UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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GODBERSEN-SMITH CONSTRUCTION COMPANY
d/b/a GOMACO CORPORATION
Petitioner

v.

GUNTERT & ZIMMERMAN CONST. DIV., INC.
Patent Owner

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Case IPR2024-00835
Patent No. 11,535,318

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# PETITION FOR *INTER PARTES* REVIEW

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a. [1pre]: "A swing leg assembly configured to be coupled to a paving machine configured to move in a paving direction for spreading, leveling, and

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| 1002 | Declaration of William Singhose, Ph.D. ("Singhose") |
| 1003 | Curriculum Vitae of William Singhose, Ph.D. |
| 1004 | Prosecution History for U.S. Patent No. 11,535,318 (downloaded from Patent Center) |
| 1005 | Commander III New Generation Trimmer/Paver Operator/Service Manual G21 Controls ("CIII") |
| 1006 | U.S. Patent No. 7,523,995 to Rio et al. ("Rio") |
| 1007 | U.S. Patent No. 4,558,758 to Littman et al. ("Littman") |
| 1008 | U.S. Patent No. 4,029,165 to Miller et al. ("Miller") |
| 1009 | U.S. Patent Publication No. 2003/0173130 to Johns ("Johns") |
| 1010 | GT-3200 Trimmer/Slipform Paver ("GT-3200") |
| 1011 | U.S. Patent No. 5,127,335 to Whitaker ("Whitaker") |
| 1012 | U.S. Patent No. 3,792,745 to Files ("Files") |
| 1013 | U.S. Patent Publication No. 2010/0181136 to Swasey et al. ("Swasey") |
| 1016 | U.S. Patent No. 3,572,458 to Tax ("Tax") |
| 1021 | U.S. Patent No. 6,481,924 to Smolders et al. ("Smolders") |
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| 1031 | Disclosure of Preliminary Claim Constructions and Extrinsic Evidence, *Guntert & Zimmerman Const. Div., Inc. v. GOMACO Corp.*, Case No. 5:20-cv-04007-CJW-KEM (N.D. Iowa) (Sept. 15, 2020) |
| 1032 | Deposition Transcript of Kenneth Bryden, Ph.D., *Guntert & Zimmerman Const. Div., Inc. v. GOMACO Corp.*, Case No. 5:20-cv-04007-CJW-KEM (N.D. Iowa) (Aug. 13, 2020) |
| 1033 | U.S. Patent No. 10,029,749 ("'749 patent") |
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| 1037 | *Godbersen-Smith Const. Co. v. Guntert & Zimmerman Const. Div., Inc.*, IPR2021-00136, Paper 65 (June 9, 2022) (Public Version) |

| Exhibit No. | Description |
|---|---|
| 1100 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-702 |
| 1101 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-703 |
| 1102 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-704 |
| 1103 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-705 |
| 1104 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-706 |
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| 1107 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-709 |
| 1108 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-710 |
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| 1123 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-737 |

| Exhibit No. | Description |
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| 1124 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-739 |
| 1125 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-741 |
| 1126 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-742 |
| 1127 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-743 |
| 1128 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-745 |
| 1129 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-746 |
| 1130 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-747 |
| 1131 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-748 |
| 1132 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-749 |
| 1133 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-750 |
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| 1135 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-756 |

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| 1144 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-770 |
| 1145 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-771 |
| 1146 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-772 |
| 1147 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-773 |

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| 1148 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-774 |
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| 1151 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-675 |
| 1152 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-713 |
| 1153 | Public dissemination evidence for the New Generation Commander III Operator's Manual related to machine 900100-762 |
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## I. PRELIMINARY STATEMENT

Godbersen-Smith Construction Company d/b/a GOMACO Corporation ("Petitioner") requests *inter partes* review and cancellation of claims 1-8 of U.S. Patent No. 11,535,318 ("'318 patent"; Ex. 1001). The '318 patent relates to a slipform paver for laying concrete.

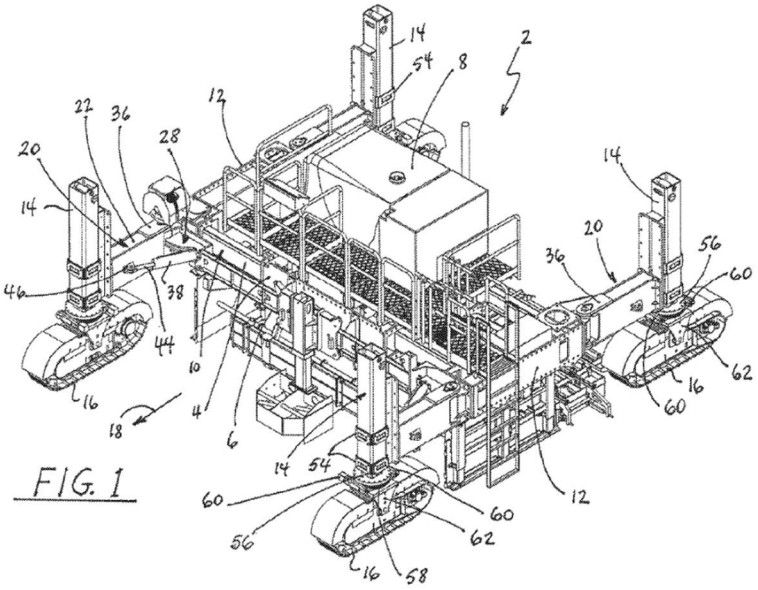


FIG. 1

Ex. 1001, Fig. 1. Prior-art slipform pavers often had pivotable swing legs (like the four shown in the corners of the paver above) that allowed the crawler tracks to be positioned at various widths. The purported invention involves a sensor-based control system that coordinates rotation of a crawler track with pivoting of a swing leg.

The Board previously addressed similar claims in this same patent family in four IPRs, finding every challenged claim unpatentable over U.S. Patent No.

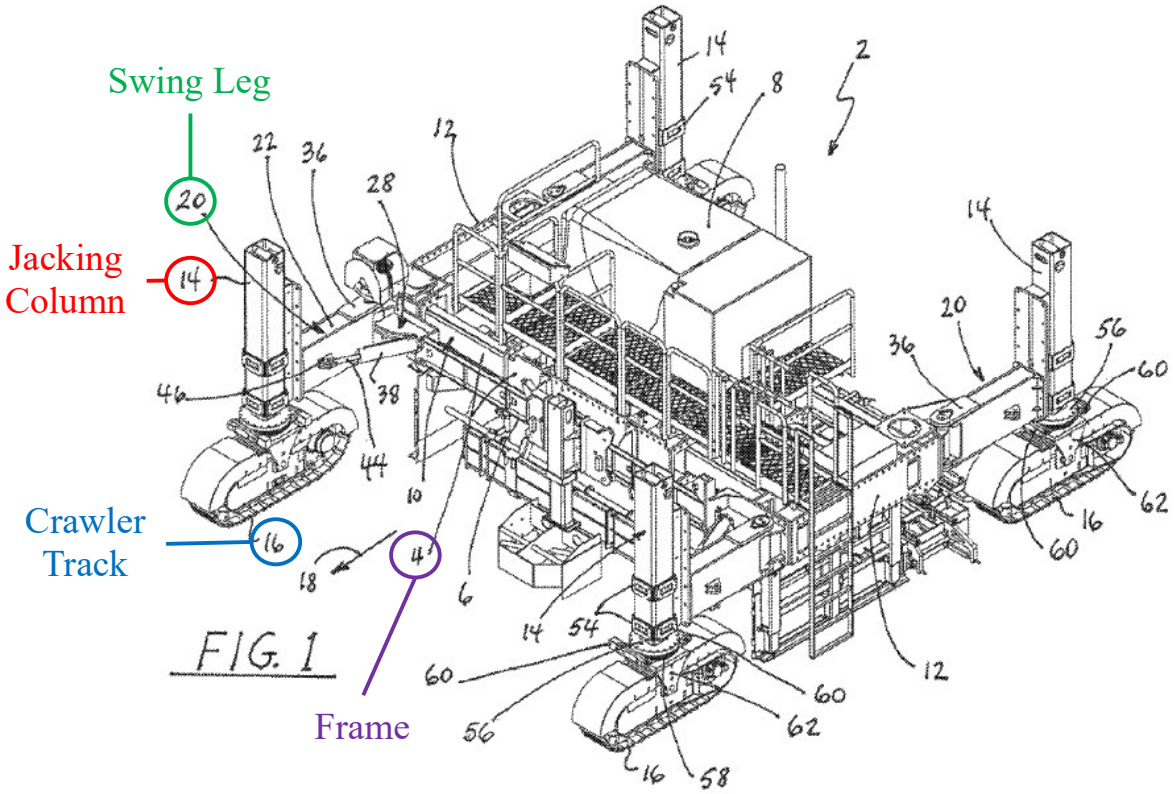
7,523,995 ("Rio"; Ex. 1006), among other patents and publications. Claims of U.S. Patent No. 10,029,749 ("'749 patent"; Ex. 1033), which the Board previously found unpatentable over the same grounds asserted here, are so similar that collateral estoppel compels the same obviousness determination. Like the '318 patent claims, Rio discloses a swing-leg assembly with an actuator that pivots the swing leg, a sensor that measures the angular position of the swing leg, an actuator that rotates the track, and a sensor that measures the rotation of the track. Moreover, Rio's control system uses signals from the sensors to rotate the crawler track in coordination with the swing leg as the swing leg pivots.

These aspects of Rio would have been obvious to implement on the slipform paver described in "Commander III New Generation Trimmer/Paver Operator/Service Manual G21 Controls" ("CIII"; Ex. 1005), which discloses a slipform paver swing-leg assembly containing nearly every component of the claimed invention. Accordingly, claims 1-8 of the '318 patent should be canceled.

## II. THE '318 PATENT

### A. Specification

As shown below, each swing-leg assembly of the '318 patent contains a jacking column 14, a crawler track 16, and a swing leg 20 that couples the jacking column to frame 4. Ex. 1001, 8:53-10:51.




*Id.*, Fig. 1 (annotated). The crawler tracks "are mounted to" and rotate relative to the jacking columns. *Id.*, 8:65-9:1. Each jacking column includes two telescoping hollow tubes (outer 48 and inner 50) that raise and lower the machine in response to an internal hydraulic actuator extending or retracting. *Id.*, 8:63-65, 11:20-39.

The swing leg is fixed to the jacking column on one end and is pivotally connected to the machine on the other, allowing the swing leg to pivot horizontally. *Id.*, 2:24-32, 9:30-37. When it pivots, it swings the jacking column and crawler track to various positions. *Id.*, 10:52-11:2. Every feature described above predates the '318 patent, as the specification admits. *Id.*, 1:28-5:61 (describing features as "conventional" and "well known").

Regarding the ’318 patent’s purported invention, the specification discloses an actuator that pivots the swing leg and a “slew or worm gear drive” that rotates the crawler track. *Id.*, 6:17-23, 6:36-41, 6:66-7:6, 11:40-61. Angular position transducers provide outputs to a processor, which uses those signals to control rotation of the crawler track as the swing leg pivots. *Id.*, 6:17-28. Under this design, “no matter what the swing leg angle is, the crawler track stays straight ahead in the paving direction and position.” *Id.*, 6:29-31.

### B. Prosecution History

The ’318 patent claims priority to the ’749 patent, the subject of a prior IPR in which the Board found all claims unpatentable based on the same prior art asserted here. *See Godbersen-Smith Const. Co. v. Guntert & Zimmerman Const. Div., Inc.*, IPR2020-01698, Paper 80 (Apr. 12, 2022) (“’749 FWD”).[1] For patentability purposes, the claims of the ’749 and ’318 patents do not meaningfully differ. *Compare* Ex. 1001, Claims 1-8, *with* Ex. 1033, Claims 2, 4-6, 10-11, 14, 17-18, 20; Ex. 1002, ¶ 53 (comparing claims).

[1] Patent Owner appealed, and the Federal Circuit affirmed, No. 22-1831, Dkt. 61 (Fed. Cir. Jan. 18, 2024). The public version of the ’749 FWD is Exhibit 1036.

During prosecution of the ’318 patent, the examiner never applied CIII or Rio in any rejection. Instead, the Examiner allowed claim 1 after Applicant filed a terminal disclaimer following a double-patenting rejection. Ex. 1004, 148, 205, 215. Applicant then added the dependent claims following allowance. *Id.*, 289-291. The Examiner issued the notice of allowance approximately three months before the Board issued the ’749 FWD holding all claims of the ’749 patent unpatentable. *See id.*, 308-310.

Applicant later submitted an IDS citing the Board’s Final Written Decisions regarding the ’749 patent and three other related patents without specifically noting that these decisions held all claims unpatentable. *See id.*, 530-532. The Examiner issued another notice of allowance without explaining how the claims were allowable despite reciting substantially similar language to claims the Board just found obvious. *Id.*, 548-549. The Examiner never explained how the claims differ from what the prior art discloses. *Id.*, 309, 420, 480, 549.

## III. STATEMENT OF PRECISE RELIEF REQUESTED

Claims 1-8 are unpatentable and should be canceled in view of the following grounds.

### A. Prior Art

- CIII; prior art under 35 U.S.C. § 102(a)(1),[2] as explained in Section VII.A.1.b, *infra*.
- Rio, filed on July 14, 2005, and issued on April 28, 2009; prior art under § 102(a)(1)-(2).
- U.S. Patent No. 6,481,924 to Smolders ("Smolders"; Ex. 1021), issued on November 19, 2002; prior art under § 102(a)(1)-(2).

### B. Challenges

| Grounds | Challenged Claims | Basis | Prior Art |
|---|---|---|---|
| 1 | 1-8 | § 103 | CIII and Rio |

[2] The Board previously found that claim 8 of U.S. Patent No. 9,908,571, to which the '318 patent claims priority, has an effective filing date of June 14, 2017, making that patent and the '318 patent subject to the America Invents Act. *See* Ex. 1037, *Godbersen-Smith Const. Co. v. Guntert & Zimmerman Const. Div., Inc.*, IPR2021-00136, Paper 65, 9-11 (June 9, 2022) (public version); AIA, Pub. L. No. 112-29, § 3(n)(1), 125 Stat. 284, 293 (2011). Treating the '318 patent as subject to pre-AIA law would not alter the analysis, as the asserted references all constitute prior art under at least pre-AIA 35 U.S.C. § 102(a) and (b), and Rio and Smolders are also prior art under § 102(e).

| Grounds | Challenged Claims | Basis | Prior Art |
|---|---|---|---|
| 2 | 2-7 | § 103 | CIII, Rio, and Smolders |

## IV. COLLATERAL ESTOPPEL FROM THE '749 FWD

The Board should apply collateral estoppel based on the '749 FWD holding unpatentable the substantially similar claims of the related '749 patent over the same grounds asserted here. An IPR decision has a preclusive effect on issues in subsequent IPRs based on collateral estoppel when "(1) the issue is identical to one decided in the first action; (2) the issue was actually litigated in the first action; (3) resolution of the issue was essential to a final judgment in the first action; and (4) the party against whom collateral estoppel is being asserted had a full and fair opportunity to litigate the issue in the first action." *Google LLC v. Hammond Dev. Int'l, Inc.*, 54 F.4th 1377, 1381 (Fed. Cir. 2022) (cleaned up). Each element applies here.

"[P]atent claims need not be identical for collateral estoppel to apply." *Id.* Indeed, "collateral estoppel may apply even if the patent claims 'use slightly different language to describe substantially the same invention,' so long as 'the differences between the unadjudicated patent claims and adjudicated patent claims do not materially alter the question of invalidity.'" *Id.* (citation omitted). The below sections addressing each claim element show that the differences between

these elements and corresponding elements in the ’749 patent do not materially alter the question of invalidity/unpatentability. *Infra* Section VII.A; *see also* Ex. 1002, ¶ 53 (comparing claims). Whether the asserted references disclose or render obvious each of these claims was decided in the ’749 FWD. Additionally, the level of ordinary skill; CIII’s qualification as prior art; CIII, Rio, and Smolders being analogous art to the ’318 patent; the motivations to combine CIII and Rio and CIII, Rio, and Smolders; and the reasonable expectation of success in these combinations are identical issues decided in the ’749 FWD.

Each of these issues was essential to the unpatentability finding in the ’749 FWD, a decision affirmed by the Federal Circuit. Patent Owner had a full and fair opportunity to litigate these issues in the IPR of the ’749 patent. Collateral estoppel, therefore, compels a conclusion that claims 1-8 of the ’318 patent are obvious based on the issues decided in the ’749 FWD. And even if collateral estoppel did not apply, Petitioner has carried its burden of demonstrating unpatentability for the reasons provided below.

## V. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art (“POSITA”) pertinent to the ’318 patent would have had at least a four-year degree in mechanical engineering or a closely related field and at least two years of experience designing, developing, or operating heavy machinery, including their components and control systems.

Ex. 1002, ¶¶ 22-24. Additional experience could substitute for a formal degree, and an advanced degree could substitute for experience. *Id.*, ¶¶ 22-25. The Board adopted this definition of the level of ordinary skill for the related '749 patent. '749 FWD, 21-24.

## VI. CLAIM CONSTRUCTION

Only disputed terms need to be construed, and only to the extent necessary to resolve the dispute. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017). In district court litigation involving related patents, the parties dispute constructions of claim terms that appear in claims of the '318 patent,[3] but the Board need not resolve these disputes here because the asserted prior art discloses embodiments within the scope of both parties' constructions. Ex. 1002, ¶ 20. Accordingly, the Board need not construe the claims in this proceeding.

In the '749 FWD, the Board construed the claims "to encompass both an embodiment where the crawler track is rotated when the track is in contact with the ground," known as "on-the-fly steering," and "an embodiment where the crawler

[3] Patent Owner identified no terms for construction that appear in the '318 patent, and GOMACO identified two (i.e., "swing leg" and "hinge bracket"). Ex. 1031.

track is lifted off the ground and rotated." '749 FWD, 35-40. Should Patent Owner again attempt to limit the claims to require on-the-fly steering, the Board should reject this argument for the same reasons as before—the claims lack any such requirement.

## VII. DETAILED EXPLANATION AND EVIDENCE

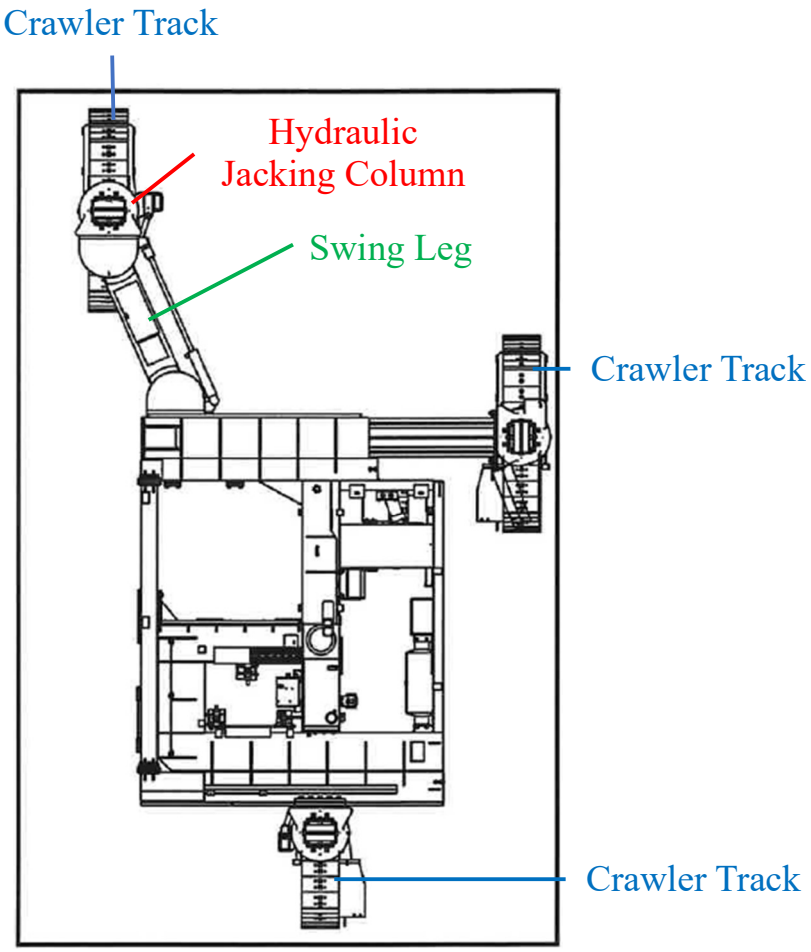
Petitioner demonstrates below why the challenged claims are unpatentable.

### A. Ground 1: Claims 1-8 Are Obvious over CIII and Rio

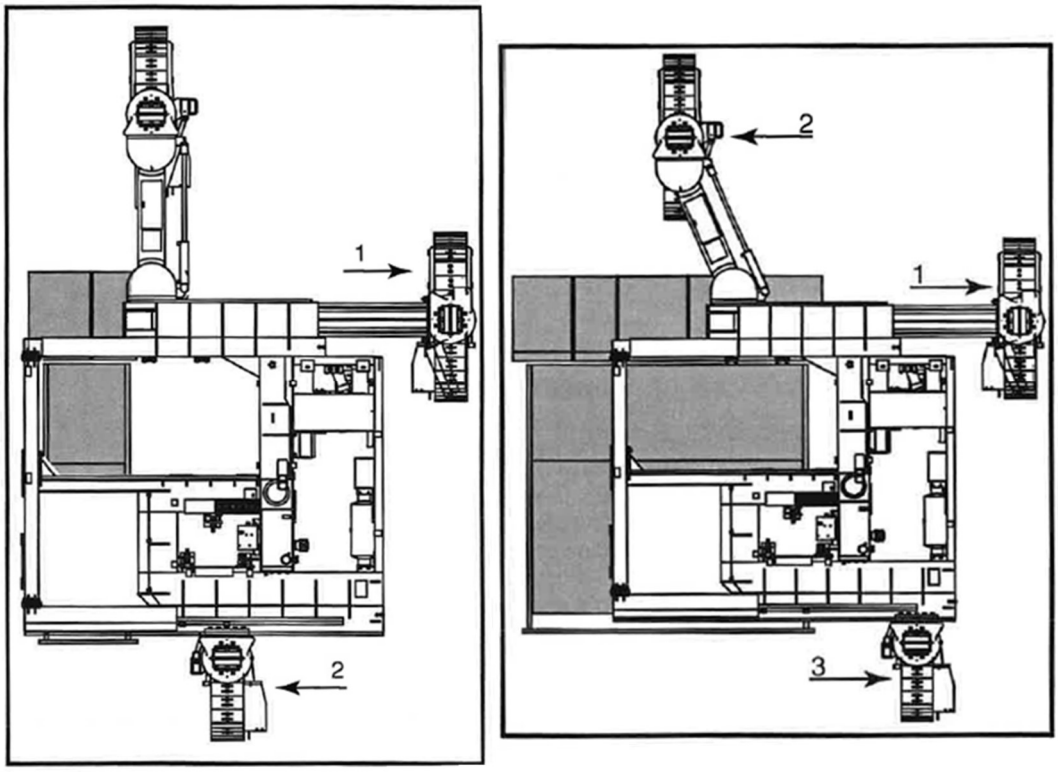
#### 1. Summary of CIII

##### a. Technical Disclosure

CIII, also asserted in the IPR of the '749 patent ('749 FWD, 8-10), discloses a slipform paver, which is convertible between three-track and four-track configurations, depending on the project. Ex. 1005, 42, 194, 204-206, 209; *see id.*, 15 (depicting three-track configuration), 19 (depicting four-track configuration); Ex. 1002, ¶¶ 38-48. Its three-track configuration includes a pivoting swing leg, a laterally telescoping leg, and a slidable rear-mounted leg. Ex. 1005, 76, 201, 204.




*Id.*, 201 (annotated top-down view). CIII describes different leg positions, depending on the job. *Id.*, 76.



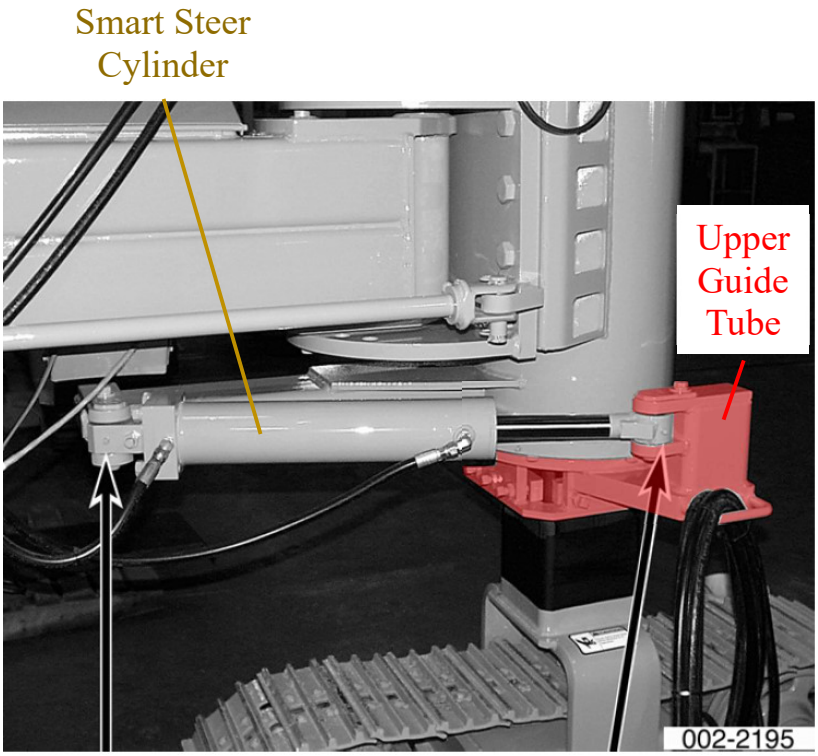

*Id.* (top-down views showing positioning for curb and gutter projects (left) and sidewalk projects (right)).

The hydraulic jacking column has an outer cylinder fixed to the swing leg and telescoping, rectangular-shaped upper and lower guide tubes (also referred to as outer and inner guide tubes, respectively).[4] *Id.*, 74, 173-175. Each jacking column has an internal hydraulic "lift cylinder" that extends/retracts to control the

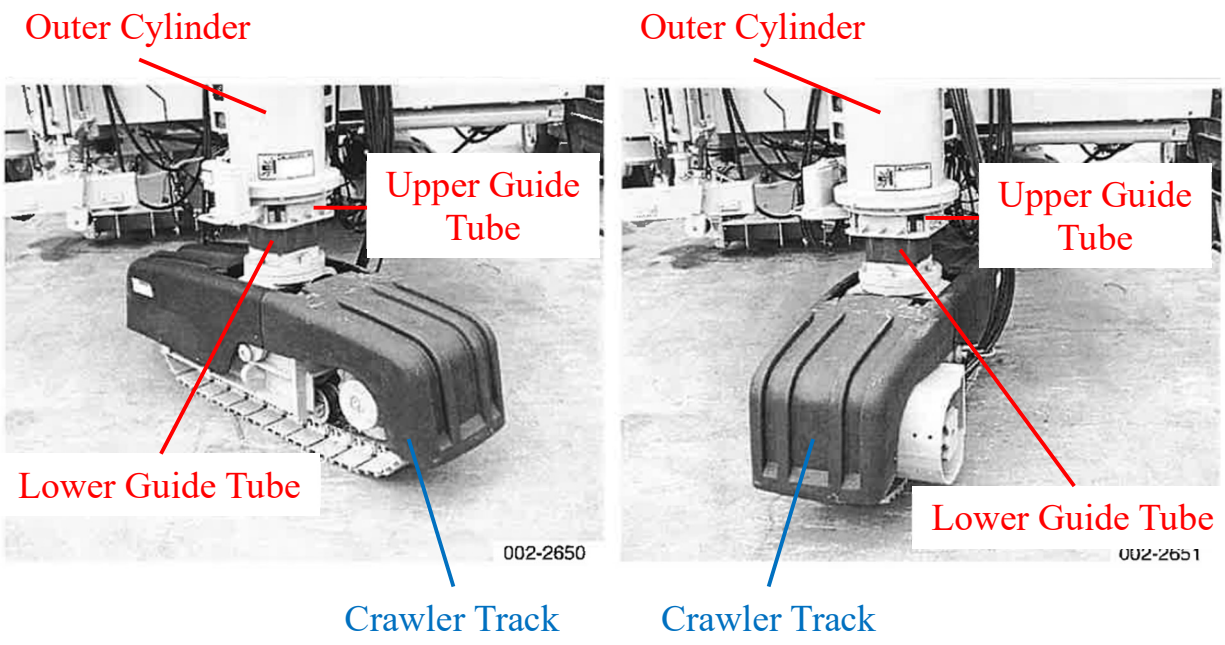
[4] *See id.*, 175, 194 (calling component "outer guide tube" and "upper guide tube"), 173-174, 376 (calling component "inner guide tube" and "[l]ower guide tube").

jacking column's vertical position (and thus the elevation of the machine). *Id.*, 373-374, 79; Ex. 1002, ¶ 40.

CIII discloses a hydraulic "smart steer cylinder," depicted below, that attaches to the upper guide tube. Ex. 1005, 407-409, 165.



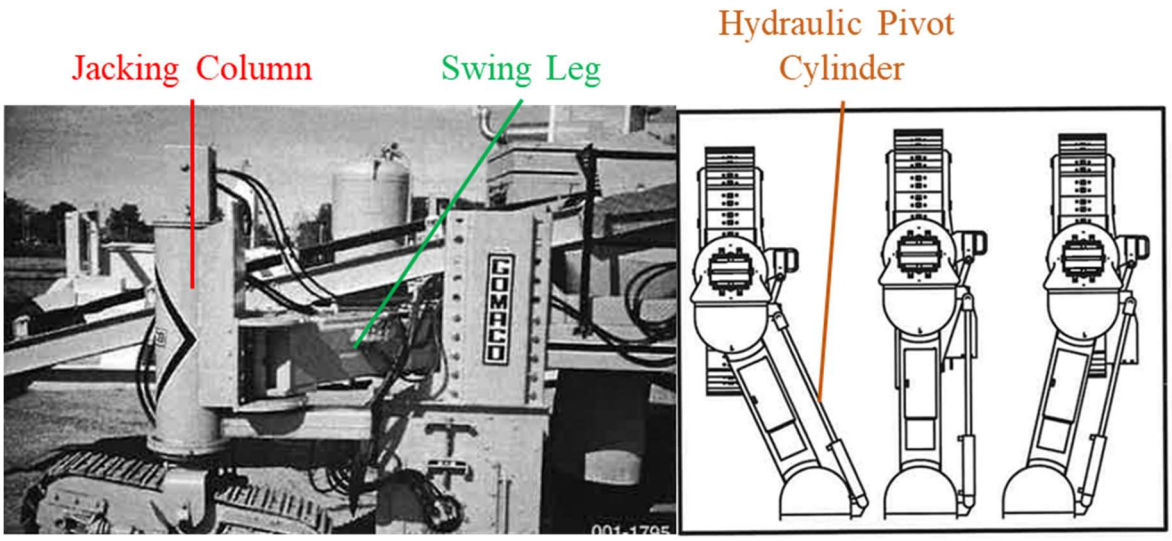

*Id.*, 165 (annotated). Because of the guide tubes' rectangular cross-sections and lack of "any looseness" between them, the steering cylinder, when actuated, rotates the guide tubes and the crawler track connected to the lower guide tube together relative to the outer cylinder, as depicted in the images below. *Id.*, 407-409, 373-374, 193-195; Ex. 1002, ¶¶ 40-41.



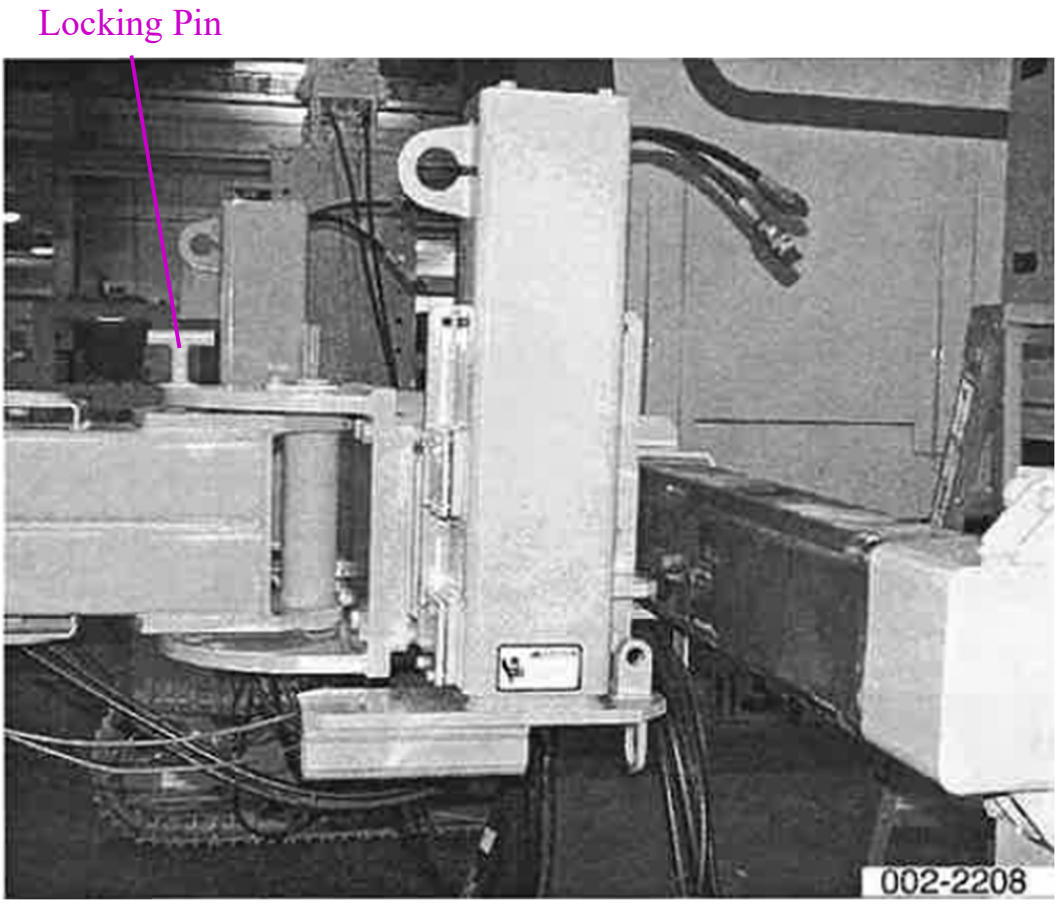

Ex. 1005, 193, 195 (annotated).

An electronic steering system for each leg assembly, consisting of "a sensor, a feedback pot [(potentiometer)], a servo valve and a control loop on a S2X controller," is "networked to the other S2X controllers on the machine, including the Pancon controller in the control box." *Id.*, 407. "The feedback pot measures the position of the track and sends a continuous signal to the S2X, indicating the track position." *Id.*, 408. The central Pancon controller compares steer and feedback pot signals for each leg assembly, and generates corrective signals that cause the tracks to rotate to the desired position. *Id.*; Ex. 1002, ¶ 42.

CIII also discloses a hydraulic pivot cylinder that swings the leg horizontally. Ex. 1005, 79-80, 34.

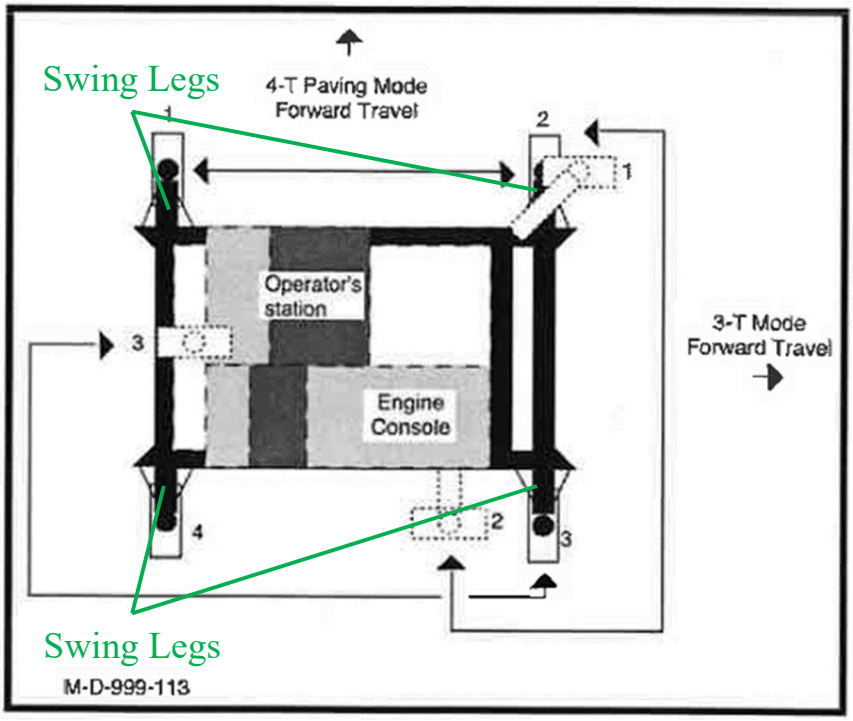



*Id.*, 79-80 (annotated). To swing the leg, an operator raises the crawler track off the ground with the jacking column, removes the pin locking the leg in place, and holds a switch to extend or retract the pivot cylinder until the leg reaches the desired position. *Id.*




*Id.*, 85 (annotated).

CIII also discloses converting the paver from its three-track to four-track configuration by removing the jacking columns and crawler tracks in the three-track configuration (dashed lines below), attaching them to three of the swing legs (green) on a four-track frame, and attaching a fourth jacking column and crawler track assembly to the final swing leg on the four-track frame. *Id.*, 204-206, 209, 253; Ex. 1002, ¶ 45.




Ex. 1005, 204 (annotated top-down view). The four-track configuration allows the slipform paver to perform different projects. For example, in this configuration, an auger spreads concrete placed in front of the slipform paver "evenly across the width of the paving mold" that is "mounted to the machine frame." *Id.*, 199, 211, 240-242.

Concrete spread evenly in front of machine

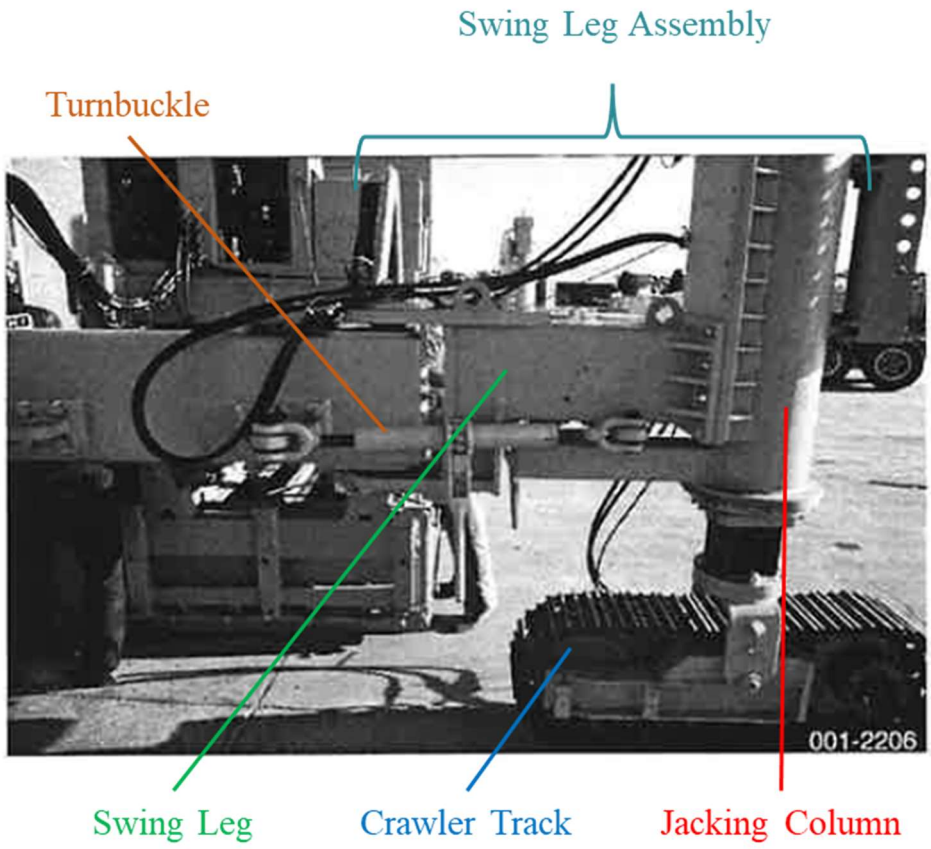
*Id.*, 242. As the slipform paver moves forward, it levels and finishes the concrete into a form having a generally upwardly exposed, finished concrete surface and terminating in lateral concrete sides. *Id.*, 241-245.

Finish concrete around header

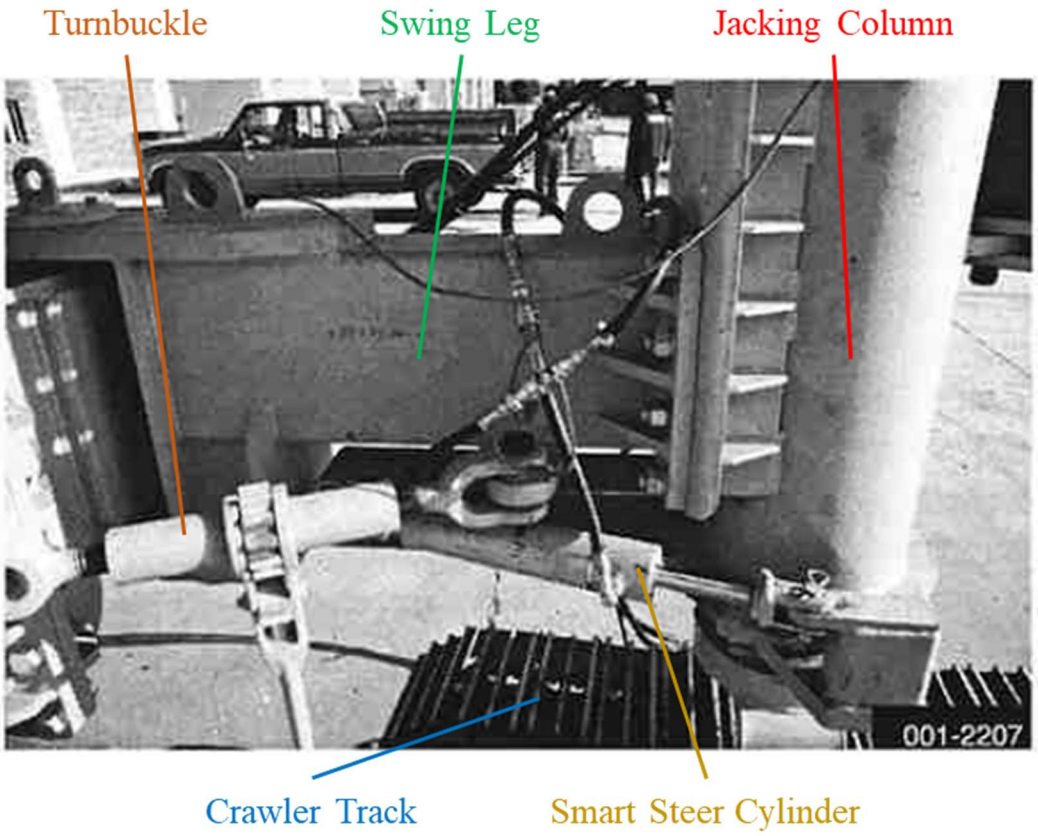
Check concrete grade

*Id.*, 241 (left), 243 (right).

Each of the four swing-legs has two turnbuckles that are adjustable for minor swing-leg rotations or removable for larger rotations. *Id.*, 209, 253-254, 265; Ex. 1002, ¶ 48. CIII discloses removing the turnbuckles when rotating the swing legs from "paving mode to barrier/transport mode." Ex. 1005, 253.




*Id.*, 209 (annotated, depicting outer side of a first swing-leg assembly).




*Id.*, 265 (annotated, depicting inner side of second swing-leg assembly).

**b. CIII Is a Printed Publication**

CIII, published by GOMACO before March 26, 2009, is a prior-art "printed publication" under 35 U.S.C. § 102, as the Board previously found. '749 FWD, 27-33 (finding that "CIII qualifies as a printed publication" on identical facts). A reference is a printed publication if it was "publicly accessible," meaning it was "disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art exercising reasonable diligence, can

locate it." *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29, 10-11 (Dec. 20, 2019) (precedential).

Although "a petitioner need not establish that specific persons actually accessed or received a work to show that the work was publicly accessible," in this case, GOMACO distributed over 100 copies of CIII to over 50 customers and/or dealers who purchased Commander III machines. *Id.* at 10; Ex. 1030, ¶¶ 20-21, Appendix; *see also GoPro, Inc. v. Contour IP Holding LLC*, 908 F.3d 690, 695 (Fed. Cir. 2018) (document distributed to dealers with no restrictions and intended to reach the general public qualified as a printed publication).

GOMACO's Technical Publications Manager, Shari Simmons, oversaw distribution of CIII from 2005-2007 and kept detailed records, which include the database entries and scanned paper files shown in Exhibits 1100-1154. Ex. 1030, ¶¶ 1-26, Appendix. As the Simmons declaration and Appendix show, Ms. Simmons sent *numerous* physical copies of CIII to dealers and/or customers more than a year before the '318 patent's earliest priority date. Ex. 1030, ¶¶ 20-21, Appendix. In most instances, she also provided a CD containing a digital copy of CIII. *Id.*, ¶ 22. For international purchasers, she also wrote the machine serial number on CIII's cover. *Id.*, ¶¶ 23-24; Exs. 1151-1154. Her records identify UPS tracking information for packages shipping CIII, the date the dealers and/or

customers received those packages, and the names of people who signed for them. *See* Ex. 1030, ¶¶ 1-26, Appendix; Exs. 1100-1154.

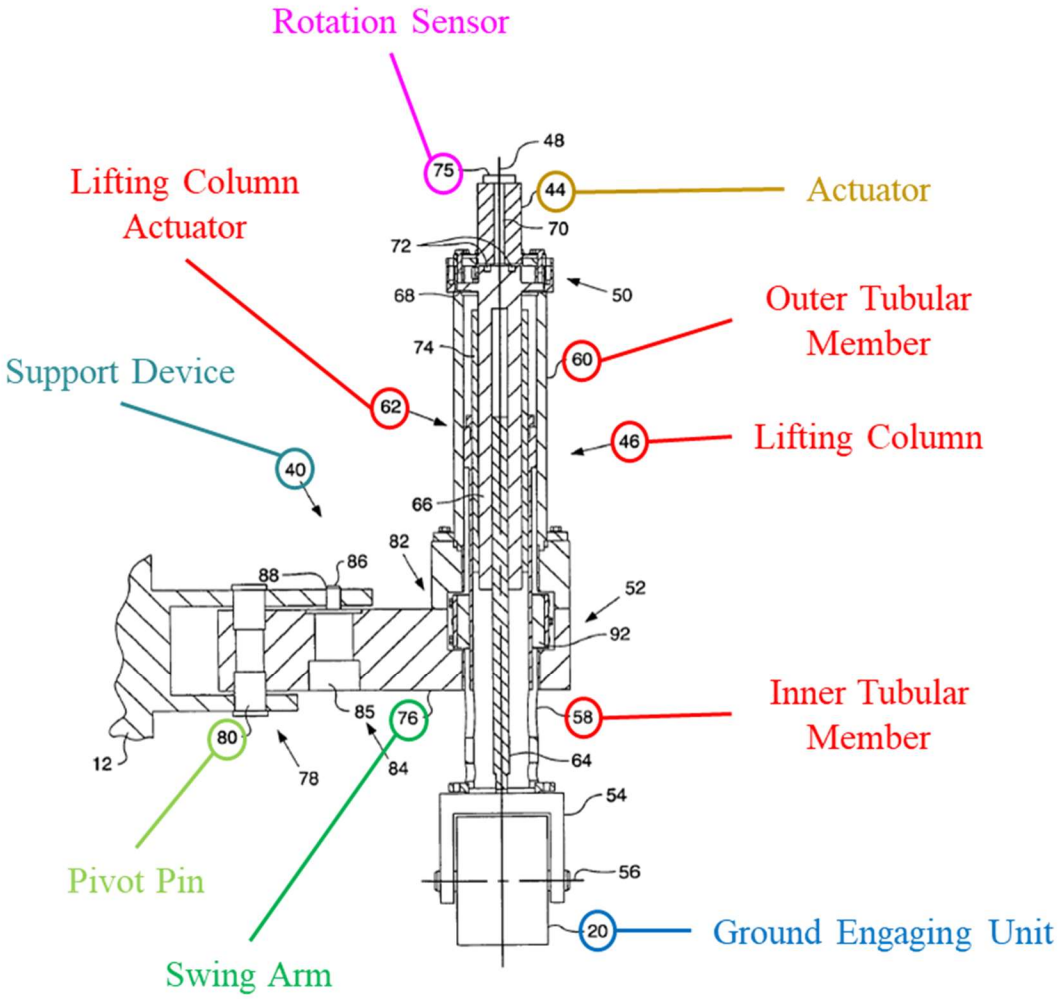
No CIII described in the Simmons declaration or Appendix was subject to a nondisclosure agreement or secrecy obligation. Ex. 1030, ¶ 26. Nor does CIII itself bear any markings suggesting that dissemination was prohibited or restricted. *See* Ex. 1005. Instead, CIII has a 2002 copyright date and encourages users to contact GOMACO for the latest version of the manual. *Id.*, 3, 4.

Because GOMACO distributed over 100 copies of CIII to over 50 customers and/or dealers without any expectation of secrecy, CIII was a publicly accessible, prior-art "printed publication" under § 102. *See Weber, Inc. v. Provisur Techs., Inc.*, 92 F.4th 1059, 1067-69 (Fed. Cir. 2024).

**2. Summary of Rio**

Rio, also asserted in the '749 IPR ('749 FWD, 10-12), discloses a road-milling machine with a machine frame 12 supported by four ground engaging units (e.g., tracks). Ex. 1006, 1:5-7, 3:43-45, 3:48-49; Ex. 1002, ¶¶ 49-51. Support device 40 consisting primarily of swing arm 76 and lifting column 46 connects the ground engaging unit 20 to machine frame 12. Ex. 1006, 4:38-40, 4:51-53, 6:12-15. Lifting column 46 has two hollow tubes (i.e., "inner tubular member 58" and "outer tubular member 60") that telescope in response to an internal hydraulic "lifting column actuator 62" that extends and retracts. *Id.*, 5:32-53. The

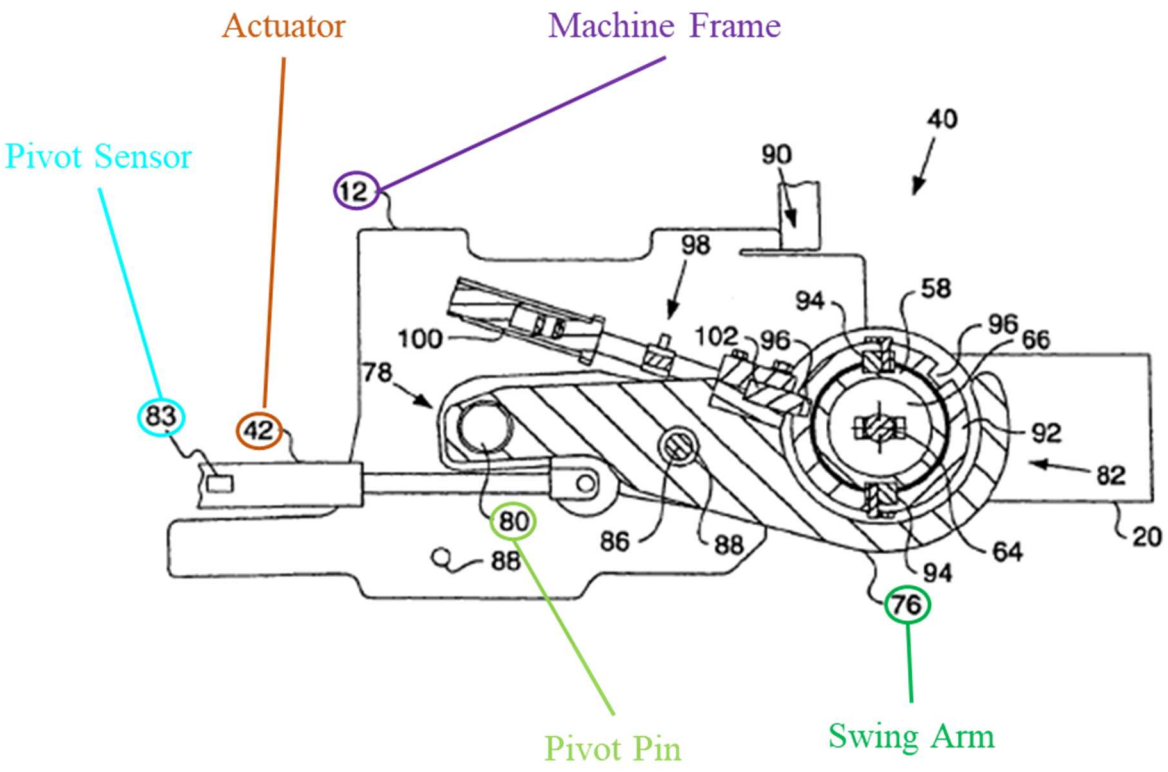
extension/retraction of "lifting column actuator 62" raises and lowers the machine. *Id.*, 5:32-53, 8:4-17, 8:66-9:9. Figure 2 shows these components:



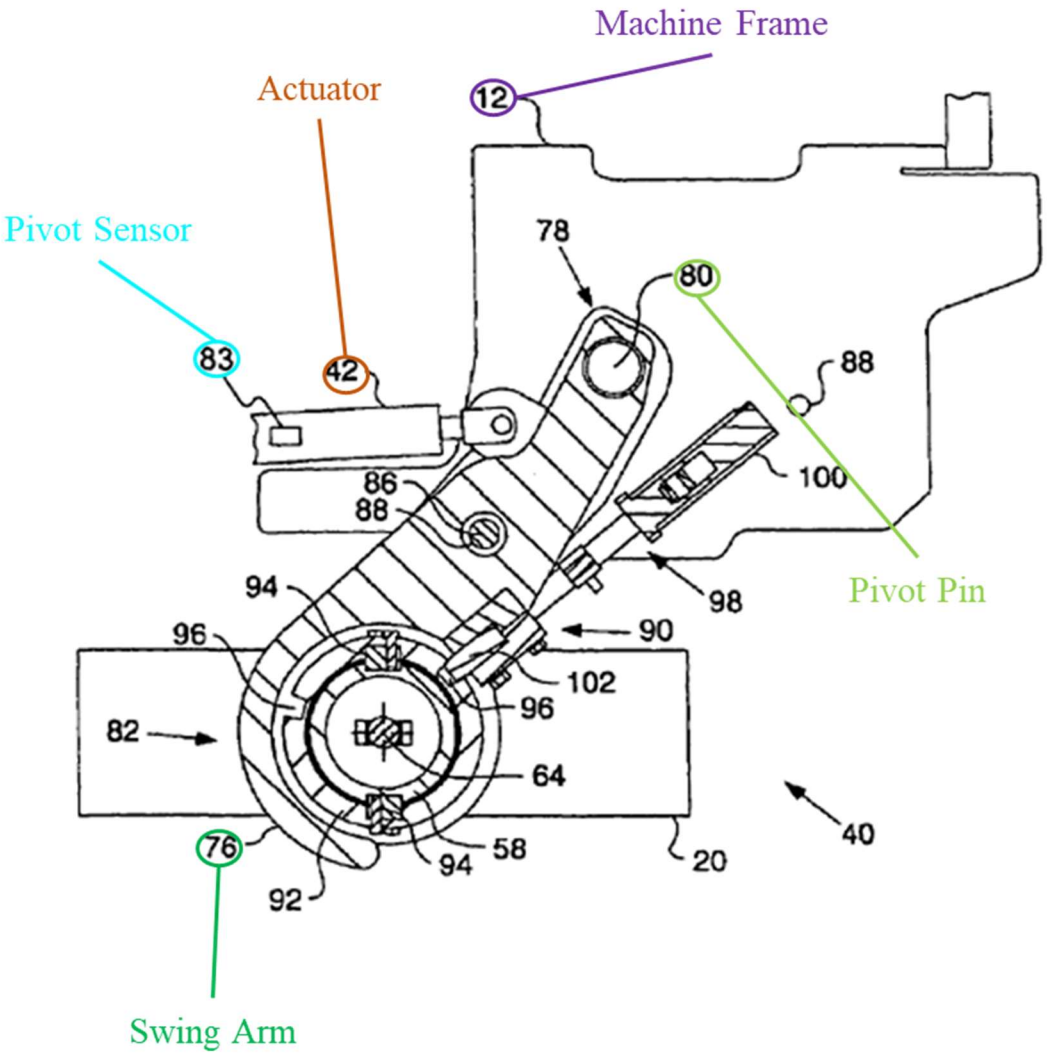

*Id.*, Fig. 2 (annotated).

Rio discloses a first actuator 42 that pivots swing arm 76 about pivot pin 80, moving ground engaging unit 20 between retracted and projecting positions (shown below in Figures 3 and 4, respectively). *Id.*, 6:19-22. Second actuator 44 (shown above) rotates ground engaging unit 20 about a vertical lifting column axis

48. *Id.*, 4:56-60, 6:4-6. Actuators 42 and 44 may be linear actuators or rotary actuators such as "worm or sun gear designs." *Id.*, 4:61-5:3. Although Figure 2 depicts second actuator 44 at the top of the lifting column in a "typical embodiment," Rio discloses another embodiment, where "second actuator 44 is positioned on the lifting column 46" and "along the lifting column axis 48" in any position that "avoids problems caused by an accumulation of mechanical devices at a single location on the lifting column 46." *Id.*, 4:53-60, 5:8-24. The Board previously found that "[t]his express disclosure would include positioning actuator 44 on lifting column 46 at the bottom of the column." '749 FWD, 74.




Ex. 1006, Fig. 3 (annotated).




*Id.*, Fig. 4 (annotated).

Rio discloses a rotation sensor 75 (shown in Figure 2 above) associated with actuator 44 that generates signal 124 "indicating the instantaneous rotation angle of the one ground engaging unit 20." *Id.*, 7:23-27. A pivot sensor 83 associated with actuator 42 or the swing arm 76 generates signal 122 "indicating the instantaneous angular position of the swing arm 76 relative to the machine frame 12." *Id.*, 7:19-

23. Controller 32 uses these signals to counter-rotate ground engaging unit 20 *while swing arm 76 pivots* so that the wheel/track "remain[s] parallel to the machine frame 12 at all points in the pivot arc." *Id.*, 6:65-7:13, 8:31-55.

### 3. CIII and Rio Are Analogous Art

By determining that CIII in combination with Rio rendered obvious claims of the related '749 patent that are similar to those at issue here, the Board implicitly found that CIII and Rio are analogous art. *See* '749 FWD, 41, 61-63, 95. CIII and Rio are analogous art to the '318 patent for the same reasons here. CIII and Rio are in the same field of endeavor as the '318 patent—they all describe swing-leg assemblies for road-construction machines. *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1237 (Fed. Cir. 2010); Ex. 1002, ¶ 54; Ex. 1001, Abstract, 1:28-32, Fig. 1; Ex. 1005, 79-80, 209, 253; Ex. 1006, 8:18-9:14, Fig. 2. Additionally, both the '318 patent and CIII disclose concrete slipform paving machines. Ex. 1001, Fig. 1, 1:28-32; Ex. 1005, 19, 240-249; Ex. 1002, ¶ 54.

Rio is also analogous art because it is reasonably pertinent to the problems the '318 patent purports to solve, namely, reducing the profile of the actuator used to rotate the crawler tracks and the "costly" and "time-consuming" processes associated with repositioning and controlling swing legs and crawler tracks on road-construction machines, which often required extensive manual intervention. *Wyers*, 616 F.3d at 1237; Ex. 1001, 2:8-11, 4:20-36, 5:6-9; Ex. 1006, 2:30-41; Ex.

1002, ¶ 55. Rio eliminated these hardships in the same way as the '318 patent—by using a rotary actuator to rotate the crawler tracks and automating the positioning of swing legs and crawler tracks. Ex. 1006, 2:30-41, 4:61-5:7, 8:31-9:14, 9:37-42; Ex. 1002, ¶ 55.

#### 4. Rationale for Combining CIII and Rio

As the Board in the '749 FWD already found, a POSITA would have been motivated to combine CIII and Rio with a reasonable expectation of success. Ex. 1002, ¶¶ 56-81; '749 FWD, 40-63. It would have been obvious to use Rio's rotary actuator instead of CIII's steering cylinder to rotate each crawler track and to incorporate Rio's teaching of a control system that maintains the track in a desired orientation as the corresponding swing leg pivots. '749 FWD, 42, 50-52, 57-63, 73-74.

A POSITA would have been motivated to modify CIII by replacing each steering cylinder with Rio's rotary actuator 44 (e.g., worm-gear design). Ex. 1002, ¶ 57. A POSITA would have recognized that a rotary actuator would give the crawler track greater rotational range of motion than CIII's steering cylinder. Ex. 1006, 9:37-42, Figs. 3-4; (disclosing rotary actuator providing more than 120° of rotation between retracted and projecting positions); U.S. Patent No. 4,029,165 ("Miller"; Ex. 1008), 2:51-53, 7:36-60, Fig. 7 (disclosing a rotary actuator for 360° steering); U.S. Patent Publication No. 2010/0181136 ("Swasey"; Ex. 1013),

¶¶ [0041], [0044] (disclosing worm-gear rotary actuator that can "be turned either clockwise or counterclockwise, in full circles," while simultaneously "bearing a very large load and providing a significant amount of torque"); Ex. 1002, ¶ 57; '749 FWD, 50-52, 61. Greater range of motion would have led to greater maneuverability of the paver and faster adjustments in crawler-track position. Ex. 1002, ¶ 57; '749 FWD, 61-62.

A POSITA would have been motivated to provide these benefits to eliminate CIII's manual adjustments required to "center the stroke of the steer cylinder" after "adjusting the swinging legs." Ex. 1005, 209; Ex. 1002, ¶ 58. This requires lowering the frame onto a support, removing bolts from the track yoke, extending/retracting the steer cylinder to the desired position, manually turning the track to face straight ahead, and reattaching the track yoke. Ex. 1005, 209; Ex. 1002, ¶ 58. Eliminating the need for these manual adjustments with Rio's rotary actuator would have greatly reduced the risk that an accident might occur due to operator error during the adjustment process. Ex. 1002, ¶ 58.

A POSITA would have further been motivated to implement Rio's rotary actuator to provide "a compact apparatus" with high torque that achieves "fine rotary steering control" and provides "rotary motion without the need for complicated and bulky linkages." Ex. 1006, 4:66-5:7; Ex. 1002, ¶ 59; '749 FWD, 61-62. CIII's steering cylinder assembly is the type of "bulky linkage[]" for which

Rio provides a solution. Ex. 1005, 408; Ex. 1002, ¶ 59; '749 FWD, 42. Rotary actuators were well known and commonly used to rotate wheel and track assemblies, as disclosed in Rio, U.S. Patent No. 4,558,758 ("Littman"; Ex. 1007), Miller, U.S. Patent Publication No. 2003/0173130 ("Johns"; Ex. 1009), GT-3200 Trimmer/Slipform Paver ("GT-3200"; Ex. 1010), and U.S. Patent No. 5,127,335 ("Whitaker"; Ex. 1011). Ex. 1007, 3:31-5:52; Ex. 1008, 2:51-53, 7:36-60, Fig. 7; Ex. 1009, ¶ [0020], Fig. 2; Ex. 1010, 3; Ex. 1011, 4:7-16, Fig. 3; Ex. 1002, ¶ 59; '749 FWD, 57.

Both Rio and CIII disclose a sensor that measures the angular position of the crawler tracks and a controller that rotates the crawler tracks based on the receipt of multiple signals. Ex. 1005, 407-408; Ex. 1006, 6:6-11, 8:39-47, 9:37-42; Ex. 1002, ¶ 60; '749 FWD, 62. Combining aspects of these swing-leg assemblies would have involved substituting one known element for another according to known methods to yield predictable results. Ex. 1002, ¶ 60.

Given Rio's disclosure of a worm-gear design for rotary actuator 44 that can be "positioned on the lifting column 46" anywhere "along the lifting column axis 48," a POSITA would have known to mount Rio's rotary actuator 44 on the bottom of CIII's jacking column between the jacking column and crawler track. Ex. 1006, 5:8-11; Ex. 1002, ¶ 61; '749 FWD, 73-75. At a minimum, such a design would have been an obvious design choice. Ex. 1002, ¶ 61. Given the finite number of

places to mount a rotary actuator with a worm-gear design "along the lifting column axis 48," a POSITA would have been motivated to try positioning the rotary actuator between the jacking column and crawler track. Ex. 1006, 5:8-11; Ex. 1002, ¶ 61. A POSITA would have already been aware of such a design and the maneuverability it provides. Ex. 1002, ¶¶ 62-67; '749 FWD, 50-52, 61-62, 75.

State-of-the-art references like Miller disclose a similar rotary actuator that includes "driven gear 232" and "drive pinion gear 238 [that] engages the driven gear 232" and is mounted between a crawler track (tractors 140) and a jacking column (extendable support means 60). Ex. 1008, 7:35-53, Figs. 7, 20; '749 FWD, 48, 50-52; Ex. 1002, ¶¶ 62-63. Whitaker discloses a rotary actuator that includes "a ring gear 31 affixed to the tracked conveyor 29 and rotatively mounted to the lower end" of a jacking column's lower guide tube and rotated "about a vertical axis" via a steering motor 32 and pinion gear 35. Ex. 1011, 4:7-16, Fig. 3; Ex. 1002, ¶ 64. Johns similarly discloses a "slew drive 42" positioned between a wheel bracket 36 and a chassis 22 that supports heavy components such as "an engine 50" and "boom assembly 70," the slew drive "allow[ing] the wheel bracket 36 to be rotated about a vertical axis through 180 degrees of motion, thus[] allowing steering of the wheel 32." Ex. 1009, ¶¶ [0005], [0019]-[0020], Fig. 2; Ex. 1002, ¶ 65; '749 FWD, 49, 52; *see also* Ex. 1007, 5:14-59, Figs. 4-5 (disclosing rotary actuator 122 for wheels 90 at bottom of second section 70); Ex. 1013, ¶¶ [0041], [0044]-[0045]

(disclosing worm-gear rotary actuator supporting "a large load" on top); Ex. 1002, ¶¶ 66-67.

A POSITA would have been motivated to mount Rio's rotary actuator with a worm-gear design in this way because it would have simplified CIII's jacking column design by eliminating the rotational relationship between the outer cylinder and upper guide tube. *Id.*, ¶ 68; '749 FWD, 59, 75. To provide for this simpler design, it would have been routine and obvious either to fix the upper guide tube to the nonrotatable outer cylinder or to combine the outer cylinder and upper guide tube into one unitary component that allows the lower guide tube to telescope vertically, and then connect the rotary actuator to the bottom of the lower guide tube. Ex. 1002, ¶¶ 69-73. A POSITA would have been aware of such designs, for example, from references like Whitaker. Ex. 1011, 3:65-4:16, Fig. 3; Ex. 1002, ¶¶ 70-71. This design would have been advantageous by simplifying the manufacturing and/or maintenance of the jacking column and reducing the power needed to rotate the actuator because no portion of the jacking column would rotate. Ex. 1002, ¶ 74; '749 FWD, 59. In view of these benefits and the existence of similar designs in Miller, Whitaker, Johns, Littman, and GT-3200, a POSITA would have known that positioning the rotary actuator below the bottom of the jacking column and above the crawler track was a simple and obvious design choice. Ex. 1002, ¶ 74; *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007).

CIII discloses time-consuming manual adjustments for repositioning the swing legs and crawler tracks. Ex. 1002, ¶ 75; Ex. 1005, 79-80, 193-195, 209-211, 253. In the four-track configuration, this involves removing or manually adjusting turnbuckles and then manually calibrating the steering cylinders. Ex. 1005, 193-195, 209-211, 253. A POSITA would have been motivated to eliminate these manual adjustments to reduce cost and save time during paving operations, and reduce risking injury to operators. Ex. 1002, ¶ 75; '749 FWD, 62.

Rio solves these adjustment problems. Ex. 1002, ¶ 76. Its control system includes controller 32 that receives signals from pivot sensor 83 and rotation sensor 75, and counter-rotates the track so it remains oriented in a particular direction even as actuator 42 pivots the swing leg. Ex. 1006, 6:65-66, 7:11-13, 8:31-59. A POSITA would have been motivated to implement Rio's control system in the CIII machine to automate rotation of each swing leg and crawler track. Ex. 1002, ¶ 76; '749 FWD, 60-62. CIII discloses a feedback system like Rio's for steering the slipform paver, where a controller receives signals from a steering sensor and feedback pots, and rotates the tracks to a desired position based on those signals. Ex. 1005, 407-408. A POSITA would have thus found it obvious to use the feedback system described in Rio to simultaneously control the angles of the swing legs and crawler tracks in the CIII machine. Ex. 1002, ¶ 76; '749 FWD, 62.

In view of modifying CIII's leg assemblies to include a rotary actuator, a POSITA would have found it obvious to implement Rio's rotation sensor to measure the rotation of the crawler track relative to the jacking column. Ex. 1006, 6:6-11; Ex. 1002, ¶ 77; '749 FWD, 60. This would have been a routine substitution of one known sensor for another—CIII already discloses using a sensor (i.e., CIII's feedback pot) to measure rotation of the crawler track relative to the outer cylinder of the jacking column. Ex. 1002, ¶ 77. Moreover, Rio discloses that rotation sensor 75 can be "associated with" any "rotating component" driven by rotary actuator 44, which includes the crawler track. Ex. 1006, 6:6-11. It was well known to position a rotation sensor at the bottom of a jacking column and use it to sense rotation of the crawler track. Ex. 1007, 5:34-42, 6:12-26, Figs. 4-6 (disclosing synchro 130 at bottom of second section 70 for sensing angle of wheels 90); Ex. 1008, 12:23-46, Fig. 3 (disclosing sensor 506 below extendable support means 62 and above tractor 140); Ex. 1009, ¶ [0021] (disclosing positional reader 34 attached to steering shaft 33 of wheel 32); Ex. 1002, ¶ 77.

A POSITA would have further known from Rio to implement pivot sensor 83 either as a rotary encoder associated with the shaft about which CIII's swing leg pivots or as a linear sensor associated with a linear actuator for pivoting the swing leg. Ex. 1006, 6:22-26; Ex. 1005, 79, 85; Ex. 1002, ¶ 78. The swing leg's pivot sensor and the crawler track's rotation sensor would have allowed CIII's controller

to determine the angle of the crawler tracks relative to the frame regardless of the location of the swing leg. Ex. 1006, 8:31-59, 9:15-21; Ex. 1005, 407-408; Ex. 1002, ¶ 78.

In view of implementing Rio's control system in CIII, a POSITA would have been motivated to further implement a hydraulic actuator, such as CIII's swing cylinder or Rio's rotary or linear actuator, to facilitate pivoting the swing leg about a vertical axis while maintaining the crawler tracks in a desired orientation. Ex. 1005, 34, 79-80, 253-254; Ex. 1006, 4:40-44, 4:61-5:7; Ex. 1011, 3:56-63, Figs. 1, 3; Ex. 1002, ¶ 79; '749 FWD, 62. It would have been obvious to substitute CIII's locking pin (when using CIII's hinge bracket) or CIII's turnbuckles for Rio's automatic anti-swing device 84 to fully automate the rotation of the swing leg "for the convenience of the operator." Ex. 1006, 6:27-37, 8:21-30; Ex. 1005, 79-80; Ex. 1002, ¶ 79. A POSITA would have known that modifying CIII with Rio as described would provide manufacturing cost savings. Ex. 1002, ¶ 79.

A POSITA would have had a reasonable expectation of success in combining CIII and Rio as described. Ex. 1002, ¶ 81; '749 FWD, 57-61. Implementing Rio's actuators and control system on the CIII machine would have constituted nothing more than a combination of well-known prior-art elements according to known methods to yield predictable results. Ex. 1002, ¶ 81; *KSR*, 550 U.S. at 419-20. Rio's actuators and control system already successfully allowed an

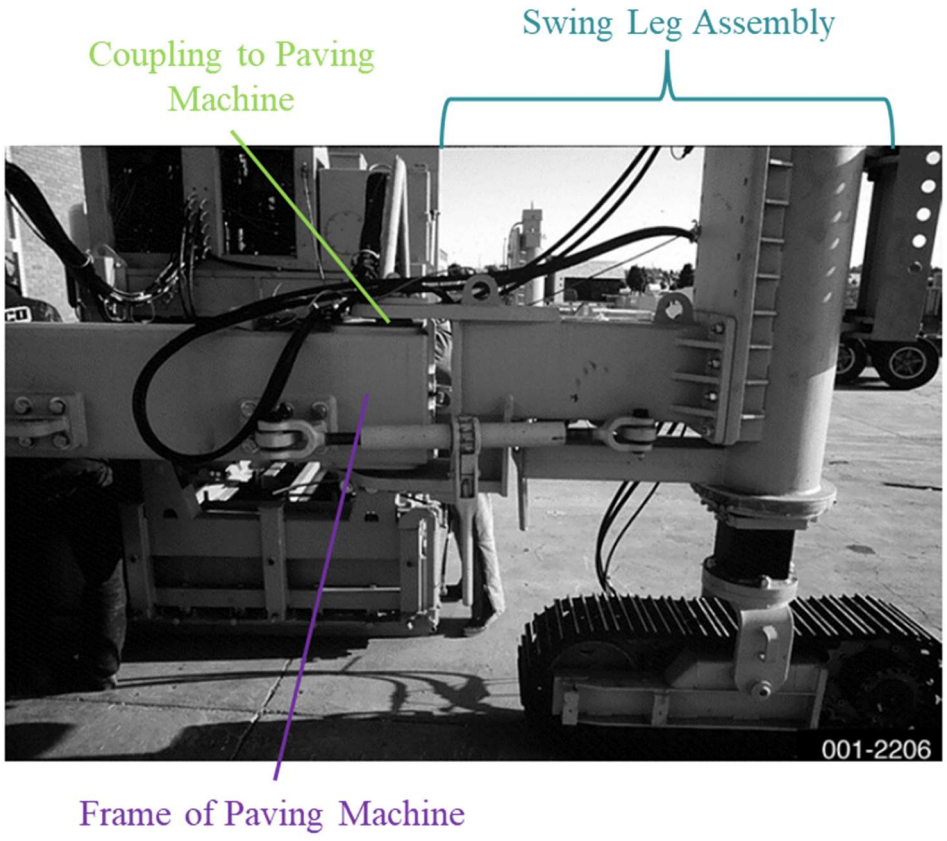
operator to move a swing leg while orienting the associated crawler track in the travel direction. Ex. 1002, ¶ 81; '749 FWD, 57-58. A POSITA would have reasonably expected from Rio's teachings about steering and the use of similar known designs that the design may be implemented as described above with a rotary actuator having sufficient torque. Ex. 1002, ¶ 81; '749 FWD, 57, 59-60. A POSITA would have reasonably expected that Rio's rotary actuators (e.g., its worm-gear design) would support the necessary weight when positioned between the jacking column and crawler track. *See* Ex. 1013, ¶¶ [0041], [0044]-[0045]; Ex. 1009, ¶ [0020], Fig. 2; Ex. 1002, ¶ 81. A POSITA would have recognized that Rio's actuators and control system, when implemented on CIII's paver, would function in the same manner as they functioned on Rio's machine. Ex. 1002, ¶ 81; '749 FWD, 60-61.

**5. Independent Claim 1**

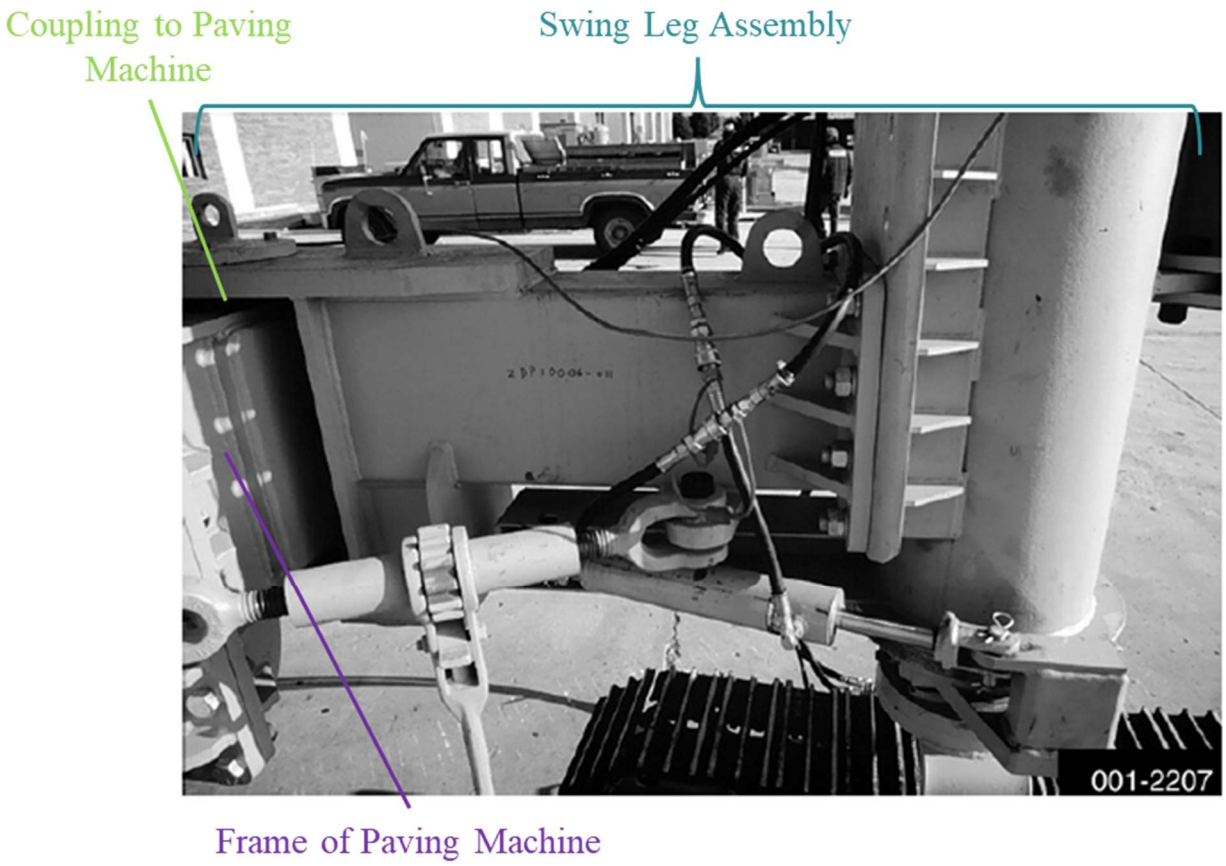
**a. [1pre]: "A swing leg assembly configured to be coupled to a paving machine configured to move in a paving direction for spreading, leveling, and finishing concrete into a form having a generally upwardly exposed, finished concrete surface and terminating in lateral concrete sides, the swing arm assembly comprising:"**

If limiting, CIII discloses this feature. Ex. 1002, ¶¶ 82-83. The Board found that CIII discloses a substantially similar limitation in claim 17 of the '749 patent. Ex. 1033, 23:54-24:2 ("A paving machine configured to move in a paving

direction for laying concrete into a molded form, having a generally upwardly exposed concrete surface and terminating in lateral concrete sides, the paving machine comprising[] … two or more swing leg assemblies ….”); ’749 FWD, 95-96. CIII discloses a four-track configuration with four swing-leg assemblies configured to be coupled to a paving machine. Ex. 1005, 204-206, 209, 253-254, 265; Ex. 1002, ¶ 82. The images below show these swing-leg assemblies coupled to the paving machine:

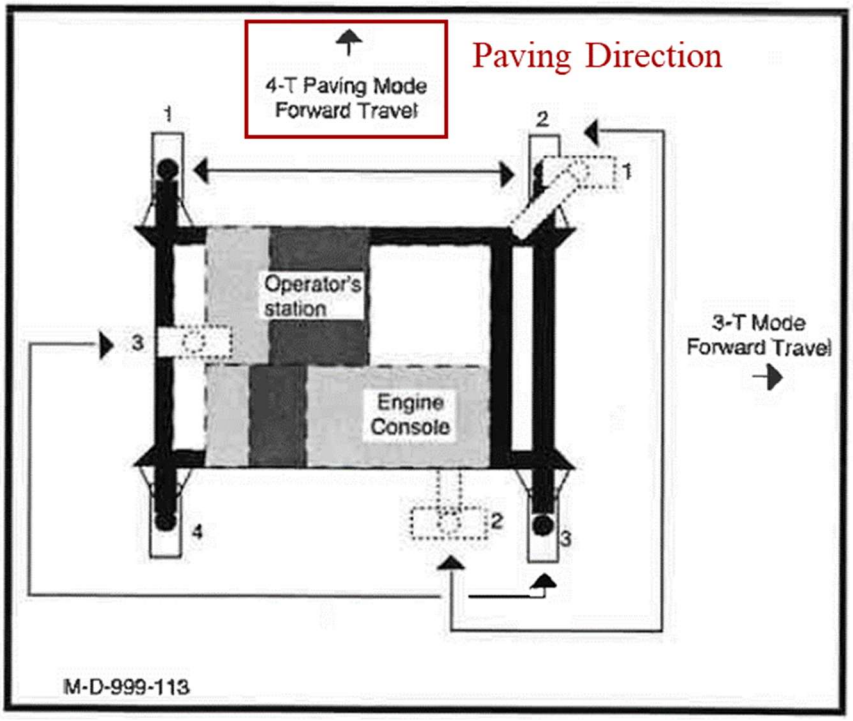



Ex. 1005, 209 (annotated); Ex. 1002, ¶ 82.



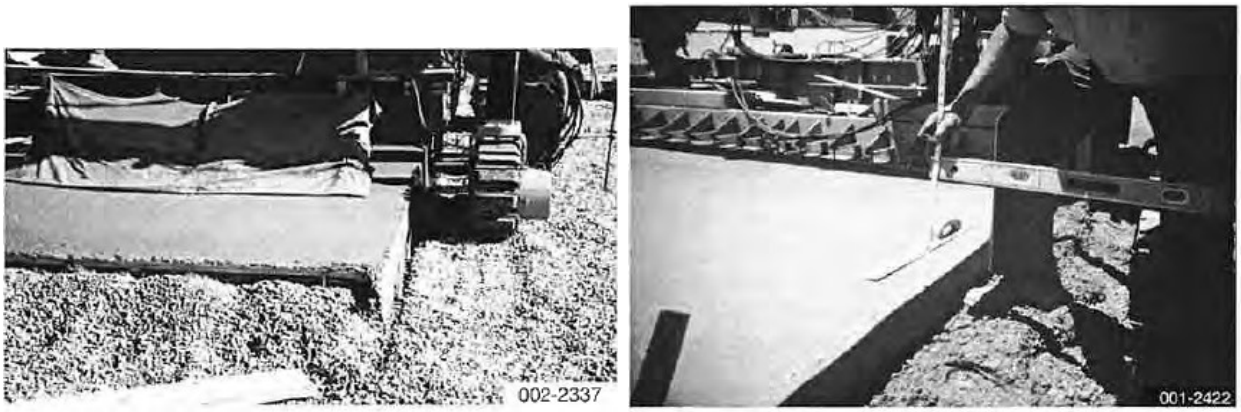

*Id.*, 265 (annotated); Ex. 1002, ¶ 82.

CIII discloses a "Paving Mode" for the four-track configuration, where the paving machine moves in a paving direction indicated by the "Forward Travel" arrow in the image below. Ex. 1005, 204; Ex. 1002, ¶ 83.




Ex. 1005, 204 (annotated top-down view). In this mode, an auger attached to the paving machine spreads concrete placed in front of the paving machine "evenly across the width of the paving mold" that is "mounted to the machine frame." *Id.*, 199, 211, 240-242.

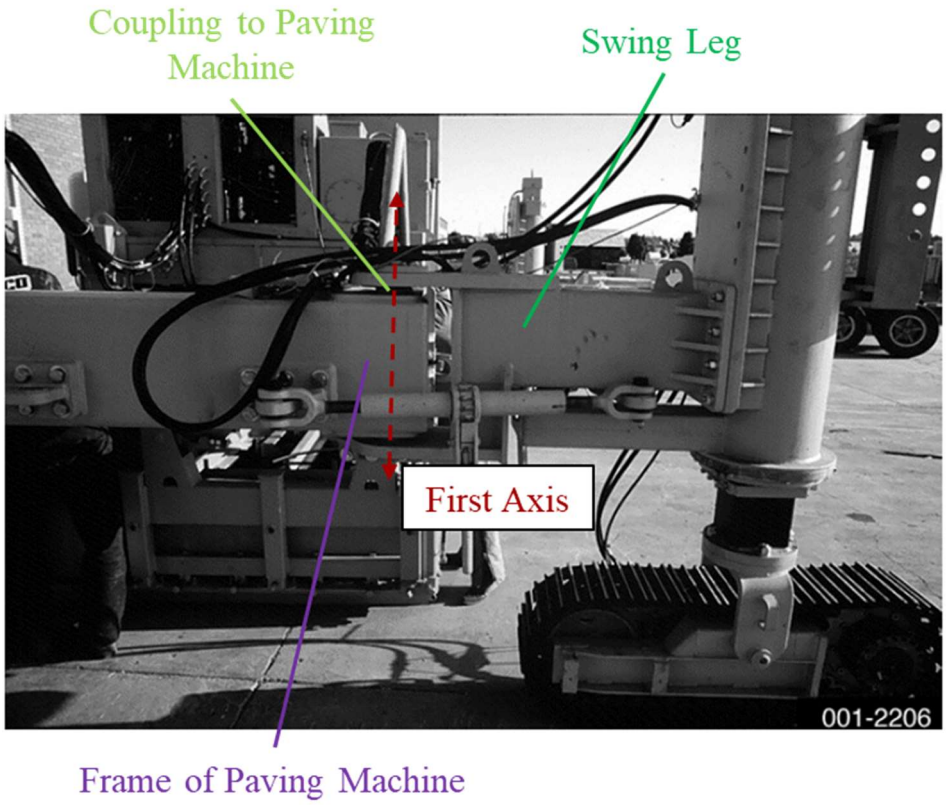
*Id.*, 242 (annotated); Ex. 1002, ¶ 83. As the paving machine moves in the paving direction, it levels and finishes the concrete into a form having a generally upwardly exposed, finished concrete surface and terminating in lateral concrete sides, as shown below. Ex. 1005, 241-245; Ex. 1002, ¶ 83.




Ex. 1005, 241 (left), 243 (right).

**b. [1A]: "a swing leg configured to be coupled to the paving machine, and configured to pivot about a first axis to a first angular orientation relative to the paving machine;"**

CIII discloses this feature. Ex. 1002, ¶ 84. The Board previously found that CIII discloses a similar limitation of the '749 patent. Ex. 1033, 24:4-5 ("a swing leg configured to mechanically couple with a surface of the module frame"), 24:19-21 ("an angular orientation of the swing leg relative to the module frame"), 24:32-33 ("pivotal motions of the swing leg about an upright pivot shaft"); '749 FWD, 64, 66-68, 95-96. CIII discloses four swing legs coupled to the paving machine in its four-track configuration, one of which is shown in the image below. Ex. 1005, 204-206, 209, 253-254; Ex. 1002, ¶ 84.

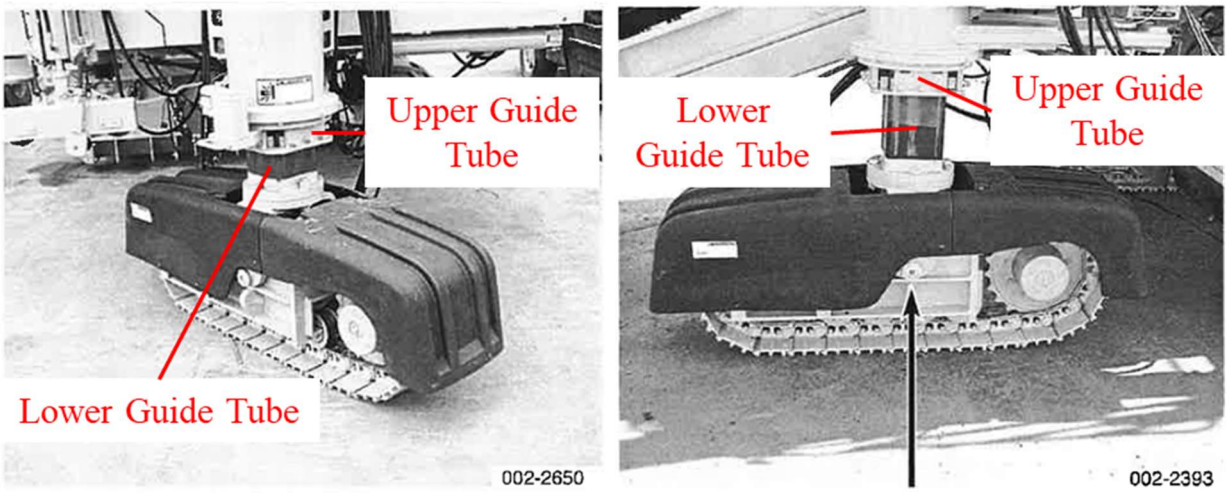



Ex. 1005, 209 (annotated); Ex. 1002, ¶ 84.

Each swing leg pivots about a first axis (labeled above) to a first angular orientation relative to the paving machine. Ex. 1002, ¶ 84. CIII discloses "[s]wing[ing] the swinging legs into position and attach[ing] the turnbuckles on either side of each leg," adjusting their angular orientation left or right by loosening or tightening the turnbuckles, and adjusting the angular orientation of each swing leg to change from the paving mode to the transport mode by removing the turnbuckles and pivoting each leg "around to the end of the 4-track frame" about its axis. Ex. 1005, 209, 253-254; Ex. 1002, ¶ 84.

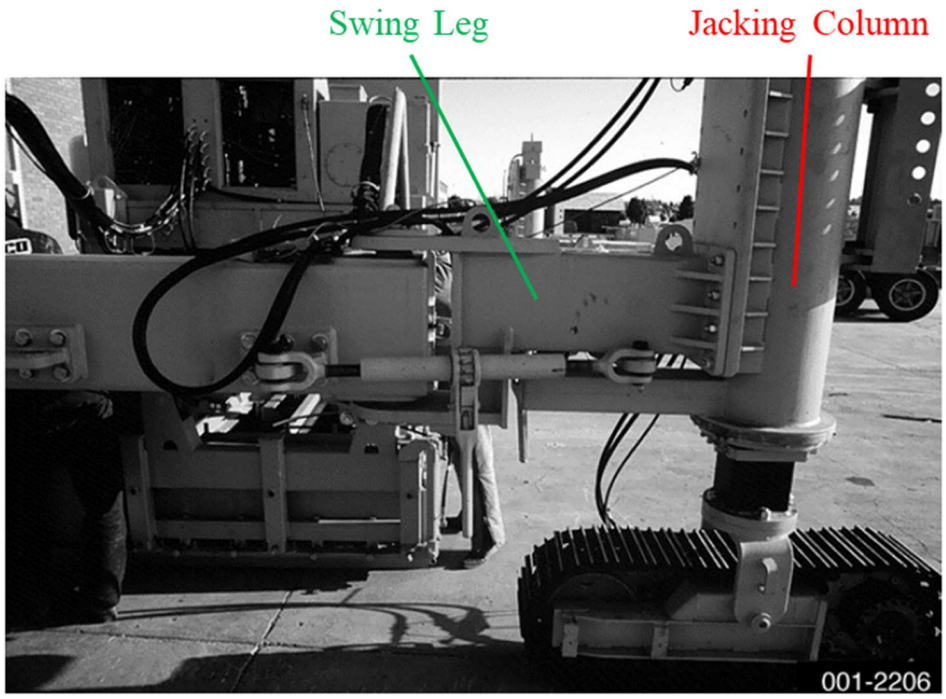
**c. [1B]: "a jacking column coupled to the swing leg;"**

CIII discloses this feature. Ex. 1002, ¶¶ 85-86. The Board previously found that CIII discloses a similar limitation of the '749 patent. Ex. 1033, 24:7 ("an upright jacking column secured to the swing leg"); '749 FWD, 64-65, 95-96. CIII discloses a jacking column that can raise/lower the crawler track or the machine frame. Ex. 1005, 38-39, 44, 74-75, 79. The jacking column includes a lower guide tube that telescopes in and out of an upper guide tube. *Id*., 79, 173; Ex. 1002, ¶ 85; *supra* Section VII.A.1.a.




Ex. 1005, 193, 175 (showing lower guide tube telescoped at different heights).

The same jacking columns are used in CIII's three-track and four-track configurations, with the jacking columns coupled to the swing legs in the four-track configuration, as shown in the image below. *Id.*, 204-206, 209, 265; Ex. 1002, ¶ 86.

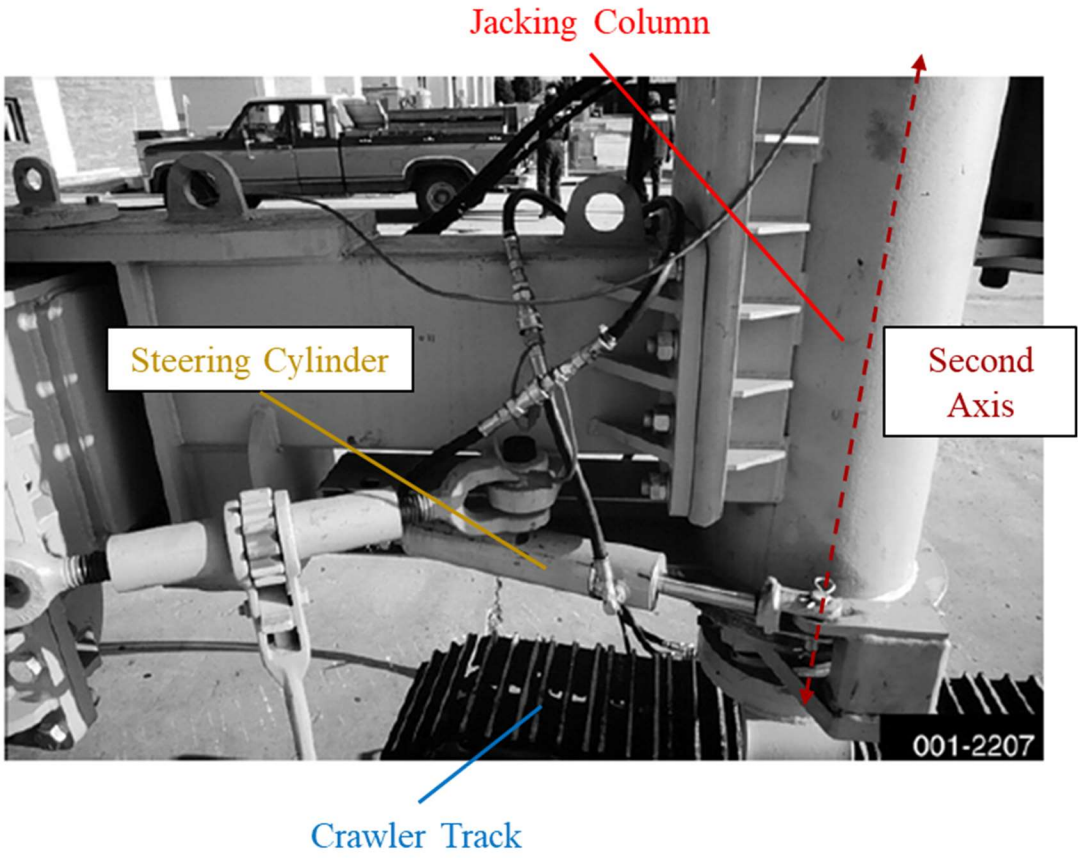



Ex. 1005, 209 (annotated).

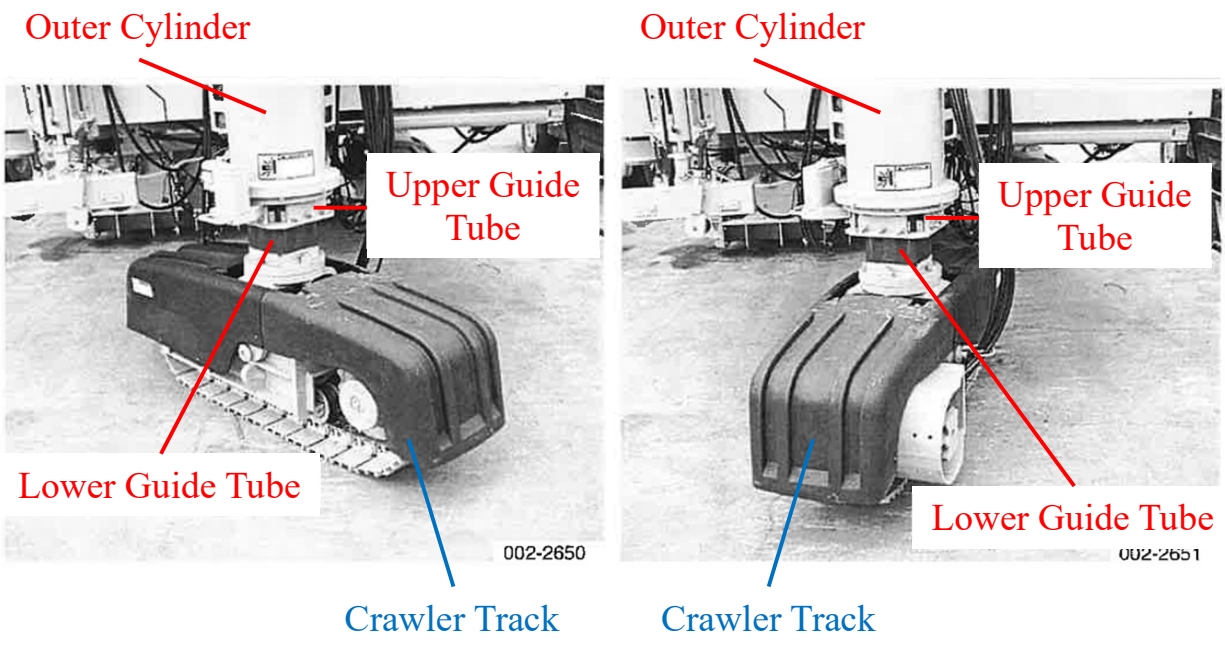
**d. [1C]: "a crawler track rotatably coupled to the jacking column, wherein the crawler track is configured to rotate about a second axis to a second angular orientation relative to the jacking column;"**

CIII and Rio renders obvious this feature. Ex. 1002, ¶¶ 87-89. The Board previously found that CIII and Rio render obvious a similar feature of the '749 patent. Ex. 1033, 24:6 ("a crawler track"), 24:8-11 ("a rotary connection between the jacking column and the crawler track permitting relative rotational movements of the crawler track and the jacking column about a first upright axis"), 24:14-16 ("an angular orientation of the crawler track relative to the jacking column"); '749 FWD, 64-66, 95-96. CIII discloses four crawler tracks in its four-track

configuration, each of which is rotated about the claimed "second axis" to a second angular orientation relative to the outer cylinder of the jacking column via a hydraulic steering cylinder that extends/retracts. Ex. 1005, 165, 193, 195, 204-206, 373-374; *supra* Section VII.A.1.a; Ex. 1002, ¶ 87.




Ex. 1005, 265 (annotated). The rotation of the track and guide tubes relative to the outer cylinder of the jacking column is shown below.




*Id.*, 193, 195 (annotated).

Rio discloses rotary actuator 44 positioned "on the lifting column 46" and "along the lifting column axis 48" (a "second axis") that moves the crawler track "rotationally about the lifting column axis 48." Ex. 1006, 4:56-5:16, 5:32-34, 6:2-6; Ex. 1002, ¶ 88.

For the reasons explained in Section VII.A.4, it would have been obvious to modify each of CIII's swing-leg assemblies by positioning Rio's rotary actuator 44 between the jacking column and crawler track, and using that rotary actuator to rotate CIII's crawler track relative to the entire jacking column, rather than just its outer cylinder. Ex. 1002, ¶ 89. This design was well known. *Supra* Section VII.A.4 (discussing state-of-the-art references with similar design); Ex. 1002, ¶ 89.

**e. [1D]: "a slew drive coupled to the jacking column and the crawler track, wherein the slew drive is configured to cause rotation of the crawler track relative to the jacking column;"**

CIII and Rio render obvious this feature. Ex. 1002, ¶¶ 90-92. The Board previously found that CIII and Rio render obvious a similar feature of the '749 patent. Ex. 1033, 24:22-25 ("a power drive between the jacking column and the crawler track, configured for translating relative rotational movements between the jacking column and the crawler track"), 23:37-38 ("the power drive comprises a slew gear drive"); '749 FWD, 68-79, 95-96, 102. As described in Sections VII.A.4 and VII.A.5.d, it would have been obvious to modify each of CIII's swing-leg assemblies by substituting its steering cylinder for Rio's rotary actuator 44 positioned between the jacking column and crawler track, such that the rotary actuator rotates CIII's crawler track relative to the entire jacking column. Ex. 1002, ¶ 90.

Rio discloses that rotary actuator 44 can use a worm-gear design—a "well-known mechanical implementation[]"—"with good result[s]." Ex. 1006, 4:61-5:3. A POSITA would have understood that Rio's worm-gear rotary actuator discloses a slew drive. Ex. 1002, ¶ 91. Patent Owner's expert represented that a slew gear drive is "a drive that comprises a worm gear." Ex. 1032, 84:12-86:17; *see also*

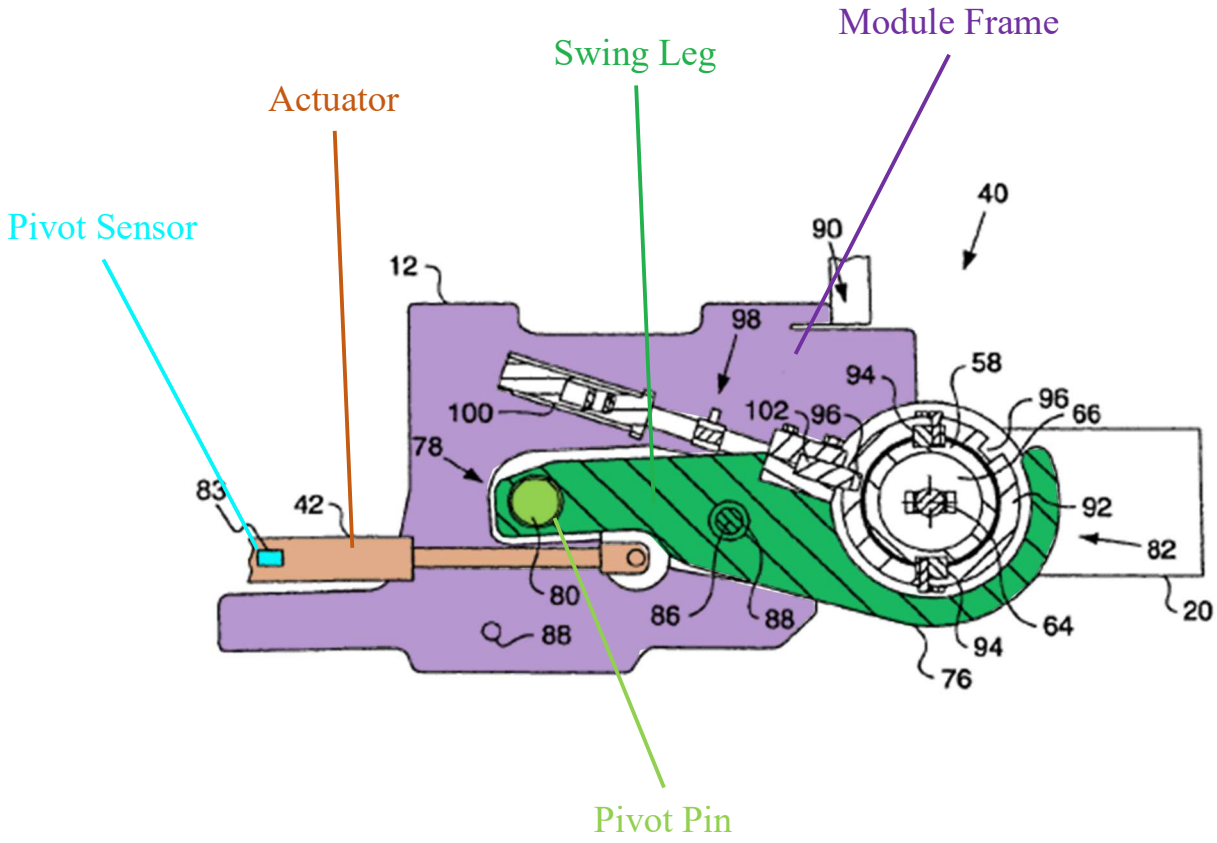
Ex. 1001, 11:40-61 (describing a ring gear "with two oppositely arranged worm drives" as a slew drive).

Rio discloses positioning its rotary actuator 44 "on the lifting column 46" and "along the lifting column axis 48," and discloses using the rotary actuator to cause the crawler track to rotate "about the lifting column axis 48." Ex. 1006, 5:8-11, 6:2-6; Ex. 1002, ¶ 92. For the reasons explained in Sections VII.A.4 and VII.A.5.d, it would have been obvious to modify each of CIII's leg assemblies by coupling Rio's rotary actuator 44 to the jacking column and the crawler track, such that actuating the rotary actuator causes the crawler track to rotate relative to the entire jacking column. Ex. 1002, ¶ 92.

**f. [1E]: "a first sensor configured to emit a first signal corresponding to the first angular orientation;"**

CIII and Rio render obvious this feature. Ex. 1002, ¶¶ 93-94. The Board previously found that CIII and Rio render obvious a similar feature of the '749 patent. Ex. 1033, 24:17-21 ("a second angular position transducer between the swing leg and the module frame, configured to emit a second signal which is indicative of an angular orientation of the swing leg relative to the module

frame")[5]; '749 FWD, 66-67, 95-96. Rio discloses a pivot sensor 83 ("first sensor") associated with the first actuator 42 or pivot pin 80 that emits a pivot position signal 122 ("first signal") "indicating the instantaneous angular position of the swing arm 76 relative to the machine frame 12" (i.e., "corresponding to the first angular orientation") and sends the signal to controller 32. Ex. 1006, 6:22-26, 7:19-23, 8:32-34; Ex. 1002, ¶ 93.



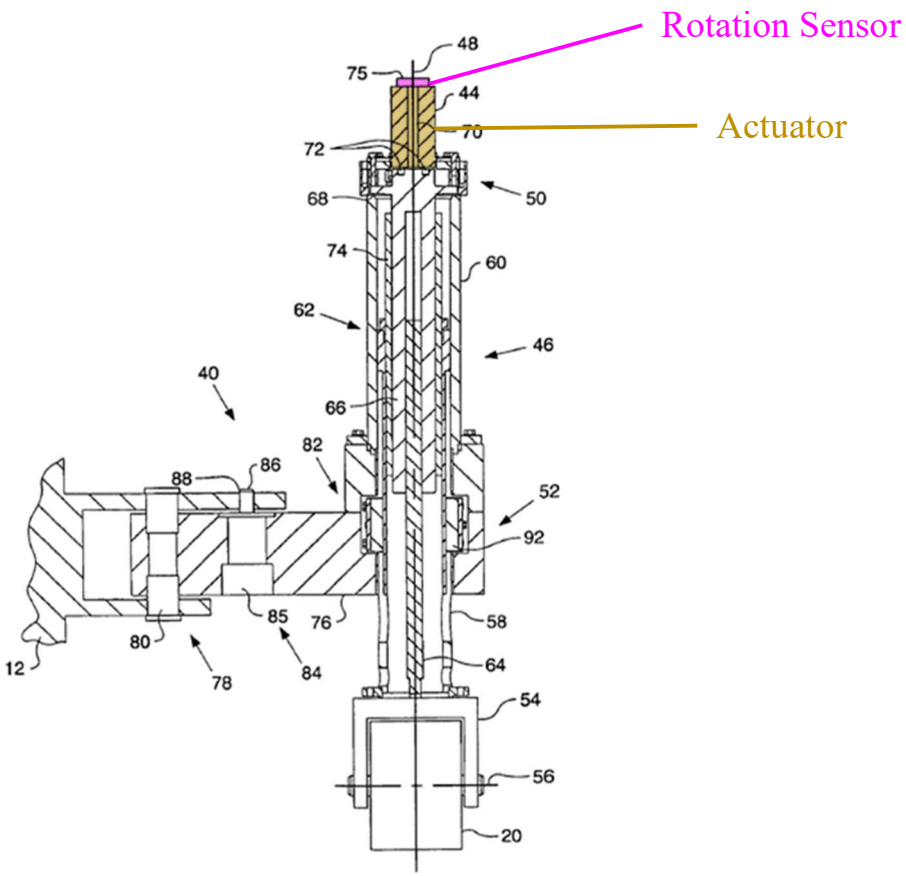

[5] The "first signal" in the '318 patent claims corresponds to the "second signal" in the '749 patent claims, and vice versa. Ex. 1002, ¶ 93.

Ex. 1006, Fig. 3 (annotated).

For the reasons explained in Section VII.A.4, it would have been obvious to implement Rio's pivot sensor 83 in CIII's machine such that it emits a first signal corresponding to the first angular orientation. Ex. 1002, ¶ 94.

**g. [1F]: "a second sensor configured to emit a second signal corresponding to the second angular orientation; and"**

CIII and Rio render obvious this feature. Ex. 1002, ¶¶ 95-100. The Board previously found that CIII and Rio render obvious a similar feature of the '749 patent. Ex. 1033, 24:12-16 ("a first angular position transducer between the jacking column and the crawler track, configured to emit a first signal which is indicative of an angular orientation of the crawler track relative to the jacking column"); '749 FWD, 65-66, 95-96. Rio discloses a rotation sensor 75 ("second sensor") associated with rotary actuator 44 or a "connected rotating component" that "deliver[s] signals representing the rotation angle of the one ground engaging unit 20 relative to the machine frame 12." Ex. 1006, 6:6-11; Ex. 1002, ¶ 96. Sensor 75 emits a rotational position signal 124 associated with the angular position of the crawler track. Ex. 1006, 7:23-27, 8:38-39.




*Id.*, Fig. 2 (annotated).

Because Rio describes sensor 75 as "a rotary encoder" "associated with the second actuator 44" that rotates about lifting column axis 48, a POSITA would have understood that sensor 75's rotation position signal 124 indicates the angular orientation of the crawler track relative to the outer tubular member 60 of lifting column 46 ("second signal corresponding to the second angular orientation"). *Id.*, 6:6-11, 8:39-47, Fig. 2; Ex. 1002, ¶ 97. This is apparent from Rio's depiction of sensor 75 in Figure 2, shown above, which shows sensor 75 coupled to a fixed portion of the rotary actuator 44, which is attached to outer tubular member 60, and

its rotating rotor, meaning the sensor would determine the relative rotation between the outer tubular member of the lifting column and the crawler track. Ex. 1006, 5:54-56, 6:6-11, Fig. 2; Ex. 1002, ¶ 97.

While Rio discloses that the rotational position signal 124 indicates "the instantaneous rotation angle of the one ground engaging unit 20 relative to the machine frame 20," a POSITA would have understood this disclosure as meaning that the controller 32 uses the pivot position signal 122 and rotational position signal 124 to determine the angular orientation of the one ground engaging unit 20 relative to the machine frame to "coordinate the actuators 42, 44" such that "the one ground engaging unit 20 remain[s] parallel to the machine frame 12 at all points in the pivot arc." Ex. 1006, 7:23-27, 8:38-47; Ex. 1002, ¶ 98.

To the extent Patent Owner argues that Rio's sensor 75 does not emit a signal corresponding to the second angular orientation, it would have been obvious to have it do so given the configuration depicted in Rio's Figure 2. Ex. 1002, ¶ 99. A POSITA would have understood that, with the signals from sensors 83 and 75, the controller may determine the angular orientation of the crawler track relative to the machine frame and would have been motivated to have sensor 75 emit a signal corresponding to the second angular orientation because this would have been a simpler design typical of how rotary encoders were used at the time. *Id.*, ¶ 99. CIII already discloses a sensor-based steering cylinder, which measures the crawler

track's rotational position and sends continuous position signals to the S2X controller, and a POSITA would have found it obvious to similarly design sensor 75 to emit such a signal. Ex. 1005, 408, 412; Ex. 1002, ¶ 99.

For these reasons and the reasons explained in Section VII.A.4, it would have been obvious to implement Rio's rotation sensor 75 in CIII's swing-leg assembly such that it emits a second signal corresponding to the second angular orientation. Ex. 1002, ¶ 100.

**h. [1G]: "a processor configured to: …"**

CIII and Rio render obvious this feature. *Id.*, ¶¶ 101-110. The Board previously found that CIII and Rio render obvious a similar feature of the '749 patent. Ex. 1033, 24:26 ("a processor operable to"); '749 FWD, 67-68, 95-96. CIII discloses a controller that receives a steer signal and a signal corresponding to the position of each crawler track and controls each steering cylinder so that the crawler-track position reaches the desired position. Ex. 1005, 407-408. But before this can occur, CIII discloses, each crawler track must be manually aligned to the frame of the paver via time-consuming measurements to calibrate CIII's steering system. *Id.*, 193-194; *supra* Section VII.A.4. Rio discloses a control system that eliminates the need for this alignment procedure after pivoting a swing leg. Ex. 1006, 8:31-9:14; Ex. 1002, ¶ 101. As explained in Section VII.A.4, it would

have been obvious to implement Rio's control system in CIII to improve CIII. Ex. 1002, ¶ 101.

Rio's control system includes a controller 32 that receives signals from the sensors and coordinates movements of the swing leg and crawler track via signals to the actuators. Ex. 1006, 4:16-20, 4:47-50, 6:56-7:42, Fig. 5. A POSITA would have understood that Rio's controller discloses a processor configured to perform the actions in the following sections for [1G1]-[1G4] (Sections VII.A.5.h.i-VII.A.5.h.iv). Ex. 1002, ¶¶ 102-110. It would have been obvious to combine CIII and Rio such that the control system includes a processor configured to perform these actions. Ex. 1002, ¶ 102; *supra* Section VII.A.4.

**i. [1G1]: receive the first signal from the first sensor, and the second signal from the second sensor;**

The modified CIII-Rio controller is configured to receive the pivot position signal 122 ("first signal") from the pivot sensor 83 ("first sensor") and the rotational position signal 124 ("second signal") from the rotation sensor 75 ("second sensor"). Ex. 1006, 6:65-66, 7:11-13, 8:32-34, 8:38-39; Ex. 1002, ¶ 103; *supra* Sections VII.A.5.f (identifying the same first sensor and first signal from Rio), VII.A.5.g (identifying the same second sensor and second signal from Rio). The Board previously found that CIII and Rio render obvious a similar feature of the '749 patent. Ex. 1033, 24:26-27 ("receive the first and second signals"); '749

FWD, 67-68, 95-96. For example, Rio discloses that controller 32 receives "a ground engaging unit pivot position signal 122[] and a ground engaging unit rotational position signal 124," and uses these signals "to coordinate activation of the first and second actuators 42, 44." Ex. 1006, 6:65-7:13, 8:38-41, Fig. 5; Ex. 1002, ¶ 103.

**ii. [1G2]: "determine a change of the first angular orientation based on the first signal;"**

The modified CIII-Rio controller is configured to determine a change of the angular orientation of the swing leg relative to the machine frame ("first angular orientation") based on the pivot position signal 122 ("first signal"). Ex. 1006, 6:65-66, 7:11-12, 7:19-23; Ex. 1002, ¶¶ 104-105. The Board previously found that CIII and Rio render obvious a similar feature. '749 FWD, 67-68, 95-96 (finding that "CIII, as modified by Rio's teachings of its control system, discloses the subject matter of the 'processor' limitation" based in part on Rio's teaching that "controller 32 actuates first actuator 42 to move swing arm 76 and pivot sensor 83 tracks the movement," and that "controller 32 uses signals 122, 124 to maintain the track in the same running direction"); Ex. 1002, ¶¶ 53, 104 (stating that this portion of the '749 FWD "means that a change of the angular orientation of Rio's swing arm relative to the frame (the '318 patent's 'first angular orientation') is determined based on the corresponding signal 122 indicating the angular

orientation of the swing arm relative to the frame (the '318 patent's 'first signal') so that the corresponding change to the angular orientation of the crawler track can be made"); *see* Ex. 1033, 24:26-33.

For example, Rio discloses that "pivot sensor 83 tracks" the movement of the swing arm 76 "and sends responsive pivot position signals 122 to the controller 32," which uses this signal to counter-rotate the one ground engaging unit 20 "to continuously and precisely offset the rotation caused by the pivoting, resulting in the one ground engaging unit 20 remaining parallel to the machine frame 12 at all points in the pivot arc." Ex. 1006, 8:31-47; Ex. 1002, ¶ 105. A POSITA would have understood that this discloses the controller determining a change of the swing leg's angular orientation based on the signal from the pivot sensor 83. Ex. 1002, ¶ 105.

**iii. [1G3]: "in response to determining the change of the first angular orientation, determine a target second angular orientation based on the determined change of the first angular orientation and the second angular orientation based on the second signal; and"**

The modified CIII-Rio controller is configured such that, in response to determining the change of the angular orientation of the swing leg relative to the machine frame ("first angular orientation"), it determines a target second angular orientation for the crawler track based on the determined change of the first

angular orientation and the angular orientation of the crawler track relative to the swing leg ("second angular orientation") based on the signal from the rotation sensor indicating the angular orientation of the crawler track relative to the swing leg ("second signal"). Ex. 1006, 2:52-57, 3:5-22, 4:47-50, 7:23-36, 8:31-9:14; Ex. 1002, ¶¶ 106-108.

The Board previously found that CIII and Rio render obvious a similar feature. '749 FWD, 67-68, 95-96 (finding that "CIII, as modified by Rio's teachings of its control system, discloses the subject matter of the 'processor' limitation" based in part on Rio's teaching that "controller 32 actuates first actuator 42 to move swing arm 76 and pivot sensor 83 tracks the movement," and that "controller 32 uses signals 122, 124 to maintain the track in the same running direction"); Ex. 1002, ¶¶ 53, 106 (stating that this portion of the '749 FWD "means that, in response to determining the change of the angular orientation of Rio's swing arm relative to the frame (the '318 patent's 'first angular orientation'), a target angular orientation of Rio's track relative to its lifting column (the '318 patent's 'second angular orientation') is determined based on the determined change of the angular orientation of Rio's swing arm relative to the frame (the '318 patent's 'first angular orientation') and the angular orientation of Rio's track relative to its jacking column (the '318 patent's 'second angular orientation') based on the corresponding signal 124 indicating the angular orientation of the track

relative to the lifting column (the '318 patent's 'second signal') so that the corresponding change to the angular orientation of the crawler track can be made"); *see* Ex. 1033, 24:26-33.

For example, Rio discloses that controller 32 receives signals from the pivot sensor 83 and rotation sensor 75, and "may send control signals to" the first and second actuators 42, 44. Ex. 1006, 7:19-33; Ex. 1002, ¶ 107. Rio discloses that controller 32 uses the pivot position signal 122 to determine the change of the swing leg's angular orientation relative to the machine frame and "responsively actuates the second actuator 44 to counter-rotate the one ground engaging unit 20 to maintain it in the same running direction" as the swing leg pivots. Ex. 1006, 8:31-37; Ex. 1002, ¶ 107. "As counter-rotation begins, the rotation sensor 75 sends rotation position signals 124 to the controller 32," which "uses the pivot and rotation signals 122, 124 to coordinate activation of the first and second actuators 42, 44 … in a manner to cause the counter-rotation of the one ground engaging unit 20 to continuously and precisely offset the rotation caused by the pivoting, resulting in the one ground engaging unit 20 remaining parallel to the machine frame 12 at all points in the pivot arc." *Id.*, 8:38-47.

A POSITA would have understood that this discloses the controller, in response to determining the change of the angular orientation of the swing leg as it moves between different positions, determining a target angular orientation for the

crawler track, i.e., an angular orientation that maintains it parallel to the machine frame, based on this determined change of the angular orientation of the swing leg and the second angular orientation based on the second signal. Ex. 1002, ¶ 108.

**iv. [1G4]: "send a control signal to the slew drive in order to cause the second angular orientation of the crawler track to rotate to the target second angular orientation."**

The modified CIII-Rio controller is configured to send a control signal to the worm-gear rotary actuator 44 ("slew drive") to cause the angular orientation of the crawler track relative to the jacking column ("second angular orientation of the crawler track") to rotate to the target second angular orientation. Ex. 1006, 2:52-57, 3:5-22, 4:47-50, 4:61-5:3, 7:28-36, 8:31-9:14; Ex. 1002, ¶¶ 109-110. The Board previously found that CIII and Rio render obvious a similar feature of the '749 patent. Ex. 1033, 24:27-30 ("emit a control signal for activating the power drive and thereby rotationally move the crawler track relative to the jacking column to maintain an orientation of the crawler track"); '749 FWD, 67-68, 95-96.

For example, Rio discloses that controller 32 "may send control signals to" the worm-gear rotary actuator 44. Ex. 1006, 7:19-33, 4:61-5:3. Controller 32 "responsively actuates the second actuator 44 to counter-rotate the one ground engaging unit 20 to maintain it in the same running direction" as the swing leg pivots. *Id.*, 8:31-37. Specifically, Rio discloses that the controller 32 coordinates

"activation of the first and second actuators 42, 44 … in a manner to cause the counter-rotation of the one ground engaging unit 20 to continuously and precisely offset the rotation caused by the pivoting, resulting in the one ground engaging unit 20 remaining parallel to the machine frame 12 at all points in the pivot arc." *Id.*, 8:38-47. A POSITA would have understood that this discloses the controller sending a control signal to the slew drive to cause the second angular orientation of the crawler track to rotate to the target second angular orientation. Ex. 1002, ¶ 110.

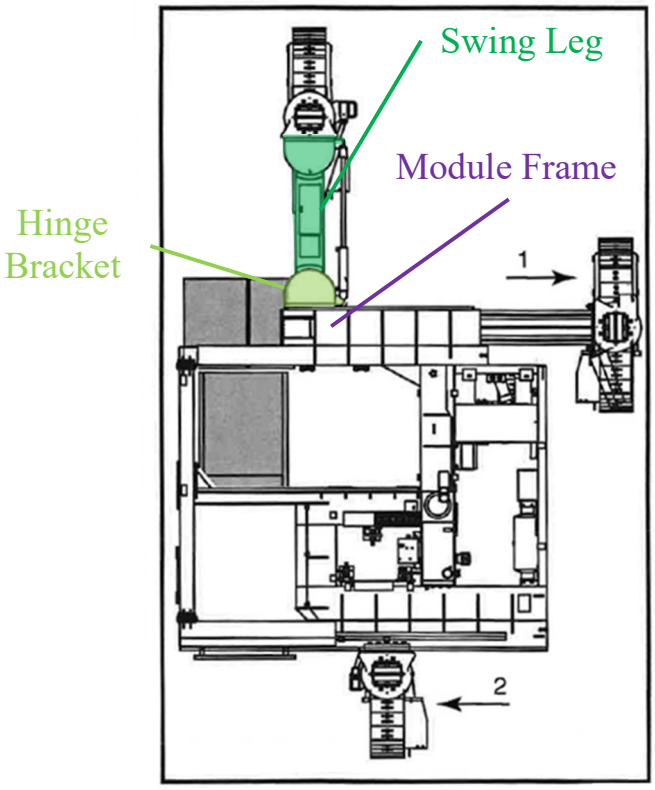
#### 6. Claim 2: "The swing leg assembly of claim 1, further comprising a hinge bracket arranged to be interposed between the swing leg and a surface of a module frame of the paving machine."

CIII alone or CIII and Rio render obvious this feature.[6] *Id.*, ¶¶ 111-117. The Board previously found that CIII discloses a similar feature of the '749 patent in its three-track configuration and that CIII and Rio render obvious a similar feature of the '749 patent in its four-track configuration.[7] Ex. 1033, 23:2-3, 24:36-37 (both,

[6] The unpatentability arguments presented in this Petition for any base claim from which a claim depends apply equally to the dependent claim.

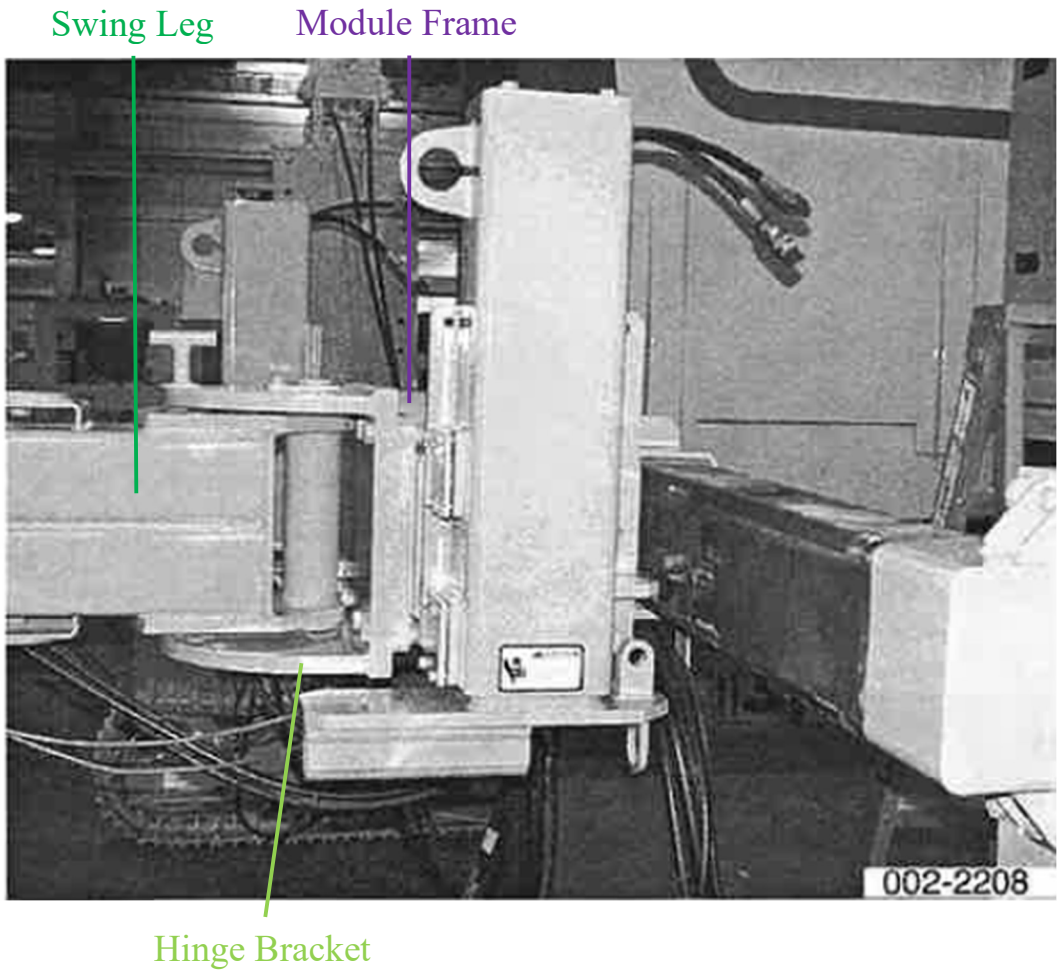
[7] Claim 18 of the '749 patent, which depends from claim 17, requires "two or more swing leg assemblies," Ex. 1033, 24:2, so the Board's analysis for this

"a hinge bracket arranged to be interposed between the swing leg and the surface of the module frame"); '749 FWD, 96-97, 105-106. CIII discloses a hinge bracket in its three-track configuration arranged to be interposed between the swing leg and a surface of the module frame of the paving machine, as shown below. Ex. 1002, ¶ 111.



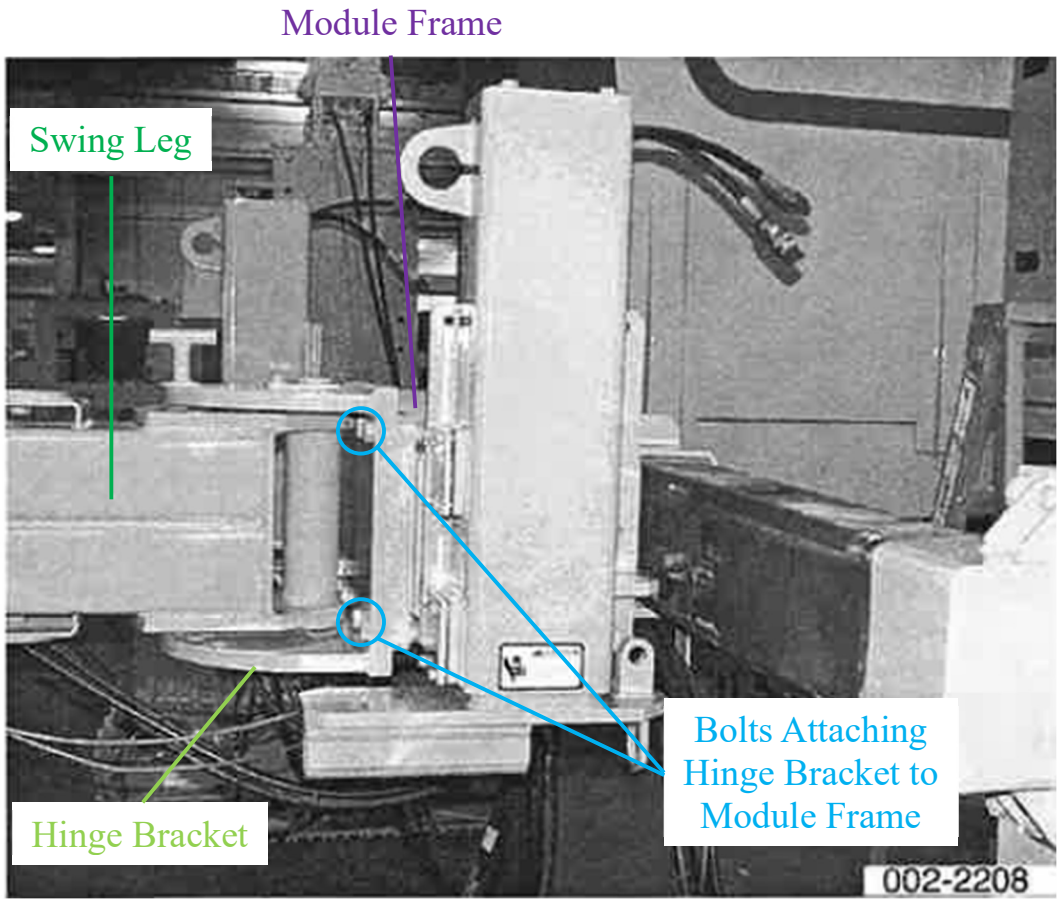

Ex. 1005, 76 (annotated).

claim also includes a third reference for the disclosure of "hinged brackets on multiple swing legs." '749 FWD, 105. No such requirement exists here.




*Id.*, 85 (annotated).

A POSITA would have recognized that this hinge bracket provides an easy-to-assemble/disassemble bracket attachable/removable from the frame, allowing for removal of the entire swing-leg apparatus. *Id.*, 204; Ex. 1002, ¶ 112.




Ex. 1005, 85 (annotated).

It would have been obvious to use this hinge bracket to attach each of the four swing legs (or at least one) to the module frame in the four-track configuration, *supra* Section VII.A.5.b, because this design permits easy attachment and removal of each swing-leg assembly. Ex. 1002, ¶ 113. A POSITA would have recognized that the ability to quickly attach and remove each swing-leg assembly facilitates swing-leg maintenance, allows greater flexibility in paving configurations, and allows faster changes between configurations. *Id.*, ¶ 113. Interposing a hinge bracket, like the one for CIII's three-track configuration, would

have been beneficial for at least CIII's left-rear swing-leg assembly, which CIII discloses removing in a multi-step process when setting up the four-track configuration for its "Minimum Clearance Setup." Ex. 1005, 255; Ex. 1002, ¶ 114. Incorporating a hinge bracket would have simplified the removal of this swing-leg assembly from the frame, thus improving efficiency in changing configurations. Ex. 1002, ¶ 114.

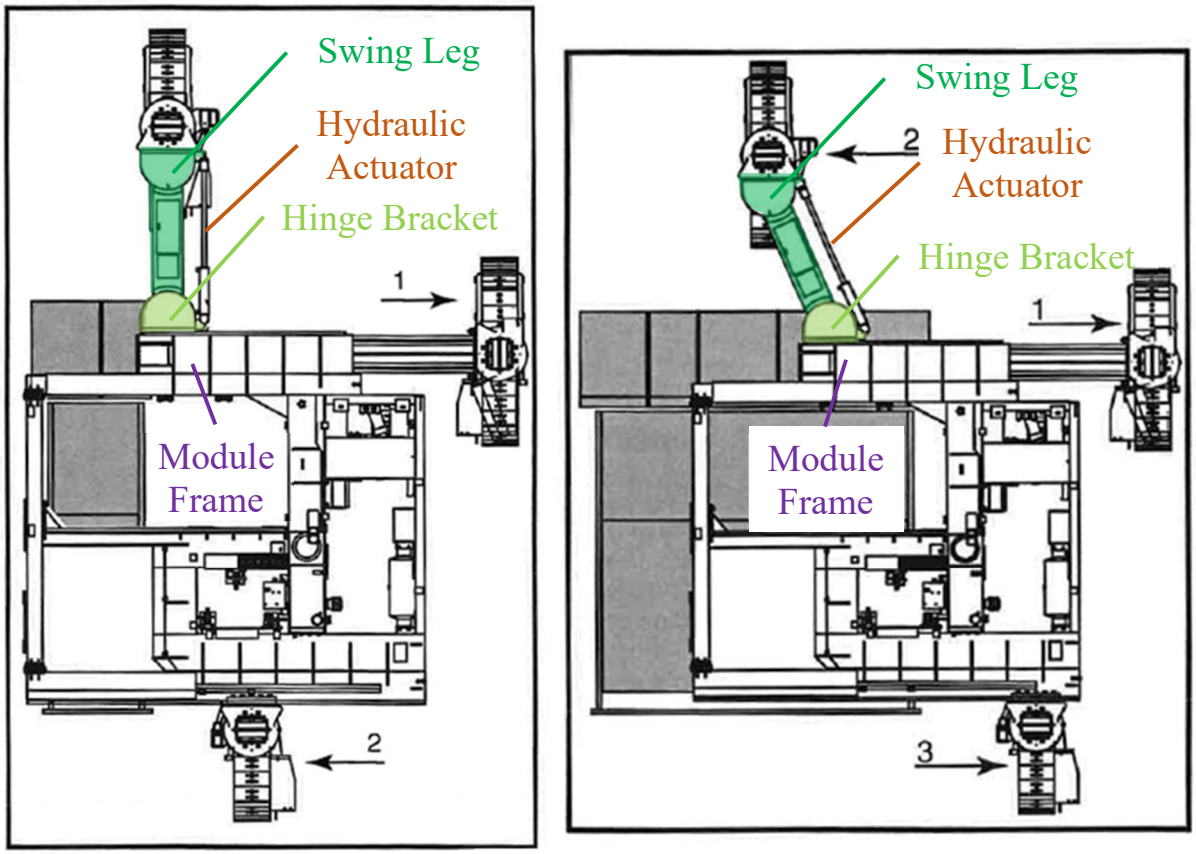
A POSITA would have been motivated to modify CIII in this way because it would have reduced manufacturing costs. *Id.*, ¶ 115. CIII discloses a swing leg in its three-track configuration that, when the machine is changed to its four-track configuration, is not used. Ex. 1005, 204 (disclosing that the left front leg pivot "will not be used"). By incorporating CIII's hinge bracket into the swing-leg assemblies of the four-track configuration, it would have allowed the machine to use the same swing leg in both configurations, thereby reducing the need to manufacture separate swing legs for each configuration. Ex. 1002, ¶ 115.

A POSITA would have had a reasonable expectation of success in such a modification, as this would have simply been a combination of familiar elements according to known methods to yield predictable results. *Id.*, ¶¶ 116-117. CIII discloses that this hinge bracket works well with the three-track configuration, and a POSITA would have likewise expected it to work in the four-track configuration. References like U.S. Patent No. 3,792,745 ("Files"; Ex. 1012) disclose a similar

hinge bracket between the frame and each of the four swing legs in a similar machine, further confirming the expectation of success. Ex. 1012, 2:57-61, Fig. 2; Ex. 1002, ¶ 116.

**7. Claim 3: "The swing leg assembly of claim 2, further comprising a hydraulic actuator mounted between the hinge bracket and the swing leg, wherein the hydraulic actuator is configured to cause the swing leg to pivot relative to the module frame."**

CIII alone or CIII and Rio render obvious this limitation. Ex. 1002, ¶¶ 118-120. The Board previously found that CIII discloses a similar feature of the '749 patent in its three-track configuration and that CIII and Rio render obvious a similar feature of the '749 patent in its four-track configuration. Ex. 1033, 23:12-14, 24:45-47 (both, "a hydraulic actuator mounted between the hinge bracket and the swing leg, permitting the swing leg to pivot relative to the module frame"); '749 FWD, 97, 105-106; *supra* note 7. CIII's hinge bracket in the modified CIII-Rio paver, *supra* Section VII.A.6, includes a "swing cylinder" ("hydraulic actuator") mounted between the hinge bracket and swing leg, permitting the swing leg to pivot relative to the module frame. Ex. 1005, 76, 79-80; Ex. 1002, ¶ 118; *supra* Section VII.A.6. CIII illustrates the swing cylinder causing the swing leg to pivot relative to the module frame in the below images. Ex. 1002, ¶ 118.




Ex. 1005, 76 (annotated).

Because this hinge bracket is already designed to accommodate a hydraulic actuator, it would have been obvious to mount CIII's swing cylinder or Rio's linear actuator 42 between CIII's hinge bracket and the swing leg to pivot the swing leg. *Id.*, 76, 79-80; Ex. 1006, Figs. 3-4, Claims 1, 12; Ex. 1002, ¶ 119. In its four-track configuration, CIII discloses turnbuckles that, to pivot the swing leg, must be either manually loosened/tightened or removed entirely. Ex. 1005, 209, 253. CIII also discloses a need to pivot the swing legs "to bypass obstacles or for narrow clearances." *Id.*, 209; Ex. 1002, ¶ 119.

A POSITA would have been motivated to replace these turnbuckles with a hydraulic actuator, as disclosed in CIII's three-track configuration and in Rio, mounted between the hinge bracket and the swing leg to facilitate the pivoting of the swing leg, improving usability and the speed of changing swing-leg positions. Ex. 1002, ¶ 120; *supra* Sections VII.A.4, VII.A.6. Doing so would have replaced the time-consuming manual adjustments to a turnbuckle with the quicker, less labor-intensive press of a button. Ex. 1005, 79-80. Ex. 1002, ¶ 120. It also would have allowed the swing-leg assemblies to be more easily attached and removed because removing the hinge bracket from the frame of the paving machine would detach essentially the entire swing-leg assembly, thereby reducing the time needed to change configurations. Ex. 1002, ¶ 120.

**8. Claim 4: "The swing leg assembly of claim 2, wherein the hydraulic actuator is configured to be disengaged from at least one of the hinge bracket and the swing leg when the swing leg is positioned in a transport orientation."**

CIII renders obvious this limitation. *Id.*, ¶¶ 121-123. The Board previously found that CIII discloses an identical feature of the '749 patent in its three-track configuration and that CIII renders obvious an identical feature of the '749 patent in its four-track configuration. Ex. 1033, 23:15-18, 24:47-50 (both, "wherein the hydraulic actuator is configured to be disengaged from at least one of the hinge

bracket and the swing leg when the swing leg is positioned in a transport orientation"); '749 FWD, 98, 105-106; *supra* note 7.

CIII discloses a transport orientation for its four-track configuration, shown below, where the turnbuckles are removed and the four swing legs are pivoted to the ends of the frame. Ex. 1005, 253-254; Ex. 1002, ¶ 122.

Ex. 1005, 253.

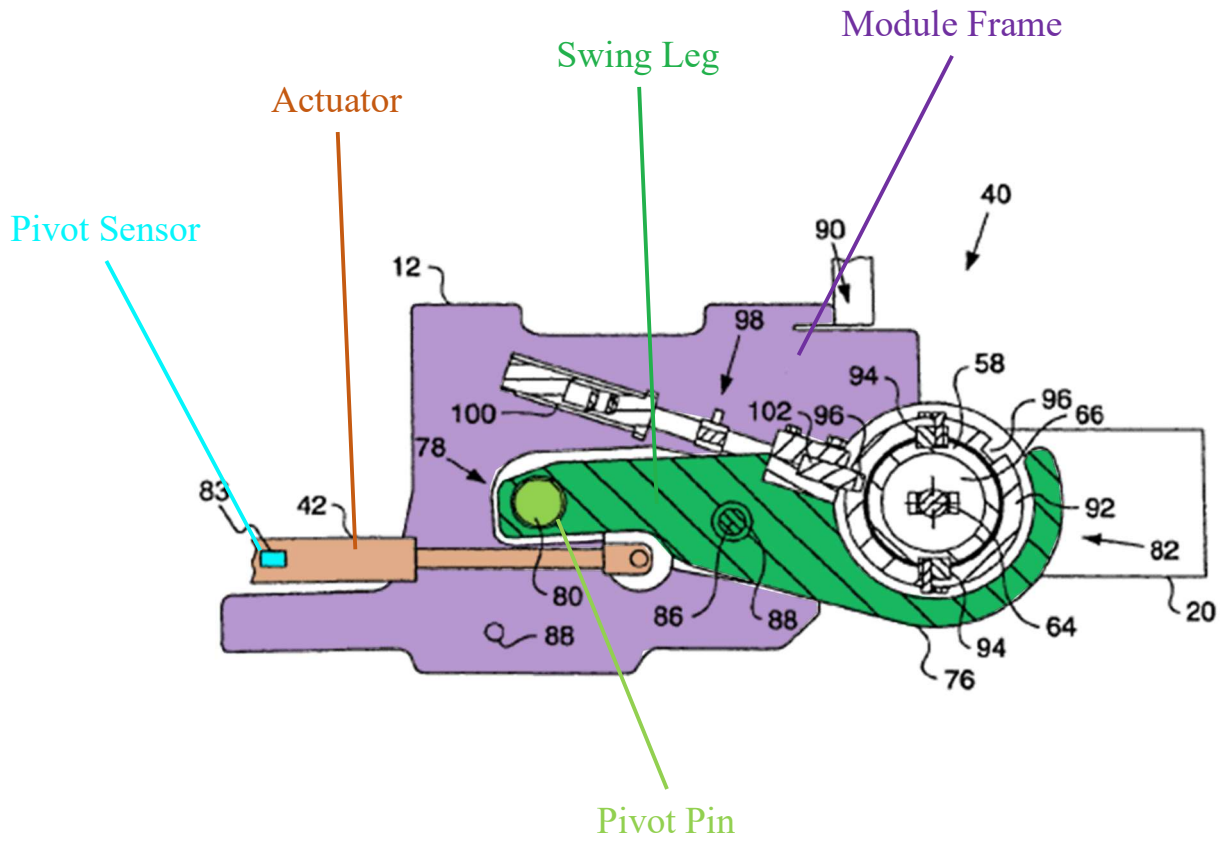
With this in mind, a POSITA would have recognized that for swing-leg assemblies with linear actuators, *supra* Section VII.A.7, those actuators likewise would need to be removed to prevent them from interfering with the swing leg's path to the compact transport position. *Id.*, 76 (disclosing the "maximum left

position" of the swing-leg assembly); Ex. 1002, ¶ 123. CIII's disclosures regarding disconnecting turnbuckles in transport mode provide motivation for doing the same with actuators. Ex. 1005, 253; Ex. 1002, ¶ 123. It would have been obvious to provide more range of motion in CIII's transport mode by disengaging each linear actuator from the hinge bracket and swing legs, thereby allowing each swing leg to pivot to the end of the frame. Ex. 1005, 253-254; Ex. 1002, ¶ 123. Doing so would have involved known methods to achieve predictable results, especially since CIII already discloses this disconnection operation for turnbuckles. Ex. 1002, ¶ 123.

#### 9. Claim 5: "The swing leg assembly of claim 2, wherein the first sensor is positioned between the swing leg and the hinge bracket."

CIII and Rio render obvious this feature. *Id.*, ¶¶ 124-128. The Board previously found that CIII and Rio render obvious a similar feature of the '749 patent. Ex. 1033, 23:21-23 ("wherein the second angular position transducer is positioned between the swing leg and the hinge bracket"); '749 FWD, 99. Rio discloses a pivot sensor 83 ("first sensor") that emits a pivot position signal 122 "indicating the instantaneous angular position of the swing arm 76 relative to the machine frame 12." Ex. 1006, 6:22-26, 7:19-23; Ex. 1002, ¶ 124. It would have been obvious to modify CIII to incorporate Rio's pivot sensor 83. *Supra* Sections VII.A.4, VII.A.5.f.

Rio discloses that its pivot sensor 83 can be "a linear sensor associated with the first actuator 42" and depicts the pivot sensor 83 within the linear actuator that pivots the swing leg relative to the module frame, as shown below. Ex. 1006, 6:22-26; Ex. 1002, ¶ 125.

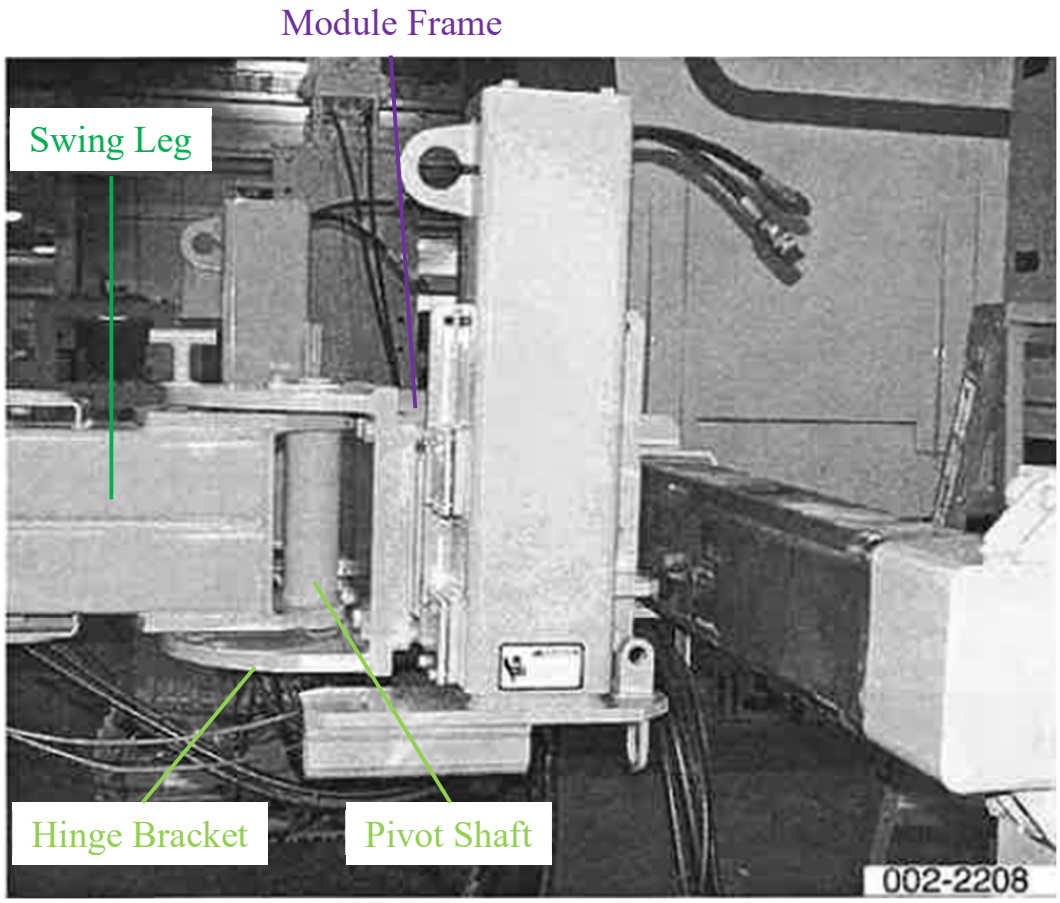



Ex. 1006, Fig. 3 (annotated). Rio also discloses that the pivot sensor 83 can be "a rotary encoder associated with the pivot pin 80." *Id.*, 6:22-26; Ex. 1002, ¶ 126.

For the reasons explained in Section VII.A.7, it would have been obvious to incorporate a hydraulic linear actuator mounted between a hinge bracket and the swing leg that is configured to cause the swing leg to pivot relative to the module

frame. Ex. 1002, ¶ 127. Because this linear actuator is mounted between a hinge bracket and the swing leg, incorporating Rio's pivot sensor 83 as a linear sensor in the linear actuator would result in a first sensor positioned between the swing leg and the hinge bracket. *Id.*, ¶ 127. Given Rio's disclosure of a linear sensor positioned in a linear actuator, this would have been an obvious design choice and a simple combination of familiar elements according to known methods to yield predictable results. Ex. 1006, 6:22-26, Fig. 3; Ex. 1002, ¶ 127.

CIII and Rio also render obvious an alternative way to implement Rio's pivot sensor 83 between the swing leg and the hinge bracket. Ex. 1002, ¶ 128. Similar to Rio's pivot pin 80, CIII's hinge bracket includes a pivot shaft, about which the swing leg rotates. *Id.*



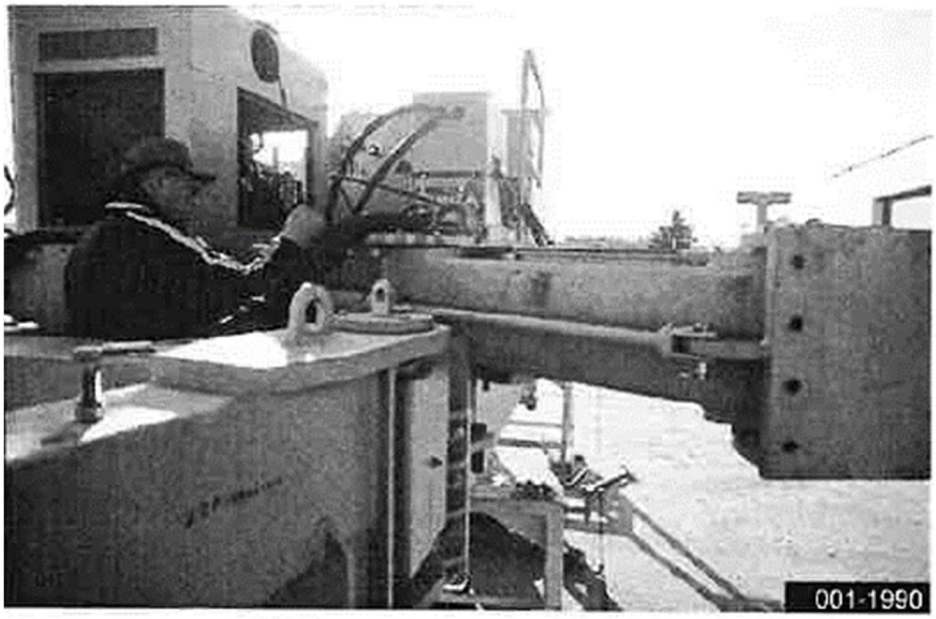

Ex. 1005, 85 (annotated).

For the reasons explained in Section VII.A.6, it would have been obvious to incorporate CIII's hinge bracket into its four-track configuration. Ex. 1002, ¶ 128. Considering Rio's disclosure that sensor 83 can be "a rotary encoder associated with the pivot pin 80," about which the swing arm 76 rotates, Ex. 1006, 6:22-26, Figs. 3-4, it would have been obvious to associate Rio's sensor 83 with the pivot shaft of CIII's hinge bracket such that the sensor is positioned between the swing leg and hinge bracket. *Supra* Sections VII.A.4, VII.A.6; Ex. 1002, ¶ 128. This would have been an obvious design choice and a simple combination of familiar

elements according to known methods to yield predictable results. Ex. 1006, 6:22-26; Ex. 1002, ¶ 128.

**10. Claim 6: "The swing leg assembly of claim 2, wherein the swing leg assembly is configured to be removably coupled to the module frame."**

CIII renders obvious this feature. Ex. 1002, ¶¶ 129-131. The Board previously found that CIII and Rio render obvious a similar feature of the '749 patent. Ex. 1033, 23:46-47 ("wherein the swing leg assembly is removably coupled to the module frame"); '749 FWD, 103. CIII discloses steps for converting the paver between three-track and four-track configurations. Ex. 1005, 204-206. When converting from the three-track to the four-track configuration, the swing-leg assembly in its three-track configuration is removed from the frame ("module frame"). *Id.*, 204; Ex. 1002, ¶ 129.



Ex. 1005, 204 (showing removal of jacking column from swing leg and swing leg from module frame).

For the reasons explained in Section VII.A.6, it would have been obvious to use CIII's hinge bracket in its four-track configuration to attach the swing legs to the module frame. For example, this design would have permitted easy attachment and removal of each swing-leg assembly, meaning each swing-leg assembly would have been removably coupled to the module frame. Ex. 1002, ¶ 130. A POSITA would have recognized that the ability to quickly attach and remove each swing-leg assembly facilitates swing-leg maintenance, allows greater flexibility in paving configurations, and allows faster changes between configurations. *Id.*, ¶ 130.

Moreover, a POSITA would have been motivated to modify CIII in this way to reduce manufacturing costs. *Id.*, ¶ 131. For example, the swing leg in CIII's three-track configuration is not used when the machine is changed to its four-track configuration. Ex. 1005, 204 ("Set the left front leg pivot off to the side of the work area as it will not be used."). By incorporating CIII's hinge bracket into the swing-leg assemblies of the four-track configuration, it would have allowed the machine to use the same swing leg in both configurations, reducing the need to manufacture separate swing legs for each configuration. Ex. 1002, ¶ 131.

### 11. Claim 7: "The swing leg assembly of claim 2, wherein the swing leg is configured to change orientation by up to 180° relative to the module frame."

CIII and Rio render obvious this feature. *Id.*, ¶¶ 132-134. The Board previously found that CIII and Rio render obvious an identical feature of the '749 patent. Ex. 1033, 24:54-56 ("wherein the swing leg is configured to change orientation by up to 180° relative to the module frame"); '749 FWD, 104-105. As explained in Section VII.A.7, it would have been obvious to use CIII's hinge bracket, which includes a "swing cylinder" to cause the swing leg to pivot relative to the module frame, in its four-track configuration. Ex. 1005, 76, 79-80; Ex. 1002, ¶ 132; *supra* Section VII.A.6. Additionally, Rio discloses a rotary actuator 42 that causes the swing leg to pivot relative to the machine frame. Ex. 1006, 4:38-44, 4:61-62, 6:19-22. The swing-leg assemblies in both the three- and four-track configurations require manual adjustments to pivot the swing leg and rotate the crawler track. Ex. 1005, 76, 79-80, 209, 253-254; Ex. 1002, ¶ 132. A POSITA would have been motivated in both configurations to automate swing-leg pivoting and crawler-track rotation to eliminate these manual adjustments. Ex. 1002, ¶ 132; *supra* Section VII.A.4.

It would have been obvious in view of CIII's pivot cylinder and Rio's actuator 42 to include a rotary actuator for pivoting all four CIII swing legs. Ex. 1005, 79-80; Ex. 1006, 4:38-44, 4:61-62, 6:19-22, Figs. 3-4; Ex. 1002, ¶ 133.

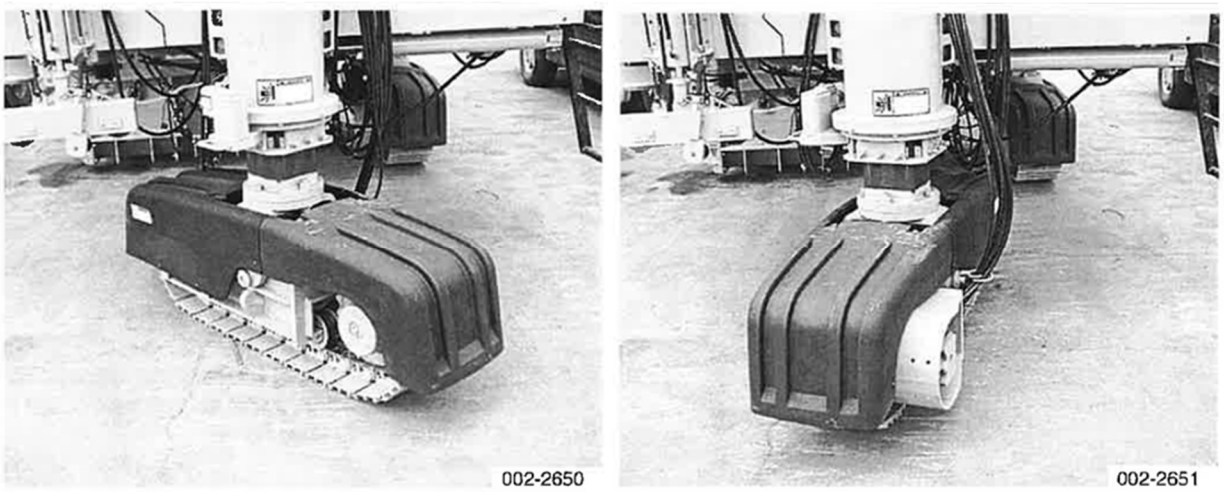
A POSITA would have known that rotary actuators like Rio's permit more range of motion than linear-actuator designs and allow swing legs to rotate up to 180°. Ex. 1002, ¶ 133; *supra* Section VII.A.4; *see also* Ex. 1008, 7:35-60, Fig. 7 (disclosing rotary actuator like Rio's permitting 180° rotation); Ex. 1010, 3 (disclosing a "rotary actuator system that allows" for 180° rotation).

A POSITA would have known to modify CIII's swing legs to include Rio's rotary actuator 42 and permit each swing leg to change orientation by up to 180° relative to the module frame. Ex. 1002, ¶ 134. This modification would have improved the machine's usability and efficiency because it would have allowed the machine to more quickly change between the paving and transportation modes, which would have otherwise required removing the turnbuckles or the linear actuator between the swing leg and hinge bracket to swing the swing legs "around to the end of the 4-track frame." Ex. 1005, 253; Ex. 1002, ¶ 134; *supra* Section VII.A.8. Incorporating Rio's rotary actuator 42 would have made such manual disconnecting unnecessary. Ex. 1002, ¶ 134.

**12. Claim 8: "The swing leg assembly of claim 1, further comprising an angular crawler track adjuster for changing an angular, rotational inclination between the crawler track and the swing leg in a substantially horizontal plane."**

CIII and Rio render obvious this feature. *Id.*, ¶ 135. The Board previously found that CIII and Rio render obvious an identical feature of the '749 patent.

Ex. 1033, 23:34-36 ("an angular crawler track adjuster for changing an angular, rotational inclination between the crawler track and the swing leg in a substantially horizontal plane"); '749 FWD, 101-102. As described, it would have been obvious to use Rio's rotary actuator to rotate the crawler track relative to the jacking column. *Supra* Sections VII.A.4, VII.A.5.e; Ex. 1002, ¶ 135. A POSITA would have understood that this rotary actuator is an "angular crawler track adjuster" when implemented on CIII's jacking column, which is fixed to the swing leg, because it drives changes to an angular, rotational inclination between the crawler track and the swing leg in a substantially horizontal plane. Ex. 1002, ¶ 135.




Ex. 1005, 193, 195 (showing crawler track's rotational movement in CIII).

### B. Ground 2: Claims 2-7 Are Obvious over CIII, Rio, and Smolders

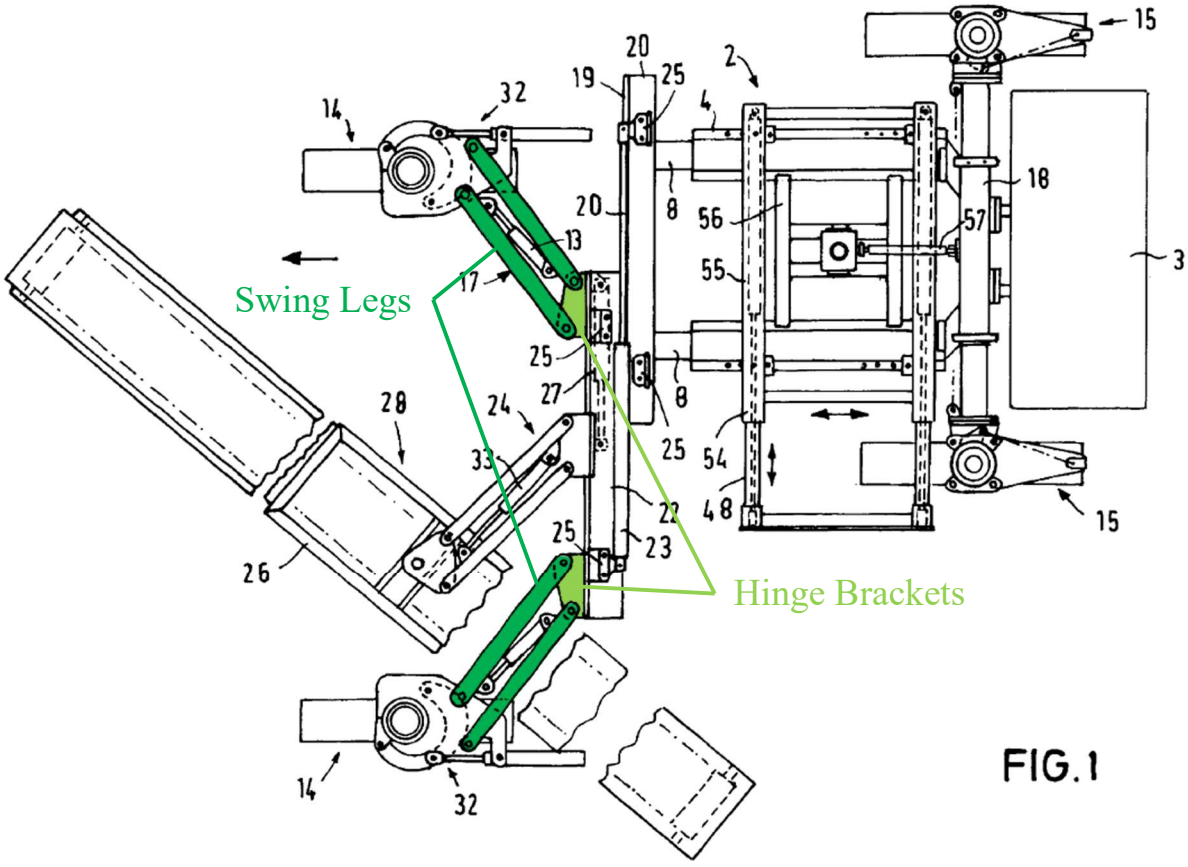
#### 1. Claim 2: "The swing leg assembly of claim 1, further comprising a hinge bracket arranged to be interposed between the swing leg and a surface of a module frame of the paving machine."

If CIII alone or CIII and Rio do not render obvious this feature, CIII, Rio, and Smolders render obvious this feature. Ex. 1002, ¶¶ 136-141. The Board previously found that CIII, Rio, and Smolders render obvious a similar feature of the '749 patent in its four-track configuration. Ex. 1033, 24:36-37 ("a hinge bracket arranged to be interposed between the swing leg and the surface of the module frame"); '749 FWD, 96-97, 105-106.

For the reasons explained in Section VII.A.6, CIII discloses a hinge bracket arranged to be interposed between the swing leg and a surface of the three-track module frame, and it would have been obvious to incorporate this hinge bracket in all four of the swing-leg assemblies of CIII's four-track configurations. Ex. 1002, ¶ 138.

In addition to the reasons that a POSITA would have had a motivation to do so with a reasonable expectation of success explained in Section VII.A.6, a design with hinge brackets on multiple swing-leg assemblies is further obvious in view of Smolders. Ex. 1002, ¶ 139. Smolders discloses a "slip-form paver" having a "machine frame 4" and multiple pivoting devices 17. Ex. 1021, 3:48-53, 5:13-20.

Pivoting devices 17 are pivoted "with the associated piston-cylinder units 23 [that] allow for the setting of different track widths between the two front truck assemblies 14 while the track position can be varied by means of the slidable traverse member 22." Ex. 1021 (Smolders), 5:16-20; Ex. 1002, ¶¶ 136, 139. As shown below, Smolders discloses two swing-leg assemblies, each coupled to the paver frame with a hinge bracket. Ex. 1002, ¶ 139.




Ex. 1021, Fig. 1 (annotated).

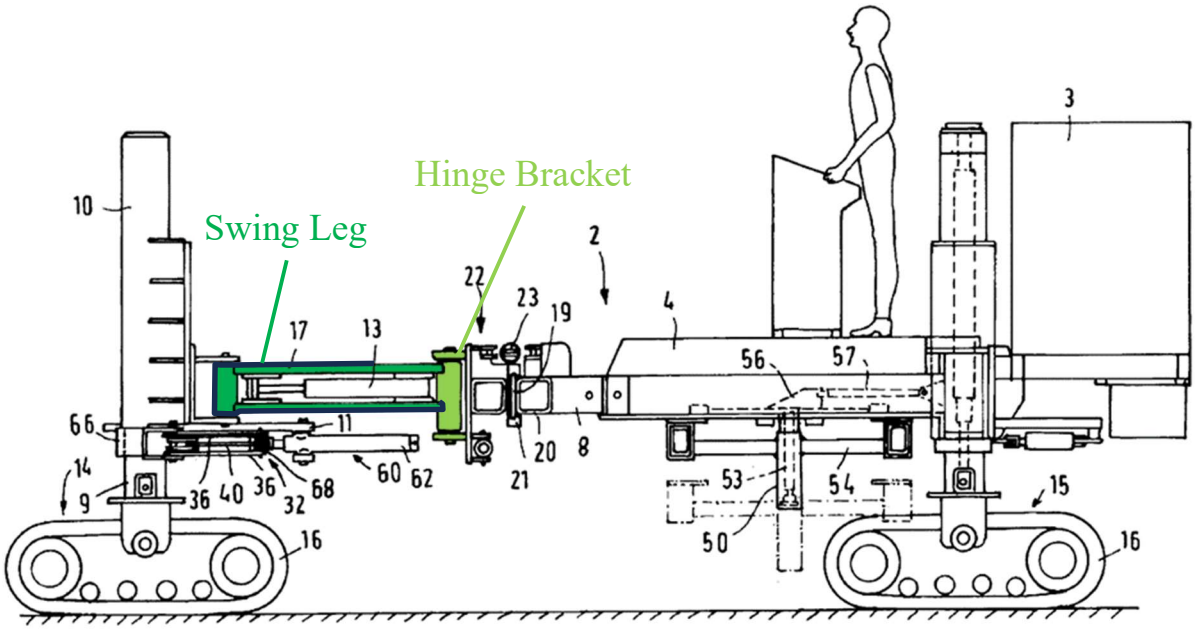
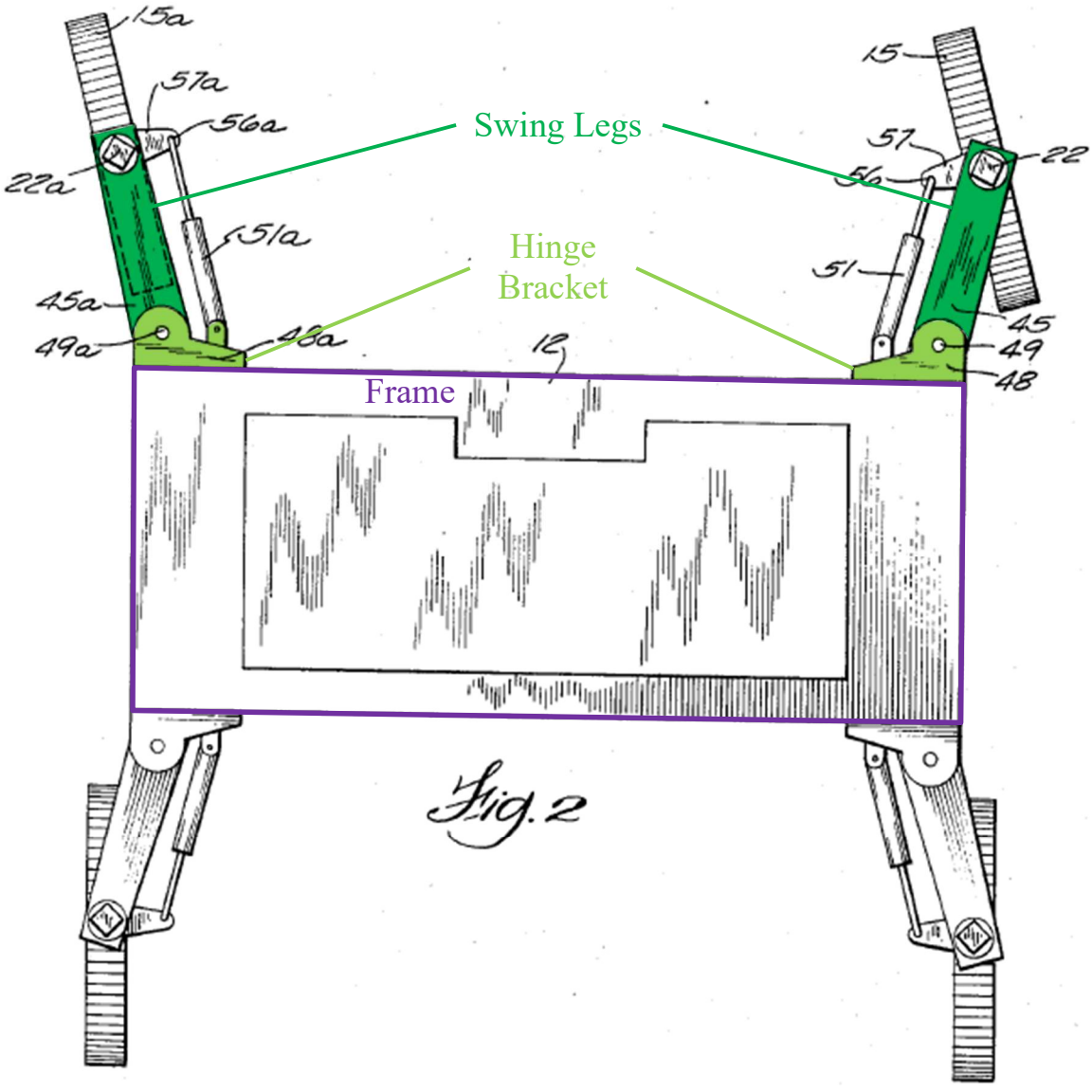



FIG. 3

*Id.*, Fig. 3 (annotated).

A POSITA would have understood from Smolders that, where multiple swing-leg assemblies are present, such as in Smolders' embodiment above and CIII's four-track configuration, it is beneficial to connect each swing leg-assembly to the paver frame with a hinge bracket. Ex. 1002, ¶ 140. A POSITA would have been motivated to do so because it would have allowed each of the four swing-leg assemblies to be easily attachable/detachable, as explained in Section VII.A.6. Ex. 1002, ¶ 140. This was a well-known design in the art, as references like Files similarly disclose interposing a hinge bracket between a swing leg and the frame for each of multiple swing-leg assemblies, as shown below. Ex. 1012, 2:57-61, Fig. 2; Ex. 1002, ¶ 140.




Ex. 1012, Fig. 2 (annotated).

Accordingly, modifying CIII's four-track configuration to interpose a hinge bracket, like the one in CIII's three-track configuration, between each of the four swing legs and a surface of the module frame would have been a combination of familiar elements according to known methods to yield the predictable result of a

swing-leg assembly that is more easily attachable and removable from the module frame. Ex. 1002, ¶ 141.

#### 2. Claims 3-7

CIII alone or CIII and Rio render obvious the additional features of claims 3-7 for the reasons explained in Sections VII.A.7-VII.A.11. Ex. 1002, ¶¶ 142-146.

## VIII. SECONDARY CONSIDERATIONS

In the prior IPRs of related patents, Patent Owner unsuccessfully argued nonobviousness based on secondary considerations. For example, in the '749 FWD, the Board found that Patent Owner did not provide "any persuasive evidence" that its slipform pavers have the claimed technology. '749 FWD, 82. The Board also found a lack of nexus based on "the presence of critical, unclaimed features." *Id.* at 83. The Board found that "the prior art already solved" the purported long-felt need and that the purported evidence of industry praise, copying, and commercial success was entitled to little weight. *Id.* at 85-86, 90, 93. Because Patent Owner already litigated and lost on these issues in prior IPRs, which the Federal Circuit affirmed, Patent Owner should be estopped from raising them again here. Even if not estopped, Petitioner is unaware of any secondary considerations that would undermine obviousness here.

## IX. DISCRETIONARY DENIAL IS NOT APPROPRIATE UNDER § 325(d)

Though the Board may exercise discretion to deny a petition that presents the same or substantially the same art or arguments as were previously presented to the Office, it should not do so here. 35 U.S.C. § 325(d). The Board has outlined factors it considers in determining whether to exercise discretion to deny institution under § 325(d). *See Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8, 17-18 (Dec. 15, 2017) (precedential as to § III.C.5, first paragraph) ("*Becton, Dickinson*"); *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6, 8-11 (Feb. 13, 2020) (precedential) ("*Advanced Bionics*"). *Advanced Bionics* explains how the *Becton, Dickinson* factors fit into a two-part framework that examines:

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

*Advanced Bionics* at 8.

In evaluating this first factor, the Board looks to *Becton, Dickinson* factors (a), (b), and (d). *Id.* at 9-10. Factor (a) under the *Becton, Dickinson* construct

assesses "the similarities and material differences between the asserted art and the prior art involved during examination." *Id.* at 9 n.10. Factor (b) considers "the cumulative nature of the asserted art and the prior art evaluated during examination." *Id.* Factor (d) weighs "the extent of the overlap between the arguments made during examination and the manner in which petitioner relies on the prior art." *Id.*

"If, after review of factors (a), (b), and (d), it is determined that the same or substantially the same art or arguments previously were presented to the Office, then factors (c), (e), and (f) relate to whether the petitioner has demonstrated a material error by the Office." *Id.* at 10. Factor (c) assesses "the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection." *Id.* at 9 n.10. Factor (e) analyzes "whether petitioner has pointed out sufficiently how the examiner erred in its evaluation of the asserted prior art." *Id.* Factor (f) considers "the extent to which additional evidence and facts presented in the petition warrant reconsideration of the prior art or arguments." *Id.*

While the applicant submitted CIII, Rio, Smolders, and the Board's Final Written Decisions holding all claims in related patents obvious based on these references, *Advanced Bionics* counsels against the Board exercising its discretion here. The examiner did not apply CIII, Rio, or Smolders either separately or in

combination in any prior-art rejection during examination of the '318 patent. Aside from signing the IDSs submitted by the applicant, there is no indication that the examiner considered CIII, Rio, Smolders, or the Board's analysis for why CIII and Rio and CIII, Rio, and Smolders render obvious substantially similar claims. *See generally* Ex. 1004; '749 FWD.

Indeed, despite IPR2020-01698 challenging substantially similar claims based on CIII, Rio, and Smolders, the applicant submitted CIII on a separate IDS eleven months apart from the IDS that included Rio and Smolders, never called to the examiner's attention the fact that CIII, Rio, and Smolders were asserted together in an IPR against similar claims, and never informed the examiner that the Board had concluded that these claims were obvious in view of CIII and Rio or CIII, Rio, and Smolders. *See* Ex. 1004, 164-167 (submitting Rio and Smolders but not CIII), 293-296 (submitting CIII over a year after the first IPR petition was filed and eleven months after submitting Rio and Smolders), 530-533 (omitting the grounds and the outcome of the Board's Final Written Decisions). Moreover, the examiner's notices of allowance provide no information as to why he thought the '318 patent claims were allowable over any prior art, let alone CIII and Rio. *See id.*, 308-310, 419-421, 479-481, 548-550. Accordingly, *Becton, Dickinson* factor (c) weighs against the Board exercising its discretion.

*Becton, Dickinson* factors (e) and (f) likewise weigh against the Board exercising its discretion. The Petition sufficiently demonstrates how CIII and Rio render each claim of the ’318 patent obvious, meaning the examiner erred in allowing the claims. Moreover, the Petition identifies, for each feature of the challenged claims, where the Board has found similar features disclosed or rendered obvious by the same prior art in the ’749 FWD and explains why collateral estoppel precludes Patent Owner from arguing against obviousness of the challenged claims. *Supra* Section IV. Considering the Board has already evaluated this combination for substantially similar claims and found the claims obvious, this combination warrants reconsideration.

## X. MANDATORY NOTICES

### A. Real Party-in-Interest Under 37 C.F.R. § 42.8(b)(1)

The real party-in-interest is Godbersen-Smith Construction Company, for which GOMACO Corporation is a registered active fictitious name. No unnamed entity is funding, controlling, or otherwise has an opportunity to control or direct this Petition or Petitioner’s participation in any resulting IPR.

### B. Related Matters Under 37 C.F.R. § 42.8(b)(2)

Patent Owner has asserted five patents in the same family in litigation captioned *Guntert & Zimmerman Const. Div., Inc. v. GOMACO Corp.*, Case No. 5:20-cv-04007-CJW-KEM (N.D. Iowa). Petitioner challenged each of the five

asserted patents in prior petitions for IPR. *Godbersen-Smith Const. Co. v. Guntert & Zimmerman Const. Div., Inc.*, IPR2020-01698, Paper 1 (Oct. 1, 2020) (U.S. Patent No. 10,029,749); *Godbersen-Smith Const. Co. v. Guntert & Zimmerman Const. Div., Inc.*, IPR2021-00050, Paper 1 (Oct. 14, 2020) (U.S. Patent No. 9,708,020); *Godbersen-Smith Const. Co. v. Guntert & Zimmerman Const. Div., Inc.*, IPR2021-00161, Paper 1 (Nov. 6, 2020) (U.S. Patent No. 10,053,167); *Godbersen-Smith Const. Co. v. Guntert & Zimmerman Const. Div., Inc.*, IPR2021-00135, Paper 1 (Nov. 6, 2020) (U.S. Patent No. 9,908,571); *Godbersen-Smith Const. Co. v. Guntert & Zimmerman Const. Div., Inc.*, IPR2021-00136, Paper 1 (Nov. 6, 2020) (U.S. Patent No. 9,908,571); *Godbersen-Smith Const. Co. v. Guntert & Zimmerman Const. Div., Inc.*, IPR2021-00234, Paper 1 (Nov. 25, 2020) (U.S. Patent No. 10,196,101); *Godbersen-Smith Const. Co. v. Guntert & Zimmerman Const. Div., Inc.*, IPR2021-00235, Paper 1 (Nov. 25, 2020) (U.S. Patent No. 10,196,101).

Each of the cases that resulted in a Final Written Decision, covering every asserted patent except U.S. Patent No. 10,053,167, found all challenged claims obvious. *Godbersen-Smith Const. Co. v. Guntert & Zimmerman Const. Div., Inc.*, IPR2020-01698, Paper 80 (Apr. 12, 2022); *Godbersen-Smith Const. Co. v. Guntert & Zimmerman Const. Div., Inc.*, IPR2021-00050, Paper 80 (Apr. 12, 2022); *Godbersen-Smith Const. Co. v. Guntert & Zimmerman Const. Div., Inc.*, IPR2021-

00136, Paper 61 (May 18, 2022); *Godbersen-Smith Const. Co. v. Guntert & Zimmerman Const. Div., Inc.*, IPR2021-00234, Paper 59 (May 18, 2022). Patent Owner appealed those Final Written Decisions to the U.S. Court of Appeals for the Federal Circuit, which summarily affirmed them. *Guntert & Zimmerman Const. Div., Inc. v. Godbersen-Smith Const. Co.*, Nos. 22-1831, -1833, -1835, -1836, Dkt. 61 (Fed. Cir. Jan. 18, 2024).

On April 17, 2024, Patent Owner moved to amend its pleadings to add the '318 patent and related U.S. Patent No. 11,772,723 in *Guntert & Zimmerman Const. Div., Inc. v. GOMACO Corp.*, Case No. 5:20-cv-04007-CJW-KEM (N.D. Iowa). That motion is still pending as of the filing of this Petition. Petitioner is concurrently filing a petition for post grant review of U.S. Patent No. 11,772,723 in PGR2024-00026.

### C. Lead and Back-Up Counsel Under 37 C.F.R. § 42.8(b)(3)

Petitioner designates lead and back-up counsel as noted below. Powers of attorney pursuant to 37 C.F.R. § 42.10(b) accompany this Petition.

| Lead Counsel | Back-up Counsel |
|---|---|
| Jason E. Stach, Reg. No. 54,464<br>jason.stach@finnegan.com<br>Finnegan, Henderson, Farabow, Garrett & Dunner, LLP<br>271 17th Street, NW<br>Suite 1400<br>Atlanta, GA 30363<br>Phone: 404.653.6400<br>Fax: 404.653.6444 | Luke J. McCammon, Reg. No. 70,691<br>luke.mccammon@finnegan.com<br>David K. Mroz, Reg. No. 66,116<br>david.mroz@finnegan.com<br>Sonja W. Sahlsten, Reg. No. 70,927<br>sonja.sahlsten@finnegan.com<br>Finnegan, Henderson, Farabow, Garrett & Dunner, LLP<br>901 New York Avenue, NW<br>Washington, DC 20001<br>Phone: 202.408.4000<br>Fax: 202.408.4400<br><br>Robert K. High, Reg. No. 75,786<br>robert.high@finnegan.com<br>Finnegan, Henderson, Farabow, Garrett & Dunner, LLP<br>271 17th Street, NW<br>Suite 1400<br>Atlanta, GA 30363<br>Phone: 404.653.6400<br>Fax: 404.653.6444 |

### D. Service Information Under 37 C.F.R. § 42.8(b)(4)

Please address all correspondence to counsel at the address above. Petitioner consents to electronic service by email at Gomaco-IPRs@finnegan.com.

## XI. GROUNDS FOR STANDING

Pursuant to 37 C.F.R. § 42.104(a), Petitioner certifies that the ’318 patent is available for IPR and the Petitioner is not barred or estopped from requesting IPR.

## XII. CONCLUSION

The challenged claims should be canceled for the reasons discussed above.

Dated: April 30, 2024

By: /Jason Stach/
Jason Stach
Reg. No. 54,464

## CERTIFICATION OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(c) and (d), Petitioner certifies that the word count of Petitioner's Petition for *Inter Partes* Review (exclusive of any table of contents, table of authorities, mandatory notices under § 42.8, certificates of service and word count, and list of exhibits or claim listing) as measured by Microsoft Word is 13,847.

Dated: April 30, 2024

By: /Jason Stach/
Jason Stach
Reg. No. 54,464

## CERTIFICATE OF SERVICE

The undersigned certifies that the foregoing Petition for *Inter Partes* Review, the associated Power of Attorney, and Exhibits 1001 through 1013, 1016, 1021, 1030-1033, and 1036-1037, were served on April 30, 2024, by FedEx Priority Overnight at the following address of record for the subject patent. The Confidential Exhibits 1030, 1100-1154 will be served when Protective Order acknowledgments are received, pursuant to 37 C.F.R. § 42.55.

IP Docketing - 22
Kilpatrick Townsend & Stockton LLP
1100 Peachtree Street
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Atlanta, GA 30309

A courtesy copy has also been mailed to litigation counsel for Patent Owner at:

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Date: April 30, 2024

By: /Daniel E. Doku/
Daniel E. Doku
Litigation Legal Assistant

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, LLP