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Paper 9
Entered: January 31, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CATERPILLAR INC.,
Petitioner,

v.

WIRTGEN AMERICA, INC.,
Patent Owner.

IPR2022-01277
Patent 9,879,391 B2

Before BARRY L. GROSSMAN, JAMES J. MAYBERRY, and RICHARD H. MARSCHALL, *Administrative Patent Judges*.

GROSSMAN, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. Background and Summary

Caterpillar Inc. ("Petitioner" or "Caterpillar") filed a Petition for *inter partes* review of claims 1–20 of U.S. Patent No. 9,879,391 B2 (Ex. 1001, "the '391 patent"). Paper 1 ("Pet."). Wirtgen, Inc. ("Patent Owner" or "Wirtgen") timely filed a Preliminary Response to the Petition. Paper 8 ("Prelim. Resp.").

We have jurisdiction under 35 U.S.C. § 314. Under § 314, 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). The Board determines whether to institute a trial on behalf of the Director. 37 C.F.R. § 42.4(a) (2022).

Petitioner has the burden of proof. *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) ("In an IPR, the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.").

For the reasons set forth below, we determine that Petitioner has demonstrated that there is a reasonable likelihood that at least one of the challenged claims is unpatentable. Accordingly, we institute an *inter partes* review of all challenged claims and on all grounds asserted in the Petition. *PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (stating that a decision to institute is "a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition").

B. Real Parties-in-Interest

Caterpillar identifies itself as well as its subsidiaries Caterpillar Paving Products, Inc. and Caterpillar Prodotti Stradali S.r.L. as real parties-in-interest. Pet. 81. Wirtgen identifies itself and Wirtgen GmbH as real parties-in-interest. Paper 6, 2.

C. Related Matters

Petitioner and Patent Owner each identify the following district court proceeding as a related matter: *Wirtgen Am., Inc. v. Caterpillar, Inc.*, Case No. 17-770-RGA (D. Del.). Pet. 81; Paper 6, 2.

Petitioner and Patent Owner also each identify the following pending *inter partes* review proceeding as a related matter: IPR2022-01264 (the "'264 IPR") challenging claims in Patent 9,879,390 (the '390 patent"). The '391 patent in the proceeding before us is a continuation of the '390 patent challenged in the '264 IPR. *See* Ex. 1001, code (60) (stating that the application that matured into the '391 patent is a "Continuation of application No. 15/376,023," which matured into the '391 patent). *See* Ex. 3001 code (21)

The '264 IPR and the proceeding before us are further related in that both proceedings involve the same parties, the same declarant offering testimonial evidence, and rely on the same two references as the asserted basis of unpatentability. *Compare* Section I.F of this Decision and the Decision issued in the '264 IPR).

Additionally, we note that pending IPR2022-01278 and IPR2022-01310 also are related to the proceeding before us and to IPR2022-01264, as summarized in the chart below. Citations to the common references identified in the chart are provided in the substantive analysis of patentability in this Decision.

	IPR2022-01264	IPR2022-01277	IPR2022-01278	IPR2022-01310
Challenged Patent–Title	9,879,390 "Road Milling Machine and Method for Measuring the Milling Depth,"	9,879,391 "Road Milling Machine and Method for Measuring the Milling Depth"	8,424,972 "Road Milling Machine and Method for Positioning the Machine Frame Parallel to the Ground"	8,424,972 "Road Milling Machine and Method for Positioning the Machine Frame Parallel to the Ground"
Challenged Claims–Grounds	1–6, 8–17, 19–22–OMM and Samuelson 7, 8–OMM, Samuelson, Zarniko	1–20– OMM and Samuelson	1–10, 25, 27, 30–31, 33, 34, 36–40–OMM, Sehr, Samuelson	1, 15, 16, 22, 23, 26–OMM, Sehr, Samuelson 1, 12–OMM, Sehr, Matsuda
Discretionary Denial Asserted	325(d)	325(d)	325(d)	N.A.
Petitioner	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.	Caterpillar Inc.
Patent Owner	Wirtgen America, Inc.	Wirtgen America, Inc.	Wirtgen America, Inc.	Wirtgen America, Inc.

D. The '391 Patent

The '391 patent discloses "a self-propelled road milling machine, especially a cold milling machine, as well as [] methods for measuring the milling depth." Ex. 1001, 1:21–23. The '391 patent explains that "a problem with known road milling machines [is] that the milling depth can not be controlled accurately enough" so that measuring "an adjustment of side plates, for example, with respect to the machine frame is not sufficiently accurate." *Id.* at 1:47–58. The '391 patent purports to address this problem, in one embodiment, by using side plates having a

plurality of sensors "spaced apart in the travelling direction." *Id.* at 3:34–36. Figure 1 of the '391 patent is reproduced below.

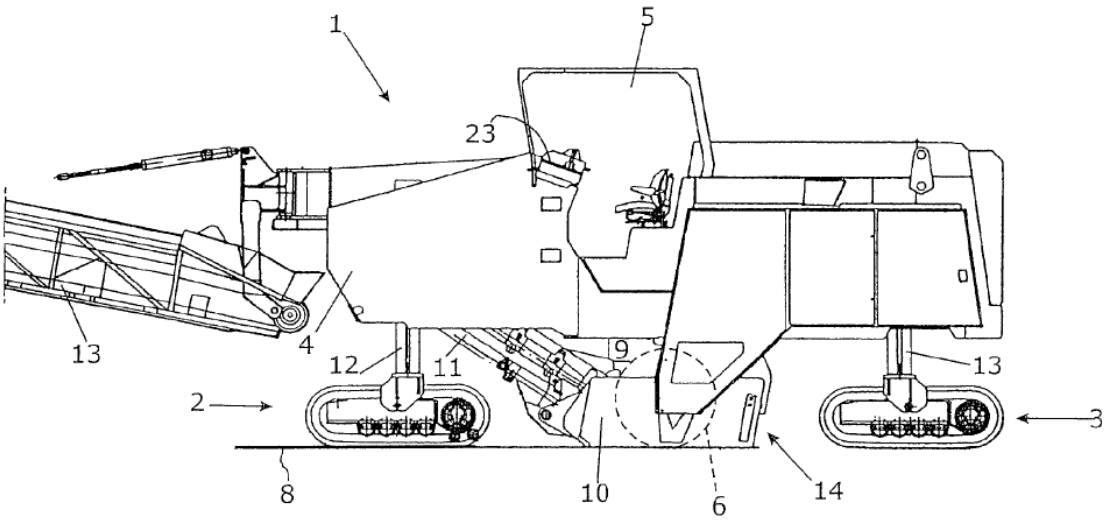


Fig.1

Figure 1 "shows a cold milling machine." Ex. 1001, 3:57. The milling machine includes a machine frame 4 supported by a track assembly having two front chain tracks 2 and at least one rear chain track 3. Chain tracks 2, 3 are connected with machine frame 4 through lifting columns respective 12, 13. *Id.* at 4:9–13. Using lifting columns 12, 13, machine frame 4 can be moved to a predetermined inclined position with respect to the ground or traffic surface 8. *Id.* at 4:15–18. Machine frame 4 supports milling roll 6. *Id.* at 4:18. Arranged behind milling roll 6 is height-adjustable stripping means 14 which, in operation, has stripping plate 15 that engages milling track 17 formed by milling roll 6. *Id.* at 4:25–28.

Side plates 10 are arranged on either side near the front end of milling roll 6. *Id.* at 4:36–37. Stripping means 14 are provided with measuring means 16 that allow determination of the current milling depth at the level of the stripping means

14 or the calculation of the milling depth at the level of the rotational axis of the milling roll. Ex. 1001, 4:37–41.

The '391 patent explains that measuring means 16, preferably formed by "position sensing means" measure the displacements of "sensor means" positioned on side plates 10, beam 20, or stripping plate 15 with respect to machine frame 4 or relative to each other. *Id.* at 4:49–53.

Figure 7a of the '391 patent, reproduced below, illustrates an embodiment of position sensing means of the side plates.

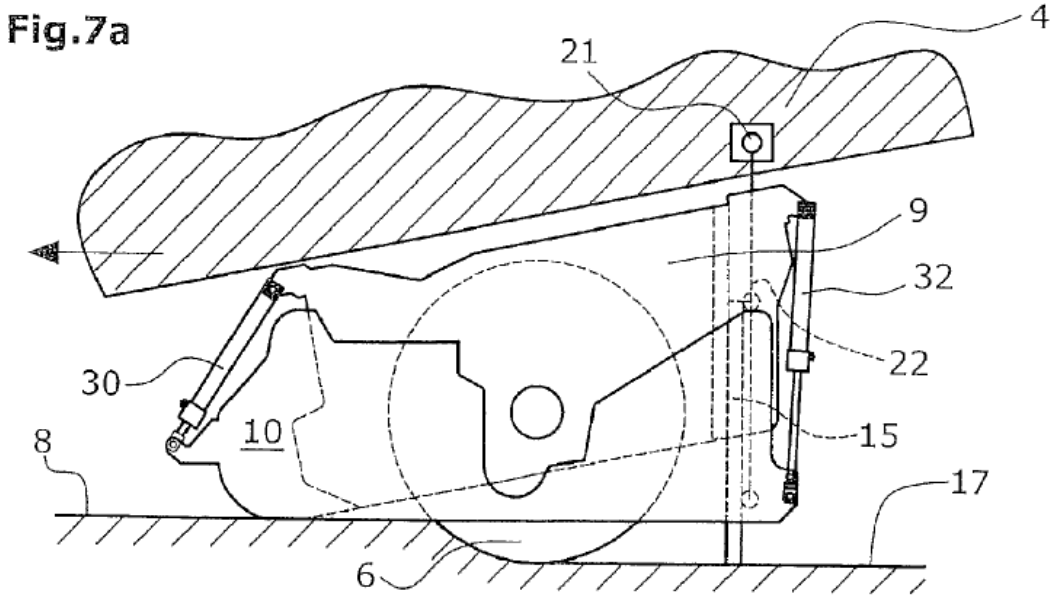


Figure 7a is a "schematic illustration of the measurement error occurring at the stripping plate of the stripping means in the absence of parallelism between the machine frame and the ground or traffic surface." Ex. 1001, 4:1–4. Figure 7a evidences the extent to which side plates 10 are pivotable with respect to machine frame 4. *Id.* at 6:18–20. Piston/cylinder units 30, 32 are provided with position sensing systems, and their measuring signals may be used to determine the distance of side plates 10 from machine frame 4. *Id.* at 6:20–24. The '391 patent explains:

> Should two measuring means be used, one in front of the side plates 10 and one behind the same, seen in the travelling direction, it is also possible to determine the longitudinal inclination of the machine frame 4 with respect to the ground or traffic surface 8 or to also determine the transverse inclination of the machine frame 4 by a comparison of the measured values for both side plates 10 on both sides of the milling roll 6.

Id. at 5:43–50.

E. Illustrative Claim

Among the challenged claims, claims 1, 8, and 16 are independent claims. Independent claim 1 is directed to a "self-propelled road milling machine." Ex. 1001, 6:53–7:7. Independent claim 8 is directed to a "method of controlling a milling machine." *Id.* at 7:38–51. Independent claim 16 is directed to a "method of measuring a milling depth of a milling machine." *Id.* at 8:15–38.

Independent claim 1 is illustrative and is reproduced below.

> 1. A self-propelled road milling machine, comprising:
> a machine frame;
> at least two front ground engaging supports, and at least one rear ground engaging support;
> front and rear lifting columns supporting the frame from the ground engaging supports, each of the front and rear lifting columns comprising a position sensor configured to detect a lifted condition for a respective lifting column;
> a milling roller supported from the frame for treatment of a ground surface;
> a height adjustable stripping plate arranged behind the milling roller and operable to be lowered, during operation, into a milling track generated by the milling roller; and
> first and second height adjustable side plates arranged on opposite sides of the milling roller, at least one of the side plates comprising a plurality of position sensors spaced apart in a traveling direction of the milling machine, wherein each side plate position sensor generates position signals representing changes in position for a respective side plate.

Id. at 6:53–7:7.

To further illustrate the close relationship between the '391 patent in the proceeding before us and the '390 patent in related IPR2022-01264[1], the following chart compares claim 1 from each patent, with differences shown in a red font.

Pat. No. 9,879,391 IPR2022-01277	Pat. No. 9,879,390 IPR2022-01264
1. A self-propelled road milling machine, comprising:	1. A self-propelled road milling machine, comprising:
a machine frame;	a machine frame;
at least two front ground engaging supports, and at least one rear ground engaging support;	at least two front ground engaging supports, and at least one rear ground engaging support;
front and rear lifting columns supporting the frame from the ground engaging supports, each of the front and rear lifting columns comprising a position sensor configured to detect a lifted condition for a respective lifting column;	front and rear lifting columns supporting the frame from the ground engaging supports;
a milling roller supported from the frame for treatment of a ground surface;	a milling roller supported from the frame for treatment of a ground surface;
a height adjustable stripping plate arranged behind the milling roller and operable to be lowered, during operation, into a milling track generated by the milling roller; and	a height adjustable stripping plate arranged behind the milling roller and operable to be lowered, during operation, into a milling track generated by the milling roller;
first and second height adjustable side plates arranged on opposite sides of the milling roller, at least one of the side plates comprising	first and second height adjustable side plates arranged on opposite sides of the milling roller; and

[1] The '390 patent is provided as Ex. 3001 in this proceeding.

a plurality of position sensors spaced apart in a traveling direction of the milling machine, wherein each side plate position sensor generates position signals representing changes in position for a respective side plate.	a plurality of position sensors, each of the first and second side plates including at least two of the position sensors spaced apart in a traveling direction of the milling machine, wherein each position sensor generates position signals representing changes in position for a respective side plate.

As shown in the claim comparison above, claim 1 of the '391 patent recites that "a plurality of position sensors" are on "at least one of the side plates," whereas the '390 patent recites that "at least two position sensors" are on "each of the first and second side plates."

Claim 1 of the '391 patent also includes the additional claim limitation that "each of the front and rear lifting columns" comprise "a position sensor configured to detect a lifted condition for a respective lifting column," which is not in claim 1 of the '390 patent. Claim 8 of the '390 patent, dependent from claim 1, however, includes a substantially similar limitation. *See* Ex. 3001, 7:32–35 ("The self-propelled road milling machine of claim 1, wherein each of the lifting columns includes an integrated position sensor configured to directly detect a lifted condition of its associated lifting column").

F. Prior Art and Asserted Ground

Petitioner asserts that the challenged claims are unpatentable on the following ground:

Claims Challenged	35 U.S.C. §[2]	Basis
1–20	103(a)	OMM[3] and Samuelson[4]

Petitioner also relies on the declaration testimony of William Singhose, Ph.D. *See* Ex. 1006.

II. ANALYSIS

A. Legal Standards

Section 103 forbids issuance of a patent when "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question 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 available, evidence such as commercial success, long felt but unsolved needs, and failure of

[2] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 296–07 (2011), took effect on September 16, 2011. The changes to 35 U.S.C. §§ 102 and 103 in the AIA do not apply to any patent application filed before March 16, 2013. Because the application for the patent at issue in this proceeding has an effective filing date before March 16, 2013, we refer to the pre-AIA version of the statute.
[3] Caterpillar's PM-465 Cold Planer, Operation & Maintenance Manual (Ex. 1002 hereinafter "OMM" for consistency with the Petition).
[4] Samuelson et al, US 6,450,048 B1, issued Sept. 17, 2002 (Ex. 1004 "Samuelson").

others.[5] *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966); *see KSR*, 550 U.S. at 407 ("While the sequence of these questions might be reordered in any particular case, the [Graham] factors continue to define the inquiry that controls."). The Court in Graham explained that these factual inquiries promote "uniformity and definiteness," for "[w]hat is obvious is not a question upon which there is likely to be uniformity of thought in every given factual context." 383 U.S. at 18.

The Supreme Court made clear that we apply "an expansive and flexible approach" to the question of obviousness. *KSR*, 550 U.S. at 415. Whether a patent claiming the combination of prior art elements would have been obvious is determined by whether the improvement is more than the predictable use of prior art elements according to their established functions. *Id.* at 417. To support this conclusion, however, it is not enough to show merely that the prior art includes separate references covering each separate limitation in a challenged claim. *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011). Rather, obviousness additionally requires that a person of ordinary skill at the time of the invention "would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention." *Id.*

In determining whether there would have been a motivation to combine prior art references to arrive at the claimed invention, it is insufficient to simply conclude the combination would have been obvious without identifying any reason *why* a person of skill in the art would have made the combination. *Metalcraft of Mayville, Inc. v. Toro Co.*, 848 F.3d 1358, 1366 (Fed. Cir. 2017).

Moreover, in determining the differences between the prior art and the claims, the question under 35 U.S.C. § 103 is not whether the differences

[5] Patent Owner does not direct us to any objective evidence of non-obviousness in its Preliminary Response.

themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 164 (Fed. Cir. 1985) ("It is elementary that the claimed invention must be considered as a whole in deciding the question of obviousness."); *see also Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1537 (Fed. Cir. 1983) ("[T]he question under 35 U.S.C. § 103 is not whether the differences *themselves* would have been obvious. Consideration of differences, like each of the findings set forth in *Graham*, is but an aid in reaching the ultimate determination of whether the claimed invention as a whole would have been obvious.").

As a factfinder, we also must be aware "of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning." *KSR*, 550 U.S. at 421.

Applying these general principles, we consider the evidence and arguments of the parties.

B. Level of Ordinary Skill in the Art

The level of skill in the art is "a prism or lens" through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). "This reference point prevents . . . factfinders from using their own insight or, worse yet, hindsight, to gauge obviousness." *Id.*

"The *Graham* analysis includes a factual determination of the level of ordinary skill in the art. Without that information, a . . . court cannot properly assess obviousness because the critical question is whether a claimed invention would have been obvious at the time it was made to one with ordinary skill in the art." *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986); *see also Ruiz v. A.B. Chance*, 234 F.3d 654, 666 (Fed. Cir. 2000) ("The

determination of the level of skill in the art is an integral part of the *Graham* analysis.").

Factors pertinent to a determination of the level of ordinary skill in the art include: (1) educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of workers active in the field. *Best Med. Int'l, Inc. v. Elekta Inc.*, 46 F.4th 1346, 1353 (Fed. Cir. 2022) (citing *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007) (quoting *Env't Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696 (Fed. Cir. 1983). These factors are not exhaustive but merely are a guide to determining the level of ordinary skill in the art. *Daiichi Sankyo*, 501 F.3d at 1256. In determining a level of ordinary skill, we also may look to the prior art, which may reflect an appropriate skill level. *Okajima*, 261 F.3d at 1355. "The patent's purpose also can be informative." *Best Med. Int'l*, 46 F.4th at 1353 (citing *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1362–63 (Fed. Cir. 2006).

Petitioner asserts that a person of ordinary skill in the art would have had "at least a four-year degree in mechanical engineering or a closely related field and at least two years of experience designing, developing, servicing or operating heavy machinery, including their components and control systems." Pet. 5 (citing Ex. 1006 ¶ 23). Petitioner also states that "[a]dditional education could substitute for professional experience, and significant work experience—such as working with, servicing, or operating heavy machinery in the field—could substitute for formal education." *Id.* Petitioner does not state the basis for these conclusions.

Dr. Singhose repeats Petitioner's conclusions without any additional facts, data, or analysis to support his "opinion." *See* 37 C.F.R. § 42.65(a) ("Expert

testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.").

"Patent Owner does not dispute the Petition's definition." Prelim. Resp. 13.

For purposes of this Decision, based on the prior art, the sophistication of the technology disclosed in the '391 patent, and giving little weight to Dr. Singhose's opinion, we adopt Petitioner's definition of the level of ordinary skill.

C. Claim Construction

We construe each claim "using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b)." 37 C.F.R. § 42.100(b). Under this standard, claim terms are generally given their ordinary and customary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (en banc) ("We have frequently stated that the words of a claim 'are generally given their ordinary and customary meaning.'" (citations omitted)).

Petitioner asserts that "all challenged claims [are] unpatentable under their plain and ordinary meaning," and that "no terms need construction here." Pet. 5.

"Patent Owner does not believe that any claim terms need construction to resolve the prior art grounds raised in the Petition." Prelim. Resp. 13.

We do not perceive the need to construe any claim limitation. Claims must be construed "only to the extent necessary to resolve the controversy." *AstraZeneca AB v. Mylan Pharms. Inc.*, 19 F.4th 1325, 1345 (Fed. Cir. 2021) (quoting *Vivid Techs., Inc. v. American Science & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999); *see also Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) ("Because we need only construe terms 'that are in controversy, and only to the extent necessary to resolve the

controversy,' we need not construe the claim preambles here where the construction is not 'material to the [obviousness] dispute.'" (citations omitted)).

We now turn to the merits of Petitioner's asserted Ground of unpatentability.

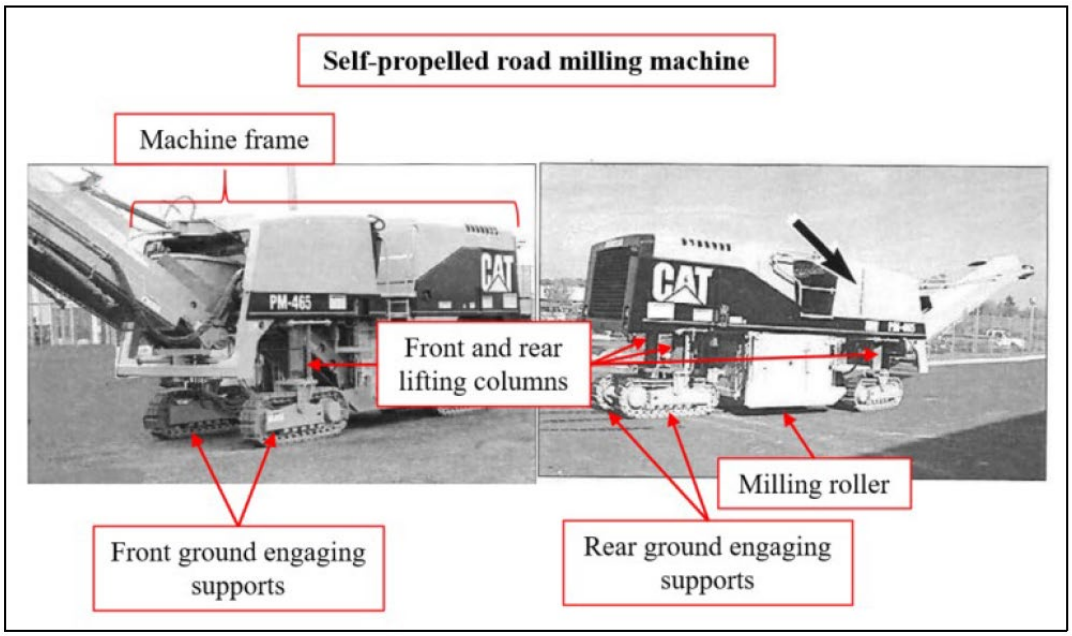
D. Ground 1; Claims 1–20 Based on OMM and Samuelson

1. OMM (Ex. 1002)

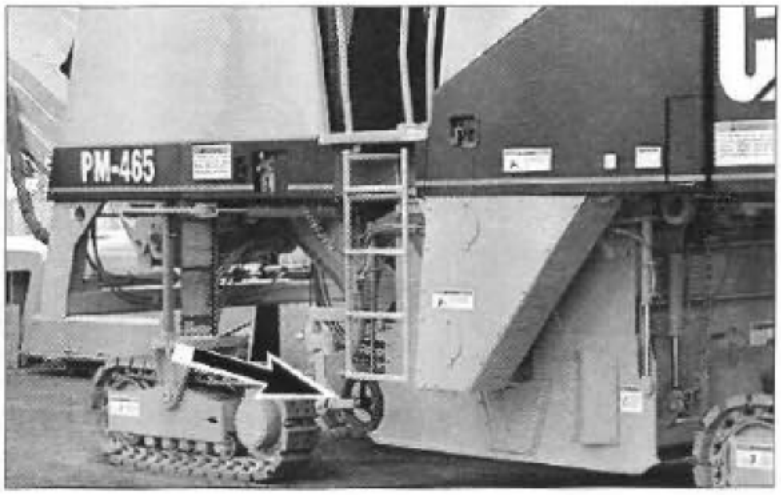
OMM is an operation and maintenance manual for the PM-465 cold planer that is used for cold milling pavement. Ex. 1002, 1, 4[6].

We reproduce below Petitioner's annotated versions of images depicted on pages 4 and 42 of OMM.

[6] Ex. 1002 has original page numbers on the top left or top right corners of each substantive page. Petitioner, in accord with our rules (37 C.F.R. § 42.63(d)(2)(i)), also uniquely numbered each page in sequence, placed on the bottom left corner of each page, in the format of "Page 1 of 162." *See* Ex. 1002, 1. As a result, each page has two different numbers. For example, original page number 2 (upper left corner of the page) corresponds to "Page 4 of 162" (lower left corner of the page) based on pagination required by our rules. *Petitioner*, however, cites to the original pagination, rather than the unique pagination required by our rules. *See* Pet. 6 (citing to "*OMM,* 2 and 40" for figures that appear at Ex. 1002, 4 and 42). The purpose of requiring unique pagination is for the parties to cite to these unique page numbers. We note *Patent Owner* cited to the unique page numbers added by Petitioner. *See* Prelim. Resp. 9, n. 4 ("References to page numbers in this POPR refer to the stamped page numbers."). Accordingly, we also will cite to the unique page numbers of all exhibits. *In future submissions, Petitioner is required to do the same*.



The images on pages 4 and 42 of OMM are annotated by Petitioner to denote various uncontested components of the milling machine. Pet. 6; *see also* Prelim. Resp. 9. In particular, Petitioner adds the title, "Self-propelled road milling machine" placed inside a red rectangle. *Id.* Petitioner also denotes the "machine frame," "milling roller," "front and rear lifting columns," "front ground engaging supports," and "rear ground engaging support," by placing these terms in red rectangles and using a lead arrow that extends from a rectangle to its respective component. *Id.* OMM's machine also includes Caterpillar's "Grade and Slope Electronic Control System," which includes, an "Electronic Control Module," "grade/slope controllers on the left and/or right side of the operator's console, the grade/slope controllers at ground level in front and/or behind the mandrel, a contacting or a non contacting sensor on each side of the machine, [and] a slope sensor at the center of the machine." Ex. 1002, 34. According to OMM, the contacting sensor can include a grade slope wheel as depicted in the image on Page 51 of OMM, reproduced below.



The image on page 51 of OMM, on the left-hand side of the page, includes a black arrow denoting a grade slope wheel on the side plate of machine. Ex. 1002, 51. OMM explains that "[t]he grade slope wheel sends signals to the controller as the ground elevation varies." *Id.* According to OMM, [i]f the machine uses the non-contacting method of measuring the grade, a sonic sensor is attached. The sonic grade sensor uses sound waves to monitor the distance from a fixed point on the machine to a grade reference point (such as: finished surface, curb, gutter, or stringline)." *Id.* OMM notes that "[t]he sensors should be positioned on the centerline of the rotor to achieve an accurate cut. The further away from the center of the rotor, the less accurate the reading on the readout and the potential for less accurate cuts." *Id.* at 50.

2. Samuelson (Ex. 1004)

Samuelson relates to "a hydraulic cylinder monitoring apparatus for a welded construction-type hydraulic cylinder." Ex. 1004, 1:15–17. Samuelson discloses that hydraulic cylinders are used in various industries including "mobile equipment." *Id.* at 1:35–40. Samuelson recognizes the importance of protecting the position measuring structure, e.g. transducer, of the cylinders, while being able

to interchange "dumb" cylinders without transducers to "smart" cylinders. *Id.* at 1:45–60. Figures 5 and 6 of Samuelson are reproduced below.

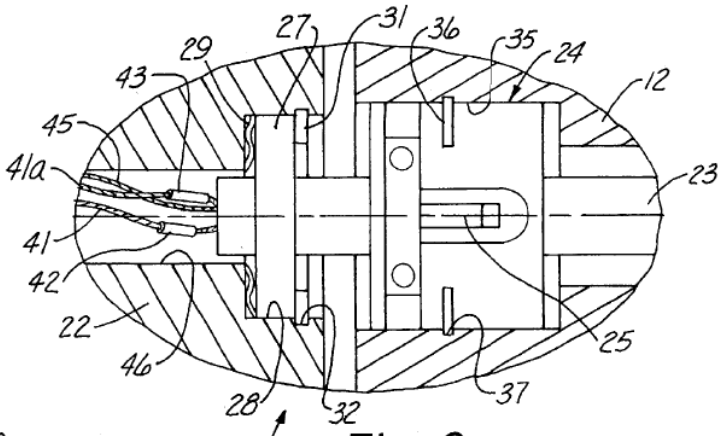


Fig. 6

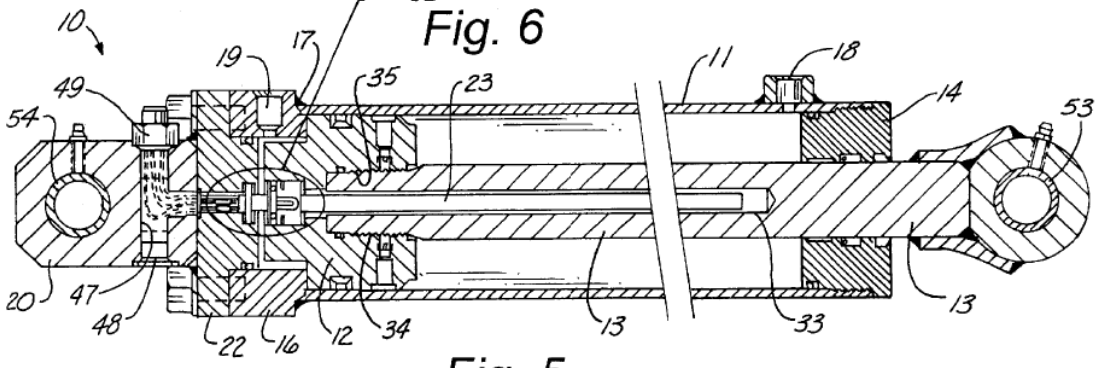


Fig. 5

Figure 5 is a cross sectional view of a hydraulic cylinder having a monitoring apparatus disposed therein, and Figure 6 is an enlarged view of the circled portion shown in Figure 5. Ex. 1004, 2:53–57. Samuelson discloses that in operation, hydraulic cylinder 10 is connected at ends 53 and 54 to two objects that need to be selectively controlled by being separated and then moved back together while the relative spacing is monitored by the transducer structure 23 and 24. *Id.* at 4:17–21.

Samuelson explains that in Figure 5, a controller, not shown, is sensing the position of piston 12 with respect to cap 22 through reference supply and/or ground return wires 41 and 41a, which have fixed resistors. *Id.* at 4:22–26. Similarly,

output wire 45 is connected to the controller. Ex. 1004, 4:27–28. According to Samuelson, when pressurized hydraulic oil is directed into port 19, cylinder 12 moves to the right and follower 24 will move with it, which will change the resistance. *Id.* at 4:29–33. "Consequently, the position of the piston 12 and/or rod 13 can readily be monitored as the piston 12 and rod 13 move from one position to another within the cylinder 11." *Id.* at 4:41–44. Samuelson notes that "[b]ecause the fixed resistors (42) and (43) are disposed within the steel confines of the supplemental cap (22) and its flange (20), there is very little chance that they can be damaged during the use of the device." *Id.* at 4:48–51. Samuelson discloses the benefits of "smart cylinders:"

> As programmable Logic Controller (PLC) usage became more cost effective, original equipment manufacturer's (OEMs) producing mobile equipment have employed them to improve operator interface requirements (user friendly) as well as automate functions repeatedly used by the equipment. Many functions involved the use of cylinders as linear actuators. The position and movement of these actuators had to be monitored and communicated back to the PLC if closed-loop feedback control was to be utilized. Cylinders were capable of providing this feedback via the output of linear transducers. Placing the transducers inside cylinders inside of tie-rod or threaded construction hydraulic cylinders have provided the most direct method of incorporating them as well as protecting them from damage and environmental degradation.

Id. at 1:35–49.

3. Claim 1

a. Petitioner's Contentions

Petitioner provides a clause-by-clause analysis of independent claim 1, identifying where in each of the cited references, OMM or Samuelson, the claimed element is disclosed, and why it would have been obvious to a person of ordinary skill to combine the various disclosed elements with a reasonable expectation of

success. *See* Petition 33–51. Throughout its analysis, Petitioner cites the Declaration testimony (Ex. 1006) of Dr. Singhose for evidentiary support.[7] Petitioner also provides annotated images from the references to further show the Petitioner's analysis of the scope and content of the references. *E.g., see* Pet. 34–36.

Petitioner labels each clause for ease of reference. Pet. 33–51. For independent claim 1, the clauses are listed as "[1pre]" through "[1h]." *Id.* For ease of reference and consistency, we will refer to Petitioner's labeling convention.

b. Patent Owner's Contentions

Patent Owner recognizes that OMM discloses "typical features of milling machines, including a frame, tracks for moving the machine, lifting columns to raise the machine, side plates and a moldboard to contain debris from the milling process, and a milling roller to mill the pavement." Prelim. Resp. 9 (citing Ex. 1002, 4, 7, 16, 32, 40, 42).

Patent Owner also concedes that "[l]ike other typical milling machines, OMM identifies sensors for measuring the grade and slope of the pavement." *Id.* Patent Owner acknowledges that OMM discloses a milling machine with "two grade sensors (one on each side of the machine) and a slope sensor." *Id.* (citing Ex.1002, 34). Additionally, Patent Owner admits that "t]he grade sensor may be 'a contacting or a non contacting sensor.'" *Id.* at 10 (citing Ex. 1002, 34). According to Patent Owner, however, "[t]he sonic sensors taught by OMM are conventional ultrasonic sensors that utilize sound waves to determine the distance from the sensor to the ground, thereby communicating a distance of the machine frame to the ground." *Id.* at 10. We note, as discussed further below, that the challenged

[7] Petitioner cites this testimony as "Singhose." Pet. ix. We will cite it, as we do all other evidence, by reference to its Exhibit number, which is Exhibit 1006.

claims refer only to a "position sensor" (e.g., *see* Ex. 1001, 6:59) or "position sensors" (e.g., *see* Ex. 1001, 7:3). We have not been directed to any persuasive evidence that the claimed "position sensors" exclude "ultrasonic sensors" or any other type of sensor that can determine a position.

Patent Owner asserts OMM does *not* disclose "utilizing a side plate as part of the sensor mechanism." *Id.* at 10–11.

Patent Owner also concedes that OMM discloses "conventional side plates that may be lifted and lowered using hydraulic cylinders." *Id.* at 11. Patent Owner also acknowledges that hydraulic cylinders may also be used to lift and lower the moldboard in OMM. *Id.* (citing Ex. 1002, 62).

Patent Owner asserts that the OMM "hydraulic cylinders do not include a sensor." *Id.* (citing Ex. 1002 42). We agree. Petitioner, however, relies on Samuelson for the disclosure of cylinders that include a position sensor.

Patent Owner further concedes that "Samuelson is directed to combining sensor components with a welded-type hydraulic cylinder to create a sensor-integrated hydraulic cylinder, i.e., a smart cylinder." *Id.* (citing Ex. 1004, 1:58–61 ("Moreover, the ability to retrofit/upgrade existing equipment without extensive structural change requires direct interchangeability between 'smart' and 'dumb' cylinders which adds further design constraints.").

Against this general background, we specifically consider the challenged claims, beginning with claim 1.

c. Analysis of Independent claim 1

i. Preamble
A self-propelled road milling machine

Petitioner asserts that "OMM discloses this." Pet. 33 (citing Ex. 1002, 4, 29; Ex. 1006 ¶ 104). With this clause and several other clauses of claim 1, as stated

above, Patent Owner has admitted that OMM discloses the basic elements of typical road milling machines. Prelim. Resp. 9–12. For example, there can be no reasonable dispute that OMM discloses a self-propelled road milling machine and other typical elements of road milling machines, including a frame, tracks for moving the machine, lifting columns to raise the machine, side plates and a moldboard to contain debris from the milling process, and a milling roller to mill the pavement." *See* Prelim. Resp. 9 (citing Ex. 1002, 4, 7, 16, 32, 40, 42). Thus, our analysis does not focus on these acknowledged typical elements.

Patent Owner does not address this clause.

Based on the current record, for the purposes of this Decision, we are persuaded Petitioner has demonstrated sufficiently that OMM discloses "[a] self-propelled road milling machine," as recited in the preamble of claim 1.

ii.Limitation [1a]
a machine frame

Petitioner asserts that OMM discloses a machine frame. Pet. 34–35 (citing Ex. 1002, 2, 8; Ex. 1006 ¶ 105).

Patent Owner does not address this clause.

Based on the current record, for the purposes of this Decision, we are persuaded Petitioner has demonstrated sufficiently that OMM discloses "a machine frame," as recited in claim 1.

iii.Limitation [1b]
at least two front ground engaging supports, and at least one rear ground engaging support

Petitioner asserts that OMM discloses "two front tracks and two rear tracks (i.e., 'ground engaging supports') that support the PM-465." Pet. 35 (citing Ex. 1002, 4, 31, 42; Ex. 1006 ¶ 106).

Patent Owner does not address this clause.

Based on the current record, for the purposes of this Decision, we are persuaded Petitioner has demonstrated sufficiently that OMM discloses "at least two front ground engaging supports, and at least one rear ground engaging support," as recited in claim 1.

iv.Limitation [1c]
front and rear lifting columns supporting the frame from the ground engaging supports

Petitioner asserts that OMM discloses "four legs (i.e., 'lifting columns')—two that support the PM-465's frame from the front tracks and two that support the frame from the rear tracks." Pet. 35–36 (citing Ex. 1002, 4, 32–33, 42; Ex. 1006 ¶ 107).

Patent Owner does not address this clause.

Based on the current record, for the purposes of this Decision, we are persuaded Petitioner has demonstrated sufficiently that OMM discloses "front and rear lifting columns supporting the frame from the ground engaging supports," as recited in claim 1.

v.Limitation [1d]
each of the front and rear lifting columns comprising a position sensor configured to detect a lifted condition for a respective lifting column

Petitioner asserts that OMM discloses lifting columns as discussed for limitation [1c], and that an ordinary artisan "would have been motivated to use sensor-integrated cylinders like Samuelson's inside" of OMM's columns "to measure the extension and retraction of the hydraulic cylinders in each leg, which would have allowed the machine to measure the extension and retraction of the legs themselves (i.e., 'detect a lifted condition for a respective lifting column')." Pet. 37 (citing Ex. 1002, 34; Ex. 1006 ¶ 108). Petitioner also provides a reason

why it would have been obvious to modify and combine the references with a reasonable expectation of success, as proposed by Petitioner. *Id.* at 37–40.

Patent Owner does not does not dispute that once the cited references are combined, the asserted discloses this limitation. Patent Owner disputes the motivation to combine the references, as discussed below, but does not further address the limitations in this clause.

Based on the current record, for the purposes of this Decision, we are persuaded Petitioner has demonstrated sufficiently that OMM discloses "each of the front and rear lifting columns comprising a position sensor configured to detect a lifted condition for a respective lifting column," as recited in claim 1.

vi.Limitation [1e]
a milling roller supported from the frame
for treatment of a ground surface

Petitioner asserts that OMM discloses "a rotor drum (i.e., 'milling roller') that is supported from the frame and that is used to treat a ground surface." Pet. 40–41 (citing Ex. 1002, 14, 34, 53, 115, 121, 136; Ex. 1006 ¶ 117).

Patent Owner does not address this clause.

Based on the current record, for the purposes of this Decision, we are persuaded Petitioner has demonstrated sufficiently that OMM discloses "a milling roller supported from the frame for treatment of a ground surface," as recited in claim 1.

vii.Limitation [1f]
a height adjustable stripping plate arranged behind the milling roller
and operable to be lowered, during operation, into a milling track
generated by the milling roller

Petitioner asserts that OMM discloses "a moldboard (i.e., 'height-adjustable stripping plate'), which is the bottom portion of the rotor door." Pet. 41–45 (citing Ex. 1002, 16, 40, 122; Ex. 1006 ¶¶ 118–120).

Patent Owner does not address this clause.

Based on the current record, for the purposes of this Decision, we are persuaded Petitioner has demonstrated sufficiently that OMM discloses "a height adjustable stripping plate arranged behind the milling roller and operable to be lowered, during operation, into a milling track generated by the milling roller," as recited in claim 1.

viii.Limitation [1g]
first and second height adjustable side plates
arranged on opposite sides of the milling roller

Petitioner asserts that OMM's "side plates are height-adjustable relative to the frame via two hydraulic, height-adjustment cylinders on each side plate." Pet. 46 (citing Ex. 1002, 49; Ex. 1006 ¶ 122).

Patent Owner does not address this clause.

Based on the current record, for the purposes of this Decision, we are persuaded Petitioner has demonstrated sufficiently that OMM discloses "first and second height adjustable side plates arranged on opposite sides of the milling roller," as recited in claim 1.

ix.Limitation [1h]
at least one of the side plates comprising a plurality of position sensors
spaced apart in a traveling direction of the milling machine,
wherein each side plate position sensor generates position signals
representing changes in position for a respective side plate

Petitioner asserts that the combination of OMM and Samuelson discloses this limitation. Pet. 47 (citing Ex. 1006 ¶¶ 124–130). In particular, Petitioner asserts that OMM discloses various grade sensors including a "grade slope wheel,' positioned near the side plate." *Id.* at 48 (citing Ex. 1002, 4, 51, 64). According to Petitioner's declarant, Dr. Singhose, "it was well known to use side plates and

components attached on and around them as ground sensors." *Id.* at 49 (citing Ex. 1006 ¶ 126).

Dr. Singhose testifies:

> *Samuelson* provides a solution to sensor problems by disclosing its *robust* sensor-integrated cylinder, which could be easily incorporated onto the PM-465 machine's side plates in a way that monitored ground position. [*See* Section VIII.A.2.] As mentioned above, it was well known in the art to use side plates and components attached on and around them as ground sensors. [*See* Section VIII.A.3. *OMM*, 32, 48–49; *Barton*, 9:48-61. *Swisher*, 38:27–41:20.] The state-of-the-art even suggested using *the side plate itself* to actuate sensors used in a grade-and-slope control system. [*SOTA*, 15 (explaining that a grade-position sensor can be "actuated by" the "side plate of the machine").] [8]

Ex. 1006 ¶ 126 (brackets and italic font in original).

Thus, based on the testimonial evidence of Dr. Singhose and the OMM and Samuelson references, Petitioner concludes that because OMM already uses two hydraulic cylinders attached to the side plates, it would have been obvious "to replace the PM-465's existing side plate cylinders with sensor-integrated cylinders like *Samuelson's*." Pet. 23 (citing Ex. 1002, 40, 49, 59; Ex. 1006 ¶ 78). The reason for this proposed modification asserted by Petitioner is that "instead of the grade slope wheel," "the sensor-integrated cylinder design is a *robust* design where the sensors are protected inside the hydraulic cylinders, and *OMM's* grade slope wheel is susceptible to damage and wear." *Id.* (citing Ex. 1006 79–80).

[8] The SOTA acronym refers to Caterpillar's System Operation Testing and Adjusting manual for the PM-465 Cold Planer (Ex. 1003 "SOTA"). "Barton" (Ex. 1023, U.S. Patent No. 4,186,968 ("Barton")) and "Swisher" (Ex. 1024, U.S. Patent No. 4,270,801 ("Swisher")) are background prior art references. The "Section" citations refer to sections of Dr. Singlehose's Declaration.

Patent Owner asserts that "the inclusion of a plurality of sensors included on the height adjustable side plates requires the side plate itself to act as part of the sensing mechanism." Prelim. Resp. 35 (citing Ex. 1001, 2:3–11, 2:31–39, 3:34–41). According to Patent Owner, neither OMM nor Samuelson discloses this limitation and, "the combination of such asserted prior art is also insufficient for disclosing the required claim element." *Id.* at 36.

According to Patent Owner, Petitioner's reliance on "the state-of-the-art references" does not establish a reason to use the side plate for sensing. *Id.* at 37. In addition, Patent Owner asserts that Petitioner "does not substantively address the modifications a POSITA[9] would have had to make to the PM-465 controller to use two new sensors on each side plate to independently determine grade for each side of the machine." *Id.* at 40–41 (referencing Pet. 17–19). Patent Owner thus asserts that the Petition's "conclusory assertions" "do not provide the required articulated reasoning with rational underpinnings," and therefore, "the Petition does not demonstrate a reasonable likelihood of success in making the specific combination proposed." *Id.* at 41. We disagree.

The knowledge and creativity of a person of ordinary skill are critical components of the obviousness analysis. As explained in *KSR*, "familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle." *KSR*, 550 U.S. at 420; *see also ClassCo, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1219 (Fed. Cir. 2016) ("The rationale of *KSR* does not support

[9] A common acronym in patent jargon meaning a "person having ordinary skill in the art." *See* 35 U.S.C. § 103 (referring to a "person having ordinary skill in the art" to which the claimed invention pertains in determining whether a claimed invention would have been obvious).

ClassCo's theory that a person of ordinary skill can only perform combinations of a puzzle element A with a perfectly fitting puzzle element B.").

Here, Petitioner is proposing to replace OMM's "dumb" hydraulic cylinder's that raise and lower the side plates with smart "sensor-integrated cylinder's like Samuelson's." Pet. 23, 49 (citing Ex. 1002, 42, 51, 61).

Petitioner asserts:

> A POSITA would have been motivated to use *Samuelson*'s sensor-integrated cylinders (instead the of the grade slope wheel) near the PM-465's side plates to sense the ground and determine if the machine is milling at the intended depth. Singhose [Ex. 1006], ¶ 69. A POSITA would have known that side plates make excellent ground sensors on road-milling machines. The side plates are one of the few components on a milling machine that can move vertically relative to the milling drum—most other relevant components (e.g., the machine frame) are fixed relative to the drum and thus move up and down only when the drum moves up and down, which occurs when the legs are raised/lowered. *Id.*

Pet. 19.

Petitioner also asserts that "during milling operations, side plates routinely ride on top of the ground in 'float mode,' meaning that the hydraulic cylinders apply no down pressure on the side plates, and they are free to move up or down relative to the rotor drum as they traverse the ground surface." *Id.* (citing Ex. 1006 ¶ 70; Ex. 1002, 39–40). According to Petitioner, "[t]he location and ability of side plates to undulate with the ground profile make them ideal candidates to use as ground sensors in grade-and-slope systems for road-milling machines, and a POSITA would have known that." Pet. 19–20 (citing Ex. 1006 ¶ 70).

Petitioner also relies, in part, on the state-of-the-art disclosure in SOTA (Ex. 1003) stating that a grade "sensor can be actuated by one of the following devices: wheel, ski, and side plate of the machine." *Id.* at 49 (citing Ex. 1003, 16).

Thus, positioning sensors on the side plates of a road milling machine was a known option available to a person of ordinary skill.

Patent Owner criticizes the SOTA disclosure because "SOTA provides only two sentences in relation to the alleged disclosure of the 'side plate' as the grade sensing apparatus." Prelim. Resp. 37. SOTA discloses:

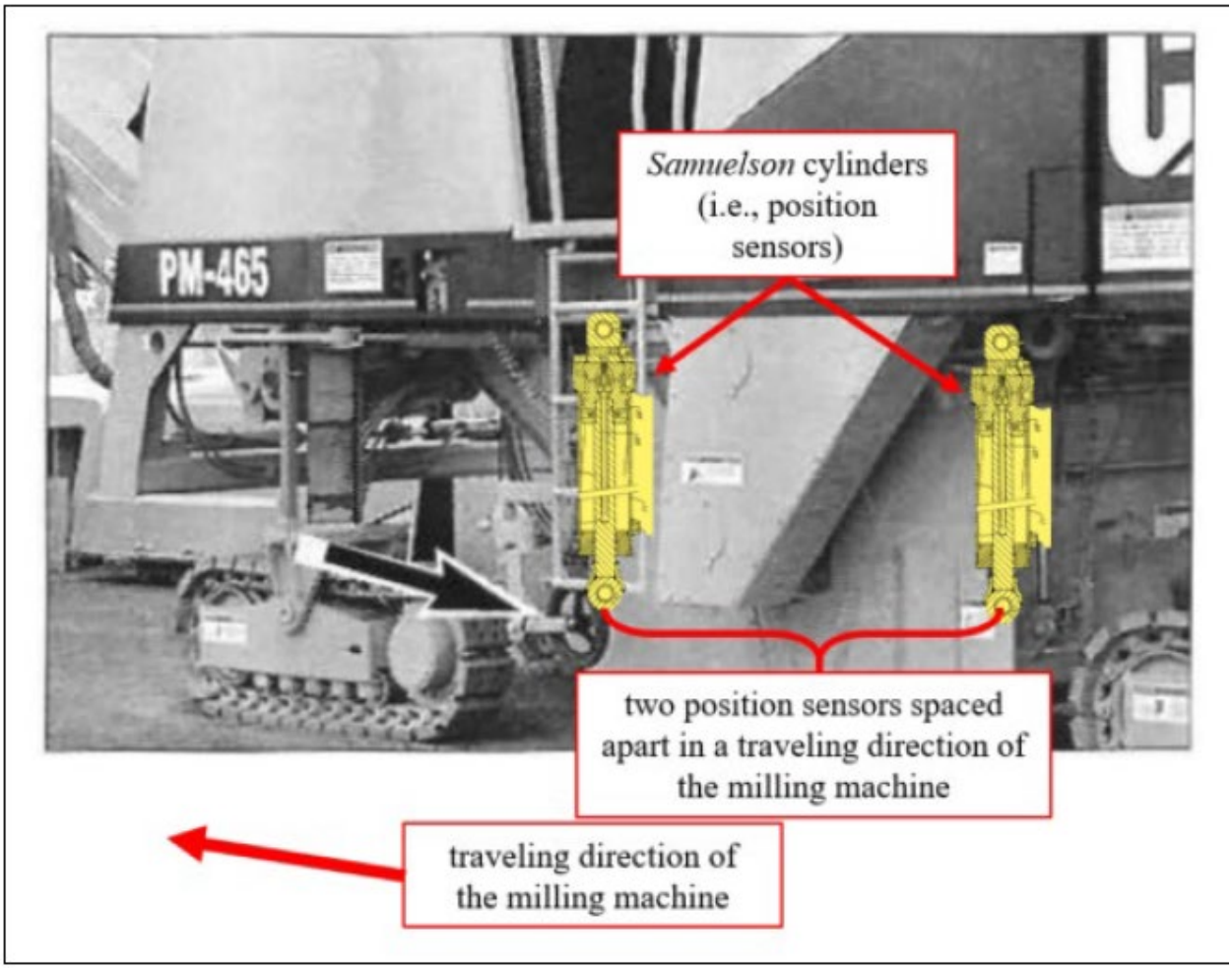
> The *method for measuring* grade that contacts a reference surface uses a grade *position sensor*. The *sensor* can be *actuated by* one of the following devices: wheel, ski, and *side plate of the machine*.

Ex. 1003, 16 (emphases added). We consider the substance of the disclosure, not its length. As we discussed above, these two sentences disclose that the side plate can serve as a "position sensor."

Claim 1 requires that "at least one of the side plates comprising a plurality of position sensors . . . wherein each side plate position sensor generates position signals representing changes in position for a respective side plate." Based on the evidence before us, SOTA discloses that the position sensor is "actuated by" movement of the side plate and generates position signals representing changes in position of the side plate.

Dependent claim 2 further requires that the "plurality of side plate position sensors are integrated with hydraulic piston/cylinder units for lifting or lowering the respective side plates." Ex. 1001, 7:8–11. As discussed above, Samuelson discloses position sensors integrated with hydraulic cylinders.

Dr. Singhose testifies that a "POSITA would have been motivated to replace the [OMM] hydraulic cylinders with robust sensor-integrated cylinders like those taught by Samuelson." Ex. 1006 ¶ 128. Dr. Singhose illustrates the proposed combination of OMM and Samuelson as follows:



Dr. Singhose's annotated illustration from Ex. 1002, 51 showing how Samuelson's cylinders with position sensors would be retrofitted to the OMM machine. Ex. 1006 ¶¶ 128–130.

Dr. Singhose explains his annotated illustration by explaining that "the in-cylinder position sensors would continuously measure the side plates' changes in vertical position as the side plates float along the ground." Ex. 1006 ¶ 130. He also states this modification "would allow for more accurate sensing through grade averaging, because there are two sensor locations on each side plate instead of one." *Id.* He also explains that "[t]he grade-and-slope controllers already on the PM-465 would then process the side-plate position signals and ensure that the rotor drum is milling at the predetermined depth set by the operator." *Id.*

Patent Owner asserts that Petitioner's argued "motivations are insufficient because the Petition relies solely on the testimony of its expert for establishing a motive to combine." Prelim. Resp. 36 (citing *TQ Delta LLC v. Cisco Sys., Inc.*, 942 F.3d 1352, 1359–61 (Fed. Cir. 2019)). We disagree. Petitioner relies on at least the disclosures of OMM, Samuelson, and SOTA, as discussed above, in combination with Dr. Singhose's testimony as to what would have been obvious to a person of ordinary skill. In *TQ Delta*, the Federal Circuit concluded that "Dr. Tellado . . . offers only unsupported and conclusory statements asserting that an ordinarily skilled artisan at the time of the invention would have been motivated to apply the randomization disclosed in Stopler as a means to reduce PAR in Shively." *TQ Delta*, 942 F.3d at 1362. Here, Dr. Singhose relies on the cited references and other prior art evidence of record to support his testimony.

For purposes of this Decision, the level of ordinary skill is high – a four-year degree in mechanical engineering with at least two years of specific experience in "designing, developing, servicing or operating heavy machinery, including their components and control systems." Pet. 5; *see also* Section II.B of this Decision (adopting, for purposes of this Decision, the undisputed definition of the level of ordinary skill proposed by Petitioner). Based on the evidence before us, we disagree that the "necessary link" is missing for an artisan "to use the side plate as part of the sensing mechanism using a plurality of position sensors on each of the first and second side plates," as argued by Patent Owner. *See* Prelim Resp. 38.

x. Conclusion as to Independent Claim 1

Having reviewed the preliminary record, including Petitioner's showing as to how OMM and Samuelson disclose each of the limitations of claim 1 (*see* Pet. 33–51), and Petitioner's assertions as to why a person of ordinary skill would have combined the disclosures of OMM and Samuelson with a reasonable expectation

of success in doing so, supported by the testimonial evidence of Dr. Singhose, we conclude that Petitioner demonstrates a reasonable likelihood that claim 1 would have been obvious to a person of ordinary skill based on OMM and Samuelson.

4. Claims 2–20

Petitioner also challenges claims 2–20 based on OMM and Samuelson. Pet. 52–77. Petitioner provides a limitation-by-limitation analysis of claims 2–20 as to where OMM and Samuelson disclose the recited limitations together with supporting testimony from Dr. Singhose. *Id.*

Patent Owner argues claims 1 and 2 together, essentially treating them the same, and does not separately argue any other claim. *See* Prelim Resp. 35 ("For claims 1 and 2 of the '391 Patent, the inclusion of a plurality of sensors included on the height adjustable side plates requires the side plate itself to act as part of the sensing mechanism."), 36 ("Petition's asserted prior art does not disclose the foregoing element of claims 1 and 2.").

Independent claim 8 is directed to a "method of controlling a milling machine." *Id.* at 7:38–51. Independent claim 16 is directed to a "method of measuring a milling depth of a milling machine." *Id.* at 8:15–38. In substance, these method claims are substantially similar to independent claim 1.

For example, claim 8, is reproduced below.

> 8. A method of controlling a milling machine, the milling machine having a machine frame, a milling roller supported from the machine frame, front and rear ground engaging supports, front and rear lifting columns supporting the machine frame from the ground engaging supports, and first and second side plates on opposing sides of the milling roller, the side plates being height-adjustable with respect to the machine frame, the method comprising:
>
> receiving position sensing signals from first and second position sensors spaced apart in a traveling direction on one or more of the side plates; and

> measuring a displacement of the one or more of the side plates with respect to the machine frame, based on the received position sensing signals.

Ex. 1001, 7:38–51. As is clear, the preamble recites typical features of milling machines, including a frame, tracks for moving the machine, lifting columns to raise the machine, height-adjustable side plates, and a milling roller. *See* Prelim. Resp. 9 (acknowledging these known "typical features.").

The two method steps of "receiving position sensing signals from first and second position sensors" and "measuring a displacement of the one or more of the side plates," based on the received position sensing signals is exactly what the sensors in the proposed OMM/Samuelson combination do, as discussed above. *See* Pet. 62–64.

Petitioner provides analyses of claims 2–20, with citations to the evidence of record supporting Petitioner's assertions. Pet. 52–77. We address Patent Owner's arguments as to claim 2 above in the context of its arguments as to claim 1, and Patent Owner does not address claims 3–20.

But keeping in mind that Petitioner bears the burden of establishing a likelihood of success, we have fully considered Petitioner's showing with respect to those claims, and conclude that Petitioner demonstrates a reasonable likelihood that claims 2–20 would have been obvious based on OMM and Samuelson.

Accordingly, we proceed with institution of an *inter partes* review of all claims as challenged in the Petition. *See SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1356 (2018).

III. DISCRETIONARY DENIAL UNDER 35 U.S.C. 325(d)

Patent Owner urges us to deny the Petition under 35 U.S.C. § 325(d), because Petitioner "merely replaces the W1900 milling machine cited during prosecution with Caterpillar's own substantially similar PM-465 milling machine"

and because Samuelson was cited on an IDS. Prelim. Resp. 13–34. The exercise of our discretion under § 325(d) involves a two-part framework that considers:

> (1) whether the same or substantially the same art or arguments were previously presented to the Office; and
>
> (2) if the first part of the framework is satisfied, whether petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims.

Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH, IPR2019-01469, Paper 6 at 8 (PTAB Feb. 13, 2020) (precedential) ("*Advanced Bionics*"). In applying this framework, we consider the *Becton, Dickinson*[10] factors that address discretion to deny when a petition presents the same or substantially the same prior art or arguments previously presented to the Office, including:

(a) the similarities and material differences between the asserted art and the prior art involved during examination;
(b) the cumulative nature of the asserted art and the prior art evaluated during examination;
(c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection;
(d) the extent of the overlap between the arguments made during examination and the manner in which Petitioner relies on the prior art or Patent Owner distinguishes the prior art;
(e) whether Petitioner has pointed out sufficiently how the Examiner erred in its evaluation of the asserted prior art; and
(f) the extent to which additional evidence and facts presented in the Petition warrant reconsideration of the prior art or argument.

Becton, Dickinson, Paper 8 at 17–18.

Factors (a), (b), and (d), relate to whether the same or substantially the same art or arguments were previously presented to the Office, and factors (c), (e), and

[10] *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 17–18 (PTAB Dec. 15, 2017) (precedential as to § III.C.5, first paragraph) ("*Becton, Dickinson*").

(f) relate to whether the petitioner demonstrates that the Office erred in a manner material to the patentability of the claims. *Advanced Bionics*, Paper 6 at 9–11. Only if the same or substantially the same art or arguments were previously presented to the Office do we then consider whether the petitioner has demonstrated a material error by the Office. *Id.*

A. Part One of the Advanced Bionics Framework

Patent Owner asserts that the "Petition relies on the PM-465 in 'substantially the same manner as the Examiner' with respect to the disclosure of the W1900." Prelim. Resp. 19 (citing *Advanced Bionics*, Paper 6 at 17). In support of this assertion, Patent Owner provides a chart comparing the similarities. *Id.* at 20–22. Patent Owner also asserts that Samuelson was "cited in an IDS" that was considered by the Examiner. *Id.* at 24–26.

We note, however, that each claim element listed in Patent Owner's chart (*id.* 20–22) is an element that Patent Owner admitted is a "typical feature" of a road milling machine. *Id.* at 9 ("The OMM is asserted to include *typical features of milling machines*, including a frame, tracks for moving the machine, lifting columns to raise the machine, side plates and a moldboard to contain debris from the milling process, and a milling roller to mill the pavement." (emphasis added)). Because claim 1 includes these "typical features" as claim elements, any patentability challenge to the claim must include a reference disclosing these "typical feature" claim elements. Thus, any challenge must necessarily include a reference which is the same or substantially the same as a reference relied on by the Examiner to show these "typical features." Accordingly, we agree with Patent Owner that OMM is substantially similar to W1900 in that both disclose admittedly "typical features." We *do not* agree with Patent Owner that OMM, as

applied by Petitioner, is substantially similar or cumulative to Wirtgen, the reference describing the W1900 that the examiner relied on during prosecution.

Moreover, the issue is not whether the PM-465 *machine* is substantially similar to the W1900 *machine*. Instead, the issue is whether OMM is substantially similar to documents on which the Examiner relied.

The rejection made by the Examiner was based on a brochure and photo submitted by the Applicant. *See e.g.*, Ex. 2001, 1396 (prosecution history Part 6/6). The rejection made by the Examiner was that "Claims 1–6 and 8–20 [of the application that matured into the '391 patent] are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over NPL [non-patent literature] documents submitted by Applicant - Wirtgen Wl500/Wl900 and Exhibit H - photo of Wirtgen W1900." *Id.* Exhibit H is a "photo of a Wirtgen W1900 milling machine having a side plate raised by two vertical hydraulic cylinders. A single wire rope sensor is attached to the center of the side plate to measure vertical movement of the side plate. (Undated but admitted to be prior art.)" Ex. 2001, 1389, listed item No. 5); *see also id.*, listed item 6 (citing "Ex. I - Brochure - Wirtgen Cold milling machines W1500/W1900 (8 pages) (dated 2001)"; *see also id.* at 1161–1168 (the cited "8-page brochure" describing the W1500/W1900 Wirtgen milling machines.).

OMM is a comprehensive 162-page document describing and illustrating the typical features of a milling machine, and much more, as discussed in this Decision. OMM provides detailed information on the operation and maintenance of the PM-465 machine. We have not been directed to persuasive evidence that OMM merely duplicates, or is substantially the same as, the W1500/W1800 brochure.

Samuelson also was before the Examiner. Ex. 1001, code (56); Ex. 2001, 1447, 1465; *see also* Pet. 25 (Petitioner acknowledging that "Samuelson was submitted to the examiner in an IDS" and that "the Wirtgen W1900 machine—lacked a sensor-integrated cylinder" during the '391 patent's prosecution). Based on Petitioner's statement, we understand that W1900, similar to OMM, discloses each of the limitations of claim 1 except for the sensor-integrated cylinder.

More significantly, contrary to Patent Owner's characterization, Petitioner does *not* "rel[y] on OMM as disclosing a single grade wheel sensor aligned with the center of the milling drum to monitor the vertical motion of the machine frame at the center of the milling drum in relation to the ground surface." Prelim. Resp. 23 (citing Pet. 10–13). Instead, Petitioner relies on OMM disclosing that the PM-465 machine includes two hydraulic cylinders on each of the side plates, spaced apart in the traveling direction of the milling machine. Pet. 48–51; *see also id.* at 52 (discussing dependent claim 2).

Petitioner contends that a person having ordinary skill in the art would have found it obvious, based on Samuelson's teaching, to modify the two OMM cylinders, to convert the OMM cylinders from dumb cylinders to smart cylinders. *Id.*; *see also id.* at 22 ("Upon seeing the disclosures in Samuelson, a [person having ordinary skill in the art] would have been further motivated to incorporate sensor-integrated cylinders into the side plates and to use those side plates as sensors by having the sensor-integrated cylinders monitor the extent to which the side plate moves up and down as it traverses the ground."). Indeed, Petitioner argues that a person having ordinary skill in the art "would have been motivated to consider *different types* of grade sensors" because of known problems with mechanical wheel sensors (such as grade slope wheels) or ultrasonic sensors. *Id.* at 48 (emphasis added).

In contrast, the Examiner does *not* expressly point out that Wirtgen's W1900 includes hydraulic pistons/cylinders. *See* Ex. 1008, 90–92. Instead, the Examiner merely takes Official Notice that it was old and well known to integrate sensors into hydraulic piston/cylinder units, an action that the applicant criticized. *Id.* at 60–63, 92.

For at least this reason, we determine that there is a material difference between OMM and the Wirtgen W1900 reference, and that OMM is not cumulative to this reference. Also, given that the Petition provides express teachings of a hydraulic cylinder with a sensor and reasons to modify PM-465's dumb cylinders, and the Examiner does not expressly identify cylinders in W1900 and relies on Official Notice for sensors in a cylinder, we determine that the extent of the overlap between the arguments made during examination and the manner in which Petitioner relies on the prior art is minimal. Accordingly, we determine that Patent Owner does not sufficiently demonstrate that part one of the *Advanced Bionics* framework is satisfied. That is, we determine that the same or substantially the same art or argument previously was *not* presented to the Office. *Cf. Advanced Bionics* at 8.

B. Part Two of the Advanced Bionics Framework

Patent Owner contends that the Petition fails to establish that the Office erred in a manner material to the patentability of the challenged claims. Prelim. Resp. 27–30. Patent Owner also contends that the Petition does not present new evidence or facts that are sufficient to warrant institution. *Id.* at 30–34. Petitioner asserts that "Samuelson provides th[e] missing feature and it was thus material error for the examiner to fail to apply it." Pet. 78.

For the reasons set forth above, we find that Petitioner has demonstrated a reasonable likelihood of prevailing in showing that at least claim 1 of the '391

patent is unpatentable over OMM and Samuelson based on the current record. *See* Section II.D.3, supra. In doing so, Petitioner demonstrates that the Examiner erred in a manner material to the patentability of the challenged claims by not appreciating that Samuelson discloses features recited in the claims of the '391 patent. *See*, e.g., Ex. 2001, 1396–1398 (Examiner rejecting then-pending claims 1 and 2 because the applied prior art discloses a single wire rope sensor attached to side plate, but that it would have been obvious to duplicate the sensor, and that placing sensors in cylinders was known), 1457–1462 (Applicant arguing in a Response that it would have been far more than a "mere duplication" and that the Examiner has provided no evidence of integrating sensors in hydraulic units on road machines), 1492 (Allowance of claims 1–20 noted based on the Response, without further comment from the Examiner); *see also*, *Advanced Bionics* at 8, n. 9 ("An example of a material error may include misapprehending or overlooking specific teachings of the relevant prior art where those teachings impact patentability of the challenged claims."). Because Petitioner persuasively shows that Samuelson discloses the subject matter that the Examiner found missing in the art applied during prosecution, we determine that the Petition establishes that the Office erred in a manner material to the patentability of the challenged claims.

C. Conclusion

Based on our analysis within the *Advanced Bionics* framework, we find that the Petition does not implicate § 325(d) in a manner sufficient to warrant discretionary denial, and we decline to exercise our discretion to deny institution under § 325(d).

IV. CONCLUSION

For the above reasons, we determine that the information presented in the Petition shows a reasonable likelihood that at least claim 1 of the '391 patent is

unpatentable as obvious over OMM and Samuelson. Because Petitioner demonstrates that at least one claim of the '391 patent meets the threshold for institution, we institute an *inter partes* review of all claims as challenged in the Petition. 37 C.F.R. § 42.108(c); *SAS*, 138 S. Ct. at 1359–60.

V. ORDER

Accordingly, it is:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–20 of the '391 patent is *instituted*; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4(b), notice is hereby given of the institution of trial, which will commence on the entry date of this Decision.

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