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Datasheet for the decision of 20 April 2023

Case Number: T 1447/19 - 3.4.01

Application Number: 12781941.5

Publication Number: 2707749

IPC: G01S17/42, B66C13/46

Language of the proceedings: EN

Title of invention:
SYSTEM FOR DETERMINATION OF A CONTAINER'S POSITION IN A VEHICLE AND/OR IN ITS TRAILER TO BE LOADED WITH CONTAINERS

Patent Proprietor:
Cargotec Finland Oy

Opponents:
Siemens Aktiengesellschaft
Konecranes Global OY

Headword:
Determination of a container's position / Cargotec

Relevant legal provisions:
EPC Art. 100(a), 100(b), 56
RPBA Art. 12(4)

Keyword:
Grounds for opposition - insufficiency of disclosure (no) - lack of inventive step (no)
Late-filed evidence - some admitted, some not

Decisions cited:
T 1914/12

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Beschwerdekammern

Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 1447/19 - 3.4.01

D E C I S I O N
of Technical Board of Appeal 3.4.01
of 20 April 2023

Appellant: (Opponent 1)	Siemens Aktiengesellschaft Werner-von-Siemens-Straße 1 80333 München (DE)
Representative:	Siemens AG Postfach 22 16 34 80506 München (DE)
Appellant: (Opponent 2)	Konecranes Global OY Koneenkatu 8 05830 Hyvinkää (FI)
Representative:	Espatent Oy Kaivokatu 10 D 00100 Helsinki (FI)
Respondent: (Patent Proprietor)	Cargotec Finland Oy Ruskontie 55 33710 Tampere (FI)
Representative:	Papula Oy P.O. Box 981 00101 Helsinki (FI)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 21 March 2019 rejecting the opposition filed against European patent No. 2707749 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chair	T. Zinke
Members:	T. Petelski
	C. Almberg

Summary of Facts and Submissions

I. Two oppositions were filed against the European patent by the opponents, hereinafter referred to as O1 (Siemens AG) and O2 (Konecranes Global Oy). The oppositions were based on Articles 100(a) and (b) EPC.

II. The Opposition Division rejected the oppositions, and, thereby, maintained the patent as granted.

III. Appeals were lodged against this decision by O1 and by O2. The respective argumentations of O1 and O2 rely on the following documents, all of which were already part of the opposition proceedings:

- D1: DE 102 12 590 A1
- D2: DE 10 2008 014 125 A1
- D3: JP 2002-255476 A
- D4: EP 0 820 957 A1
- D5: US 2004/125985 A1
- D6: CN 1884034 A
- P1: US 2005/0192702 A1
- P2: XP 055363419; Wikipedia article on "3D scanner"

- P3: XP 055363410; G. Sansoni et al. "State-of-The-Art and Applications of 3D Imaging Sensors in Industry, Cultural Heritage, Medicine, and Criminal Investigation"; Sensors 2009, 9, pages 568 - 601

- P4: US 2010/0243593 A1

- P5: XP 055363414; LASE Industrielle Lasertechnik GmbH; presentation "Laser measurement systems for container harbor", 5 December 2007

- P6: CN 1884034 A, with P6A being a machine translation of P6

- P7: EP 0 820 957 A1, with P7A being an English translation of P7

In addition, with the statement of grounds of appeal, O2 introduced the following documents:

- P6B: English translation of P6, to be used instead of P6A

- P8: H. Surmann et al. "Fast acquiring and analysis of three dimensional laser range data"; VMV 2001, Stuttgart, 21 - 23 November 2001

- P9: EP 1 043 262 A1, with P9A being an English machine translation of P9

IV. Following a written procedure, oral proceedings were held at which the parties confirmed these to be their final requests:

- The opponents request that the decision be set aside, and the patent be revoked.

- The proprietor, as respondent, requests that the appeals be dismissed, i.e., that the patent be maintained as granted (main request). In the alternative, the patent is to be maintained on the basis of one of five auxiliary requests filed during opposition proceedings.

- Further, the proprietor requests that neither P8 and P9 be admitted into the appeal proceedings, nor the new feature table of claim 1 annexed to O1's statement of grounds of appeal, nor any new lines of argumentation based on these documents or based on P7 as closest prior art.

V. Claim 1 of the main request reads (reference signs removed):

System for determination of a container's position in a vehicle and/or its trailer to be loaded with containers in a loading area for containers, such as a container freight terminal,

where a container or containers are loaded into a vehicle and/or its trailer and, correspondingly, they are unloaded from this/ these by a crane, which handles containers and travels in the loading area above a traffic lane or traffic lanes, and which is equipped with a container spreader gripping the containers from above and with a

positioning system for the crane and the container spreader,

whereby the vehicle and similarly its trailer have locking pins locking into pin holes in the corners of the container,

whereby the system has laser scanners for determination of the position of the locking pins in the vehicle and/or in its trailer and for determination of the container's position depending on these,

characterized in

that the laser scanner/laser scanners are installed in the loading area into a fixed structure and they are arranged to determine the positions in relation to the ground of the locking pins in the vehicle and/or in its trailer parked in the loading area, and

that the system is arranged to relay the position information determined by the laser scanner to the crane,

whereby based on the crane's and the container spreader's position information the crane's positioning system is adapted to calculate the position of the locking pins in relation to the crane.

VI. The contents of the auxiliary requests are not relevant for the decision.

Reasons for the Decision

Disclosure of the patent

1. The patent is concerned with the automated loading of containers onto vehicles, for example in a container freight terminal. A system is used in the loading process, which comprises laser scanners mounted to a structure that is fixed in relation to the ground. The laser scanners determine the positions of locking pins on a vehicle in relation to the ground, and the system relays this information to a crane. The positioning system of the crane can then determine its position relative to the locking pins based on the relayed information. This allows the crane to load the container onto the vehicle in a way that the pin holes of the container engage with the corresponding locking pins of the vehicle.

Main Request – Sufficiency of disclosure

2. O2 considers the invention to be insufficiently disclosed because the patent does not teach

   (a) how the laser scanner detects the locking pins, or twist locks, as is defined in a general manner by claim 1;

   (b) how the position information of the locking pins can be relayed from the laser scanner to a crane, as is also defined by claim 1; and

(c) how a container can be correctly loaded when only one or two locking pins of a vehicle or trailer, or two locking pins of a vehicle with trailer, are in sight of the laser scanner, as is implied or disclosed by claim 5 in combination with claims 1 to 4.

3. The Board, however, finds the proprietor's arguments more persuasive.

- Regarding point (a), a person skilled in the art of laser scanners or object recognition is aware of how data of a laser scanner can be processed to recognize objects, including twist-locks or locking-pins.

- Regarding point (b), claim 1 defines the laser scanners to be configured "for determination of the position of the locking pins" (feature 6) and to be "arranged to determine the positions" (feature 8). This implies that the scanners include a processor for calculating the positions from the measured point cloud. Hence, the scanners are also able to relay this position information. It follows from the last feature of claim 1 that the crane's positioning system uses this information. Hence, it is apparent that this information is not relayed to a mechanical part of the crane, but to the crane's positioning system.

- Regarding point (c), claim 5 merely adds the information that at least two locking pins are in sight. This does not imply the option that there is only one pin in sight for the higher-ranking claims. Further, it is apparent that a measurement with a single pin is hardly possible. Therefore,

the skilled person aiming at realizing the invention understands claim 5 to mean that at least two pins are in sight per vehicle or per trailer, and not two pins altogether. The knowledge of two pins is sufficient, if the pins are arranged diagonally, considering that the distance between the pins is standardised. And if the laser-scanner would allow to identify the pins, even other pairs of pins would be sufficient to determine the container's correct position. The fact that not all combinations of two twist-locks allow to determine the correct position of the container is irrelevant. The skilled person would not consider options that are, on the first sight, technically meaningless.

4. Hence, the invention as claimed is sufficiently disclosed (Article 100(b) EPC).

Main Request - inventive step starting from D1/P1

5. Both opponents raised inventive step objections starting from D1, or its family member P1. In the following, it will be solely referred to D1 and the respective passages therein.

6. D1 discloses a system for loading or unloading vehicles. In an exemplary loading process, an empty vehicle is parked in a loading/unloading area 6, and its position is determined via a fixedly mounted camera 10 ([0074]; Figure 5). The camera image is shown to the operator on a screen (Figure 6). The operator selects the positions of the twist-locks 13 (including the respective locking pins) on the screen, and the respective coordinates are delivered to a data-

processing system ("DV-System"). The crane, which carries a container, is then moved to the correct position over the loading surface of the vehicle, as determined from the delivered coordinates. Between one and four further cameras 18 ([0077]) are installed on the movable crane 3. Images taken by the crane camera(s) of the same twist-locks are also displayed to the operator in a further image, superposed with the calculated positions of the matching locking pins of the container (Figure 9). With input of the operator, a computer system determines potential deviations of the alignment of the container with respect to the twist-locks on the vehicle. The crane adjusts the orientation of the container accordingly, and then lowers it for loading on the vehicle.

7. The determination of the coordinates of the twist-locks in the image of camera 10 and the loading of the container onto the vehicle after the fine adjustment of its alignment may be performed automatically (see paragraphs [0018] and [0030]). However, the operator still controls and supervises the parking ([0074]) and loading processes ([0024], [0046] and [0078]), even if only from a distance ([0036]). Hence, the operator may interfere, for example in case of misalignment of the twist-locks ([0077]).

8. It is undisputed by the parties that the subject-matter of claim 1 differs from D1 in that the means for determining the position of the locking-pins are laser scanners and not cameras.

9. In the Board's view, the technical effect of using laser scanners instead of cameras lies in a greater reliability of detection under non-optimum conditions. The two-dimensional nature of camera images requires a

detection of the twist-locks using object recognition software. However, unfavourable lighting or weather conditions, or the presence of dirt or rust, may hamper a correct recognition of the twist-locks. The three-dimensional point cloud generated by laser scanners is far less susceptible to such influences.

10. Hence, the objective technical problem lies in providing a more reliable position detection of the twist-locks.

11. Opponent O2, in contrast, identifies a different objective technical problem of realizing a more complete, or alternative, automation of the position determination of the twist-locks.

12. However, the Board points out that the problem of automation is not related to the differing feature. By using appropriate software, both the image of a camera and the data of a laser scanner can be used to recognize objects and to determine their position (see D1, [0018]). Also, both can be used to provide a user with an image that allows to manually determine a position. Hence, the objective technical problem cannot be related to an automation of the position determination, and the arguments presented along this line are moot.

13. The skilled person faced with the problem of improving the reliability of the twist-lock position determination could have considered a number of measures, amongst them better lighting, more powerful image recognition software, better camera resolution, or the use of stereo cameras or laser scanners for surface-shape recognition. The skilled person would also have considered that the operator in D1 uses the

images of cameras 10 and 18 for controlling and supervising the parking and loading processes. However, since the point-cloud images of a laser scanner, even if processed for visual presentation, are generally more difficult to interpret than camera images, not least because they lack colour and brightness information, the skilled person would not have replaced camera 10 with a laser scanner.

14. The opponents counter-argue that the skilled person would have employed a laser scanner, either in place of, or in addition to the camera 10 in D1. At the priority date of the patent in suit, laser scanners were well-known alternatives to cameras and were routinely used for identifying twist-locks on vehicles. This was shown, for example, by D4, column 1, lines 36 to 48, or D5, paragraphs [0011] and [0012]. Appropriately conditioned laser-scanner images could be interpreted by an untrained operator in D1 just as well as camera images. The reliability of laser-scanners would even have rendered a control by the operator superfluous, and thereby increased the throughput of the freight terminal. Hence, it would have been a straightforward measure for the skilled person to employ a laser scanner on the fixed structure on which resides camera 10 in D1 to determine the position of the twist-locks. A possible higher cost would have been negligible compared to the cost savings due to the higher reliability of position detection, and, in case of a more extensive automation, the higher throughput of containers. Once determined with accuracy by this laser scanner, the container could have been centred correctly over the vehicle. It would not have been relevant for the inventive step argumentation, if the cameras 18 installed on the crane and used for alignment of the container orientation would have also

been replaced by one or more laser-scanners, or not. If a camera would have been preferred for the identification of faulty states of the twist-locks, then this could have also been performed by cameras 27 whilst the vehicle was in the identification area 25, prior to the position determination in the loading area 6.

15. Generally, the Board agrees with the opponents' opinion that laser scanners were known alternatives to cameras for determining positions of objects, laser scanners being more reliable under outdoor conditions. This is, for example, shown by several of the other documents on file (D2, D3, D4/P7, D5, D6/P6, P2, P3). Most of those documents show laser scanners used to determine the position of containers with respect to the loading surface of a vehicle, in particular with respect to the locking pins thereon.

16. However, the skilled person would have been dissuaded from using a laser scanner in place of or in addition to camera 10 for the following reasons:

(a) A laser scanner is advantageous whenever a camera would not be able to correctly recognize the position of a twist-lock, for example because of dirt. In such a case, replacing camera 10 would have been useless without also replacing camera(s) 18 by a laser scanner, or else the loading procedure of D1 would have failed at the step of adjusting the container orientation. However, using laser scanners on the crane in place of, or in addition to, camera(s) 18 would have required the crane to stop during the time of data acquisition of the scanner. This, however, would have been

highly undesirable in a freight terminal because it would prolong the loading process.

(b) Replacing camera 10 and camera(s) 18 by laser scanners would have made the supervision of the loading process cumbersome and error-prone. The image of a laser scanner was hardly suitable for the operator to recognize faulty states of the twist locks or unknown objects on the loading area.

(c) In D1, camera 10 is also used by the operator to control the parking operation of the vehicle. This use, however, would have been incompatible with the low imaging frame rate of a laser-scanner.

(d) Keeping the cameras 10 and 18 for the use of the operator and merely adding laser-scanners would not have solved the problem of a more reliable detection of the lock positions, because in D1, it is the operator who marks the lock positions in the image of cameras 18 ([0077]). Further, since cameras and laser-scanner could not be in the same position, this would have posed problems of coordinate transformation between the respective reference frames.

(e) Even if the skilled person would have considered the additional problem of providing a full automation, the control and supervision of the loading process by the operator would not have been dispensed with for a fully automated process using laser-scanners, because the control and supervision is an essential element in the loading process in D1, not least for safety reasons.

17. As a consequence, the skilled person would not have employed laser-scanners in the system of D1, and the subject-matter of claim 1 involves an inventive step (Articles 52(1) and 56 EPC). None of the documents D2, D3, D4/P7, D5, D6/P6, P2 and P3 changes this conclusion.

18. Hence, the subject-matter of claim 1 is inventive over D1, even when considering the technical knowledge of the skilled person and the teaching of the previously mentioned documents (Articles 100(a), 52(1) and 56 EPC). Accordingly, also the subject-matters of the claims dependent on claim 1 are inventive.

Main Request - inventive step starting from P6

19. An inventive-step attack was put forward by O2 starting from D6/P6, relying on the translation P6B.

20. P6 discloses the automatic control of the process of loading or unloading a container to or from a truck. A dual laser scanner is used for aligning the crane spreader with the container or with the locking pins on the truck. The laser scanner is used to recognize locks on the truck, the locks implicitly including locking pins to couple with the lock holes of the container (paragraph [0029]).

21. It is undisputed that the dual laser scanners 3 in P6 are mounted on the beam 4 of the crane, as illustrated by Figure 1 of P6, the beam being movable along the direction indicated by arrow 4 in Figure 2. The positioning of the laser scanners on the beam in a diagonal arrangement with respect to the truck or the container (paragraph [0010] and Figure 2) is such that

the scanners are able to scan the side surfaces and the top surface of the truck or the container ([0012]) in order to determine the position of the locking pins ([0029]). At the same time, the positioning is such that the laser scanners are also able to obtain the attitude and position of the crane spreader once it is lowered for loading or unloading of the container. This allows for an adjustment of the crane spreader's position and attitude with respect to the locking pins ([0031]).

22. Hence, the subject-matter of claim 1 differs from P6 in that the scanners are installed into a fixed structure. The further differences of measuring the positions in relation to ground and of separate processing means come along with the separation of the scanners from the crane.

23. In view of the arguments presented by the parties, the only technical effect of the distinguishing features, which the Board can identify, is another way of mounting the scanners. The corresponding problem lies in finding an alternative configuration of the scanner.

24. It was known, to the skilled person, that both, the installation of the scanners on the crane, and the external installation, come with their respective advantages and disadvantages:

(a) An external installation allows measurements with respect to ground. Hence, once the positions of the locking pins on the stationary loading platform are known, they will remain known, even if their sight is blocked by a movement of the crane. However, the scanners might be distant from the target, which requires wide scanning ranges at nevertheless high

resolution or the presence of several spatially spaced scanners. Further, the measurements need to be related to the moving reference system of the crane or spreader.

(b) An installation on the crane will put the scanners in the proper place for measurement, but will require repeated measurements of the locking pins, whenever the part of the crane that carries the scanners has moved. That might be problematic since the movement might cause a blocking of the view of the scanners by the spreader or the container.

25. Generally, the skilled person would have considered both alternatives for mounting scanners when designing a scanner system from scratch.

26. However, in the particular case of P6, a separate mounting of the scanners on a fixed structure would have been counter intuitive. The scanners in P6 are arranged symmetrically in diagonal positions above the truck and below the spreader in its upper position for an unimpeded view of the truck, and above the spreader in its lowered position for an unimpeded view of the spreader during the loading process. The presence of a separate, fixed structure in a corresponding position might have been in the way of the crane movement and would have required a precise placement of the truck. There is no reason the skilled person would have added such a separate structure, if there already was a suitable structure in form of the beam 4 of the crane in exactly the right place. The beam 4 does not move after the truck has been measured. Because of this, the spreader's position and attitude are measured in the same reference frame as the previously measured truck.

27. In view of these advantages of the mounting on the beam of the crane, the skilled person trying to find an alternative configuration of the scanner would not have considered providing a separate structure for mounting the laser scanners in P6. Rather, she might have considered other types of scanners, or additional scanners below the spreader. The knowledge of P7 would not have changed that, because, in P7, the scanners that measure the position of the locking-pins during the loading process are also fixed to the crane.

28. Therefore, the subject-matter of claim 1, and, accordingly, the subject-matters of the claims dependent on claim 1, also involve an inventive step in view of P6 (Articles 100(a), 52(1) and 56 EPC).

Main Request - inventive step starting from P7

29. Two new lines of argumentation were introduced in O2's statement of grounds of appeal, starting from P7/D4. Their admission into the proceedings, which the proprietor contests, is at the Board's discretion under Article 12(4) RPBA 2007.

30. According to recent case law on the RBPA 2007 (cf. Case Law of the Boards of Appeal, 10th edition, V.A.5.10.1 with reference to T 1914/12), new arguments, which do not create a new case, and which are based on facts and evidence that are already part of the proceedings, are to be considered in the appeal proceedings.

31. P7/D4 has already been discussed in the context of inventive step during the opposition proceedings and the arguments are similar to those relating to P6. Hence, the inventive step argumentation starting with

P7 does not amount to a fresh case and is considered in the appeal proceedings.

32. P7 discloses an automated loading of containers on trucks, and a respective unloading. Two laser scanners 15 are mounted to the spreader of a crane, or on the uprights of the crane. During the loading process, the laser scanners determine the relative positions of the twist-locks (and, thereby, of the locking pins) and the pin holes of the container. A control system derives, therefrom, movement instructions for the crane. A third laser scanner 21 for determining the rear of the loading platform and the height of the container is mounted to have a view on the truck or the container from above.

33. Neither the spreader nor the uprights of the crane are fixed with respect to the ground. In contrast to the proprietor's opinion, according to which the third scanner was mounted to the crane, and also in contrast to O2's opinion, according to which the third scanner was mounted to a fixed structure, there is no information in P7 regarding the structure on which the third scanner is mounted.

34. Although the skilled person would have known about the possibility to externally install the laser scanners (see above point 24.), the skilled person would not have done so in the particular system disclosed by P7. O2 argues that the skilled person would have substituted the two laser scanners 15 and the third laser scanner 21 with a single laser scanner having a wide viewing range (like the scanner disclosed by P8) and being mounted to a fixed structure. However, a potentially lower price would not have led the skilled person to give up on the advantageous mounting of the

two scanners 15 below the spreader in immediate vicinity of the containers locking structures, irrespective of whether P8 (or P5) was considered or not.

35. Hence, the subject-matter of claim 1, and, accordingly, the subject-matter of the claims dependent on claim 1, also involves an inventive step starting from P7/D4 (Articles 100(a), 52(1) and 56 EPC).

Admission of P8 and P9/P9A

36. Documents P8 and P9/P9A were introduced, for the first time, with the statement of grounds of appeal. Their admission into the proceedings is at the Board's discretion under Article 12(4) RPBA 2007.

37. P8 discloses a light and fast 3D laser range finder (laser scanner) with a large viewing angle. P8 was mentioned in the opponent's argumentation cited under above point 34., however, without making the respective argument any stronger. With regard to the present case, P8 does not add anything that would go beyond the common general knowledge of the skilled person.

38. P9 discloses the automatic loading of containers on trucks. The process relies on the measurements of two video cameras fixed to the spreader of the crane used for the loading. One of the two cameras determines the crane's position relative to ground, the other relative to the truck loading surface. P9 is not more relevant than the documents already on file, because it fails to disclose laser scanners that are mounted to a fixed structure. Accordingly, O2's inventive step objection

starting from P9 is, prima facie, not more persuasive than the other inventive step objections.

39. For these reasons, P8 and P9 are not considered in the appeal proceedings.

Conclusion

40. The grounds of opposition raised by O1 and O2 under Articles 100(a) and 100(b) EPC do not prejudice the maintenance of the patent as granted.

Order

For these reasons it is decided that:

The appeals are dismissed.

The Registrar: The Chair:

D. Meyfarth T. Zinke

Decision electronically authenticated