

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

EXOTEC PRODUCT FRANCE SAS, EXOTEC NORTH AMERICA INC.,
AND EXOTEC PRODUCTS USA INC.,

Petitioner,

v.

OPEX CORPORATION,
Patent Owner.

IPR2024-00850
Patent 11,472,632 B2

Before JOSIAH C. COCKS, JAMES J. MAYBERRY, and
RICHARD H. MARSCHALL, *Administrative Patent Judges*.

COCKS, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Petitioner Exotec Product France SAS, Exotec North America Inc., and Exotec Product USA Inc. (“Petitioner”) filed a Petition to institute *inter partes* review of claims 1, 3–12, 14, and 23–27 (“the challenged claims”) of U.S. Patent No. 11,472,632 B2 (Ex. 1002, “the ’632 patent”). Paper 1 (“Pet.”). Patent Owner Opex Corporation (“Patent Owner”) filed a Preliminary Response. Paper 7 (“Prelim. Resp.”). As was authorized by the panel, Petitioner filed a Preliminary Reply (Paper 9, “Prelim. Reply”) to the Preliminary Response, and Patent Owner filed a Preliminary Sur-reply (Paper 10, “Prelim. Sur-reply”) to the Preliminary Reply.

We have authority under 35 U.S.C. § 314 to determine whether to institute an *inter partes* review. The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a), which provides that an *inter partes* review may not be instituted unless “there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a).

A decision to institute under § 314 may not institute on fewer than all claims challenged in the petition. *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018). In addition, if the Board institutes trial, it will “institute . . . on all grounds in the petition.” PTAB Consolidated Trial Practice Guide, 5–6 (Nov. 2019)¹; 37 C.F.R. § 42.108(a); *see also PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (interpreting the statute to require “a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition”).

¹ Available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>.

Having considered the arguments and evidence presented in the Petition, and all the briefing before us, we institute *inter partes* review.

II. BACKGROUND

A. Related Matters

Both parties indicate that they are unaware of any related matters in connection with the '632 patent. *See* Pet. 97; Paper 6 (Patent Owner's Mandatory Notices), 1.

B. Real Parties-in-Interest

Petitioner identifies its entities of Exotec Product France SAS, Exotec North America Inc., and Exotec Product USA Inc. as the only real parties-in-interest. *See* Pet. 97. Patent Owner identifies itself, OPEX Corporation, as the only real party-in-interest. *See* Paper 6, 1.

C. Overview of the '632 patent

The '632 patent is titled "Material Handling System." Ex. 1001, code (54). The Abstract of the '749 patent is reproduced below:

A system may include a vehicle for delivering items and a plurality of racks having a plurality of storage locations. The racks may be arranged to form one or more aisles. The vehicles are configured to drive horizontally along a path that may extend along a path under the racks that is parallel to the aisles. Additionally, the vehicles may be operated to turn while the vehicle is positioned under one of the racks. The vehicles may travel under the racks and cross one or more aisles to reach a particular column in one of the aisles. The vehicle climbs upwardly within the particular column to retrieve an item from a storage location in the column.

Id. at code (57).

Figure 2 of the '632 patent is reproduced below:

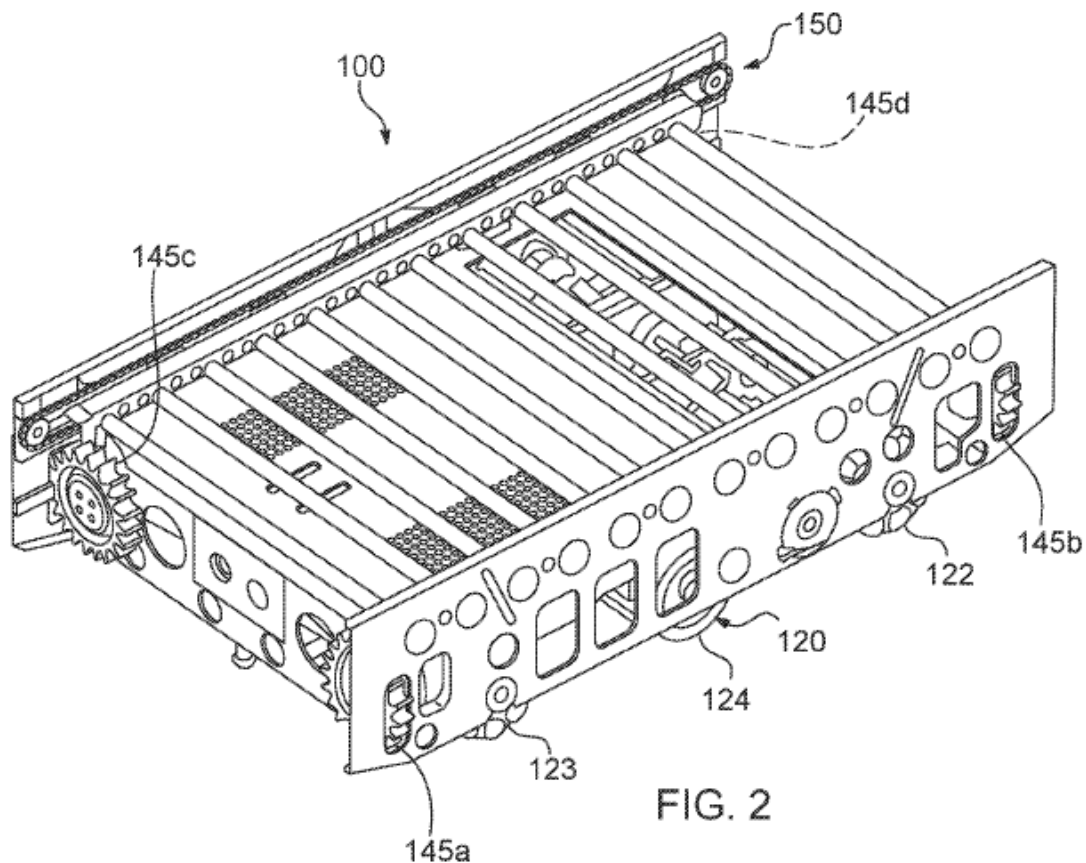


Figure 2 above illustrates details of a vehicle that is part of an automated material handling system. Ex. 1001, 5:42–43, 7:62–63. Vehicle 100 includes horizontal drive assembly 120 formed of rollers 122, 123, and 124 and which allows for the vehicle “to drive along a track or along an open horizontal surface, such as a floor.” *Id.* at 8:9–23. Vehicle 100 also includes vertical drive mechanism 140 (not numbered in Figure 2) including drive gears 1451, 145b, and 145c. *Id.* at 9:20–32. The vertical drive mechanism allows for vehicle 100 to move vertically within storage racks. *Id.* Vehicles 100 may be semi-autonomous or fully autonomous and include a processor configured to perform steps of a navigation process stored in a memory. *Id.* at 11:37–38; 12:54–58.

Figure 1 of the '632 patent is reproduced below:

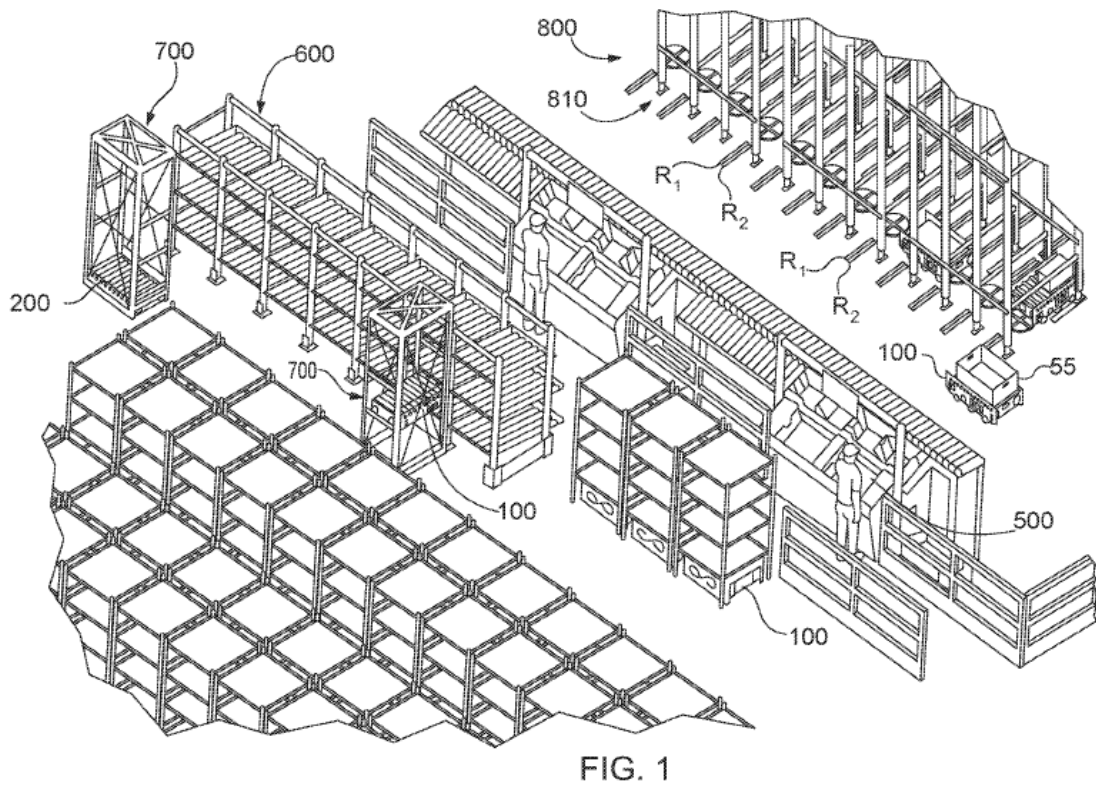


Figure 1 above illustrates a perspective view of a material handling system that includes vehicles 100 sorting and retrieving items associated with racks 600, 700, and 800. *Id.* at 5:40–41; 7:10–35.

Figure 7 of the '632 patent is reproduced below:

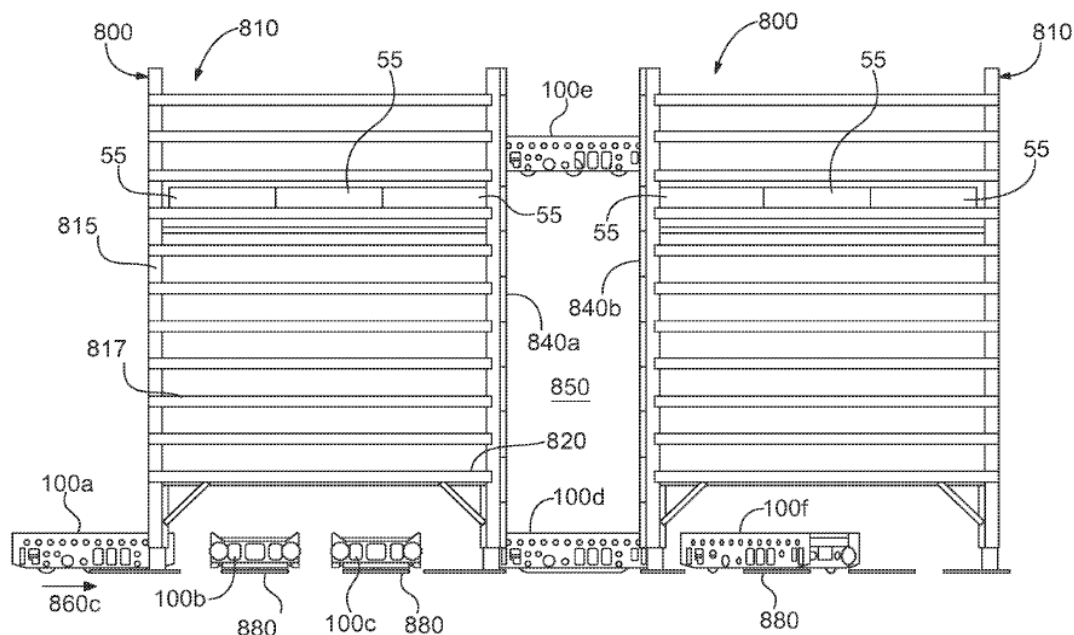


FIG. 7

Figure 7 above illustrates a rack system of a material handling system. *Id.* at 5:51–52. Storage racks 800 include vertical columns 810 and a plurality of storage locations 820. *Id.* at 7:41–52. One or more guides 880 function to align vehicles 100 as they travel around, underneath, and within the racks. *See, e.g., id.* at 8:55–57; 9:41–53.

D. The Challenged Claims

Petitioner challenges claims 1, 3–12, 14, and 23–27 of the '632 patent.

Pet. 1. Of those challenged claims, claims 1, 11, and 23 are independent.

Claim 1 is representative and is reproduced below:

[1.pre] A method for delivering items to storage locations and retrieving items from storage locations, comprising the steps of:

[1.a1] providing a plurality of storage racks spaced apart from one another forming a plurality of aisles,

[1.a2] wherein each storage rack comprises a plurality of columns and each column comprises a plurality of storage locations;

[1.b1] providing a plurality of delivery vehicles
[1.b2] wherein each vehicle comprises a horizontal drive system operable to drive the vehicle along a horizontal surface, [1.b3] a vertical drive operable to drive the vehicle vertically and [1.b4] a transfer mechanism operable to transfer an item between the vehicle and one of the storage locations;

[1.c] driving a first one of the vehicles to drive the first vehicle to the storage racks;

[1.d1] driving the first vehicle along a first path under a first one of the racks [1.d2] wherein the first rack is adjacent a first one of the aisles and [1.d3] wherein the first path extends in a direction parallel to the first aisle and spaced apart from the first aisle;

[1.e] turning the first vehicle while the first vehicle is under the first rack;

[1.f] driving the vehicle into the first aisle;

[1.g] driving the first vehicle upwardly in the aisle to a first of the storage locations;

[1.h] transferring an item between the first vehicle and the first storage location;

[1.i] driving the first vehicle downwardly in the aisle until the vehicle is on a horizontal surface;

[1.j] driving the first vehicle across the first aisle after the step of driving the first vehicle downwardly; and

[1.k] driving the vehicle out from under the storage racks after the step of driving the first vehicle across the first aisle.

Ex. 1001, 25:2–35.²

² We reproduce claim 1 with similar limitation identification designations used in the Petition (i.e., “[1.pre]” through “[1.k]”). *See, e.g.*, Pet., Claims Appendix.

E. Asserted Grounds of Unpatentability

Petitioner asserts the following ground of unpatentability:

Claim(s) Challenged	35 U.S.C. §³	Reference(s)/Basis
1, 3–12, 14, 23–27	103	Raizer, ⁴ Hangzhou ⁵

Pet. 1.

F. Testimonial Evidence

In support of its proposed ground of unpatentability, Petitioner relies on the Declaration of Dr. Stephen Derby (Ex. 1003). In challenging that ground, Patent Owner relies on the Declaration of William E. Singhouse, Ph.D. (Ex. 2001).

III. PATENTABILITY ANALYSIS

A. Principles of Law

A patent claim is unpatentable under 35 U.S.C. § 103 “if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains.” 35 U.S.C. § 103. The question

³ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102 and 103 effective on March 16, 2013, and those amendments apply to the ’632 patent. Neither party, however, argues that the outcome of this case would differ based on applying the pre-AIA or post-AIA versions of these laws.

⁴ U.S. Patent Application Publication No. US 2017/0158430 A1 published June 8, 2017 to Raizer (Ex. 1005, “Raizer”).

⁵ CN Patent Publication No. CN 109987366A published July 9, 2019 (Ex. 1007; English translation Ex. 1006, “Hangzhou”).

of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in evidence, objective evidence of nonobviousness.⁶ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden of persuasion never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

At this preliminary stage, we determine whether the information presented shows a reasonable likelihood that Petitioner would prevail in establishing that at least one of the challenged claims would have been obvious over the proposed prior art. We analyze the asserted grounds with the above-noted principles in mind.

B. Level of Ordinary Skill in the Art

We consider the asserted grounds of unpatentability in view of the understanding of a person of ordinary skill in the art. In assessing the level of ordinary skill in the art, various factors may be considered, including the

⁶ Patent Owner does not present arguments or evidence of secondary considerations in its Preliminary Response. Therefore, secondary considerations do not constitute part of our analysis herein.

“type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (quoting *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986)). “[O]ne or more factors may predominate.” *Id.*

Petitioner contends the following in connection with the level of ordinary skill in the art:

A person of ordinary skill in the art (“POSITA”) at the time of the alleged invention of the ’632 Patent would have been a person with a working knowledge of mechanical design and automation. That person would have had a Bachelor of Science degree in an academic discipline emphasizing the design of mechanical, automation, and robotics technologies, in combination with training or at least one to two years of related work experience. Alternatively, that person could have also had a Master of Science degree in a relevant academic discipline with less than a year of related work experience in the same discipline. (Ex. 1003, ¶¶42-43). More education can supplement practical experience and *vice versa* (Ex. 1003, ¶¶42-43).

Pet. 5.

Patent Owner does not dispute Petitioner’s assessment of the level of ordinary skill in the art, or offer its own assessment. Based on this record, we adopt Petitioner’s articulation of the level of ordinary skill in the art, which is consistent with the ’632 patent and the asserted prior art, and we apply it in our patentability evaluations below. *See also Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (the prior art, itself, can reflect appropriate level of ordinary skill in art).

C. Claim Construction

In interpreting the claims of the '632 patent, we “us[e] the same claim construction standard that would be used to construe the claim[s] in a civil action under 35 U.S.C. [§] 282(b).” *See* 37 C.F.R. § 42.100(b) (2020). The claim construction standard includes construing claims in accordance with the ordinary and customary meaning of such claims as would have been understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. *See id.*; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (*en banc*).

Neither Petitioner nor Patent Owner contends that any claim term has a meaning other than its ordinary and customary meaning. *See, e.g.*, Pet. 4; Prelim. Resp. 8. Having considered the record, we determine that no express claim construction is necessary for any claim term. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (holding that only claim terms in controversy need to be construed, and only to the extent necessary to resolve the controversy (citing *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

D. Proposed Ground Based on Raizer and Hangzhou

1. Overview of Raizer

Raizer is titled “Automatic Warehouse System.” Ex. 1005, code (54). Raizer’s Abstract is reproduced below:

The invention is an automatic system for picking and placing boxes on shelves in a warehouse. The system comprises a set of autonomous mobile robots; a network of vertical and horizontal rails that are parallel to the vertical support posts and horizontal shelves of the shelving system in the warehouse; and a Real Time

Traffic Management (RTTM) server, which is a central processing server configured to communicate with the robots and other processors and servers in the warehouse. The system is characterized in that the robots comprise a set of on-board sensors, a processor, software, and other electronics configured to provide them with three-dimensional navigation and travel capabilities that enable them to navigate and travel autonomously both along the floor and up the vertical rails and along the horizontal rails of the network of rails to reach an exact location on the floor or shelving system of the warehouse.

Id. at code (57).

Figures 5A and 5B of Raizer are reproduced below:

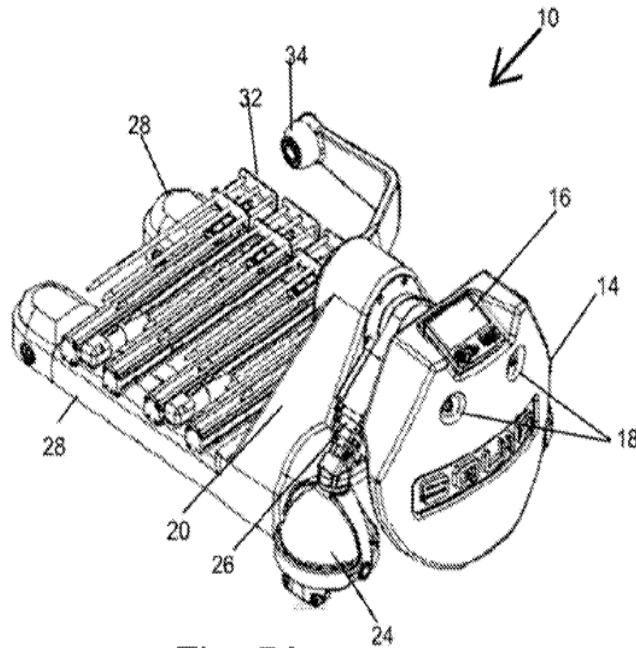


Fig. 5A

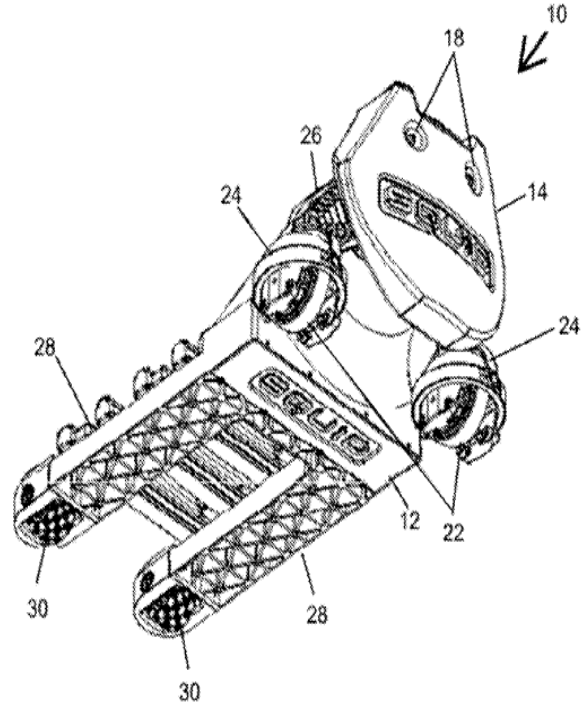


Fig. 5B

Figures 5A and 5B above illustrate top and bottom perspective view of a robot according to Raizer's invention. Ex. 1005 ¶ 65. Robot 10 includes, among other components, a frame formed of beams 28 and 12, rear wheels 30, front wheels 22, drive and steering units 24, arm units 26, micro-pallet

lifters 32, and fine positioning sensor 34. *Id.* ¶¶ 103–106. Raizer further describes the following in connection with its robots:

[A] robot having three-dimensional navigation and travel capability that enable it to navigate and travel both along the ground and up vertical rails and along horizontal rails of a network of rails[.]

Robots: A set of autonomous centrally controlled mobile robots that bring desired boxes to and from the picking station. The robots have 3 dimensional travel capabilities enabling them to travel along the ground and up and along the shelves. The robots are pre-loaded with proprietary software which includes the warehouse layout, routes, intersections, and designated areas (this mapping Survey is recorded by a “Survey Mode” of the robot's software). Each robot utilizes dedicated maneuvering algorithms and a proprietary “Fine Positioning procedure to enable precise, quick and efficient loading.

Id. ¶¶ 48, 84.

Raizer’s Figure 1 is reproduced below:

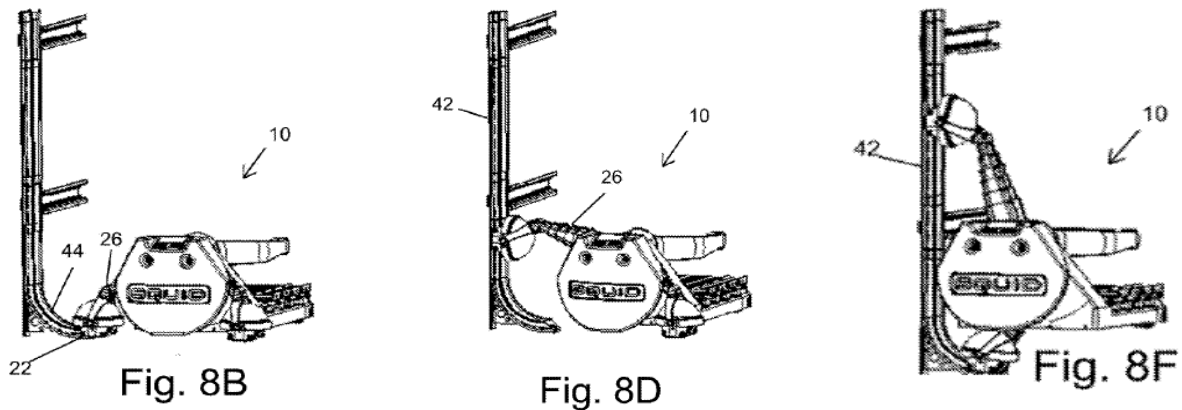


Fig. 1

Figure 1 above shows the floor plan of a typical warehouse which has been automated according to Raizer's invention. "The warehouse is divided into three main sections: a Receiving and Dispatch Center (RDC), an Operation Area (OP), and a storage area, which can be divided into zones (for example zone Z01 is shown in FIG. 1.)]" *Id.* ¶92. Robots can be loaded with boxes for delivering merchandize to shelves (within bays B1, B2, etc.) or retrieve boxes containing items to be shipped from the shelves. *Id.* "The sides of the shelving units that face the aisles between units are called faces (F1, F2, [etc.])." *Id.* Raizer further describes the following: "the system of the invention is designated as a self-learning system where, for example,

algorithm can track the movement of the robots and organize the routes of traffic in and around the warehouse to reduce congestion and prevent ‘traffic jams’ when the robots are busy filling orders.” *Id.* ¶ 98.

Figures 8B, 8D, and 8F of Raizer are reproduced below:



Figures 8B, 8D, and 8F above depict “different stages in the process of the robot of the system of the invention leaving the floor of the warehouse and climbing a vertical rail attached to the shelving.” *Id.* ¶ 65. Robot 10 may engage with rails 42 of a shelving unit at “terminal 44” so as to climb or descend from the shelves. *Id.* ¶ 111.

2. Overview of Hangzhou

Hangzhou is titled “Unmanned Warehouse System and Inbound and Outbound Method Therefor.” Ex. 1006, code (54). Hangzhou summarizes its disclosure in-part as follows:

An unmanned warehousing system using mobile robots and caching apparatuses and an inbound and outbound method utilizing caching apparatuses to improve operation efficiency are provided, wherein an outbound process is completed by picking items placed on a shelf and transporting them to a sorting site, or an inbound process is completed by transporting items from the sorting site to the shelf and storing them on the shelf. The unmanned warehousing system is provided with: at least one

shelf, a front surface of which an item can be picked up or placed on; at least one standardized container or a movable bracket for storing scattered items; at least one auto-guided trolley for transporting the standardized container to a specified position; at least one stacking device capable of picking up and storing items on the shelf; and a management terminal for supplying handling instructions to the auto-guided trolley and the stacking device.

Ex. 1006 ¶ 8.

Hangzhou's Figure 1 is reproduced below:

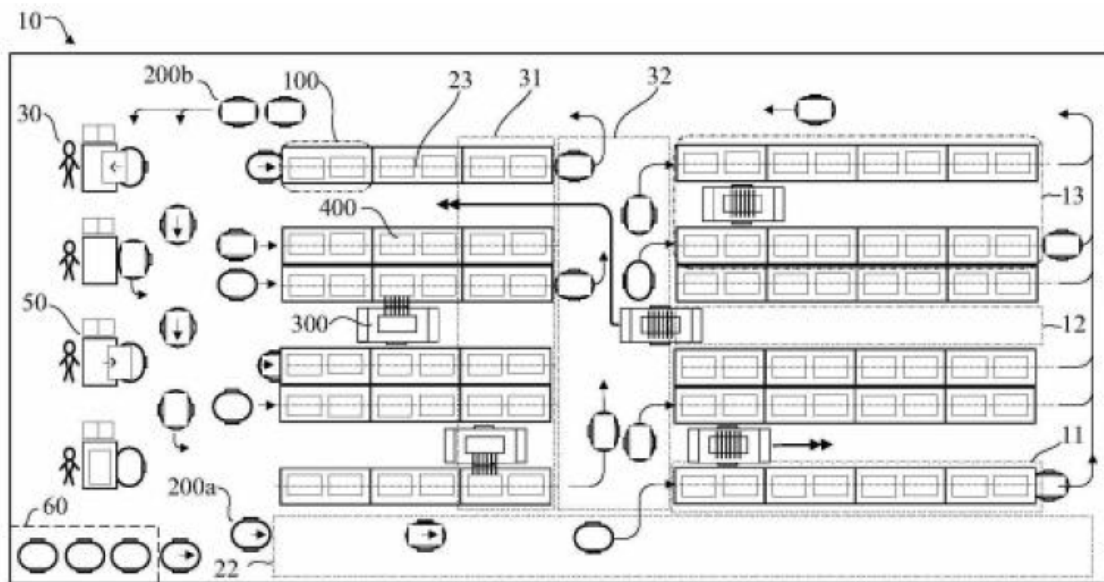


Figure 1 above shows a top view of an unmanned warehousing system according to an embodiment of Hangzhou's invention. *Id.* ¶ 11. "The warehousing system 10 includes a dispatch control system not shown in the figure, a plurality of multi-layer shelves 100, a plurality of auto-guided trolleys 200, a plurality of stacking vehicles 300, optional sorting workstations 50, etc." *Id.* ¶ 35. Hangzhou further describes the following:

Shelves are placed in rows and columns to improve the plot ratio. In general, a plurality of modular shelves 100 are horizontally connected into a shelf row 11, and a stacking row laneway 12, which is mainly for stacking vehicles 300 to travel and operate and occasionally for auto-guided trolleys 200 and

workers to pass through, is provided in front of each shelf row 11. Two shelf rows are usually placed face to face to share a stacking row laneway 12 in the middle thereof. The combination of the stacking row laneway 12 and all the shelf rows 11 facing the row laneway is defined as a shelf-laneway combination 13.

In FIG. 1, the thin lines and solid arrows above or in front of auto-guided trolleys 200 indicate the current paths or directions of the auto-guided trolleys, and the thick lines and solid arrows in front of stacking vehicles 300 indicate the current paths and target positions of the stacking vehicles.

Id. ¶¶ 37, 40.

Hangzhou's Figure 2 is reproduced below:

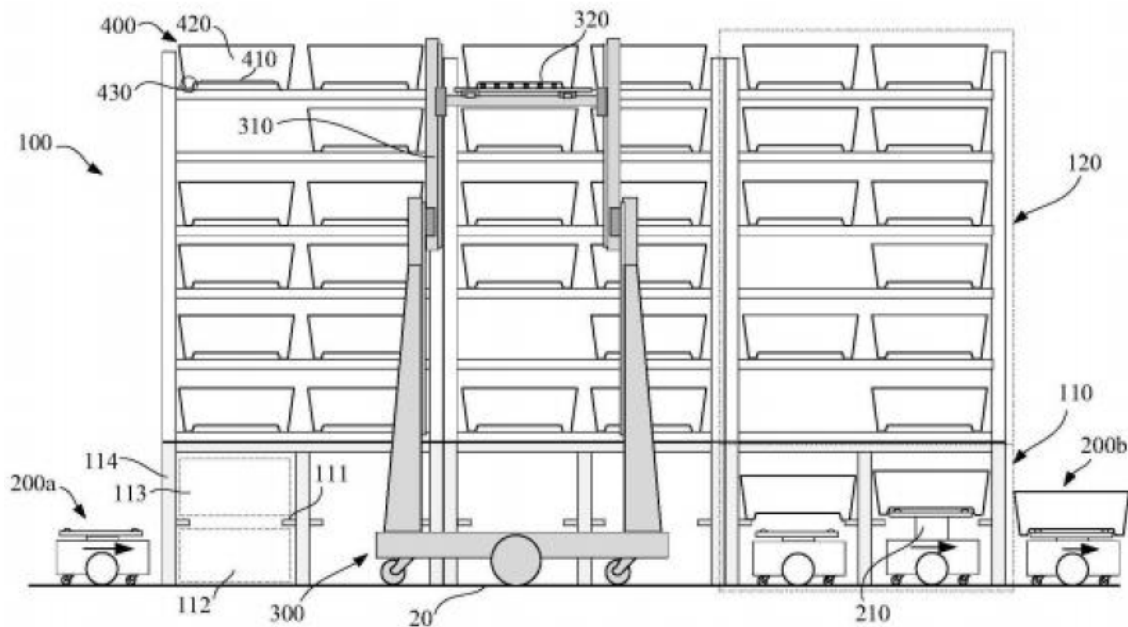


Figure 2 above shows “a side view of the working principle of the unmanned warehousing system” according to the embodiment shown in Figure 1. *Id.*

¶ 12. Shelves 100 are formed as multi-layer racks 120. *Id.* ¶ 43. Hangzhou also explains the following:

An auto-guided trolley 200 is a small mobile robot with auto-navigation ability, usually driven by a differential gear train, and equipped with four universal wheels. Such a trolley is characterized by a small size and a low cost. In addition, trolleys

are generally designed in symmetrical so that they can turn in place. However, the specific driving form is not limited thereto, and may also be an omnidirectional drive wheel train and others. As shown in FIG. 1, in this embodiment, an auto-guided trolley 200 preferentially travels in column laneways 32 and auto-guided trolley passage spaces 112, never entering stacking row laneways 12 to avoid path conflicts with stacking vehicles 300.

Id. ¶ 48.

3. *Petitioner's Position*

Petitioner contends that claims 1, 3–12, 14, and 23–27 would have been obvious based on the combined teachings of Raizer and Hangzhou. Supported by the testimony of Dr. Derby, Petitioner lays out in detail where it believes all the limitations of those claims are found in Raizer and Hangzhou. Pet. 9–36 (citing to various paragraphs of Exhibits 1003, 1005, and 1006).

For instance, with respect to claim 1, Petitioner contends that Raizer discloses the preamble of claim 1, i.e., “[a] method for delivering items to storage locations and retrieving items from storage locations.” *Id.* at 9–10.⁷ Petitioner also contends that Raizer discloses steps of providing a plurality of storage racks that form aisles in the manner called for in claim 1. *Id.* at 10–11 (referencing limitations [1.a1] and [1.a2]). Petitioner further relies on Raizer as accounting for the claimed delivery vehicles, in the form of its autonomous mobile robots, and urges that the vehicles include the recited components and drives to operate on horizontal surfaces, including within

⁷ We note that Patent Owner does not dispute that Raizer accounts for the preamble of claim 1. We find Petitioner’s contention substantiated in that respect. Accordingly, we need not determine whether the preamble of claim 1 is limiting, as Petitioner adequately shows, for purposes of institution, that Raizer accounts for that preamble.

aisles, and vertically (i.e., up and down storage racks) to transfer items between the vehicles and the storage racks. *Id.* at 11–18, 29–33 (referencing limitations [1.b1], [1.b2], [1.b3], [1.b4], [1.c1], [1.g], [1.h], and [1.i]).

Where Petitioner relies on Hangzhou pertains to certain aspects of limitations [1.d1], [1.d2], [1.d3], [1.e], [1.f], [1.j], and [1.k]. Specifically, those limitations concern movement of the vehicle on paths underneath, or out from underneath, the storage racks. For instance, limitation [1.d1] recites “driving the first vehicle along a first path under a first one of the racks.” *See* Ex. 1001, 25:17–18. Petitioner notes Raizer’s desire to organize routes “to reduce congestion and prevent ‘traffic jams’ when the robots are busy filling orders” (Pet. 20 (citing Ex. 1005 ¶¶ 79, 98; Ex. 1003 ¶ 159)), but reasons that “[s]hould *Raizer* be determined to not disclose driving a vehicle along a path under one the of the racks, a POSITA would have looked to *Hangzhou*” (*id.* (citing Ex. 1003 ¶ 160)). As such, Petitioner points to Hangzhou’s disclosure of its “auto-guided trolley 200” as being a “small mobile robot” that operates within “auto-guided trolley passage spaces 112” located beneath a shelf (i.e., a rack). *Id.* at 20–22 (citing Ex. 1006, Abstract, ¶¶ 44, 45, 48, Fig. 2; Ex. 1003 ¶ 161–165).

Petitioner expresses that one of ordinary skill in the art would have been motivated to combine the teachings of Raizer and Hangzhou. Pet. 6–9. Specifically, Petitioner reasons that one of ordinary skill in the art would have recognized a need for “new travel ways” for automated robots “to avoid collisions and to reduce congestion.” *Id.* at 6–7 (citing Ex. 1003 ¶¶ 105–106). Petitioner further expresses the following:

A POSITA would have turned to *Hangzhou* and its teaching of running autonomous robots in passage spaces beneath the shelves to provide such added travel ways. (Ex.

1003, ¶¶108, 109, 110). The practice of installing shelving units with elevated lower shelves to allow robots loaded with containers to travel underneath was a known technique at the time to limit congestion and avoid bottlenecks. (Ex. 1003, ¶107).

A POSITA would have understood that combining the *Raizer* autonomous robots, which move both horizontally and vertically, with *Hangzhou*'s teaching of running such robots in passage spaces beneath the shelves, would achieve maximum flexibility in maneuvering the robots along the warehouse floor and eliminating bottlenecks. (Ex. 1003, ¶¶109-110). A POSITA would have also understood that the vertical travel flexibility of *Raizer*'s robots eliminates the need for *Hangzhou*'s stacking vehicles because *Raizer*'s robots themselves can pick and place containers on upper shelves, thereby making this combination even more useful. (Ex. 1003, ¶111).

Id. at 7.

Petitioner additionally contends that the “predictable result of reducing congestion and preventing traffic jams” would emerge from the teachings of *Raizer* and *Hangzhou*, and that a skilled artisan would have had a reasonable expectation of success in so combining those teachings. *Id.* at 8–9.

Petitioner also explains how *Hangzhou* and *Raizer*'s teachings account for the operation and positioning of a vehicle with respect to the storage racks as required by limitations [1.d2], [1.d3], [1.e], [1.f], [1.j], and [1.k] (*id.* at 22–29, 33–36), and likewise advances the above-noted reasoning for combining the teachings of *Hangzhou* and *Raizer* (*id.* at 6–9).

Petitioner takes a similar approach in accounting for the features of claims 3–12, 14, and 23–27. *Id.* at 36–95.

4. Patent Owner's Position

Patent Owner disagrees with Petitioner that the challenged claims are accounted for based on the teachings of *Raizer* and *Hangzhou*. The basis of

Patent Owner's disagreement centers on the theory that the modifications to Raizer's system based on Hangzhou's teachings are "contrary to Raizer's purported inventiveness, changes its primary principle of operations and renders Raizer unsatisfactory for its intended purpose." Prelim. Resp. 22; *see id.* at 22–28. Patent Owner characterizes Raizer and Hangzhou as being directed to "two fundamentally different systems." *Id.* at 22. According to Patent Owner, Raizer describes "anchor point navigation" in connection with its robots that provides for travel of the robots on the floor "as rapidly and efficiently as possible" whereas Hangzhou "requires a much more complete navigations planning system in order to ensure safe and reliable operation." *Id.* at 22–23 (citing Ex. 1005 ¶ 80; Ex. 1006 ¶ 63, 80 Ex. 2001 ¶¶ 84–91) (emphasis omitted). In Patent Owner's view the alleged "complexity" of Hangzhou's navigational system if implemented in Raizer's systems "would have altered what Raizer consider to be the distinguishing features of Raizer's purported invention: 'us[ing] ***less accurate sensing and motions when travelling on the floor*** in order ***to arrive at the designated destination as rapidly and efficiently as possible.***" *Id.* at 25 (citing Ex. 1005 ¶ 80; Ex. 2001 ¶ 92) (emphasis and alteration in original).

Patent Owner additionally contends the following:

In addition to having changed the purported goal of Raizer's robots to move about the floor quickly with less accurate sensing and rendering Raizer unsatisfactory for its intended purpose, a POSITA would have been dissuaded from making the proposed modification for two additional reasons, when considering the vertical movement of the robots up and along the shelves.

Id. (citing Ex. 2001 ¶ 93).

Patent Owner also notes that Petitioner proposes elevating lower shelves of Raizer's system to allow robots to travel underneath. *Id.* Patent

Owner, however, takes the view that “[i]n some cases, this would not have been possible” and postulates that “if the warehouse ceiling height was fixed, it would not have allowed further elevating the top shelves, leading to a decrease in warehouse storage capacity.” *Id.* at 25–26 (citing Ex. 2001 ¶94). Patent Owner further argues the following:

[E]ven if elevating the shelves were possible, the proposed modification would have resulted in increased energy consumption each time a robot has to travel up the shelves to deliver/retrieve an item. Not only would the robot have to travel additional distances, it would have been further burdened with additional sensor systems not desired in Raizer in order to allow the robots to roam about more freely on the floor, as Hangzhou teaches. In other words, Petitioners’ proposed modification would have rendered Raizer unsatisfactory for its intended purpose that allowed it to distinguish itself from existing systems. And a POSITA would not have been motivated to modify Raizer to destroy its purportedly inventive aspect, only to have it revert back to existing systems that do not use “anchor point navigation.”

Id. at 26 (citing EX2001 ¶¶ 95–97).

Patent Owner concludes that “the drawbacks of making the modification to Raizer outweigh the alleged benefit” such that a skilled artisan would not have been motivated to make the modifications proposed. *Id.* at 27–28.

Patent Owner additionally argues that even if the proposed modification to the lower shelf elevation in Raizer were made, certain features of claims 1, 3–10, 11, 12, and 14 would not be satisfied. Prelim. Resp. 28–33. To that end, Patent Owner expresses the following:

Independent claims 1 and 11 require “driving the first vehicle along a first path under a first one of the racks ... wherein the first path extends in a direction parallel to the first aisle and spaced apart from the first aisle,” and “a first horizontal path that

extends under the first rack in a direction parallel to the aisle,” and “a second horizontal path that extends under the first rack in a direction parallel to the aisle[.]”

Id. at 28–29.

Patent Owner proceeds to argue that certain “vertical supports” said to be shown in Raizer’s Figures 1 and 12A would allegedly preclude implementation of the above-noted paths set forth in claims 1 and 11, and that removal of such supports “can cause significant complications” including that remove “may cause warpage or buckling of the shelving units” which Patent Owner contends would affect robot movement. *Id.* at 32–33 (citing Ex. 2001 ¶¶ 101–102).

Patent Owner thus submits that Petitioner has not demonstrated a reasonable likelihood of prevailing with respect to claims 1, 3–10, 11, 12, and 14. *Id.* at 33.

5. Discussion

At the outset, we find that Patent Owner’s characterization of Raizer’s and Hangzhou’s systems as “fundamentally different” is difficult to reconcile at this time and on this record. The references are each similarly directed to automated warehouse systems involving operation of autonomous robots or trolleys that navigate a warehouse floor for the purpose of loading items on shelves or retrieving items from those shelves. *Compare* Ex. 1005, Abstract *with* Ex. 1006, Abstract. That the references may not convey complete symmetry with one another in connection with particular trolley/robot configurations, navigation techniques, or shelf positioning as a part of a warehouse floorplan does not, in our view, give rise to a fundamental dichotomy or distinction that prohibits the combination of their teachings, as Patent Owner appears to argue.

In any event, in seeking to make its case that Petitioner has not established a reasonable likelihood of success in its challenge based on Raizer and Hangzhou, Patent Owner relies heavily on Raizer's disclosure in connection with its robots' use of "anchor point navigation." *See, e.g.*, Prelim. Resp. 22–23 (citing Ex. 1005 ¶ 80; Ex. 2001 ¶¶ 84–86). Raizer's paragraph 80 is reproduced below:

The robots in the system of the invention use "anchor point navigation". That is they use less accurate sensing and motions when travelling on the floor in order to arrive at the designated destination as rapidly and efficiently as possible and employ dedicated algorithms and more precise sensing only when near anchor points, i.e. fixed specific locations in the warehouse such as terminals (locations at which the robot leaves the floor and climbs a vertical rail of the shelving system), picking stations, and battery charging stations. This feature provides significant savings in energy and load on the sensor and navigation system since the robot has to check exactly where it is only when approaching its destination.

Ex. 1005 ¶ 80.

Thus, Raizer conveys that at certain areas or locations on a warehouse floor there are recognized benefits of speed, efficiency, and energy savings in employing a navigation technique, i.e., "anchor point navigation" that does not involve use of "precise sensing" capability at certain times and in certain locations on the warehouse floor. Notably, while Raizer recognizes certain benefits of "anchor point navigation" that does not use a robot's full sensing capability, the reference also conveys that the following are aspects of its disclosed system:

Embodiments of the system comprise software that enables advanced capabilities such as realization of Internet of Things (IoT) scenarios. For example, System components will be able to identify, connect and cooperate with other IoT enabled devices like automated hauling devices, Smart entry gates and

doors, automatic counting & measure systems, cleaning robots and other warehouse IoT participants. The system of the invention is designated as a self-learning system where, for example, algorithm can track the movement of the robots and organize the routes of traffic in and around the warehouse to reduce congestion and prevent “traffic jams” when the robots are busy filling orders.

Id. ¶ 98.

As appreciated by Petitioner (*see* Pet. 20 (citing Ex. 1005 ¶¶ 79, 98; Ex. 1003 ¶ 159)), Raizer clearly conveys that its system is one characterized as “self-learning” and which employs algorithms to track robot movement and organize routes with the intent of reducing congestion and preventing “traffic jams.” Therefore, Raizer reasonably provides that its use of “anchor point navigation” in certain circumstances is harmonious with the use of algorithms to control robot movement. Raizer’s own disclosure in that respect seemingly undermines Patent Owner’s general premise that “anchor point navigation” and algorithmic control of robot movement are so distinct in character as to be mutually exclusive of one another.

As Patent Owner recognizes, Hangzhou describes algorithmic control of its auto-guided trolleys. *See* Prelim. Resp. 23 (citing Ex. 1006 ¶ 59). Specifically, Hangzhou discloses, for example, that its “auto-guided trolleys 200 also run an obstacle avoidance algorithm to ensure safety and reliability.” Ex. 1006 ¶ 59. Although Patent Owner contends that Hangzhou involves “a much more complex navigation planning system” because of its obstacle avoidance algorithm (*see, e.g.,* Prelim. Resp. 23–25), Patent Owner does not provide, on this record, adequate assessment as to why Hangzhou’s disclosure in that regard is meaningfully, or fundamentally, different than the system set forth in Raizer that also incorporates algorithms in the pursuit of reducing route congestion and avoiding “traffic jams” (*see* Ex. 1006

¶ 98). Rather than fundamentally different, the record before us reasonably conveys there is congruity in the systems of both Raizer and Hangzhou in conjunction with control of robot or trolley movement.

In its Preliminary Response, Patent Owner alleges that Raizer restricts movement of its robots on the warehouse floor to certain areas, and specifically contends that those areas do not include parts of the floor that are recognized as aisles. Prelim. Resp. 13–15 (citing Ex. 2001 ¶¶ 59–64). Neither Patent Owner nor Dr Singhouse, however, provides any credible basis, or adequate evidentiary citation, to conclude that Raizer imposes the robot movement restriction that is alleged. The general premise of Patent Owner’s argument seems to be that movement of Raizer’s robots on the warehouse floor, for instance beneath shelving, is somehow strictly incompatible with “anchor point navigation” such that general movement on the floor cannot be accomplished. Patent Owner, however, attempts to extrapolate that premise from a single paragraph of Raizer, i.e., paragraph 80. On this record, that premise does not find adequate support.

As Petitioner observes, Raizer describes in other parts of its disclosure that its robots “can be steered by its control system to any location of the floor of the warehouse . . .,” and have “three-dimensional navigation and travel capability that enable them to navigate and travel autonomously both along the floor and up the vertical rails and along the horizontal rails of the network rails. Prelim. Reply 5 (quoting Ex. 1005 ¶ 22, 89, 104 (emphasis omitted); citing Ex. 1003 ¶¶ 75, 86). And, as discussed above, Raizer also clearly conveys that even when employing “anchor point navigation” in some areas, there are other areas of the warehouse (e.g., terminals, picking stations and battery charging stations) in which robot movement is controlled

by algorithms. Ex. 1005 ¶ 80. At this time, and on this record, we find Petitioner’s position and Dr. Derby’s testimony on the matter (*e.g.*, Prelim. Reply 5; Ex. 1003 ¶¶ 75, 86) more persuasive than that of Patent Owner’s position and Dr. Singhouse’s testimony (*e.g.*, Prelim. Resp. 13–15; Ex. 2001 ¶¶ 59–64) as Petitioner’s position is more consistent with what a person of ordinary skill in the art would understand from the express teachings of the prior art.

Further, as noted above, Petitioner contends that there are various reasons why a skilled artisan would have sought to combine the teachings of Raizer and Hangzhou. *See supra* § IID.3. On this record, and for purposes of institution, we find those contentions persuasive. For example, as Petitioner observes (*see, e.g.*, Pet. 7), and which is not disputed by Patent Owner, Hangzhou sets forth that, in the area of automating warehouses, it is a known and recognized practice to provide pathways (*e.g.*, auto-guided trolley passage spaces 112) underneath shelving units for movement of automated trolleys or robots. *See, e.g.*, Ex. 1006 ¶ 48 (“an auto-guided trolley 200 preferentially travels in column laneways 32 and in auto-guided trolley passage spaces 112”); Fig. 2. Patent Owner also does not meaningfully dispute Dr. Derby’s testimony that “[i]t was well known to elevate the shelving units above the floor so that robots loaded with containers can travel underneath thereby allowing for more flexible route planning and the elimination of bottlenecks.” *See* Ex. 1003 ¶ 107; *see also id* at Section VI., ¶¶ 45–53 (describing in detail, with citation to record evidence, that one of ordinary skill in the art understood that shelving units could be elevated above warehouse floors).

We are cognizant of Patent Owner’s assertion that “[i]n some cases, [it] would not have been possible” to elevate lower shelves due to concerns of decreasing warehouse storage capacity. *See* Prelim. Resp. 25–26 (citing Ex. 2001 ¶ 94). Neither Patent Owner’s statement nor Dr. Singhouse’s testimony provides any record citation that elevating the lower shelves of a warehouse is prohibitive or constitutes some type of insurmountable pursuit. Indeed, Patent Owner’s and Dr. Singhouse’s assertions that “in some cases” lower shelf elevation is not possible is, on its face, recognition that the corollary is also true that in other cases such lower shelf elevation is possible.

We also are not satisfied at this time that any “vertical supports” illustrated as a part of Raizer’s shelves create an obstacle to a skilled artisan in seeking to harness the benefits of more available robot pathways underneath warehouse in the manner urged by Petitioner. *See, e.g.*, Pet. 6–9. Indeed, on this record, Patent Owner does not provide any credible or justifiable reasoning as to why the presence of the noted supports that are part of Raizer’s shelving units prohibit movement of Raizer’s robots along one or more horizontal paths beneath the shelves and parallel to the aisles, as is recited in claims 1 and 11. We note that those claims do not require any particular path length necessary to meet the limitations. Moreover, even if the claims do specify some particular length, Patent Owner does not articulate why a skilled artisan would be incapable of suitably configuring shelves, as a matter of routine, in seeking to harness the recognized benefits of under-shelf pathways for autonomous robots. At this time, the record reasonably conveys that a person of ordinary skill in the art, who is also a person of ordinary creativity (*see KSR Int’l Co. v. Teleflex Inc.*, 550 U.S.

398, 421 (2007)), would have recognized that shelving units may be arranged in numerous configurations and that the prior art of record provides reasons for configurations that allow for the creation of undershelf pathways for robot transit.

We note that the parties in their Preliminary Reply (Paper 9) and Preliminary Sur-reply (Paper 10) briefing appear to disagree as to where particular “terminals” are located in Raizer. *Compare* Prelim. Reply *with* Prelim. Sur-reply. In Patent Owner’s view, Petitioner’s proposal as to terminal placement gives rise to potential locations that “would have frustrated Raizer’s primary principle of operation that is based on ‘anchor point navigation[.]’” *See* Prelim. Sur-reply 3. Patent Owner also bases its arguments on the theory that Raizer prohibits movement of its robots in certain areas of the warehouse, i.e., aisles between shelves. *See id.* at 5. As discussed above, at this time, we are not satisfied that Patent Owner’s arguments pertaining to restrictions imposed by Raizer’s “anchor point navigation” or restrictions urged for robot movement are supported adequately by the record, or that they undermine combination of Raizer’s and Hangzhou’s teachings en route to accounting for the challenged claims.

Even assuming, as Patent Owner appears to contend (*see, e.g.*, Prelim. Resp. 27–28), that there may be drawbacks and benefits to be considered or weighed vis-à-vis anchor point navigation and algorithm control, an inquiry into obviousness does not foreclose such weighing or consideration. Indeed, “[t]he fact that the motivating benefit comes at the expense of another benefit . . . should not nullify its use as a basis to modify the disclosure of one reference with the teachings of another.” *Winner Int’l Royalty Corp. v. Wang*, 202 F.3d 1340, 1349 n.8 (Fed. Cir. 2000). Here, Raizer discloses an

automated warehousing system employing robots that operate using both anchor point navigation and algorithm control. Even if there is some drawback or limitation in some fashion as to robot movement in connection with anchor point navigation, the record at hand, including Hangzhou, discloses automated warehousing systems involving algorithm control of robots (e.g., trolleys), that facilitate a recognized benefit of allowing for the use of additional robot travel pathways in spaces below shelving units for the purpose of reducing robot congestion.

We have considered the record as it currently stands, including the parties' respective briefing and the evidence offered in support of that briefing. For the reasons set forth above, we conclude that Petitioner has shown a reasonable likelihood of success in showing that the challenged claims are unpatentable based on the teachings of Raizer and Hangzhou.

IV. WHETHER THE EXERCISE OF DISCRETION TO DENY THE PETITION UNDER 35 U.S.C. § 314 IS WARRANTED

Patent Owner requests that we exercise our discretion to deny institution under 35 U.S.C. § 314. *See* Prelim. Resp. 34–36. The principle basis for that request is that the panel should accept Patent Owner's arguments as to insufficient reason or motivation to combine the teachings of Raizer and Hangzhou, and exercise discretion to deny on that basis. *See id.* at 34. As set forth above, however, on this record we conclude that Petitioner has shown a reasonable likelihood in its challenge to all the challenged claims.

Patent Owner also makes reference to arguments “articulated in Section 0 (applicable to claims 1, 3–10, 11, 12, and 14)” that, if accepted, present opportunity for the panel to “discretionarily deny institution.” *See*

id. It is not apparent, however, what portion of Patent Owner’s Preliminary Reply constitutes “Section 0.” In any event, we are not satisfied on this record that any of Patent Owner’s arguments support denial of institution.

Accordingly, we decline Patent Owner’s invitation to exercise discretion to deny institution.

V. CONCLUSION

For the reasons set forth above, we conclude that Petitioner has shown a reasonable likelihood that it would prevail with respect to at least one of the challenged claims.

At this stage of the proceeding, the Board has not made a final determination on the construction of any claim term or the patentability of any challenged claim

VI. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), *inter partes* review of claims 1, 3–12, 14, and 23–27 of the ’632 patent is instituted with respect to the ground set forth in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4(b), *inter partes* review of the ’632 patent shall commence on the entry date of this Order, and notice is hereby given of the institution of a trial.

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