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**Datasheet for the decision  
of 29 October 2010**

**Case Number:** T 1179/08 - 3.2.01  
**Application Number:** 00127461.2  
**Publication Number:** 1112919  
**IPC:** B62L 1/00  
**Language of the proceedings:** EN

**Title of invention:**

Bicycle brake disk with arms connecting an inner annular portion to an outer annular portion and tangent to an effective circle

**Patentee:**

SHIMANO INC.

**Opponent:**

SRAM Deutschland GmbH

**Headword:**

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**Relevant legal provisions:**

RPBA Art. 13(1)

**Relevant legal provisions (EPC 1973):**

EPC Art. 54(1), 56

**Keyword:**

"Novelty - main request - no"

"Admissibility - first and second auxiliary request - no"

"Inventive step - third auxiliary request - yes"

**Decisions cited:**

T 1029/96

**Catchword:**

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Case Number: T 1179/08 - 3.2.01

**D E C I S I O N**  
of the Technical Board of Appeal 3.2.01  
of 29 October 2010

**Appellant 01:** SRAM Deutschland GmbH  
(Opponent) Romstr. 1  
D-97424 Schweinfurt (DE)

**Representative:** Thum, Bernhard  
Wuesthoff & Wuesthoff  
Patent- und Rechtsanwälte  
Schweigerstrasse 2  
D-81541 München (DE)

**Appellant 02:** SHIMANO INC.  
(Patent Proprietor) 3-77 Oimatsu-cho  
Sakai-ku  
Sakai City  
Osaka 590-8577 (JP)

**Representative:** GROSSE SCHUMACHER KNAUER VON HIRSCHHAUSEN  
Patent- und Rechtsanwälte  
Nymphenburger Strasse 14  
D-80335 München (DE)

**Decision under appeal:** Interlocutory decision of the Opposition  
Division of the European Patent Office posted  
21 April 2008 concerning maintenance of  
European patent No. 1112919 in amended form.

**Composition of the Board:**

**Chairman:** S. Crane  
**Members:** H. Geuss  
S. Hoffmann

## Summary of Facts and Submissions

- I. The appeals are directed against the interlocutory decision posted 21 April 2008 maintaining the patent EP 1112919 in amended form.
- II. During oral proceedings held on 29 October 2010 the appellant 01 (opponent) requested that the decision under appeal be set aside and the patent revoked.

It alleged lack of novelty with respect to the subject-matter of claim 1 of the patentee's main request and lack of inventive step concerning independent claims 1 of the patent as maintained by the opposition division (corresponding to the patentee's third auxiliary request), relying in its arguments in particular on documents:

- OPP 4** "Bike Workshop - Der Mountainbike Zubehörkatalog '99", Bike Special 1/99, first page, pages 174 and 175 and last page.
- OPP 5** Enlargement of the bottom right illustration on page 174 of OPP 4, entitled "Magura HS 44 Gustav M", with added construction lines;
- D14** US Design Patent, DES. 381.609; also referred to as **E14** on some places in the file.
- D6** US 5,390,771;
- D7** US 5,193,833.

- III. The appellant 02 (patentee) requested that the decision under appeal be set aside and the patent be maintained on the basis of the claims of the main request submitted on 17 January 2008 or in the alternative on

the basis of the claims of one of the auxiliary requests 1 to 4 submitted on 29 September 2010.

In order to confirm its argumentation with respect to what is known in the prior art, the patentee presented the following documents during the oral proceedings:

- A** "Fahrwerkstechnik", Reimpell, J., page 43;
- B** "Die neue Fahrradtechnik", Barzel, P. et al., page 228;
- C** "Disc Brake Fit Info";
- D** Printouts of <http://www.lochkreis.at/inhalt> and <http://www.lochkreis.at/bilder/Honda-org.gif>.

IV. Claim 1 of main request reads as follows, the bold printed feature identifiers in brackets have been added by the Board:

A one-piece brake disk (10) for a vehicle comprising [feature **M1**]:  
a radially inner annular portion (20) having a plurality of circumferentially located mounting holes (24) [feature **M2.1**],  
wherein a mounting circle (MC) is determined by a circle that intersects a center of each mounting hole (24) [feature **M2.2**];  
a radially outer annular portion (28) concentric with the radially inner annular portion (20) and having opposite braking surfaces (32, 34) [feature **M3**];  
a plurality of connecting arms (38) extending from an inner peripheral surface (42) of the radially outer annular portion (28) to an outer peripheral

surface (43) of the radially inner annular portion (20) [feature **M4**],  
characterized in that  
the inner peripheral surface (42) of the radially outer annular portion (28) defining an outer arm connecting circle (OAC) [feature **M5**],  
the outer peripheral surface (43) of the radially inner annular portion (20) defining an inner arm connecting circle (IAC) [feature **M6**],  
for each of the plurality of connecting arms (38),  
a straight phantom line (P) connecting an outer midpoint (OM) of the connecting arm (38) on the outer arm connecting circle (OAC) and an inner midpoint (IM) of the connecting arm (38) on the inner arm connecting circle (IAC) intersects the connecting arm (38) along an entire length of the connecting arm (38) [feature **M7**], and  
the straight phantom line (P) of each of the plurality of connecting arms (38) being tangent to an effective circle (EC) concentric with the mounting circle (MC) [feature **M8**], and  
the effective circle (EC) having a radius greater than a radius of the mounting circle (MC) [feature **M9**].

- V. Claim 1 according to the set of claims as maintained by the interlocutory decision (third auxiliary request) reads as follows, the bold printed feature identifiers in brackets have been added by the Board:

A one-piece brake disk (10) for a vehicle comprising [feature **M1**]:

a radially inner annular portion (20) having a plurality of circumferentially located mounting holes (24) [feature **M2.1**],  
wherein a mounting circle (MC) is determined by a circle that intersects a center of each mounting hole (24) [feature **M2.2**];  
a radially outer annular portion (28) concentric with the radially inner annular portion (20) and having opposite braking surfaces (32, 34) [feature **M3**];  
a plurality of connecting arms (38) extending from an inner peripheral surface (42) of the radially outer annular portion (28) to an outer peripheral surface (43) of the radially inner annular portion (20) [feature **M4**],  
the inner peripheral surface (42) of the radially outer annular portion (28) defining an outer arm connecting circle (OAC) [feature **M5**],  
the outer peripheral surface (43) of the radially inner annular portion (20) defining an inner arm connecting circle (IAC) [feature **M6**],  
for each of the plurality of connecting arms (38), a straight phantom line (P) connecting an outer midpoint (OM) of the connecting arm (38) on the outer arm connecting circle (OAC) and an inner midpoint (IM) of the connecting arm (38) on the inner arm connecting circle (IAC) intersects the connecting arm (38) along an entire length of the connecting arm (38) [feature **M7**], and  
the straight phantom line (P) of each of the plurality of connecting arms (38) being tangent to an effective circle (EC) concentric with the mounting circle (MC) [feature **M8**], and

the effective circle (EC) having a radius greater than a radius of the mounting circle (MC) [feature **M9**],

wherein the radially inner annular portion (20) includes a plurality of first openings (60) disposed radially outwardly of the plurality of mounting holes (24) [feature **M10**],

wherein the effective circle (EC) intersects the plurality of first openings (60) [feature **M11**],

wherein the side surfaces (52, 54) of each of the plurality of connecting arms (38), the inner peripheral surface (42) of the radially outer annular portion (28) and the outer peripheral surface (43) of the radially inner annular portion (20) define a plurality of circumferentially

disposed second openings (64) [feature **M12**],

wherein each of the plurality of connecting arms (38) has a straight middle portion (48) [feature **M13**] and

wherein the radially outer annular portion (28) includes a plurality of circumferentially disposed vent holes (84) [feature **M14**].

VI. The patentee's submissions on novelty of the subject-matter of claim 1 of the main request, insofar as relevant to the present decision may be summarized as follows:

The subject-matter of claim 1 of the main request is new in view of document OPP 4 which is the relevant state of the art; OPP 5 should be disregarded since it has been prepared by the opponent and is - as a result - not state of the art. Only document OPP 4, which is a copy from the magazine "Bike Workshop", is state of the

art, whereas OPP 5 is an enlargement of one illustration taken from OPP 4 which has been furnished with construction lines by the opponent. Clearly OPP 5 has not been made available in this form to the public and a person skilled in the art would not enlarge small pictures, shown in a magazine, for evaluating with construction lines if certain features of a respective brake disc are disclosed or not. Such an approach would be in contradiction to the way in which a magazine is normally read.

Furthermore, the relevant illustration on page 174 shows only approximately two-thirds of a brake disc, one third, the circle segment on the left side, is not shown. Nevertheless, feature M7 of the claim demands that for each connecting arm a straight phantom line intersects the connecting arm along the entire length. Since the connecting arms of the left side of the brake disc are not shown, the form of the connecting arms in this region can only be assumed, based on the part of the disc which is depicted. According to T 1029/96 it has "to be beyond doubt - not merely probable - that claimed subject-matter was directly and unambiguously disclosed in a patent document. So, if there is a reasonable doubt as to the outcome of a disclosure, a novelty objection based on the document in question has to be rejected."

In the present case symmetry of the illustrated brake disc cannot be assumed because asymmetric discs are known in the state of the art. Consequently with respect to feature M7, a reasonable doubt does not allow a novelty objection based on OPP 4.



VII. The first and second auxiliary request should be admitted into the proceedings. The requests have intentionally not been filed with the notice of appeal; it would have been inappropriate to present putative fallback positions at that stage of the proceedings thus weakening the argumentation with respect to the main request. The submission of these requests constitutes a permissible reaction to the Board's communication.

VIII. With respect to inventive step of claim 1 according to the interlocutory decision, the patentee responds as follows:

There is no justification for admitting Document D14 into the proceedings. This document has only been filed with the grounds of appeal and is consequently late filed. In particular, the feature M2.2 which has been added to claim 1 during the oral proceedings before the opposition division is just a clarification and not a restricting feature which would require an additional search and justify the introduction of a further state of the art document. The wording of feature M2.2 is equivalent to the wording of the former feature M2. "A mounting circle is determined by a circle that intersects a center of each mounting hole" (feature M2.2) has essentially the same meaning as "a plurality of mounting holes defining a mounting circle", which is the former feature M2 of the claim as granted. The passage in the description indicating that the mounting circle is determined by any circle that intersects the plurality of mounting holes (cf. paragraph [0008]) is obviously erroneous and identifiable as such for a skilled person. In the technical literature a mounting

circle is defined as a circle always intersecting the center of mounting holes, see documents A to D. Thus, the skilled person immediately recognizes that the mounting circle has to pass through the center of each mounting hole and that a diverging definition must be false. For this reason feature M2.2 only clarifies the claim rather than restricting or changing its subject-matter. As a consequence the further search performed by the opponent has not been induced by the introduction of feature M2.2 and hence, document D14 is late filed.

Document D14 is merely an US design patent which discloses an "ornamental design of a brake disc". A skilled person would not attempt to derive technical information from such a model and although he might give thought to improving the design aesthetically it would not be his aim to improve it technically. Consequently, D14 is an inappropriate starting point for an evaluation of inventive step.

As far as the technical disclosure is concerned, D14 seems not to disclose second openings. The boomerang shaped structure in fig. 1, which shows the front side of the disc, has the same orientation on the rear side, shown in fig. 3. If this boomerang shaped structure were to represent openings, the orientation in the rear side would have to be reversed. Therefore, it has to be assumed that these structures represent recesses.

Be that as it may, features M10, M11 and M13 alone are in any case sufficient for defining an inventive step. The opponent's interpretation of the second part of feature M10 is incorrect. This feature means that the

circle with the greatest radius which intersects the mounting holes does not cross the first openings. For that reason the second part of M10 is not disclosed in D14.

In order to optimize weight and stability, the person skilled in the art would have a lot of possibilities to reduce material. Second openings could be enlarged, connecting arms could be made smaller and the first openings could be enlarged in the direction of the center of the disc. The opponent has not explained why the skilled person would have followed the approach according to features M10, M11 and M13. These features are not merely arbitrary design choices with no technical effect. In particular, a straight connecting arm improves the stability of the disc, cf. paragraph [0003] of the description, and a light-weight construction is realized in particular by the claimed position of the second openings. The brake discs of D6 and D7 are completely different from the disc of the invention and the disc according to D14. In particular, the disc shown in D7 has a web configuration which allows the disc to move axially, cf. column 4, lines 5 et seq. Therefore a skilled person would not take these documents into account.

IX. The opponent's arguments with respect to claim 1 of the main request were essentially the following:

What is determinative with respect to novelty is whether an object which is shown in the state of the art possesses the features in dispute or not. OPP 5, which is an enlargement of part of OPP 4, provides the evidence that all features according to claim 1 of the

main request are disclosed in OPP 4. This means of providing evidence is necessary since the patent tries to define well known features with a new vocabulary, e.g. "effective circle", "phantom lines", being "tangent to the effective circle" etc, which makes it difficult to compare the state of the art with the contested invention.

The feature M7 is also shown in OPP 4. It is self-evident that the illustrated "Magura HS 44 Gustav M" disc possesses the same kind of connecting arms also in the part not shown in the photograph as in the part which is shown. In particular, a catalogue like OPP 4 serves to inform users about products which are commercially available. It is the purpose of a photograph, even if only a part of a product is depicted, to give comprehensive information to the users about the product as a whole. If the disc were not rotationally symmetrical then the catalogue would have certainly pointed to this exceptional feature. Accordingly, there is no reasonable doubt about the disclosure of feature M7 in the relevant picture of OPP 4.

- X. The opponent argued that the first and second auxiliary requests should not be admitted since they have been made at a very late stage of the proceedings without any justification.
  
- XI. With respect to the inventive step of claim 1 according to the interlocutory decision (present third auxiliary request) the opponent argued as follows:

The introduction of document D14 is a reaction to claim 1 as amended during the oral proceedings before the opposition division. Feature M2.2, which defines the radius of the mounting circle by its intersections with the centers of the mounting holes, is an amendment which restricts the claim. This feature has been taken from the description, cf. paragraph [0009] of the patent specification. The paragraph starts by explaining that the mounting circle is determined by any circle intersecting the plurality of mounting holes; the second sentence refers to the specific embodiment, in which the circle intersects the centers of the mounting holes.

This passage has to be taken as it stands; the description of an application may define terms in a particular manner which may be different to a general comprehension of this term.

As a consequence, the claim has been restricted during the oral proceedings of the opposition proceedings and the introduction of a new document is an admissible reaction.

Document D14 discloses all features of the claim except features M11 (the effective circle intersects the plurality of first openings) and M13 (the connecting arms have a straight middle portion). In particular, the second part of feature M10 is also shown in D14. This feature can be understood that the majority of the first openings ("the plurality ...") are not disposed on a radial line starting in the center of the brake disc and passing through a mounting hole. This interpretation of feature M10 is clearly derivable from fig. 3 of the patent specification and is in accordance

with technical demands. For material stress reasons a first opening should not be arranged in a radial line with a mounting hole. This is the case for the most of the openings of the example shown in fig. 3. Only the first openings which are in a one, five and nine o'clock position are located on a radial line which intersects both a mounting hole and a first opening. It can be seen that the first openings on one, five and nine o'clock position are smaller than the remaining first openings, which supports the material stress argument. However, the disc as shown in D14 also discloses first openings which are not disposed on radial lines intersecting the mounting holes, apparently for the same reasons.

Features M11 and M13 are not able to establish an inventive step over the disclosure of document D14. Feature M11, which defines that the effective circle intersects the first openings, would be fulfilled if the first openings in D14 were disposed very slightly more outwardly. This minor design modification is at the free disposal of the skilled person and cannot substantiate an inventive step.

It is not important if the connecting arms are straight or not (feature M13). Furthermore, the state of the art discloses brake discs with straight connecting arms so that the implementation of this feature is just a known alternative to a non-straight connecting arm, cf. D6 and D7.

Consequently, the subject-matter of claim 1 according to the interlocutory decision is not inventive.

The same conclusion had been reached by the Intellectual Property Court of Taiwan and reference was made to that decision.

## **Reasons for the Decision**

1. The appeals are admissible.

### *Main Request*

2. The subject-matter of claim 1 according to the main request is not new with regard to document OPP 4 (Article 54(1) EPC 1973).
  - 2.1 It is not disputed that document OPP 4 as such, comprising pages of the January 1999 magazine "Bike Workshop", belongs to the state of the art. It is also not disputed that the "Magura HS Gustav M" brake disc illustrated in the bottom right picture on page 174 possess features M1 to M6 according to claim 1. What is in dispute is whether features M7 to M9 are also disclosed in that illustration.

In support of its arguments with respect to features M7 to M9 the opponent has filed document OPP 5, which is an enlargement of the picture in question and in which construction lines showing in particular the mounting circle (MC), the inner arm connecting circle (IAC), the effective circle (EC) and a straight phantom line (P) have been introduced. Again it is not in dispute as such that the geometry defined by these construction lines complies with the relevant requirements of claim 1 in this respect, in particular that the radius

of the effective circle is greater than the radius of the mounting circle.

- 2.2 The patentee argues however that an enlargement as provided by the opponent with OPP 5 does not belong to the state of the art and therefore, it is not allowed to prove the existence of the features M7 to M9 with the help of this document. A skilled person would not use such an approach since it is in contradiction with the normal consideration of a magazine. Thus, the features M7 to M9 have to be regarded as not being disclosed in OPP 4.
- 2.3 The Board cannot agree. In its view the enlargement of an image is a common technique for better evaluating geometrical relationships which can be used legitimately if the same geometrical relationships exist in the enlargement as in the state of the art document.
- 2.4 Moreover, in the Board's view, it is not significant whether or not the photographic enlargement of an illustration coming from a magazine and adding construction lines to illustrate the existence of features in dispute is in accordance to the normal use of such a magazine by a typical reader. With respect to novelty, it is also insignificant whether this typical reader is a non-expert consumer or a person skilled in the art.

The sole question is whether the features in discussion can be derived from a state in the art without undue burden or not. The Board can see no reason why the enlargement of the image in question in the present



case so as to analyse its geometry with the help of construction lines should fall into the category of an undue burden.

2.5 The patentee further argued that feature M7 defines that for each connecting arm a straight phantom line intersects the connecting arm along the entire length. However in the relevant picture of OPP 4 only approximately two-third of the brake disc is shown. Since non-symmetric brake discs are known in the state of the art, it is not beyond doubt that in the non-shown part the connecting arms do not have another form than in the shown part. Since feature M7 relates to all connecting arms it cannot directly and unambiguously derived from document OPP 4.

2.6 Again the Board cannot agree. The part of the brake disc as shown in the bottom right photograph of page 174 gives no reasonable doubt about the design of the whole brake disc. A photograph in a catalogue is intended to inform a potential costumer about the relevant features of a product. Clearly the overall design of a brake disc is a relevant feature and it would certainly have been mentioned if the non-shown side of the disc were to exhibit features differing form those of the shown side. Additionally, an asymmetric design of a brake disc in which a segment making up approximately one third of the disc is different form the other two thirds is not shown in the state of the art on file and has not been presented by the patentee to support this line of argumentation. Hence, the Board holds the opinion that the rotationally symmetric design of the brake disc in

which each connecting arm has the same form is not only probable but beyond any reasonable doubt.

3. The first and second auxiliary requests as filed with the letter of 29 September 2010 are not admitted into the proceedings, Article 13(1) Rules of Procedure of the Boards of Appeal (RPBA, OJ EPO 2007, 536-547).
- 3.1 The patentee stated that these requests have only been filed one month before the oral proceedings since the argumentation with respect to the main request would have been weakened by presenting auxiliary requests at an earlier stage. These could have been interpreted by the Board and the opponent as putative fallback positions. It became clear however from the communication of the Board annexed to the summons that further auxiliary requests would be appropriate and they should therefore be seen as an allowable reaction to this communication.
- 3.2 According to the principles developed by the Enlarged Board of Appeal in relation to the inter partes appeal proceedings provided for in the EPC, the appeal primarily serves the parties' right to a review of the first instance decision. The purpose of the inter partes appeal procedure is mainly to give the losing party an opportunity to challenge the decision against it. Hence a patentee who has lost before the opposition division has the right to have the rejected requests reconsidered by the Board of Appeal or to file new requests with the statement of grounds of appeal or the reply. However, if the patentee wants further requests to be considered, the admission of these requests is a

matter for the Board's discretion, cf. Case Law, 6th edition 2010, VII.E.16.2.1.

3.3 In the Board's view, tactical considerations of the patentee, namely not to weaken the argumentation with respect to a main request by presenting auxiliary requests at an early stage of the proceedings, do not fall under the provisions as established in the Case Law and as summarized under 3.2. On the contrary, such a course of action prejudices the efficient working of the Board and proper conduct of the appeal proceedings in general. Since it is impossible to consider these requests with the annex to the summons to oral proceedings, the parties' will not have been informed about the Board's opinion with regard to these requests. The sole request which has been filed with the submission of the statement of grounds of appeal was the main request which has been rejected by the opposition division. As a consequence the patentee should have been aware about possible fallback positions already at this stage of the proceedings.

3.4 The first and second auxiliary request in the present case contain - additionally to the features M1 to M9 as for the main request - inter alia feature M10 and features M10 and M11 respectively. By withdrawing a first and second auxiliary request during the oral proceedings before the opposition division the patentee avoided a finding in the decision about the impact of these features M10 and M11 - which had been present in the withdrawn requests at that time as well - with respect to novelty and inventive step, which could then have served as a basis for the following appeal procedure.

3.5 In particular, the opinion of the patentee that the further requests should be allowed as a reaction to the communication of the Board cannot be followed. Clearly, the issue of a communication by the Board cannot be seen as a blank ticket for a patentee to file new requests. Each case has to be considered on its merits, in particular to determine the extent to which there is a direct casual link between the filing of these requests and what is said in the communication. In the present case the patentee seems to be relying on point 1.3 of the communication, in which the Board identifies which features appear to distinguish the subject-matter of the claim upheld by the opposition division from the prior art, as being an open invitation for it to try its luck with a broader claim in which only one or two of these features appear. In particular, the patentee did not make clear in which manner the features M10 resp. M10 and M11 would have an impact for the evaluation of inventive step with respect to document D14 (cf. letter of 29 September 2010, 2.3.2 and 3.2.2) on which point 1.3 of the communication is based. It is in any case self-evident that no such invitation as imagined by the patentee can be read into what the Board says there, especially as this would run directly counter to the requirement that the Board act impartially.

4. Document D14 is admitted into the proceedings. This document is not late filed since its introduction is a direct reaction to the amendment of claim 1 during the oral proceedings in opposition proceedings. In particular, feature M2.2 - which does not come from a dependent claim as granted - has been introduced with

the requests which have been submitted during oral proceedings, cf. minutes of the oral proceedings in opposition proceedings, page 1, last paragraph. As feature M2.2 defines the radius of the mounting circle MC, it has a direct impact on feature M9 and the specific geometry of the disc.

4.1 The patentee objected that document D14 is late filed for the reason that claim 1 of the main request - which has been amended during oral proceedings before the opposition division - has not been restricted by the added feature M2.2 but only clarified. The passage in the description indicating that a mounting circle "is determined by any circle that intersects the plurality of mounting holes" is obviously erroneous and identifiable as such for a skilled person (cf. the patent specification, paragraph [0009]). A skilled person would always presume that a mounting circle has to intersect the center of each mounting hole as indicated in the disclosed embodiment. Documents A to D, presented during the oral proceedings prove this general knowledge of a skilled person.

4.2 The Board holds the opinion that the patent specification is unambiguous about what is meant by the term mounting circle. Paragraph [0009] clearly states that a mounting circle is defined by any circle intersecting all mounting holes. There is no reason why a skilled person should assume that this definition might be false. The documents A to D do not mention the expression "mounting circle" or "*Montagekreis*" at all. Document A shows tire rims, having a bolt circle ("*Lochkreis*"); document B depicts a sprocket wheel with a bolt circle diameter ("*Lochkreisdurchmesser*");

document C discloses a "bolt circle mounting flange" for a hub and document D illustrates brake discs with a bolt circle and a bore circle ("*Lochkreis*", "*Bohrkreis*"). All these documents cannot confirm that a "mounting circle" is generally defined in the state of the art as a circle intersecting the respective centers of the mounting holes. On the contrary, in the state of the art which has been offered by the patentee no definition of a mounting circle has been found at all. Consequently a definition as made in the description of the patent is able to define a proper and specific interpretation of the term mounting circle for the context of the patent.

- 4.3 The second sentence of paragraph [0009] which explains that in the particular embodiment the mounting circle intersects the center of each mounting hole is not in contradiction with the first sentence since a concrete realisation is chosen from the manifold possibilities given by the general definition of the first sentence. Furthermore, the Board cannot identify any further passage in the description which would give reason to assume that the definition of the first sentence of paragraph [0009] is erroneous.
  
5. The subject-matter of claim 1 according to the interlocutory decision (corresponding to the patentee's third auxiliary request) is inventive according to Article 56 EPC 1973.
  - 5.1 As explained in paragraph [0002] of the description the thermal load of the disc due to the braking operation results in an uneven heating of the disc which comes from the fact that the part of the disc which is in

contact with the pads heats more up than the rest. The uneven heating may cause the disc to warp.

According to paragraphs [0003] and [0004] of the description attempts have been made to solve this problem by adopting particular connecting arm geometries and configurations, but these proposals are not optimal from the point of view of stress distribution and rigidity.

Thus the problem the claimed invention sets out to solve is to relieve thermally induced stress in the disc without compromising rotational and lateral rigidity, see paragraph [0005] of the description. It goes without saying that the weight of the disc is also an important factor which has to be born in mind.

5.2 The Board shares the view of the opponent that document D14 constitutes the closest state of the art against which the inventive step of the claimed subject-matter has to be judged. In particular, the Board cannot accept the contention of the patentee that it being labelled an "ornamental design" precludes the shown brake disc from being a starting point to which the skilled person would make modifications so as to improve its technical performance. After all, what is shown in D14 is an object which on the one hand is intended to make a pleasing impression on the eye, but on the other hand has a clearly defined technical purpose.

5.3 A preliminary point which needs to be addressed with respect to the disclosure of D14 is the question of what is actually represented by the inner ring of five

substantially equally spaced "triangular"-shaped elements and the outer ring of ten substantially equally spaced "boomerang"-shaped elements. The patentee has argued at length that these elements do not necessarily constitute openings but could be surface recesses or some form of surface ornamentation. The Board has however no doubt that the person skilled in the art seeking to produce a disc as shown in D14 would, on the basis of his knowledge of similar discs, immediately understand that he is supposed to make openings of the relevant shape in the disc at the relevant positions. Thus even if at the strictest level to the absolute disclosure, the argument of the patentee were correct, it could have no effect on the evaluation of inventive step. Thus in what follows it is assumed that a brake disc having these two rings of openings effectively belongs to the state of the art.

5.4 There is no dispute between the parties that the following features of claim 1 are not disclosed in D14:

- (M11) that the effective circle intersects the plurality of first openings; and
- (M13) that each of the plurality of connecting arms has a straight middle portion.

Where there is dispute is the extent to which the feature M10 is disclosed. In this context the opponent has adopted an interpretation of the requirement that the first openings are "disposed radially outwardly" of the plurality of mounting holes which in the Board's view is unrealistic. In particular, the opponent sees this requirement as directed to the relative circumferential dispositions of the mounting holes and



the first openings, more specifically that the openings are not located on the same radii as the mounting holes. This is certainly the case in D14, where the openings and mounting holes are intercalated regularly around the circumference. The opponent argues that it is also the case with the majority of the openings (six out of nine) in the disclosed embodiment of the claimed invention. The patent specification however makes no mention of this, nor it does explain why the other three openings are disposed differently. (The varying disposition seems to arise simply from the fact that there are nine openings and six mounting holes). In the view of the Board the feature M10 when seen in the light of the total disclosure has a plain and simple meaning, namely that there is no overlap, measured radially, between the inner edges of the first openings and the outer edges of the mounting holes. This is clearly not the case in D14, thus feature M10 is not disclosed there in its totality.

- 5.5 The Board is of the opinion that the specific position of the first openings as defined in M10 and M11 contributes to the solution of the problem explained above. Brake forces are induced via the connecting arms tangentially into the inner portion of the disc along the circumference of the effective circle which has a radius significantly larger than the mounting circle. The difference in radius for these two circles has as a consequence that brake forces induced in the effective circle and reaction forces brought on the mounting circle do not stress the same region of the brake disc. The connecting arms with the straight middle portion according to feature M13 help to induce the forces tangentially into the effective circle. A curved

connecting arm would induce the force in a direction which would negate the advantage of the different radii as explained above.

The Board is thus satisfied that the features M10, M11 and M13 have a combined effect and are not, as argued by the opponent, individual design options which should be considered separately from each other when evaluating inventive step.

- 5.6 With regard to features M10 and M11 the opponent argues that it would only be necessary to move the first openings of the disc of D14 a small distance radially outwardly for these requirements to be met there. But this is only true if the feature M10 is interpreted in the way put forward by the opponent, which for the reasons explained in detail in point 5.4 above, is incorrect. On the proper interpretation given there then the distance involved necessary to meet the requirement of feature M10 would be in fact quite considerable.

The opponent has given no clear technical incentive for the person skilled in the art to make this modification, and given the specific shape and orientation of the first openings in D14 the Board is of the opinion that he might indeed have been reluctant to make it as it could lead to a significant and potentially damaging narrowing of the load bearing areas between the first and second openings.

Similarly the opponent has not advanced any technical reason which would have led the skilled person to combine a modification of the radial position of the

first openings of the disc of D14 with a modification of the connecting arms such that they be straight. In this respect it is not sufficient to show that straight connecting arms were known per se. In particular the documents especially relied upon by the opponent in this context, D6 and D7, contain nothing which would indicate to the skilled person that straight connecting arms would be preferable to curved ones when considering the solution of the technical problem addressed in point 5.1, above.

Thus the Board has come to the conclusion that it was not obvious for the person skilled in the art to modify the brake disc of D14 in the manner necessary for the particular combination of geometrical requirements determined by the features M10, M11 and M13 to be met. The subject-matter of claim 1 of the third auxiliary request therefore involves an inventive step.

5.7 The opponent has argued that the patent specification attempts to disguise the similarity between the claimed invention and the state of the art by adoption of a new vocabulary to describe it. That the invention is based on geometrical consideration not addressed in these terms in the prior art cannot be held against it. Certainly, as the opponent has more than adequately demonstrated with OPP 5 for example, there is no difficulty in applying the vocabulary of the claims to a prior art disc to determine whether the claimed features are known or not.

5.8 The Board has studied the decision of the Taiwanese court referred to by the opponent. It appears to contain nothing comparable to the analysis made above

with respect to the combined effect of the features M10, M11 and M13 and what would have motivated the skilled person to modify the brake disc of D14 in the manner necessary to arrive at the subject-matter of claim 1 of the third auxiliary request. To that extent there is nothing in the decision which could influence the finding of the Board on this question.

6. In summary, it must be stated that both appeals cannot succeed.

## **Order**

**For these reasons it is decided that:**

The appeals are dismissed.

The Registrar:

The Chairman:

A. Vottner

S. Crane