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Datasheet for the decision of 16 July 2020

Case Number: T 2294/16 - 3.2.01

Application Number: 09173532.4

Publication Number: 2181867

IPC: B60C25/138

Language of the proceedings: EN

Title of invention:
Tyre-changing machine for fitting and removing vehicle wheels

Patent Proprietor:
SICAM S.r.l.

Opponent:
Snap-on Equipment Srl a unico socio

Headword:

Relevant legal provisions:
EPC Art. 54(1), 56, 100(a), 100(b), 100(c), 123(3)

Keyword:

Late-filed evidence - common general knowledge (admitted)
Sufficiency of disclosure - support by the description (yes)
Amendments - added subject-matter (no)
Extension of scope of protection - interpretation of claims as granted (no)
Novelty - (yes)
Inventive step - (yes)

Decisions cited:

T 1018/02, T 2221/10, T 1691/11, T 2511/17

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

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Case Number: T 2294/16 - 3.2.01

D E C I S I O N
of Technical Board of Appeal 3.2.01
of 16 July 2020

Appellant: (Opponent)	Snap-on Equipment Srl a unico socio Via Provinciale per Carpi, 33 42015 Correggio (RE) (IT)
Representative:	Eisenführ Speiser Patentanwälte Rechtsanwälte PartGmbB Postfach 31 02 60 80102 München (DE)
Respondent: (Patent Proprietor)	SICAM S.r.l. Via Gustavo Corradini, 1 42015 Correggio (RE) (IT)
Representative:	Brunacci, Marco BRUNACCI & PARTNERS S.r.l. Via Scaglia Est, 19-31 41126 Modena (IT)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 22 July 2016 rejecting the opposition filed against European patent No. 2181867 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	G. Pricolo
Members:	W. Marx
	P. Guntz

Summary of Facts and Submissions

I. The opponent lodged an appeal against the decision of the opposition division rejecting its opposition against European patent No. 2 181 867.

II. In its decision the opposition division held that the contested patent meets the requirements of Articles 123 (2) EPC and 83 EPC. Moreover, it held that the subject-matter of claim 1 was new and inventive over the following prior art:

D1: EP 1 995 083 A1;
D2: EP 1 927 484 A1;
D3: US 2004/0165180 A1;
D4: DE 41 01 921 A1;
D5: Extract of the entry "image" in Wikipedia (https://en.wikipedia.org/wiki/Image);
D6: Extract of the entry "holography" in Wikipedia (https://en.wikipedia.org/wiki/Holography).

III. With its grounds of appeal the appellant filed the following document as evidence of the common general knowledge of the person skilled in the art:

D7: Handbuch der industriellen Meßtechnik, von Prof. Dr. Paul Profos und Prof. Dr.-Ing. Tilo Pfeifer, 5. Auflage, R. Oldenbourg Verlag München Wien 1992, ISBN 3-486-21794-1; Auszug umfassend die Seiten 472 und 473.

IV. Oral proceedings before the board took place on 16 July 2020.

The appellant (opponent) requested that the decision under appeal be set aside and that the European patent be revoked.

The respondent (patent proprietor) requested that the appeal be dismissed (main request) or, in the alternative, that the patent be maintained in amended form on the basis of one of auxiliary requests 1 to 5 as submitted with the reply to the grounds of appeal.

V. Claim 1 as granted (main request) reads as follows (feature analysis as proposed by the appellant):

M1: Tyre-changing machine (1) for fitting and removing vehicle wheels, comprising:

M2: a base frame (2) supporting gripping and rotating means (3) for at least one wheel (R) of vehicles with a rim (C) and a tyre (P) to be fitted/ removed,

M3: at least an operating head (4) associable with said base frame (2) and having at least a fitting/ removal tool (5, 6),

M4: operating means (7, 8, 9) suitable for positioning said operating head (4) in a work configuration in which said tool (5, 6) is arranged in contact against said tyre (P) substantially near the flange (B) of said rim (C),

M5: detection means without contact (10) for detecting without contact said flange (B) of the rim (C)

M5.1: which are operatively associated with at least one processing and control unit (11) suitable for the control/aid of said operating means (7, 8, 9) for the positioning of said operating head (4) in said work configuration,

M5.2: said detection means (10) further comprise an identification system of the structured light type

characterized in that

M5.3: said detection means without contact (10) comprising: at least a pattern generator (12) suitable for projecting at least one three-dimensional image (13) towards said wheel (R) and

M5.4: at least one detection device (14) for detecting the light generated by reflection by the intersection of said three-dimensional image (13) with said wheel (R).

VI. The appellant (opponent) essentially argued as follows:

D7 filed with the grounds of appeal

Document D7 was filed, in view of the opposition division's interpretation of D4, to prove the common general knowledge of the person skilled in the art, a mechanical engineer working in the field of tyre-servicing machines. A light pattern described as a grid required several stripes of light crossing each other, in particular several light stripes which were projected simultaneously, as known from D7 which also showed a propagation along a pyramid or a cone.

Sufficiency of disclosure

Feature **M5.3** and in particular the term "*three-dimensional image*" was clear and understood by the skilled person as a hologram (see D5), since a statue was to be excluded in the present case. He also knew how a hologram (containing position information) was created (see D6: encoding of a light field as an interference pattern, which reproduced the original object when suitably lit). The hologram was the only known pattern generator for projecting a three-dimensional image towards the wheel (**M5.3**). When reaching the wheel, the light field intersected with the wheel (**M5.4**). The meaning of "three-dimensional image" was thus confirmed by this term as used twice in claim 1. As also confirmed by paragraph [0040] of the contested patent, according to which the three-dimensional image was projected "into space", it was the three-dimensional image that was projected.

Since features **M5.3** and **M5.4** defined that a three-dimensional image was projected towards (i.e. in direction of) the wheel which intersected with the wheel (i.e. both the image and the wheel had to be present), the resulting distorted (non-planar) two-dimensional image appearing on the wheel was not to be considered as the three-dimensional image as claimed. However, these features were fully in line and made sense for a hologram forming the three-dimensional image. Moreover, holographic interferometry for measuring tyres was a known technique.

Claim 1 had to be construed only in case of contradictions. However, features **M5.3** and **M5.4** were unambiguous and not contradictory to the remaining features of claim 1, as claim 1 did e.g. not further

specify any evaluation of data. According to the case law of the Boards of Appeal, interpretation of a claim was only required in case of ambiguous claim wording (see T 2511/17), i.e. if three-dimensional images were not known in the art. However, three-dimensional images in form of holograms were well-known. In case of a discrepancy between the claims and the description, the unambiguous claim wording had to be interpreted as it would be understood by the person skilled in the art without the help of the description (T 2221/10). A clear wording of the claim was what needed to be considered under Article 83 EPC, rather than another speculative interpretation of the claim (T 1691/11). Moreover (see T 1018/02), the description could not be used to give a different meaning to a claim feature which imparted a clear credible technical teaching to the skilled reader. In the present case, the description of the patent even did not impart a different teaching. Paragraph [0039] of the contested patent only recited "an image", not mentioning its type. Paragraphs [0040] and [0041] then referred only to variants of the image. There was no contradiction to the embodiment of Figure 2 and paragraphs [0041] to [0046] which showed that a two-dimensional image was projected towards the wheel. However, the patent had been granted for a three-dimensional image. Paragraph [0040] was the only passage mentioning and supporting a three-dimensional image. The skilled reader would only take from this passage that a hologram was projected along a cone of light, in accordance with feature **M5.3**.

The patentee was responsible for the wording of the claims, and there was no reason to give the term "*three-dimensional image*" a different meaning. It was not discernible for the public (also when considering paragraph [0040]) that anything else than a three-

dimensional image was meant. In case a "pattern of lines" or a "two-dimensional image" was meant, then claim 1 had to be reformulated by replacing the term "three-dimensional image" e.g. by "pattern of lines". This was however unallowable under Article 123(2) EPC, thus indicating that it was not meant.

In summary, the wording of features **M5.3** and **M5.4** and also paragraphs [0040] to [0043] of the contested patent clearly addressed a hologram and only made sense with a hologram. Neither the claims nor the description of the contested patent disclosed how the three-dimensional image (hologram) had to look like so that the flange of the rim was detected by its intersection with the wheel. A hologram intersecting with a wheel provided an irregular and diffuse illumination of the wheel. No image would appear on the wheel. Since the contested patent did not disclose how the light reflected by the wheel and detected (feature **M5.4**) was processed to detect the flange of the rim, the subject-matter of claim 1 was insufficiently disclosed.

Extended subject-matter

Assuming the term "*three-dimensional image*" meant a distorted two-dimensional image occurring on the wheel, claim 1 as granted was not originally disclosed as regards feature **M5.3**, which required projection of a three-dimensional image. Following the respondent's view that the three-dimensional image resulted from a two-dimensional image impinging on a tyre, amended claim 1 did not result from a literal insertion of claim 4 into claim 3 as originally filed. In this case, feature **M5.4** was not originally disclosed, although there might be no problem as regards feature **M5.3**. Under this claim construction, original claim 3 meant

two different images, so the (single) three-dimensional image of original claim 4 could not be inserted twice into claim 3. Claim 1 as granted was also not supported by the description. Paragraph [0040] only disclosed a three-dimensional image projected "into space", but not towards a wheel.
In case the term "*three-dimensional image*" meant a hologram, there was no issue with extended subject-matter but an issue under Article 100(b) EPC. To put it differently, when arguing under Article 100(b) EPC that no three-dimensional image was meant, such image was not originally disclosed. Claim 1 was more than a mere juxtaposition of features of original claims 3 and 4.

Objection under Article 123(3) EPC

When interpreting features **M5.3** and **M5.4** according to the disclosure in paragraphs [0040] to [0044] of the contested patent, technical information had to be deleted and new technical information had to be added so that these features would read as follows:

M5.3: said detection means without contact (10) comprising: at least a pattern generator (12) suitable for projecting at least ~~one three-dimensional image (13)~~ a pattern of lines towards said wheel (R) and

M5.4: at least one detection device (14) for detecting the light generated by reflection by the intersection of said ~~three-dimensional image (13)~~ pattern of lines with said wheel (R) wherein the detection device is configured to reproduce the shape of said lines on the wheel and to transfer the data to the control unit (11) which is configured to process the acquired data to recognize the flange of the rim.

Such amendment violated Article 123(3) EPC and was not admissible, as the pattern generator and the detection device were suitable for generating and processing two-dimensional images instead of three-dimensional images.

Novelty

Features **M1** to **M5.2** of granted claim 1 were known from document D1, as found by the opposition division. However, features **M5.3** and **M5.4** did not require a light source emitting light along a cone or a pyramid, but only at least one pattern generator suitable for projecting a three-dimensional image towards the wheel. According to paragraph [0040] of the contested patent the term "three-dimensional image" defined an image which did not propagate along a plane. As an example, propagation along a cone or pyramid was mentioned, but claim 1 did not exclude further non-planar three-dimensional propagation.
Figure 4 of D1 showed a possible arrangement of optical sensing devices (see paragraph [0011]), in particular three projecting devices emitting planar light beams that projected stripes onto a wheel, resulting in a distorted two-dimensional image on the wheel. The axes of sensing devices 6 and 7 were anti-parallel and approximately parallel to the wheel's rotation axis (see column 4, lines 52 ff), i.e. possibly (not necessarily) in one plane, whereas the axis of sensing device 8 was oriented differently, namely substantially horizontally in radial direction of the tyre (column 5, line 50). The light fan of sensor 8 was orthogonal to the light fans of sensors 6 and 7. Thus, the sensing devices 6, 7 and 8 emitted three sheets of light not belonging to the same plane and projected an image along a non-planar path (pattern generator of feature **M5.3**). The projected stripes resulted in a non-planar

(distorted) two-dimensional image on the wheel, which was detected by three sensors (feature **M5.4**, which did not require a single detection device). The perspective view of Figure 4 unambiguously showed that no continuous (i.e. one-dimensional) line was formed by the three stripes projected onto the tyre and the rim. Moreover, claim 1 as granted did not require stripes of light being connected to each other (see also Figure 2 of the patent). Optical sensing of rim beads was possible with sensing devices 6, 7 (paragraph [0015]), and the contour and width of the rim bed was determined with sensing device 8.

The light sources in D2 also scanned a stripe-like area on the wheel by emitting pivotable laser beams instead of laser fans. As argued with regard to D1 and the interpretation of the term "*three-dimensional image*" on the basis of paragraph [0040] of the contested patent, feature **M5.3** was known from D2 showing three laser beams that were pivotable and therefore normally not arranged in a plane. The three detection devices in D2 received the light reflected by the wheel, so feature **M5.4** was also known.

Inventive step

According to the contested decision, closest prior art document D2 disclosed all features of claim 1 except for features **M5.3** and **M5.4**, which provided the effect that no pivoting of the sensor device projecting the light beam as in D2 was required. The problem to be solved was to provide a more efficient measuring device which was faster in measuring positions on the wheel and thus more economic. As the skilled person was aware of the pivoting in D2 (see column 5, lines 12 ff), he was looking for alternative measuring methods.

The skilled person would consult D7, a basic handbook on industrial measuring dealing (as D2) with structured lighting, and would choose a sensor arrangement using a structured light pattern, such as a grid or parallel stripes, in order to scan the wheel surface and the rim flange. Applying a grid as known from D7 would allow for detecting spatial information on various positions, which was more efficient. The structured light pattern according to D7 propagated along a cone or pyramid, so he would arrive at the subject-matter of claim 1.

Alternatively, he would look for solutions in the pertinent technical field, comprising vehicle service apparatus and tyre balancing machines as mentioned in D4 (column 2, lines 25-33; column 3, lines 9-10), but also brake disc turning lathes. D4 was not limited to the detection of valves, and the turning speed of the machines was irrelevant. D4 concerned the detection of the rim beads (see column 3, lines 9-15) as described in D2 (claim 11), so D4 would be considered. Pivoting of the sensing device was avoided when using detection means as known from D4, i.e. when projecting a light pattern in form of a grid or many stripes (column 3, lines 24 ff) in order to detect the rim beads. When projecting a grid, it required a cone or pyramid of light, and D4 disclosed (column 8, lines 16 ff) how the reflected image was evaluated by means of a camera. The term "grid" was not used by mistake, as D4 taught projecting light "substantially" in a plane (column 3, lines 15-18). Moreover, the term "Streifen" used in D4 for describing the light pattern was always put in quotation marks. D4 even showed (column 8, lines 66 ff) projection of four points, which did not mean a planar light stripe. Even following the opposition division that D4 did not show simultaneous projection of several

stripes, a light pattern consisting of sequentially projected stripes represented a light propagation path formed by a pyramid. The skilled person reading D2 and D4 would thus arrive at the subject-matter of claim 1.

VII. The respondent's arguments relevant to the present decision may be summarised as follows:

Sufficiency of disclosure

Holography was used for comparing tyres, but not for scanning an object by means of a hologram, i.e. by projecting a hologram towards a wheel and detecting reflection of its intersection with a wheel to obtain a distorted two-dimensional image.
The term "image" had a broad variety of meanings. In the context of the present patent a skilled person would not think of a hologram stringently when reading claim 1, otherwise the inventor would have used this clear expression. Moreover, generation of three-dimensional holograms was complicated, requiring components that in 2008 could not immediately be mounted on a tyre-fitting machine. In the present case, the skilled person had to learn what this term meant. A clear explanation of a "*three-dimensional image*" was given in paragraph [0040] of the patent, namely that light was propagating not only along a line or a single plane, but along a cone or a pyramid of light. Thus, the three dimensions were given by the propagation direction and the two dimensions of the cone or pyramid in the direction perpendicular to the propagation of the light. This was clear from the contrasting juxtaposition of three-dimensional light propagation versus the prior art discussion of one-dimensional and two-dimensional light images in paragraph [0040] and further supported by the drawing figures 1 and 2. The

line image 13, showing two dimensions together with the propagation direction of the light as a further dimension, spanned a three-dimensional light image in the sense of the patent. Thus, a skilled person could understand and reproduce the teaching of claim 1. Decision T 1018/02 cited by the opponent was not relevant in this context, since the description in the present context was not used to give any feature a different meaning but helped to correctly understand what was meant by feature **M5.3.**

Extended subject-matter

The subject-matter of claim 1 resulted from a literal combination of originally filed claims 1, 2, 3 and 4 without adding new subject-matter.

Novelty

Document D1 clearly showed the use of a light fan which propagated only along a single plane (see Figure 4, paragraphs [0017] and [0023]: light sheet or planar light beam 21). The planar light beams 21 irradiating the vehicle tyre 4, namely two light beams for the averted outer sides of the ring beads 12 and a separate light beam for the rim bed 14, did not interfere with each other as concerns the detection of a certain part of the rim. Accordingly, D1 failed to disclose the projection of a three-dimensional image. Moreover, there was no teaching in D1 confirming that the third light emitting generator 8 projected a planar light beam lying in a plane different from the plane projected by devices 6 and 7.

The disclosure of document D2 was even further away from the invention, as D2 only disclosed the use of single light beams (paragraph [0019] and Figure 3).

Inventive step

Admittedly, D2 represented the closest prior art. The invention solved, from an economic point of view, the problem of obtaining better performance and efficiency, also as regards the overall operation by the operator. It improved the detection performance (quality, speed) and simplified the mechanical support of the optical measuring system (no pivotal support).

D7 only showed a fundamental measuring principle concerning the imaging sensor, unrelated to the field of tyre-changing machines. Moreover, the optical measuring system of D2 (disclosing a single beam system, not even a system with a two-dimensional planar light sheet) was several evolution steps away from the present invention. The D7 technology had also not been used when developing the machines according to D1 and D2. Therefore, the skilled person starting from D2 with its pivoting laser beams would not take into account D7 and combine it with D2 to arrive at the claimed invention.

D4 did not relate to tyre-changing machines, but only in general to a tyre-servicing device comprising tyre balancing, wheel alignment and brake disc turning machines. Thus, it related to a different technology, which rotated wheels at high speed and had sensing devices for detecting valves. Even considering D4, the skilled person would not arrive at the invention. D4 spoke of stripes ("Streifen"), and the overall teaching of D4 concerned the emission of planar light. Only

incidentally D4 mentioned "many stripes" or a "grid". When reading "many stripes" the skilled person would think of stripes in the same plane in view of D4's teaching of planar light beams. The mention of a "grid" seemed to be contradictory to the teaching of D4 and would not be used by the skilled person. Even trying to combine the diverging teaching in D4, projecting a "grid" could mean that planar light was generated at different times (planar light sheets intersecting at different times), so the skilled person would not arrive at a three-dimensional image according to the invention. None of the figures in D4 showed a three-dimensional image propagating along a cone or pyramid. D4 relied on measuring an angle between two planes.

Reasons for the Decision

1. The appeal is admissible.

2. Admissibility of document D7

The board sees no reason not to admit document D7 into the appeal proceedings, as it merely provides evidence for the knowledge of the person skilled in the art. In fact, the respondent did not object to the admission of this document into the appeal proceedings.

3. Sufficiency of disclosure

3.1 The invention as claimed is sufficiently disclosed and the requirements of Article 83 EPC are met, so the ground of opposition under Article 100(b) EPC does not prejudice maintenance of the patent as granted.

3.2 According to the appellant, the term "*three-dimensional image*" used in feature **M5.3** of claim 1 was clear and could only be understood by the skilled person as a hologram, which allegedly was the only known pattern generator for projecting a three-dimensional image towards the wheel.

However, the board is not convinced that the skilled reader would clearly and unambiguously understand that a hologram was meant when reading claim 1 and the rather general term "*three-dimensional image*" recited in features **M5.3** and **M5.4**. Considering this term on its own, it might mean a hologram or statue (as indicated by the appellant by referring to D5) or even a distorted two-dimensional image appearing on a non-planar surface (as noted in the board's preliminary opinion).
As claim 1 requires projection of a three-dimensional image towards the wheel and intersection of this image with said wheel (i.e. the image has to be present and not only come into existence on intersecting the wheel), a statue or a distorted two-dimensional image appearing on the wheel cannot be meant, as argued by the appellant. Nevertheless, in the context of the subject-matter of claim 1, the board has doubts that the skilled reader would inevitably assume that only a hologram was meant. Document D7 (filed by the appellant to prove the knowledge of the person skilled in the art) concerns detection of three-dimensional structures by means of structured light (see page 472: "strukturierte Beleuchtungen") which relies on the projection of a two-dimensional "grid" (namely a pattern of equidistant lines) onto the object. This already shows that the term "*identification system of the structured light type*" used in feature **M5.2** of the preamble of claim 1 indicates to the skilled reader

that not necessarily a hologram was meant by the characterising features of claim 1. Moreover, the appellant based its argument about insufficiency of disclosure on the fact that a hologram intersecting with the wheel provided an irregular and diffuse illumination of the wheel so that no image appeared on the wheel and the contested patent lacked information on how feature **M5.4** was reproduced. This also shows that when reading claim 1 the skilled person would have some doubts on what was meant by the term "*three-dimensional image*" in the context of the features of claim 1, which rely on the reflection of an illuminated surface.

3.3 According to the established case law the skilled reader would therefore use the description to assess the correct meaning of the ambiguous terms. The board agrees with the finding of the opposition division that paragraphs [0040] to [0042] of the patent clearly explain what is meant by features **M5.3** and **M5.4**. In particular, paragraph [0040] makes clear that the projection of a three-dimensional image into space means an image that is to be distinguished from an image propagating only along a line or a single plane. Moreover, it is explicitly referred to a laser diode with known angular opening which projects the three-dimensional image along a cone or a pyramid. As also supported by the embodiment shown in Figures 1 and 2, the term "*three-dimensional image*" thus means the path of an angular (non-parallel) projection of a pattern along more than one plane, resulting in different lateral extensions of the projected image subject to the distance at which the image hits the wheel forming the projection surface. As an example, it is described in paragraph [0041] that the projected image can be a pattern of more or less coloured lines which intercept

the wheel and highlight the profile. Paragraph [0042] then relates to feature **M5.4** and the detection of the light generated by reflection of this projected image. In the board's view, these passages provide a clear understanding of what is meant by features **M5.3** and **M5.4**. Paragraph [0040] provides a clear explanation and definition of the term "*three-dimensional image*", consistent with what is disclosed for the described embodiment in the following paragraphs and the figures. The board disagrees with the appellant that the skilled reader would only take from this passage that a hologram was projected along a cone (or pyramid) of light, since such interpretation clearly would be at odds with the description of the embodiment of the patent specification. As Figure 2 shows, the projected image corresponds to a pattern of parallel lines.

The case law cited by the appellant in this context is not applicable in the present case:

- Decision T 2511/17 (also citing T 1691/11) even confirms that interpretation of a claim is required in case of ambiguous claim wording. The question to be answered in the present case is not whether a hologram was known in the art, but whether the skilled person would unambiguously arrive at an understanding of claim 1 that the term "*three-dimensional image*" only meant a hologram. As set out above, the board does not share the appellant's view in this respect.
- In case T 1691/11 the clear linguistic structure of two features ("*at least one of the transferring devices coupled to each of the two independent programmable motors*") did not allow any different interpretation of the relationship between the two features (transferring devices and motors). As admitted by the board, a distorted two-dimensional

image appearing on the wheel could not be meant in view of interrelated features **M5.3** and **M5.4** of claim 1.

- In decision T 2221/10 a term ("*HES cells*") had a clear technical meaning in the art which was distinct from another term ("*EG cells*"), whereas in the present case the rather general term "*three-dimensional image*" on its own does not necessarily mean a hologram and has to be construed as set out further above.
- T 1018/02, relating to an issue under Art. 123(2) EPC, concluded that the description cannot be used to give a different meaning to a claim feature which in itself imparts a clear credible technical teaching. In the present case, the description is not used to give any feature a different meaning but helps to correctly understand what is meant. However, the board does not follow the appellant's view that the skilled reader would only take from paragraph [0040] that a hologram was projected.

3.4 In case a "pattern of lines" was meant, the appellant suggested a different formulation of claim 1 replacing the term "*three-dimensional image*" by "pattern of lines" which, however, would conflict with the requirement of Article 123(2) EPC.

However, such reformulation of claim 1 was never assumed by the board, as it would not represent a three-dimensional image as required by the wording of claim 1 and as originally disclosed and defined in the description of the application as filed. In the board's view, the term "*three-dimensional image*" has to be construed in a more specific way which ascribes an appropriate meaning to the third dimension required by the term "*three-dimensional image*" in the context of

features **M5.3** and **M5.4**. The suggested formulation "pattern of lines" would not yet take into account the definition given in paragraph [0040] of the description ("*propagating along a cone or pyramid of light*") and the spatial and non-planar extension of the emitted light which projects the image onto the wheel. In particular, it would not necessarily exclude a pattern of coplanar light beams projected towards the wheel, i.e. it would e.g. include a pattern of non-continuous lines lying in the same plane. Such interpretation of the subject-matter of claim 1 would indeed not be covered by the original disclosure. However, in the board's interpretation of the feature in question, the third dimension required by the term "*three-dimensional image*" has to be understood as set out above, on the basis of what is explicitly disclosed and defined in paragraph [0040] of the description of the patent specification (as originally disclosed page 5, line 31 to page 6, line 2 of the description as filed).

4. Objection under Article 123(3) EPC

4.1 According to Article 123(3) EPC the protection conferred by the patent as granted may not be extended as a result of amendments. In the present case, the respondent requests maintenance of the patent as granted as its main request, which does not result from any amendment. Therefore, the board cannot see how Article 123(3) EPC could be violated by the subject-matter of claim 1 of the main request.

4.2 The appellant's objection in this respect relies on a reformulation of features **M5.3** and **M5.4** of claim 1, allegedly based on paragraphs [0040] to [0044] of the description of the contested patent. However, as argued above (see point 3.4), the board does not consider that

the term "*three-dimensional image*" merely means a "pattern of lines", but requires interpretation as regards the third dimension specified by this term. Such interpretation is only required because the term "*three-dimensional image*" in claim 1 is ambiguous and unclear (see above). Therefore, the appellant rather raises a clarity objection against claim 1 as granted which is not covered by the grounds of opposition and has to be rejected.

5. Extended subject-matter (Article 100(c) EPC)

5.1 The subject-matter of the European patent does not extend beyond the content of the application as filed, so the ground for opposition under Article 100(c) EPC does not prejudice maintenance of the granted patent.

5.2 The board concurs with the opposition division that the features of claim 1 as granted are literally defined by originally filed claims 1, 2, 3 and 4. Moreover, the interpretation of the term "*three-dimensional image*" as adopted by the board relies on the explicit disclosure in the originally filed description (page 5, line 31, to page 6, line 2; paragraph [0040] of granted patent). Projecting a three-dimensional image according to feature **M5.3** means an image propagating along a cone or pyramid of light, i.e. an increasing lateral extension of the projected image along the propagation direction. Therefore, under such claim construction, there is no issue as regards the original disclosure of feature **M5.3**, as admitted by the appellant. As paragraph [0041] of the contested patent (page 6, lines 3-4 in the application as filed) discloses that the projected image intercepts the wheel, it is implicitly disclosed that the three-dimensional image is projected towards the wheel, although paragraph [0040] only discloses

that a three-dimensional image is projected "*into space*", contrary to the appellant's allegation of missing support in the description.

The appellant's argument that under such claim construction feature **M5.4** was not originally disclosed could not be followed. There is no basis for assuming that claim 3 as originally filed meant two different images, since the wording of this claim ("projecting at least one image towards said wheel", "intersection of said image with said wheel") clearly refers to one and the same image. Moreover, the three-dimensional image formed by the projection of the image along a cone or pyramid of light, e.g. the projection of a pattern having different extensions dependent on the propagation distance measured from the light source, will intersect with the wheel and be reflected as required by feature **M5.4**.

The board cannot follow the appellant's argument that, in case "no three-dimensional image was meant" (i.e. no hologram) and sufficiency of disclosure was acknowledged, the subject-matter of granted claim 1 was not originally disclosed. As argued already above, the broad term "*three-dimensional image*" in the context of claim 1 is not clearly restricted to a "hologram" and has to be construed in view of the teaching of the patent specification, for which an identical disclosure can be found in the description as originally filed.

6. Novelty (Art. 100(a) and Art. 54(1) EPC)

6.1 The subject-matter of claim 1 as granted is new over the disclosure of D1 or D2 (Article 54(1) EPC).

6.2 The definition of a "*three-dimensional image*" given in paragraph [0040] of the contested patent might not be limited to a propagation along a cone or pyramid of light, as argued by the appellant, i.e. might not be limited to these specific geometric forms but include further examples of non-planar three-dimensional propagation of light. However, as set out above, it requires at least an angular (non-parallel) projection of a pattern along more than one plane with increasing lateral extension of the projected image along the propagation direction.

6.3 As known from document D1 (Figure 4), three projecting devices emit planar light beams and project stripes onto a wheel. However, the board does not share the appellant's view that D1 discloses directly and unambiguously a three-dimensional image projected towards the wheel as required by feature **M5.3** construed according to the definition given in paragraph [0040] of the patent specification. The mere fact that the sensing direction of sensing device 8 is oriented in a horizontal direction (see D1, column 5, lines 51-52) and seemingly (see Figure 4) orthogonal to the sensing direction of sensing devices 6 and 7 (which "*may be approximately parallel to the rotation axis 11 of the wheel*", see column 4, lines 52-54) does not yet allow to conclude that the planar light beams or light fans emitted by the light sources 15 of the three sensing devices do not belong to the same plane. The sensing direction of sensing devices 6 and 7 ("*approximately parallel*") is only defined with respect to the wheel axis, not in relation to each other, so no information on non-planar light emission is derivable therefrom. Moreover, the perspective view of Figure 4 does not allow to derive directly and unambiguously that the planar light beam projected by sensing device 8 does

not lie in the same plane as formed by the light fans of sensing device 6 or 7. D1 leaves open whether the three stripes of light projected onto the wheel form a one-dimensional image or not, irrespective of whether the three stripes form a continuous or non-continuous line of light.

Thus, the information provided by document D1 (prior art according to Article 54(3) EPC) does not amount to a direct and unambiguous disclosure as required when assessing novelty.

6.4 With similar reasoning, the disclosure of D2 does not take away novelty of the subject-matter of claim 1 as granted. The appellant's argument in this respect that the three pivotable laser beams disclosed in D2 "were normally not arranged in a plane" is based on pure conjecture and not on a disclosure which is directly and unambiguously derivable from D2.

7. *Inventive step (Article 100(a) EPC, Article 56 EPC)*

7.1 The subject-matter of claim 1 as granted involves an inventive step over the prior art cited by the appellant (Article 56 EPC).

7.2 The closest prior art is represented by document D2 which discloses the features according to the preamble of claim 1, as found by the opposition division and also admitted by the parties. The problem solved by the distinguishing features **M5.3** and **M5.4**, which allow to dispense with the pivoting of laser beams in D2, can be seen in providing better performance and efficiency when fitting and removing vehicle tyres.

7.3 Even following the appellant that the person skilled in the art would know and consult the handbook D7 on industrial measuring, the board is not convinced that the skilled person would apply the measuring principle of D7 to a tyre-changing machine as known from D2. Tyre-removal or fitting is controlled in D2 on the basis of the wheel's rotary angle-related detection of the rim beads, which only requires projection of a light source along a single plane which intersects with the wheel's rotational axis and thus creates an image on the wheel for a given rotary angle of the wheel. The spatial information about a three-dimensional structure as disclosed in D7 makes sense in case of scanning a static object, but not necessarily in case of a wheel which is rotated in order to change a tyre and where a tool has to be controlled dependent on the rotary angle of the wheel, as disclosed in D2.

As indicated by the respondent, the skilled person only might consider (although not taught by D7) to replace the pivotable laser beam of D2 by providing a planar light beam in order to accelerate measurement of the rim bead position. However, this would not lead him to the claimed solution, which requires projection of an image not along a single plane but extending in a third dimension, but would only result in the next evolution step as discussed above with regard to D1.

7.4 The board follows the appellant in that the skilled person starting from D2 would consider the teaching of D4, which discloses tyre-balancing machines and also concerns detection of the rim beads. However, the board agrees with the respondent that the overall teaching of D4 concerns the emission of planar light sheets (see e.g. Figs. 2 to 6 and the relevant passages in the description). Therefore, the skilled person would at

best be tempted to replace the pivoting of light beams in D2 by providing a planar light sheet as taught in D4, which would not yet lead to the subject-matter of claim 1 as argued already above.

The appellant's argument relies on a unique passage in D4 (column 3, lines 24-28: "*Das projizierte Lichtmuster oder die Anordnung kann eine von mehreren Formen sein, wie z. B. eine halbe Ebene, eine Kante, ein Gitter oder viele Streifen. Der Ausdruck 'Streifen' bezieht sich auf dieses projizierte geometrische Muster.*"):

- In view of and consistent with the overall teaching of D4 of planar light beams, the skilled person when reading "many stripes" would think of stripes in the same plane, as e.g. disclosed in the embodiment according to Figure 5 (separate stripes of light are projected onto the inner and outer surface of the wheel). The board is not convinced that D2 would suggest to project a light pattern comprising e.g. parallel lines which would fall under the wording of claim 1, according to the board's understanding of features **M5.3** and **M5.4**.
- The mention of a "grid" in D4 seems, at first glance, contradictory to the consistent teaching of D4 of providing planar light sheets. As pointed out by the appellant with reference to Figure 13 in D4, projection of four points and thus of a "grid" was explicitly mentioned in D4 (column 8, lines 66 ff). However, this specific embodiment is again based (see column 8, lines 50-54) on a projection of four points by means of a planar light sheet which intersects with the rotational axis of a turning shaft, and the reflected image is observed by a camera under a certain angle (see column 8, lines 66 ff). As pointed out by the respondent, the teaching of D4 relied on measuring an angle between

two planes. There is no indication that D4 would reflect projecting a "grid" in the true sense of this term, i.e. several stripes of light crossing each other, or even a pattern of parallel lines as shown in the patent in suit.

Thus, the board cannot find any indication that D4 would suggest projecting a three-dimensional image as required by features **M5.3** and **M5.4** and construed in view of the definition given in paragraph [0040] of the patent specification, as set out further above.

7.5 Therefore, the board concludes that the skilled person starting from D2 and consulting D7 or D4 would not arrive in an obvious manner at the subject-matter of claim 1 as granted (main request).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

A. Vottner G. Pricolo

Decision electronically authenticated