

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

WIRTGEN AMERICA, INC.,
Petitioner,

v.

CATERPILLAR INC.,
Patent Owner.

IPR2022-01394
Patent 7,523,995 B2

Before BARRY L. GROSSMAN, JAMES J. MAYBERRY, and
MATTHEW S. MEYERS, *Administrative Patent Judges*.

MAYBERRY, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining Some Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

Wirtgen America, Inc. (“Petitioner”), filed a Petition requesting *inter partes* review of claims 18, 21–35, 45, and 49–63 (the “Challenged Claims”) of U.S. Patent No. 7,523,995 B2 (Ex. 1001, the “’995 patent”). Paper 2 (“Pet.”), 1.¹ The ’995 patent is owned by Caterpillar Inc. (“Patent Owner”). Paper 4, 1.

For the reasons provided below, we conclude that Petitioner has proven, by a preponderance of the evidence, that claims 18, 21–29, and 31–35, are unpatentable. We conclude that Petitioner has not proven, by a preponderance of the evidence, that claims 30, 45, and 49–63 are unpatentable.

A. Procedural History

Upon review of the Petition, Preliminary Patent Owner Response (Paper 7), and evidence in the record, we instituted an *inter partes* review proceeding on all challenges in the Petition. Paper 9 (“Inst. Dec.”); *see* 37 C.F.R. § 42.108(a) (2023) (“When instituting *inter partes* review, the Board will authorize the review to proceed on all of the challenged claims and on all grounds of unpatentability asserted for each claim.”).

Patent Owner filed a Response to the Petition. Paper 14 (“PO Resp.”). Petitioner filed a Reply to the Patent Owner Response. Paper 18 (Pet. Reply). Patent Owner filed a Sur-reply to the Reply. Paper 22 (“PO Sur-reply”).

¹ Petitioner challenges claims 1–15, 17–33, 35–42, 44–61, and 63 of the ’995 patent in IPR2022-01395. We issue a Final Written Decision in that proceeding concurrently with this Decision.

An oral hearing was held on December 11, 2023, and a transcript is included in the record. Paper 26 (“Tr.”).

B. Real Parties-in-Interest

Petitioner identifies Wirtgen America, Inc. and Wirtgen GmbH as the real parties-in-interest. Pet. 87. Patent Owner identifies Caterpillar Inc. as the real party-in-interest. Paper 4, 1.

C. Related Matters

The parties each identify the following district court litigation as a matter related to the ’995 patent: *Wirtgen America Inc. v. Caterpillar Inc.*, Case No. 1:17-cv-00770 (D. Del.). Pet. 87; Paper 4, 1. Patent Owner also identifies the following *inter partes* review cases as matters related to the ’995 patent: IPR2022-01395, IPR2022-01396, and IPR2022-01397. Paper 4, 1.

D. The ’995 Patent

The ’995 patent, titled “Milling Machine,” issued on April 28, 2009, from application number 11/180,688. Ex. 1001, codes (54), (45), (21). The ’995 patent ultimately claims priority to a foreign application, Italian Patent Application No. TO2004A0499, filed on July 15, 2004. *Id.* at code (30).

The ’995 patent relates to “work machines for the treatment of roadway surfaces, and more particularly to a road planer or milling machine.” Ex. 1001, 1:5–6. Figure 1 is illustrative and is reproduced below.

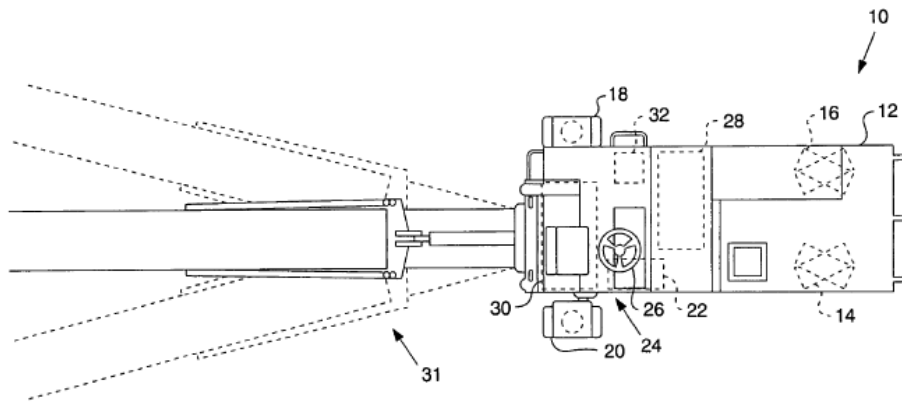


Figure 1 of the '995 patent depicts a top plan view of a self-propelled work machine. Ex. 1001, 3:26–28, 3:43–44, Fig. 1. As shown, self-propelled work machine 10 includes machine frame 12 supportable by front ground engaging units 14 and 16, and rear ground engaging units 18 and 20. *Id.* at 3:43–48. “[R]ight rear ground engaging unit 20 . . . may be pivotable between a projecting position as shown in solid lines in F[igure] 1 and a retracted position in which the one ground engaging unit 20 is positioned within the frame 12 as indicated by the recess 22 shown in hidden lines.” *Id.* at 3:51–56.

Figures 2 through 4 illustrate an exemplary embodiment of the '995 patent. Ex. 1001, Figs. 2–4; *see id.* at 4:38–44. Figure 2 is reproduced below.

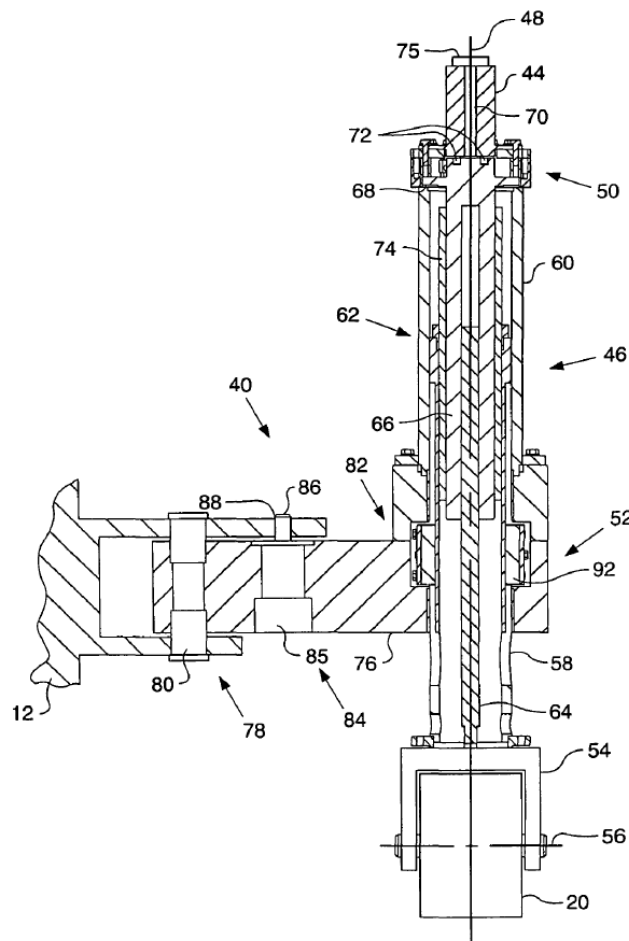


Figure 2 of the '995 patent depicts a partially sectioned longitudinal view of a detail of the work machine shown in Figure 1, referred to as “a cold planer.” Ex. 1001, 3:29–31, Fig. 2. As shown, “work machine 10 includes . . . support device 40 connected between the machine frame 12 and the one ground engaging unit 20”; “first actuator 42 is connected to the support device 40 and is adapted to move the one ground engaging unit 20 between the projecting . . . and the retracted position . . . relative to . . . frame 12”; “second actuator 44 is associated with . . . support device 40 and . . . adapted to maintain the same rotational direction of the one ground engaging unit 20 in each of the projecting and retracted positions”; “controller 32 . . . is adapted to coordinate the actuation of . . . actuators 42, 44”; “support

device 40 includes . . . lifting column 46 adapted to controllably raise and lower the associated connected ground engaging unit 20 relative to the machine frame 12”; and “second actuator 44 is connected to . . . lifting column 46 and . . . adapted to cause . . . a portion of . . . lifting column 46 to rotate about . . . lifting column axis 48,” which “is oriented generally vertically relative to . . . work machine 12.” *Id.* at 4:38–60.

“When flush milling is desired, for example, along a curb or close to a wall, the operator may choose to move the one ground engaging unit 20 to the retracted position relative to the machine frame 12.” Ex. 1001, 7:56–59. Figure 3 is illustrative and reproduced below.

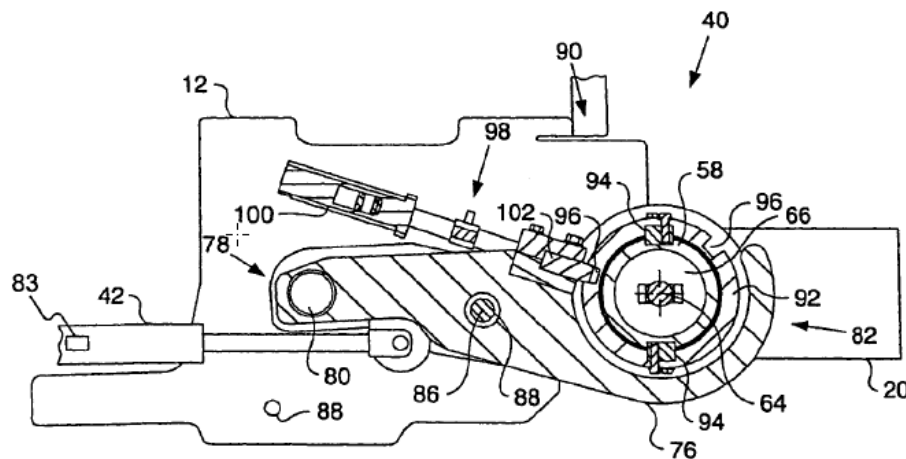


Figure 3 of the '995 patent depicts “a partially sectioned top plan view of the apparatus of F[igure] 2, with the ground engaging unit arranged in a retracted position relative to the frame.” *Id.* at 3:32–34, Fig. 3.

“Absent conditions calling for flush milling, the work machine 10 may be configured as shown in F[igure] 4, with the one ground engaging unit 20 in the projecting or outboard position relative to the machine frame 12.” Ex. 1001, 7:49–52. Figure 4 is illustrative and is reproduced below.

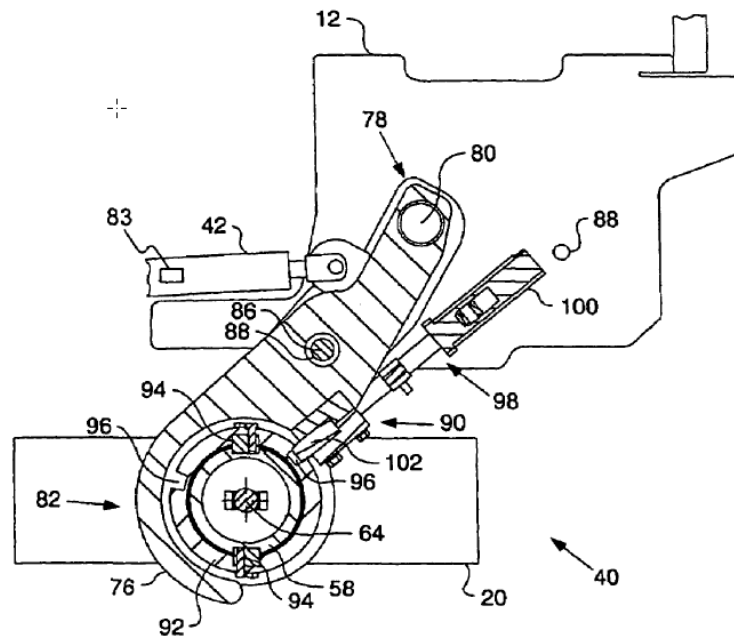


Figure 4 of the '995 patent depicts “a partially sectioned top plan view of the apparatus of F[igure] 2, with the ground engaging unit arranged in a protracting position relative to the frame.” *Id.* at 3:35–37.

E. Challenged Claims

The Petition challenges claims 18, 21–35, 45, and 49–63. Pet. 1. Below, we reproduce claims 18 and 45, which are the independent claims being challenged.

18. A self-propelled machine, comprising:

a machine frame supportable by a plurality of ground engaging units;

a support device connected between said machine frame and at least one of said ground engaging units, said support device including a lifting column having a lifting column axis and being adapted to controllably raise and lower said at least one ground engaging unit about said axis relative to said machine frame;

a first actuator connected to said support device and adapted to move said at least one ground engaging unit between

projecting and retracted positions relative to said machine frame;
and

a second actuator connected to said lifting column and adapted to cause at least a portion of said lifting column to rotate about said lifting column axis relative to said machine frame, said second actuator being positioned at a location linearly spaced apart from said first actuator along said lifting column axis.

Ex. 1001, 11:34–52.

45. A self-propelled machine, comprising:

a machine frame supportable by a plurality of ground engaging units;

support means for supporting said machine frame, said support means being connected to said machine frame and including a generally vertically oriented lifting column having a lifting column axis and being connected to at least one of said ground engaging units;

first actuatable means for moving said at least one ground engaging unit between projecting and retracted positions relative to said machine frame;

second actuatable means for rotating said at least one ground engaging unit to maintain the same rotational direction of said at least one ground engaging unit in each of said projecting and retracted positions, said second actuatable means being positioned at a location spaced apart from said first actuatable means along an axis of said lifting column; and controller means for coordinating the actuation of said first and second actuatable means.

Id. at 14:31–50.

F. Prior Art and Instituted Grounds

Petitioner asserts that the Challenged Claims are unpatentable based on the following challenges:

Claim(s) Challenged	35 U.S.C. §²	References/Basis
18, 29–31	103(a)	Volpe, ³ Piccoli ⁴
21–27, 32, 35, 45, 49–55, 57–60, 63	103(a)	Volpe, Piccoli, Skotnikov ⁵
33	103(a)	Volpe, Piccoli, Dubay ⁶
61	103(a)	Volpe, Piccoli, Skotnikov
28, 56	103(a)	Volpe, Piccoli, Skotnikov, McColl ⁷
34	103(a)	Volpe, Piccoli, McCutcheon ⁸
62	103(a)	Volpe, Piccoli, Skotnikov, McCutcheon

Pet. 20.

Petitioner relies on the declaration testimony of Mr. Cameron Orr in support of these challenges. Exs. 1003, 1040; *see also* Ex. 1004 (providing

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, with changes to 35 U.S.C. §§ 102 and 103 taking effect March 16, 2013. Because neither party disputes that 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 Volpe SF 100 T4 Operator’s Manual; published Oct. 1993 (Ex. 1005, “Volpe”).

⁴ Piccoli, US 2003/0180092 A1; published Sept. 25, 2003 (Ex. 1006, “Piccoli”).

⁵ Skotnikov et al., US 6,311,795 B1; issued Nov. 6, 2001 (Ex. 1008, “Skotnikov”).

⁶ Dubay et al., WO 02/103117 A1; published Dec. 27, 2002 (Ex. 1007, “Dubay”).

⁷ McColl, US 4,237,994; issued Dec. 9, 1980 (Ex. 1010, “McColl”).

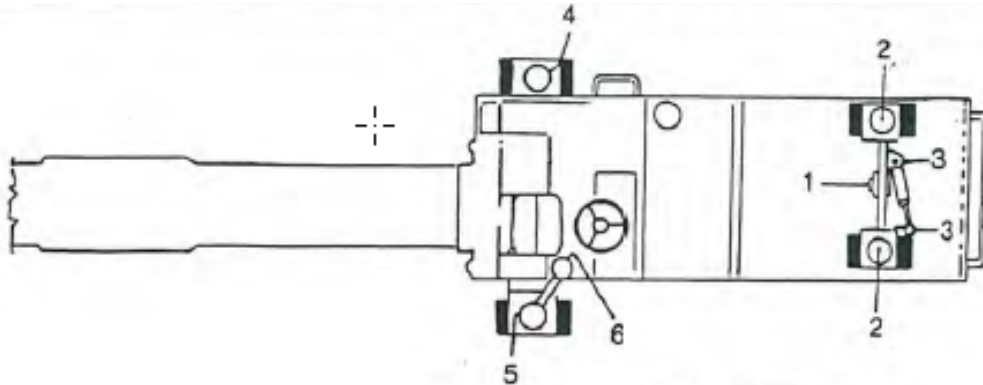
⁸ McCutcheon, US 4,566,553; issued Jan. 28, 1986 (Ex. 1013, “McCutcheon”).

Mr. Orr's curriculum vitae). Patent Owner relies on declaration testimony of Dr. Richard Klopp to support its responsive arguments. Ex. 2004; *see also* Ex. 2005 (providing Dr. Klopp's curriculum vitae).

The following subsections provide brief descriptions of the asserted prior art references.

1. Volpe (Ex. 1005)

Volpe is an operating manual for a cold planer machine. Ex. 1005, 2, 3, 6. Part of Figure BB-1 of Volpe is reproduced below.



This part of Figure BB-1 depicts a top plan view of the cold planer. Ex. 1005, 65, Fig. BB-1. As shown, the cold planer includes a frame, steering wheel, two front wheels and two rear wheels, as well as sliding supports for the left and right rear wheels. *See id.* Figure AH-7 of Volpe is reproduced below.

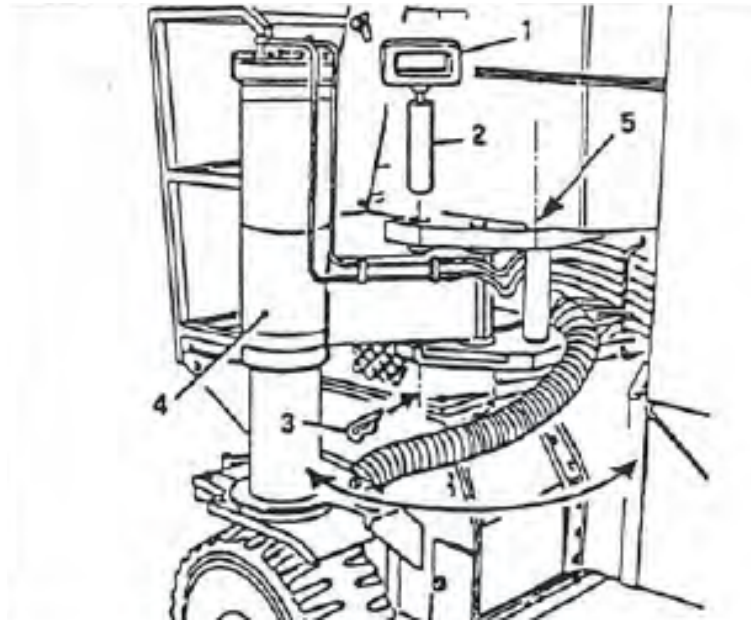
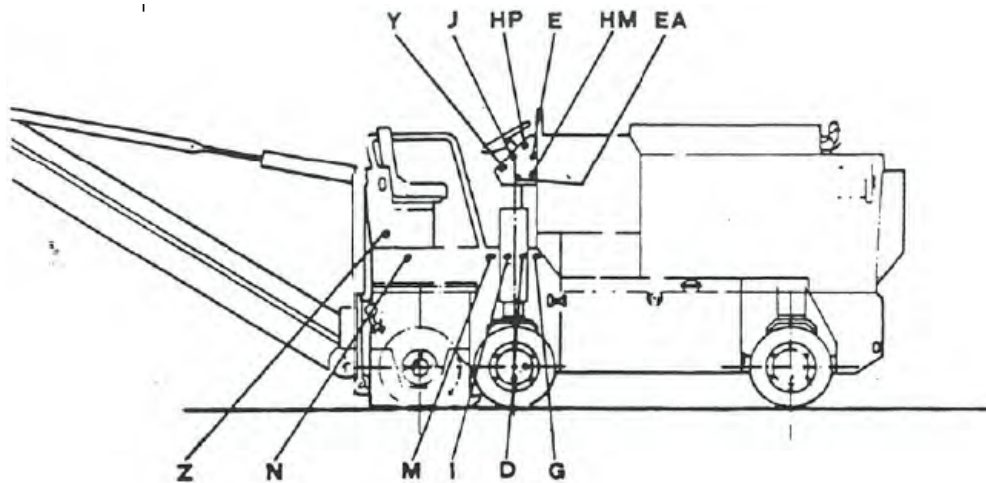


Figure AH-7 of Volpe is a visual aid for positioning the right rear wheel. *Id.* at 51. Volpe describes that “[i]f it is necessary to work up against pavement [curbs], walls or other obstacles, the rear right wheel can be positioned so that it is flush with the profile of the cutter drum.” *Id.* “In order to bring the wheel to this position,” Volpe instructs the operator to “proceed as follows:”

- a) Place a wooden spacer between the ground and the cutter drum.
- b) Lower the right hand side of the frame until the wheel is raised from the ground.
- c) Screw the handle (1) onto the pin (2), remove the safety spring (3) and then remove the pin (2).
- d) Swing the support (4) towards the frame until the pin hole (2) is aligned with the hole (5).
- e) Insert the pin (2), insert the safety spring (3); unscrew the handle (1) and return it to the tool box.
- f) Lower the wheel and raise the frame; the vehicle is now ready for work.

Id. Volpe then explains that “[t]o return the wheel to its outside position, reverse the above procedure but this time swinging the wheel out from its position flush with the cutter drum.” *Id.*

Part of Figure D-4 of Volpe is reproduced below.



This part of Figure D-4 depicts a side view diagram of the Volpe cold planer machine with labels identifying the machine’s electrical connectors and main components. Ex. 1005, 100–101. Lastly, Volpe also describes a hydraulic oil tank and hydraulic transmission system. *Id.* at 27.

2. *Piccoli (Ex. 1006)*

Piccoli, titled “Device for Forming Tight Radius Curbs and Gutters with a Paving Machine,” published September 25, 2003. Ex. 1006, codes (54), (43). Piccoli “relates . . . to a system and method to allow a paving machine to form tight radii in continuous extrusions.” *Id.* ¶ 2. Figure 1 of Piccoli is reproduced below.

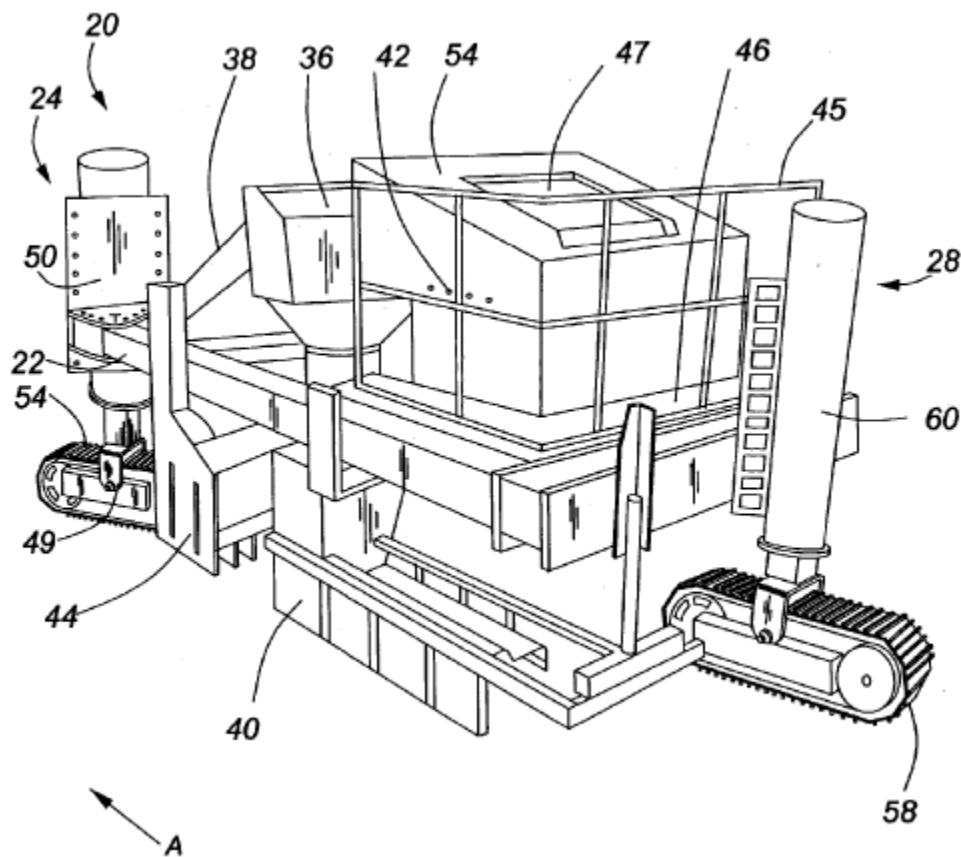


Figure 1 of Piccoli depicts a typical paving machine according to one embodiment. Ex. 1006 ¶ 31. “Paving machine 20 includes a main frame 22 supported on vertically adjustable upright leg assemblies,” preferably “a first front leg assembly 24, a second front leg assembly (not seen), and a rear leg assembly 28,” where paving machine 20 may be self-propelled by a moveable ground engaging track mounted to each leg assembly, “the first front track 49 being mounted to a hydraulic power-swing leg.” *Id.* ¶¶ 31, 38. Piccoli also describes its machine as a “a typical curb-forming machine” whose steering mechanism may be modified “to allow for much sharper turns and tighter radii on continuous extrusions.” *Id.* ¶¶ 37, 42. For example, Piccoli describes that the positioning of leg assembly 24’s leg 50

“in an offset operating position . . . is desirable when avoiding obstructions the front track 49 would have encountered if it was in its normal position.”

Id. ¶ 47; *see also id.* at Fig. 1 (depicting items 24, 50).

Figure 3 of Piccoli is reproduced below.

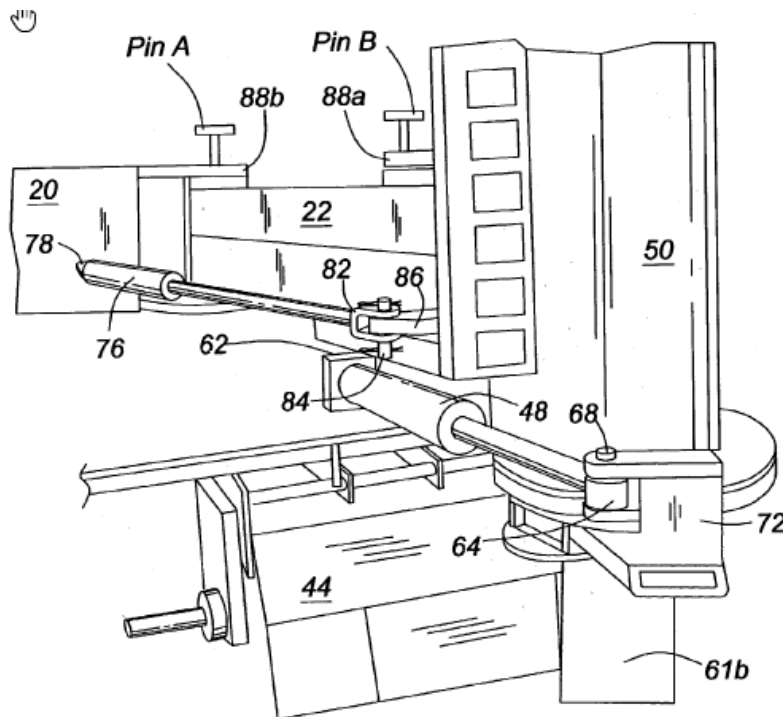


Figure 3 of Piccoli depicts the mounting of the front leg assembly. Ex. 1006 ¶ 14. As shown, Piccoli shift cylinder 76 is provided for repositioning leg assembly 24 relative to the frame, and steering cylinder 48 is provided for rotating or otherwise positioning ground engaging track 49. *Id.*, Fig. 3, ¶¶ 40–42; *see also id.*, at Figs. 2, 4a, 4b. Piccoli also describes a hydraulic system including a hydraulic circuit 90 to direct hydraulic fluid to the steering cylinder 48 and shift cylinder 76 to position leg 50 and track 49. *Id.* ¶¶ 49, 50, 54, 57, Figs. 6, 8, 10, 13.

3. Skotnikov (Ex. 1008)

Skotnikov, titled “Work Vehicle Steering and Suspension System,” issued November 6, 2001. Ex. 1008, codes (54), (45). Skotnikov “relates

... to a work vehicle steering system for off-road work vehicles.” *Id.*
at 1:5–8. Figure 1 of Skotnikov is reproduced below.

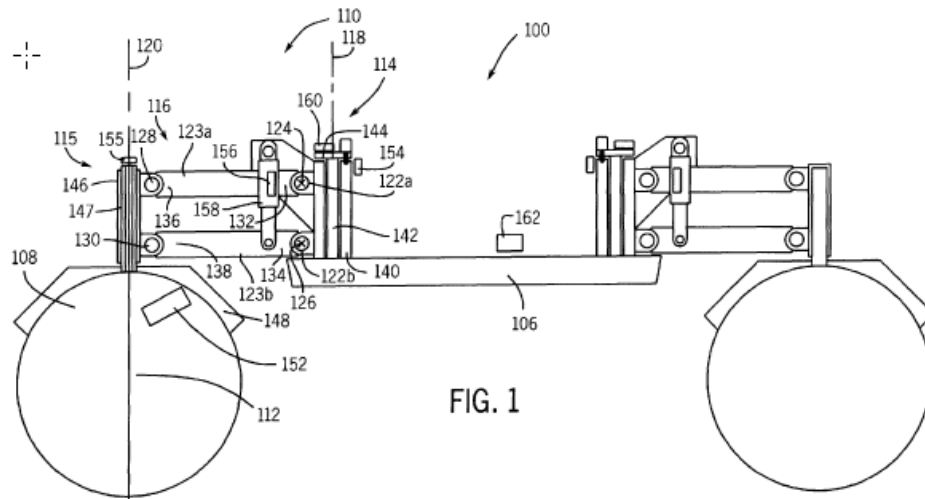


Figure 1 of Skotnikov is a side view of a chassis of a work vehicle having a steering and suspension system. Ex. 1008, 2:22–24. As shown, “chassis 100 includes a frame 106 coupled to four wheel assemblies 108 via four suspension/steering coupling assemblies 110.” *Id.* at 2:57–59. Coupling assembly 110 includes rotatable assemblies 114, 115, and 116. *Id.* at 3:17–18. Rotatable assemblies 114 and 115 can include helical rotary actuators, such as a hydraulic cylinder, and can be configured to rotate an axle or shaft within sleeves 140 and 146, respectively. *Id.* at 3:35–49, 3:53–55.

Figure 6 of Skotnikov is reproduced below.

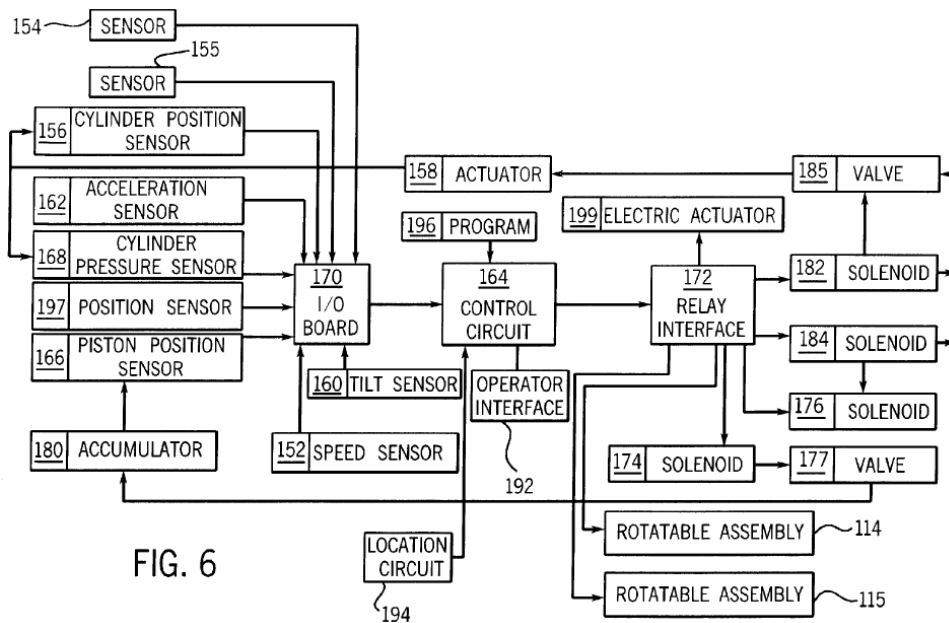
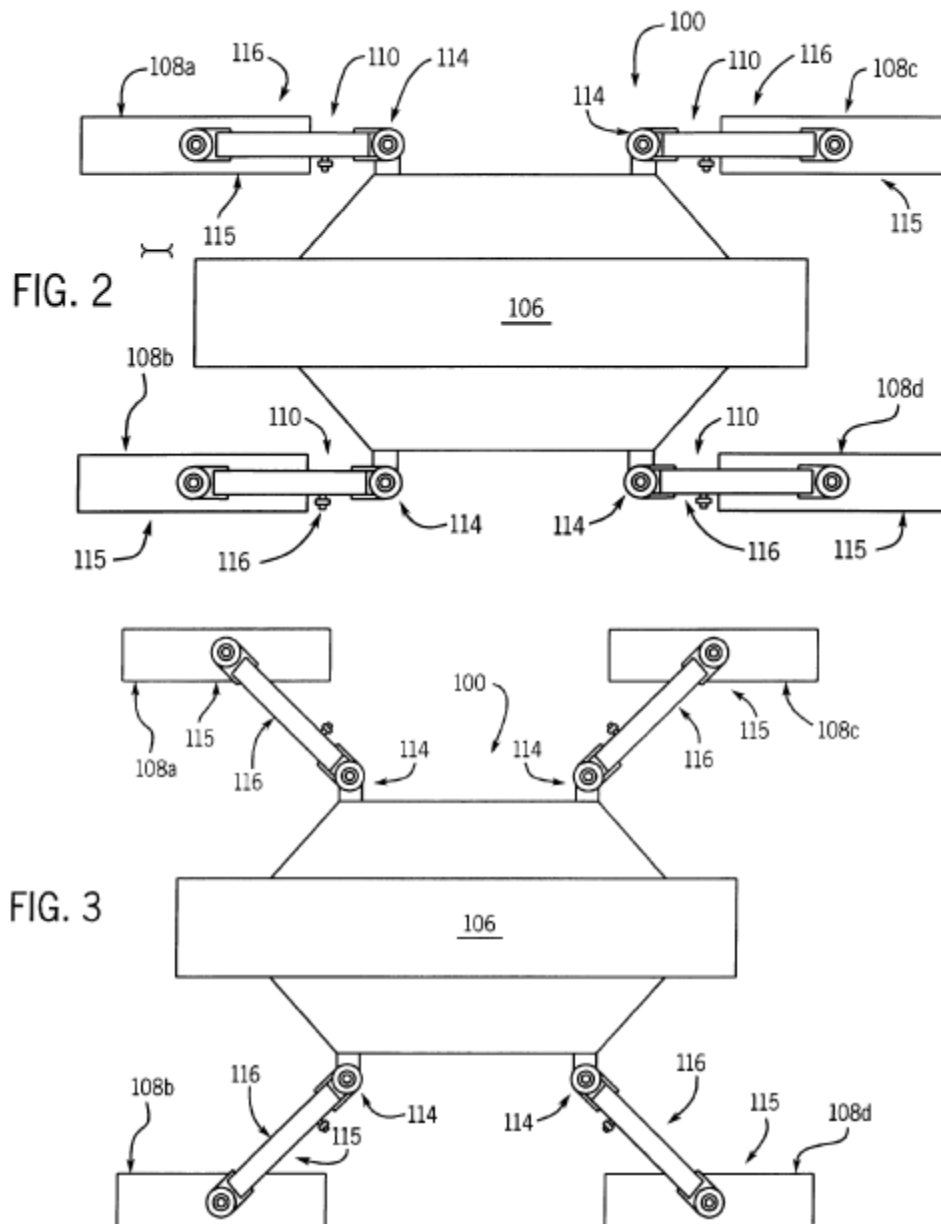


Figure 6 of Skotnikov depicts the control circuit for the steering and suspension system. Ex. 1008, 2:34–35. As shown, control circuit 164—through the use of a relay interface 172, sensors 152, 154, 155, 156, 160, 162, 166, 168, and 197 and actuator solenoids 174, 176, 182, and 184—is operative to provide control signals to rotatable assemblies 114 and 115 in order to steer wheel assemblies 108. *Id.* at 4:46–48, 4:62–67. In one embodiment, “[c]ontrol circuit 164 is configured to lower frame 106 via coupling assemblies 110 by enabling solenoid 182,” which “actuates valve 185 to remove hydraulic oil from actuator 158,” which then “retracts, providing a decreased distance between sleeve 140 and lever 123b to move frame 106 downward relative to wheel 108.” *Id.* at 7:52–57.

Control circuit 164 may also be configured to provide control signals to rotatable assemblies 114 and 115 to adjust the distance between wheels 108a, 108b, 108c, and 108d. Ex. 1008, 5:2–4. This wheel width adjustment can be seen in Figures 2 and 3, which are reproduced below.



Figures 2 and 3 of Skotnikov depict wheel assemblies 108 with narrow and wider widths, respectively. Ex. 1008, 5:19–21.

4. *Dubay (Ex. 1007)*

Dubay, titled “Milling Machine with Re-Entering Back Wheels,” published December 27, 2002 from an international application,

PCT/EP02/04638, filed April 26, 2002. Ex. 1007, codes (54), (43), (21), (22).

In the background discussion of Dubay, Dubay references “[a] prospectus entitled ‘Bitelli Volpe SF 100 T4M deep-cut cold planer for asphalt and concrete’” and states that the prospectus “describes a work machine comprising a frame which is supported by four wheels, a pair of oppositely arranged front wheels and a pair of oppositely arranged rear wheels.” Ex. 1007, 1:14–16. Dubay further states that, in the prospectus, “[o]ne of the rear wheels is adapted to raise and lower the frame relative to the respective rear wheel,” and “the operator hydraulically lowers the frame with respect to the rear wheel[;] [i].e.,] a hydraulic cylinder located inside the lifting column provides for this lowering movement.” *Id.* at 1:16–18, 1:28–2:2. Dubay additionally states that the machine’s support arm is “pivotally connected to the frame,” thereby “allow[ing] for movement between the two operating positions.” *Id.* at 1:22–25.

Dubay’s “invention relates . . . to a planer or milling machine for asphalt and concrete.” Ex. 1007, 1:7–9. Figure 4 of Dubay is reproduced below.

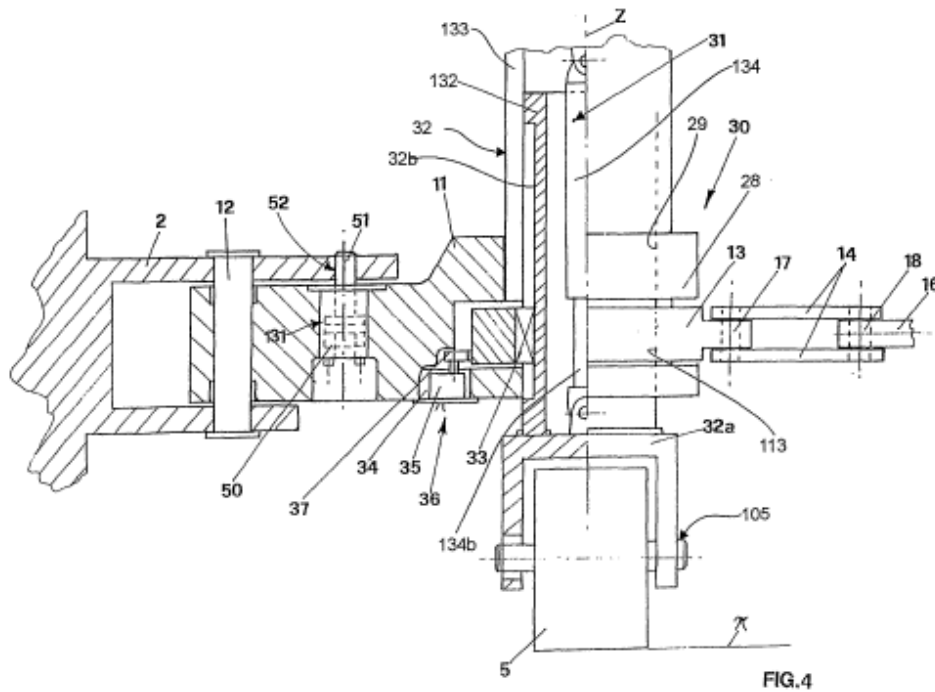


Figure 4 of Dubay is a schematic vertical sectional view of a detail of a cold planer. *Id.* at 4:11–14, 4:17. As shown, actuator 50—preferably a hydraulic jack—“is mounted in the seat 131 provided in the support arm 11,” and “actuator 50 is used for blocking a rotary movement of the support arm 11 with respect to the frame 2” through stem 51 that “can be inserted in to holes 52, 52a . . . in the frame 2 . . . to block or lock the support arm 11.” *Id.* at 9:19–26. According to Dubay, “locking the articulation apparatus 10 in this manner will also lock or block the wheel 5 . . . in the retracted position 70 and in the projecting position 60 relative to the frame 2, respectively.” *Id.* at 9:26–29.

5. *McColl (Ex. 1010)*

McColl, titled “Independent Steering and Propulsion System for Off Road Vehicle,” issued December 9, 1980. Ex. 1010, codes (54), (45). McColl “relates to self-propelled vehicles used primarily to transport long loads across roadless terrain.” *Id.* at 1:15–17. McColl describes a vehicle

including “modular front and rear wheel assemblies,” each having “an electrical or hydraulic actuator . . . to impart individually controlled steering movements to the particular wheel.” *Id.* at 1:29–30, 1:62–64. McColl’s vehicle further includes a “steering control system” with “a turn angle sensor . . . incorporated in the steering linkage for each wheel to continuously generate a signal proportional to the turning angle of such wheel.” *Id.* at 6:29–32, 6:34–35. Notably, McColl’s control system includes “a microprocessor 204 to control respectively the turn angle of the vehicle,” where “sensor signals” “respectively proportional to the rotational velocity of the wheel and to the angle of turn of the particular wheel” “are inputs to [the] microprocessor.” *Id.* at 1:64–1:68, 6:34–43. McColl also describes that its “microprocessor can be programmed to cause the vehicle to turn according to the Ackerman[n] principle.” *Id.* at 2:18–24; *see also id.* at 7:12–24, 8:53–62.

6. *McCutcheon (Ex. 1013)*

McCutcheon, titled “Agricultural Work Vehicle,” issued January 28, 1986. Ex. 1013, codes (54), (45). McCutcheon relates to “an agricultural work vehicle having an extensible and articulate load supportive frame which is particularly adapted to single-handed operations.” *Id.* at 1:5–8. Figure 1 of McCutcheon is reproduced below.

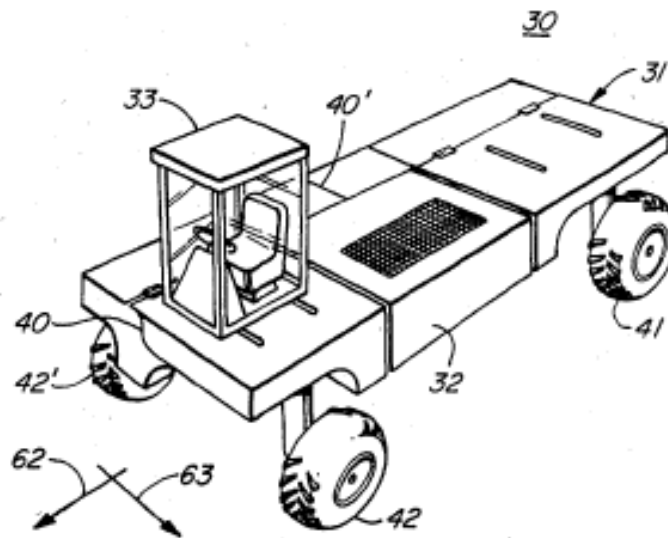


FIG. 1

Figure 1 of McCutcheon depicts a perspective view of an agricultural work vehicle. *Id.* at 2:46–47, Fig. 1. As shown, agricultural work vehicle 30 for endwise or broadside travel 62, 63 includes an extensible load supportive frame 31, an operator's cab 33 mounted thereon, individual panels 32 (some of which are overlapped at 40, 40'), and wheel assemblies 41, 41', 42, and 42'. *Id.* at 3:37–49, 4:54–64.

Figure 7 of McCutcheon is reproduced below.

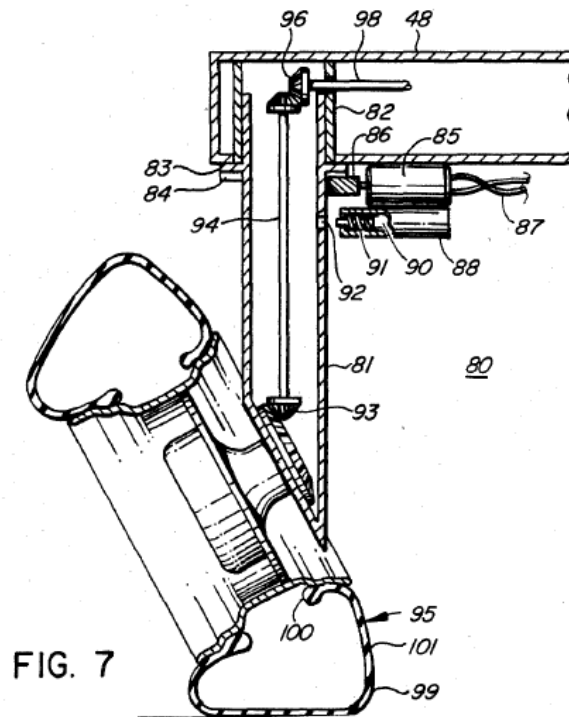


Figure 7 of McCutcheon depicts a fragmentary cross-sectional view of a wheel assembly usable on the vehicle shown in Figure 1. Ex. 1013, 2:60–62. As shown, each “wheel assembly 80 . . . comprise[s] a hollow wheel strut 81” and “a hydraulically driven steering motor 85 that is remotely controllable from the cab” of the vehicle. *Id.* at 6:5–16. Motor 85 provides “[s]teering control of the strut 81” through the “control of solenoid valves,” which apply “hydraulic fluid . . . to drive the motor 85.” *Id.* at 6:14–23. “Attached to the motor 85 is a wheel lock solenoid 88” and “a slidable plunger 90.” *Id.* at 6:24–26. “A series of apertures 92 are formed in the strut 81 in line with the plunger 90 and are engagable thereby under remote control from the cab 33 to lock the assembly 80 into predetermined positions.” *Id.* at 6:26–29.

II. ANALYSIS OF PETITIONER'S CHALLENGES

A. *Applicable Law*

Petitioner's asserted grounds of unpatentability are based on obviousness under 35 U.S.C. § 103.

Section 103(a) 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, objective evidence,⁹ such as commercial success, long felt but unsolved needs, and failure of others. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

The Supreme Court made clear that we apply “an expansive and flexible approach” to the question of obviousness. *KSR Int'l Co.*, 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

⁹ Neither party directs us to any objective evidence of non-obviousness.

invention “would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention.”
Id.

“[O]bviousness must be determined in light of *all the facts*, and . . . a given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine” teachings from multiple references. *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006) (emphasis added); *cf. Elekta Ltd. v. ZAP Surgical Sys., Inc.*, 81 F.4th 1368, 1374 (Fed. Cir. 2023) (“Whether a skilled artisan would have been motivated to combine references or would have had a reasonable expectation of success in combining references are questions of fact . . .”). 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 Int’l Co.*, 550 U.S. at 421.

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). Petitioner contends that a person having ordinary skill in the art “in the technical field of the ’995 patent (mobile construction machines) would have had knowledge of the technical literature concerning machine design, including hydraulic and mechanical systems and their use to steer and position wheels or tracks, before July 2004.” Pet. 15 (referencing Ex. 1003 ¶¶ 35–36). Petitioner further contends that a person having ordinary skill in the art

would typically have had: (i) a bachelor’s degree (or equivalent) in mechanical engineering (or a similar field) and at least two years of experience working on mobile construction machine

design (or in a similar field); or (ii) seven years of experience working on mobile construction machine design (or in a similar field).

Id. (referencing Ex. 1003 ¶¶ 35–36). Patent Owner does not address the level of ordinary skill in the art in its Response. Dr. Klopp states that “[w]hile I do not opine on the correctness of [Petitioner’s] description [of the level of ordinary skill], I apply [Petitioner’s] description of a person of ordinary skill in the art for the purposes of my declaration.” Ex. 2004 ¶ 26.

Based on the prior art, the sophistication of the technology at issue, and Mr. Orr’s Declaration testimony, we adopt Petitioner’s undisputed definition of the level of ordinary skill. We determine that this definition is consistent with the prior art of record and the skill reflected in the Specification of the ’995 patent. Ex. 1003 ¶¶ 35–36; Ex. 1001 (describing a mobile construction machine); Exs. 1005–1015 (disclosing aspects of mobile construction machine design).

C. *Claim Construction*

In *inter partes* reviews, we interpret a 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, we construe the claim “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” *Id.*

Independent claim 45 uses “means-plus-function” language, reciting several such clauses. Ex. 1001, 14:31–50; *see* 35 U.S.C. § 112 ¶ 6.¹⁰

¹⁰ We cite to the pre-AIA version of the statute applicable to the Challenged Claims.

Means-plus-function claiming occurs when a claim term is drafted in a manner that invokes 35 U.S.C. § 112 ¶ 6, which states:

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

See 35 U.S.C. § 112 ¶ 6; *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1347 (Fed. Cir. 2015) (en banc).

The parties do not dispute that § 112 ¶ 6 applies to the recited means-plus-function clauses in the Challenged Claims. *See* Pet. 16–20; PO Resp. 5–6 (implying that § 112 ¶ 6 applies in arguing that Petitioner did not satisfy the requirements for construing certain means-plus-function terms).

Where claim language may be construed according to 35 U.S.C. § 112(f) (or its predecessor, § 112 ¶ 6), a petitioner must provide a construction that includes both the claimed function and the specific portions of the specification that describe the structure, material, or acts corresponding to each claimed function. 37 C.F.R. § 42.104(b)(3). Petitioner provides specific constructions and cites allegedly corresponding structure and function in the Specification for some, but not all, of the “means for” clauses in challenged claim 45. Pet. 16–20. In particular, Petitioner proposes specific constructions for claim 45’s “support means,” “first actuatable means,” and “second actuatable means,” but does not propose a specific construction for claim 45’s “controller means.” *See id.*

Significant to our analysis of Petitioner’s patentability positions, Petitioner contends that the function associated with the second actuatable means is “rotating said at least one ground engaging unit to maintain the

same rotational direction of said at least one ground engaging unit in each of said projecting and retracted positions.” Pet. 18 (referencing Ex. 1001, 14:38–43). With respect to the structure disclosed in the Specification for performing this function, Petitioner identifies certain disclosure of a rotary actuator and concludes that a person having ordinary skill in the art would have understood the structure associated with the second actuatable means to be “a rotary actuator positioned at a top portion of the lifting column and configured to rotate part of the lifting column and the wheel/track about the lifting column axis.” *Id.* at 20.

In analyzing claim 45, Petitioner states that “the features of claim 45 should be construed under § 112, 6th paragraph to require a rotary actuator positioned at a top portion of a lifting column. But to the extent they are not, these claims would have been obvious over the grounds and references applied herein.” Pet. 45 n.1; *see also* Pet. Reply 24 (“While Petitioner construed ‘second actuatable means’ to require a rotary actuator . . . , Petitioner proposed an *alternative*, broader claim construction when addressing this limitation in its grounds. . . . [T]he purpose of this Petition was to address all ’995 patent claims that do not explicitly recite a rotary actuator.); *cf.* Paper 1, 1 (providing a ranking of multiple petitions and stating that “claims 18, 21–35, 45, 49–63 do not . . . recite a rotary actuator and instead encompass broader subject matter” (emphasis added)).

Patent Owner does not offer its own construction for the “second actuator means” term. Patent Owner did enter into the record the construction of the term from the parallel District Court litigation. *See* Ex. 2008, 2 (construing the second actuatable means for rotating said at least one ground engaging unit from claim 45 of the ’995 patent as “an actuator,

such as a linear or rotary actuator”); Ex. 2009, 16–17 (providing the District Court’s claim construction analysis of the second actuatable means, including indicating Patent Owner’s construction of the term as “an actuator, such as a linear or rotary actuator”).

Patent Owner argues that footnote 1 in the Petition does not offer any alternative construction. PO Sur-reply 17. Patent Owner also argues that Petitioner improperly incorporates arguments from its ranking paper to support Petitioner’s contention with respect to footnote 1 providing an alternative argument. *Id.*

We determine that we must construe at least the “second actuatable means” term in claim 45 to resolve a dispute between the parties. “Construing a means-plus-function claim term is a two-step process.” *Williamson*, 792 F.3d at 1351. We “must first identify the claimed function[, and] [t]hen, . . . determine what structure, if any, disclosed in the specification *corresponds to the claimed function*.” *Id.* (emphasis added) (internal citation omitted).

Starting with the language of claim 45. Claim 45 recites, in relevant part,

second actuatable means for rotating said at least one ground engaging unit to maintain the same rotational direction of said at least one ground engaging unit in each of said projecting and retracted positions, said second actuatable means being positioned at a location spaced apart from said first actuatable means along an axis of said lifting column.

Ex. 1001, 14:42–50. The recited function is “rotating said at least one ground engaging unit to maintain the same rotational direction of said at least one ground engaging unit in each of said projecting and retracted positions,” which Petitioner identifies and Patent Owner does not dispute.

See Pet. 18 (identifying the same function); *cf.* Ex. 2009, 16 (“The Parties agree . . . upon the function” of the second actuatable means term).

Turning to the corresponding structure, the Specification of the ’995 patent identifies only one structure that performs the recited function—actuator 44. The Specification states that “second actuator 44 is associated with the support device 40 and is adapted to maintain the same rotational direction of the one ground engaging unit 20 in each of the projecting and retracted positions.” Ex. 1001, 4:44–47; *see id.* at 4:56–60 (“[S]econd actuator 44 is connected to the lifting column 46 and is adapted to cause at least a portion of the lifting column 46 to rotate about a lifting column axis 48 that is oriented generally vertically relative to the work machine.”).

The Specification at least suggests that actuator 44 does not need to be a rotary actuator, or, at least, that a linear actuator is an equivalent structure to a rotary actuator. For example, in describing “one of the preferred embodiments,” the Specification describes that “at least one of the first and second actuators 42, 44 is a rotary actuator,” suggesting that actuator 44 is not necessarily a rotary actuator. Ex. 1001, 4:61–62; *see also id.* at 5:17–21 (“These embodiments may be advantageously combined by employing a rotary actuator as described above as either or both of the first and second actuators 42, 44, and by positioning these actuators at the specified longitudinally spaced apart locations.”), 5:21–24 (“[I]t may also be *preferable* that at least the second actuator 44 be implemented using the rotary actuator construction and placed at the upper portion of the lifting column 46.” (emphasis added)); *but see id.* at Fig. 3 (depicting actuator 42 as a linear actuator).

Accordingly, we find that the corresponding structure identified in the Specification for the recited function is a rotary or linear actuator. As such, we do not agree with Petitioner’s construction limiting the actuator to a rotary actuator. We also do not agree with Petitioner that the second actuator must be at the top portion of the lifting column. The Specification clearly identifies that the second actuator may be located “on the lifting column” “spaced apart from the first actuator 42,” and that locating the second actuator at the upper portion of the lifting column is merely a preferred location. *See* Ex. 1001, 5:8–24.

Also, our rules provide that “[a]ny prior claim construction determination concerning a term of the claim in a civil action . . . that is timely made of record in the *inter partes* review proceeding will be considered.” 37 C.F.R. § 42.100(b). As we indicate above, the District Court did not limit the corresponding structure for the second actuatable means to a rotary actuator. Ex. 2008, 2. As such, our construction is consistent with that of the District Court.

We determine that we need not expressly construe any other claim terms to resolve the parties’ disputes. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). To the extent that the scope of any particular claim term requires discussion, however, we provide it in our assessment of the challenges, which we turn to next.

D. Ground 1: Claims 18 and 29–31 as unpatentable over Volpe and Piccoli

Petitioner contends that the combined teachings of Volpe and Piccoli render obvious the subject matter of claims 18 and 29–31. Pet. 26–45. Patent Owner disputes Petitioner’s contention that the proposed combination teaches or suggests the “support device” limitation of claim 18, as well as the proposed motivation to combine Volpe and Piccoli. Patent Owner also criticizes Petitioner’s reliance on Dubay in Ground 1. We address Petitioner’s contentions and Patent Owner’s arguments below.

1. Motivation to combine Volpe and Piccoli

Before turning to the analysis of the challenged claims under Ground 1, we address Petitioner’s contentions with respect to motivation to combine Volpe and Piccoli, and Petitioner’s reliance on Dubay in the Petition for Ground 1.

a) Petitioner’s arguments

As will be explained in more detail in our limitation-by-limitation analysis of claim 18, Petitioner contends that it would have been obvious to modify Volpe’s machine to add linear actuators as taught by Piccoli. See Pet. 26–42. Petitioner contends that a person having ordinary skill in the art would have been motivated to modify Volpe’s machine to use actuators to (1) pivot the support arm, and (2) pivot or steer the rear wheel to avoid rear wheel scraping. *Id.* at 37–39. Petitioner explains that Volpe uses manual processes to pivot its support arm and rotate its rear wheel, and a person having ordinary skill in the art “would have known that manually pivoting the lifting column and its wheel was inconvenient and unsafe for the operator.” *Id.* at 39 (referencing Ex. 1011 ¶ 10; Ex. 1003 ¶¶ 178–180); see,

e.g., Ex. 1003 ¶ 179 (“Dismounting from the cab, manually moving the wheel, and remounting the cab was therefore inefficient, inconvenient, and uncomfortable. The prior art also describes the manual process as unsafe.” (citing Ex. 1005, 13; Ex. 1007, 2:12–15; Ex. 1011 ¶ 10)). Petitioner adds that “[m]anually moving a milling machine’s retractable wheel, such as Volpe’s rear wheel, was inefficient and unsafe, particularly when adjusting wheel position on a slope, unstable ground, or a job site close to live lanes of traffic[, a]nd in some instances, Volpe’s swing leg may be too heavy to manually pivot.” Pet. 39 (referencing Ex. 1003 ¶¶ 178–180).

Petitioner argues that “[u]sing Piccoli’s cylinder to move Volpe’s rear wheel would have automated the process of pivoting the lifting column, ultimately making the process ‘faster and safer for the operator.’” Pet. 39–40 (referencing Ex. 1011 ¶¶ 11, 16; Ex. 1003 ¶¶ 178–180); *cf.* Ex. 1023, 23 (finding, in a Final Written Decision in IPR2018-01201, between Petitioner and Patent Owner, “that the advantages of faster and safer operation provide adequate reasoning in support” of automating pivoting Volpe’s support arm).

Petitioner also contends that a person having ordinary skill in the art would have been motivated to modify Volpe with Piccoli’s steering actuator to steer the rear wheels to avoid the rear wheels scraping the ground when

the wheels are in a retracted position and the machine turns. Pet. 40 (referencing Ex. 1014¹¹ ¶ 12).

Petitioner concludes that “combining pivot and steering actuators with Volpe would be nothing more than using a known technique (using actuators to pivot a support arm and control wheel orientation) to improve a similar device in the same way.” Pet. 40 (referencing Ex. 1003 ¶ 180).

Petitioner also contends that a person having ordinary skill in the art “would have had a reasonable expectation of success in combining the teachings of Piccoli’s actuators with Volpe because Piccoli’s actuators would perform their same intended function.” Pet. 41 (referencing Ex. 1003 ¶¶ 181–182). Petitioner further contends that “using hydraulic cylinders to automate other swing legs (including four bar linkages and single support arms) had already successfully been achieved and was predictable.” *Id.* (referencing Ex. 1011 ¶¶ 24–25, Figs. 3–5; Ex. 1021, 3:29–41, Fig. 3; Ex. 1015, 4:15–21, Figs. 3a–3c; Ex. 1003 ¶¶ 181–182).

b) Patent Owner’s responsive arguments

With respect to modifying Volpe’s swing arm to include an actuator to pivot the arm, Patent Owner argues that Petitioner’s proposed modification would have required the operator to get out of the machine

¹¹ Bitelli, EP 1 039 037 A2, published September 27, 2000. (“Bitelli ’037”). Bitelli ’037 is directed to “a heavy vehicle for breaking up ground provided with retracting and steering rear wheels.” Ex. 1014 ¶ 1. When discussing the prior art, Bitelli ’037 states that “[o]ne limitation shown by the machine described in the aforementioned patent is that when the rear wheels or tracks are set in their retracted position inside the frame, when turning they scrape the ground with considerable resistance.” *Id.* ¶ 12. The “aforementioned patent” is “a patent application having protocol number VI98U000098,” which was filed by Bitelli S.p.A. *See id.* at code (71), ¶ 11.

twice, rather than once, belying Petitioner's motivation for making it more convenient, efficient, and safe to operate. PO Resp. 16. Patent Owner argues that an operator would need to leave the machine, remove a locking pin, return to the machine, operate the actuator, and again leave the machine to reinsert the locking pin. *Id.* at 17 (referencing Ex. 2004 ¶ 36). Patent Owner argues that the unmodified machine "allows for a single, simple process of adjusting the support and locking pin rather than a cumbersome series of steps moving in and out of the machine." *Id.* at 17–18 (referencing Ex. 2004 ¶ 36). Patent Owner argues that the proposed modification would require the operator to spend more time out of the machine. *Id.* at 18.

Patent Owner also argues that neither the Petitioner nor Mr. Orr's declaration provides any support for the contention that the swing leg is too heavy to manually move. PO Resp. 18–19; *see id.* at 19 ("Dr. Klopp confirms that a [person having ordinary skill in the art] would not have viewed Volpe as teaching a mechanism that is too heavy to pivot." (referencing Ex. 2004 ¶ 38)). Patent Owner argues that Mr. Orr's testimony should not be credited because he did not obtain the requisite education or experience of a person having ordinary skill in the art until after the priority date of the '995 patent. *Id.* at 19.

With respect to Petitioner's reliance on prior art references teaching fully automatic swing arms, Patent Owner argues that "Petitioner cannot justify its proposal to needlessly complicate Volpe's process with extra steps by pointing to fully automated systems that are fundamentally different from the proposed modification." PO Resp. 20 (referencing Ex. 2004 ¶ 39).

Patent Owner also argues that Mr. Orr's testimony that the proposed modification would result in less operator training is not substantiated. PO

Resp. 20. Patent Owner adds that Dr. Klopp testifies that the modification would not reduce operator training requirements. *Id.* (referencing Ex. 2004 ¶ 40). Patent Owner also argues that Mr. Orr’s testimony regarding the need for multiple operators and increased costs for the unmodified machine “is wholly conclusory.” *Id.*; *see also id.* at 20–21 (arguing that Dr. Klopp testifies that a person having ordinary skill in the art would not have understood that manually moving Volpe’s swing arm would have required multiple operators and that the proposed modifications would have increased costs (referencing Ex. 2004 ¶ 40)).

Patent Owner also argues that Piccoli does not provide motivation for Petitioner’s modification. PO Resp. 21–23. Patent Owner argues that Piccoli’s machine is distinct from Volpe, as Piccoli uses its actuator to pivot its load-bearing support while the machine is moving, and Volpe raises its wheel before pivoting the support. *Id.* at 21 (referencing Ex. 2004 ¶¶ 45–46; Ex. 1005, 51); *see id.* at 22 (explaining further that Piccoli uses its actuator to pivot a load-bearing track and Volpe pivots a support that does not bear a load during pivoting).

With respect to the motivation directed to preventing the rear wheel from scraping, Patent Owner argues that Petitioner does not demonstrate that scraping is a problem. PO Resp. 23. Patent Owner argues that Petitioner relies on another reference to support Petitioner’s motivation. *Id.* (identifying Ex. 1014). Patent Owner also criticizes Mr. Orr’s testimony as “repeat[ing] the [P]etition’s facially deficient argument nearly verbatim.” *Id.* at 23–24 (identifying Pet. 40; Ex. 1003 ¶ 180).

Patent Owner also argues that Volpe teaches to keep its rear wheels parallel to the frame using adjustable slides. PO Resp. 24. Relying on

Dr. Klopp’s testimony, Patent Owner argues that that the adjustable slides “(1) fix[] the wheel’s orientation in the forward-facing direction and (2) keep[] the wheel parallel to the frame in the vertical direction.” *Id.* at 25 (referencing Ex. 2004 ¶¶ 51–52).

Patent Owner also argues that, with respect to the proposed modification, where Piccoli’s steering cylinder would have been attached to the inner tube of the lifting column, “Petitioner does not . . . attempt to explain how Volpe would be able to function with one end of the steering cylinder attached to the frame and another end attached to a vertically moving component.” PO Resp. 27. Patent Owner argues that Piccoli’s three-part lifting column does not pose an issue for that machine, but that Petitioner does not propose to use Piccoli’s lifting column. *Id.*

c) Petitioner’s and Patent Owner’s reply arguments

Petitioner replies that a person having ordinary skill in the art “would have understood that based on the location of Volpe’s cab relative to the swing arm, an operator would have accessed Volpe’s manual locking pin while remaining in the cab because the locking pin’s handle extends upward from the frame’s platform so the operator can reach it.” Pet. Reply 8 (referencing Ex. 1040 ¶ 28; Ex. 1005, 51, 65); *see also id.* at 9 (providing annotated versions of Volpe’s Figures BB-1 and AH-7, showing the location of the locking pin). Petitioner asserts that a person having ordinary skill in the art “would have also understood that movement of Volpe’s locking pin should also be automated, as taught in Dubay and explained in the Petition.” *Id.* at 9–10 (referencing argument for claim 33, Pet. 74–76; Ex. 1040 ¶¶ 29–30).

Petitioner also replies that a person having ordinary skill in the art would have been motivated to automate the swinging motion of Volpe's rear wheel. Pet. Reply 10 (referencing Ex. 1011 ¶¶ 10–11; Ex. 1041, 117:4–7; Ex. 1046, 63:20–68:8; Ex. 1003 ¶¶ 178–179; Ex. 1040 ¶ 32).

Petitioner also replies that Patent Owner improperly argues the references individually—with Patent Owner arguing that Piccoli does not provide a motivation to use its shift cylinder because the cylinder is used to move a load-bearing track and is used to produce small turning radii. Pet. Reply 11. Petitioner replies that Patent Owner's argument is irrelevant to the subject matter of claim 18. *Id.* at 11–12. Petitioner explains that it is relying on Piccoli's shift cylinder to simply automate the movement of Volpe's swing arm. *Id.* at 12. Petitioner adds that Piccoli's disclosure would further inform a person having ordinary skill in the art that the swing arm could be moved when load-bearing. *Id.* (referencing Ex. 1040 ¶ 40).

Petitioner also argues that the primary use of Piccoli's shift cylinder is “to change the configuration of the machine by repositioning the leg assembly relative to the frame,” rather than allow for tight turning radii. Pet. Reply 12 (quoting Ex. 1006 ¶ 42).

Next, Petitioner replies that a person having ordinary skill in the art would have combined Piccoli's teaching of a steering column to steer Volpe's rear wheel to avoid scraping. Pet. Reply 13. Petitioner argues that the modification would mitigate a number of “issues,” including “accounting for weight distribution and accomplishing Ackerman[n] steering principles.” *Id.* at 13–14 (referencing Dr. Klopp's deposition testimony, Ex. 1041, 54:1–55:11).

Petitioner adds that the information in “the Petition established that wheel scraping was a problem for fixed rear-wheels, such as Volpe’s right rear wheel.” Pet. Reply 14. Petitioner states that its position is supported by a prior art reference—Exhibit 1014—a European patent application owned by Patent Owner. *Id.* Petitioner states that this reference provides state-of-the-art evidence supporting Petitioner’s motivation contention. *Id.* at 14–15. Addressing Patent Owner’s criticism that the machine referred to in Exhibit 1014 is a different machine than that disclosed in Volpe, Petitioner argues that a person having ordinary skill in the art would understand that the disclosed “machine is a road milling machine analogous to Volpe’s cold planar.” *Id.* at 15 (identifying Ex. 1042 as the “aforementioned patent” discussed in Exhibit 1014); *cf.* Ex. 1014 ¶ 12 (“One limitation shown by the machine described in the aforementioned patent is that when the rear wheels or tracks are set in their retracted position inside the frame, when turning they scrape the ground with considerable resistance.” (quoted at Pet. 40)).

Next, Petitioner replies that Volpe’s adjustable slides do not teach away from the proposed modification. Pet. Reply 16. Petitioner states that a person having ordinary skill in the art “would have understood that adding a second actuator to steer Volpe’s rear wheel would obviate the need for slide 1 because the second actuator would maintain the rear wheel’s orientation.” *Id.* (referencing Ex. 1040 ¶ 47); *see also* Ex. 1040 ¶ 48 (describing that a person having ordinary skill in the art would understand how to use Piccoli’s steering cylinder to maintain the rear wheels parallel to the frame); Ex. 1003 ¶ 307 (addressing claims 27 and 55, and explaining how the orientation of the rear wheels can be controlled).

Petitioner adds that Volpe’s use of the adjustable slides to orient the rear wheels “is a manual process for adjusting wheel orientation that is ripe for automation.” Pet. Reply 17 (referencing Ex. 1040 ¶ 49; Ex. 1046, 69:12–24). Petitioner also criticizes Patent Owner’s arguments with respect to adding Piccoli’s teachings of a steering cylinder as based on bodily incorporation. *Id.*

Petitioner also criticizes Patent Owner’s arguments with respect to connecting the steering cylinder to Volpe’s lifting column as treating a person having ordinary skill in the art as an automaton. Pet. Reply 18. Petitioner argues that “[a]dding a steering actuator to turn the inner tube of Volpe’s lifting column was well within the skill level of a” person having ordinary skill in the art. *Id.* (referencing Ex. 1040 ¶ 54; Ex. 1023, 26–33). Petitioner adds that a person having ordinary skill in the art “would have been aware of well-known structures that provide the connection and account for vertical movement of the lifting column’s inner tube, such as the structures described in Dubay and Busely.” *Id.* at 18–19; *see id.* at 19–20 (providing annotated images from Dubay and Busely showing connections); 20–21 (describing Piccoli’s teachings of connecting an end of its steering column to an arm fixed to the lower end of the lifting column’s outer tube, and providing an annotated version of Piccoli’s Figure 4a).

Patent Owner replies¹² that the proposed combination makes Volpe's machine less safe. PO Sur-reply 4. Patent Owner next argues that Petitioner provides a new argument that the operator would remove the locking pin and safety spring without leaving the cab of the machine. *Id.* at 5. Patent Owner argues that Petitioner's position ignores that the pin location is lower than the operator's feet and that the cab has a "cramped layout." *Id.* at 6; *see also id.* (providing Volpe's Fig. BB-1). Patent Owner adds that the operator must still leave the cab to place wooden spacers between the ground and cutting drum.

Citing our precedential decision in *Xerox Corp. v. Bytemark, Inc.*, Patent Owner argues that Mr. Orr's testimony should be given little or no weight. PO Sur-reply 7 (citing *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 (PTAB Aug. 24, 2022) (precedential)). Patent Owner characterizes Mr. Orr's testimony as "unsubstantiated" and "speculation." *Id.*

Patent Owner also argues that Petitioner's reliance on Dubai and arguments made in support of Ground 3, to support Petitioner's motivation argument—that the locking pin function should be automated—is foreclosed. PO Sur-reply 8 (citing *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348,

¹² Patent Owner first replies that "Petitioner belatedly argues that Caterpillar is collaterally estopped based on the decision in IPR2018-01201, but Petitioner never shows the requirements of collateral estoppel are satisfied." PO Sur-reply 4; *see* Pet. Reply 2 ("Caterpillar did not appeal these prior findings and is collaterally estopped from re-arguing them now."). Because we determine that Petitioner proves, by a preponderance of the evidence, that a person having ordinary skill in the art would have had reason to combine the teachings of Volpe and Piccoli as Petitioner proposes, we do not reach the collateral estoppel issue.

1356 (2018), providing that the Director must institute an *inter partes* review “[i]n accordance with’ or ‘in conformance to’ the petition”; Pet.

Reply 9–10).

Next, Patent Owner criticizes Petitioner’s argument that the modified machine could reposition the wheel when the machine is moving as a new argument and inconsistent with positions taken by Mr. Orr. PO Sur-reply 9.

Patent Owner replies that Petitioner’s argument that Exhibit 1014 is applicable to the problem of wheel scraping of the Volpe machine is conclusory and unsubstantiated, and that Mr. Orr’s “carbon-copy testimony” is entitled to little or no weight. PO Sur-reply 10. Patent Owner also criticizes Petitioner’s reliance on Dr. Klopp’s testimony, as it is directed to racing cars, not Volpe’s machine. *Id.*

Patent Owner also criticizes Petitioner’s reply argument that Volpe’s adjustable slides are ripe for automation as “belated and conclusory.” PO Sur-reply 11. Patent Owner clarifies that its argument directed to the adjustable slides was not limited to a teaching away argument, put also goes to considering the references teachings as a whole. *Id.* at 10–11.

Patent Owner also replies that its arguments apply bodily incorporation as Petitioner’s fault, as its obviousness theory is based on modifying Volpe’s machine. PO Sur-reply 11–12.

d) Conclusions

We find, on the complete trial record, that a person having ordinary skill in the art would have been motivated to combine Piccoli’s teachings with Volpe to automate moving Volpe’s rear wheel from the retracted position to the projected position. *See* Pet. 39.

(1) Motivation—automating Volpe’s pivoting the rear wheel support arm

With respect to Petitioner’s motivation to modify Volpe with Piccoli’s teachings of using an actuator to move Volpe’s rear wheel and lifting column from a retracted to projected position, we find that Petitioner’s reasoning is supported by rational underpinnings. *Cf. KSR Int’l Co.*, 550 U.S. at 418 (stating that, to facilitate the analysis of an obviousness position, the proponent should provide “some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”). Petitioner reasons that modifying Volpe using Piccoli’s teachings of using an actuator to move Volpe’s rear wheel and lifting column from a retracted to projected position would increase the efficiency and safety of moving the wheel. Pet. 39.

Prior art references support Petitioner’s reasoning. For example, Exhibit 1011, which discloses a scarifying machine similar to Volpe’s cold planar, states that manually moving its back wheel assembly from a projected to position to a retracted position “is awkward for the operator who is forced, in order to carry it out, to get out of the machine and to go on both sides of it to carry out the move of the wheel rotation.” Ex. 1011 ¶ 10 (cited at Pet. 38); Ex. 1014 ¶ 10 (same); *compare* Ex. 1011, code (57) (describing aspects of the machine), *with* Pet. 4–5 (describing Volpe’s retractable rear wheels).

In another example, Exhibit 1007 states that “the manual operation of displacing and locking or unlocking the pivotable wheel is somewhat uncomfortable for the operator, who is obliged to leave his seat and carry out the required operations manually.” Ex. 1007, 2:13–15 (cited at Pet. 38–39);

see id. at 1:13–2:15 (discussing Bitelli Volpe SF 100 T4M deep-cut cold planer for asphalt and concrete); *cf.* Ex. 1005, 2 (indicating that the manual is for the “VOLPE SF 100 T4”); Ex. 1003 ¶ 178 (“Volpe describes a cold planer with lifting columns associated with the rear wheels. The right rear wheel is configured to be positioned either in a retracted state or a projecting state with a pivotal connection to the machine’s frame (via the lifting column) with a single support arm.” (citing Ex. 1005, 2, 51, 65)).

Piccoli also suggests the modification. Piccoli expressly states that the *primary* use of shift cylinder 76 is to change the configuration of its machine by repositioning its leg assembly relative to the frame. Ex. 1006 ¶ 42 (cited at Pet. 39).

Mr. Orr testifies that “[m]anually adjusting the wheel position using muscle force on active job sites comprising slopes, rough terrain, or adjacent to traffic, is unsafe and ripe for improvement. In addition, the manual process requires tools and manipulation of a number of parts in these hazardous work environments.” Ex. 1003 ¶ 179. Mr. Orr supports his testimony with citations to Exhibits 1007, 1011, and 1014. *See id.* Mr. Orr adds that “[u]sing Piccoli’s cylinder to move Volpe Manual’s rear wheel would have automated the process of pivoting the lifting column, ultimately making the process ‘faster and safer for the operator.’” *Id.* ¶ 180 (citing Ex. 1011 ¶ 16); *cf.* Ex. 1011 ¶ 16 (stating that, by eliminating manually shifting the back wheels of the scarifying machine, the shifting is “faster and safer” for the operator). We credit this testimony, in part, because it is supported by, and consistent with, the cited evidence of record.

We find that Petitioner’s proposed modification to use Piccoli’s actuator to retract or project Volpe’s rear wheels is nothing more than

combining the teachings of known elements to yield predictable results. *See, e.g.*, Pet. 32 (illustrating Piccoli’s shift cylinder 76); Ex. 1006 ¶ 42 (“Shift cylinder 76 is used primarily to change the configuration of the machine by repositioning the leg assembly 24 relative to the frame.”); *cf. KSR Int’l Co.*, 550 U.S. at 416 (“The Court recognized that when a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result.”).

We have considered Patent Owner’s arguments and find, on the complete trial record, that the arguments and associated evidence do not outweigh Petitioner’s arguments and evidence. With respect to Patent Owner’s argument that the proposed modification makes Volpe’s machine less safe, because the operator has to climb in and out of the cap twice, we find that this argument fails to appreciate Petitioner’s contention. Petitioner contends that it is the manually moving the wheel structure that is unsafe and that, by automating that portion of the overall operation, that the operation will be safer. *See* Pet. 39 (contending that Piccoli’s teachings “overcome[s] the disadvantages of *manually pivoting and rotating the rear wheel*, thereby increasing the efficiency and the safety of moving the wheel between the projecting and retracted positions.” (emphasis added)); Ex. 1003 ¶ 179 (“*Manually adjusting the wheel position using muscle force* on active job sites comprising slopes, rough terrain, or adjacent to traffic, is unsafe and ripe for improvement. *In addition*, the manual process requires tools and manipulation of a number of parts in these hazardous work environments.” (emphasis added)). That is, it is the manual moving aspect of the operation that is replaced, making the overall process more efficient and safer.

To the extent that Patent Owner argues that, to have the requisite level of skill to testify as an expert, Mr. Orr had to acquire the skill level by the priority date of the '995 patent, we do not agree. *See* PO Resp. 19 (“[T]he Board should not credit this *ipse dixit* testimony, particularly given Mr. Orr’s lack of contemporaneous familiarity with the [person having ordinary skill in the art]’s perspective.”). Patent Owner does not direct us to any authority that requires an expert to have contemporaneous experience.

We acknowledge Patent Owner’s responsive arguments directed to the weight of the rear wheel, operator training, and multiple operators, but, as we do not rely on these rationales from Petitioner, we need not consider them further.

We have also considered Petitioner’s reply arguments and Patent Owner’s arguments in response. We do not rely on Petitioner’s additional arguments, Mr. Orr’s additional testimony, weighed against Patent Owner’s responses in finding that Petitioner provides, by a preponderance of the evidence, that a person having ordinary skill in the art would have been motivated to automate moving Volpe’s rear wheel. Petitioner’s additional arguments, for the most part, reply to Patent Owner’s responsive arguments to contentions upon which we do not rely. Likewise, because we do not rely on these additional reply arguments from Petitioner, Patent Owner’s associated arguments in its Sur-reply are of no moment.

(2) *Motivation – adding steering cylinder to Volpe’s rear wheels*

With respect to Petitioner’s motivation to modify Volpe with Piccoli’s teachings of a steering cylinder to pivot or steer the rear wheel, we find that Petitioner’s reasoning is supported by rational underpinnings. *Cf. KSR Int’l*

Co., 550 U.S. at 418. Petitioner reasons that a person having ordinary skill in the art would have made the modification to relieve rear wheel scraping through turns. Pet. 40.

Prior art references support Petitioner’s reasoning. For example, Exhibit 1014 states that “[o]ne limitation shown by the machine described in the aforementioned patent is that when the rear wheels or tracks are set in their retracted position inside the frame, when turning they scrape the ground with considerable resistance.” Ex. 1014 ¶ 12 (cited at Pet. 40). We find that the “aforementioned patent” is “a patent application having protocol number VI98U000098,” provided as Exhibit 1042. *See id.* ¶ 11; Pet. Reply 14 n.5. Exhibit 1042 describes “a milling machine equipped with retractable rear wheels.” Ex. 1042, 26.¹³ Based on our review of this exhibit, we find that the machine in Exhibit 1042 is comparable to the machine in *Volpe*, although the projection and retraction of the rear wheels has been automated. *See, e.g., id.* at 27 (“According to known embodiments, the positioning of the rear wheels, whether retracted or protruding from the frame, is manually carried out by the operator. . . . The present invention . . . creat[es] a . . . machine in which the operation of moving the rear wheels from the protruding position to the retracted position in relation to the frame occurs automatically.”).

Exhibit 1014 explains that providing steering capability for at least one rear wheel eliminates the problem of wheel scrape when the wheels are in a retracted position. Ex. 1014 ¶¶ 12, 14–15 (cited at Pet. 40). Relying on this supporting evidence, Mr. Orr testifies that a person having ordinary skill

¹³ Petitioner does not provide pagination for Exhibit 1042. Page 26 of the exhibit is labeled page “1” of the English translation.

in the art “would have . . . been motivated to combine the teachings of Piccoli’s steering actuator with Volpe to relieve such scraping through turns.” Ex. 1003 ¶ 180.

We find that Petitioner’s proposed modification to use Piccoli’s actuator to steer Volpe’s rear wheels is nothing more than combining the teachings of known elements to yield predictable results. *See, e.g.*, Pet. 34 (illustrating Piccoli’s steering cylinder 48); Ex. 1006 ¶ 42 (describing the positioning of steering cylinder 48, which moves track 49); *cf. KSR Int’l Co.*, 550 U.S. at 416 (“The Court recognized that when a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result.”).

We have considered Patent Owner’s arguments and find, on the complete trial record, that the arguments and associated evidence do not outweigh Petitioner’s arguments and evidence. As we state above, we find that Exhibit 1014 would sufficiently inform a person having ordinary skill in the art that wheel scraping would be an issue with Volpe’s machine, given the similarities between the machine of Exhibit 1014 and Volpe’s machine.

We also find Patent Owner’s argument directed to the Volpe’s adjustable slides inapposite, as it ignores that Petitioner’s modification would obviate the need to have the slides. Indeed, we understand Petitioner’s reasoning to include that a person having ordinary skill in the art would look to overcome the potential of wheel scraping introduced by “fixing the wheel’s orientation in a forward-facing direction” and “parallel to the frame.” *Cf.* PO Resp. 25–26. Patent Owner’s argument reduces to

that a person having ordinary skill in the art would not have had reason to *modify* Volpe as Petitioner proposes because Volpe does not do it that way.

We also agree with Petitioner that connecting the second actuator to the lifting column would have been within the level of ordinary skill, as illustrated by the prior art of record. *See, e.g.*, Ex. 1007 (discloses an articulation apparatus 10 for rotating a wheel or track about a vertical axis); Ex. 1026 (including a steering-assisting work cylinder for articulating wheels); Pet. Reply 19–20 (showing images from Exs. 1007, 1026). This prior art illustrates that a person having ordinary skill in the art, applying normal creativity, could implement Petitioner’s proposed modification.

2. *Petitioner’s reliance on Dubai*

Petitioner relies on Dubai in two asserted challenges—challenging claims 33 (Ground 3) and 61 (Ground 4). *See* Pet. 20. Patent Owner argues that “Petitioner relies on Dubai as an essential evidentiary foundation of Ground 1.” PO Resp. 12. Patent Owner argues that “Petitioner cannot show that Dubai supports a [person having ordinary skill in the art]’s understanding of Volpe when the petition never establishes a connection between Dubai and Volpe in the first place.” *Id.*

Petitioner replies that “the Petition simply refers to Dubai to support a [person having ordinary skill in the art]’s understanding of Volpe’s teaching.” Pet. Reply 5.

As we stated in our Institution Decision, the question we must answer in analyzing Petitioner’s reliance on Dubai in Ground 1 is “whether Dubai provides any evidentiary support to how a person having ordinary skill in the art would have understood what Volpe discloses.” Inst. Dec. 29.

Accordingly, we limit Petitioner’s reliance on Dubay in Ground 1 to this question.¹⁴

3. *Independent claim 18*

We now turn our analysis to the scope and content of the prior art and any differences between the prior art and the subject matter of independent claim 18, on a limitation-by-limitation basis.

a) *Preamble*

The preamble of claim 18 recites “[a] self-propelled machine.” Ex. 1001, 11:34. Petitioner contends that Volpe discloses a cold planer, which corresponds to the recited self-propelled machine. Pet. 26 (referencing Ex. 1005, 2, 65 (Fig. BB-1); Ex. 1007, 1:13–2:7; Ex. 1003 ¶¶ 147–149); *see also id.* (providing a figure from Volpe depicting Volpe’s cold planer). Petitioner also contends that Piccoli discloses a self-propelled machine. *Id.* at 27 (referencing Ex. 1006 ¶ 12; Ex. 1003 ¶¶ 147–149); *see also id.* (providing Figure 1 from Piccoli, depicting Piccoli’s exemplary machine).

Upon review of the information in the Petition and corresponding evidence, we find that Petitioner has proven, by a preponderance of the evidence, that the combination of Volpe and Piccoli teaches or suggests a self-propelled work machines.

Patent Owner does not dispute Petitioner’s contentions with respect to the preamble.

¹⁴ Patent Owner also states that Petitioner’s reliance on Dubay is “improper hearsay.” PO Resp. 12. Because Patent Owner did not file an objection to this evidence and a subsequent motion to exclude, as our rules require, we do not consider this argument. *See* 37 C.F.R. § 42.64.

b) The machine frame limitation

Claim 18 recites “a machine frame supportable by a plurality of ground engaging units.” Ex. 1001, 11:35–36 (the “machine frame” limitation of claim 18). Petitioner contends that Volpe discloses a machine frame supported by wheels. Pet. 27 (referencing Ex. 1005, 8 (providing “[f]rame serial number”), 16, 51, 65; Ex. 1003 ¶¶ 150–152); *see also id.* (providing annotated image from Volpe, indicating the frame and ground engaging units). Petitioner also contends that Piccoli teaches a machine with a frame supported by tracks. *Id.* at 28 (referencing Ex. 1006 ¶¶ 31–32; Ex. 1003 ¶ 151); *see also id.* (providing annotated version of Piccoli’s Figure 1, indicating the frame, a ground engaging unit, a support device, and a lifting column).

Upon review of the information in the Petition and corresponding evidence, we find that Petitioner has proven, by a preponderance of the evidence, that the combination of Volpe and Piccoli teaches or suggests the subject matter of the machine frame limitation of claim 18.

Patent Owner does not dispute Petitioner’s contentions with respect to this limitation.

c) The support device limitation

Claim 18 also recites “a support device connected between said machine frame and at least one of said ground engaging units, said support device including a lifting column having a lifting column axis and being adapted to controllably raise and lower said at least one ground engaging unit about said axis relative to said machine frame.” Ex. 1001, 11:37–42 (the “support device” limitation of claim 18). Petitioner contends that

Volpe's swing arm and lifting column correspond to the recited support device. Pet. 29.

Petitioner explains that Volpe's "sliding support" (which Petitioner contends corresponds to the recited lifting column) is connected to a wheel and allows the operator to lower the machine. Pet. 29 (referencing Ex. 1005, 23, 32, 51, 65; Ex. 1003 ¶¶ 153–158); *see also id.* at 30 (providing an annotated image from Volpe indicating the frame, lifting column, ground engaging unit, swing arm, support device, and pivot motion).

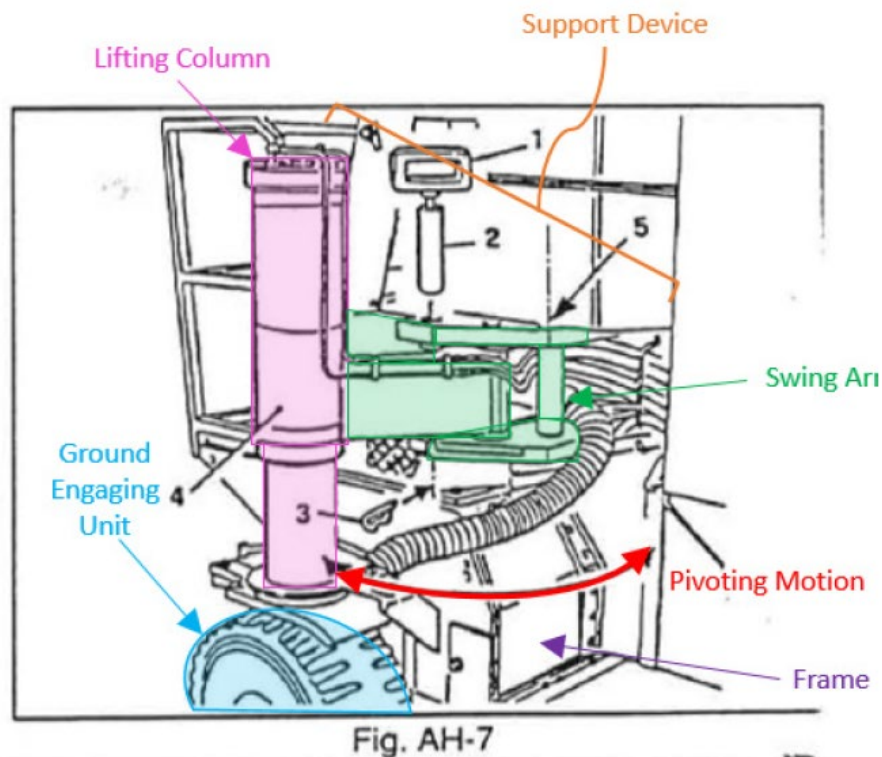
Petitioner contends that Piccoli discloses a similar device. Pet. 30; *see also id.* at 31 (providing an annotated version of Piccoli's Figures 2 and 3, indicating the lifting column, frame, and support device).

Patent Owner argues that "the [P]etition never attempts to show the applied references teach a support device 'including a lifting column,' let alone a lifting column 'having a lifting column axis' and adapted to raise and lower the ground engaging unit 'about said axis relative to said machine frame,'" as required by this limitation. PO Resp. 8. Patent Owner argues that Petitioner does not allege that Volpe discloses a support device that "includ[es] a lifting column." *Id.* Patent Owner continues that the Petition indicates that Volpe's lifting column is "connected to" the swing arm. *Id.*

Patent Owner argues that "Petitioner also fails to explain how the alleged lifting column has 'a lifting column axis' and is adapted to raise and lower the ground engaging unit 'about said axis relative to said machine frame.'" PO Resp. 8. Patent Owner adds that "Petitioner's conclusory discussion of Piccoli's purported support device and lifting column does not remedy these deficiencies." *Id.* at 9.

Petitioner replies that an annotated version of Volpe’s Figure AH-7 “identified both the ‘swing arm’ (green) and ‘lifting column’ (pink) as part of the ‘support device’ (indicated by orange bracket).” Pet. Reply 3 (citing Pet. 29–30). Petitioner adds that Mr. Orr testifies that, based on the disclosure in Volpe, a person having ordinary skill in the art would understand that the sliding support (the alleged lifting column), meets the recited lifting column. *Id.* at 4 (referencing Ex. 1003 ¶¶ 153–158; Ex. 1005, 51, 65).

We find, on the complete trial record, that Petitioner proves, by a preponderance of the evidence that the combination of Volpe and Piccoli teaches or suggests the subject matter of the “support device” element of claim 18. We reproduce Petitioner’s annotated image of Figure AH-7 from Volpe, below.



Pet. 30. Figure AH-7 depicts an image of Volpe's right rear wheel.

Ex. 1005, 51. Petitioner adds annotations labeling and coloring components of the structure, including a ground engaging unit (blue), lifting column (pink), and swing arm (green), and indicates the pivoting arc of the wheel (red). The image also includes a bracket (in orange) spanning the lifting column and swing arm and labeled support device.

As can be seen from this image, the swing arm is connected to the lifting column, such that the support structure, bracketed in orange, includes a lifting column. We understand that the Petitioner states that a person having ordinary skill in the art "would have understood that Volpe's *swing arm* was the recited 'support device.'" Pet. 29 (emphasis added). The Petition continues, however, and states that a person having ordinary skill in the art "would have thus understood that Volpe's sliding support was the *recited lifting column*." *Id.* (emphasis added). That is, the Volpe's sliding support is included in the support device and has a lifting column axis and is adapted to controllably raise and lower the at least one ground engaging unit about the axis relative to said machine frame, as *recited* in the claim. Petitioner's statement in the Petition makes it clear that Petitioner contends that Volpe's sliding support, the lifting column, is included as part of the support device. And the annotated version of Figure AH-7 further supports this understanding, as the orange bracket, labeled "Support Device," brackets both the swing arm and lifting column. *See also* Ex. 1003 ¶ 154 (testifying that a person having ordinary skill in the art would have understood that Volpe discloses a support device "in the form of a swing arm and lifting column," based, at least in part, on the annotated version of Figure AH-7 (referenced at Pet. 29)).

We also find that Volpe teaches or suggests that its sliding support, the alleged lifting column, is adapted to controllably raise and lower a ground engaging unit about the lifting column's axis relative to said machine frame. We credit Mr. Orr's testimony that Volpe's sliding supports extend and retract, acting as lifting columns to raise and lower the wheel relative to the machine frame. Ex. 1003 ¶ 155. We credit this testimony, in part, because it is consistent with other evidence on record and consistent with our reading of Volpe. *See, e.g.*, Ex. 1007 (providing a milling machine similar to Volpe's machine and including lifting column 32, including inside column 132 slidably mounted inside column 133 and attached to support arm 11); Ex. 1041, 113:18–116:12 (providing Patent Owner's declarant's deposition testimony on Volpe's support 4).

We also find that Volpe's sliding support, the alleged lifting column, has a lifting column axis. As seen in the annotated Figure AH-7, above, the sliding support is shaped like a vertical column. A vertical column would have a vertical axis. It is not fatal to Petitioner's position, as Patent Owner appears to argue, that Petitioner did not label the axis. This understanding can be derived from the Petition's explanation of how Volpe's sliding support operates—that the “sliding supports allow an operator to ‘[l]ower the machine.’” Pet. 29 (referencing Ex. 1005, 23, 32); *see also* Ex. 1005, 51 (describing lowering the machine to retract the right rear wheel (referenced on Pet. 29)).

Accordingly, upon review of the information in the Petition and corresponding evidence, and Patent Owner's counter arguments and evidence, we find that Petitioner has proven, by a preponderance of the

evidence, that the combination of Volpe and Piccoli teaches or suggests the subject matter of the “support device” limitation of claim 18.

d) The first actuator limitation

Claim 18 also recites “a first actuator connected to said support device and adapted to move said at least one ground engaging unit between projecting and retracted positions relative to said machine frame.” Ex. 1001, 11:43–46 (the “first actuator” limitation of claim 18). Petitioner contends that Piccoli’s shift cylinder 76 corresponds to the recited first actuator. Pet. 32 (referencing Ex. 1006 ¶¶ 31, 42; Ex. 1003 ¶¶ 159–165). Petitioner contends that a person having ordinary skill in the art “would have been motivated to combine the teachings of Piccoli’s shift cylinder with Volpe . . . resulting in a hydraulic cylinder connected to Volpe’s frame and support arm to move the support arm relative to the frame to pivot Volpe’s wheel between the retracted and projecting positions.” *Id.* at 33 (referencing Ex. 1003 ¶¶ 178–180).

Upon review of the information in the Petition and corresponding evidence, including Petitioner’s reasons for modifying Volpe with Piccoli’s teachings, we find that Petitioner has proven, by a preponderance of the evidence, that the combination of Volpe and Piccoli teaches or suggests the subject matter of the “first actuator” limitation of claim 18.

Patent Owner does not dispute Petitioner’s contentions with respect to this limitation.

e) The second actuator limitation

Claim 18 further recites “a second actuator connected to said lifting column and adapted to cause at least a portion of said lifting column to rotate about said lifting column axis relative to said machine frame.”

Ex. 1001, 11:47–50 (the “second actuator” limitation of claim 18).

Petitioner contends that Piccoli’s steering cylinder 48 corresponds to the recited second actuator. Pet. 33 (referencing Ex. 1006 ¶¶ 39, 40; Ex. 1003 ¶¶ 166–172); *see also id.* at 34 (providing an annotated version of Piccoli’s Fig. 3, identifying the second actuator and lifting column). Petitioner contends that the proposed modification “result[s] in a hydraulic cylinder connected to Volpe’s lifting column to rotate the lifting column’s inner tube and rear wheel.” *Id.* at 34 (referencing Ex. 1003 ¶¶ 178–180).

Upon review of the information in the Petition and corresponding evidence, including Petitioner’s reasons for modifying Volpe with Piccoli’s teachings, we find that Petitioner has proven, by a preponderance of the evidence, that the combination of Volpe and Piccoli teaches or suggests the subject matter of the “second actuator” limitation of claim 18.

Patent Owner does not dispute Petitioner’s contentions with respect to this limitation.

f) The spaced apart limitation

Finally, claim 18 recites “said second actuator being positioned at a location linearly spaced apart from said first actuator along said lifting column axis.” Ex. 1001, 11:50–52 (the “spaced apart” limitation of claim 18). Petitioner contends that the combined teachings of Volpe and Piccoli teach this limitation. Pet. 34 (referencing Ex. 1003 ¶¶ 173–177). Petitioner contends that Piccoli shows its steering cylinder 48 spaced apart from shift cylinder 76 along the vertical axis of lifting column 50. *Id.* at 34–35 (referencing Ex. 1006 ¶¶ 40–42; Ex. 1003 ¶¶ 174–176); *see also id.* at 35 (providing an annotated version of Piccoli’s Fig. 3, identifying the

frame, first and second actuators, and lifting column, and identifying the vertical separation of the actuators).

Petitioner contends that

Piccoli teaches rotating the *lower* inner tube of the lifting column to rotate its wheel and positioning the shift cylinder along the lifting column's outer tube, which is disposed *above* the rotating assembly that connects the steering cylinder to the inner tube of the lifting column. . . . in combining the teachings of Piccoli with Volpe, a [person having ordinary skill in the art] would have coupled a steering cylinder to the inner tube of Volpe's lifting column to rotate the rear wheel and would have positioned a shift cylinder at an axis extending through the outer tube of Volpe's lifting column such that the shift cylinder is linearly spaced apart from the steering cylinder along the lifting column axis . . . allow[ing] the first and second actuators to fully extend and retract without interference.

Pet. 35–36 (referencing Ex. 1006 ¶¶ 39, 41; Ex. 1003 ¶¶ 174–177); *see also id.* at 36 (providing an annotated version from Volpe, identifying the inner and outer tubes of the lifting column).

Upon review of the information in the Petition and corresponding evidence, including Petitioner's reasons for modifying Volpe with Piccoli's teachings, we find that Petitioner has proven, by a preponderance of the evidence, that the combination of Volpe and Piccoli teaches or suggests the subject matter of the "spaced apart" limitation of claim 18.

Patent Owner does not dispute Petitioner's contentions with respect to this limitation.

g) Conclusion

For the reasons discussed above, we conclude, on the complete trial record, that Petitioner proves, by a preponderance of the evidence,

that claim 18 is unpatentable under 35 U.S.C. § 103 over the combination of Volpe and Piccoli.

4. *Dependent claims 29–31*

a) *Claims 29 and 30*

Claim 29 depends from claim 18 and recites “wherein said support device includes a swing arm having a first end portion connected to said machine frame and a second end portion connected to said lifting column.” Ex. 1001, 12:39–42. Claim 30 depends from claim 29 and recites “wherein said first actuator is a linear actuator having a first end connected to said machine frame and a second end connected to said swing arm.” *Id.* at 12:43–46. Patent Owner disputes Petitioner’s contentions with respect to claim 30. PO Resp. 28–30. Because claim 30 depends from claim 29, we begin our analysis there.

Petitioner contends that Volpe teaches a support device that includes a swing arm connected to the machine frame and the lifting column. Pet. 42–43; *see id.* at 43 (providing an annotated version of Volpe’s Figure AH-7 showing the swing arm, lifting column, frame, and the first and second ends of the swing arm connected to the lifting column and frame). Upon review of the information in the Petition and corresponding evidence, including Petitioner’s reasons for modifying Volpe with Piccoli’s teachings, we find that Petitioner has proven, by a preponderance of the evidence, that the combination of Volpe and Piccoli teaches or suggests the subject matter of claim 29. Patent Owner does not dispute these contentions.

With respect to claim 30, Petitioner contends that Piccoli teaches that its shift cylinder 76, which we find to be the first actuator, is pivotally mounted to the frame of Piccoli’s machine through lug 90 and pin 91.

Pet. 43. Petitioner contends that, based on this teaching, a person having ordinary skill in the art would have attached the end of the first actuator to Volpe’s machine, in view of Petitioner’s proposed modification. *Id.*

Petitioner continues that, although Piccoli teaches the other end of its shift cylinder to the outer tube of Piccoli’s lifting column, a person having ordinary skill in the art “would have found it obvious to connect the rod end of the shift cylinder to Volpe’s swing arm, not the lifting column.”

Pet. 43–44 (referencing Ex. 1003 ¶¶ 188–192). Petitioner contends that a person having ordinary skill in the art would have understood that connecting the shift cylinder to the swing arm instead of the lifting column “would provide a more compact arrangement, while generating enough leverage to pivot Volpe’s swing arm and position its wheel in the retracted and projecting positions.” *Id.* at 44 (referencing Ex. 1003 ¶¶ 188–192).

With respect to modifying Piccoli’s teachings of attaching one end of the actuator to the swing arm, rather than the lifting column, Mr. Orr testifies that a person having ordinary skill in the art “would have found it obvious to connect the rod end of the shift cylinder to either Volpe’s swing arm.”

Ex. 1003 ¶ 191. Mr. Orr adds that a person having ordinary skill in the art “would have understood that connecting the shift cylinder’s rod end to Volpe’s swing arm would provide a more compact arrangement with a shorter shift cylinder, while still generating enough leverage to pivot Volpe’s swing arm over the angle necessary to position its wheel in the retracted and projecting positions.” *Id.* Mr. Orr does not provide any additional support for this testimony.

Patent Owner argues that Petitioner’s contentions are “pure hindsight” and that Mr. Orr’s testimony is “conclusory” and “essentially just a carbon

copy of the petition’s conclusory argument.” PO Resp. 28–29. Patent Owner argues that Mr. Orr. Does not cite to any supporting evidence nor provide support for the assertion that the modification would still provide sufficient leverage to move Volpe’s leg. *Id.* at 29.

Petitioner replies that Patent Owner is improperly treating a person having ordinary skill in the art as an automaton. Pet. Reply 22. Petitioner explains that Piccoli attaches the actuator to the lifting column “to achieve its secondary purpose of supplementing steering.” *Id.* (referencing Ex. 1006 ¶ 51). Petitioner argues that its proposed modification uses Piccoli’s shift cylinder for its primary purpose only—to change the configuration of the machine’s leg.

Petitioner argues that a person having ordinary skill in the art “would have understood the shift cylinder does *not* need to be connected to the lifting column to simply reposition Volpe’s rear wheel.” Pet. Reply 22 (referencing Ex. 1040 ¶¶ 61–63). Petitioner notes that state-of-the-art references, such as Dubay provide a similar configuration. *Id.* (referencing Ex. 1007, 9:1–11, Figs, 2, 3). Petitioner concludes that armed “[w]ith this background knowledge, a POSITA would have been motivated to attach the shift cylinder to Volpe’s arm to provide “a more compact arrangement.” *Id.* (citing Pet. 44; Ex. 1003 ¶¶ 188–192; Ex. 1040 ¶ 63).

Patent Owner replies that Petitioner improperly attempts to supplement the Petition and change its motivation for the proposed modification. PO Sur-reply 14–15. Patent Owner also argues that Petitioner misreads Piccoli, which does not distinguish between the primary and secondary purposes for shift cylinder 76. *Id.*

We find that Petitioner does not prove, by a preponderance of the evidence, that a person having ordinary skill in the art would have modified Piccoli's teachings to connect the second end of the first actuator to the swing arm as required by claim 30. In the Petition, the only evidence to support its modification is *conclusory* testimony from Mr. Orr. This testimony is accorded no weight. *See Xerox Corp.*, IPR2022-00624, Paper 9.

With respect to Petitioner's reliance on Dubay as state-of-the-art evidence (for the first time in the Reply), we agree with Patent Owner that this argument is an improper new argument. In determining whether an argument is a proper argument in reply, we look to see if the Reply argument is responsive to an argument from Patent Owner and expands on a position in the Petition. *See Rembrandt Diagnostics, LP v. Alere, Inc.*, 76 F.4th 1376, 1384 (Fed. Cir. 2023) ("[W]e have held that a reply may be proper if it is responsive and simply expands on previously raised arguments."). Or, if Petitioner relies on previously unidentified disclosure "to make a meaningfully distinct contention." *Id.* at 1383 ("[W]e held that a petitioner who asserted in its reply previously unidentified prior-art disclosures 'to make a meaningfully distinct contention' was impermissibly raising a new theory of unpatentability."). We find that Petitioner's argument in reply is closer to the later situation.

Here Petitioner does not expand on a position from the Petition that Patent Owner criticizes based on the merits of the contentions. Instead, Petitioner supplements its contentions by arguing that the linear actuator does not have to be attached to the lifting column to retract and extend Volpe's leg assembly, and by citing to Dubay when Patent Owner argues that

Petitioner provides no supporting evidence for its contentions. These responses are the type of “meaningfully distinct contention[s]” that signal that Petitioner is augmenting deficient contentions in the Petition with new arguments.

Accordingly, upon review of the information in the Petition and corresponding evidence, including Petitioner’s reasons for modifying Volpe with Piccoli’s teachings, and Patent Owner’s arguments, we find that Petitioner has not proven, by a preponderance of the evidence, that the combination of Volpe and Piccoli teaches or suggests the subject matter of claim 30.

b) Claim 31

Claim 31 depends from claim 18. *See* Ex. 1001, 12:47–49. Petitioner provides citations to evidence of record, including Volpe and Mr. Orr’s testimony on how the combination of Volpe and Piccoli teaches or suggests the subject matter of claim 31. Pet. 44–45.

Upon review of the information in the Petition and corresponding evidence, including Petitioner’s reasons for modifying Volpe with Piccoli’s teachings, we find that Petitioner has proven, by a preponderance of the evidence, that the combination of Volpe and Piccoli teaches or suggests the subject matter of claim 31. Patent Owner does not dispute Petitioner’s contentions with respect to this claim, other than the arguments made with respect to claim 18, which we address above.

5. Conclusions, Ground 1

Based on the analysis above, we conclude that Petitioner has proven, by a preponderance of the evidence, that claims 18, 29, and 31 are unpatentable under 35 U.S.C. § 103 over the combination of Volpe and

Piccoli. We also conclude that Petitioner has not proven, by a preponderance of the evidence, that claim 30 is unpatentable under 35 U.S.C. § 103 over the combination of Volpe and Piccoli.

E. Ground 2: Claims 21–27, 32, 35, 45, 49–55, 57–60, and 63 as unpatentable over Volpe, Piccoli, and Skotnikov

Petitioner contends that the combined teachings of Volpe, Piccoli, and Skotnikov render obvious the subject matter of claims 21–27, 32, 35, 45, 49–55, 57–60, and 63. Pet. 20. Patent Owner disputes Petitioner’s contentions with respect to independent claim 45 and dependent claims 25, 49, 51, 53, and 63. We address these arguments first, then turn to the other claims in this Ground.

1. Independent claim 45 – means-plus-function elements
a) Second actuatable means

Claim 45 recites, in relevant part, a “second actuatable means for rotating said at least one ground engaging unit.” Ex. 1001, 14:42–43 (the “second actuatable means” limitation of claim 45). Petitioner contends that this element “is similar to [the second actuator element of claim 18] . . . [and] Piccoli discloses the recited second actuatable means in the form of a steering cylinder.” Pet. 47.

Patent Owner argues that Petitioner identifies the corresponding structure of this means-plus-function term as a rotary actuator, but the Petitioner maps this element to a linear actuator. PO Resp. 31. We have considered this argument and determine it does not identify a deficiency in Petitioner’s position. As we conclude in our claim construction analysis above, we construe the corresponding structure for this term to be a rotary or a linear actuator. Accordingly, we find that Petitioner’s identification of

Piccoli's steering cylinder satisfies the second actuatable means claim limitation.

b) Controller means

Claim 45 also recites, in relevant part, a “controller means for coordinating the actuation of said first and second actuatable means.” Ex. 1001, 14:48–50 (the “controller means” limitation of claim 45). Petitioner contends that “Skotnikov discloses the controller recited in element [45.6] in the form of a control circuit operatively connected to first and second actuators.” Pet. 49 (referencing Ex. 1003 ¶¶ 230–233); *see id.* at 49–50 (explaining Skotnikov's relevant disclosure (referencing Ex. 1008, 4:50–55, 5:2–4, 5:34–36, Fig. 6); *see also id.* at 50–53 (addressing motivation to combine Skotnikov with Volpe and Piccoli, and reasonable expectation of success). Petitioner concludes that a person having ordinary skill in the art “would have understood that Skotnikov's control circuit 164 is adapted to coordinate control of a first actuator (i.e., rotatable assembly 114) for swinging an articulation unit relative to a chassis frame and a second actuator (i.e., rotatable assembly 115) for controlling orientation of a wheel.” *Id.* at 50 (referencing Ex. 1003 ¶¶ 230–233).

Patent Owner argues that Petitioner “fails to identify corresponding structure for the ‘controller means.’” PO Resp. 34. Patent Owner adds that Petitioner does not attempt to rebut the presumption that the term is a means-plus-function term. *Id.*; *cf.* Pet. 16–20 (addressing claim construction for claim 45, but not for the “controller means” term). Patent Owner argues that, as such, Petitioner cannot demonstrate unpatentability of claim 45. PO Resp. 34.

Petitioner replies that, in addressing dependent claims 53 and 60, it identified the corresponding structure for the “controller means” term. Pet. Reply 25 (citing Pet. 63–64, 70–71, 74–76 and referencing Ex. 1040 ¶¶ 69–70). Petitioner directs us to a Board decision in *American National Manufacturing Inc. v. Sleep Number Corp.*, where “the Board noted that ‘ANM’s Petition does not expressly state that “pressure sensing means” [of claim 20] should be construed as a means-plus-function limitation’ but still determined that ANM’s Petition ‘fairly meets the requirements of Section 42.104(b)(3)’ by referencing the subject matter of claim 3, which recited the corresponding structure.” *Id.* at 25–26 (citing *American National Manufacturing Inc. v. Sleep Number Corp.*, IPR2019-00500, Paper 114 at 22–24 (PTAB Sept. 30, 2020), *Microchip Technology Inc. v. HD Silicon Solutions LLC*, IPR2021-01089, Paper 8 at 6–8 (PTAB Jan. 10, 2022), *Realtime Data, LLC*, 912 F.3d at 1371).

Petitioner argues that, like *American National Manufacturing*, it identified structure in a dependent claim, so “the Petition addressed and established obviousness of the [means-plus-function] claim elements.” Pet. Reply 26 (citing *Callaway Golf Co. v. Acushnet Co.*, 576 F.3d 1331, 1344 (Fed. Cir. 2009) (“A broader independent claim cannot be nonobvious where a dependent claim stemming from that independent claim is invalid for obviousness.”)).

Petitioner argues that claim 60 recites “said controller means includes a programmable logic device connected to a memory device.” Pet. Reply 27. Petitioner argues that the “the structure recited in claim 60 corresponds to the structure disclosed in the specification of the ’995 patent.” *Id.* Petitioner argues that “[i]n showing how the Volpe-Piccoli-

Skotnikov combination disclosed the recited ‘programmable logic device’ and ‘memory device,’ of claim 60, the Petition also addressed the structure corresponding to the recited ‘controller means’ of claim 45.’” *Id.* at 28 (referencing Ex. 1040 ¶ 71).

Patent Owner replies that “the [P]etition’s discussion of claim[] . . . 60 does not even mention the ’995 specification, let alone identify the structure in the specification corresponding to the recited functions for the ‘controller means.’” PO Sur-reply 18–19. Patent Owner adds that “the [P]etition expressly removes the term ‘means’ when discussing the claim language.” *Id.* at 19; *see also id.* at 19–22 (distinguishing Petitioner’s cited Board and Federal Circuit cases). Patent Owner also argues that Petitioner uses the Reply to backfill the Petition, identifying the corresponding structure for the “controller means” for the first time in the Petitioner Reply. *Id.* at 22.

“[A] challenger who seeks to demonstrate that a means-plus-function limitation was present in the prior art must prove that the corresponding structure—or an equivalent—was present in the prior art.” *Fresenius USA, Inc. v. Baxter Int’l, Inc.*, 582 F.3d 1288, 1299 (Fed. Cir. 2009). We find that Petitioner has not met its burden to prove unpatentability by failing to identify corresponding structure for the controller means in the Specification of the ’995 patent.

Petitioner’s reliance on its analysis of dependent claim 60 is not persuasive. First, the Petition treats claims 32 and 60 as reciting the same subject matter. *See* Pet. 70. As Patent Owner argues, the Petition removes the word “means” from the recitation of the subject matter of the claims. *See id.* As such, the Petition does not tie its analysis for claims 32 and 60 to the controller means limitation of claim 45.

Second, even if we consider the analysis of claims 32 and 60, the plain language of claim 60 is that the controller means *includes* a programmable logic device connected to a memory device. Ex. 1001, 16:16–18. The claim language does not state that the controller means *is* a programmable logic device connected to a memory device. The word “includes” indicates that it is part of larger whole.

The Board decisions and Federal Circuit case law upon which Petitioner relies are distinguishable. As for *American National Manufacturing*, a non-precedential case from the Board, the petitioner is that case *specifically referenced* its analysis in dependent claim 3 for the means-plus-function limitation at issue, which the Board credited. *See American National Manufacturing Inc.*, IPR2019-00500, Paper 114 at 23.¹⁵ No such cross-reference is made in this case.

In *Microchip Technology Inc.*, the Petitioner did not provide specific means-plus-function claim construction analyses, even though the petition identified certain terms as containing means-plus-function terms. *Microchip Technology Inc.*, IPR2021-01089, Paper 8 at 6–7. The panel, applying the more flexible institution standard, noted that the petition at issue, “in its comparison of [the prior art] to element [1.b], [p]etitioner identifies structures from the ’299 patent’s specification that correspond to the claimed ‘connecting means,’ including switches which [p]etitioner

¹⁵ Even with the specific reference in *American National Manufacturing*, which is not present here, the panel in that case stated that “the Petition and the relevant reference to claim 3 of the ’154 patent at page 54 is not as express as one would hope with respect to complying with our rule.” *American National Manufacturing Inc.*, IPR2019-00500, Paper 114 at 23.

contends are controlled gate structures.” *Id.* at 7. Petitioner does not make such comparison of structure from the ’995 patent here.

In *Realtime Data*, the case did not involve a means-plus-function claim limitation. *Realtime Data LLC*, 912 F.3d at 1371. As such, it is inapposite. Similarly, *Callaway Golf Co.* is inapposite. That case deals with an inconsistent jury verdict, where a dependent claim was found invalid, but not a broader independent claim. *Callaway Golf Co.*, 576 F.3d at 1344. We make no such inconsistent conclusions here.

Accordingly, for the reasons discussed above, we conclude that Petitioner has not proven, by a preponderance of the evidence, that independent claim 45 is unpatentable under 35 U.S.C. § 103 over the combination of Volpe, Piccoli, and Skotnikov.

2. *Dependent claims 21, and 23–25*

Patent Owner disputes Petitioner’s contentions with respect to dependent claim 25. PO Resp. 37–40. Dependent claim 25 ultimately depends from independent claim 18, through a chain of dependent claims. Claim 21 depends from claim 18, claim 23 depend from claim 21, claim 24 depends from claim 23, and claim 25 depends from claim 24. *See* Ex. 1001, 11:60–12:20. Accordingly, we address the relevant limitations in the claims upon which claim 25 depends.

Claim 21 recites, in relevant part, “at least a rotation sensor adapted to produce an alignment signal indicative of the rotational position of said at least one ground engaging unit relative to said machine frame, said rotation sensor being connected to deliver said alignment signal to said controller.” Ex. 1001, 11:60–67. Petitioner contends that “Skotnikov discloses this limitation in the form of a sensor 155 coupled to an actuator and configured

to monitor the angular position of its corresponding wheel.” Pet. 56 (referencing Ex. 1008, 4:4–8; Ex. 1003 ¶¶ 253–255). Petitioner references its reasoning associated with claims 45 and 49 for why a person having ordinary skill in the art would have been motivated to modify Volpe and Piccoli with the teachings of Skotnikov. *Id.* Upon review of the information in the Petition and corresponding evidence, including Petitioner’s reasons for modifying Volpe and Piccoli with Skotnikov’s teachings, we find that Petitioner has proven, by a preponderance of the evidence, that the combination of Volpe, Piccoli, and Skotnikov teaches or suggests the subject matter of claim 21. Patent Owner does not dispute these contentions.

Claim 23 recites “a pivot sensor adapted to produce a position signal indicative of the position of said at least one ground engaging unit relative to said machine frame between said projecting and retracted positions, said pivot sensor being connected to deliver said position signal to said controller.” Ex. 1001, 12:6–11. Petitioner contends that Skotnikov discloses coupling a sensor 154 to the rotatable assembly 114, which corresponds to the recited pivot sensor. Pet. 58 (referencing Ex. 1008, 3:67–4:4; Ex. 1003 ¶¶ 260–273); *see also id.* at 59 (providing an annotated version of Skotnikov’s Figure 6 showing sensor 154), *id.* at 59–61 (providing motivation to combine Skotnikov’s teachings with Volpe and Piccoli and discussing reasonable expectation of success). Upon review of the information in the Petition and corresponding evidence, including Petitioner’s reasons for modifying Volpe and Piccoli with Skotnikov’s teachings, we find that Petitioner has proven, by a preponderance of the evidence, that the combination of Volpe, Piccoli, and Skotnikov teaches or

suggests the subject matter of claim 23. Patent Owner does not dispute these contentions.

Claim 24 recites “wherein said controller receives said alignment signal from said rotation sensor and said position signal from said pivot sensor and responsively coordinates the actuation of said first and second actuators in a predetermined manner.” Ex. 1001, 12:12–16. Petitioner contends that “Skotnikov discloses configuring the control circuit 164 to ‘monitor[] the distance between wheels 108a, 108b via feedback from position sensors 154 and 155 and [to] calculate[] any error in the wheel width.’” Pet. 61 (quoting Ex. 1008, 5:11–15) (alterations in original); *see id.* at 61–62 (explaining how Skotnikov uses signals from sensors 154 and 155 to properly align the wheel). Upon review of the information in the Petition and corresponding evidence, including Petitioner’s reasons for modifying Volpe and Piccoli with Skotnikov’s teachings, we find that Petitioner has proven, by a preponderance of the evidence, that the combination of Volpe, Piccoli, and Skotnikov teaches or suggests the subject matter of claim 24. Patent Owner does not dispute these contentions.

Claim 25 recites “wherein said rotation sensor is a rotary sensor associated with said second actuator, and said pivot sensor is a linear sensor associated with said first actuator.” Ex. 1001, 12:17–20. Petitioner contends that “Skotnikov discloses that ‘[s]ensor 155 is coupled to rotatable assembly 115 . . . to sense the angular position of rotatable assembly 115,’ which includes a rotatable shaft 147 for steering wheel 108.” Pet. 63 (quoting Ex. 1008, 3:48–51, 4:4–8) (alteration in original). Petitioner concludes that a person having ordinary skill in the art would have understood that Skotnikov’s sensor 155 was the recited ‘rotary sensor’

because sensor 155 is configured to detect the angular position of a rotary actuator—Skotnikov’s rotatable assembly 115.” *Id.* (referencing Ex. 1003 ¶¶ 286–294).

Next, Petitioner contends that “Skotnikov discloses that ‘[s]ensor 154 is coupled to rotatable assembly 11 . . . to sense the angular position of rotatable assembly 114.’” Pet. 64 (quoting Ex. 1008, 3:67–4:4) (alteration in original). Petitioner adds that “Skotnikov discloses that rotatable assembly 114 can be a hydraulic cylinder and teaches to use a cylinder position sensor ‘to provide a cylinder position signal representative of a position of . . . a hydraulic cylinder . . . to the control circuit.” *Id.* (quoting Ex. 1008, 3:53–55, 4:10–12) (alteration in original).

Petitioner concludes that, “when combining Skotnikov’s sensor 154 with the hydraulic cylinder implemented in Volpe’s modified machine, a [person having ordinary skill in the art] would have found it obvious to configure sensor 154 as a linear sensor to detect the linear displacement of hydraulic cylinder.” Pet. 64 (referencing Ex. 1003 ¶¶ 286–294); *see also id.* (“And a [person having ordinary skill in the art] would have been motivated to combine the teachings of Skotnikov with Volpe and Piccoli and would have had a reasonable expectation of success in doing so for the reasons discussed in claims 45 *and* 21.” (emphasis added)).

Patent Owner argues that Petitioner’s analysis is internally inconsistent, such that it does not demonstrate that the combination teaches the recited rotary sensor. PO Resp. 38. Patent Owner argues that “Petitioner’s discussion of the “rotary sensor” points to Skotnikov’s sensor 155 *in isolation* without even alleging that the proposed combination satisfies the claims as a whole.” *Id.* at 39. Patent Owner argues that, under

Petitioner’s proposed modification, the second actuator is a linear actuator, and Skotnikov’s sensor 155 is associated with a rotary actuator. Patent Owner argues that, extending Petitioner’s argument as to why sensor 154 is a linear sensor, sensor 155 should be a linear sensor in the modified combination. *Id.* at 35–36.

Petitioner replies that, as Mr. Orr testified, a person having ordinary skill in the art “would have known to couple Skotnikov’s sensor 155 to the second actuator implemented in Volpe’s modified machine or at a rotational coupling assembly implemented on Volpe’s lifting column to correlate rotational movement of the lifting column to wheel orientation.”

Pet. Reply 23 (referencing Ex. 1003 ¶ 293; Ex. 1040 ¶ 67) (emphasis omitted).

Petitioner argues that “[i]mplementing a rotary sensor with a linear actuator to detect rotational movement is well within the level of ordinary skill in the art, as evidenced by Dubay.” Pet. Reply 23 (referencing Ex. 1040 ¶ 68; Ex. 1007, 8:24–28); *see id.* at 23–24 (explaining Dubay’s disclosure and stating “[l]ike Dubay’s detector 36, Skotnikov’s sensor 155 would have similarly been used to detect rotary movement associated with the coupling element of a linear actuator, such as the steering cylinder in the Volpe-Piccoli combination”).

Patent Owner replies that Petitioner’s reply argument is a new argument that we should disregard. PO Sur-reply 26.

We find that Petitioner has proven, by a preponderance of the evidence that the combination of Volpe, Piccoli, and Skotnikov teaches or suggests the subject matter of claim 25. Petitioner points to Skotnikov’s

sensor 155 as the recited rotary sensor. Pet. 63. Petitioner had already identified the second actuator as a linear actuator. *Id.* at 33.

Petitioner next directs us to its reasons for combining Skotnikov’s teachings with Volpe and Piccoli—the reasons discussed to claim 21 (from which claim 25 depends). Pet. 64. Petitioner’s analysis for claim 21 points us to its reasoning for claims 45 and 49. *Id.* at 56. In discussing the motivation to combine Skotnikov’s teachings with Volpe and Piccoli and the reasonable success in doing so, Petitioner states that

Skotnikov further teaches that rotatable assembly 115 can be a hydraulic cylinder, similar to Piccoli’s shifting cylinder. Recognizing that rotatable assembly 115 is analogous to Piccoli’s steering cylinder 48, a [person having ordinary skill in the art] would have known to couple Skotnikov’s sensor 155 to the second actuator implemented in Volpe’s modified machine *or at a rotational coupling assembly* implemented on Volpe’s lifting column to correlate rotational movement of the lifting column to wheel orientation.

Id. at 55 (referencing Ex. 1008, 3:53–57; Ex. 1003 ¶¶ 246–247) (emphasis added).

That is, the Petition’s proposed combination uses a linear actuator for the second actuator and Skotnikov’s sensor 155 connected to the lifting column through a rotational coupling assembly to correlate rotational movement. That way, sensor 155 is “associated” with the linear actuator.

We have considered Patent Owner’s arguments and find that they do not identify a deficiency on Petitioner’s position. We do not agree that Petitioner’s contentions are internally inconsistent. Although the Petition forces a reader to move to analyses for different claims (which may not be ideal), the path of analyses ultimately demonstrates, contrary to Patent Owner’s argument, that Petitioner does not identify sensor 155 in isolation

to its other modifications, and, specifically, that a linear actuator is used for the second actuator, with the rotary actuator associated with a rotational coupling attached to the end of the actuator.

Also, we do not agree that Petitioner’s argument in its Reply constitutes a new argument. Petitioner directs us to testimony from Mr. Orr—testimony that supports the contention that the rotary actuator would be associated with the second actuator (a linear actuator) by being located at a rotational coupling assembly that couples the linear actuator to the lifting column. *See* Pet. Reply 23. Also, Petitioner’s reference to Dubay provides state-of-the-art evidence that illustrates Petitioner’s combination. *See id.* (referencing Ex. 1007, 6:5–22, 7:19–31, 8:24–28, and identifying Dubay’s detector 36, which detects rotary motion of coupling ring 13, which is driven by a linear actuator). In this way, Petitioner’s arguments in its Reply responds to Patent Owner’s criticism of the Petition and simply expands on the argument that is already in the Petition. *See Rembrandt Diagnostics, LP*, 76 F.4th at 1384 (“[W]e have held that a reply may be proper if it is responsive and simply expands on previously raised arguments.”).

Accordingly, upon review of the information in the Petition and corresponding evidence, including Petitioner’s reasons for modifying Volpe and Piccoli with Skotnikov’s teachings, and Patent Owner’s counter arguments, we find that Petitioner has proven, by a preponderance of the evidence, that the combination of Volpe, Piccoli, and Skotnikov teaches or suggests the subject matter of claim 25.

3. *Dependent claims 49–55, 57–60, and 63*

Dependent claims 49–55, 57–60, and 63 depend, directly or indirectly, from independent claim 45. Because we conclude that Petitioner has not proven, by a preponderance of the evidence, that independent claim 45 is unpatentable under 35 U.S.C. § 103 over the combination of Volpe, Piccoli, and Skotnikov, we conclude that dependent claims 49–55, 57–60, and 63 are not proven unpatentable for at least the reason that they depend from an independent claim that is not proven unpatentable.

4. *Dependent claims 22, 26, 27, 32, and 35*

Petitioner also contends that dependent claims 22, 26, 27, 32, and 35, which depend, directly or indirectly from independent claim 18, are unpatentable as obvious over the combination of Volpe, Piccoli, and Skotnikov. Pet. 20. Petitioner provides citations to evidence of record, including Skotnikov, and Mr. Orr’s testimony on how the combination of Volpe, Piccoli, and Skotnikov teaches or suggests the subject matter of claims 22, 26, 27, 32, and 35, and reasons to combine the teachings of Skotnikov with Volpe and Piccoli. *Id.* at 57–58, 64–71.

Upon review of the information in the Petition and corresponding evidence, including Petitioner’s reasons for modifying Volpe and Piccoli with Skotnikov’s teachings, we find that Petitioner has proven, by a preponderance of the evidence, that the combination of Volpe, Piccoli, and Skotnikov teaches or suggests the subject matter of claims 22, 26, 27, 32, and 35. Patent Owner does not dispute Petitioner’s contentions with respect to this claim, other than the arguments made with respect to claim 18, which we address above.

5. *Conclusions as to Ground 2*

For the reasons above, we conclude that Petitioner has proven, by a preponderance of the evidence, that claims 21–27, 32, and 35 are unpatentable under U.S.C. § 103 over Volpe, Piccoli, and Skotnikov. We conclude that Petitioner has not proven, by a preponderance of the evidence, that claims 45, 49–55, 57–60, and 63 are unpatentable under U.S.C. § 103 over Volpe, Piccoli, and Skotnikov.

F. *Remaining Grounds and Challenges*

Petitioner further contends that the combined teachings of Volpe, Piccoli, and Dubay render obvious the subject matter of claim 33 (Ground 3); the combined teachings of Volpe, Piccoli, Skotnikov, and Dubay render obvious the subject matter of claim 61 (Ground 4); the combined teachings of Volpe, Piccoli, Skotnikov, and McColl render obvious the subject matter of claim 28 and 56 (Ground 5); the combined teachings of Volpe, Piccoli, and McCutcheon render obvious the subject matter of claim 34 (Ground 6); and the combined teachings of Volpe, Piccoli, Skotnikov, and McCutcheon render obvious the subject matter of claim 62 (Ground 7). Pet. 20, 74–86.

Claim 28 depends from claim 26. *See* Ex. 1001, 12:35–38. Petitioner provides citations to evidence of record, including McColl and Mr. Orr’s testimony on how the combination of Volpe, Piccoli, Skotnikov, and McColl teaches or suggests the subject matter of claim 28. Pet. 78–79. Petitioner provides a motivation to combine McColl’s teachings with Volpe, Piccoli, and Skotnikov, and that there is a reasonable expectation of success in making the combination. *Id.* at 79–81.

Upon review of the information in the Petition and corresponding evidence, including Petitioner's reasons for modifying Volpe, Piccoli, and Skotnikov, with McColl's teachings, we find that Petitioner has proven, by a preponderance of the evidence, that the combination of Volpe, Piccoli, Skotnikov, and McColl teaches or suggests the subject matter of claim 28 for Ground 5. Patent Owner does not dispute Petitioner's contentions with respect to this claim, other than the arguments made with respect to claim 18, which we address above in connection with Ground 1.

Claim 33 depends from claim 18. *See* Ex. 1001, 12:53–58. Petitioner provides citations to evidence of record, including Dubay and Mr. Orr's testimony on how the combination of Volpe, Piccoli, and Dubay teaches or suggests the subject matter of claim 33. *Pet.* 74–75. Petitioner provides a motivation to combine Dubay's teachings with Volpe and Piccoli, and that there is a reasonable expectation of success in making the combination. *Id.* at 76–77.

Upon review of the information in the Petition and corresponding evidence, including Petitioner's reasons for modifying Volpe and Piccoli with Dubay's teachings, we find that Petitioner has proven, by a preponderance of the evidence, that the combination of Volpe, Piccoli, and Dubay teaches or suggests the subject matter of claim 33 for Ground 3. Patent Owner does not dispute Petitioner's contentions with respect to this claim, other than the arguments made with respect to claim 18, which we address above in connection with Ground 1.

Claim 34 depends from claim 18. *See* Ex. 1001, 12:59–65. Petitioner provides citations to evidence of record, including McCutcheon and Mr. Orr's testimony on how the combination of Volpe, Piccoli, and McCutcheon

teaches or suggests the subject matter of claim 34. Pet. 81–83. Petitioner provides a motivation to combine McCutcheon’s teachings with Volpe and Piccoli, and that there is a reasonable expectation of success in making the combination. *Id.* at 83–85.

Upon review of the information in the Petition and corresponding evidence, including Petitioner’s reasons for modifying Volpe and Piccoli with McCutcheon’s teachings, we find that Petitioner has proven, by a preponderance of the evidence, that the combination of Volpe, Piccoli, and McCutcheon teaches or suggests the subject matter of claim 34 for Ground 6. Patent Owner does not dispute Petitioner’s contentions with respect to this claim, other than the arguments made with respect to claim 18, which we address above in connection with Ground 1.

With respect to claims 56, 61, and 62, these claims depend, directly or indirectly, from independent claim 45. Because we conclude that Petitioner has not proven, by a preponderance of the evidence, that independent claim 45 is unpatentable under 35 U.S.C. § 103, and the Petition does not identify anything in Grounds 4, 5, and 7 to remedy the deficiency in Petitioner’s analysis of claim 45, we conclude that dependent claims 56, 61, and 62 are not proven unpatentable for at least the reason that they depend from an independent claim that is not proven unpatentable.

III. CONCLUSION

After considering all the evidence and arguments presently before us, we conclude Petitioner has proven, by a preponderance of the evidence, that claims 18, 21–29, 31–35, are unpatentable. We conclude Petitioner has not

proven, by a preponderance of the evidence, that claims 30, 45, and 49–63 are unpatentable.¹⁶

¹⁶ Should Patent Owner wish to pursue amendment of the Challenged Claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding, 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. §§ 42.8(a)(3), (b)(2).

In summary:

Claims	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
18, 29–31	103(a)	Volpe, Piccoli	18, 29, 31	30
21–27, 32, 35, 45, 49–55, 57–60, 63	103(a)	Volpe, Piccoli, Skotnikov	21–27, 32, 35	45, 49–55, 57–60, 63
33	103(a)	Volpe, Piccoli, Dubay	33	
61	103(a)	Volpe, Piccoli, Skotnikov, Dubay		61
28, 56	103(a)	Volpe, Piccoli, Skotnikov, McColl	28	56
34	103(a)	Volpe, Piccoli, McCutcheon	34	
62	103(a)	Volpe, Piccoli, Skotnikov, McCutcheon		62
Overall Outcome			18, 21–29, 31–35	30, 45, and 49–63

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, Petitioner has proven by a preponderance of the evidence that claims 18, 21–29, 31–35 of U.S. Patent No. 7,523,995 B2 are unpatentable;

FURTHER ORDERED that Petitioner has not proven by a preponderance of the evidence that claims 30, 45, and 49–63 of U.S. Patent No. 7,523,995 B2 are unpatentable;

FURTHER ORDERED that, pursuant to 35 U.S.C. § 318(b), upon expiration of the time for appeal of this decision, or the termination of any such appeal, a certificate shall issue canceling claims 18, 21–29, 31–35 of U.S. Patent No. 7,523,995 B2; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

IPR2022-01394
Patent 7,523,995 B2

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