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**Datasheet for the decision
of 22 September 2021**

Case Number: T 1242/19 - 3.2.01

Application Number: 13190352.8

Publication Number: 2865553

IPC: B60K15/03

Language of the proceedings: EN

Title of invention:

TANK COMPRISING A REINFORCEMENT MEMBER AND METHOD FOR
MANUFACTURING SUCH A REINFORCEMENT MEMBER

Patent Proprietor:

Plastic Omnium Advanced Innovation and Research

Opponent:

Kautex Textron GmbH & Co. KG

Headword:

Relevant legal provisions:

EPC Art. 100(b), 100(a), 54, 56
EPC R. 103(1)(a)

Keyword:

Grounds for opposition - insufficiency of disclosure (no)

Novelty - main request (yes)

Inventive step - main request (yes)

Reimbursement of appeal fee - (no)

Decisions cited:

Catchword:



Beschwerdekammern

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Chambres de recours

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Case Number: T 1242/19 - 3.2.01

D E C I S I O N
of Technical Board of Appeal 3.2.01
of 22 September 2021

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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
7 March 2019 concerning maintenance of the
European Patent No. 2865553 in amended form.**

Composition of the Board:

Chairwoman S. Fernández de Córdoba
Members: S. Mangin
J. J. de Acha González

Summary of Facts and Submissions

- I. The appeals were filed by appellant 1 (opponent) and appellant 2 (proprietor) against the interlocutory decision of the opposition division finding that, on the basis of the auxiliary request 5, the patent in suit (hereinafter "the patent") met the requirements of the EPC.
- II. In particular, the opposition division held that
- (1) the patent, on the basis of the main request, disclosed the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art,
and
 - (2) the subject-matter of the main request was novel over D1 (WO 2006/008308) but did not involve an inventive step over:
 - D2 (WO 2012/139962) in combination with the skilled person common general knowledge represented by the brochure D3 ("Overmolding Guide", brochure from GLS Total TTPE solutions dated 2004) and the textbook D4 (pages 115-121 of the manual injection molding for practitioners "Spritzgiessen für Praktiker", 2003 Carl Hanser Verlag München Wien),
 - D7 (WO2010/122065) in combination with the skilled person common general knowledge represented by D3 or D4,
 - D6 (DE 60 2004 010 946) in combination with the skilled person common general knowledge.
- III. Oral proceedings were held by the Board on 22 September 2021.

IV. The appellant 2 (patent proprietor) requested that the decision under appeal be set aside and the patent be maintained as granted or, in the alternative, that the patent be maintained on the basis of one of the auxiliary requests 1-4 submitted on 29 November 2018 , auxiliary request 5 submitted in oral proceedings in opposition proceedings (that means that the appeal of the opponent be dismissed) or auxiliary requests 6 and 7, corresponding to auxiliary requests 5 and 6 submitted on 29 November 2018.

The appellant 1 (opponent) requested that the decision under appeal be set aside and that the European patent be revoked. Furthermore, the appellant requested that the appeal fee be reimbursed in full by reason of a substantial procedural violation according to Rule 103(1) (a) EPC.

V. Independent claims 1 and 13 of the granted patent, i.e. according to the main request read (feature numbering used by both parties in their grounds of appeal and adapted by the Board to the actual wording of the claims):

1. Tank manufactured from a plastic material, said tank comprising a reinforcement member,

1.1. said reinforcement member (100, 200, 300, 400, 500) comprising:

1.1.1. a first portion (110, 210, 310, 410, 510) made of first material (M1) weldable to the plastic material of the tank; and

1.1.2. a second portion (120, 220, 320, 420, 520) made of a second material (M2);

characterised in that the second material (M2) has a tensile stress at break which is three to nine times

larger than the tensile stress at yield of the first material (M1);

1.1.3. wherein said second portion comprises at least one through-hole (122, 222, 322, 422, 522A-522C), and

1.1.4. said first material (M1) extends in said at least one through-hole and

1.1.5. at opposite sides of said second portion adjacent said at least one through-hole.

13. A method for manufacturing a reinforcement member (100, 200, 300, 400, 500) for a tank manufactured from a plastic material, said method comprising:

13.1. providing a second portion (120, 220, 320, 420, 520) of a second material (M2)

13.1.1. comprising at least one through-hole (122, 222, 322, 422, 522A-522C);

13.2. overmoulding said second portion with a first material (M1)

13.2.2. such that said first material extends in said at least one through-hole and

13.2.3. at opposite sides of said second portion adjacent said at least one through-hole;

wherein said first material and said second material are chosen such that

13.1.2. said second material has a tensile stress at break which is three to nine times larger than the tensile stress at yield of the first material, and such that

13.2.1. said first material is weldable to said plastic material of the tank.

VI. The decision further refers to the following additional documents:

- D10: "Zugfestigkeit", <http://wiki.polymerservice-merseburg.de/index.php/Zugfestigkeit>,

- D11: "Kunststoffprüfung", Wolfgang Grellmann and Sabine Seidler, Carl Hanser Verlag, 2005, pages 15-17, ISBN 3-466-22086-0.

Reasons for the Decision

1. Insufficiency of disclosure - Article 100(b) EPC
 - 1.1 The Board confirms the decision of the opposition division which held that the patent based on the main request disclosed the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art. Reference is made to point 20 on pages 11-13 of the decision under appeal.

During oral proceedings, the parties referred to their written submissions. The Board confirmed its preliminary opinion submitted in its communication dated 17 February 2021.

- 1.2 Appellant 1 considered that the invention according to claim 1 was not sufficiently disclosed since features 1.1.2 of claim 1 and 13.1.2 of claim 13 defining that the second portion is made of a second material (M2) which has a tensile stress at break which is 3 to 9 times larger than the tensile stress at yield of the first material (M1) was not reproducible for the following reasons:

(i) The tensile stress at yield was not clearly defined and could either be according to D10:

- the yield stress, "Streckspannung" or
- the tensile strength, "Zugfestigkeit".

(ii) The relative comparison of the tensile stress at break to the tensile stress at yield of two different materials did not have the claimed effect on the tank.

(iii) According to D11, the moulding compounds' properties differed significantly from the ones of moulded parts produced from the same moulding compound. Therefore, it was impossible for the skilled person to determine the tensile strength at break of the first material and the tensile strength at yield of the second material of the reinforcement member that were mounted in the tank. Tables with compounds' characteristics and standard measurements of samples did not enable the determination of the parameter defined in 1.1.2. and 13.1.2. Furthermore, as this parameter was an unusual parameter, appellant 2 (proprietor) should disclose all necessary information to measure it.

(iv) D10 taught that the tensile strength at break was not appropriate to compare polymers. The parameter defined in features 1.1.2 and 13.1.2 was hence even more inappropriate.

1.3 The Board does not agree and judges that features 1.1.2 and 13.1.2 are reproducible for the following reasons:

(i) The tensile stress at break (Bruchspannung, contrainte à la rupture) and the tensile stress at yield (Streckspannung, contrainte à la limite d'élasticité) are clear and are standard parameters for the skilled person in the art. D10 discloses that the tensile strength (Zugfestigkeit σ_m) corresponds by definition to the stress value on the vertical axis of the stress-strain-diagram at the first stress maximum during the tensile test. Depending on the type of

diagram of the examined plastic (see figure 1 on page 2 of D10), the tensile strength (Zugfestigkeit σ_m) can either be identical to the tensile stress at yield (Streckspannung σ_y) or the tensile stress at break (Bruchspannung σ_b) if the sample breaks before reaching a non-elastic deformation.

(ii) The effect of the ratio of the tensile stress at break of the first material (M1) and the tensile stress at yield of the second material (M2) is disclosed in paragraphs [0008] and [0009] of the patent and is credible:

"[0008] (...) By using a second material having a tensile stress at break which is three to nine times higher than the tensile stress at yield of the first material, there is provided a good compromise between this good resistance to a permanent internal tank pressure and a good impact resistance of the fuel tank, taking into account that in impact tests the objective is to break the reinforcement member in order to prevent any leakage of fuel after such an impact. Such an improved impact resistance of the tank improves the overall crash resistance of the car.

[0009] Preferably, the second material has a tensile stress at break which is four to eight times larger than the tensile stress at yield of the first material. Surprisingly the inventors have discovered that such a ratio between the tensile stress of the first and second material provides optimal results with regard to impact resistance and durability of the tank".

In any case, the effect of the above-mentioned ratio is not defined in claim 1. Therefore, whether the effect is achieved by the invention defined in claim 1 is a matter of inventive step and not a matter of sufficiency of disclosure.

(iii) As can be seen from D10 (figure 1) both the tensile strength at break (Bruchspannung σ_b) and the tensile strength at yield (Streckspannung σ_y) are standard parameters, which are commonly disclosed in material data sheets and which can be measured by standardised stress tests. Hence, neither one of these two parameters nor their comparison can be considered as unusual parameters as alleged by appellant 1. The patent does not disclose a method for measuring the tensile stress at break and the tensile stress at yield of the first material (M1) and the second material (M2) respectively. However, in the present case it is not necessary considering that the features 1.1.2 and 13.1.2 relate to a comparison and not to absolute values of the two parameters and considering the skilled person common general knowledge. Furthermore, the skilled person is aware that a material given a specific shape different from the usual testing rod will have different mechanical properties (see D11). The skilled person will therefore select the first and the second materials M1 and M2 based on standardised method where the shape of the samples and the testing parameters are the same for comparison purposes. In this respect, it is emphasised that features 1.1.2 and 13.1.2 define the relationship between the tensile stress at break and the tensile stress at yield of the materials M2 and M1 and not of the second and the first portions.

(iv) The skilled person will infer from the disclosure of D10 that the testing machine and, in particular, the Switch-off criterion should be adjusted in a consistent way in order to compare the tensile strength at break of polymers, which is a usual practice.

1.4 Appellant 1 was further of the opinion that claim 8 was not sufficiently disclosed as it covered for the second material M2 combination of materials including metal, for which the tensile stress at break was even more impossible to determine.

1.5 The Board does not agree and follows the opinion of the Opposition Division (see point 20.5 on page 12 of the decision under appeal). Appellant 1 has not shown any concrete example of composite materials where the skilled person was unable to determine whether the tensile stress at break of a second material was 3 to 9 times larger than the tensile stress at yield of a first material. Furthermore, although the mechanical properties of the composite material M2 may not be found in data sheets, they still may be determined with standard tests.

2. Novelty - Articles 100(a) and 54 EPC

The Board confirms the decision of the Opposition Division which held that the subject-matter of claim 1 was novel over D1.

2.1 Appellant 1 presented two alternatives to reason the lack of novelty of the subject-matter of claim 1 over D1. The first alternative was based on the tank being made of HDPE comprising an accessory made of a material different from the wall of the tank such as POM (page 1, line 29 - page 2, line 2) and the second alternative was based on the accessory being made of two materials, for example POM overmoulded with HDPE (page 8, lines 13-17).

For both alternatives, appellant 1 considered that the passage on page 7, line 35 - page 8, line 5 of D1

disclosed a plastic fuel tank equipped with an accessory having an orifice in which plastic of the wall tank was forced into and extended on the opposite side of the accessory. According to page 4, line 10, the accessory could be a "stiffening bar".

Turning to figure 1 appellant 1 considered that the end product disclosed in D1 was a tank manufactured from a plastic material (HDPE) comprising a reinforcement member, said reinforcement member comprising a first portion, corresponding to the portion of the tank 1 protruding through the orifice 5 of the accessory 4 and a second portion corresponding to the accessory 4.

2.2 The Board does not agree. The analysis of the end product of D1 made by appellant 1 for both alternatives is not consistent with the disclosure of D1. Referring to the passages of the description, appellant 1 considers the accessory numbered 4 in figure 1, which may be a stiffening bar, to be the reinforcement member (reference is made to page 8, lines 26 - page 9, line 2 of D1). However, when it comes to analysing the end product, appellant 1 considers the reinforcement member to comprise the accessory 4 (second portion) and the part of the tank 1 protruding through the orifice 5 (second portion). By doing so appellant 1 distorts the teaching of D1.

D1 (figure 1, page 8, lines 27-36) teaches applying the "staking" technique to attach an accessory comprising an orifice to the wall of a fuel tank. D1 teaches to force constituent material of the wall tank through the orifice of the accessory. The material of the wall tank extending on both sides of the accessory has thereby an attaching function and not a reinforcing function. Therefore, the part of the tank extending through the

orifice cannot be considered as the first portion of the reinforcement member.

2.3 For the second alternative appellant 1 considered in view of the passage on page 8, lines 16-17 of D1 that the reinforcement member was an accessory comprising an orifice made of POM overmoulded with HDPE. The overmoulded HDPE would extend over and inside the orifice of the POM and would extend opposite sides of the POM. Furthermore, the molten plastic of the wall tank, which could also be HDPE, was forced through the orifice.

2.4 The Board is not convinced. Appellant 1 considers that the overmoulding of HDPE over the POM would take place after the POM has been perforated and would thereby cover the orifice. While this is a possible way of manufacturing the accessory, it is not directly and unambiguously disclosed in D1. The overmoulding of HDPE could be carried out before the accessory is perforated, or the overmoulding of HDPE could be made after the perforation of the POM without covering the orifice. In these two cases, HDPE of the reinforcing member would not go inside the orifice. D1 does not therefore disclose directly and unambiguously feature 1.1.5. Moreover, in view of the "staking" technique to be implemented, forcing the wall tank material into the orifice of the reinforcing material, the skilled person is rather prompted to leave the orifice free of material.

2.5 The above reasoning is equally valid for independent claim 13 directed to a method for manufacturing a reinforced member for a tank manufactured from a plastic material. In claim 13, the reference to the materials M1 and M2 corresponds to the material of the

first portion of the reinforcement member and the second portion of the reinforcement material respectively and not to the material of the tank. D1 discloses a method for attaching a reinforcement material. In D1, the part of the tank protruding on each sides of the reinforcement member 4 enables the attachment of reinforcement member to the tank 1 and cannot be considered as a portion of the reinforcement member.

3. Inventive step - Articles 100(a) and 56 EPC

The Board judges that the subject-matter of claims 1 and 13 involves an inventive step starting from D2 in combination with the teaching of D3, D4 or D1 as well as starting from D7 in combination with D3 or D4 and starting from D6 in combination with common general knowledge.

3.1 Starting from D2 as closest prior art

D2 discloses a fuel tank comprising a reinforcing member in the form of a pillar consisting of two overmoulded materials. The body of the pillar made of POM is overmoulded with HDPE at its flanges (reference is made to page 5, lines 12-16 of D2).

The subject-matter of claim 1 differs from D2 in that

- 1.1.3. the second portion comprises at least one through-hole;

- 1.1.4. the first material extends in said at least one through-hole; and

- 1.1.5. the first material extends at opposite sides of said second portion adjacent said at least one through-hole.

This is not disputed by the parties.

3.1.1 Appellant 1 considered that the objective technical problem based on these differences was to improve the bonding stability of the first portion and the second portion of the reinforcement member.

Appellant 1 considered that D3 and D4 represented the skilled person's common general knowledge and disclosed ways to improve the bonding of two overmoulded materials, namely by mechanically interlocking the two materials as shown on figure 3 of page 8 of D3 and figure 4.31 of page 119 of D4.

Furthermore, appellant 1 argued that if the skilled person was concerned that the teaching in D3 was specific to thermoplastic elastomer, then considering D1, the skilled person would realise that the teaching of D3 was applicable to HDPE. Therefore, starting from D2 and in view of the objective technical problem to be solved, the skilled person would arrive at the subject-matter of claim 1 with their common general knowledge represented by D3, D4 and D1.

3.1.2 The Board judges that the skilled person starting from the reinforcing pillar of D2, which design has been carefully chosen to obtain a reinforced fuel tank limiting the tank deformations when the tank is pressurized combined with an easy breaking area to protect the tank shell from breaking during a high speed impact test (page 7, line 16-19 of D2), has no incentive to provide through-holes in the body of the pillar as it would weaken the reinforcement member even if the through-hole is filled with HDPE material. The Board does not contest that through mechanical interlocking, the bonding of the POM and the HDPE of the reinforcement element may be improved, but this would impair the reinforcement member for the tank as a

whole considering the requirements disclosed on page 7 of D2.

3.1.3 While it is not contested that D3 bearing the date of 2004 was accessible to the public before the date of filing of the patent in suit (2013) and is therefore prior art, the Board judges that the overmoulding guide of GLS, does not represent the common general knowledge of overmoulding in general. D3 is a brochure about the overmoulding of thermoplastic elastomers (TPE), in particular TPE from the GLS company: Dynaflex[®], Versalloy[®], Versafled[®] and versollan[™] (pages 6 and 7 of D3) and is specific to the following applications: improving grip in dry and wet environments, vibration damping, increase in comfort level, water resistant seal, sound absorption and electrical insulation (page 2 of D3).

3.1.4 Even if the skilled person considers providing through-holes in the pillar of D2, the skilled person has no incentive to consider D3, a specialised brochure from GLS on the overmoulding of thermoplastic elastomers for uses which do not relate to the reinforcement of fuel tanks. While claim 1 does not specify the chemical composition of the materials M1 and M2 and only requires that the tensile stress at break of the second material (M2) be 3 to 9 times higher than the tensile stress at yield of the first material (M1), the skilled person starts from the teaching of D2, whereby POM is used for the body of the pillar and HDPE is overmoulded at the flanges of the pillar. Starting from this specific embodiment of D2, the skilled person would not combine it with D3 without hindsight.

D1 discloses on page 8, lines 16-17 overmoulding HDPE over another material such as POM, without giving any

further details on the overmoulding especially no information on whether the HDPE extends through the hole at opposite sides of the POM. Therefore, even considering the teaching of D1, the skilled person would not consider that the specific teaching of TPE overmoulding in D3 is applicable to the specific embodiment of D2, where the overmoulding is of HDPE.

The skilled person has no incentive either to combine the teaching of D2 with the teaching of D4, which deals with overmoulding for other purposes than the reinforcement of fuel tank. Indeed, page 115 of D3 refers to multi-coloured injection moulded part ("mehrfarbige Spritzlinge"), movable joints ("bewegliche Gelenkverbindungen") and hard-soft connection ("Hart-Weich-Verbindung"). Furthermore, D4 does not disclose any mechanical bonding whereby a first material would extend at opposite sides of a second material. The first material does not extend at opposite sides in the rivet connection ("Nietverbindung") in figure 4.31 of page 119 of D4, but only fills up the holes.

Similarly to claim 1, the method for manufacturing a reinforcement member for a tank manufactured from plastic material of claim 13 is not rendered obvious by the teaching of D2 in combination with D3, D4 or D1.

3.2 Starting from D7 as closest prior art

D7 discloses a plastic fuel tank comprising a reinforcing element in the form of a hollow plastic pillar connecting the lower and the upper wall of the tank. The pillar may be a two-material pillar, one part which is made of a material compatible with HDPE and another part which is made of a material having a

limited deformation and/or creep (POM, PA, PEEK, metal, etc.) (D7, page 4, line 30-page 5, line 2).

Similarly to D2, the subject-matter of claim 1 differs from D7 in features 1.1.3, 1.1.4 and 1.1.5. This is not disputed by the parties.

3.2.1 Appellant 1 is of the opinion that the skilled person would combine the teaching of D7 with the skilled person's common general knowledge represented by D3 and D4 to arrive at the subject-matter of claim 1 in a similar way than when starting from D2.

3.2.2 The Board disagrees. D7 does not disclose the way the two materials of the reinforcement element are arranged. In particular, D7 does not disclose that the two materials are overmoulded. Starting from the teaching of D7 the skilled person has therefore even less incentives to consult documents D3 and D4 relating to overmoulding.

The Board concludes that for the same reasons as provided above when starting from D2, the skilled person would not combine the teaching of D7 with the teaching of D3 or D4 to arrive at the subject-matter of claims 1 or 13 without hindsight (reference is made to points 3.1.2 and 4.1.3).

3.3 Starting from D6 as closest prior art

D6 (figure 5 and paragraph [0047]) discloses an arrangement of two pipes (12, 21) comprising an annular space (105) between the two pipes filled with an injected plastic (53). This injected plastic extends in the perforations (15, 24) and on both sides of the two pipes. Paragraphs [0041] and [0044] disclose various

possible materials for the pipes and for the injected plastic.

The subject-matter of claim 13 differs from D6 in that the reinforcement member is for a tank manufactured from a plastic material, whereby the first material M1 of the reinforcement material is weldable to the plastic of the tank.

- 3.3.1 Appellant 1 argues that in view of the use of the pipe arrangement as a reinforcement element in automobile manufacturing in D6 (paragraphs [0002] and [0004]) the skilled person would implement the pipe arrangement of D6 in a plastic tank and use as injected plastic a thermoplastic material weldable to the plastic of the tank.

Appellant 1 further argues that the same reasoning applies to claim 1 as granted. The subject-matter of claim 1 differs from D6 in the tank manufactured from a plastic material comprising the reinforcement material disclosed in D6. The provision of an alternative use in another vehicle's component requires no inventive skills.

- 3.3.2 The Board does not agree. D6 does not constitute the closest prior art as it does not deal with reinforcement members for plastic tanks. The use of reinforcement members in plastic tanks implies several requirements on the shape/structure of the reinforcement member and on the materials to be used. Indeed the reinforcement member immersed in fuel should be attached to the plastic wall tank and should be capable of resisting permanent stresses that may occur in a tank, while not being too voluminous.

Even if D6 were to be considered as a suitable starting point, the skilled person has no incentive to insert the pipe arrangement of D6 in a plastic tank, which will be submerged in fuel and which would need to resist permanent stress. The pipe arrangement of D6 to be arranged in car seats and car structures has not been developed for such environment and such requirements. Furthermore, while D6 discloses possible materials for the pipes and the injected plastic, which to some extent fall within the scope of claim 1, a selection according to different considerations from the ones in D6 is required to arrive at the subject-matter of claim 1. It is therefore not obvious for the skilled person, starting from the teaching of D6 to arrive at a reinforcement material for a plastic tank, whereby the first material of the reinforcement material is weldable to the plastic tank.

D6 does not therefore render the subject-matter of claims 1 and 13 obvious.

4. Reimbursement of the appeal fee in full by reason of violation of the right to be heard - Rule 103(1)(a) EPC.

According to Rule 103(1)(a)EPC, the appeal fee shall be reimbursed in full where the Board of Appeal deems an appeal to be allowable, if such reimbursement is equitable by reason of a substantial procedural violation. In the present case the grounds of opposition based on Article 100(a) and (b) EPC raised by the appellant 1/opponent do not prejudice the maintenance of the patent as granted. Appellant 1's appeal is therefore not allowable, and a reimbursement of the appeal fee cannot be granted.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is maintained as granted.

The Registrar:

The Chairwoman:



A. Voyé

S. Fernández de
Córdoba

Decision electronically authenticated