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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/914,695	02/26/2016	Per Willför	04190-P0277A	4065
137670	7590	06/26/2020	EXAMINER	
ABB - Whitmyer IP Group LLC 600 Summer Street Stamford, CT 06901			JOHNSON, CEDRIC D	
			ART UNIT	PAPER NUMBER
			2129	
			MAIL DATE	DELIVERY MODE
			06/26/2020	PAPER

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte PER WILLFÖR, ROGER KULLÄNG, and
ROGER MELLANDER

Appeal 2019-002627
Application 14/914,695
Technology Center 2100

Before JOSEPH L. DIXON, ST. JOHN COURTENAY III, and
LARRY J. HUME, *Administrative Patent Judges*.

HUME, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant,¹ ABB Technology Ltd, appeals from the Examiner’s decision rejecting claims 1–4, 6–9, and 11–19, which are all claims pending in the application. Appellant has canceled claims 5 and 10. Appeal Br. 11, 13. An oral hearing was held on May 21, 2020. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM IN PART.

¹ We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42(a). Appellant identifies the real party in interest as ABB Schweiz AG. Appeal Br. 2.

STATEMENT OF THE CASE²

The claims are directed to a method and device for verifying one or more safety volumes for a movable mechanical unit. *See* Spec. (Title). In particular, Appellant’s disclosed embodiments and claimed invention “relate[] to a method for verifying one or more safety volumes for a movable mechanical unit with respect to an environment of the mechanical unit in order to avoid collisions between the mechanical unit and obstacles in the environment,” and “also relates to a device for verification of the safety volumes.” Spec. ¶ 1.

Exemplary Claims

Claims 1, 9, and 17, reproduced below, are representative of the subject matter on appeal (*italics* added to contested prior-art limitations; underlining added to limitation contested under § 112(b)):

1. A method for verifying one or more safety volumes for a mechanical unit with respect to an environment of the mechanical unit, wherein the mechanical unit is moveable and a world-coordinate system is defined in relation to the mechanical unit and in relation to the environment of the mechanical unit, the method comprising:

storing a description of one or more safety volumes defined in relation to the world-coordinate system, and repeatedly:

² Our decision relies upon Appellant’s Appeal Brief (“Appeal Br.,” filed Aug. 13, 2018); Reply Brief (“Reply Br.,” filed Feb. 12, 2019); Examiner’s Answer (“Ans.,” mailed Dec. 13, 2018); Final Office Action (“Final Act.,” mailed Apr. 20, 2018); Transcript of Oral Hearing held May 21, 2020 (“Transcript” mailed June 3, 2020); and the original Specification (“Spec.,” filed Feb. 26, 2016) (claiming benefit under 35 U.S.C. § 371 to PCT/EP2013/070773, filed Oct. 7, 2013).

determining a position and an orientation of a portable display unit in relation to the world-coordinate system;

determining a graphical representation of the safety volumes based on the description of the safety volumes and the position and the orientation of the portable display unit;

overlaying the graphical representation of the safety volumes on a view of a real environment of the mechanical unit to provide a composited augmented reality image; and

displaying the augmented reality image on the portable display unit;

wherein at least one of said safety volumes is a moving safety volume having a size and position that depends on a velocity and a position of a critical part of the mechanical unit;

wherein the method further comprises repeatedly:

obtaining the velocity and the position of the critical part of the mechanical unit;

determining the moving safety volume for the critical part of the mechanical unit based on the velocity and the position of the critical part; and

storing a description of the moving safety volume defined in relation to the world-coordinate system.

9. A device for verifying one or more safety volumes for at least one mechanical unit positioned in an environment, wherein the mechanical unit is movable and a world coordinate system is defined in relation to the mechanical unit and in relation to the environment of the mechanical unit, the device comprising:

a storage unit for storing descriptions of the safety volumes;

a portable display unit;

a position detector configured to continuously determine a position and an orientation of the portable display unit in relation to the world coordinate system;

a graphical unit configured to determine graphical representations of the safety volumes based on the stored descriptions of the safety volumes and the position and the orientation of the portable display unit; and

an augmented reality unit configured to overlay the graphical representations of the safety volumes on a view of a real environment of mechanical unit to provide a composited augmented reality image, and to display the augmented reality image on the portable display unit;

wherein the device comprises a description generator configured to obtain positions and velocities of a critical part of the mechanical unit, to determine moving safety volumes for the critical part of the mechanical unit based on the positions and the velocities of the critical part, and to store a description of the moving safety volume defined in relation to the world coordinate system in said storage unit.

17. The method according to claim 3, wherein the method comprises detecting user interactions with the graphical representation of the fixed safety volume, and modifying the description of the fixed safety volume based on said user interactions.

REFERENCES

The prior art relied upon by the Examiner as evidence is:

Name	Reference	Date
Kazi et al. (“Kazi”)	US 2004/0189631 A1	Sept. 30, 2004
Corrales et al., “Safe Human-Robot Interaction Based on Dynamic Sphere-Swept Line Bounding Volumes,” Robotics and Computer-Integrated Manufacturing, Vol. 27, 2011, pp. 177–185 (hereinafter “Corrales”).		

REJECTIONS

R1. Claim 17 stands rejected under 35 U.S.C. § 112(b) as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor(s) regard(s) as the invention. Final Act. 5 (as modified by Ans. 21–23).³

R2. Claims 1–4, 6– 9, and 11–19 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Kazi and Corrales. Final Act. 6.

ISSUES AND ANALYSIS

In reaching this decision, we consider all evidence presented and all arguments actually made by Appellant. To the extent Appellant has not advanced separate, substantive arguments for particular claims, or other issues, such arguments are waived. 37 C.F.R. § 41.37(c)(1)(iv).

We disagree with arguments made by Appellant with respect to indefiniteness Rejection R1 of claim 17 under 35 U.S.C. § 112(b) and, unless otherwise noted, we incorporate by reference herein and adopt as our own: (1) the findings and reasons set forth by the Examiner in the action from which this appeal is taken, and (2) the reasons and rebuttals set forth in the Examiner’s Answer in response to Appellant’s arguments.

However, we agree with particular arguments made by Appellant with respect to obviousness Rejection R2 of claims 1–4, and 6– 8, but note

³ The status of the Examiner’s rejection of claim 14 in the Final Action (5) is somewhat unclear given the apparently conflicting statements on pages 21–23 of the Examiner’s Answer. As best can be determined, the § 112(b) rejection of claim 14 has been withdrawn, and the rejection of claim 17 is before us on Appeal.

Appellant presents no separate arguments concerning Rejection R2 of independent claim 9, and claims 11–19 depending therefrom.

We highlight and address specific findings and arguments regarding claims 1, 9, and 17 for emphasis as follows.

1. § 112(b) Rejection R1 of Claim 17

Issue 1

Appellant argues (Appeal Br. 4; Reply Br. 2–3) the Examiner’s rejection of claim 17 under 35 U.S.C. § 112(b) as being indefinite is in error. These contentions present us with the following issue:

Did the Examiner err in finding the recitation of “the description of the fixed safety volume” in claim 17 lacks proper antecedent basis?

Principles of Law

We apply the indefiniteness test approved by *In re Packard*, 751 F.3d 1307 (Fed. Cir. 2014) (per curiam): “A claim is indefinite when it contains words or phrases whose meaning is unclear,” and “claims are required to be cast in clear—as opposed to ambiguous, vague, indefinite—terms.” *See Packard*, 751 F.3d at 1310, 1313; *Ex parte McAward*, Appeal No. 2015-006416 (PTAB Aug. 25, 2017) (precedential) at *8–11 (explaining because of different approaches to indefiniteness before the PTAB and the courts, the PTAB continues to follow *Packard* after the Supreme Court’s *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898 (2014) decision).

[W]hen the USPTO has initially issued a well-grounded rejection that identifies ways in which language in a claim is ambiguous, vague, incoherent, opaque, or otherwise unclear in describing and defining the claimed invention, and thereafter the applicant fails to provide a satisfactory response, the

USPTO can properly reject the claim as failing to meet the statutory requirements of § 112(b).

Packard, 751 F.3d at 1311.

Analysis

The Examiner finds claim 17 lacks antecedent basis for the recitation of “*the* description of the fixed safety volume” because there is no previous recitation of a “description of the fixed safety volume” in any of claims 1, 2, and 3 from which claim 17 depends. Ans. 4.

Appellant contends “claim 17 at least implies that the ‘fixed safety volume’ is capable of being described, and thus the complained-of phrase in claim 17 has implicit antecedent basis.” Reply Br. 3 (citing Appeal Br. 4).

During oral argument, Appellant’s representative admits “[t]he 112 rejection relates to antecedent basis issues that I think are straightforward, and we can probably easily resolve these by an examiner's amendment.” Transcript 3:4–6.

We agree with the Examiner that claim 17 lacks antecedent basis for the disputed limitation, which could be addressed by a minor claim amendment as admitted by Appellant.

Therefore, based upon the findings above, on this record, we are not persuaded of error in the Examiner’s conclusion that the disputed limitation of claim 17 lacks proper antecedent basis, and thus is indefinite.

2. § 103 Rejection R2 of Claims 1–4, 6–9, and 11–19

Issue 2

Appellant argues (Appeal Br. 4–8; Reply Br. 3–6) the Examiner’s rejection of claim 1 under 35 U.S.C. § 103 as being obvious over the

combination of Kazi and Corrales is in error. These contentions present us with the following issue:

Did the Examiner err in finding the cited prior art combination teaches or suggests “[a] method for verifying one or more safety volumes for a mechanical unit with respect to an environment of the mechanical unit, wherein the mechanical unit is moveable and a world-coordinate system is defined in relation to the mechanical unit and in relation to the environment of the mechanical unit,” that includes, *inter alia*, the step of “storing a description of one or more safety volumes defined in relation to the world-coordinate system . . . wherein at least one of said safety volumes is a moving safety volume *having a size and position that depends on a velocity and a position of a critical part* of the mechanical unit,” as recited in claim 1 (emphasis added)?

Analysis

Independent Claim 1

The Examiner finds Corrales teaches or suggests the disputed limitation, but we note, however, while the claim requires that the “safety volume” (reading on the “bounding volume” in Corrales) has a *size and position* that depends on a velocity *and a position* of a critical part, the Examiner’s rejection merely finds that “the bounding volume of the moving manipulator is based on *a velocity* of each link (connects the parts of the robot, considered joints), with FIG. 5 adding the bounding volume of the robot shown at different positions, based on its moving manipulator based on its position.” Final Act. 8 (citing Corrales p. 182, right column, ll. 43–50) (emphasis added).

Appellant contends:

Even assuming, for the sake of argument, that the bounding volumes of Corrales (i.e., the alleged “moving safety volume”) each have a position that depends on a velocity and position of a robot link (i.e., the alleged “critical part of the mechanical unit”), Corrales still fails to disclose or suggest that the size of each bounding volume depends on a velocity and position of a robot link. Corrales discloses that the size of each bounding volume depends on the velocity of a robot link, but there is nothing in Corrales that discloses or suggests that the size of a bounding volume depends on a position of a robot link.

Appeal Br. 6.

During the Oral Hearing, Appellant’s representative directs us to Section 4.1 of Corrales which states “One of the main contributions of this paper is the development of dynamic bounding volumes *whose sizes change depending on the linear velocity of the associated link.*” Corrales 180:10–13 (emphasis added). In addition, Appellant’s representative directed us to equation (1) on page 180 of Corrales, i.e.,

$$radius_i(t) = radius_surface_i + |v(t)|\Delta t \quad (1)$$

which confirms that the size (radius) of the bounding volume as a function of time is determined by the linear velocity of the associated link, and not the location or position of the bounding volume. We find Appellant’s argument to be persuasive.

Based upon the findings above, on this record, we are persuaded of at least one error in the Examiner’s reliance on the cited prior art combination to teach or suggest the disputed limitation of claim 1, such that we find error in the Examiner’s resulting legal conclusion of obviousness. Therefore, we

do not sustain the Examiner's obviousness rejection of independent claim 1, and claims 2–4, and 6–8 that depend from claim 1.

Independent Claim 9

The Examiner cites Kazi paragraph 20 as teaching or suggesting the recited “position detector configured to continuously determine a position and an orientation of the portable display unit in relation to the world coordinate system” in claim 9, and relies upon Corrales, similar in some respects to claim 1, as teaching or suggesting “determin[ing] moving safety volumes for the critical part of the mechanical unit based on the positions and the velocities of the critical part, and to store a description of the moving safety volume defined in relation to the world coordinate system in said storage unit.” Final Act. 9–12.

However, we note that claim 9 is dissimilar to claim 1 by not requiring that the *size* of the moving safety volume depends on the positions and velocities of the critical part. Appellant presents no separate argument in the Briefs, but Appellant's representative does address this issue during the Oral Hearing by stating “[i]f it's a matter of adding that language that's present in Claim 1 to Claim 9 to make Claim 9 also allowable, I think we — that's something the applicant would likely be willing to do.” Transcript 18.

Accordingly, we sustain the rejection of independent claim 9 and dependent claims 11–19 which depend from claim 9.

REPLY BRIEF

To the extent Appellant *may* advance new arguments in the Reply Brief (Reply Br. 2–8) not in response to a shift in the Examiner's position in the Answer, arguments raised in a Reply Brief that were not raised in the

Appeal Brief or are not responsive to arguments raised in the Examiner's Answer will not be considered except for good cause (*see* 37 C.F.R. § 41.41(b)(2)), which Appellant has not shown.

CONCLUSIONS

(1) The Examiner did not err with respect to indefiniteness Rejection R1 of claim 17 under 35 U.S.C. § 112(b), and we sustain the rejection.

(2) The Examiner erred with respect to obviousness Rejection R2 of claims 1–4 and 6–8 under 35 U.S.C. § 103 over the cited prior art combination of record, and we do not sustain the rejection.

(3) The Examiner did not err with respect to obviousness Rejection R2 of claims 9 and 11–19 under 35 U.S.C. § 103 over the cited prior art combination of record, and we sustain the rejection.

DECISION SUMMARY

Claims Rejected	35 U.S.C. §	Basis / References	Affirmed	Reversed
17	112(b)	Indefiniteness	17	
1–4, 6–9, 11–19	103	Obviousness Kazi, Corrales	9, 11–19	1–4, 6–8
Overall Outcome			9, 11–19	1–4, 6–8

FINALITY AND RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv). *See* 37 C.F.R. § 41.50(f).

AFFIRMED IN PART