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**Datasheet for the decision
of 27 March 2007**

Case Number: T 0754/03 - 3.5.04

Application Number: 96935765.6

Publication Number: 0858640

IPC: G06T 1/00

Language of the proceedings: EN

Title of invention:
Teat location for milking

Patentee:
DeLaval Holding AB

Opponent:
MAASLAND N.V.

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56, 110(a), (b) and (c), 114

Keyword:
"Novelty and inventive step - (yes)"
"Late-submitted ground for opposition - correct exercise of
discretion by the first instance (yes)"
"Decision re appeals - remittal (no)"

Decisions cited:
G 0009/91, G 0010/91, G 0001/95

Catchword:
-



Case Number: T 0754/03 - 3.5.04

D E C I S I O N
of the Technical Board of Appeal 3.5.04
of 27 March 2007

Appellant: MAASLAND N.V.
(Opponent) Weverskade 110
NL-3147 PA Maassluis (NL)

Representative: -

Respondent: DeLaval Holding AB
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Representative: Kossmann, Jan Henrik
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 6 May 2003
rejecting the opposition filed against European
patent No. 0858640 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: F. Edlinger
Members: A. Dumont
T. Karamanli

Summary of Facts and Submissions

- I. The opponent lodged an appeal against the decision of the opposition division to reject the opposition against European patent EP 0 858 640.
- II. The opposition had been filed based on grounds for opposition under Article 100(a), 54 and 56 EPC and under Article 100(b) EPC. The opponent referred to the following prior art:
- D1: A.R. FROST, "Robotic milking: a review", Robotica (1990), volume 8, pages 311 to 318;
- D2: R. ARTMANN et al., "Entwicklungsstand von Melkrobotern", Landtechnik 12/90, pages 437 to 440; and
- D3: D. BONNEAU et al., "Robot de traite" proceedings of the second international conference AGROTIQUE 89, pages 348 to 360.
- III. In response to the summons to oral proceedings, the opponent requested that the opposition division examine of its own motion the ground for opposition under Article 100(c) EPC because the subject-matter of claim 1 as granted extended beyond the content of the application as filed. According to the minutes of the oral proceedings (point 20), the opponent withdrew the objection of lack of novelty.
- IV. The decision under appeal set out the reasons why the grounds for opposition under Article 100(a) EPC (lack of inventive step) and Article 100(b) EPC (insufficiency of disclosure) did not prejudice the maintenance of the patent as granted. The opposition

division, referring to the Guidelines for Examination in the European Patent Office, C-VI, 5.8a (edition June 2005: C-VI, 5.3.10), found that the feature "fixed start position" was not essential to the invention and could therefore be deleted from the independent claims 1 and 15. The division concluded that the late-filed ground for opposition under Article 100(c) EPC did not *prima facie* prejudice the maintenance of the patent and, exercising its discretion under Article 114(2) EPC, decided not to admit it into the proceedings.

V. In the statement setting out the grounds of appeal, the appellant (opponent) did not challenge the finding of the opposition division that the objection of insufficiency of disclosure was not founded. He reiterated his objections of lack of novelty and lack of inventive step and he requested that the board examine the ground for opposition under Article 100(c) EPC of its own motion in accordance with Article 114(1) EPC.

VI. In reply thereto, the respondent (patentee) argued that the appellant had withdrawn his objection of lack of novelty at first instance and requested that this ground not be admitted into the appeal proceedings, since novelty had not been decided on by the opposition division. He also requested that the late-filed ground under Article 100(c) EPC not be admitted into the proceedings.

VII. Oral proceedings before the board took place on 27 March 2007.

VIII. The appellant requested that the decision under appeal be set aside and that the patent be revoked as a whole (main request), or that the case be remitted to the opposition division in order to fully consider the ground under Article 100(c) EPC (auxiliary request).

IX. The respondent requested that the appeal be dismissed and the patent be maintained as granted (main request), or that the patent be maintained in amended form on the basis of the first or second auxiliary request as submitted with letter of 26 February 2007.

X. Independent claims 1 and 15, on the basis of which the patent was granted (main request), read as follows.

"1. A method of guiding a milking apparatus support (16) towards at least one teat of a milk animal, the method comprising the following steps:

- to move said support (16) to a start position
- to illuminate (10, 11) with a sheet of light (12) from the support (16) a region expected to contain at least one udder,
- to capture from said support (16) images (41) by viewing the region with a video camera (17),
- to analyze said captured images (41) to identify possible teat candidates (44, 45, 56, 58),
- to select one of said teat candidates (44, 45, 56, 58) as a target teat (44),
- to determine the position of said target teat (44),

characterized in that the method further comprises the following steps:

- to provide in said captured image (41) the position (50) of a teat cup entry point for a target teat (44),
- to quantify the separation of the teat cup entry point from the position of said target teat (44),
- to quantify said separation in steps defined by areas (51, 52, 53) of said captured image,
- to provide guidance information for said support (16) on the basis of the amount of said separation, and
- to home in said support (16) and any supported milking apparatus (15) to said target teat (44)."

"15. A milking apparatus support (16) guide arrangement, wherein the support (16) carries a source (10, 11) of a sheet of light (12), positioned to pass no lower than the mouth (14) of a teat cup (15) arranged on said support (16), and a video camera (17) arranged to view through the sheet and over the mouth of the teat cup (15), wherein said support (16) has a start position, wherein said source (10, 11) and video camera (17) are together arranged to cooperate (12, 19) forwardly of the support (16), the video camera (17) arranged to capture an image (41) formed by said light (12) forwardly of the support (16) and provide an image signal, the arrangement further including image signal processing means (35) to analyze said captured image signal and identify possible teat candidates (44, 45, 56, 58), to select one of said teat candidates (44, 45, 56, 68) as a target teat (44), to determine the position of said target teat (44), characterized in that said image signal processing means (35) provides in said captured image (41) the position (50) of a teat cup entry point for a target teat (44), and includes means to quantify the spatial separation of the teat

cup entry point from the position of said target teat (44), to quantify said separation in steps defined by areas (51, 52, 53) of said captured image, and provide guidance information for said support (16) on the basis of the amount of said separation, and wherein the image signal processing means (35) homes in said support (16) and any supported milking apparatus (15) to said target teat (44)."

XI. The arguments of the appellant may be summarised as follows.

- (a) The independent claims set out steps and means, respectively, to quantify the separation between the teat cup entry point and a target teat in steps defined by areas of the captured image and also to provide guidance information on the basis of the amount of the separation, without establishing a synergetic effect between the two methods steps. As a result, the "steps" or "areas" play no role in the guiding process and they do not contribute any technical effect to the invention.
- (b) D1 discloses on page 313 a milking robot with a laser for illuminating a portion of a target teat with a sheet of light, a camera supported by the robot arm and processing of the camera image in order to provide guidance information to home in the teat cup to the target teat. Thus D1 discloses all the features of the independent claims except for the technically irrelevant quantification in steps defined by areas of the captured image. The subject-matter of these claims is therefore not new.

- (c) D2 discloses on page 439 a milking robot (FAL II), similar to that according to D1, with a laser and a camera both supported by the robot arm in order to provide for both coarse and fine positioning of the arm. D2 is therefore also novelty-destroying.
- (d) D3 is referred to in D1 and shows in figure 3 on page 357 the same system as that according to D1.
- (e) D1 discloses on page 315 (left-hand column) an operating sequence combining two different time constants, that is two different speeds, for coarse and fine positioning of the robot arm according to the distance between teat cup and teat. Image analysis and quantification of distances in steps are moreover common general knowledge in feedback systems for robots. As a result, the subject-matter of the claims is not inventive in view of this prior art.
- (f) In examining the relevance of the late-filed ground for opposition under Article 100(c) EPC, the opposition division has applied wrong principles. The amendment in question is a generalisation from claim 1 as filed for which there is no direct and unambiguous support in the application as filed. Since a feature has not been omitted but broadened, the criteria set out in the Guidelines, C-VI, 5.3.10 (whether it was essential in the disclosure, etc.) are not relevant. Even if the broadening were considered as a removal of one feature and its replacement by another, one should check whether there is proper support for the replacement. This was not done by the opposition division. The board should therefore consider this ground or remit the case to the opposition division.

XII. The arguments of the respondent may be summarised as follows.

- (a) The features of the characterising portion of the independent claims are clearly interrelated and they cannot be read in isolation.
- (b) D1 does not disclose a laser generating a sheet of light being supported by the robot arm.
Furthermore D1 describes several distinct vision systems relying either on triangulation or on the determination of the relative positions of the teat and teat cup. In the latter case the image processing is explicitly mentioned on page 313 as being very complicated. The control sequence on page 315 relates to an arrangement with two different sensors. In contrast thereto, the analysis of the image captured by a single camera according to the invention allows both coarse and fine positioning so as to home in the support to the target teat. It divides the image into discrete areas and bases the guidance on steps defined by the areas, thereby providing for quick and safe guiding. This solution is not suggested in D1 or in the other documents.
- (c) The appellant has adduced no proof of the alleged common general knowledge and no explanation as to why it would render the claimed solution obvious.
- (d) The late-filed ground under Article 100(c) EPC does not prejudice the maintenance of the patent. Since the opposition division has applied the correct principles, the board should not admit this ground into the appeal proceedings.

Reasons for the Decision

1. The appeal is admissible.
2. *Ground for opposition under Articles 100(a) and 54 EPC*
 - 2.1 The ground for opposition of lack of novelty was substantiated by the opponent in his statement of grounds under Rule 55(c) EPC. It is therefore not considered a "fresh ground of opposition" within the meaning of G 10/91, OJ EPO 1993, 420. Consequently, this ground for opposition may be considered and decided upon by the board without the approval of the patentee.
 - 2.2 The characterising portions of both independent claims 1 and 15 according to the main request set out that a teat cup entry point is provided in the captured image. In the description this point is qualified as a notional fixed point (see paragraph [0063] of the patent specification). The characterising portions also set out that the separation of the teat cup entry point (in the direction of which the target teat image moves following the movement of the camera mounted on the support, see paragraph [0065]) from the position of the target teat is quantified in steps defined by areas of the image and that guidance information is provided on the basis of the amount of said separation. The explicit reference to "said separation" establishes a relationship between guidance information and the image area in which the target teat is positioned. The division of the image in (a number of discrete) areas (cf. column 10, lines 30 to 36 of the patent

specification) is therefore not technically irrelevant for the guiding process and plays a role for the assessment of novelty and inventive step.

2.3 D1 is a review of milking robots. It briefly describes vision systems of a first type used for automating teat cup attachment, with a camera and a laser illuminating a region expected to contain an udder with a sheet of light. The caption of figure 3 of D1 explicitly makes reference to D3. These systems rely on triangulation to obtain the absolute teat coordinates from a knowledge of the position of the (fixed) camera, the laser and the angle of inclination of the sheet of light (see D1, page 313, right-hand column, first paragraph and D3, page 357, first paragraph). This is different from the present invention, which analyses the image captured by a camera supported on the movable robot arm in order to provide guidance information on the basis of the amount of separation between the teat cup entry point and the target teat.

2.4 D1 (page 313, right-hand column, third paragraph) mentions vision systems of a second type which come closer to that of the opposed patent, with a camera mounted on the movable robot arm and image analysis to determine the relative positions of a target teat with respect to the teat cup in order to guide the movement of the arm. Concerning these systems, D1 is silent about the location or the nature of the source of illumination and about how the image is analysed to provide the guidance information. As a result, D1 does not unambiguously disclose that the region of interest is illuminated with a sheet of light and does not teach to quantify the separation between the teat and a teat

- cup entry point in areas of the captured image, so as to base the guidance on the amount of said separation.
- 2.5 D2 also describes various available milking robots, in particular a system (FAL II system in figure 4 on page 439) in which the camera and the laser are mounted on the robot. D2 is silent about how the pictures from the camera are processed to guide the robot arm.
- 2.6 In conclusion, the invention is distinguished from the systems known from any of D1, D2 and D3 at least by the image processing as set out in the characterising portions of the independent claims. The subject-matter of the claims is therefore new.
3. *Ground for opposition under Articles 100(a) and 56 EPC*
- 3.1 The quantification of the separation in steps defined by (a limited number of) areas of the captured image, as set out in the characterising portions of the independent claims, allows a simple determination of the area in which the target teat is found. This caters for a simple adaptation of the guiding process according to the distance between teat cup and target teat, for instance so as to ensure swift guidance whilst avoiding the risk of hunting or overshoot by applying a high control gain when the target teat is identified in an area far remote from the teat cup entry point, and a lower control gain when it is identified closer to it (see column 10, lines 48 to 52, of the patent specification). Guidance of the milking apparatus, including homing in to the target teat, may therefore be carried out on the basis of captured images by a single sensor (video camera).

- 3.2 An above-mentioned vision system of a second type in D1 (page 313, right-hand column, third paragraph) constitutes the closest prior art because it is the only available prior art disclosure mentioning guidance based on the relative position of the teat and teat cup. D1 qualifies image analysis in such a case as being complicated, but mentions no particular solution. D1 further mentions on page 315 (left-hand column, penultimate paragraph) two-stage teat detection with different time constants for approximate (that is coarse) and fine position sensors. D2, figure 4, provides a synopsis of systems generally using separate sensors for coarse and fine positioning, except for the "FAL II" system which tries to do without an additional sensor for fine positioning, but does not disclose how it achieves this concretely (see page 439, right-hand column, second paragraph). In practice these systems adapt the robot arm actuation in dependence on the distance between target teat and teat cup, as does the present invention, but none of them points to a processing on the basis of areas defined in the image from a camera.
- 3.3 The board accepts that actuation proportional to the difference between a set point and a measured actual value, here the separation between two positions, belongs to the basics of control loops, in particular for robots. This common general knowledge merely reflects the fundamentals on which the present invention has been developed, but does not render obvious the specific solution consisting in a stepwise control depending on areas of a captured image.

3.4 As a result, the subject-matter of the claims involves an inventive step.

4. *Ground for opposition under Article 100(b) EPC*

The appellant has not challenged the finding of the opposition division that the invention is sufficiently disclosed. The board does not see any reason to review this finding of its own motion.

5. *Ground for opposition under Article 100(c) EPC*

5.1 The appellant raised this ground during the opposition proceedings after the expiry of the time limit laid down in Article 99(1) EPC. Exercising its discretion under Article 114(2) EPC, the opposition division decided to disregard this late-filed ground because it did not *prima facie* prejudice the maintenance of the patent. The opposition division thus essentially followed the principles set out in decision G 9/91, OJ EPO 1993, 408, point 16 of the reasons. For assessing whether the replacement or removal of a feature from a claim violates Article 123(2) EPC, the opposition division applied the so-called "essentiality test" and referred to the Guidelines for Examination in the European Patent Office, C-VI, 5.3.10.

5.2 The appellant argued that, in doing so, the opposition division applied the wrong principles because the amendment in the present case consists in the broadening of a feature, not in a removal. The board does not concur with this view. In the board's opinion, the amendment in the present case can be equally regarded as the deletion of an expression comprising

the features "a+b" followed by the replacement by the broadened feature "a" alone, as did the appellant, or as the direct removal of the feature "b" from the expression, as did the opposition division. The board sees nothing wrong in the latter approach. The board judges therefore that the opposition division has exercised its discretion correctly and in a reasonable way.

5.3 The ground for opposition under Article 100(c) EPC was neither raised and substantiated in the notice of opposition, nor introduced into the proceedings by the opposition division. It is therefore a fresh ground for opposition (see G 1/95, OJ EPO 1996, 615, points 5.3 and 5.4 of the reasons) and it accordingly may not be introduced into the appeal proceedings without the approval of the patentee. The patentee did not agree to the introduction of the fresh ground, which may therefore not be dealt with in substance in appeal proceedings (see G 9/91, supra and G 10/91 supra, point 18 of the reasons). Consequently, the present case can also not be remitted for the opposition division to fully consider the ground for opposition under Article 100(c) EPC.

6. In view of the above, none of the grounds for opposition which the board is entitled to consider prejudices the maintenance of the patent as granted. The appeal therefore does not succeed.

7. Since the board accedes to the respondent's main request, his first and second auxiliary requests need not be dealt with.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar

The Chairman

D. Sauter

F. Edlinger