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**Datasheet for the decision  
of 2 March 2018**

**Case Number:** T 0306/16 - 3.3.05

**Application Number:** 10175576.7

**Publication Number:** 2339670

**IPC:** H01M2/20, H01M2/30

**Language of the proceedings:** EN

**Title of invention:**

Battery module comprising a connecting member composed of first and second connecting bars

**Patent Proprietor:**

SB LiMotive Co., Ltd.

**Opponent:**

ElringKlinger AG

**Headword:**

Battery module/SB LiMotive

**Relevant legal provisions:**

EPC Art. 56, 87(1), 88(3), 89, 123(2)  
RPBA Art. 13(1)

**Keyword:**

Priority - (no)  
Inventive step - main request (no)  
Amendments - auxiliary request 1 - added subject-matter (yes)  
Late-filed auxiliary requests 2 and 3 - request clearly allowable (no)  
Auxiliary request 4 - admitted (yes)  
Auxiliary request 4 - inventive step (yes)

**Decisions cited:**

T 0530/15

**Catchword:**



**Beschwerdekammern**  
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Case Number: T 0306/16 - 3.3.05

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.05**  
**of 2 March 2018**

**Appellant:** ElringKlinger AG  
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**Respondent:** SB LiMotive Co., Ltd.  
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**Representative:** Gulde & Partner  
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**Decision under appeal:** Interlocutory decision of the Opposition  
Division of the European Patent Office posted on  
16 December 2015 concerning maintenance of the  
European Patent No. 2339670 in amended form.

**Composition of the Board:**

<b>Chairman</b>	E. Bendl
<b>Members:</b>	G. Glod
	O. Loizou
	A. Haderlein
	R. Winkelhofer

## Summary of Facts and Submissions

I. The present appeal from **opponent 1 (appellant)** lies from the interlocutory decision of the opposition division holding that amended European patent No. EP-B-2 339 670 in the form of the then auxiliary request 1 met the requirements of the EPC.

Former opponent 2 had withdrawn its opposition in the course of the opposition proceedings.

II. Claim 1 of said request (now the main request) reads as follows:

*"1. A battery module (100) comprising:  
a plurality of rechargeable batteries (110) formed in a prismatic shape each having a case (112) and a cap plate (114) connected to an opening of the case (112),  
and  
a connecting member (160) to electrically connect a first positive electrode terminal (130) of a first rechargeable battery (110) with a negative second electrode terminal (140) of a second rechargeable battery (110), wherein the first electrode terminal (130) is made of aluminum and the second electrode terminal (140) is made of copper and the first and second electrode terminals (130, 140) protrude outside the case (112),  
wherein  
the connecting member (160) has the form of a plate covering the first electrode terminal (130) and the second electrode terminal (140) and comprises:  
a first connecting bar (161) connected to the first electrode terminal (130) of the first rechargeable battery (110) and comprising the same material as the first electrode terminal (130),*

*a second connecting bar (162) connected to the second electrode terminal (140) of the second rechargeable battery (110) and comprising the same material as the second electrode terminal (140), wherein the second connecting bar (162) comprises a different material than the first connecting bar (161), and a welding portion (150) connecting the first connecting bar (161) with the second connecting bar (162),*

**characterized in that**

*the first connecting bar (161, 211) has a stepped profile and comprises a first welding portion (161a, 212a) formed to contact the second connecting bar (162, 212) by friction stir welding, and a body portion (161b, 211a)."*

III. The following documents cited in the decision under appeal among others are of relevance here:

O1D1: DE 20 2009 012 647 U1

O1D5a:US 61/248 806 (certified translation of the priority document concerning the older priority claimed)

IV. With the statement of grounds of appeal of 11 April 2016, the appellant submitted the following document:

O1D11: US 2002/0046864 A1

V. With its reply of 22 August 2016, the **respondent (patent proprietor)** submitted an auxiliary request.

VI. By submission of 26 October 2016, the appellant submitted the following document:

O1D13: DE 10 2006 050 709 B3

VII. In its communication pursuant to Article 15(1) RPBA of 20 October 2017, the board was of the preliminary opinion that the subject-matter of claim 1 of the request found allowable by the opposition division (now the main request) lacked an inventive step in view of O1D1 in combination with O1D11.

VIII. By letter of 20 February 2018, the respondent filed auxiliary requests 1 to 6.

Claim 1 of **auxiliary request 1** includes the following amendment (underlined) compared with claim 1 of the main request:

" 1. [...]than the first connecting bar (161),  
wherein the connecting bars (161, 162) abut each other and an overlap is created between the first connecting bar (161) and the second connecting bar (162),  
and  
a welding portion (150) connecting the first connecting bar (161) with the second connecting bar (162),  
**characterized in that**  
upper surfaces of the connecting bars (161, 162) form a common surface, the first connecting bar (161, 211) has a stepped profile and comprises a first welding portion (161a, 212a) formed to contact the second connecting bar (162, 212) by friction stir welding, and a body portion (161b, 211a)."

Claim 1 of **auxiliary request 2** includes, apart from the deletion of reference numbers, the following amendment (underlined) compared with claim 1 of the main request:

" 1. [...] a first connecting bar (161) connected to the first electrode terminal (130) of the first rechargeable battery (110) and made of the same material as the first electrode terminal (130), a second connecting bar (162) connected to the second electrode terminal (140) of the second rechargeable battery (110) and made of the same material as the second electrode terminal (140), ~~wherein the second connecting bar (162) comprises a different material than the first connecting bar (161),~~ and [...]."

Claim 1 of **auxiliary request 3** includes, apart from the deletion of reference numbers, the following amendment (underlined) compared with claim 1 of the main request:

"1. [...] a first connecting bar (161) connected to the first electrode terminal (130) of the first rechargeable battery (110) by welding and ~~comprising~~ made of the same material as the first electrode terminal (130), a second connecting bar (162) connected to the second electrode terminal (140) of the second rechargeable battery (110) by welding and ~~comprising~~ made of the same material as the second electrode terminal (140), ~~wherein the second connecting bar (162) comprises a different material than the first connecting bar (161),~~ and a welding portion (150) connecting the first connecting bar (161) with the second connecting bar (162), wherein an overlap is created between the first connecting bar (161) and the second connecting bar (161), **characterized in that** [...]."

The characterising part of claim 1 of **auxiliary request 4** reads as follows (changes with respect to the main request underlined):



**"characterized in that**

*the first connecting bar (161, 211) has a stepped profile and comprises a first welding portion (161a, 212a) formed to contact the second connecting bar (162, 212) by friction stir welding, and a body portion ~~(161b, 211a),~~*

*wherein the upper surface of the first connecting bar (161) is stepped and the first welding portion (161a) has a smaller thickness than the body portion, the lower surfaces of the body portion and the welding portion being aligned with each other, and*

*wherein the second connecting bar (162) has a stepped profile and comprises a body portion and a second welding portion (162a) formed to contact the first welding portion (161a), the second connecting bar (162) being arranged such that the upper and lower surfaces of the first and second connecting bar (161, 162) are aligned with each other.*

The five dependent claims of auxiliary request 4 correspond to claims 2, 3, 6, 12 and 13 of the patent as granted.

- IX. Oral proceedings before the board took place on 2 March 2018.
  
- X. The **appellant** essentially argued that the right to priority had not been validly transferred and that the subject-matter of claim 1 of the main request was not directly and unambiguously derivable from the priority document, since it contained several generalisations of the embodiments disclosed in the priority document.

O1D11 was filed as a reaction to the request held allowable by the opposition division that was filed late during opposition proceedings. The respondent's objection to admitting this document into the appeal proceedings was also late.

The subject-matter of claim 1 of the main request lacked an inventive step in view of O1D1 in combination with the common general knowledge. It was obvious to use copper instead of steel, since copper had a better conductivity. Copper was also explicitly mentioned in O1D1 (paragraphs [0019], [0063] and claim 5).

Even if the problem formulated by the opposition division in view of O1D1 were to be accepted, the solution was still obvious in view of O1D11. The latter document taught that the joint formed by friction stir welding between a copper element and an aluminum element was at least as strong as conventional welds (paragraph [0029]).

The subject-matter of claim 1 of the auxiliary request 1 was an intermediate generalisation of the disclosure of the application as filed.

Auxiliary requests 2 and 3 should not be admitted, since they were clearly not allowable.

Auxiliary request 4 should also not be admitted, since it was filed very late. Furthermore, the subject-matter of its claim 1 was obvious in view of O1D1 in combination with O1D13. O1D13 was highly relevant, since it disclosed in Figure 3 the same structure with the same materials as now present in claim 1 (paragraph [0038]). Said structure was also obtained with stir

welding and had mechanical stability as set out in paragraph [0008].

XI. The **respondent** refuted the arguments of the appellant. O1D1 was not prior art under Article 54(2) EPC, since the priority of US 61/248 806 was validly claimed. The subject-matter of claim 1 was a generalisation of the subject-matter disclosed in the priority document that was acceptable and understandable to the skilled person.

Even if the priority claim were not recognised, the subject-matter of the claims would still be inventive when starting from O1D1 as closest prior art. The selection of the combination of aluminum and copper with friction stir welding was not obvious to the skilled person.

O1D11 should not be admitted, since it could already have been presented at the first instance. The independent claims as upheld by the opposition division had been filed one month before the oral proceedings before the opposition division.

O1D11 related to the enhancement of gas-metal arc welding and not to laser welding. O1D11 failed to disclose that friction stir welding improved the weld so that it was more stable against vibration and external shock. Furthermore, O1D11 taught to position the bars side by side, contrary to what was shown in O1D1. A rotating pin as taught by O1D11 would not lead to the formation of a "nugget zone".

The amendment introduced in claim 1 of auxiliary request 1 was derivable among others from Figures 2 and

4 and page 10, lines 18 to 21 and page 15, lines 2, 3, 7 and 8 of the application as filed.

Auxiliary requests 2 to 4 were a reaction to the board's communication. Auxiliary requests 2 and 3 tried to overcome the objection concerning the validity of the priority. Auxiliary request 4 clearly overcame the inventive step objection. O1D13 should not be admitted. It did not concern friction stir welding.

XII. **The appellant requests** that the impugned decision be set aside and that the patent be revoked in its entirety.

**The respondent requests** that the appeal (main request) be dismissed, alternatively that the patent be maintained in amended form on the basis of the first auxiliary request submitted with the reply of 22 August 2016 (resubmitted with letter dated 20 February 2018) or on the basis of one of the second to sixth auxiliary requests submitted with letter dated 20 February 2018.

### **Reasons for the Decision**

Main request - claims as held allowable by the opposition division

1. Priority claimed from US 61/248 806 - Articles 87(1) and 88(3) EPC
- 1.1 The patent claims the priority of two earlier applications, including US 61/248 806 filed on 5 October 2009. The opposition division concluded that this priority was not validly claimed, since the transfer of priority right to SB LiMotive Co, Ltd.

before the filing date of the patent had not been sufficiently proven and because the subject-matter of claims 1 and 9 of the present main request (then the first auxiliary request) was not directly and unambiguously derivable from the priority document O1D5a (points 2.4.3 and 3.4 (heading "Priority") of the reasoning of the impugned decision).

1.2 Independently of the question whether the priority right has been validly transferred, the older priority is not validly claimed, since the subject-matter of claim 1 is not directly and unambiguously derivable from the priority document.

1.2.1 O1D5a, a certified translation of the priority document in question, discloses neither that the first connecting bar **comprises** the same material as the first electrode terminal nor that the second connecting bar **comprises** the same material as the second electrode terminal. The priority document only discloses that the connecting bar **is** made of the same material, i.e. aluminum or copper (page 7, lines 19 and 21) as the negative and positive electrode, respectively. This is also in line with the disclosure on page 3, lines 14 to 16 referring to "made of" and not to "comprising". A basis for the generalisation to the wording "comprising" cannot be found in the priority document, since only the wording "made of" is used throughout the priority document in that context (page 12, lines 5 to 7; page 13, lines 8 to 10; page 15, lines 12 and 15; page 16, lines 5 to 8).

1.2.2 The same applies to "the second connecting bar **comprises** a different material than the first connecting bar", since in that context the priority document only uses the wording "made of a different

material" (page 3, lines 12 and 13) or "made of different materials" (page 12, lines 4 and 5; page 13, lines 7 and 8), while in the specific embodiments the two connecting bars are made of aluminum and copper, respectively (page 7, lines 19 to 21; page 15, lines 7 and 8).

1.2.3 Furthermore, the feature "to contact" in the penultimate line of claim 1 is also not directly and unambiguously derivable from the priority document, since the stepped profile of the first connecting bar is only disclosed in Figures 2 and 4, wherein the first connecting bar does not only contact the second connecting bar, but overlaps and has at least the upper surface at the same level as the second connecting bar. A basis for other embodiments, wherein the two connecting bars only contact each other in an undefined orientation, cannot be found in the priority document.

1.3 As a consequence, 5 October 2009, i.e. the filing date of the older priority document US 61/248 806, cannot serve as the filing date of the patent in suit for the purpose of Article 54, paragraphs 2 and 3 (Article 89 EPC).

2. Admittance of O1D11

Document O1D11 was filed by the appellant with its grounds of appeal. With its reply to the grounds of appeal dated 22 August 2016, the respondent discussed O1D11 in substance and did not raise an objection as to its admissibility. With its submissions of 20 February 2018, 10 days before the oral proceedings, the respondent asked the board not to admit O1D11 into the proceedings.

This amounts to an amendment of the respondent's case, and its admission is at the board's discretion.

In its communication pursuant to Article 15(1) RPBA, the board set out its preliminary opinion that O1D11 could be considered as a reaction to the impugned decision, especially to show that it was known to use friction stir welding for joining aluminum and copper. The board saw no reason why O1D11 should already have been filed before the opposition division, so Article 12(4) RPBA was not invoked.

Although the independent claim of the present main request had been filed one month before the oral proceedings before the opposition division, it constituted a considerable amendment based on the combination of several claims, which led to a request held allowable by the opposition division. Under the given circumstances, the appellant's reaction to such a major amendment with the statement of grounds of appeal is justified.

Therefore, and considering that the respondent only objected to the admission of O1D11 very late, the respondent's request to hold O1D11 inadmissible is rejected (see also T 530/15, Reasons 1).

3. Inventive step - Article 56 EPC

3.1 Invention

The invention relates to a battery module having a connecting member composed of two connecting bars.

3.2 Closest prior art

Given the considerations above, 01D1, which was entered into the register on 26 November 2009 and mentioned in the Patent Bulletin on 31 December 2009, i.e. prior to the filing date of the second priority claimed, is prior art under Article 54(2) EPC. It is considered the closest prior art, since it relates to the problem of connecting batteries in a simple and efficient way (paragraphs [0008] and [0011]). It also has the most features in common with claim 1, especially since it discloses a connecting bar having a stepped profile and friction stir welding.

It discloses a plurality of rechargeable batteries connected to each other by connecting members that are made of connecting bars of aluminum and connecting bars of steel, tin, zinc, copper or silver (claim 5 depending on claim 1). The bars can be joined together by several techniques, including friction stir welding (paragraph [0020]). The first electrode terminal is made of the same material as the first connecting bar, while the second electrode terminal is made of the same material as the second connecting bar (paragraph [0012]).

### 3.3 Problem to be solved

The problem to be solved is to improve resistance to external vibration and shock (column 8, lines 50 and 51 of the patent).

### 3.4 Solution

As a solution to the posed problem, a battery module according to claim 1 is proposed, characterised in that the batteries are formed in a prismatic shape, the second electrode terminal and the second connecting bar



are made of copper and the latter contacts the first connecting bar by friction stir welding.

### 3.5 Success of the solution

To the benefit of the respondent, it is accepted that the problem has been successfully solved, in view of the explanations given in paragraphs [0051] and [0052], which have not been called into question by evidence from the appellant.

### 3.6 Obviousness

The board agrees with the opposition division that the provision of batteries in a prismatic shape is an obvious alternative to cylindrical batteries, especially since the two shapes were commonly known to the skilled person before the (second) priority date of 30 August 2010. The conclusion of the opposition division with respect to this point has not been questioned by the respondent.

O1D1 discloses both copper and friction stir welding, but it does not provide a pointer towards this specific selection, since there is no teaching that this selection would provide any benefit.

Starting from O1D1, the skilled person trying to solve the posed problem would turn to O1D11, since it concerns the joining of different conductive materials including those disclosed in O1D1. It specifically relates to the problem of minimising or eliminating conductivity discrepancy between the joint and the original conductive material (paragraph [0004]). Although it explicitly mentions gas-metal arc welding (paragraph [0002]), it also deals more generally with

the minimisation of the heat affected zone found in conventionally welded busway distribution systems (paragraph [0028]). It teaches that joints formed by friction stir welding are at least as strong, if not stronger, than conventional welds and that in a bend test, no cracking or breakage was observed at the weld joint (paragraph [0029], first and last sentences) between a bar in copper and one in aluminum (see claim 1 and paragraph [0021]).

The person skilled in the art thus learns from O1D11 that friction stir welding provides stable joints between copper and aluminum bars. Although O1D11 does not explicitly refer to stability against vibration and shock, the skilled person would understand from O1D11 that the stability of the joints is a prerequisite for resisting vibration and shocks. It is also understood that the type of joint that is obtained by friction stir welding is beneficial to the overall stability of the joint.

Based on this teaching, the skilled person has a clear incentive to choose friction stir welding and copper in combination with aluminum to solve the posed problem with a reasonable expectation of success.

O1D11 teaches that the friction stir welding process can be used for different types of joints (paragraphs [0016] and [0030]). There is no reference to a nugget zone, but claim 1 of the present request is not limited to a connection obtained by a specific type of friction stir welding, but refers generally to friction stir welding.

To conclude, it was obvious to the skilled person starting from O1D1 to try a connecting member made by

joining an aluminum bar with a copper bar by friction stir welding, thereby arriving at the proposed solution.

- 3.7 The subject-matter of claim 1 lacks an inventive step in view of O1D1 in combination with O1D11, so the requirements of Article 56 EPC are not fulfilled.

Therefore the main request is not allowable.

Auxiliary request 1

4. Article 123(2) EPC

The features introduced in claim 1 are alleged to be based on page 10, lines 18 to 21 and page 15, lines 3, 4 and 7 and 8, as well as page 4, lines 12 to 14 and claims 1, 4, 5, 8 and 10 as originally filed.

The passage on page 10 relates to the embodiment shown in Figure 2, while the passage on page 15 relates to the embodiment shown in Figure 4. It is evident from these figures that the upper surface formed after connection of the first connecting bar with the second connecting bar is in one plane. This is also evident from page 10, lines 16 and 17 and page 15, lines 7 and 8. However, such a feature is missing from claim 1, so claim 1 is a generalisation of the original disclosure. The cited passage on page 4 relates to the metals used (aluminium and copper), and the cited claims do not unambiguously describe the upper surface formed after connection either. Since the application as filed does not provide any basis for such a generalisation, the only top surfaces of the first and second connecting bars being those that are disclosed having the same

level, the subject-matter of claim 1 does not fulfil the requirements of Article 123(2) EPC.

Therefore, the auxiliary request 1 is not allowable.

Auxiliary request 2

5. Article 13(1) RPBA

5.1 According to Article 13(1) RPBA, any amendment to a party's case after it has filed its grounds of appeal or reply may be admitted and considered at the board's discretion. This discretion is to be exercised in view of inter alia the complexity of the new subject-matter submitted, the current state of the proceedings and the need for procedural economy.

5.2 One of the criteria commonly invoked for deciding whether a request filed after the grounds of appeal may be admitted is whether the amended request is clearly or obviously allowable.

5.3 In the present case, the amendments made to claim 1 do not address and consequently do not suffice to overcome the priority objection based on point 1.2.3 above, so O1D1 is still prior art under Article 54(2) EPC. Since the amendment to claim 1 does not impact the reasoning of the main request concerning inventive step (point 3 above), it is evident that the present request is not clearly or obviously allowable.

Therefore, it is not admitted into the proceedings.

Auxiliary request 3

6. Article 13(1) RPBA

The amendment introduced in claim 1 is even broader in scope than the amendment introduced in claim 1 of auxiliary request 1. It does not contain any feature relating to the upper surface of the first and second connecting bars formed after welding, although, as indicated for auxiliary request 1, the only disclosure in the application as filed is that said surface is in one plane. Therefore, it is immediately evident that claim 1 is not clearly or obviously allowable.

Auxiliary request 3 is therefore not admitted into the proceedings.

Auxiliary request 4

7. Articles 13(1) and (3) RPBA

7.1 This request was only filed 10 days before the oral proceedings, although the appellant's objection based on O1D1 in combination with O1D11 had been filed with the statement of grounds of appeal and the notification pursuant to Article 15(1) RPBA was dispatched four months before the submission.

In spite of the late submission, the board in the present case exercises its discretion in favour of admitting this request for the following reasons:

The request is considered a reaction to the board's preliminary opinion and the appellant's objection based on the combination of O1D1 with O1D11. The features introduced in claim 1 are taken from dependent claim 10

as granted, which corresponds to claim 11 as filed. Therefore, the request does not give rise to any objections under Article 123(2) EPC and cannot be considered a surprise to the appellant. Further, it evidently overcomes the inventive step objection based on O1D1 in combination with O1D11.

- 7.2 As a reaction to the admission of auxiliary request 4, the appellant disputed the allowability of this request, referring inter alia to O1D13. This document was submitted after the expiry of the time limit given in Article 108 EPC (submission of 26 October 2016), so its admission is also at the discretion of the board.

Auxiliary request 4 triggered O1D13 to become relevant to the question of inventive step, since O1D13 discloses in Figure 3 a configuration according to the features added to claim 1. Thus, this prior art document was considered *prima facie* relevant. In view of this *prima facie* relevance, the late submission of the respondent's present request and both parties' readiness to respond, inter alia on the basis of O1D13, to this late-filed request without necessitating a major interruption or even adjournment of the oral proceedings, the board did not see any reason not to admit O1D13 into the procedure.

8. Article 56 EPC

- 8.1 The reasoning brought forward under points 3.1 to 3.5 above still applies, except that now as a solution to the posed problem a battery module according to claim 1 is proposed, characterised in that the batteries are formed in a prismatic shape, the second electrode terminal and the second connecting bar are made of copper and the latter contacts the first connecting bar

by friction stir welding, wherein the upper surface of the first connecting bar is stepped and the first welding portion has a smaller thickness than the body portion, the lower surfaces of the body portion and the welding portion being aligned with each other, and wherein the second connecting bar has a stepped profile and comprises a body portion and a second welding portion formed to contact the first welding portion, the second connecting bar being arranged such that the upper and lower surfaces of the first and second connecting bar are aligned with each other.

## 8.2 Obviousness

8.2.1 O1D11 neither shows nor teaches such a configuration of the two connecting bars, and hence does not provide the skilled person with the proposed solution. Therefore, the combination of the closest state of the art with O1D11 does not lead to the claimed invention.

8.2.2 O1D13 relates to a motor battery lead that should be maniable and flexible. It comprises a first flat lead part and second flat lead part connected by rotation friction welding. This guarantees a high mechanical stability of the connected parts and allows to provide different types of parts that can be adapted to the different vehicle types (paragraphs [0007] and [0008]). Preferably, the first flat part is made of aluminum and the second flat part is made of copper (paragraph [0037]). Figure 3 shows an embodiment that requires little space (paragraph [0038]). O1D13 is silent about the connection of batteries, does not relate to the stability of connected batteries and does not disclose different welding methods, so it seems questionable whether the skilled person trying to solve the posed problem would turn to it. Even if it were to be

accepted, to the benefit of the appellant, that the skilled person would consider O1D13, it is evident that O1D13 only relates to rotational friction welding (paragraphs [0034] and [0035], claims 1 and 16, Figures 7a to 7c), which is also one of the methods disclosed in paragraph [0020] of O1D1. As a consequence, the skilled person, based on the teaching of O1D13, would choose rotational friction welding and not friction stir welding to connect the two connecting bars of O1D1, thereby arriving at a different solution, i.e. a different final product, than the battery module according to claim 1 of the present request.

- 8.2.3 The solution to the posed problem is not obvious. The subject-matter of independent claim 1 and of the five dependent claims therefore involves an inventive step.



## Order

### For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance with the order to maintain the patent in amended form on the basis of the claims of the fourth auxiliary request (labelled auxiliary request 4) as filed with letter dated 20 February 2018 and a description and drawings to be adapted thereto.

The Registrar:

The Chairman:



C. Vodz

E. Bendl

Decision electronically authenticated