party of right, according to which the claimed subject-matter was not inventive when starting from E15, should be admitted into the appeal proceedings.

VII. The arguments of the respondent may be summarized as follows:

The feature according to which the housing had a "flattened, disk-shaped circular cylinder form" was taken from a passage in the description of the application as filed reciting that "the housing 12 is illustrated in the general form of a flattened, disc-shaped circular cylinder typically or generally having a length (denominated "L") to diameter (denominated "D") ratio of about 0.5 or less". It was clear from this passage that the feature of the length to diameter ratio

being about 0.5 or less was an optional or preferred arrangement.

As regards the feature that the auto-ignition insulation barrier was "disposed about the second chamber to avoid auto-ignition of the second gas generant material contained within the second chamber upon thermal contact therewith by the first combustion products", it was clearly supported by the disclosure in the description and figures of the application as filed. Moreover, the wording "disposed about" was clear and meant "all around from outside", i.e. "encircling". This feature did not extend the scope of protection as compared to the granted patent, because it was clear from the wording of claim 1 that the function of preventing auto-ignition of the second gas generant material by the first combustion products was also the result of the auto-ignition insulator barrier covering the exit orifice.

As regards novelty, E1 did not disclose the feature of the second chamber housed within the first chamber. Claim 1 required that the volume of the second chamber should be wholly within the volume of the first chamber, not merely within a notional volume of a chamber defined by a complete outer housing of the inflator. Moreover, in the E1 inflator, the auto-ignition insulator barrier which covered the exit orifices of the second chamber was not disposed about (i.e. not around, not encircling) the second chamber. It was in the form of a ring which simply covered part of the intermediate wall which separated the upper (second) chamber from the lower (first) chamber.

In any case, there was no reason for the skilled person, having regard to common general knowledge, to consider modifying the insulating ring of E1 such as to extend about the second chamber, as it completely fulfilled its

function of insulating the chambers from each other by being disposed on the intermediate wall.

Nor was the claimed subject-matter rendered obvious by the available prior art, starting from any of E1, E3, E5, E6, E7.

E1 did not disclose the following features:

- (i) second chamber housed within the first chamber;
- (ii) auto-insulation barrier covering the exit orifice of the second chamber and disposed about the second chamber;
- (iii) the auto-ignition barrier avoids auto-ignition of the second gas generant material contained within the second chamber upon thermal contact therewith by the first combustion products.

E3 showed an inflator not designed for a steering wheel, i.e. not having a flattened disc-shaped circular cylinder form, and did not disclose features (i) and (ii). Figs. 3 and 4 embodiment of E2, and E5 as well, did not disclose at least features (i), (ii) and (iii). In particular, E5 did not disclose a second chamber provided with exit orifices and relied on the destruction of the wall of the second chamber for allowing gas to escape. E6 and E7 did not disclose at least features (ii) and (iii). If the barrier shell housing the heating device in the inflator of E6 was regarded as defining the second chamber, then there was no reason to provide the barrier shell with an exit orifice.

Accordingly, combining any of E2, E3, E5, E6 or E7 with E1 would not result in the inflator of claim 1 or in the method according to claim 10. As compared to E1, E3 was not designed for a steering wheel.

Moreover, the E6 and E7 inflators were hybrid inflators, and as a consequence of their construction, there was no risk that combustion products of the first heating device in the first chamber would auto-ignite pyrotechnic material in the second heating device in the second chamber.

The skilled person would not be led to modify the E7 inflator using the teachings of E2 or E3, or the E6 inflator in the light of the teaching of E3. Starting from document E5, there was no reason to provide exit orifices because the wall of the container was destroyed when activating the igniter.

The line of argumentation filed by opponent 2 as party of right, according to which the claimed subject-matter was not inventive when starting from E15, should not be admitted into the appeal proceedings because it represented a complete new case on inventive step that was filed at a very late stage of the appeal proceedings.

Reasons for the Decision

1. The appeal is admissible.
2. *Added subject-matter (Article 100(c) and Article 123(2) EPC) and clarity of the amendments (Article 84 EPC)*
- 2.1 Feature "*housing having a flattened, disk-shaped circular cylinder form*".

Basis for this feature is found in the passage on page 6, lines 24 to 27, of the application as filed, where it is stated that "*the housing 12 is illustrated in the general form of a flattened, disk-shaped circular cylinder typically or generally having a length (denominated "L") to diameter (denominated "D") ratio of about 0.5 or less.*" Although this passage refers specifically to the embodiment according to Figs. 1 and 2, it is clear for the skilled reader that the shape of the housing is of general application in the context of the patent. This was not disputed. The matter at issue was whether the further features of the housing defined in the passage, namely a ratio L/D of about 0.5 or less are inextricably linked with the particular shape of the housing disclosed. The Board judges that this is not the case, the ratio L/D of about 0.5 or less being explicitly disclosed as a facultative feature by way of the wording "typically or generally" associated thereto in the mentioned passage. Moreover, the Board cannot see that further features of the specific embodiment according to Figs. 1 and 2 had to be included in claim 1. In this respect the appellant only made unsubstantiated allegations by generally referring to further features without specifying them.

- 2.2 Feature "*the second chamber is housed within the first chamber*".

As pointed out by the Board in the annex to the summons to oral proceedings, this feature is not open to an objection of lack of clarity (one was, in fact, raised by the appellant with the statement of grounds of appeal), following the decision G 3/14 of the Enlarged Board of Appeal, as it was already present in claim 1 as granted. However, much discussion was made in this proceedings as regards the meaning of this feature. In this respect the Board notes that, when giving the normal meaning to the terms of the claim, this feature can only be read as meaning that the second chamber is identifiable as a chamber contained within the first chamber. This reading is fully supported by description and figures of the patent in suit, see in particular Fig. 1.

- 2.3 Feature "*auto-ignition insulator barrier (106) covers the exit orifice (104) and is disposed about the second chamber (82) to avoid auto-ignition of the second gas generant material*".

The preamble of claim 1 recites that the second chamber contains a quantity of second gas generant material and that it includes an exit orifice adapted to open to place the second combustion products in fluid communication with the contents of the first chamber. By further defining, in the characterizing portion, that the auto-ignition insulator barrier covers the exit orifice and is disposed about the second chamber to avoid auto-ignition of the second gas generant material, claim 1 makes clear that the function of the auto-ignition insulator barrier is of avoiding auto-ignition of the second gas generant material not only by

preventing heat transfer to the wall of the second chamber, but also by covering the exit orifice, thereby preventing the second combustion products to be placed in fluid communication with the contents of the first chamber. An interpretation of claim 1 allowing for the auto-ignition insulator barrier to avoid auto-ignition of the second gas generant material by merely being disposed about the second chamber and not necessarily by covering the exit orifice is at odds with a fair reading of the claim and also with the description and drawings of the patent in suit. Given this reading of the above-mentioned feature, it ensues that claim 1 cannot be given a meaning going beyond that of, and/or a broader scope of protection than, claim 1 as granted, which defines that the auto-ignition insulator barrier covers the exit orifice to prevent auto-ignition of the second gas generant material by the first combustion products. It is noted that this latter feature of claim 1 as granted was not objected under Article 100(c) EPC and there is thus no reason to question whether this feature has a basis in the application as filed.

As regards the term "disposed about", which was present in granted claim 2 (reciting "*the insulator is disposed about the second chamber*"), and as already pointed out in the annex to the summons to oral proceedings, the Board considers that the issue raised by the appellant is not whether the term per se is unclear but whether it should be given a narrow interpretation (such as disposed completely about, e.g. the insulator forming a loop about the second chamber) or a broad interpretation (such as disposed about "but possibly with some gaps"). Assuming that the term "disposed about" is open to a clarity objection under Article 84 EPC (by it being in a slightly different context than in the combination of claims 1 and 2 as granted), the Board takes the view

that the term, when given its normal meaning, is not unclear, and is equivalent to "disposed around" (cf. the extract of the "Britannica World Language Dictionary" filed during oral proceedings). However, there is no room for interpreting this term as merely requiring the auto-ignition insulator barrier being "outside" the second chamber (according to the extract of the "Britannica World Language Dictionary", when used as a preposition, the term "about" may have the meaning of "*on the outside or on every side of, encircling: walls about the city*"), e.g. just for covering the exit orifice. Such a meaning would be at odds with the clear aim of the auto-ignition insulator barrier to act as a thermal insulator. Claim 1 does not specify further dimensions of the insulator barrier (such as its height), but the Board follows the judgment of the Opposition Division in this respect that the "specific extent of the coverage of the second chamber ... is to be taken in combination with the functional requirement that auto-ignition of the pyrotechnic material contained within the second chamber upon thermal contact therewith by the combustion products formed upon ignition of the pyrotechnic material contained within the first chamber is, in addition, to be avoided".

- 2.4 Feature "said inflator (10) also including a second chamber (82)".

Claim 1 as originally filed specifies "an airbag inflator comprising a housing defining a first chamber ..., said first chamber also containing a second chamber", i.e. the inflator also comprises (or includes) a second chamber. Therefore, apart from a mere formal difference in wording in the second part of this passage, the Board cannot see that claim 1 as granted contains subject-matter which was not originally

disclosed. Moreover, a more specific definition is given by the first characterising feature in claim 1 as granted, according to which "the second chamber (82) is housed within the first chamber (34)", so no unallowable intermediate generalisation can be identified.

2.5 It follows from the above that claim 1 does not introduce subject-matter extending beyond the content of the application as filed (Article 100(c) and Article 123(2) EPC), does not extend the scope of protection (Article 123(3) EPC), and that the amendments made to claim 1 do not introduce a lack of clarity (Article 84 EPC). The same applies for claim 10, which is a method claim defining features analogous to that of product claim 1.

3. *Novelty*

3.1 Using the wording of claim 1 of the patent in suit, document E1 discloses an airbag inflator (see Fig. 1) comprising: a housing (made of upper and lower elements 10 and 30) having a flattened, disc-shaped circular cylinder form and defining a first chamber (lower chamber 62) which in an at rest state contains a quantity of a first gas generant material 64 ignitable to produce first combustion products, said inflator also including a second chamber (upper chamber 61) which in an at rest state contains a quantity of a second gas generant material 63 ignitable to produce second combustion products, said second chamber 61 including an exit orifice 21 adapted to open to place the second combustion products in fluid communication with the contents of the first chamber; a first igniter device 41 operatively associated with the first chamber; a second igniter device 18 operatively associated with the second chamber, and a single filter assembly (within filter

chamber 51) for the filtration of inflation products of the first and second chambers.

- 3.2 The appellant argued that if the first chamber was identified as a chamber occupying the volume of the upper and lower chambers without the intermediate wall 20, then the second chamber being the upper chamber 61 would be housed within said first chamber. The Board does not follow this view. As explained above (point 2.2), the feature of claim 1 according to which the second chamber is housed within the first chamber, can only be read as meaning that the second chamber is identifiable as a chamber contained within the first chamber. What is shown in E1 are two distinct chambers 61, 62 disposed one on top of the other. The interpretation of the appellant is a rather artificial one, as it deprives the feature "chamber" of any functional significance and is simply based on geometrical considerations about what volumes can be identified. What counts is, rather, what chambers containing first and second gas generant materials, respectively, can be identified in the inflator according to Fig. 1 of E1.
- 3.3 E1 further discloses an insulator barrier 22 (see also col. 6, lines 20,21 referring to insulator body), which covers the exit orifice 21. The barrier is ring-shaped and is disposed onto the intermediate wall 20 between the upper and lower chambers 61, 62. It is thus not disposed about the second chamber 61 (cf. also point 2.3 above in respect of the interpretation of the term "disposed about").
- 3.4 Accordingly, the subject-matter of claim 1 is novel over E1 because this document does not disclose at least the following features recited in the preamble of claim 1:

- i) the second chamber is housed within the first chamber;
- ii) the auto-ignition insulator barrier is disposed about the second chamber.

The subject-matter of claim 10 is likewise novel over E1, as features i) and ii) are also included in claim 10.

4. *Inventive step*

4.1 Prior art

4.1.1 Apart from E1, which is discussed above in respect of novelty, also documents E2, E3, E5, E6, E7 were cited in respect of inventive step.

4.1.2 E2 discloses an airbag inflator (see Figs. 3 and 4) comprising: a housing 51 having a flattened, disc-shaped circular cylinder form and defining a first chamber 56 which in an at rest state contains a quantity of a first gas generant material 58 ignitable to produce first combustion products, said inflator also including a second chamber 57 which in an at rest state contains a quantity of a second gas generant material ignitable to produce second combustion products; a first igniter device 59 operatively associated with the first chamber; a second igniter device 60 operatively associated with the second chamber 82.

The airbag inflator according to E2 includes two distinct chambers 56 and 57, which are provided in a ring-shaped housing 51 and are separated from each other by intermediate, radially arranged walls 55. These walls 55 provide an insulation, so that the gas generant materials in the respective chambers can be ignited

independently (see page 7, last paragraph). Accordingly, each chamber occupies a separate circumferential portion of the ring-shaped housing, whereby the second chamber is not housed within the first chamber. Exit orifices 67 are provided in the inner wall 51a of the ring-shaped housing. These exit orifices are closed by a ring 68 that is provided with lids 68a which, when the inflator is activated, may be opened by the pressure of gas generated in the chambers. This ring 68 may be regarded as an auto-ignition barrier, but it is not disposed about the second chamber. Moreover, the function of the exit orifices is to allow the gas generated in any of the chambers 56, 57 to enter the inner centrifugal chamber 73 and then, via pipe 75 and chambers 78, 78a, leave the ignitor through openings 80 (see page 7, 2nd paragraph). The exit orifices 67 are not intended for placing the combustion products of one chamber in fluid communication with the contents of the other chamber.

4.1.3 E3 discloses (see Fig. 1) an airbag inflator 20 comprising: a tubular housing 22 defining a first chamber (identified as second chamber 32 in E3) which in an at rest state contains a quantity of a first gas generant material 40 ignitable to produce first combustion products, said inflator also including a second chamber (identified as first chamber 30 in E3) which in an at rest state contains a quantity of a second gas generant material 40 ignitable to produce second combustion products, said second chamber 30 including an exit orifice 60a adapted to open to place the second combustion products in fluid communication with the contents of the first chamber 32 (see col. 4, lines 40 to 56); a first igniter device 52 operatively associated with the first chamber 32; a second igniter device 44 operatively associated with the second chamber 30. A filter assembly 42 is provided for the filtration

of inflation products of the first and second chambers. The interior of the tubular housing 22 is divided into separate first and second chambers by an internal wall structure 34. The second chamber, therefore, is not housed within the first chamber. Moreover, although in E3 there is an auto-ignition insulator barrier 64 covering the exit orifice 60a (see col. 5, lines 43 to 47), the barrier is a layer of heat insulating material disposed onto a backing ring 60 of the internal wall structure 34, which barrier therefore is not disposed about the second chamber.

4.1.4 E5, in the embodiment according to Fig. 2 referred to by the appellant, discloses an airbag inflator comprising: a housing having a flattened, disc-shaped circular cylinder form; a first chamber 8 which in an at rest state contains a quantity of a first gas generant material 1 ignitable to produce first combustion products, said inflator also including a second chamber 9 which in an at rest state contains a quantity of a second gas generant material 2 ignitable to produce second combustion products; a first igniter device 3 operatively associated with the first chamber; a second igniter device 4 operatively associated with the second chamber 82, and a single filter assembly 13 for the filtration of inflation products of the first and second chambers. The first and second chambers are defined by distinct containers 19, 20, each shaped as a piece of pie ("kuchenförmig", see col. 3, line 42), that are arranged within a chamber 25 defined by a cylindrical wall 14. The space in the chamber 25 which is not occupied by the containers 19 and 20 is filled with the filter 13. The first and second chambers do not have exit openings; in fact, in case of an explosion within one of the chambers, the respective container is "opened" by the explosion as it destroys the wall of the

container (see col. 3, lines 13 to 34 and 59 to 65), whilst leaving intact the wall of the other container. Moreover, the second chamber is not housed within the first chamber; in fact, the two chambers are separated from each other.

4.1.5 Document E6 relates to a hybrid airbag inflator. In hybrid inflators, there is a pressure vessel containing a quantity of pressurized inert gas and a heater which heats the gas before it is released from the inflator (see E6, col. 1, lines 29 to 38). Specifically, E6 discloses (see Fig. 3) a hybrid inflator including first and second chambers 68 and 70, defined by a spherical housing 58, 60, and a divider wall 62 within the housing, respectively. Each of these chambers holds a quantity of stored inert gas and includes a heating device 72, 74, respectively. Heated gas escapes the chambers after reaching a predetermined pressure, which is sufficient for rupturing respective burst discs 96 and 100 associated with each chamber (see col. 7, lines 5 to 16). The heating device may take the form of a pyrotechnic initiator 78 (see col. 5, lines 64, 65), located, together with pyrotechnical material 92 (see col. 6, lines 45 to 60), within the interior 88 of a barrier shell 86. The second chamber 70 is housed within the first chamber 68 and has an exit orifice 94 which is normally covered by the burst disc 96. The burst disc 96, however, is only provided in correspondence of the exit orifice 94 and thus cannot be regarded as an auto-ignition insulator barrier disposed about the second chamber to avoid auto-ignition of gas generant material contained within the second chamber 70 upon thermal contact therewith by the first combustion products.

The appellant argued that one could regard the barrier shell 86 as defining a second chamber and the divider

wall 62 as an auto-ignition insulator barrier about the second chamber. However, in such case, there is no exit orifice in the second chamber, the barrier shell being continuous and not interrupted by any orifices (see col 6, lines 14-18). In this respect it is noted that claim 1 of the patent in suit requires the presence of an identifiable exit orifice in the inflator in an at rest state, and the fact that claim 1 specifies that the exit orifice is "adapted to open" does not imply that the rupturing of the barrier shell 86 of E6 on firing the initiator 78 (i.e. when the inflator is no longer in an at rest state) provides such an exit orifice.

4.1.6 Document E7 relates to a hybrid airbag inflator (see col. 1, first paragraph), which comprises (see Figs. 1 and 3): a housing having a flattened, disc-shaped circular cylinder form and defining a first chamber 32 (first subchamber according to E7) which in an at rest state contains a quantity of a first gas generant material 42 ignitable to produce first combustion products, said inflator also including a second chamber 34 (second subchamber according to E7) which in an at rest state contains a quantity of a second gas generant material 42 ignitable to produce second combustion products, said second chamber 34 including an exit orifice 44 (vent port according to E7); a first igniter device 36 operatively associated with the first chamber; a second igniter device 36 operatively associated with the second chamber, and a single filter assembly 54 for the filtration of inflation products of the first and second chambers (see col. 5, lines 1-5), whereby the second chamber 34 is housed within the first chamber 32 (see col. 3, lines 3 to 15). The exit orifice 44 (vent port) is covered, in an at rest state, by a burst disk 46. As in E6, the burst disk 46 is provided in correspondence of the exit orifice and thus cannot be

regarded as an auto-ignition insulator barrier disposed about the second chamber to avoid auto-ignition of gas generant material contained within the second chamber upon thermal contact therewith by the first combustion products.

4.2 *Assessment of inventive step*

4.2.1 The appellant argued lack of inventive step starting from any of documents E1, E3, E5, E6 or E7.

4.2.2 Starting from E1 (see point 3.4 above identifying the distinguishing features of claim 1 over E1), the question is whether the prior art would suggest to the skilled person the modifications of the known inflator consisting of housing the second chamber 61 within the first chamber 62 and disposing the auto-ignition barrier 22 that covers the exit orifice about the second chamber.

As discussed above, documents E2 and E3 disclose separate chambers, i.e. there is no second chamber housed within the first chamber. Furthermore, these documents do not disclose an auto-ignition barrier disposed about the second chamber.

As regards E6, there is no auto-insulation barrier disposed about the second chamber, if the burst disc 96 is considered to represent such barrier. If, on the other hand, the barrier shell 86 is considered as defining a second chamber and the divider wall 62 as an auto-ignition insulator barrier about the second chamber, then, as explained above, there is no exit orifice in the second chamber. Accordingly, there is no auto-insulation barrier covering the exit orifice of the second chamber (and disposed about it).

E7 likewise does not disclose an auto-ignition insulator barrier disposed about the second chamber.

Accordingly, none of E2, E3, E6 and E7 would suggest (at least) the modification of E1 consisting of disposing the auto-ignition barrier that covers the exit orifice about the second chamber.

Nor would the skilled person consider such modification in view of common general knowledge. In fact, according to the teaching of E1, the ring 22 provides thermal insulation between the two chambers disposed one on top of the other (see col. 7, lines 4 to 17) by it covering the exit orifice 21 and being disposed onto the intermediate wall separating the two chambers. It is not apparent what considerations would motivate the skilled person to provide additional thermal insulation by modifying the ring such as to extend about the second chamber 61, in view of the fact that ring 22 is disposed on the intermediate wall 20 through which thermal contact mainly takes place.

As pointed out already above (cf. point 2.3 in respect of the limitation provided by the functional requirement in claim 1 that auto-ignition is avoided), the Board does not follow the appellant's argument that the feature according to which the insulator barrier "is disposed about the second chamber to avoid auto-ignition" - which explicitly specifies said technical effect - does not achieve the effect of avoiding auto-ignition and would not support inventiveness.

4.2.3 Similar considerations apply when starting from document E3, according to which the auto-insulation barrier is a layer of heat insulating material 64 disposed on the

internal wall structure 34 separating the first and second chambers 32,30: here also, it is not apparent what considerations would motivate the skilled person to provide additional thermal insulation by modifying the layer 64 such as to extend about the second chamber 30, in view of the fact that the layer 64 is disposed on the wall 34 through which thermal contact mainly takes place.

4.2.4 Starting from document E5 (see point 4.1.4 above identifying the distinguishing features of claim 1 over E5), the question is whether the prior art would suggest to the skilled person the modifications of the known inflator consisting of housing the second chamber within the first chamber and of providing the second chamber with exit openings. However, in view of the functioning of the airbag inflator of E5, according to which the containers defining the first and second chambers are opened by an explosion within the respective container as it destroys the wall thereof (see col. 3, lines 13 to 34 and 59 to 65), there is no apparent reason for the skilled person, either in view of E1, E2 or E3, or the skilled person's general knowledge, to provide such containers with exit orifices.

4.2.5 Starting from document E6 (see point 4.1.5 above identifying the distinguishing features of claim 1 over E6), the question is in particular whether the prior art would suggest to the skilled person the following modification of the known inflator:

- if the burst disc 96 is regarded as an auto-ignition insulator barrier, providing instead of, or in addition to, the burst disc, an auto-ignition insulator barrier disposed about the divider wall 62 defining the second chamber 70, or
- if the divider wall 62 is regarded as the auto-

ignition insulator barrier, providing an exit orifice in the barrier shell 86.

As regards the first alternative, it is not apparent why the skilled person would consider providing an insulation barrier about the divider wall 62, the pyrotechnic initiator 78 being at distance from the divider wall and surrounded by the pressurized inert gas within chamber 70 (see E6, col. 5, lines 44 to to 65). Accordingly, the skilled person would consider that the pyrotechnic initiator 78 within the second chamber is sufficiently protected against heat generated by the initiator 72 in the first chamber and would therefore have no motivation to provide an insulation barrier about the divider wall 62.

As regards the second alternative, considering that the barrier shell 86 has to store inert gas and is formed as frangible upon activation of the initiator (col. 6, lines 29 to 44), there is no motivation whatsoever to provide an exit orifice, as it would serve no apparent purpose.

- 4.2.6 Finally, starting from document E7 (see point 4.1.6 above), an issue is whether the skilled person would consider providing an auto-ignition insulator barrier about the second chamber 34. Also here, there is no reason for the skilled person to consider that the shield wall 30 and/or the burst disc do not provide sufficient thermal insulation of the second chamber, in case the initiator within the first chamber is fired. On the contrary, the disclosure in E7 suggests that the insulation is sufficient to provide a controlled and independent activation of the first and second chambers (see col. 3, lines 50 to col. 4, line 46). As regards E2 and E3, as explained above, they do not disclose an auto-ignition barrier disposed about the

second chamber and thus do not provide any useful hints either.

4.2.7 Accordingly, the Board judges that the arguments submitted by the appellant fail to show that the subject-matter of claim 1, and likewise of claim 10 which is directed to a method of operating an airbag inflator having the features of claim 1, does not involve an inventive step.

5. *Admissibility of a further line of argumentation of lack of inventive step starting from E15*

The line of argumentation according to which the claimed subject-matter was not inventive when starting from E15, was submitted by opponent 2 as party of right for the first time with letter dated 11 December 2015. This line of argumentation was not submitted previously at any stage of the opposition and appeal proceedings and thus represents a fresh case which was raised shortly (about one month) before the date scheduled for oral proceedings. Considering that document E15 was already cited during the opposition proceedings (see point II above), this line of argumentation could have been filed at an earlier stage. In fact, opponent 2 did not file any written submissions in these appeal proceedings apart from those of 11 December 2015. Moreover, opponent 2 did not provide any justification for the late filing. Under these circumstances, with particular regard to the current state of the proceedings, the Board decided to exercise its discretion pursuant to Article 13(1) of the Rules of Procedure of the Board of Appeal not to admit the line of argumentation on lack of inventive step taking E15 as the closest prior art.

6. From the above it follows that the decision of the Opposition Division is to be upheld.

Order

For these reasons it is decided that:

The appeal is dismissed

The Registrar:

The Chairman:



A. Vottner

G. Pricolo

Decision electronically authenticated