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**Datasheet for the decision
of 16 October 2008**

Case Number: T 0338/07 - 3.2.01

Application Number: 99304115.1

Publication Number: 0962363

IPC: B60R 21/16

Language of the proceedings: EN

Title of invention:
Airbag

Patentee:
TAKATA CORPORATION

Opponent:
Delphi Technologies, Inc.

Headword:
-

Relevant legal provisions:
-

Relevant legal provisions (EPC 1973):
EPC Art. 56

Keyword:
"Inventive step (yes)"

Decisions cited:
-

Catchword:
-



Case Number: T 0338/07 - 3.2.01

D E C I S I O N
of the Technical Board of Appeal 3.2.01
of 16 October 2008

Appellant: Delphi Technologies, Inc.
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 15 January 2007
rejecting the opposition filed against European
Patent No. 0962363 pursuant to Article 102(2)
EPC 1973.

Composition of the Board:

Chairman: S. Crane
Members: J. Osborne
T. Karamanli

Summary of Facts and Submissions

- I. The appeal is directed against the decision posted 15 January 2007 to reject the opposition against European patent No. 0 962 363.
- II. The following state of the art played a role during the appeal procedure:
- D1: WO-A-98/12075;
- D3: JP-A-06-016099 with abstract (Patent Abstracts of Japan) and machine translation into English;
- D4: US-A-5 519 104;
- D5: WO-A-95/32240;
- D6: Patent Abstracts of Japan vol. 014, No. 556 11 December 1990 & JP-A-02 237837;
- D7: US-A-5 877 256;
- D8: JP-A-08-104194 with abstract (Patent Abstracts of Japan) and machine translation into English;
- D13: DE-A-195 20 067
- D15: DE-C-40 25 291
- D16: Abstract of JP-A-10-102029 (Patent Abstracts of Japan) and machine translation into English.

III. At oral proceedings held on 16 October 2008 the appellant requested that the decision under appeal be set aside and the patent revoked. The respondent requested that the appeal be dismissed (main request) or, in the alternative, that the patent be maintained in amended form on the basis of the claims according to auxiliary requests 1 to 7 filed with a letter dated 15 September 2008.

IV. Claim 1 as granted reads:

"An airbag comprising a first panel (1) and a second panel (2) peripheral portions of which are connected to each other by connecting means, wherein said connecting means includes sewing by yarn (6A,6B) and characterised in that said connecting means further includes bonding by silicone adhesive (5), the silicone adhesive being applied to the peripheral portions of the panels to form a seam of silicone adhesive between the panels, said seam of silicone adhesive (5) being stretchable between said first panel (1) and said second panel (2) thereby preventing gas leakage between said panels (1,2), wherein said silicone adhesive (5) is stretchable by 200% or more; and wherein the seam of silicone adhesive (5) to be applied is from $0.01\text{g}/\text{cm}^2$ to $0.05\text{g}/\text{cm}^2$."

Claim 1 is followed by claims 2 to 7 which specify features additional to those of claim 1.

V. The appellant argued in respect of the main request essentially as follows:

The subject-matter of claim 1 differs from the disclosure of D1 by the features that the connecting means include sewing by yarn and that the silicone adhesive is stretchable by 200% or more. The corresponding technical problem can be seen as achieving a reliable seal. D13 discloses a gas-tight protective bag having sewn and sealed seams which would be subject to higher loading than those on an airbag. Moreover, a method is known from D15 for manufacturing water-tight seams involving placing a sealing material between two layers, sewing through them and polymerizing the sealing material. The claimed 200% stretchability is an intrinsic property of the silicone material and not a property of the airbag. Silicone having such a property is well known, as may be seen from each of D3 to D5. It follows that the subject-matter of claim 1 does not involve an inventive step.

Alternatively, the subject-matter of claim 1 involves no inventive step if D6 is considered as the closest state of the art, in which the panels of an airbag are connected by a combination of stitching and silicone adhesive. It is clear for the skilled person that the silicone is stretchable in order to avoid leaks and the subject-matter of claim 1 differs from the disclosure of D6 by the features of the 200% stretchability of the silicone and the density of its application. The corresponding problem is to improve the sealing. It is known from D1 that silicone adhesive can provide effective sealing in an airbag and it would be obvious for the skilled person to improve the silicone in D6 correspondingly. Silicone having a stretchability of at least 200% is well known to the skilled person and the application density is known from each of D1, D7 and D8.

VI. The respondent's reply may be summarised as:

The skilled person beginning with the state of the art according to D1 would not arrive at the subject-matter of claim 1 because its fundamental teaching is to dispense with a stitched seam.

D6 is largely unclear because it is only an abstract of the full document and does not disclose which condition is shown in the detailed figure of the seam construction. As far as the disclosure is clear, only the features of the preamble of claim 1 are present. The first part of the characterising portion of claim 1 specifies that the two panels are bonded in the seam by silicone adhesive, the subsequent part that the seam is stretchable in order to prevent leakage. Not only the silicone as a material but the seam as a whole must be stretchable by at least 200% in order to prevent separation and thereby ensure a seal when the bag is explosively inflated. By comparison, the seam of D6, which is created from two separate layers, appears to separate. The text of D6 speaks of improving reliability of the joint but at the date of D6 the skilled person was concentrating on mechanical strength and there is no explicit mention of preventing leakage. The subject-matter of claim 1 is an airbag having a high strength seam with no leakage, in which the silicone protects the yarn and prevents combing. D1 and D16 both address the problem of gas leakage but the former suggests dispensing with stitching and the latter proposes the use of a hot-melt adhesive which will flow into the holes around the sewn yarn.

Reasons for the Decision

1. The present case relates to an airbag for use as an emergency restraint for an occupant of a vehicle. In the event of the vehicle being involved in a collision the bag would be deployed by being inflated with gas, typically within a period of up to 50 milliseconds and to a pressure of around 140 kPa. The bag comprises two panels of fabric which are joined at their periphery by a combination of stitching and adhesive in order to provide a reliably gas-tight connection.

2. Only inventive step is at issue in this case. Before considering that matter the board will address one aspect of interpretation of claim 1 as granted on which the parties differ.
 - 2.1 Claim 1 includes in the characterising portion the wording: "said seam of silicone adhesive being stretchable between said first panel and said second panel thereby preventing gas leakage between said panels, wherein said silicone adhesive is stretchable by 200% or more". Whilst the appellant argues that this requires merely that the seam remain gas-tight and that the silicone adhesive has an elongation of at least 200%, the respondent argues that the elongation is a property of the seam.

 - 2.2 Figures 1c and 2 of the patent specification are enlarged sectional views of a portion of the periphery of the airbag in two stages of inflation. Particularly from the fully inflated condition shown in figure 2 it can be seen that the silicone has stretched and remains

intact and attached to the surface of the fabric as the two panels have moved apart. In the description paragraphs [0019] and [0020] it is explained with reference to figures 1c and 2 that:

- "the silicone adhesive stretches following the panels which move apart from each other";
- "the adhesive stretches with being adhered to the panels thereby preventing a gas leakage"; and
- "the adhesive bonding the panels to each other has elongation of 200% or more".

2.3 The teaching of the description to the skilled person therefore is that during inflation the silicone adhesive remains intact in itself and also maintains its adhesion to the panels. This results from a combination of the elongation of the silicone itself and its interaction with the surface of the panels. Correspondingly, claim 1 specifies that the silicone is stretchable between the panels "thereby preventing gas leakage". Whether the seam is stretchable by 200% or more is not derivable from the patent specification but it is implicit that the elongation of the silicone contributes to the prevention of leakage resulting from both the body of the silicone and its bonding to the fabric remaining intact.

3. The appellant's first attack on inventive step begins from D1 which relates to an airbag having the panels joined by a seam of silicone adhesive only. The disclosure of D1 begins by detailing some of the problems which arise from the use of stitched seams in

airbags, including cost, labour intensive manufacture and "combing", the creation of holes in the fabric where the stitches pass through which permit gas leakage. The essential teaching of D1 is to form the seams by bonding. In the closing paragraph of the description it is stated that this "eliminates the need to sew the seam together (a cumbersome, time consuming process that can also compromise the integrity of the inflatable restraint ...)" (page 47, lines 14-16). A few lines later it further states that "no sewing is required and the fabric will not be subject to combing on deployment" (lines 24, 25). This is a clear teaching away from the use of stitched seams and it would not be an obvious measure for the skilled person to act counter to it. Moreover, of the documents upon which the appellant relies to provide motivation for adding stitching to the joints according to D1, namely D13 and D15, neither is in the same technical field as occupant restraint airbags and the skilled person would have no motivation to even consider their content.

4. The appellant alternatively uses the disclosure of D6 as its starting point and argues that the subject-matter of claim 1 differs therefrom by the features of the 200% stretchability and the range of density of application of the silicone.
- 4.1 D6 is an English language abstract of a Japanese patent application which was not filed in the present proceedings either as a translation or as the original. The abstract includes a figure which is a detailed cross-section through the joined peripheries of the panels of the airbag showing stitching and two layers of silicone rubber each extending outwards beyond the

apparently inverted joint and remaining in contact with their respective panels.

4.2 In the text of D6 it is stated that the silicone rubber is "press-attached" as a film and then "heated and hardening-attached". The stated purpose is to "improve the strength ... and improve the reliability of the joint by ... a hardening adhesive layer for joining" the panels together. Similarly, according to a later passage: "the seamed part ... is reinforced by the silicone ... and the joint strength is drastically improved."

4.3 As the respondent convincingly argues, in the absence of an explanation of which condition the detailed cross-section represents, for example as manufactured or inflated, it is impossible to derive a clear teaching as regards any effect from the silicone rubber on leakage through the joint between the panels. The reference in the text to reinforcement and strength would lead the skilled person to understand that the silicone rubber is effective to improve the reliability of the connection between the panels. However, there is no disclosure that the two layers having been adhered to the panels provide any mutual bond when they are subsequently "hardened" by being heated. As a consequence the silicone rubber which is shown in the joint between the edges of the panels cannot be considered as being a seam. It follows that there also is no disclosure of a seam being stretchable between the panels in order to prevent gas leakage. It is undisputed by the parties that the features of the 200% elongation of the silicone and its density of application are also not known from D6. The appellant does take the view, though, that the specified aim of

D6, to "improve the reliability of the joint" would be understood by the skilled person as an attempt to also reduce leakage at the joint. However, explicit reference in the text is only to strength of the joint and the appellant's view results from an *ex-post* interpretation.

- 4.4 The problem solved by the features of present claim 1 when beginning from D6 may be seen as to provide an airbag in which gas is prevented from leaking through the joint between the panels. D1 addresses this problem but its solution is to bond the edges of the panels and dispense with stitching, thereby teaching away from the presently claimed solution. D16 proposes joining the peripheral portions of the panels by a combination of stitching and a hot-melt adhesive. During the manufacture of the airbag the adhesive is applied to bond the fabric, the bonded area is stitched and then the adhesive is heated to cause it to run into and seal the holes formed by the stitching. That solution differs from the one according to present claim 1 not only by the nature of the bonding material, its inherent elongation and its density of application but also because there is no requirement for the adhesive to stretch with the movement of the panels. The appellant argued that the skilled person when starting from D6 would need merely to select appropriate values for the elongation and application density of the silicone in order to arrive at the subject-matter of present claim 1. However, as set out above, this approach presupposes a disclosure of D6 which extends beyond that which would be appreciated by the skilled person having no knowledge of the present patent specification.

5. On the basis of the foregoing the board finds that the subject-matter of claim 1 as granted is not rendered obvious by the available state of the art and so involves an inventive step (Article 56 EPC 1973). Since claims 2 to 7 contain all features of claim 1 the same conclusion applies to them. Under these circumstances consideration of the auxiliary requests is superfluous.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

A. Vottner

S. Crane