

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LIFTWERX USA INC.,
Petitioner

v.

LIFTRA IP APS,
Patent Owner.

Case: IPR2026-00102
Patent No. 12,104,578

PETITION FOR *INTER PARTES* REVIEW

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1003	Declaration of John Bosche (“Bosche”)
1004	CV of John Bosche
1005	U.S. Patent No. 10,378,518
1006	Prosecution History of U.S. Patent No. 10,378,518
1007	U.S. Patent Application Publication No. 2012/0141292 (“Signore”)
1008	European Patent No. 1,748,182 (“Weaver”)
1009	U.S. Patent Application Publication No. 2010/0021278 (“Stegemann”)
1010	U.S. Patent No. 9,651,020 (“Holloway”)
1011	U.S. Patent No. 4,464,127 (“Boudreaux”)
1012	U.S. Patent No. 1,152,271 (“Bisbee”)
1013	U.S. Patent No. 4,177,701 (“Schulz”)
1014	China Patent Application No. 201483408 (“Hanxing”) and Certified Translation
1015	U.S. Patent No. 3,036,667 (“Schilling”)
1016	U.S. Patent No. 3,731,768 (“Fetzer”)
1017	U.S. Patent No. 8,556,591 (“Koronkiewicz”)
1018	European Patent No. 1,101,934 (“Weitkamp”) and Certified Translation
1019	“US Value Proposition,” Cooper Roller Bearings Company Limited, <i>available at</i>

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	https://web.archive.org/web/20130531010830/http://www.cooperbearings.com/downloads/English/Value%20Proposition.pdf (WayBack Machine capture from May 31, 2013) (“Cooper”)
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1022	U.S. Patent Application Publication No. 2012/0099993 (“Guerenbourg”)
1023	January 22, 2014 Press Release by Power Climber Wind
1024	“Power Climber Wind supplies over 1,000 nacelle davits in North America,” WindTech International (Jan. 23, 2014) <i>available at</i> https://web.archive.org/web/20140130072352/http://www.windtech-international.com:80/products-news/power-climber-wind-supplies-over-1-000-nacelle-davits-in-north-america (WayBack Machine capture from January 30, 2014).
1025	An Overview of the History of Wind Turbine Development: Part II-The 1970s Onward, Gipe and Mollerstrom, Wind Engineering 1-29, 2022.
1026	“Advertising Information,” WindTech International (<i>available at</i> https://www.windtech-international.com/advertising/advertising-information)
1027	Nacelle Davit Brochure, Power Climber Wind (Aug. 8, 2012)
1028	Wind Power Today – 1998 Wind Energy Program Highlights, Page 6, US Department of Energy, DOE/GO-10099-820, June 1998.

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1029	Wind Turbines - Designing With Maintenance In Mind, Power Engineering, Volume III, Issue 5, May 1, 2007 (<i>available at</i> https://www.power-eng.com/renewables/wind-energy/wind-turbines-designing-with-maintenance-in-mind/)
1030	WindPACT Turbine Design Scaling Studies Technical Area 2: Turbine, Rotor, and Blade Logistics, Kevin Smith, NREL/SR-500-29439, June 2001
1031	WindPACT Turbine Design Scaling Studies Technical Area 3: Self-Erecting Tower and Nacelle Feasibility, NREL/SR-500-29493, May 2001
1032	U.S. Patent Application No. 16/452,617 (U.S. Patent Publication No. 2019/0316569A1)
1033	U.S. Patent Application No. 15/517,288 (U.S. Patent Publication No. 2017/0306930A1)
1034	International Patent Application No. PCT/DK2015/000040 (International Publication No. WO/2016/055065 A1)
1035	“US Value Proposition” document from Cooper Roller Bearings Company Limited (with metadata appended)
1036	Moventas Expands Up-tower Service With Mobile Service Units, Windpower Engineering & Development, February 8, 2013
1037	NextEra Energy Resources Generation Repair & Service Overview, Slide 12, November 15, 2013, available at https://home.engineering.iastate.edu/jdm/WESEP594/BarriosNextEra.pdf
1038	New Vestas Wind Turbine, Crane Blogger, May 14, 2009, available at https://www.craneblogger.com/new-cranes/new-vestas-wind-turbine/2009/05/14/
1039	Press Release, Timken Acquires Wazee Companies, LLC; Expands Industrial Service Offerings, January 2, 2013, available at https://news.timken.com/2013-01-02-Timken-Acquires-Wazee-

Exhibit	Description
	Companies-LLC-Expands-Industrial-Service-Offerings
1040	IRS Fact Sheet, Energy Provisions of the American Recovery and Reinvestment Act of 2009 (ARRA), FS-2009-10, April 2009
1041	Google Search Results (date limited to before Oct. 7, 2014) for “split roller bearing.”
1042	Google Search Results (date limited to before Oct. 7, 2014) for “schaeffler split roller bearing.”
1043	YouTube Search Results for “Schaeffler split roller bearing.”

MANDATORY NOTICES UNDER 37 C.F.R. §42.8

Pursuant to 37 C.F.R. §42.8, Petitioner states as follows:

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

Petitioner LiftWerx USA Inc. is the real party-in-interest.

In addition, while Petitioner LiftWerx USA Inc. does not admit that they qualify as real parties-in-interest, out of an abundance of caution, Petitioner identifies the following entities as additional real parties-in-interest:

- LiftWerx Solutions Inc.;
- LiftWerx NewCo, Inc.;
- LiftWerx ExchangeCo, Inc.;
- LiftWerx CallCo, Inc.;
- LiftWerx TopCo, L.P.;
- LiftWerx Purchaser, Inc.;
- Meemaken BV; and
- Liftoff-MCE BV.

In addition, and out of an abundance of caution, Petitioner identifies the following entities as related to Patent Owner, Liftra IP ApS:

- Liftra USA Inc.; and
- Liftra ApS.

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

1. U.S. District Court for the Eastern District of Virginia

The following pending federal district court litigation may affect or be affected by the decision in this proceeding: *LiftWerx USA Inc. v. Liftra IP ApS*, No. 2:25-cv-00679 (E.D. Va.), filed October 23, 2025.

C. Lead Counsel and Service Information (37 C.F.R. §§42.8(b)(3) and (b)(4))

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I. INTRODUCTION

Petitioner requests *Inter Partes* Review (“IPR”) and cancellation of claims 1-17 (the “Challenged Claims”) of U.S. Patent No. 12,104,578 (the “’578 Patent”) (Ex. 1001). The ’578 Patent relates to a main shaft fixture for fixing a main shaft of a wind turbine during installation and repair. Ex. 1001, Abstract.

The ’578 Patent recently issued on October 1, 2024, from an application filed on January 24, 2024. It purports to claim priority through a series of continuation applications dating back to 2014, one of which issued as U.S. Patent No. 10,378,518 (the “’518 Patent”) in 2019. The purported priority applications, however, are explicitly limited to a main shaft fixture having “***at least three*** radial displaceable pressure mandrels.” Indeed, applicant distinguished prior art raised during prosecution of the ’518 Patent on the ground that it disclosed only ***two*** pressure mandrels and therefore “would not provide a reason for [a POSITA] to use ***at least 3*** independent displaceable pressure mandrels.”

By preliminary amendment in prosecution of the ’578 Patent, however, applicant ***deleted*** the specification discussion of “***at least three*** radial displaceable pressure mandrels” and submitted broader claims with a scope including a fixture having only ***two*** pressure mandrels. This had two consequences:

First, as discussed in Sections III.A.2 and VIII.A-C, unable to distinguish the prior art on the basis that the claims recite “at least three” pressure mandrels, applicant’s amendment led the examiner to material error by relying for patentability on just one added limitation relating to a “crane.” Applicant’s argument mischaracterized the examiner’s rejection, asserting incorrectly that it was directed to the initially submitted claims before amendment. Further, the examiner conducted just one overly narrow search for prior art cranes before allowance. The examiner materially erred by never considering relevant wind turbine crane art described herein, which is now applied against the claims of the ’578 Patent for the very first time.

Second, as discussed in Section VIII.D, because applicant’s 2024 amendment attempted to broaden the scope of the specification and claims, claims 1 and 3-17 of the ’578 Patent are not entitled to the filing date of the priority applications. There is no written description support in the priority applications for an apparatus with fewer than three pressure mandrels. Instead, the earliest filing date of claims 1 and 3-17 of the ’578 Patent is January 24, 2024. Nonetheless, because those claims include a fixture having three (or more) pressure mandrels, the ’518 Patent—which issued and published more than a year before January 24, 2024—anticipates the claims.

Grounds 1-4 each independently prove that the Challenged Claims addressed in each Ground are unpatentable. Trial should be instituted and claims 1-17 should be canceled.

II. REQUIREMENTS FOR IPR UNDER 37 C.F.R. § 42.104

A. Standing

Petitioners certify that (1) the '578 Patent is subject to IPR based on its asserted October 7, 2014 priority date and (2) Petitioners are not barred or estopped from the requested review.

B. Identification of Challenges

Pursuant to 37 C.F.R. §§ 42.104(b) and 42.22(a)(1), Petitioners request review and cancellation of the Challenged Claims as follows:

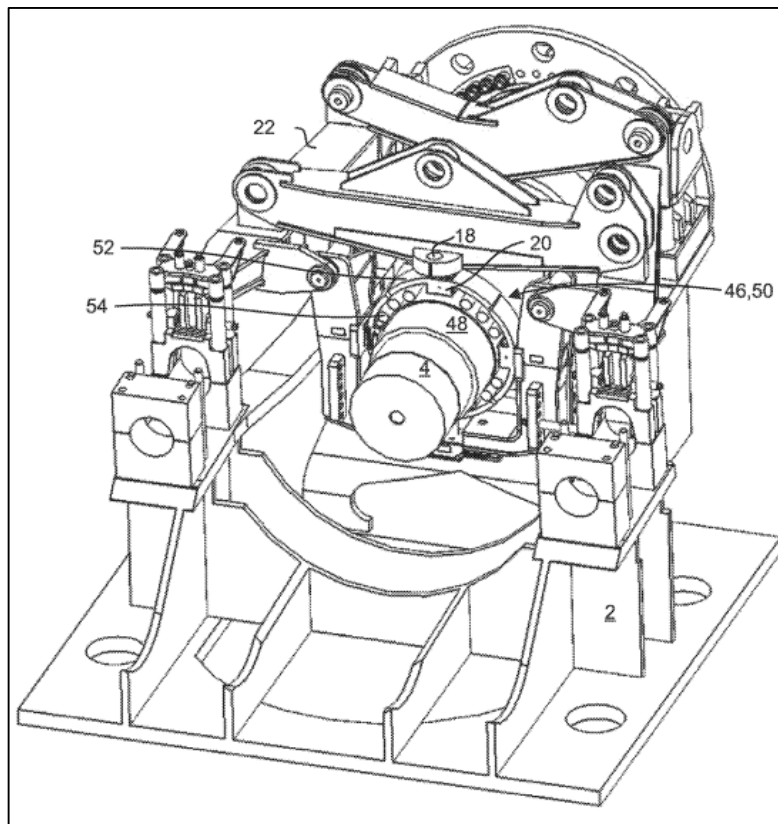
Ground	Claims	Basis	References
1	1-4, 6-8, 10, and 13-14	AIA §103	Signore and Weaver in view of Power Climber, Holloway, and/or Stegemann
2	2, 5, and 15	AIA §103	Signore and Weaver in view of Power Climber, Holloway, and/or Stegemann, further in view of Hanxing and/or Schulz
3	9, 11-12, and 16-17	AIA §103	Signore and Weaver in view of Power Climber, Holloway, and/or Stegemann, further in view of Cooper, Schaeffler, and/or Guerenbourg
4	1 and 3-17	AIA §102	'518 Patent

III. THE '578 PATENT

The '578 Patent, titled “Main Shaft Fixture,” issued on October 1, 2024 from U.S. Patent Application No. 18/420,859 (the “’859 Application”), which was filed on January 24, 2024 as a continuation of U.S. Patent Application No. 16/452,617 (filed June 26, 2019) (the “’617 Application”). The ’617 Application was a divisional of U.S. Patent Application No. 15/517,288 (the “’288 Application”) (filed April 6, 2017), which issued as the ’518 Patent on August 13, 2019, and which was a 371 of PCT/DK2015/000040 (filed October 6, 2015), which claims priority to Denmark Patent Application Nos. PA2015/00527 (filed September 4, 2015) and PA2014/00573 (filed October 7, 2014).

A. Specification

The '578 Patent describes well-known apparatuses in the field of wind turbines. The disclosed apparatuses comprise a main shaft fixture for use during installation and repair of a wind turbine. Ex. 1001, Abstract. An embodiment of the main shaft fixture is depicted in Figure 5:



The claimed fixture may be “formed of several sections for mounting on stable structural parts in the nacelle, including the nacelle’s bottom frame.” *Id.* Further, “[t]he main shaft fixture has adjustable pressure mandrels with tap shoes, ... facilities for mounting of a lightweight crane and a self-hoisting crane with a ground-based winch, respectively, as well as a rotor lock which, in combination with actuators of

the main shaft fixture, enables the main shaft and the main shaft bearing to be sufficiently displaced vertically from its bearing in the nacelle to service or replace the bearing.” *Id.*

As the ’578 Patent admits, “main shaft fixture[s] for fixing the main shaft on a wind turbine during the execution of installation and repair work on heavy parts that are arranged in the nacelle on wind turbines” were well known in the art. *Id.* 1:45-48. The ’578 Patent also admits it was well known that such main shaft fixtures could be “divided up into a number of sections for installation,” that “rotor locks” could be used to halt the turbine during repairs, that “self-hoisting cranes” could be used rather than using “large mobile cranes” on the ground, and that “a lightweight crane” could be mounted in the nacelle. *Id.* 1:45-51, 1:52-56, 1:66-2:5, 2:7-13.

The purpose of the ’578 Patent was “a main shaft fixture that provide[s] a more universal application in relation to shaft geometry, which moreover does not require halting and fixing of the wind turbine main shaft,” and that includes “facilities for the mounting of a [self-hoisting/lightweight] crane.” *Id.* 2:26-33, 2:42-43. The ’578 Patent accomplished its ‘more universal’ application by utilizing multiple radially-displaceable “adjustable pressure mandrels with tap shoes.” *Id.* 2:37-42.

The '578 Patent illustrates embodiments of the claimed main shaft fixture with adjustable pressure mandrels (pink) with tap shoes (red), and a main shaft (blue). *Id.* Figs. 2 and 5.¹

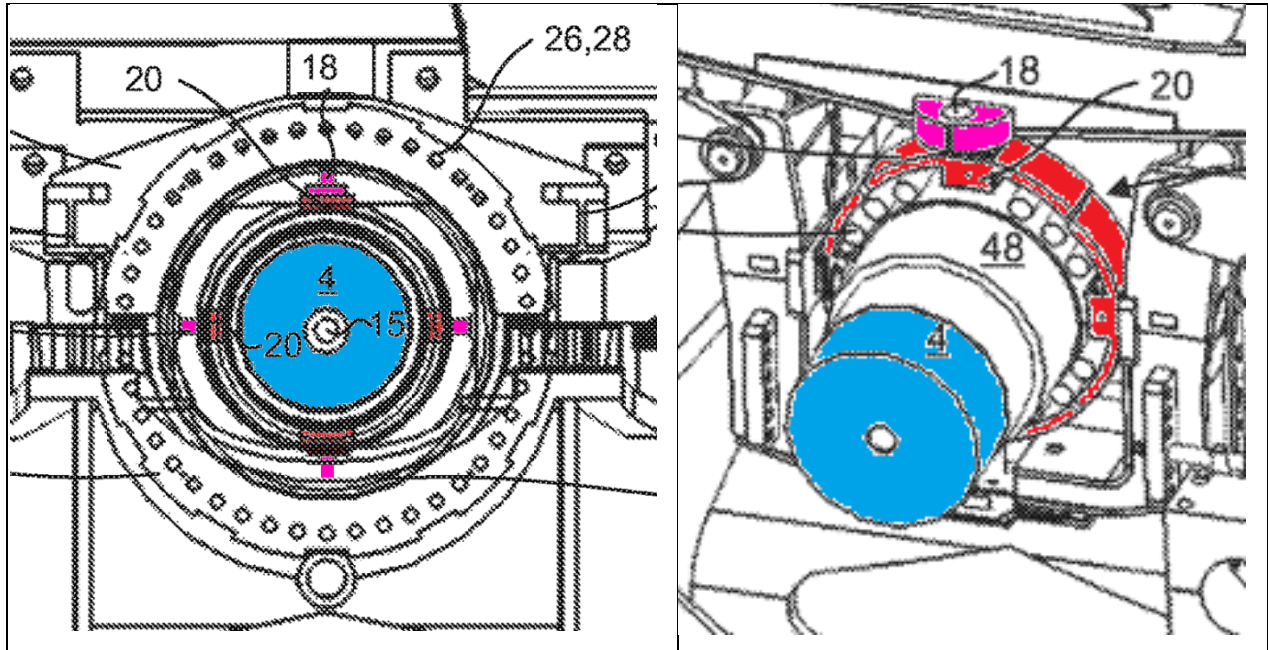
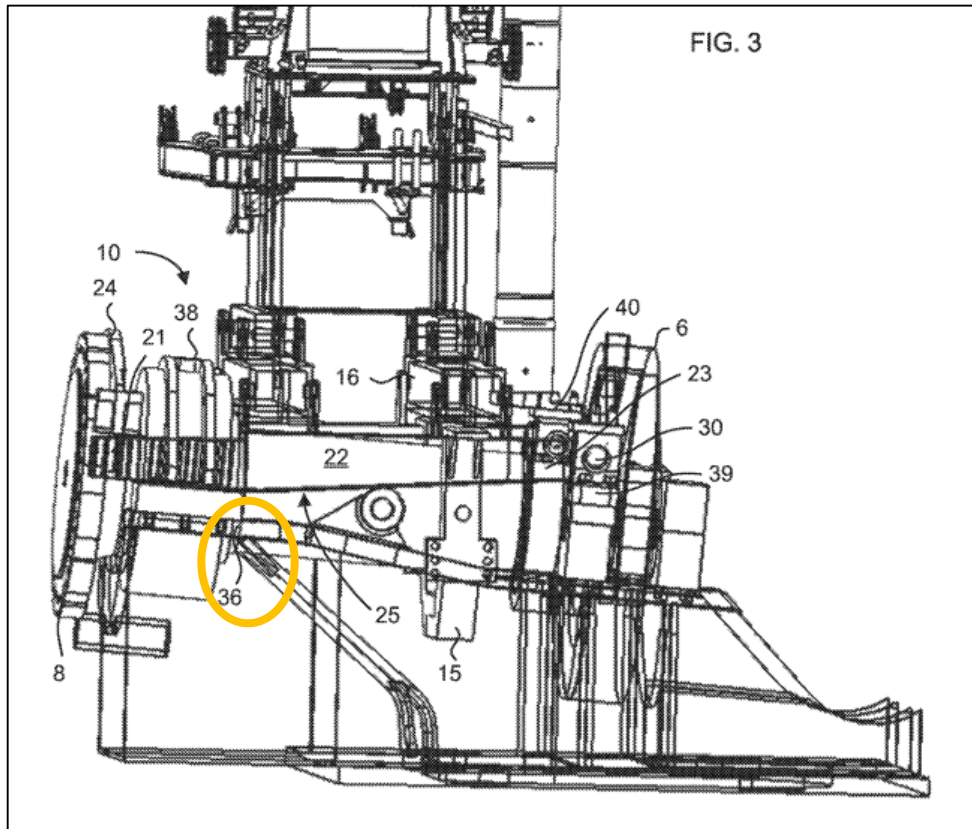


Figure 2

Figure 5

The '578 Patent also discloses an embodiment “where the tap shoes and the main shaft are furnished with slide plates,” which permit “rotation of the main shaft” when engaged.” *Id.* 4:61-62, 6:4-9, 6:46-51 (slide bearing types). Further, the '578 Patent discloses actuators (orange) to raise one end of the shaft during maintenance. *Id.* 5:57-67, Fig. 3.

¹ Colorized elements of figures are added annotations.



As discussed in the Bosche Declaration (Ex. 1003, “Bosche”), these concepts were well-known by no later than 2014, and the components of the ’578 Patent were conventional and operated in a purely conventional manner, particularly in view of the references relied upon in Grounds 1-3. Bosche ¶¶ 54-64, 63-64.

1. Prosecution of the Parent ’518 Patent

In prosecution of the ’518 Patent, a parent to the challenged ’578 Patent, the examiner twice rejected pending claim 1 as obvious over U.S. Patent Application Publication No. 2012/0141292 (“Signore”) (Ex. 1007) in view of European Patent No. 1,748,182 (“Weaver”) (Ex. 1008), based in part on a finding that radially displaceable pressure mandrels with tap shoes were not inventive. Ex. 1006 at 98-

99, 42. Although the examiner allowed claims containing additional limitations, *id.* 13, 35-37, the claimed “radially displaceable pressure mandrels” were not a basis for patentability. *Bosche* ¶¶ 65-68.

2. Prosecution of the Challenged '578 Patent

The '859 Application that led to the '578 Patent was filed on January 24, 2024 along with a Preliminary Amendment, amending both the specification and the claims. Ex. 1002 at 132-140 (“Preliminary Amendment”).² As discussed in detail below, the Preliminary Amendment expanded the scope of the '859 Application to include claims with only **two** pressure mandrels, even though the priority applications exclusively taught the use of **three or more** pressure mandrels. The consequence is that claims covering two mandrels (Claims 1 and 3-17) lack written description support in the priority applications and are *not* entitled to a priority date *earlier than January 24, 2024*. *Bosch* ¶ 421-432; *Indivior UK Ltd. v. Dr. Reddy's Labs. S.A.*, 18 F.4th 1323, 1330 (Fed. Cir. 2025).

² The changes marked in the Preliminary Amendment do not correspond to the initially submitted claims. *Compare* Ex. 1002 at 134 *with id.*, 174. A correct reflection of the Preliminary Amendment changes to Claim 1 is provided as Appendix A to the *Bosche* Declaration.

a. Non-Final Rejection

On April 26, 2024, a Non-Final Rejection rejected pending claim 1 as obvious over Signore in view of Weaver, finding that radially displaceable pressure mandrels with tap shoes were obvious. Exhibit 1002 at 87-88. The Examiner further concluded that all other elements of the rejected claims, including “mounting facilities adapted for anchoring a crane on/in a nacelle of a wind turbine,” were obvious in light of Signore and Weaver. *Id.* 88; Bosche ¶ 70.

b. Applicant’s Response

On 7/26/2024 applicant made only one argument in response to the prior-art-based rejections, namely that “the cited references fail to disclose or suggest, inter alia, ‘that the main shaft fixture further comprises mounting facilities adapted for anchoring a crane on/in a nacelle of a wind turbine,’” Ex. 1002 at 73-74.

Applicant asserted that the examiner’s rejection referred to claim 1’s pre-amended recitation of “suitable for a lightweight crane.” *Id.* 74. However, nowhere did the examiner refer to that language. Moreover, “suitable for a lightweight crane” was **not** in the initially submitted claims (*id.* 174); the Preliminary Amendment instead recited “adapted for anchoring a crane on/in a nacelle of a wind turbine.” *Id.* 134; Bosche ¶¶ 72-74.

In responding to the examiner’s prior-art based rejections, applicant made no other arguments and did not address any other limitations. Applicant made minor

amendments to pending Claim 1, but none related to the “mounting facilities” limitation it relied on. Applicant also added new Claims 15-17. Ex. 1002, 73-76; Bosche ¶ 74.

a. Allowance

Notwithstanding applicant’s narrow (and inaccurate) response, the pending claims were allowed and issued as the ’578 Patent. Ex. 1002 at 25-27.

Consequently, throughout prosecution, Claims 5, 9, 11-12, and 15-17 faced no prior-art-based rejection before allowance. As the “Reasons for Allowance,” the examiner stated: “the prior art of record does not teach the main shaft fixture further having mounting facilities adapted for anchoring a crane on or in a nacelle of a wind turbine.” *Id.* 26; Bosche ¶ 75

The examiner also provided his search strategy following applicant’s response to the non-final rejection. Although the examiner’s reasons for allowance focused exclusively on the “crane” limitation, the examiner conducted only **one** search that included the term “crane” and it was unreasonably narrow, requiring *eighteen* separate terms all connected by “AND.” Ex. 1002 at 48-49; Bosche ¶¶ 77.

Ultimately, the examiner committed several material errors during prosecution. Despite the focus on the “crane” limitation, the examiner conducted just one unreasonably narrow search for crane prior art. Consequently, the

examiner erred by overlooking and not applying relevant wind turbine crane art, including Holloway, Stegemann, and Power Climber, which are now applied against the Challenged Claims for the very first time. By never issuing a prior-art-based rejection for seven of the sixteen claims, the examiner erred by not finding and applying the teachings of Hanxing, Schulz, Cooper, and Schaeffler. Finally, as discussed below, the examiner failed to recognize that there was no written description support in the parent priority applications for an apparatus with only two adjustable pressure mandrels in Claims 1 and 3-17. As such, the examiner erred by overlooking that those claims are not entitled to the priority date of the parent applications, which anticipate them.

IV. LEVEL OF ORDINARY SKILL IN THE ART

The person of ordinary skill in the art (“POSITA”) as of the claimed priority date (October 7, 2014) would have had at least a Bachelor of Science degree in Mechanical Engineering or an equivalent field and five or more years of experiencing working in the field of wind turbine design and/or operations. This experience would include familiarity with the use of cranes for performing maintenance activities on a wind turbine and experience related to the repair or replacement of major components on a wind turbine. The relevant experience would further include having spent sufficient time working inside the nacelles of

wind turbines in order to appreciate the logistics and human factors involved in performing up-tower maintenance activities inside a nacelle. Bosche ¶ 51.

In addition, a POSITA as of the January 24, 2024 priority date of Claims 1 and 3-17, would have had the same amount of education/experience described above. However, because of the advancements in technology between 2014 and 2024, that same education and experience would provide a POSITA in 2024 with a more expansive level of skill and knowledge as compared to 2014. *Id.*

V. CLAIM CONSTRUCTION

Claim terms are construed using the standard applied in civil actions under 35 U.S.C. § 282(b), in accordance with “the ordinary and customary meaning” as understood by the POSITA and the patent’s prosecution history. 37 C.F.R. § 42.100(b). The Board need only construe terms to the extent necessary to resolve disputes between the parties. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017); 83 Fed. Reg. 51,340, at 51,353 (Nov. 13, 2018). As explained below, the relied-upon prior art meets the claim terms under any reasonable interpretation. Bosche ¶¶ 79-80.

VI. OVERVIEW OF THE PRIOR ART

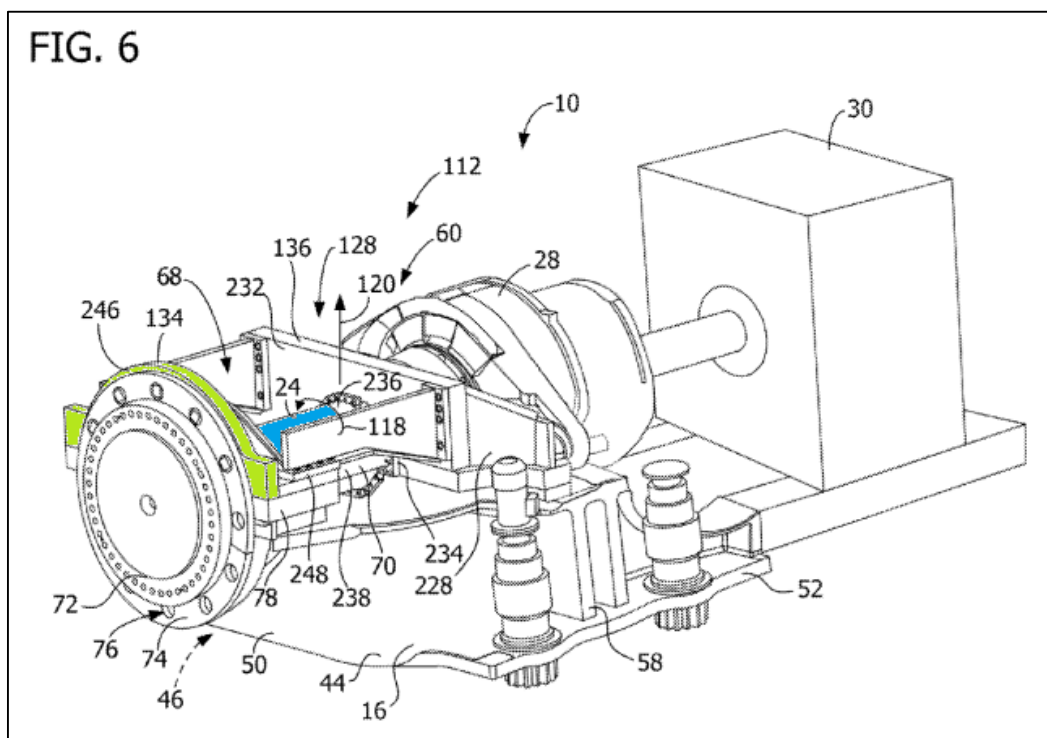
Petitioner asserts four grounds for invalidity based on the following references:

A. Signore

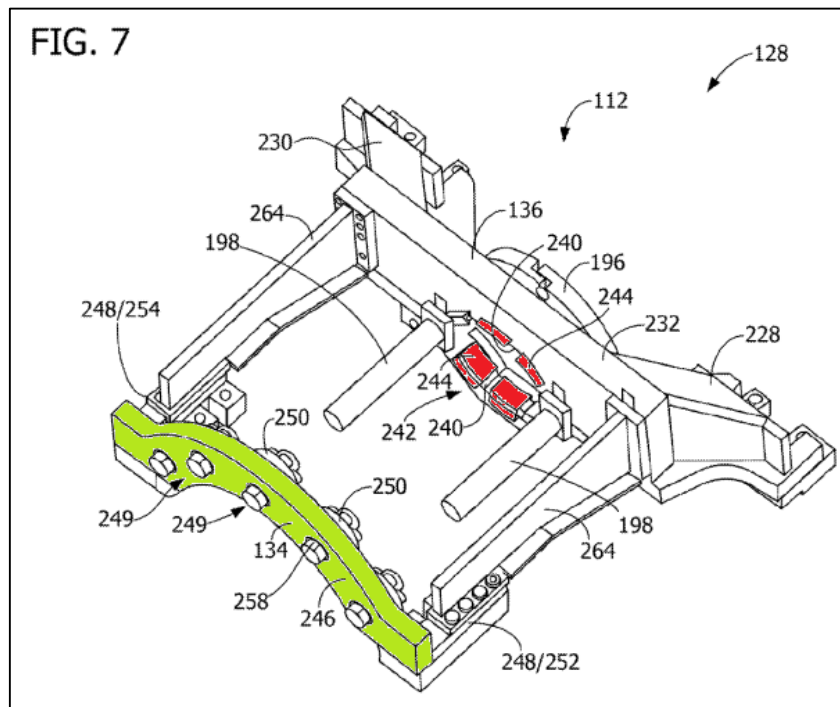
Signore (Ex. 1007) is prior art under at least §§ 102(a)(1) and (2). Bosche ¶ 82.

Signore discloses a main shaft fixture including a rotor lock (green) that uses bolts placed through mating holes to lock rotation of a wind turbine shaft (blue).

Bosche ¶¶ 83-84.



In the exemplary embodiment “a plurality of torque clamps 244 [(red)] are...oriented circumferentially about opening 242...to facilitate coupling restraint assembly 136 to drive shaft 24 via a friction fit to facilitate limiting a movement of the drive shaft 24.” Signore [0053]; Bosche ¶¶ 85-86.

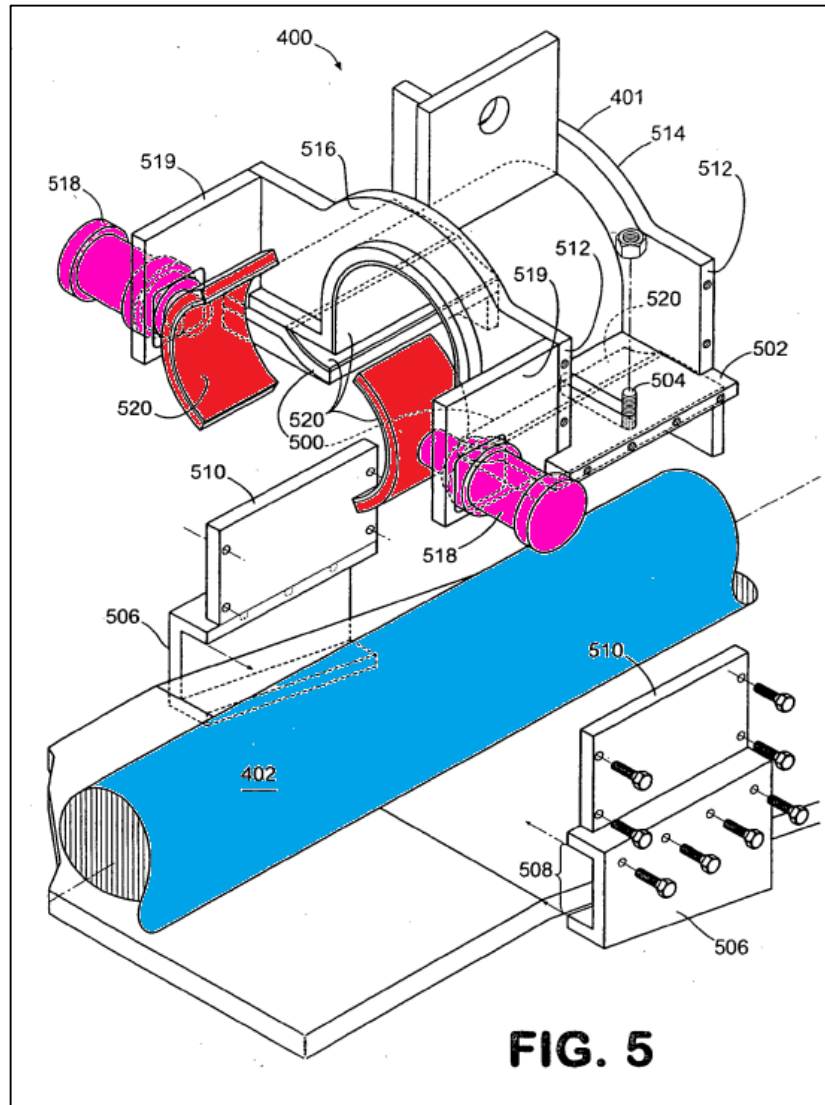


B. Weaver

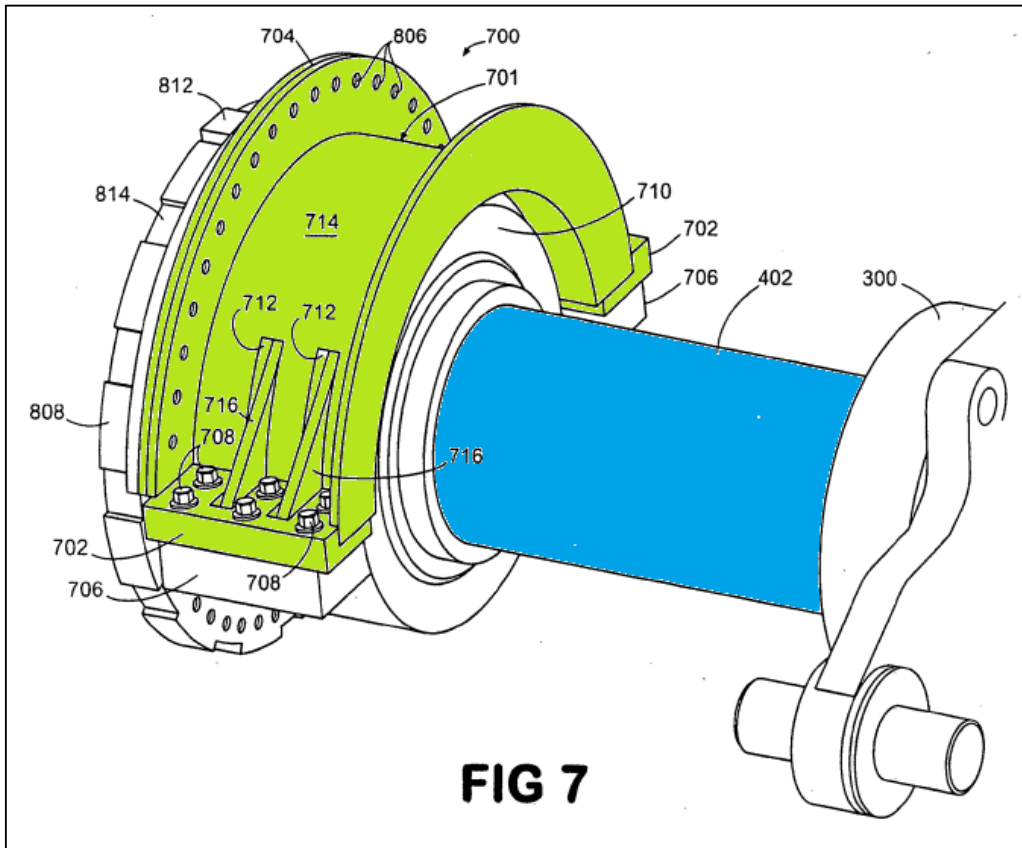
Weaver (Ex. 1008) is prior art under at least § 102(a)(1). Bosche ¶ 88.

Weaver addresses “the removal [and] replacement of gearboxes in wind turbine generators without requiring the removal of blades.” Weaver [0001].

Hydraulically or mechanically operated friction brakes (518) in the restraining member clamp the main shaft (402) “to restrain rotating shaft 402...from tilting from its horizontal position” and “inhibit rotation of shaft 402” during maintenance. Weaver [0015]-[0017]; Bosche ¶¶ 89-91.



In addition, Weaver discloses a rotor lock (green) that employs bolts placed through mating holes to lock rotation of the shaft (blue). Weaver [0011], [0001], [0023]; *id.* [0020], [0022], [0024] (additional embodiments); Bosche ¶¶ 92-93.

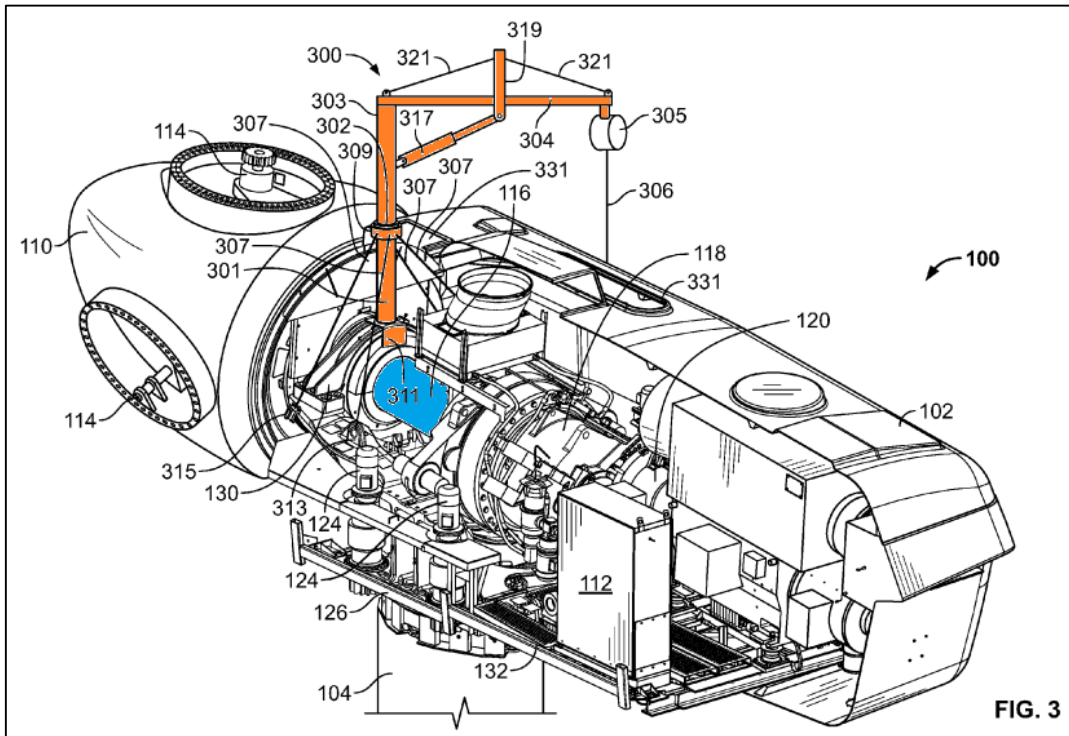


Weaver discloses that “[i]n some configurations, shaft-restraining members 400 are configured to allow for rotation of rotor 104 during high wind speed events” by employing friction brakes, such as “surfaces 520 [that] are Teflon(TM)-covered or provided with roller bearing surfaces...that allow rotation of shaft 402 above a predetermined torque.” Weaver [0018]; Bosche ¶ 94.

C. Stegemann

Stegemann (Ex. 1009) is prior art under at least §§ 102(a)(1) and (2). Bosche ¶ 95.

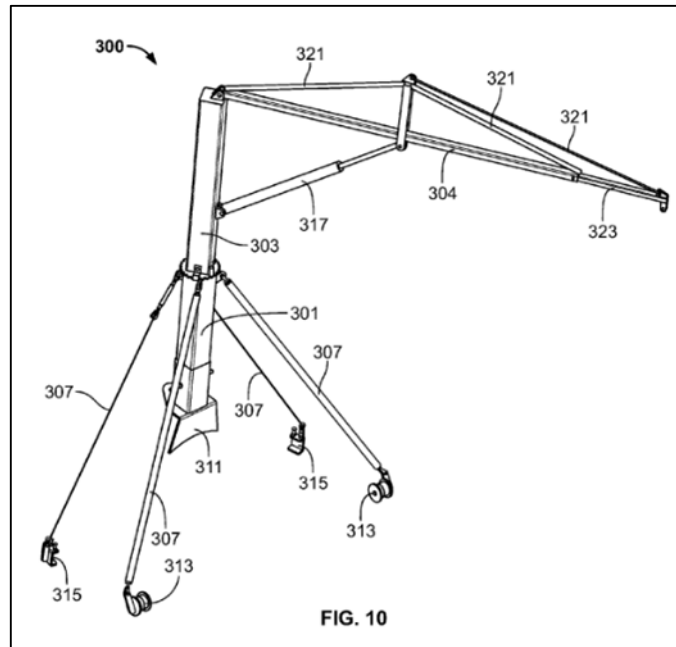
Stegemann discloses a lightweight crane (orange) mounted to a wind turbine component in the nacelle. Stegemann [0046], Fig. 2; Bosche ¶¶ 96-97.



Stegemann’s crane is mounted via a primary support member 301 “attached to the wind turbine by attachment plate 311,” which “may attach to or replace existing components, and utilize existing fastening locations.” Stegemann, [0039]; Bosche ¶ 98.

Stegemann discloses additional, “secondary support members 307 [which] may be a bar, wire, cable, rope, chain, strap or any other elongated device capable of supporting the first and second primary support members 301, 303.” Stegemann [0040]. Such secondary support members may be anchored to “secondary support clamps 315 [which] may be clamped or otherwise fastened to *lips, features or surfaces within the wind turbine 100 that provide a desired angle providing*

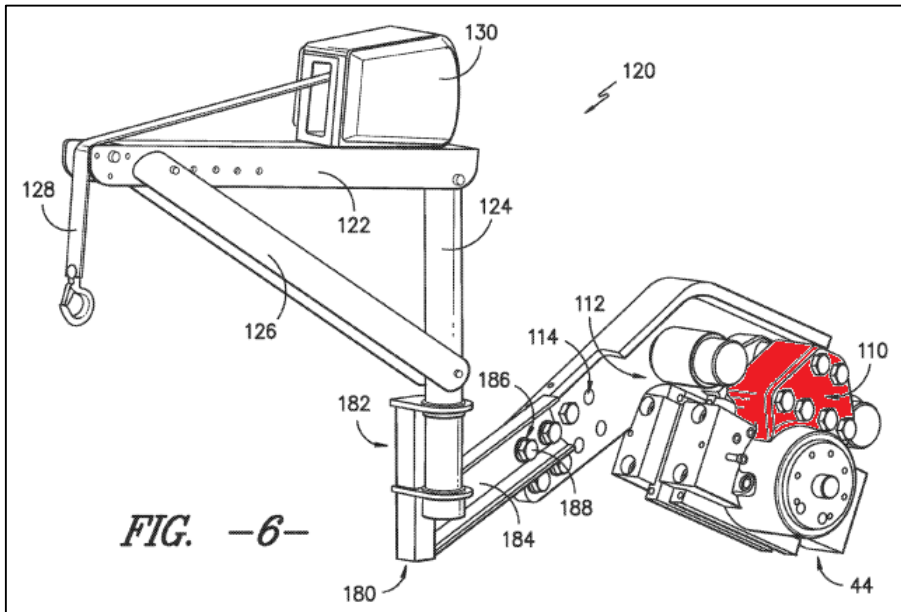
support for the first and second primary support members 301, 303.” Id.; Bosche ¶ 99.



D. Holloway

Holloway (Ex. 1010) is prior art under at least § 102(a)(2). Bosche ¶ 100.

Holloway’s portable crane mounts to various parts of a wind turbine, including to the bedplate of the nacelle or a brake caliper. Holloway, Claims 1, 6, 9, Fig. 6; Bosche ¶ 101.



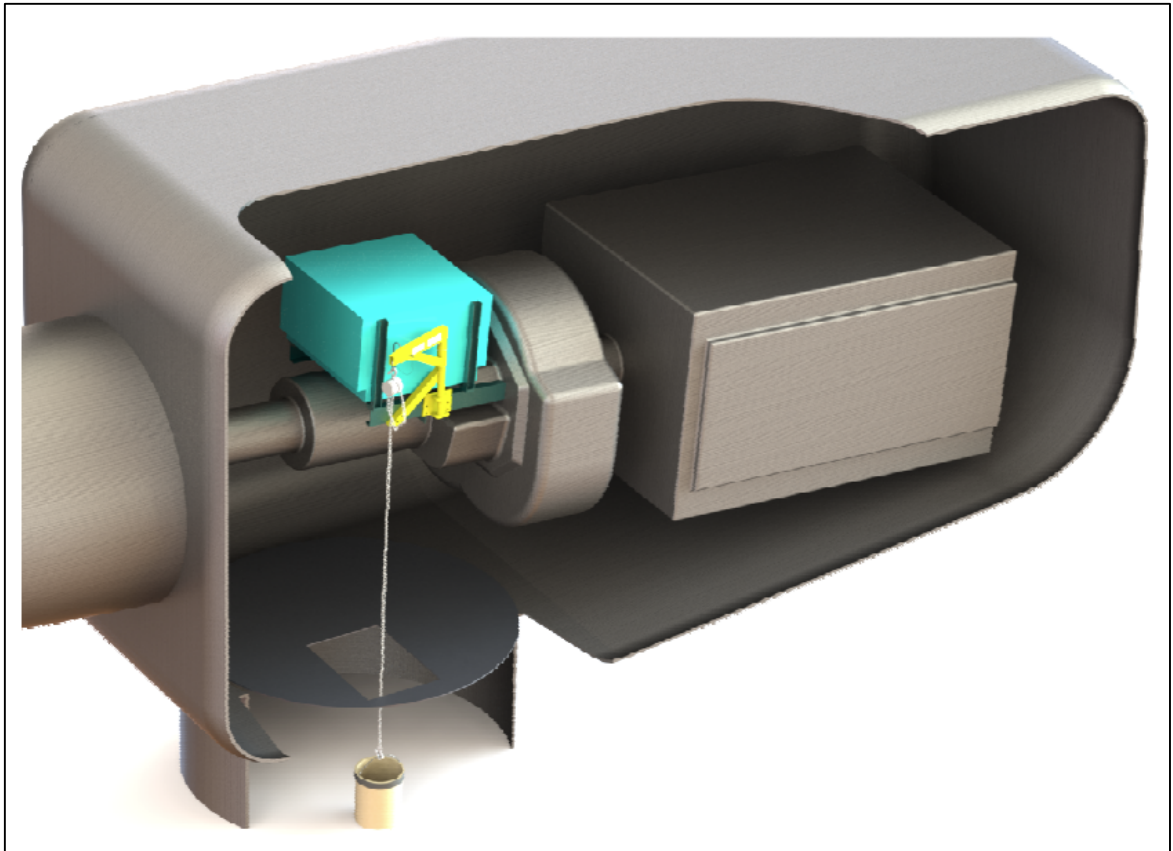
Holloway discloses “a mount assembly 180 for use with a brake caliper 110 [(red)] of a gearbox 44....” Holloway 7:3-4. Fasteners, such as bolts, “couple[] the flange 184 and mount assembly 180...to the brake caliper 110.” *Id.* 7:5-13. Holloway teaches mounting the crane to “various other suitable wind turbine 10 components...[such as] the main shaft 40 [or] main bearing, etc.” *Id.* 7:20-32, 7:40-48; Bosche ¶ 102.

E. Power Climber

Power Climber (Ex. 1023) is prior art under at least § 102(a)(1) because it is a printed publication accessible to the public no later than January 22, 2014.³ Bosche ¶¶ 121-123.

³ Metadata for Power Climber reflects a created and last modified date of January 22, 2014. Ex.1023 at 2.

Power Climber discloses a lightweight Power Climber Wind Nacelle Davit (yellow) mounted to a main shaft fixture (green) in the nacelle of a wind turbine. Power Climber describes the provision of “over 1,000 [Power Climber Wind] nacelle davits to 18 different wind plants across North America.” Power Climber; Bosche ¶ 124.



At institution, showing public accessibility requires only a “reasonable likelihood” that “interested members of the relevant public could locate the reference by reasonable diligence.” *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 13 (PTAB Dec. 20, 2019) (precedential); *Weber, Inc. v. Provisur Techs., Inc.*, 92 F.4th 1059, 1067-68 (Fed. Cir.), *cert. denied sub nom.*

Provisur Techs., Inc. v. Weber, Inc., 145 S. Ct. 173 (2024) (operating manuals obtainable upon purchase or request were publicly accessible); *see also Valve Corp. v. Ironburg Inventions Ltd.*, 8 F.4th 1364, 1374 (Fed. Cir. 2021) (article promoting business and serving as a “dialogue with the intended audience” was publicly accessible).

The public accessibility of Power Climber is corroborated by a January 23, 2014 article in WindTech International titled “Power Climber Wind supplies over 1,000 nacelle davits in North America.” Ex. 1024 (“WindTech Publication”). Windtech International is a “worldwide magazine, website and newsletter for the wind energy industry,” and “has been published for more than 20 years.” Ex. 1026 (<https://www.windtech-international.com/advertising/advertising-information>). A POSITA would understand that in 2014 WindTech International (both in print and online) was among the most reputable and popular sources of technical information related to commercial aspects of the wind energy industry. *Bosche* ¶¶ 122-123.

The public availability of Power Climber is further corroborated by the press release directing the public to “download the brochure at <http://www.powerclimberwind.com/NacelleDavit.aspx>.” Ex. 1023. The provided link leads to a Nacelle Davit website that describes the Power Climber Wind Nacelle Davit and directs users to “Download” the Power Climber Brochure. The Power Climber Wind Nacelle Davit Brochure available at the download link

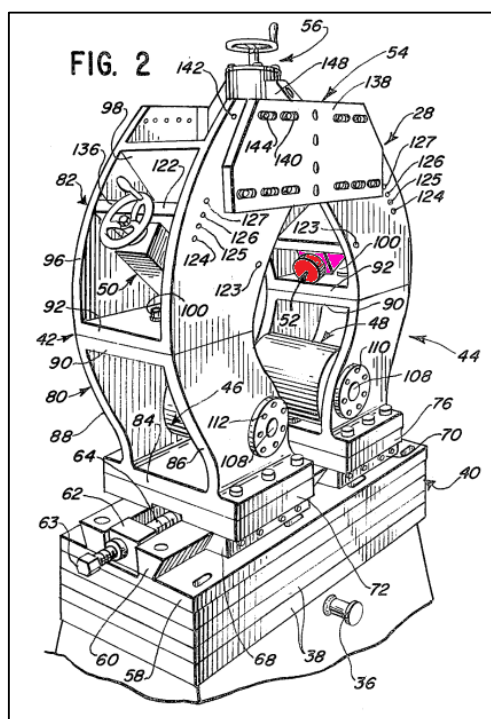
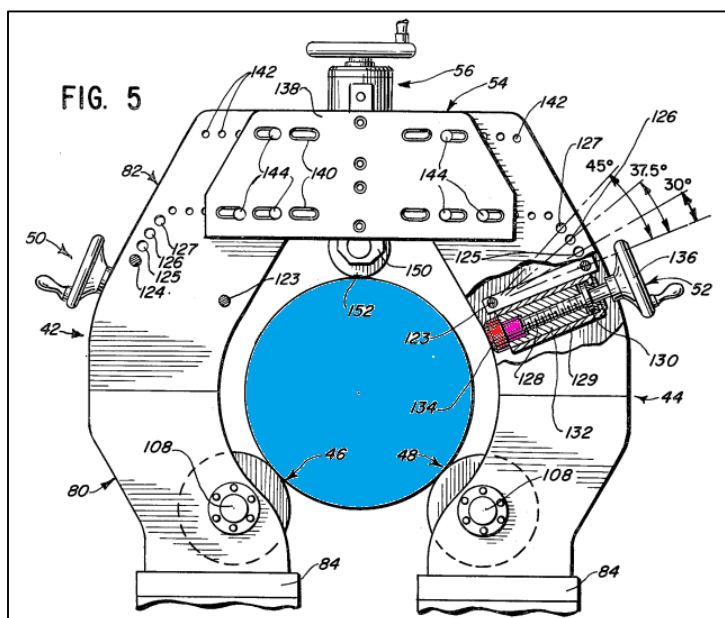
(“Power Climber Brochure”) (Ex. 1027) was created by no later than August 8, 2012. Ex. 1027⁴; Bosche ¶¶ 122-123.

F. Schulz

Schulz (Ex. 1013) is prior art under at least §§ 102(a)(1) and (2). Bosche ¶ 104.

Schulz discloses a shaft fixture for heavy rotor shafts (blue) for a power generation turbine, in particular for steam turbine electric generators. Schulz 1:11-12. Schulz’s shaft fixture is used to make repairs, *id.* 1:8-17, and would be considered suitable for fixation of a main shaft on a wind turbine. Bosche ¶ 105.

⁴ The metadata reflects the document was created and last modified on August 8, 2012. Ex. 1027 at 3.



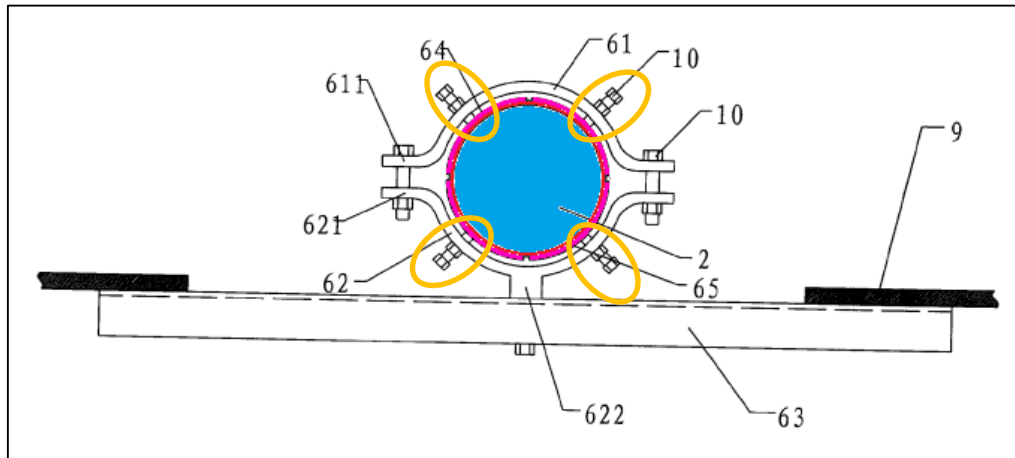
Schulz discloses a “head” with radially displaceable pressure mandrels with a brake pad 134 (red) mounted on the end of an elongated brake nut 132 (pink) and that can be operated with a brake screw 129. Schulz 3:6-14, 4:28-36, 4:39-52. Schulz describes a vertical adjustment assembly 26 to allow the shaft to be raised and lowered, and a device that allows a shaft to be fixed in location but allowed to rotate. *Id.* 2:56-3:5, 5:64-6:1; Bosche ¶ 106.

G. Hanxing

Hanxing (Ex. 1014)⁵ is prior art under at least § 102(a)(1). Bosche ¶ 107.

⁵ Citations to Hanxing are to the certified translation in Ex. 1014.

Hanxing discloses a “device for assembling or disassembling the gearbox of a wind turbine, specifically to a special fixture for replacing the gearbox of a single-support main shaft wind turbine set.” Hanxing [0001], Fig. 4.



Hanxing discloses a rotor clamp comprising “upper clamping hoop 61, lower clamping hoop 62, and anti-rotation plate 63. The upper and lower clamping hoops 61/62 encircle the main shaft 2 [(blue)] and are securely fastened together to tightly hold the main shaft 2.” *Id.* [9931]. Hanxing further discloses that “a layer of soft wear-resistant material 65,” (red), *e.g.*, a brake pad, “can also be added inside the steel sleeve for better sealing.” *Id.*; Bosche ¶¶ 110-111.

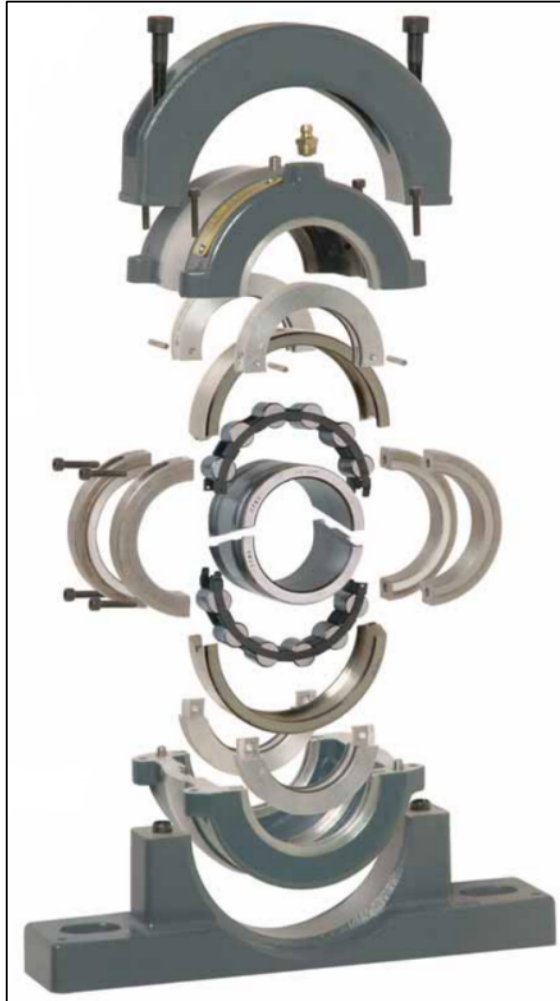
Finally, Hanxing discloses that “screw holes are provided on the upper and lower clamping hoops 61/62, and bolts 10 [(orange)] passing through these screw holes will tightly press the steel sleeve against the main shaft 2 to ensure surface contact.” Hanxing [0031]. The adjustable bolts 10 are substantially symmetrical

and radially displaceable between a passive and an active position. Hanxing; Bosche ¶ 112.

H. Cooper

Cooper (Ex. 1019) is prior art under at least § 102(a)(1) because it is a printed publication accessible to the public no later than May 31, 2013. Bosche ¶ 113.

Cooper discloses split roller bearings, including for mounting on “pillow blocks,” and that are intended for use in “Power Generation,” including “Wind Turbines.” Cooper, 2 of 2; Bosche ¶ 114.



The public accessibility of Cooper is corroborated by the fact that a POSITA would have been familiar with Cooper roller bearings, as Cooper was a well-known manufacturer of bearings for wind turbines and it was common in 2014 for wind energy engineers to refer to materials from Cooper to aid in selecting bearings for wind energy applications. Bosche ¶ 113.

I. Schaeffler

Schaeffler (Ex. 1020) is prior art under at least § 102(a)(1) because it is a printed publication accessible to the public no later than June 15, 2013. Bosche ¶ 115.

Schaeffler discloses split spherical roller bearings that offer “[c]ost[] savings through rapid bearing replacement at difficult to access bearing locations.”

Schaeffler, 1, 4 of 28; Bosche ¶ 116.



Schaeffler discloses a general procedure for the fitting of a split spherical roller bearing, which includes “[s]upport[ing] the weight of the rotor” (*e.g., raising the end of the rotor shaft* to create clearance for the bearing replacement process). Schaeffler, 9 of 28. This procedure is animated in Ex. 1021 at 18-25, 47-52 of 124. Bosche ¶ 117.

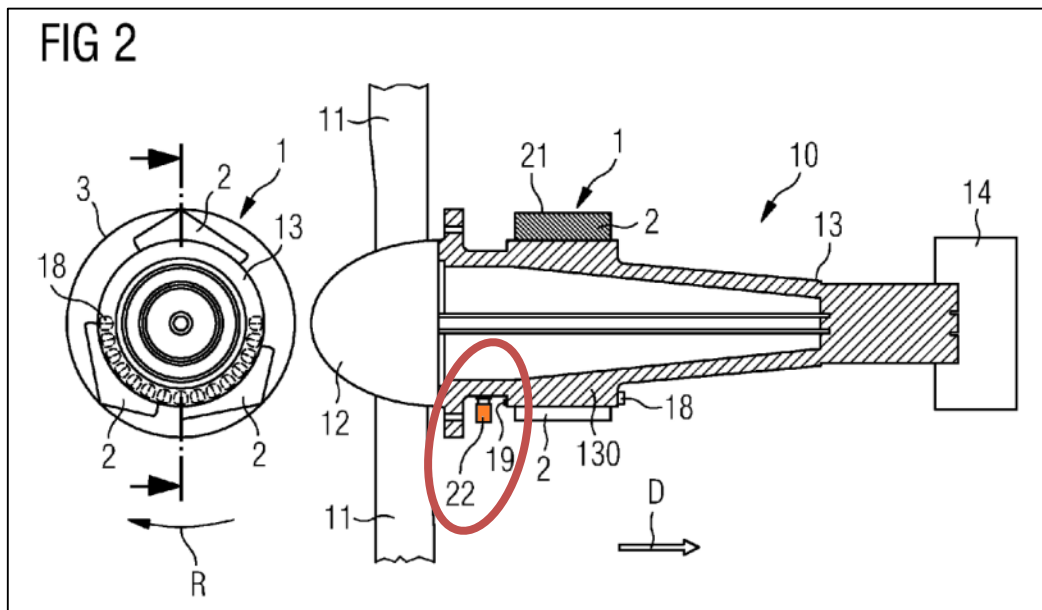
The public accessibility of Schaeffler is corroborated by the fact that a POSITA would have been familiar with Schaeffler roller bearings, as Schaeffler was a well-known manufacturer of bearings for wind turbines and it was common in 2014 for wind energy engineers to refer to materials from Schaeffler to aid in selecting bearings for wind energy applications. Bosche ¶ 115.

J. Guerenbourg

Guerenbourg (Ex. 1022) is prior art under at least §§ 102(a)(1) and (2). Bosche ¶ 118.

Guerenbourg discloses “a method of performing maintenance on a wind turbine.” Guerenbourg, Abstract, [0004]-[0005]; Bosche ¶ 119.

The method includes “halting a rotation of the shaft, ***operating a lifting arrangement to raise the shaft***, and removing a bearing pad.” Guerenbourg [0017]. Guerenbourg further discloses “***a lifting arrangement such as a jack [(orange)] for raising a relevant part such as the main shaft*** to reduce the load on the main bearing in order to facilitate removal, insertion or maintenance of a bearing pad.” *Id.* [0032], [0053]; Bosche ¶ 120.



K. The '518 Patent

As discussed in Section VIII.D, the '578 Patent's priority date is no earlier than January 24, 2024. As such, the '518 Patent, which issued on August 13, 2019, qualifies as prior art under at least § 102(a)(1). Bosche ¶ 127.

VII. BACKGROUND ART

The following background art discussed in the grounds below corroborates that various aspects of the Challenged Claims were well known in the art by no later than October 7, 2014.

A. Boudreaux

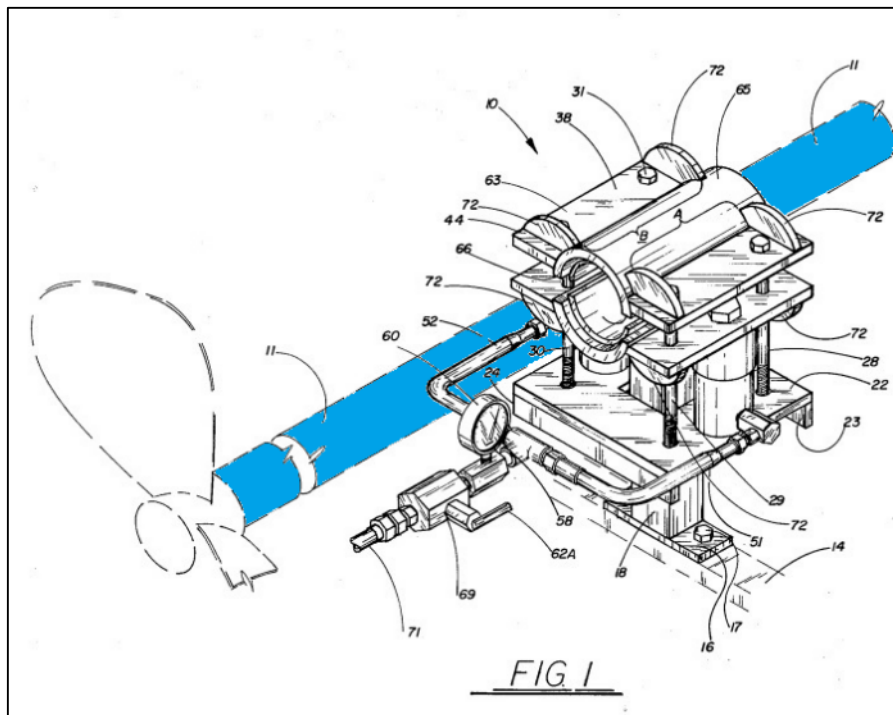
Boudreaux (Ex. 1011) is prior art under at least §§ 102(a)(1) and (2). Bosche ¶¶ 134.

Boudreaux discloses “immobilizers for propeller shafts and the like” used particularly in the energy industry, “which hydraulically or manually immobilize[]

the propeller shaft...of large boats...in servicing the offshore oil and gas industry.”

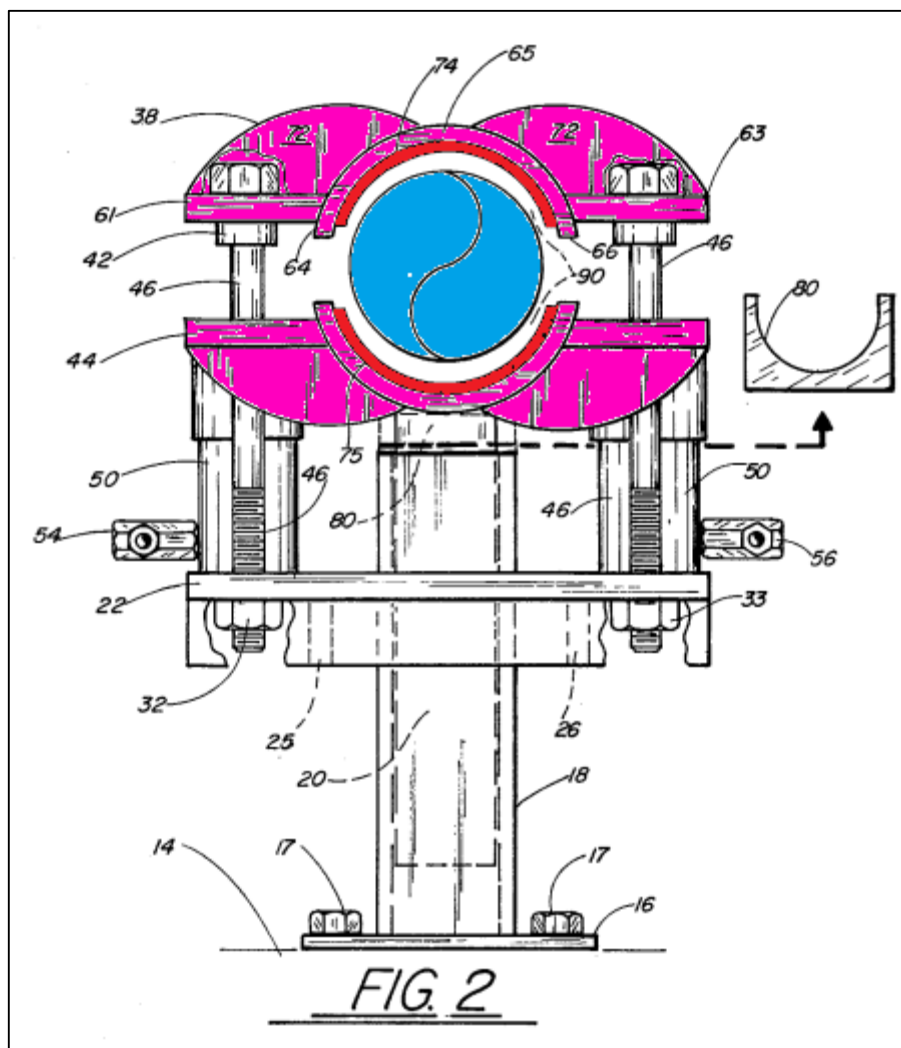
Boudreaux, 1:5-14, 1:20-25; Bosche ¶ 135.

Boudreaux’s shaft immobilizer is “mounted to the bottom portion of a crew boat” and prevents rotation of the shaft despite forces on a propeller from the flow of water. Boudreaux, 1:6-11, 1:20-25, 4:1-10; Bosche ¶ 135.



Boudreaux’s shaft immobilizer includes lower and upper sections “with the ability to move upward and downward.” Boudreaux 2:66-3:2. “[A] lower and upper engaging means” (pink), is “mounted on the upper base portion which [is] movable to frictionally engage the [shaft] to be immobilized” using “a layer of typical brake lining 74” (red). *Id.*, 3:2-5, 5:47-51. The engaging means are moved into engagement with the propeller shaft (blue) “by hydraulic power or the like” or

by using threaded bolts. *Id.*, 3:5-8, 7:58-8:10, 6:66-7:13; 7:58-8:10; 5:47-51, 7:57-63; Bosche ¶¶ 137-141.

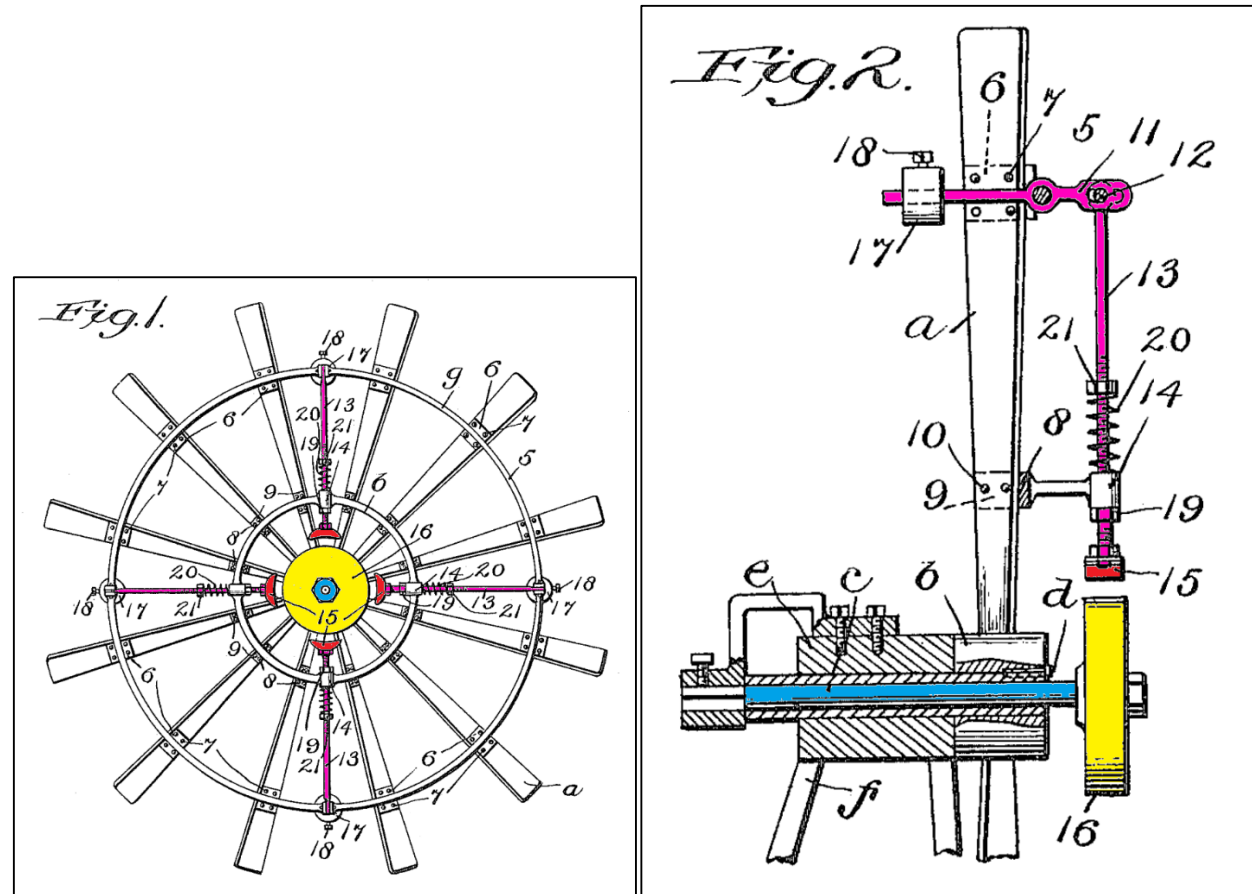


B. Bisbee

Bisbee (Ex. 1012) is prior art under at least §§ 102(a)(1) and (2). Bosche ¶ 142.

Bisbee discloses a brake comprising multiple pressure mandrels (pink) with tap shoes (red) symmetrically arranged around a friction disc (yellow) on the drive shaft (blue). As the blades turn more quickly, connected weights (17) cause the

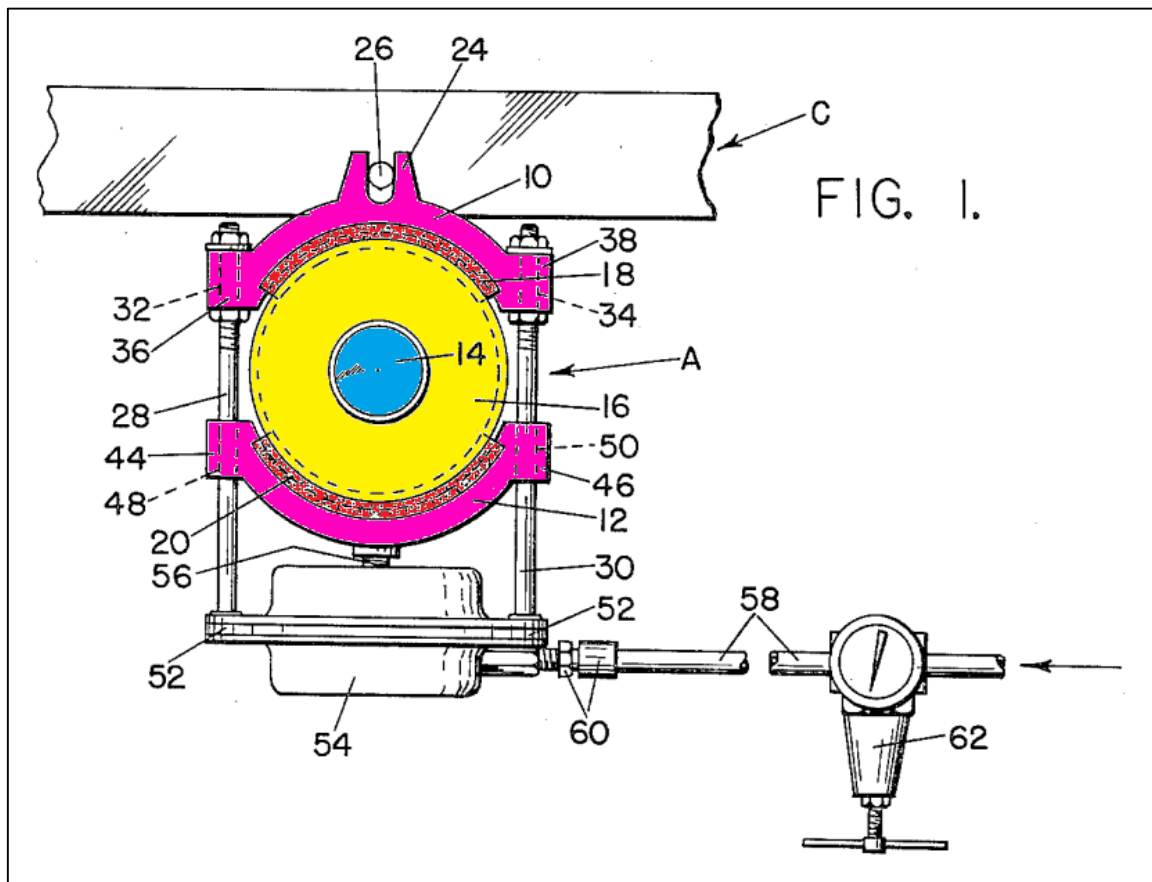
143-144.



C. Schilling

¶ 145.

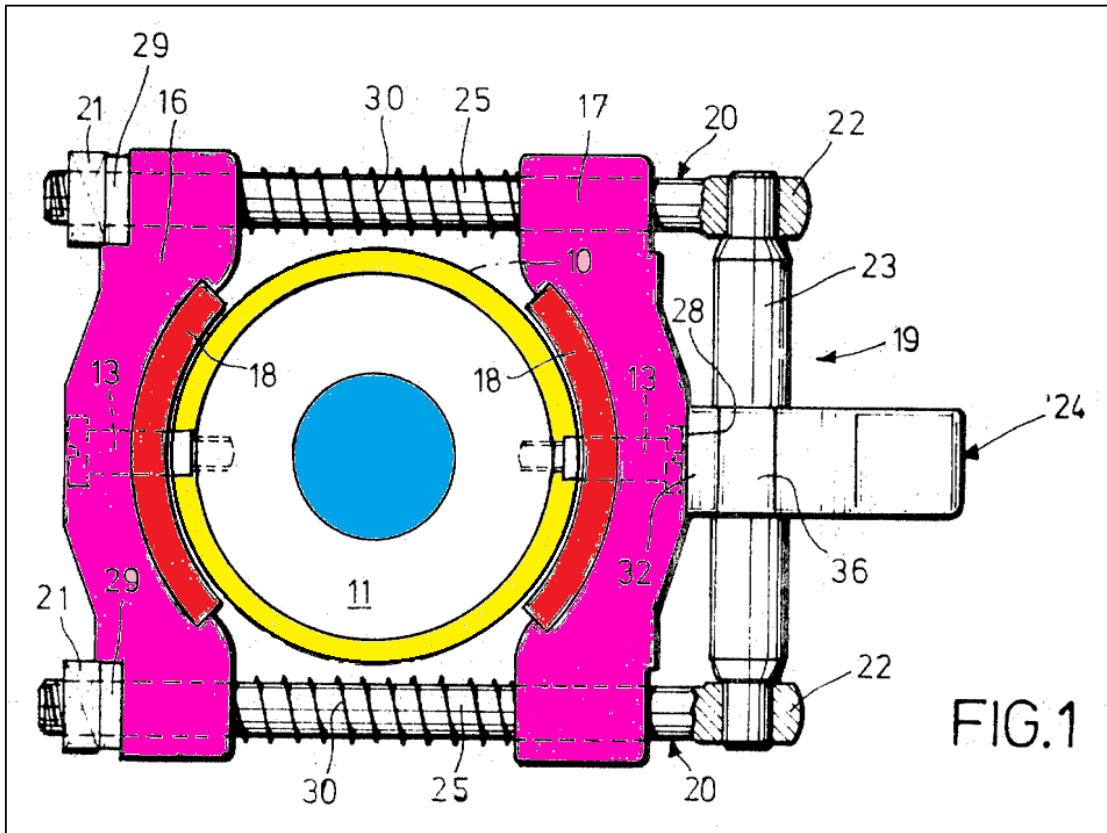
1:29-34, 3:27-31, 1:35-44, 1:51-57, Fig. 1; Bosche ¶¶ 146-148.



D. Fetzer

Fetzer (Ex. 1016) is prior art under at least §§ 102(a)(1) and (2). Bosche ¶ 149.

Fetzer discloses a brake comprising a set of two mandrels with tap shoes that can be engaged/applied using a lever. Fetzer, Abstract, 2:27-29, Fig. 1, 2:45-59; Bosche ¶¶ 150-151.

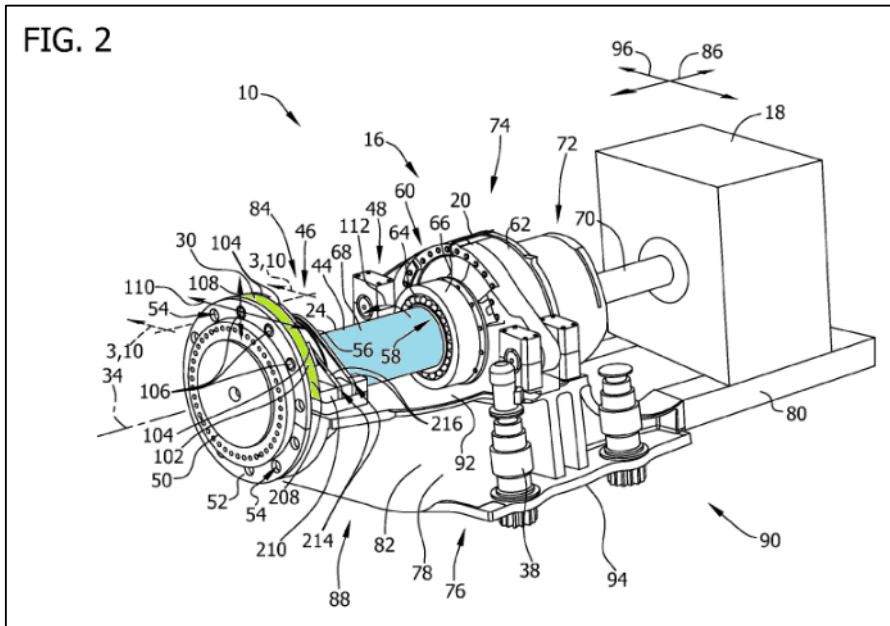


E. Koronkiewicz

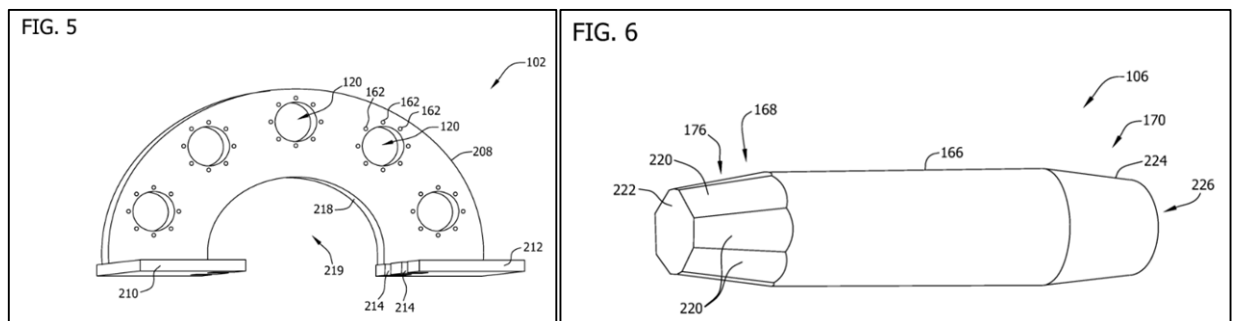
Koronkiewicz (Ex. 1017) is prior art under at least §§ 102(a)(1) and (2).

Bosche ¶ 152.

Koronkiewicz discloses a “rotor lock assembly” (green) to “facilitate [uptower] repair and/or replacement of wind turbine components.” Koronkiewicz, 2:29-34, 4:57-5:4; Bosche ¶¶ 153-154.



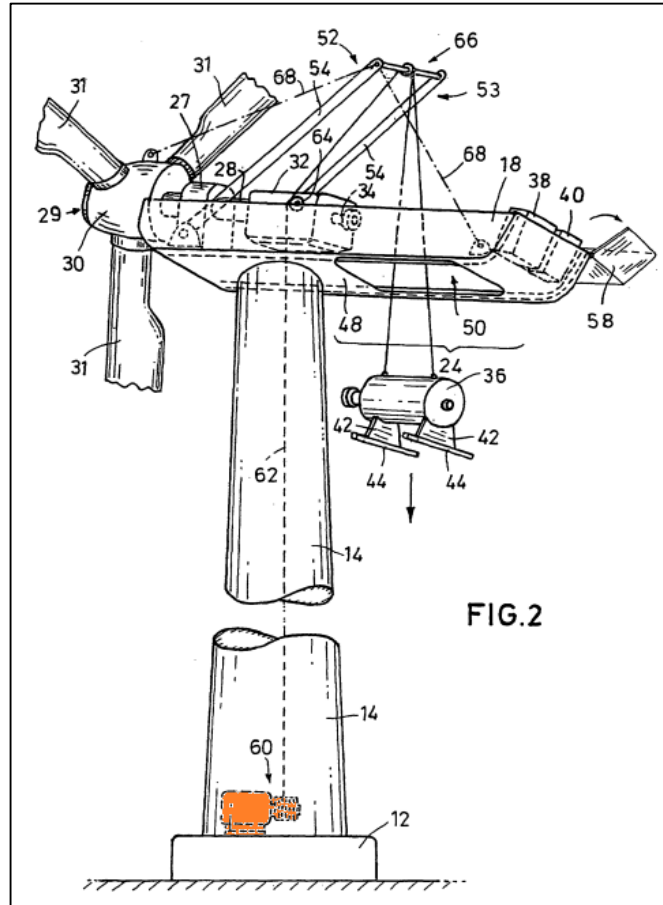
Koronkiewicz’s rotor lock “includes a support frame 102,” “a plurality of lock pin housings 104,” and “a plurality of lock pins 106” “configured to be inserted through a corresponding rotor lock disk opening 54.” Koronkiewicz 4:57-5:4, Figs. 5 and 6; Bosche ¶ 155.



F. Weitkamp

Weitkamp (Ex. 1018) is prior art under at least § 102(a)(1). Bosche ¶ 156.

Weitkamp discloses “[a] cable winch 60 [(orange)]...mounted at the bottom of the foundation 12 of the tower 14, from which a rope 62 runs...to the upper end 66 of the crane arms 54.” Weitkamp [0022], [0001], [0008], [0013]; Bosche ¶ 157.



VIII. CLAIMS 1-17 OF THE '578 PATENT ARE UNPATENTABLE

A. **Ground 1: Claims 1, 3-4, 6-8, 10, and 13-14 are Obvious Over Signore and Weaver in View of Power Climber, Holloway, and/or Stegemann**

1. **A POSITA Would Have Been Motivated to Combine Weaver and Signore with a Reasonable Expectation of Success**

The teachings of Weaver and Signore provide substantial motivation to combine them. Weaver and Signore teach the same type of apparatus for the same purpose—assisting in the uptower removal and replacement of wind turbine components without requiring the use of large, ground-based cranes. *See, e.g.*, Weaver [0001], [0015] (wind turbine shaft restraining member (400) with a rotor lock); [0016]-[0017] (friction brakes (518) in a restraining member to clamp main shaft (402)); Signore [0001], [0029] (“[A] component handling system” with a rotor lock “for use in removing a component of a drive train assembly from the wind turbine.”). Both Weaver and Signore are also concerned with the cost and difficulty of known repair methods that required removal of the rotor assembly prior to repair. *Compare* Weaver [0001], [0004], [0007] *with* Signore [0003], [0016]; Bosche ¶¶ 158-160.

Weaver and Signore both use friction to inhibit rotation of the shaft. *Compare* Weaver [0017] *with* Signore [0053]. At the time of the '578 Patent, it was well known that a hydraulic or mechanically operated brake clamp was one way to achieve an increased normal force. Bosche ¶ 162. As such, a POSITA would be

motivated to combine the hydraulically or mechanically operated friction brakes taught by Weaver into the shaft restraint taught by Signore. Bosche ¶ 163.

A POSITA would have been motivated, at the time of the priority date of the '578 Patent, to combine the multiple pressure mandrels taught by Weaver with the device taught by Signore because they would provide greater applicability to a wider range of wind turbine shaft diameters, and they would also improve the friction retention of the wind turbine's main shaft. Bosche ¶¶ 161.

In addition, in the prosecution of both the parent '518 Patent and the '578 Patent, the examiner rejected pending claims as obvious over Signore in view of Weaver. Sections III.A.1 & III.A.2. In doing so, the examiner necessarily found that a POSITA would have been motivated to combine Signore and Weaver, which Patent Owner did not contest.

“[A]ny need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 420 (2007). Motivation to combine is particularly strong where “there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions.” *Id.* 421. This is especially true where the cited references teach (1) “all the limitations of [the challenged] claims” and (2) the same “known

problem” addressed by the challenged patent. *Ball Aerosol and Specialty Container, Inc. v. Ltd. Brands, Inc.*, 555 F.3d 984, 993 (Fed. Cir. 2009).

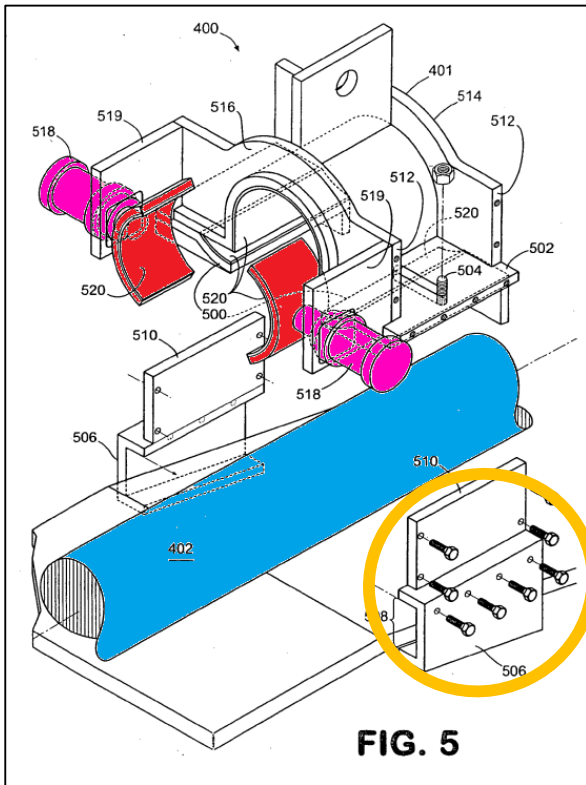
Every element of the above-referenced claims appears in Weaver and Signore. Sections VIII.A.4-VIII.A.13; Bosche ¶¶ 182-335. Those elements are standard mechanical components that would be familiar to any POSITA. There is nothing unpredictable, surprising, unconventional, or unexpected about the claimed use of those components in the practice of up-tower maintenance of a wind turbine. Furthermore, the technology and operation of such components was well-understood at the relevant time such that the combination of Weaver and Signore would have had a high likelihood of success. Bosche ¶ 165.

Since Weaver and Signore teach the same kind of device used for assisting in the uptower removal and replacement of wind turbine components, since they identify the same problem identified in the ’578 Patent and solve it in the same way, since the elements of Weaver and Signore were conventional elements performing the same function they had always been known to perform, and since the combination of elements is nothing more than the predictable use of prior art elements according to their established functions, a POSITA would have been motivated to combine Weaver and Signore with a high likelihood of success. Bosche ¶ 166.

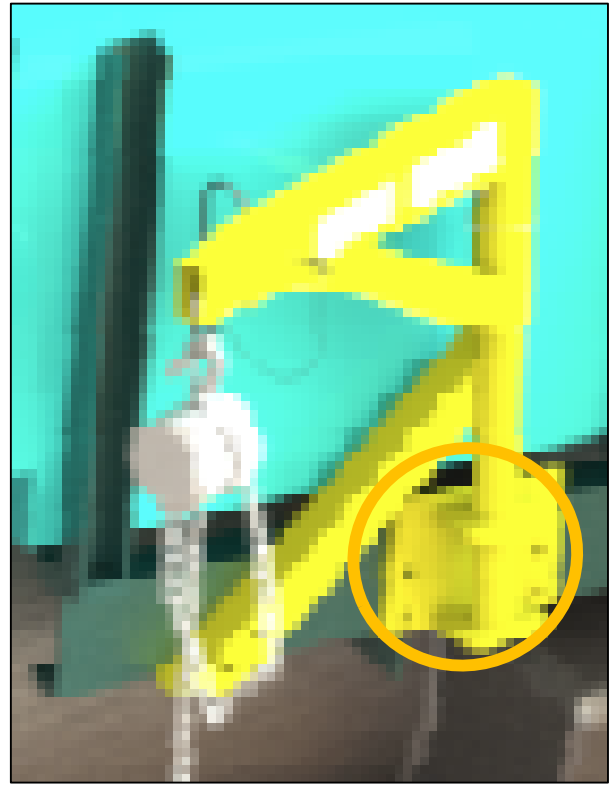
2. A POSITA Would Have Been Motivated to Combine Weaver and Signore with Power Climber, Holloway, and/or Stegemann with a Reasonable Expectation of Success

Like Signore and Weaver, Power Climber, Stegemann, and Holloway relate to uptower repair of wind turbines without requiring large cranes. Power Climber; Stegemann [0005]-[0006]; Holloway 1:30-43, 5:34-59; Bosche ¶¶ 167, 171, 177-178. Moreover, the '578 Patent itself admits as prior art the use of self-hoisting cranes in the nacelle. '578 Patent, 2:1-5; Bosche ¶¶ 170, 172.

For example, a POSITA would have recognized that the teachings of Power Climber are directed to the same problem as Signore and Weaver—performing major maintenance activities quickly, safely, and efficiently up-tower without the use of large mobile cranes. Bosche ¶ 168. The Nacelle Davit taught by Power Climber is compatible with the main shaft fixtures taught by Signore and Weaver to achieve the advantages taught by Power Climber. Bosche ¶ 168-170. A POSITA would have been motivated to use a lightweight or self-hoisting crane to avoid the expense of a large mobile crane. *Id.*



Weaver, Fig. 5



Power Climber

Similarly, a POSITA would understand that Holloway's portable crane would be a useful addition to the devices taught by Signore and Weaver. A POSITA would also understand that Holloway teaches a number of attachment points for a portable crane, Holloway, 6:16-18, 6:35-37, 6:52-53, 7:2-5, 7:20-39, that the selection of mounting location is a matter of design choice, and that a POSITA would be able to select a suitable mounting location. Bosche ¶ 179.

Moreover, Stegemann provides several reasons why it would be beneficial to use a portable crane in a wide range of wind turbine repair situations. Stegemann [0010]-[0015]; Bosche ¶¶ 173-174. A POSITA would understand that when

repairing or replacing wind turbine components, some modifications may be necessary to mount such cranes, and would be motivated to include standardized mounting facilities on a main shaft fixture, which itself will be installed in a nacelle for wind turbine repair. Bosche ¶ 175.

Further, a POSITA would find it advantageous to combine Power Climber's Nacelle Davit, Stegemann, and/or Holloway with Signore's and Weaver's main shaft fixture—and would expect success in doing so—because the main shaft fixture is a strong and solid structure that, by way of its attachment to the nacelle frame, is part of an integrated structure together with the nacelle frame and creates a consistent structure in each wind turbine, whereas other structures and surfaces in the wind turbine can vary in size and location. Bosche ¶¶ 169-170, 180.

In addition, the main shaft fixture, as taught by the '578 Patent, serves a function that is very similar to attachment plate 311 of Stegemann. Stegemann [0039]; Bosche ¶ 175. A POSITA in the relevant time frame would have recognized that the main shaft fixtures taught by Signore and Weaver would be a convenient mounting location for a crane, as taught by Stegemann. Stegemann [0040]. As such, a POSITA would have been motivated to attach a primary or secondary support for a portable crane to a lip, feature, or surface on the main shaft fixture as taught by Signore. Bosche ¶ 176.

Combining Power Climber, Holloway, and/or Stegemann, together with the

main shaft fixtures taught by Signore and Weaver makes use of conventional mechanical elements performing the same function they had always been known to perform, and is nothing more than the predictable use of prior art elements according to their established functions. The combination provides expected benefits that would have been obvious to a POSITA, and does not provide any surprising or unexpected results. *Bosche* ¶¶ 168-170, 180.

3. The Combination of Signore and Weaver in View of Power Climber, Holloway, and/or Stegemann Meets All Elements of Challenged Claims 1-4, 6-8, 10, and 13-14

As discussed below, every element of Challenged Claims 1-4, 6-8, 10, and 13-14 are taught by Signore and Weaver in view of Power Climber, Holloway, and/or Stegemann (the “Ground-1 References”). To the extent the teachings of any of these references are substantively different for any given claim element, it would have been at least obvious to try the other references’ implementation of that element, given the overall similarity in their purpose, design, and operation. *Bosche* ¶ 181.

4. Claim 1

Following the rejection of then pending claim 1 over the combination of Weaver and Signore, Patent Owner argued only that “the cited references fail to disclose or suggest, inter alia, ‘that the main shaft fixture further comprises mounting facilities adapted for anchoring a crane on/in a nacelle of a wind

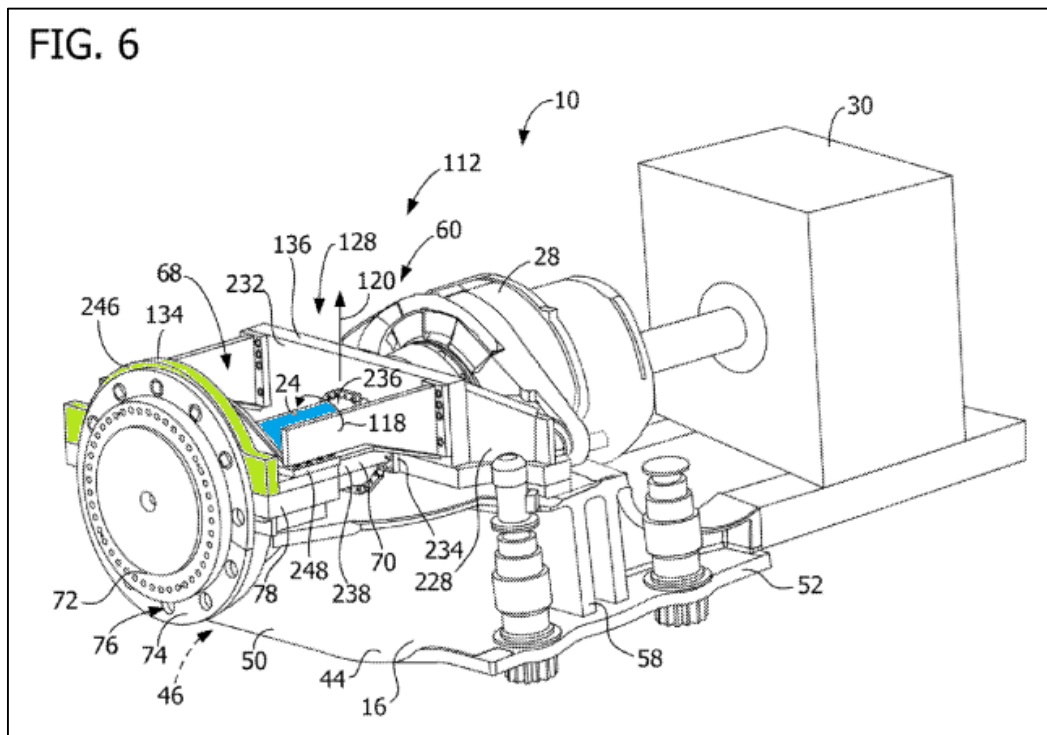
turbine,’ as recited in [pending] independent claim 1.” Ex. 1002 at 73-74. Patent Owner did not otherwise dispute that the combination of Weaver and Signore disclose every element of then pending claim 1. Regardless, every element of Claim 1 is disclosed by the combination of the Ground-1 References.

a. 1[Pre]: Main Shaft Fixture⁶

Regardless of whether the preamble of Claim 1 is limiting, it is disclosed by the Ground-1 References. Moreover, in prosecution, the Examiner found that Signore and Weaver disclose this element, which Patent Owner did not dispute. Section III.A.2; Exhibit 1002 at 87; Bosche ¶¶ 186, 189.

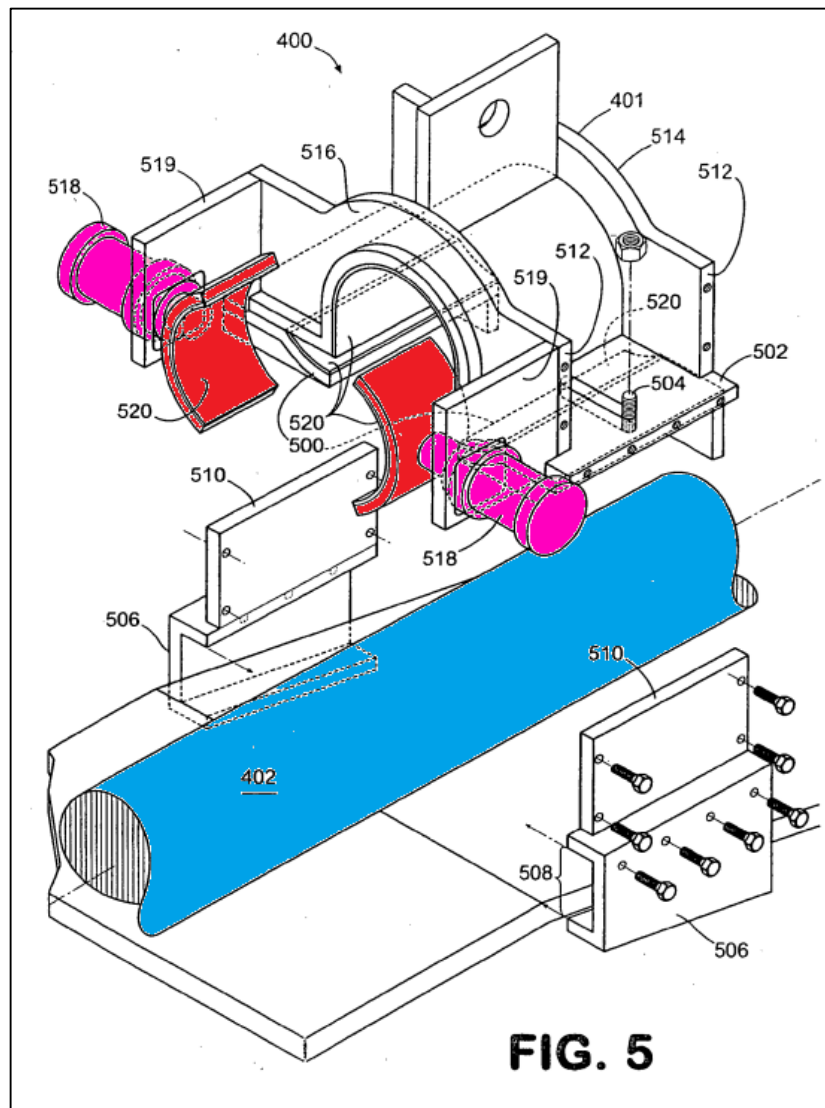
Signore’s “[c]omponent handling system 112 enables a user to remove and/or install component 114 uptower of wind turbine 10.” Signore [0029]. As such, it is a “[m]ain shaft fixture for fixation of a main shaft on a wind turbine during execution of installation and repair work on heavy parts of a wind turbine.” Bosche ¶ 185.

⁶ Abbreviations of claim elements are as provided in Appendix A.



Signore, Figure 6

Weaver discloses a shaft restraining member (400) that is placed on top of the wind turbine's rotor shaft, and "is used to restrain rotating shaft 402." Weaver [0015]; Bosche ¶ 187.



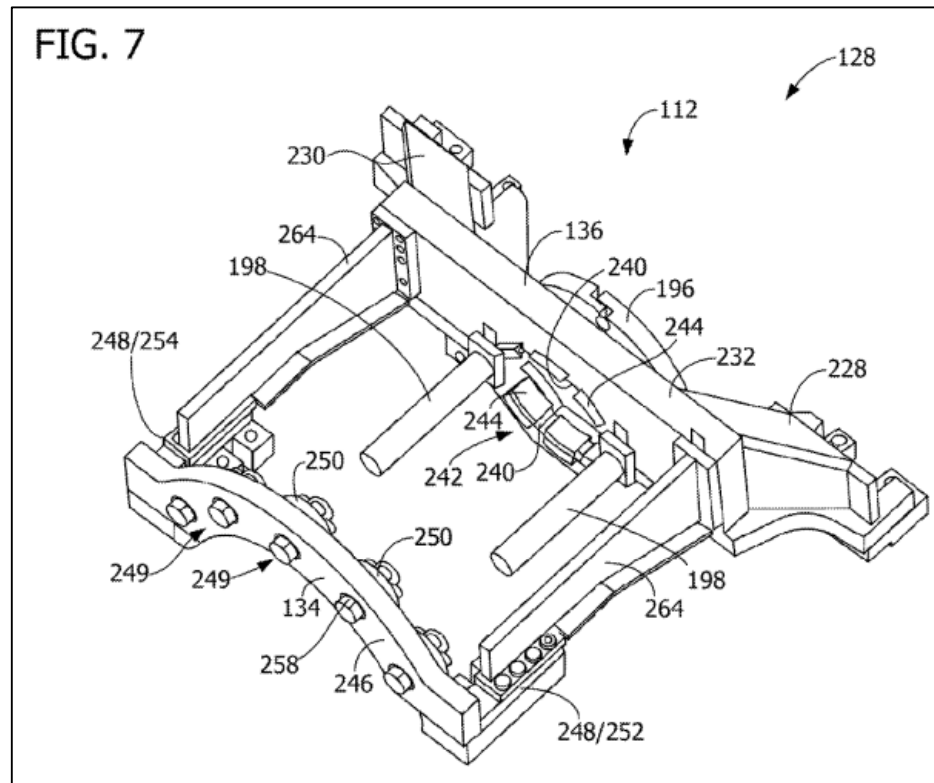
Weaver, Figure 5

b. 1[a]: Divided in Sections

Signore and Weaver each teach this element. Bosche ¶¶ 190-194.

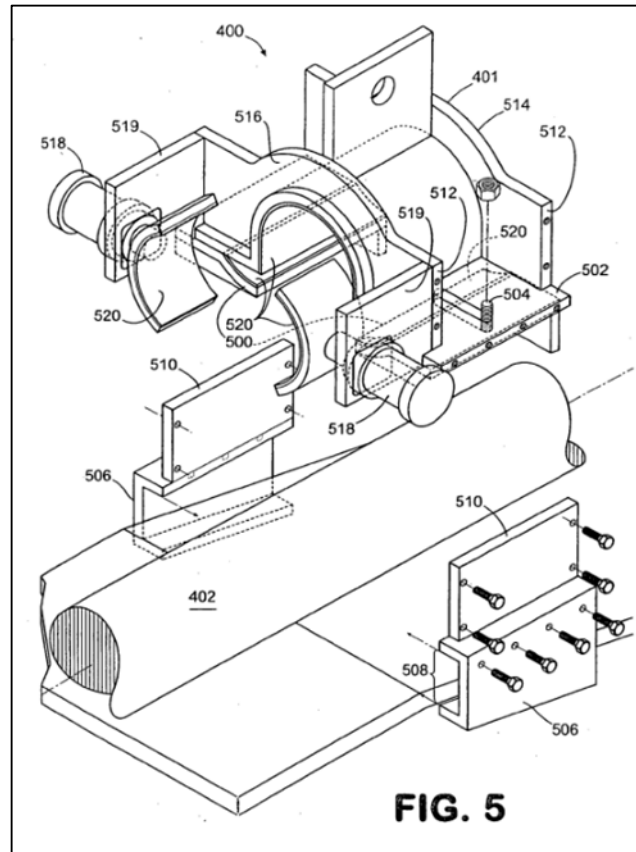
In prosecution, the examiner found that Signore discloses this element, which Patent Owner did not dispute. Exhibit 1002 at 87-88; Section III.A.2; Bosche ¶ 192.

Signore teaches that shaft support assembly 128 is divided up into a number of sections, including “a **drive shaft locking assembly 134** and a **restraint assembly 136**,” for mounting on stable structural parts in a nacelle of a wind turbine when “**coupled to support frame 16.**” Signore [0031]; Bosche ¶ 191.



Signore, Figure 7

Weaver’s fixture is similarly divided up into sections, including at least “[a]n **additional stiffening plate 510**,” and “**channel clamp[s] 506**.” Weaver [0016], Fig. 5. In addition, Weaver teaches “each mounting wing 502...is held in place using a channel clamp 506...that attaches onto **a bedplate...of wind turbine 100**.” *Id.*; Bosche ¶ 194.

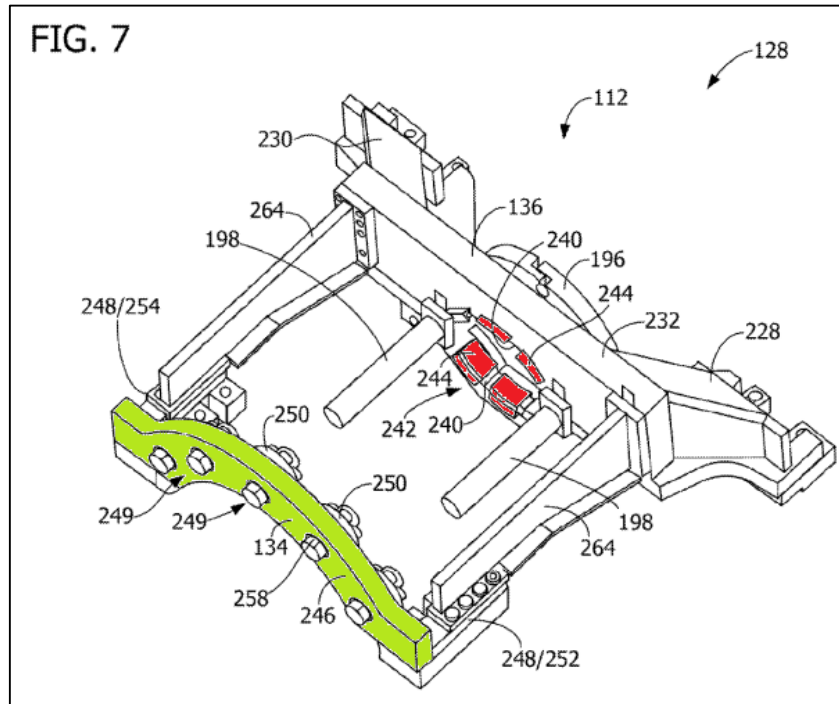


Weaver, Figure 5

c. 1[b]: Adjustable Pressure Mandrels

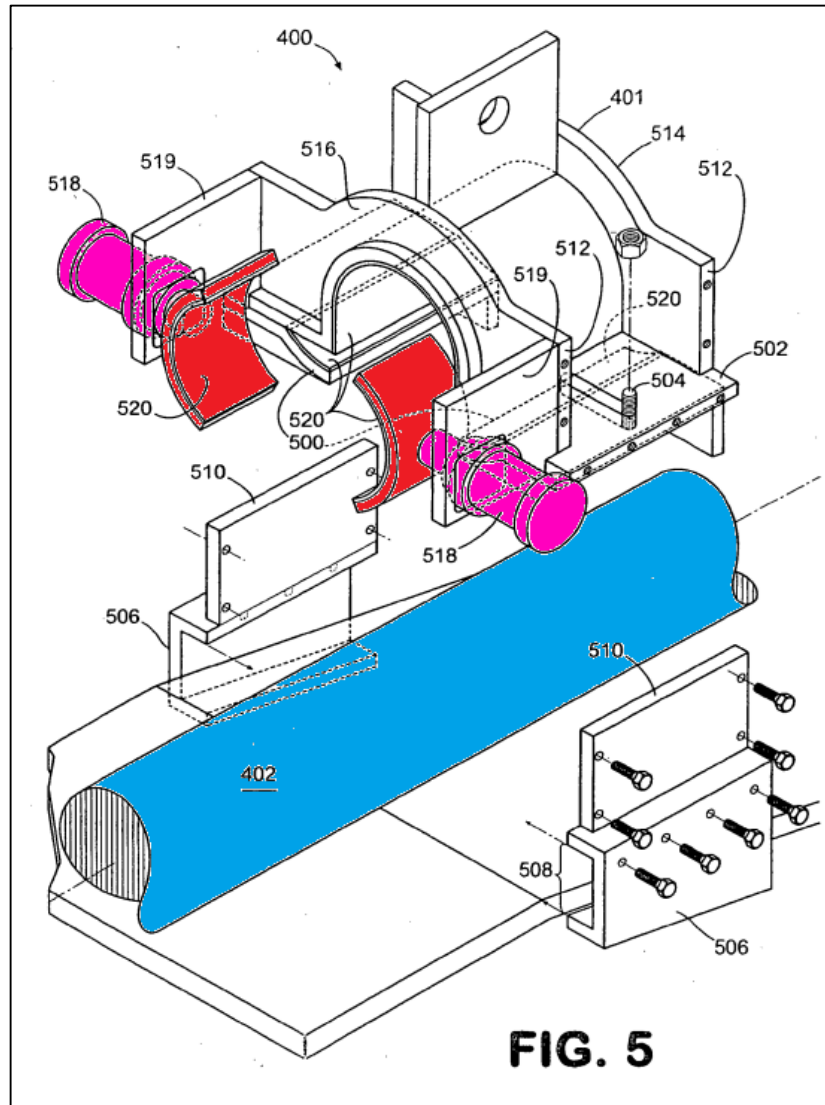
Signore and Weaver teach this element. Bosche ¶¶ 195-210.

Signore discloses pressure mandrels with tap shoes in the form of “a plurality of torque clamps 244 [(red)]...coupled to interior surfaces 240” to provide “a friction fit to facilitate limiting a movement of drive shaft 24.” Signore [0053]; Bosche ¶ 196.



Signore, Figure 7

Weaver also discloses adjustable pressure mandrels with tap shoes. Weaver [0017] (“Hydraulic or mechanically operated friction brakes 518 [(pink)]” “on opposing brake support flanges 519” and that act to “clamp main shaft 02 and thereby inhibit rotation of shaft 402.”); Bosche ¶ 199.

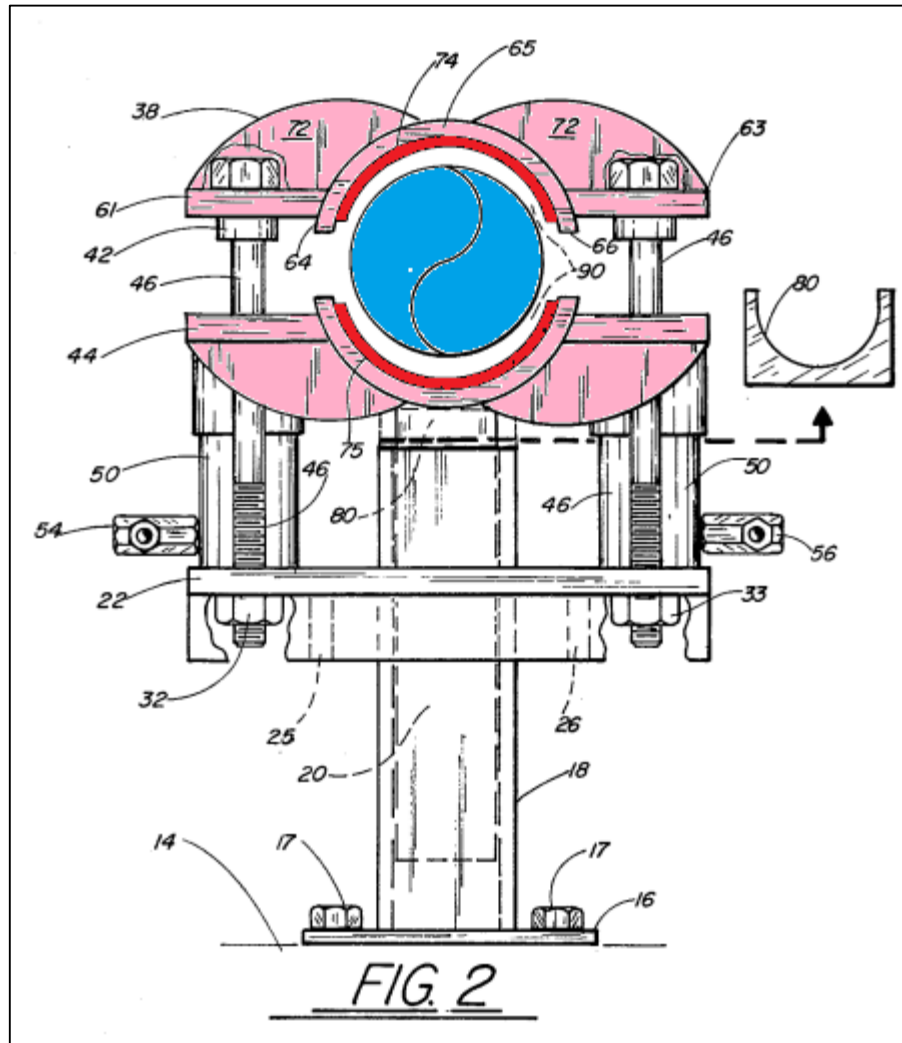


Weaver, Figure 5

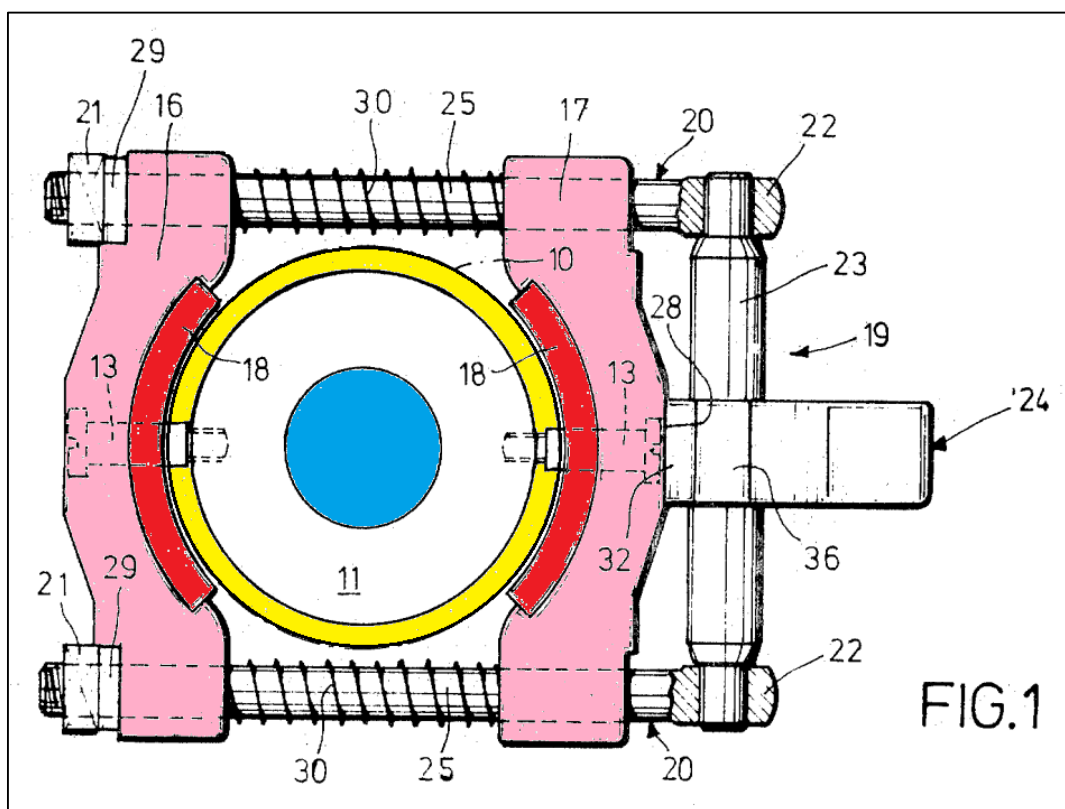
In prosecution, the examiner found that this element was rendered obvious by Signore and Weaver, which Patent Owner did not dispute. Exhibit 1002 at 88; Section III.A.2; Bosche ¶¶ 200-201.

In addition, and as explained in the Bosche Declaration, displaceable adjustable pressure mandrels were well known in the art. Bosche ¶¶ 202-210.

For example, **Boudreaux** discloses a shaft immobilizer used in the energy industry that uses friction to inhibit rotation of a shaft. Boudreaux, Abstract, 1:5-14, 1:6-11, 1:20-25, 6:63-7:4; Bosche ¶¶ 203-206.



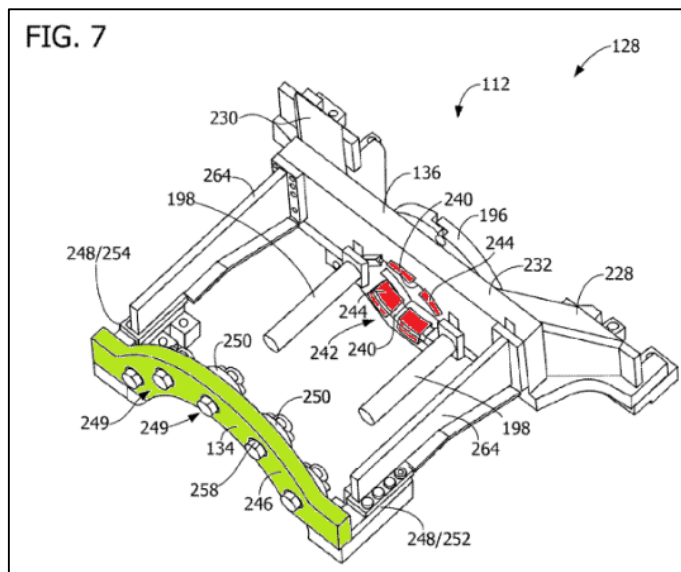
Schilling discloses friction brakes comprising a set of symmetrically arranged mandrels with brake shoes (pink) with heat resistant liners (red) to engage a roller (yellow), or a stub shaft (blue), where a bladder adjusts the amount of engagement/friction. Schilling 1:29-34, 3:27-31, 1:51-57; Bosche ¶¶ 207-208.



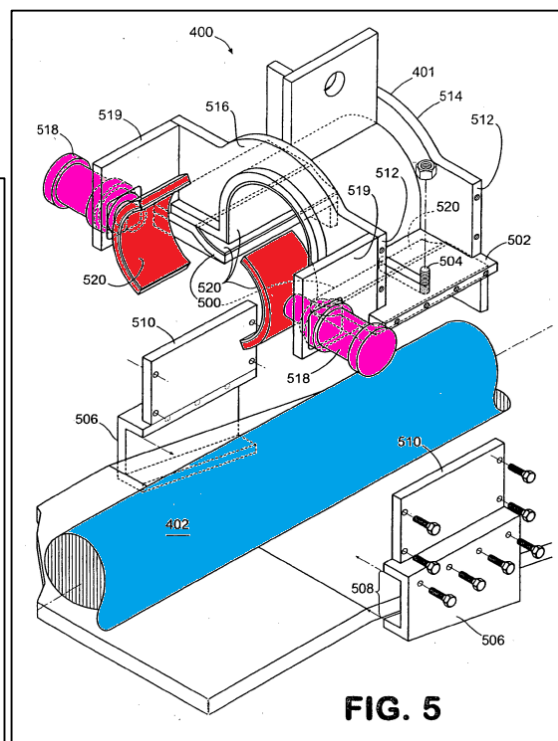
d. 1[c]: Passive/Active Mandrel Positions

Signore and Weaver teach this element. Bosche ¶¶ 211-223.

As discussed above in Section VIII.A.4.c, Signore and Weaver disclose the claimed pressure mandrels adjustable with active and passive positions. Bosche ¶¶ 212-213; Signore [0053], Fig. 7; Weaver [0017], Fig. 5.



Signore, Figure 7



Weaver, Figure 5

Further, in prosecution, the examiner found that this element was rendered obvious by Signore and Weaver, which Patent Owner did not dispute. Exhibit 1002 at 88; Section III.A.2; Bosche ¶¶ 214, 216.

To the extent that either of Weaver or Signore does not explicitly disclose that Weaver's hydraulic or mechanically operated friction brakes 518 or that Signore's torque clamps 244 can be configured at *either* a "passive" or "active" position, it would be obvious to a POSITA that the friction brakes and torque clamps would be operated between passive and active positions to selectively restrain or release the main shaft as various steps of a maintenance activity are performed (for example, releasing the friction brakes or torque clamps to adjust the rotor position and then

engaging them to restrain the shaft while a gearbox or bearing is replaced). Bosche ¶ 215.

Adjustable pressure mandrels with tap shoes for use with shafts were well known in the art. For example, this is corroborated by Boudreaux, Schilling, and Fetzer. Bosche ¶¶ 217-223; Boudreaux, 1:5-14, 7:14-29 (maintaining the apparatus either in a closed position or an open position), 7:58-8:10, Fig. 4; Schilling, 1:29-34, 1:51-57, 3:27-31, Fig. 1; Fetzer 2:45-59, Fig. 1.

e. 1[d]: Crane Mounting Facilities

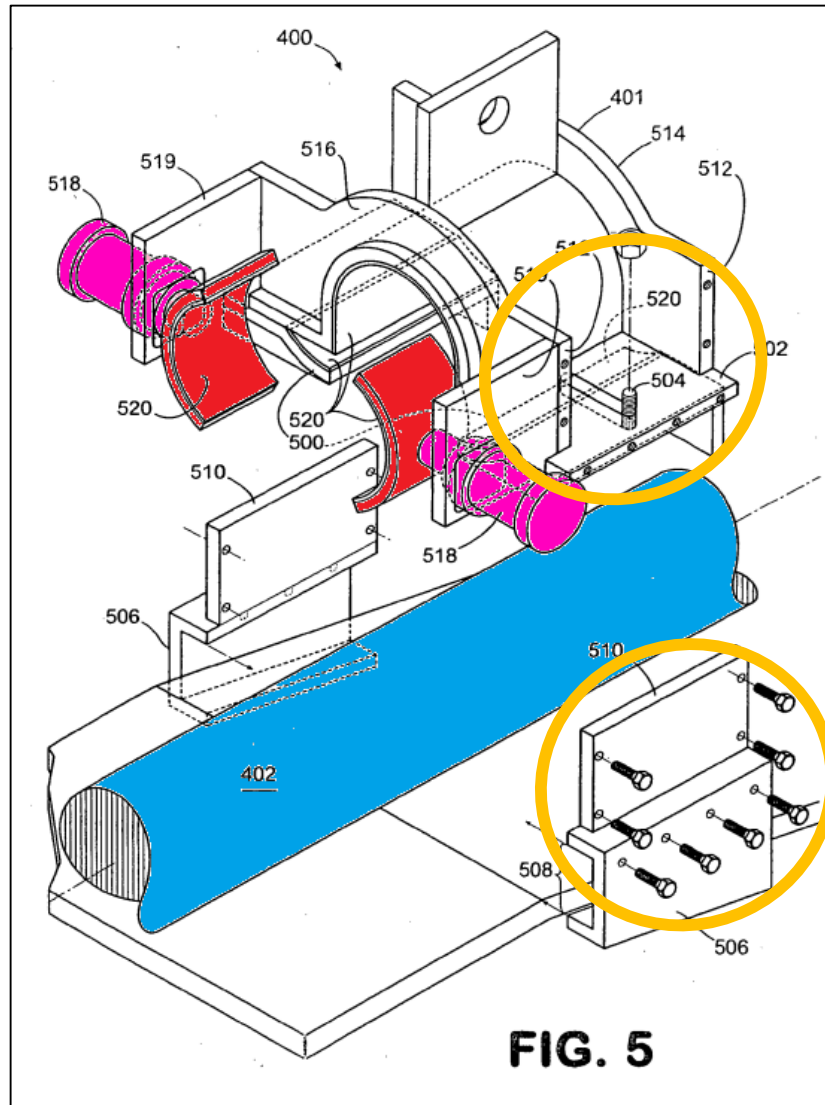
This element is taught by the Ground-1 References. Bosche ¶¶ 224-246.

The specification of the '578 Patent discloses two types of cranes in/on a nacelle, “self-hoisting” cranes and “lightweight” cranes. '578 Patent, 2:34-43, 2:56-60. Element 1[d] does not limit the claimed mounting facilities for use with a certain type of crane—thus, mounting facilities for *any* crane meets this limitation. Bosche ¶ 225.

Furthermore, the claim does not require the mounting facilities to be the *sole* mounting point for a crane or to support the full weight of a crane. Nor does the '578 Patent provide any other specific mounting characteristics. Bosche ¶ 226.

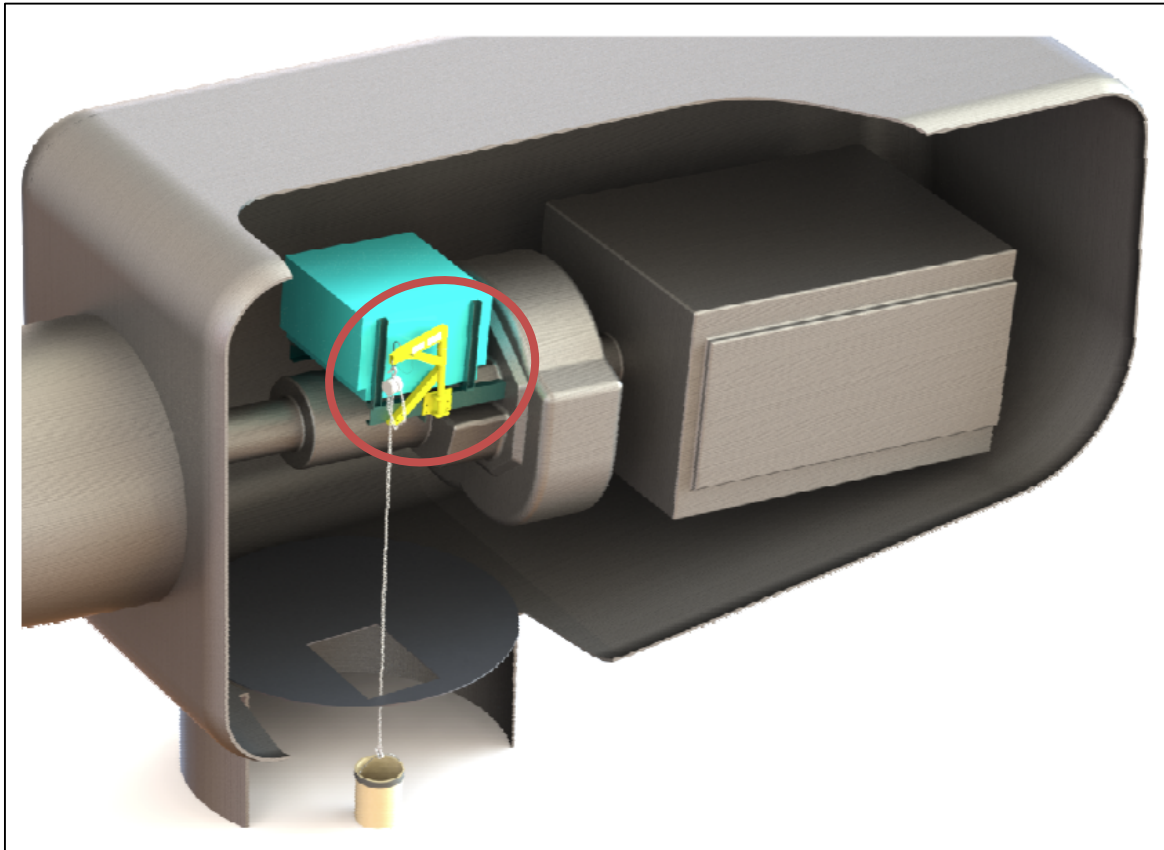
In prosecution, the examiner found that Signore discloses this element, “such as by using a chain or a cable connected between the crane and [Signore’s] main shaft fixture.” Exhibit 1002 at 88; Section III.A.2. However, to the extent

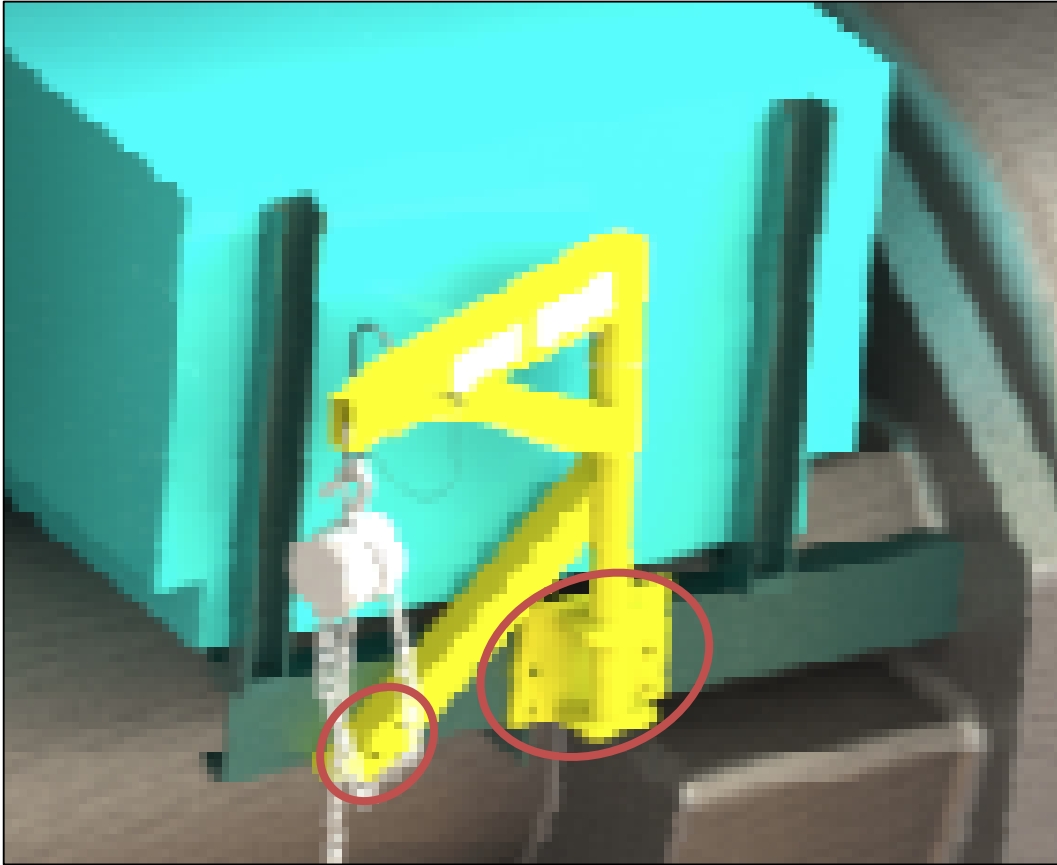
that Signore does not disclose this element, Weaver provides sufficient mounting facilities for a crane, such as on mounting wings 502 or stiffening plates 510 (orange). Bosche ¶¶ 227-228.



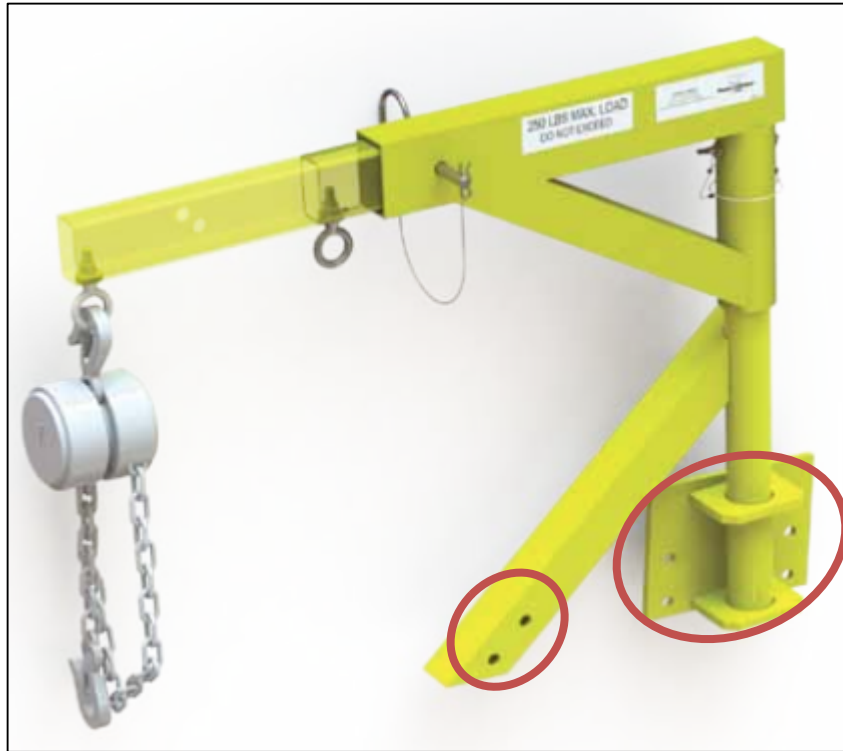
Moreover, Power Climber, Stegemann, and Holloway each disclose this element. Bosche ¶ 229.

Power Climber discloses a lightweight “Nacelle Davit” (crane) lifting device (yellow) with holes, *e.g.*, for mounting bolts, depicted mounted to a main shaft fixture (green) in a wind turbine. Power Climber; Bosche ¶¶ 230-231.



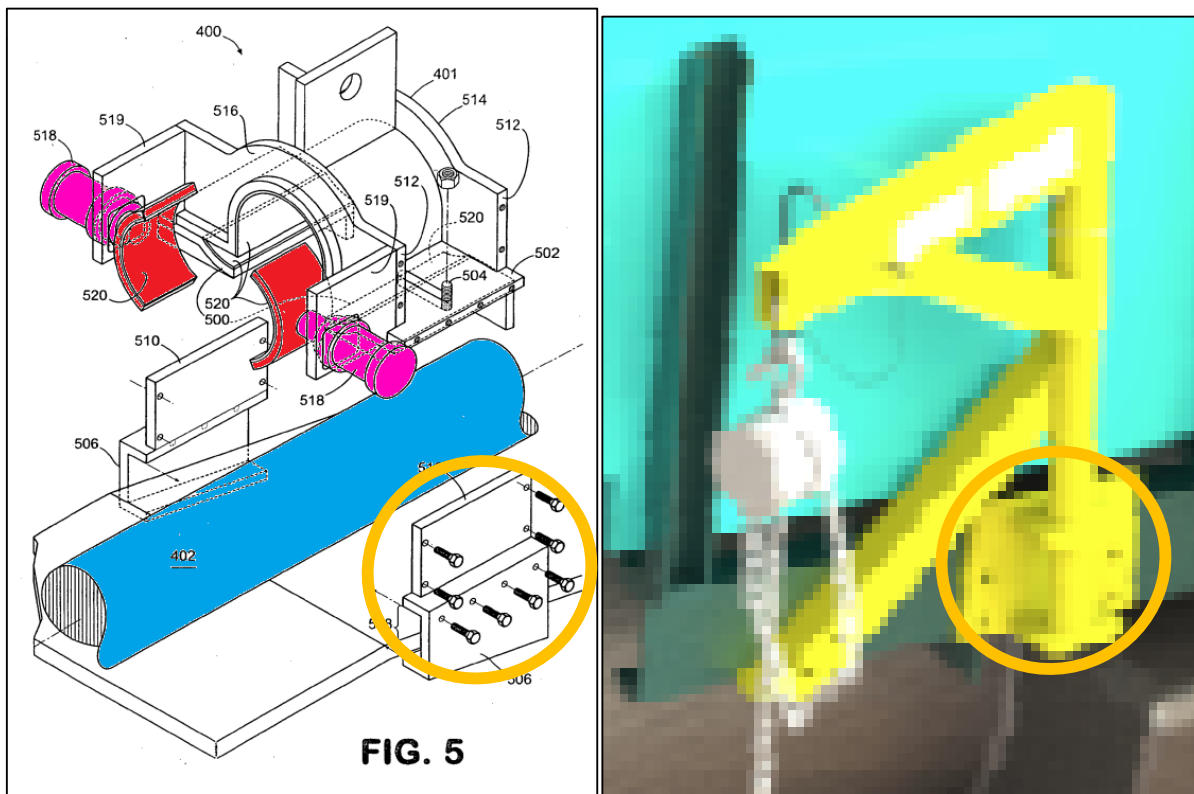


The disclosure of mounting facilities on the main shaft fixture/Nacelle Davit is corroborated by the August 8, 2012 Power Climber Brochure, which likewise depicts the Nacelle Davit mounting plate with holes, *e.g.*, for mounting bolts. Power Climber Brochure; Bosche ¶¶ 232-233.

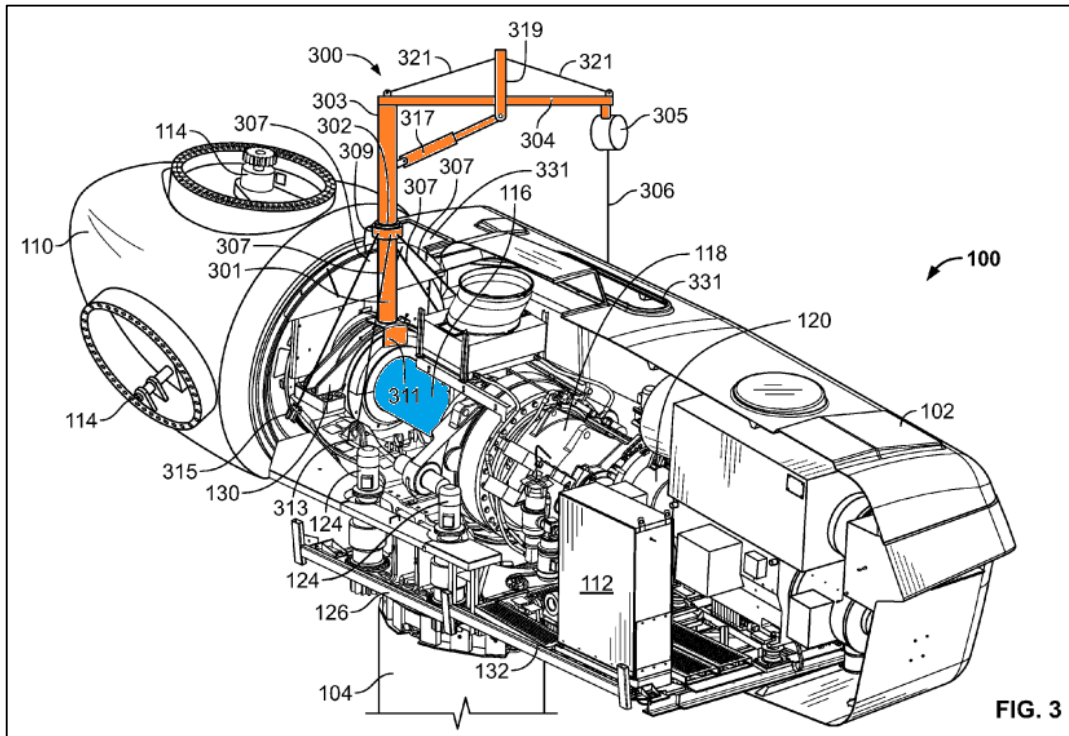


A POSITA would find it obvious to provide mounting facilities, including facilities for mounting bolts, on the main shaft fixture of Signore and Weaver for use as “mounting facilities adapted for anchoring a crane on/in a nacelle of a wind turbine.” Bosche ¶¶ 233-235.

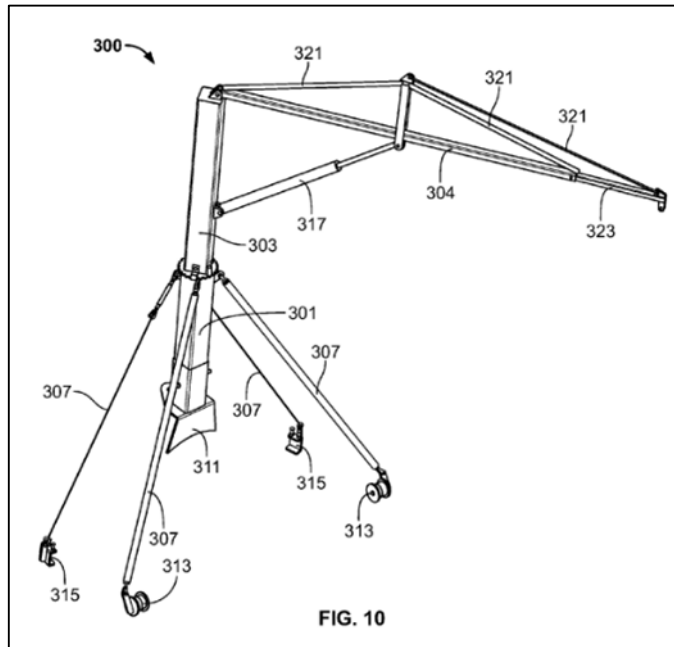
For example, *compare* Figure 5 of Weaver *with* Power Climber:



Stegemann discloses a crane assembly 300 (orange) mounted to a wind turbine component in the nacelle, and that “[w]hile not so limited, the attachment plate 311 may attach to or replace existing components, and utilize existing fastening locations.” Stegemann [0039], [0046]; Bosche ¶¶ 237-238.

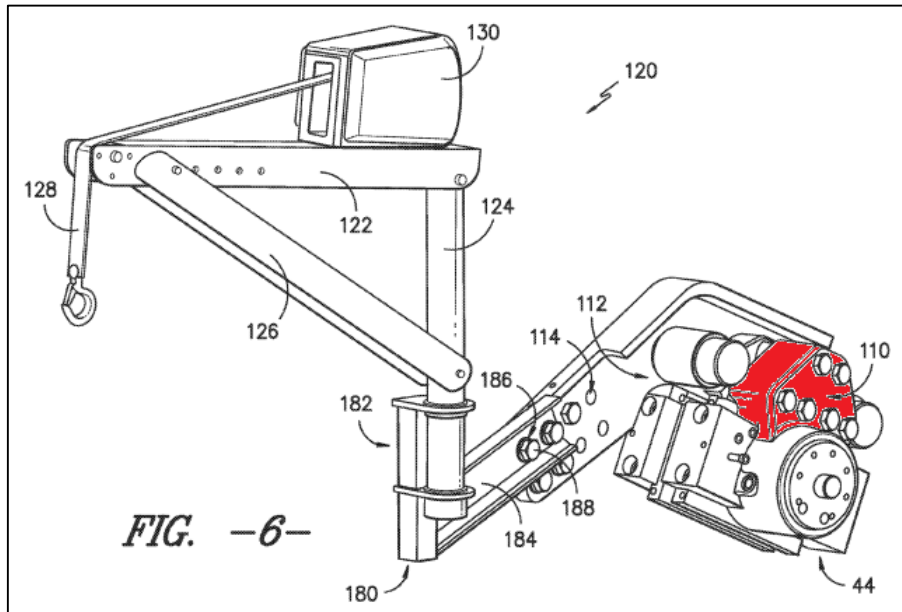


Stegemann discloses additional, “secondary support members 307, which may be anchored to “secondary support clamps 315 [which] may be clamped or otherwise fastened to *lips, features or surfaces within the wind turbine 100 that provide a desired angle providing support for the first and second primary support members 301, 303.*” Stegemann [0040]; Bosche ¶¶ 239-240.



A POSITA would have found it obvious to provide mounting facilities on the main shaft fixture of Signore and Weaver for use as “mounting facilities adapted for anchoring a crane on/in a nacelle of a wind turbine,” including mounting facilities for securing cables or chains. Bosche ¶¶ 241.

Holloway discloses mounting a portable crane to various areas or parts of a wind turbine, including to the bedplate of the nacelle or to a main shaft brake caliper (red). Holloway, 7:3-13, 7:20-32, 7:40-48; Bosche ¶¶ 242-243.

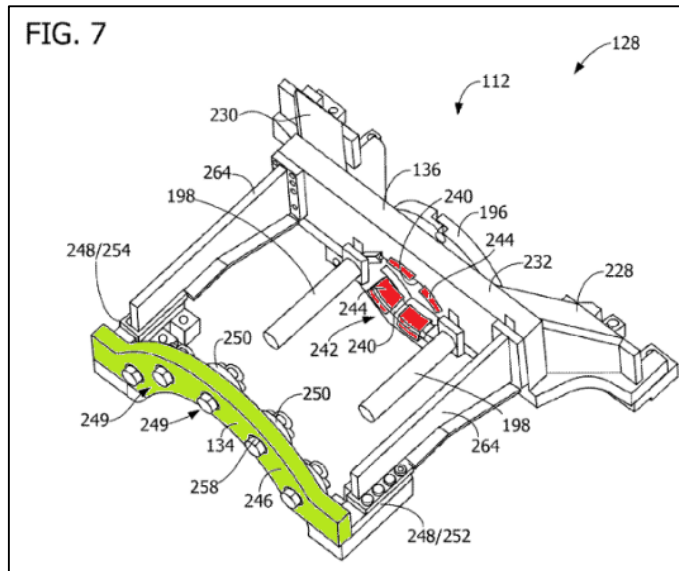


The selection of a crane mounting location is an obvious matter of design choice within the ability of a POSITA, and selecting a mounting location on a main shaft fixture does not provide surprising or unexpected benefits compared to any other mounting location within the nacelle. Indeed, a POSITA would be motivated to select the main shaft fixture as a crane mounting location in order to provide a consistent and standard mounting position, as would have been obvious to a POSITA. *Bosche ¶¶ 244-246.*

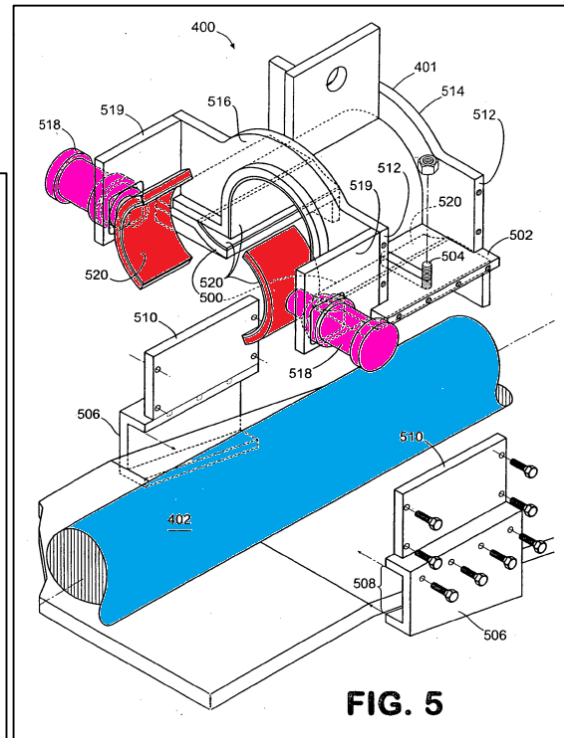
5. **Claim 2: At Least Three Radial Displaceable Pressure Mandrels**

The main shaft fixture of Claim 1 is taught by the Ground-1 References. Section VIII.A.4.

Signore, showing four torque clamps (red) in view of Weaver further teaches the claimed at least three radially displaceable pressure mandrels. Section VIII.A.4.c; Signore [0053], Fig. 7; Weaver, [0017], Fig. 5; Bosche ¶¶ 248-250.



Signore, Figure 7



Weaver, Figure 5

Further, in view of Signore's four torque clamps and the risk of creating a bending moment on the main shaft, Bosch ¶ 262, a POSITA would find it obvious to include *at least three* radially displaceable friction brakes because it would have been recognized by a POSITA as providing a more secure and more adjustable attachment point for securing the main shaft and to better adapt to shafts of varying geometries. Selecting the number and locations of torque clamps or friction brakes would be an obvious matter of design decision. Bosche ¶¶ 251, 262-263, 427-430.

6. Claim 3: Mounting Facilities for Self-Hoisting Crane

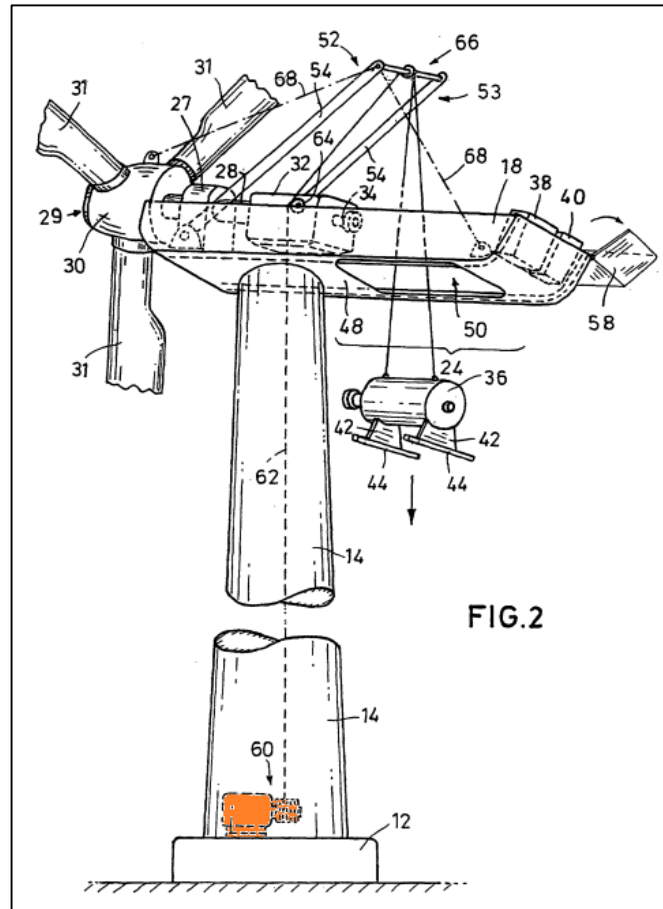
The main shaft fixture of Claim 1 is taught by the Ground-1 References. Section VIII.A.4. Claim 3 is also taught by the Ground-1 References. Bosche ¶¶ 265-274.

In prosecution, the examiner found that this element was obvious in light of Signore and Weaver. Exhibit 1002 at 89; Section III.A.2; Bosche ¶¶ 267.

To the extent that this element is not taught by Signore as modified by Weaver, it would have been obvious to a POSITA, as described above in relation to Claim 1 element 1[d]. Section VIII.A.4. In addition, utilizing a winch located on the ground surface would have been obvious to a POSITA as such crane and winch arrangements were well-known in the wind industry at the relevant time frame. As the '578 Patent admits, “[t]he use of self-hoisting cranes, whose winches are placed on the ground surface near the turbine’s tower,” was obvious “because the use of such involves large savings in the level of expenses for servicing of wind turbines since the use of large mobile cranes...is made superfluous.” ’578 Patent, 1:66-2:5; Bosche ¶¶ 268-270, 274.

As further described in the Bosche Declaration, the well-known nature of crane winches located on a ground surface near a foot of the wind turbine is further corroborated by, for example, Weitkamp. Bosche ¶¶ 270-274.

Weitkamp teaches a crane system for replacing the main components of the machine housing of a wind turbine where the “rope winch 60 [(orange)] can be mounted at the bottom of the foundation 12 of the tower 14” for lifting of heavy components. Weitkamp [0022]; Fig 2, [0013], [0025], [0016]; Bosche ¶¶ 271-272.



It would have been an obvious design choice to a POSITA to use well-known ground-based winches located near a foot of the wind turbine, as a hoist of a self-hoisting crane at least because it removes a heavy and bulky element of the self-hoisting crane from the nacelle where space is constrained and where lifting

and handling heavy elements like a winch can be difficult and problematic.

Bosche ¶ 273.

7. Claim 4: Pressure Mandrel Actuators

The main shaft fixture of Claim 1 is taught by the Ground-1 References. Section VIII.A.4. Claim 4 is also taught by the Ground-1 References. Bosche ¶¶ 275-287.

An actuator is well-known a component that produces force, torque, or displacement, when an electrical, pneumatic or hydraulic input is supplied to it. Bosche ¶ 277.

It would have been obvious to a POSITA to include actuators for safely and quickly displacing and retaining the tap shoes in the passive or active position. For example, Weaver discloses “[h]ydraulic or mechanically operated friction brakes 518.” Weaver, [0017]; Bosche ¶¶ 278, 281, 287.

In prosecution, the examiner found that this element was obvious in light of Signore and Weaver, which Patent Owner did not dispute. Exhibit 1002 at 89; Section III.A.2; Bosche ¶¶ 279-280.

In addition, the claimed actuators for displacing and retaining tap shoes in a passive or active position were well known in the art. For example, this is corroborated by Boudreaux and Fetzer. Bosche ¶ 281-287.

Boudreaux discloses hydraulic valve actuators that can be used to maintain the engaging sections either in contact with or in a position away from the shaft. Boudreaux, 1:5-14, 7:14-29, 7:58-8:10; Bosche ¶¶ 283-285.

Fetzer discloses a brake lever that is operated to maintain the friction face in contact with or away from the shaft or spindle. Fetzer, 2:45-59, Fig. 1; Bosche ¶ 286.

8. Claim 6: Slideway Lining

The main shaft fixture of Claim 1 is taught by the Ground-1 References. Section VIII.A.4. Claim 6 is also taught by the Ground-1 References. Bosche ¶¶ 288-295.

The '578 Patent describes that the claimed slideway lining “involves ***the main shaft 4 being permitted to rotate*** simultaneously with it being fixed in its position.” '578 Patent, 6:46-51. Further, the '578 Patent concedes in the background section, that allowing a small amount of rotation was well known in the art. '578 Patent, 2:14-22. Methods of stopping or slowing the rotor, including application of a mechanical friction brake, were well known to a POSITA since the 1980s. Bosche ¶¶ 290.

Further, Weaver discloses that “[i]n some configurations, shaft-restraining members 400 are configured to allow for rotation of rotor 104,” including where “surfaces 520 are Teflon(TM)-covered or provided with roller bearing surfaces

in some configurations that allow rotation of shaft 402 above a predetermined torque.” Weaver, [0018], Claim 6; Bosche ¶¶ 291-292.

In addition, in prosecution, the examiner found that this element was obvious in light of Signore and Weaver, and Weaver’s disclosure of “a slideway lining (520) [of] (Teflon),” which Patent Owner did not dispute. Exhibit 1002 at 89 (citing Weaver Figure 5, [0018]); Section III.A.2; Bosche ¶¶ 293-294.

9. Claim 7: Slide Plate

The main shaft fixture of Claim 6 is taught by the Ground-1 References. Section VIII.A.8. Claim 7 is also taught by the Ground-1 References. Bosche ¶¶ 296-301.

Weaver discloses a slideway lining (520), which as discussed in Section VIII.A.8, allows rotation of shaft 402 above a predetermined torque. Bosche ¶¶ 297-298.

In addition, in prosecution, the examiner found that this element was obvious in light of Signore and Weaver, and Weaver’s disclosure of “a slideway lining (520) [of] (Teflon),” which Patent Owner did not dispute. Exhibit 1002 at 89 (citing Weaver Figure 5, [0018]); Section III.A.2; Bosche ¶¶ 299-300.

10. Claim 8: Multi-Part Slide Plate

The main shaft fixture of Claim 7 is taught by the Ground-1 References. Section VIII.A.9. Claim 8 is also taught by the Ground-1 References. Bosche ¶¶ 302-307.

Weaver discloses a multi-part slide plate for mounting on the main shaft, where the multi-part slide plate is cooperating with the tap shoes. Weaver discloses that “***surfaces 520***,” *e.g.*, comprising multiple parts 520, “are Teflon(TM)-covered or provided with roller bearing surfaces.” Weaver, [0018], Claim 6 (claiming “***surfaces (520)***”); Bosche ¶¶ 303-304.

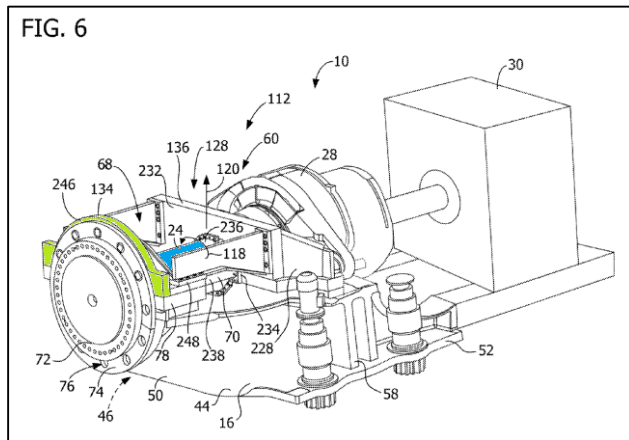
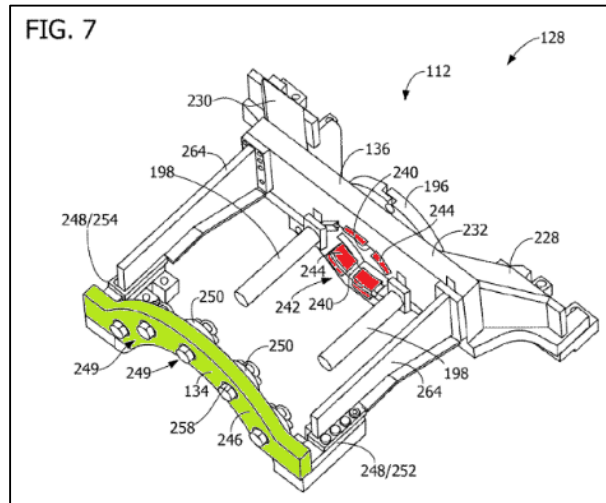
The choice of surfaces on the tap shoes, including Teflon or other types of surfaces, would have been an obvious design decision to a POSITA because it allows the coefficient of friction to be controlled, limiting the torque forces to prevent damage in case of a high wind gust. Bosche ¶ 305.

In addition, in prosecution, the examiner found that this element was obvious in light of Signore and Weaver, which Patent Owner did not dispute. Exhibit 1002 at 90, 89; Section III.A.2; Bosche ¶¶ 305-306.

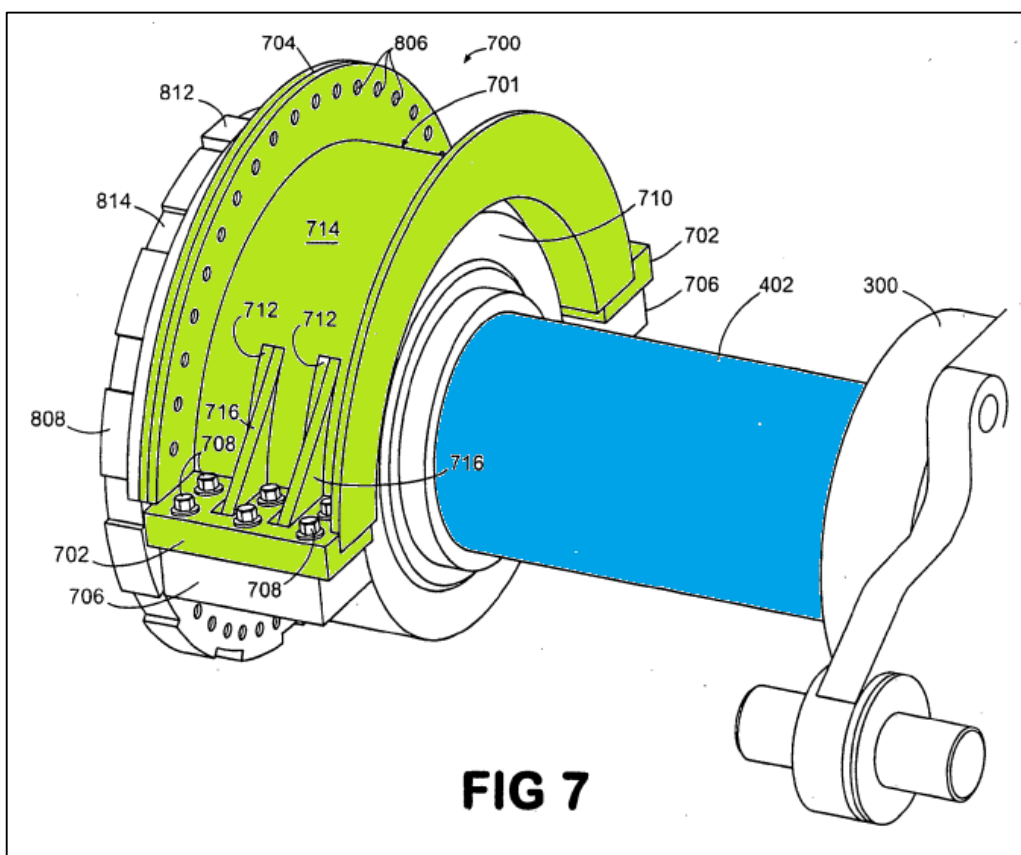
11. Claim 10: Rotor Lock

The main shaft fixture of Claim 1 is taught by the Ground-1 References. Section VIII.A.4. Claim 10 is also taught by the Ground-1 References. Bosche ¶¶ 308-321.

Signore discloses “a drive shaft locking assembly 134 [(green)]...to facilitate limiting a rotation of drive shaft.” Signore [0031], [0022], [0031], Figs. 6 and 7; Bosche ¶ 309-311.



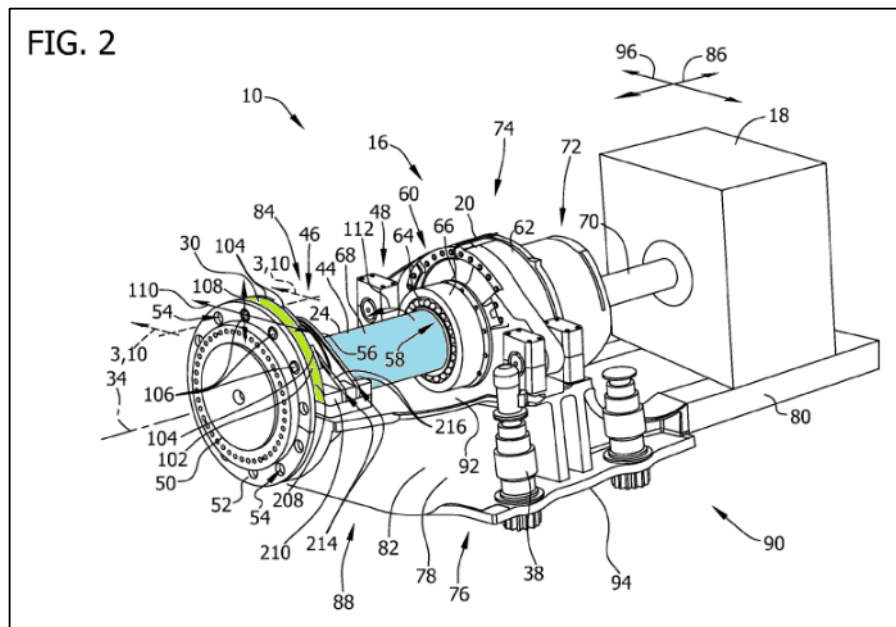
Weaver also discloses a rotor lock (green) that employs bolts placed through the rotor lock and the rotor flange via mating holes to lock rotation of the rotor shaft. Weaver [0011], [0023], Fig. 7. Weaver also discloses additional embodiments of rotor locks. *Id.* [0020], [0022], [0024]; Bosche ¶¶ 312-314.



In addition, in prosecution, the examiner found that this element was obvious in light of Signore and Weaver, which Patent Owner did not dispute. Exhibit 1002 at 90; Section III.A.2; Bosche ¶¶ 315-316.

In addition, rotor locks for fixation of a rotor of the wind turbine were well known to a POSITA. For example, this is corroborated by Koronkiewicz. Bosche ¶¶ 317-320.

Koronkiewicz discloses a “rotor lock assembly” (green) to “limit[] rotation of the rotor shaft” (blue). Koronkiewicz, 2:29-34, 4:57-5:4.



12. Claim 13: Mounted Crane

The main shaft fixture of Claim 1 is taught by the Ground-1 References.

Section VIII.A.4. Claim 13 is also taught by the Ground-1 References. Bosche ¶¶ 322-327.

Claim 13 differs from Claim 1 only in that in Claim 13 a “crane *is* mounted to the main shaft fixture” rather than merely providing “mounting facilities adapted for anchoring a crane.” A POSITA would have found it obvious to use the main shaft fixture’s “mounting facilities adapted for anchoring a crane on/in a nacelle of a wind turbine” for their intended purpose to mount a crane, like the mounted cranes taught by Power Climber, Holloway, and Stegemann, to the main shaft fixture. Bosche ¶¶ 323-325.

In addition, in prosecution, the examiner found that this element was obvious in light of Signore and Weaver. Exhibit 1002 at 89 (“*[T]he main shaft fixture [of Signore] further comprises mounting facilities for a self-hoisting crane,*” and “*is capable for mounting with a self-hoisting crane.*”); Section III.A.2; Bosche ¶ 326.

13. Claim 14: Mount for Lightweight Crane

The main shaft fixture of Claim 1 is taught by the Ground-1 References. Section VIII.A.4. For the same reasons, Claim 14 is taught by the Ground-1 References. Bosche ¶¶ 328-335.

The main shaft fixture of Claim 14 is identical to that recited in Claim 1 except that the “mounting facilities” are adapted for anchoring a “lightweight” crane. Bosche ¶ 332.

Stegemann teaches that a lightweight crane with “individual components [that]...preferably do not exceed about 30 kg and are sufficiently lightweight and sufficiently small to be handled manually” may be “attached to the wind turbine by attachment plate 311,” which “may attach to...existing components, and utilize existing fastening locations.” Stegemann, [0046], [0039]; Bosche ¶ 330.

Holloway teaches that the cranes may be “portable cranes which are lightweight, inexpensive, and have high load capacities[, which] would be advantageous.” Holloway, 1:41-43; Bosche ¶ 331.

In addition, lightweight cranes mounted to a main shaft fixture were well known in the art. For example, Power Climber teaches the use of a lightweight crane that weighs just 37 lbs. and has a “[h]eaviest [s]ingle [p]iece that weighs just 19 lbs.” Power Climber Brochure, 1, 2; Bosche ¶ 333.

A POSITA would find it obvious to attach the lightweight crane of Stegemann, Holloway, or Power Climber to the main shaft fixture of Signore in view of Weaver for the same reasons as provided above in relation to Claim 1. Bosche ¶¶ 334-335.

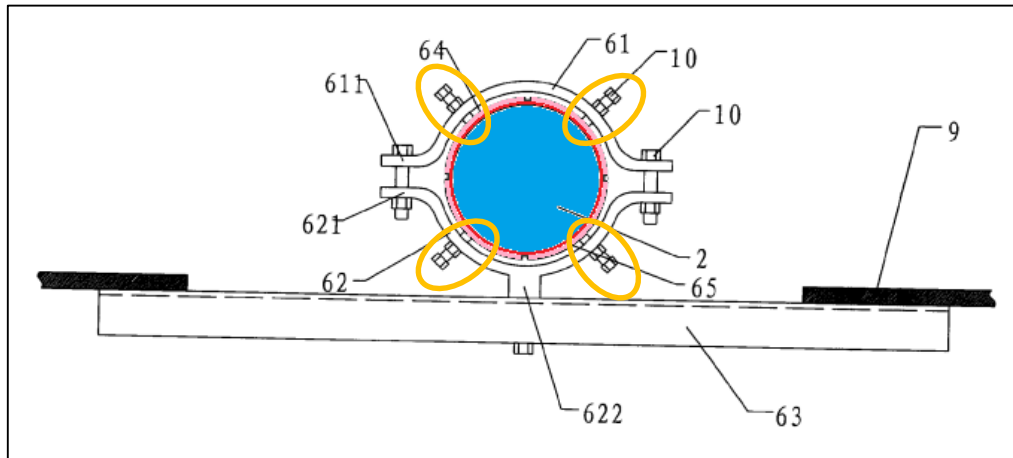
B. Ground 2: Claims 2, 5, and 15 are Obvious Over the Combination of Signore and Weaver in View of Power Climber, Holloway, and/or Stegemann , Further in View of Hanxing and/or Schulz

1. A POSITA Would have Been Motivated to Combine Signore and Weaver with Hanxing with a Reasonable Expectation of Success

Like Signore and Weaver (Section VIII.A.1), Hanxing is concerned with the cost of repairing/replacing components in a wind turbine, especially the gearbox, and an object of Hanxing is to eliminate the need for large cranes for removing the rotor of the wind turbine during gearbox repair or replacement. Hanxing, [0003], [0016]; Bosche ¶ 337.

Hanxing discloses upper and lower hoops, to which “a soft wear-resistant material layer 65” can be added as a brake pad, that are fastened to each other around the main shaft of the wind turbine to “hold the main shaft tightly.”

Hanxing, [0029], [0031]. Moreover, Hanxing discloses screw holes and “bolts 10” (orange) “passing through the screw holes [to] tightly buckle the steel sleeve on the main shaft to ensure surface contact.” *Id.*; Bosche ¶¶ 338-339.



A POSITA would be motivated to combine Hanxing’s bolts with the devices taught by Signore and Weaver—and would expect success in doing so—because the bolts provide a tight contact with the wind turbine shaft and ensure surface contact, including on wind turbines with unknown or varying shaft diameter. This provides greater security and safety and allows a single device to be used on a wider range of wind turbine nacelle and shaft configurations, making the maintenance device more widely applicable. Bosche ¶¶ 340-341. Further, the combination makes use of conventional mechanical elements performing the same function they had always been known to perform, and is nothing more than the predictable use of prior art elements according to their established functions. Bosche ¶ 341.

2. A POSITA Would have Been Motivated to Combine Signore and Weaver with Schulz with a Reasonable Expectation of Success

Like Signore and Weaver (Section VIII.A.1) (and Hanxing, Section VIII.B.1), Schulz is concerned with repairing main shafts of power generation equipment, and would also be considered suitable for fixation of a main shaft on a wind turbine. Schulz, 1:8-12, 5:67-6:1, 6:9-12; Bosche ¶ 342.

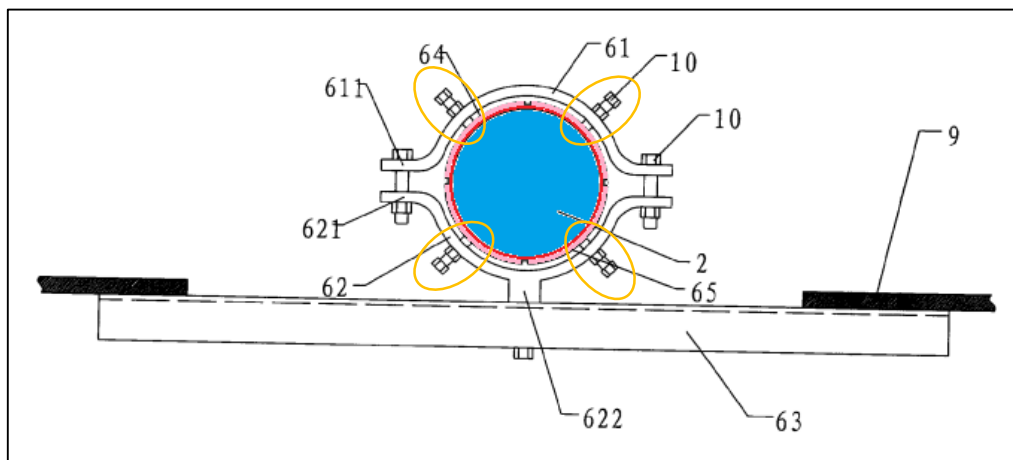
Because Schulz relates to the similar subject matter (namely repair of rotating equipment in the context of power generation), and solves similar problems, as Signore and Weaver, a POSITA would be motivated to utilize the teachings of Schulz to improve the devices taught by Signore and Weaver. Further, a POSITA would have a reasonable expectation of success because Schulz's shaft fixation device is compatible with a wind energy application and the combination makes use of conventional mechanical elements performing the same function they had always been known to perform, and is nothing more than the predictable use of prior art elements according to their established functions. Bosche ¶ 343.

3. Claim 2: At Least Three Radial Displaceable Pressure Mandrels

The main shaft fixture of Claim 1 is taught by the Ground-1 References, also raised in Ground 2. Section VIII.A.4.

To the extent that Signore in view of Weaver does not teach at least *three* radially displaceable pressure mandrels, and in view of Signore's four torque clamps, a POSITA would find it obvious to include one or more *additional* radially displaceable torque clamps or friction brakes to Signore in view of Weaver in order to better adapt to shafts of varying geometries and positions and to better distribute the normal forces. Moreover, selecting the number and locations of torque clamps or friction brakes would be a matter of design decision for a POSITA. Bosche ¶ 348 and 349.

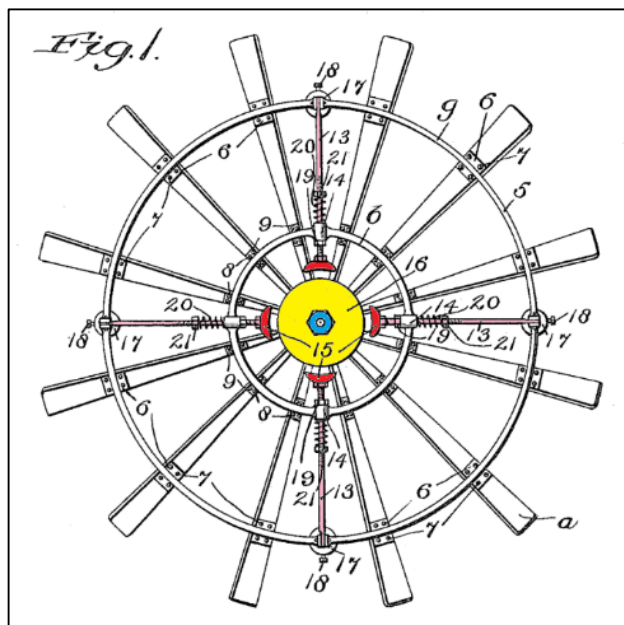
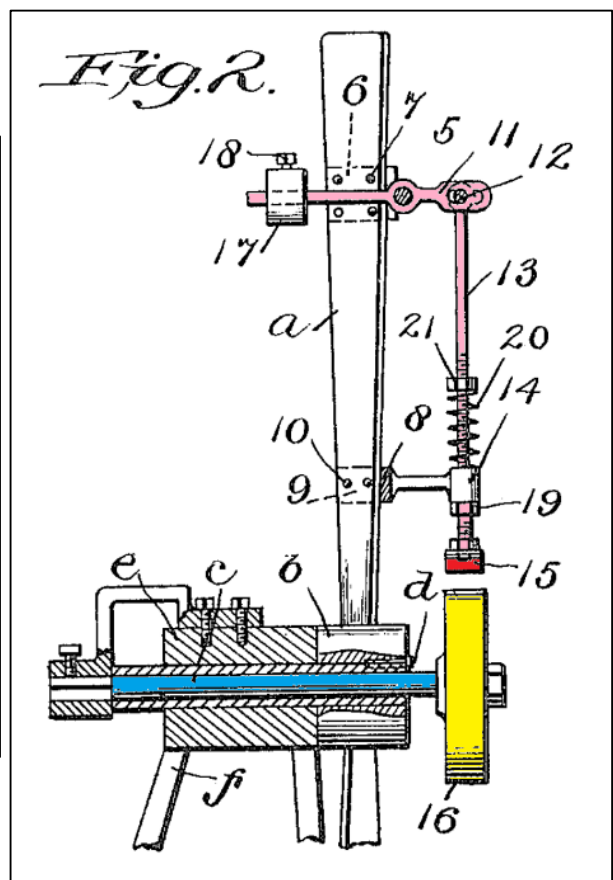
Hanxing teaches a main rotor clamp comprising four pressure mandrels, disclosed as radially displaceable “curved steel plates 64” (pink) around the rotor shaft, including “a soft wear-resistant material layer 65” (red), *e.g.*, a brake pad. Hanxing, [0029]; Bosche ¶¶ 351-355.



Hanxing, Figure 4

Selecting the number and locations of torque clamps or friction brakes would be a matter of design choice, and a POSITA would have recognized that the device taught by Hanxing provides a set of equally spaced and equal but opposite forces on the main shaft, resulting in a secure restraint of the main shaft without applying a bending force on the main shaft. Bosche ¶¶ 356, 360.

In addition, at least three radially displaceable pressure mandrels, substantially symmetrical located around a centre axis of the main shaft, ends of the adjustable pressure mandrels facing the main shaft being furnished with the tap shoes were well known in the art. For example, *Bisbee* depicts four pressure mandrels (pink) with tap shoes (red) symmetrically arranged around a friction disc on a drive shaft. Section VII.B; Bisbee 1:53-67, 1:67-79, Figs. 1 and 2; Bosche ¶¶ 357-359.



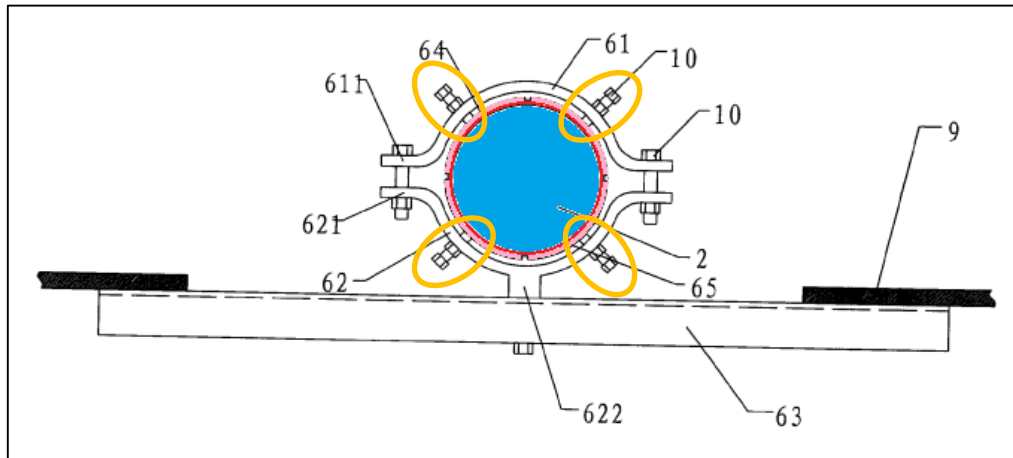
Bisbee, Figures 1 and 2.

4. Claim 5: Pressure Mandrel Threaded Bolts

The main shaft fixture of Claim 1 is taught by the Ground-1 References, also raised in Ground 2. Section VIII.A.4. Claim 5 is taught by the Ground-1 References in view of Hanxing and/or Schulz. Bosche ¶¶ 363-376.

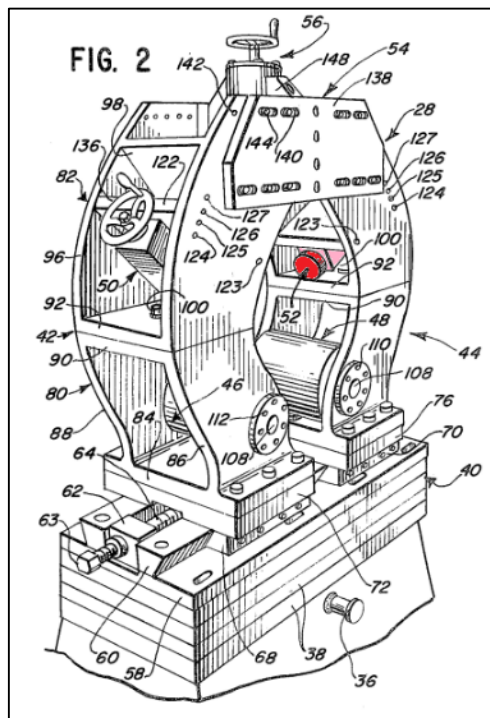
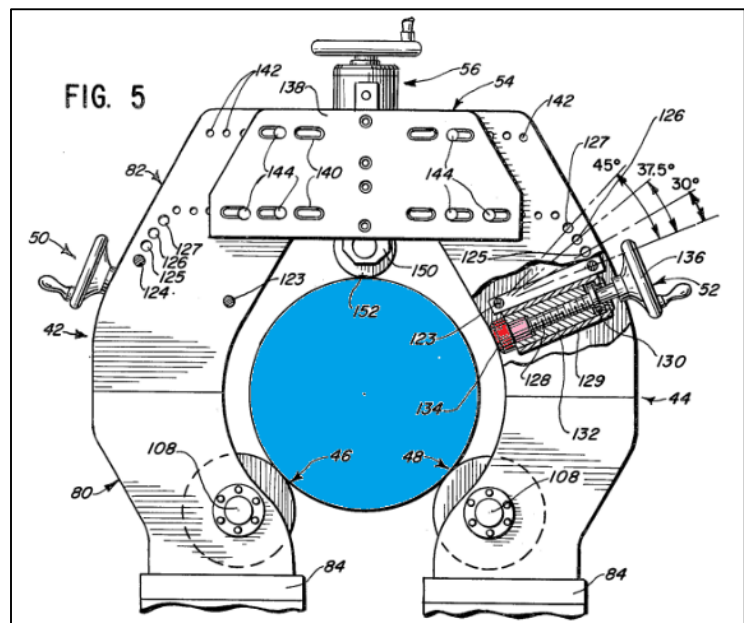
Weaver discloses “[h]ydraulic or *mechanically* operated friction brakes 518” that act to “clamp main shaft 402 and thereby inhibit rotation.” Weaver, [0017]; Bosche ¶¶ 365.

Hanxing discloses “screw holes...[with] bolts 10” (orange) “passing through the screw holes [to] tightly buckle the steel sleeve on the main shaft 2 to ensure surface contact.” Hanxing [0031]; Bosche ¶¶ 366-368.



Hanxing, Figure 4

Schulz’s “brake housing 128...has a brake screw 129 rotatably mounted therein,...[and a]n elongated brake nut 132 is threadedly mounted on the brake screw.” Schulz 4:39-47. “A conventional wheel 136” is used “for turning the screw for extension or retraction of the brake pad 134.” Schulz 4:46-52; Bosche ¶¶ 369-370.



In addition, adjustable pressure mandrels consisting of threaded bolts were well known in the art. For example, this is corroborated by the **Boudreaux**, which discloses a shaft immobilizer that can be manually activated using threaded bolts. Boudreaux 7:58-8:10; Bosche ¶¶ 372-376.

[15.a]: Divided in Sections	Section VIII.A.4.b; Bosche ¶¶ 378, 190-194
[15.b]: Adjustable Pressure Mandrels	Section VIII.A.4.c; Bosche ¶¶ 379, 195-210
[15.c]: Passive/Active Mandrel Positions	Section VIII.A.4.d; Bosche ¶¶ 380, 211-223
[15.d]: Pressure Mandrel Threaded Bolts	Section VIII.B.4; Bosche ¶¶ 381, 363-376
[15.e]: Crane Mounting Facilities	Section VIII.A.4.e; Bosche ¶¶ 382-383, 224-246

C. Ground 3: Claims 9, 11-12, and 16-17 are Obvious Over the Combination of Signore and Weaver in View of Power Climber, Holloway, and/or Stegemann Further in View of Cooper, Schaeffler, and/or Guerenbourg

1. A POSITA Would have Been Motivated to Combine Signore and Weaver in view of Power Climber, Holloway, and/or Stegemann , with Cooper, Schaeffler, and/or Guerenbourg with a Reasonable Expectation of Success

Like Signore and Weaver, Guerenbourg is concerned with uptower maintenance of a wind turbine. *Compare Weaver* [0001]; Signore [0058]; *with Guerenbourg* [0001], [0017]. A POSITA would have recognized that uptower component replacement includes not only gearbox replacement, as taught by

Signore and Weaver, but also main bearing replacement, as taught by Guerenbourg. A POSITA would have been motivated at the time of application of the '578 Patent to combine the teachings of Signore, Weaver, and Guerenbourg to design a more adaptable and useful device that can facilitate repair and replacement of either the gearbox or the main bearing without the use of large mobile cranes. Bosche ¶¶ 384, 389.

Further, like Signore and Weaver, Section VIII.A.1, Guerenbourg, Cooper, and Schaeffler recognize that removing components from the nacelle is difficult and costly. Guerenbourg [0005], [0017]; Cooper, 2 of 2; Schaeffler, 1 of 28; Bosche ¶¶ 386. Schaeffler discloses split spherical roller bearings that offer “[c]ost[] savings through rapid bearing replacement at difficult to access bearing locations.” Schaeffler, 1 and 4 of 28; Bosche ¶¶ 385-387.

A POSITA would have recognized that the use of split bearings provides additional cost savings, and that the use of such bearings is consistent with and compatible with the use of a lifting device such as that taught by Guerenbourg, or by Signore as modified by Weaver and Guerenbourg, to raise one end of the shaft and facilitate bearing replacement. Bosche ¶¶ 388-89. Further, the combination makes use of conventional mechanical elements performing the same function they had always been known to perform, and is nothing more than the predictable use of

prior art elements according to their established functions, such that a POSITA would have a reasonable expectation of success. Bosche ¶ 389.

2. Claim 9: “Multi-Part Bearing”

The main shaft fixture of Claim 1 is taught by the Ground-1 References, also raised in Ground 3. Section VIII.A.4. Claim 9 is taught by the Ground-1 References in view of Cooper and/or Schaeffler. Bosche ¶¶ 390-395.

Cooper discloses split roller bearings, including mounted on pillow blocks, that are intended for use in “Power Generation,” including “Wind Turbines.” Cooper, 2 of 2; Bosche ¶ 392.



Schaeffler discloses split spherical roller bearings that offer “[c]ost[] savings through rapid bearing replacement at difficult to access bearing locations.”

Schaeffler, 1 of 28; Bosche ¶ 393.



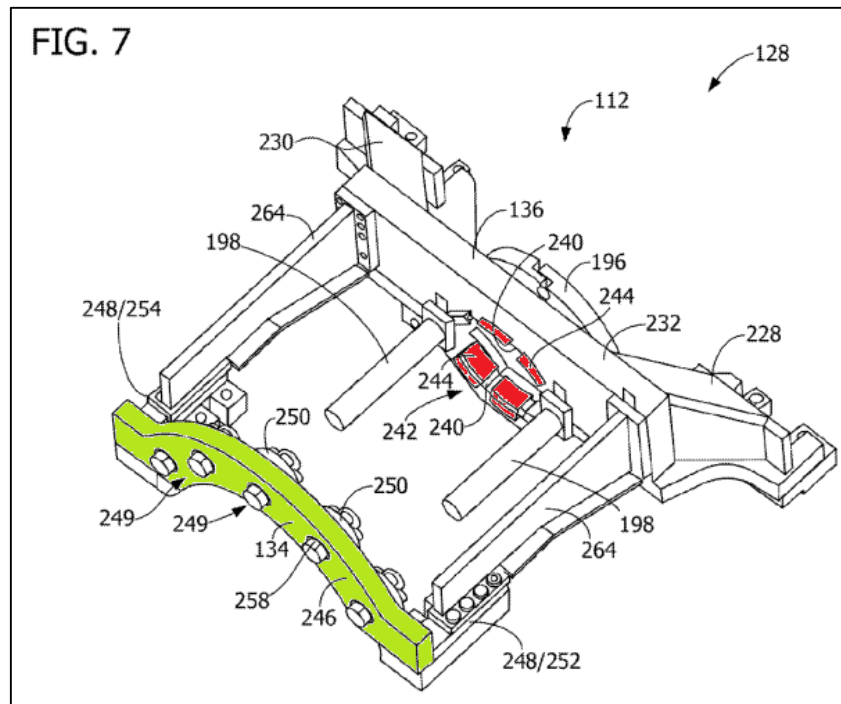
The split bearings of Cooper and Schaeffler disclose a multi-part inner ring fastened to the main shaft, and therewith cooperating multi-part outer ring consisting of bowed subsegments. Bosche ¶ 394.

Furthermore, Weaver teaches the use of “**roller bearing** surfaces...that allow rotation of shaft 402 above a predetermined torque.” Weaver [0018]. As such, it would have been obvious for a POSITA to utilize a roller bearing as taught by Weaver and specifically to utilize a split roller bearing with a multi-part inner ring and a multi-part outer ring as taught by Cooper or Schaeffler. Bosche ¶¶ 394-395.

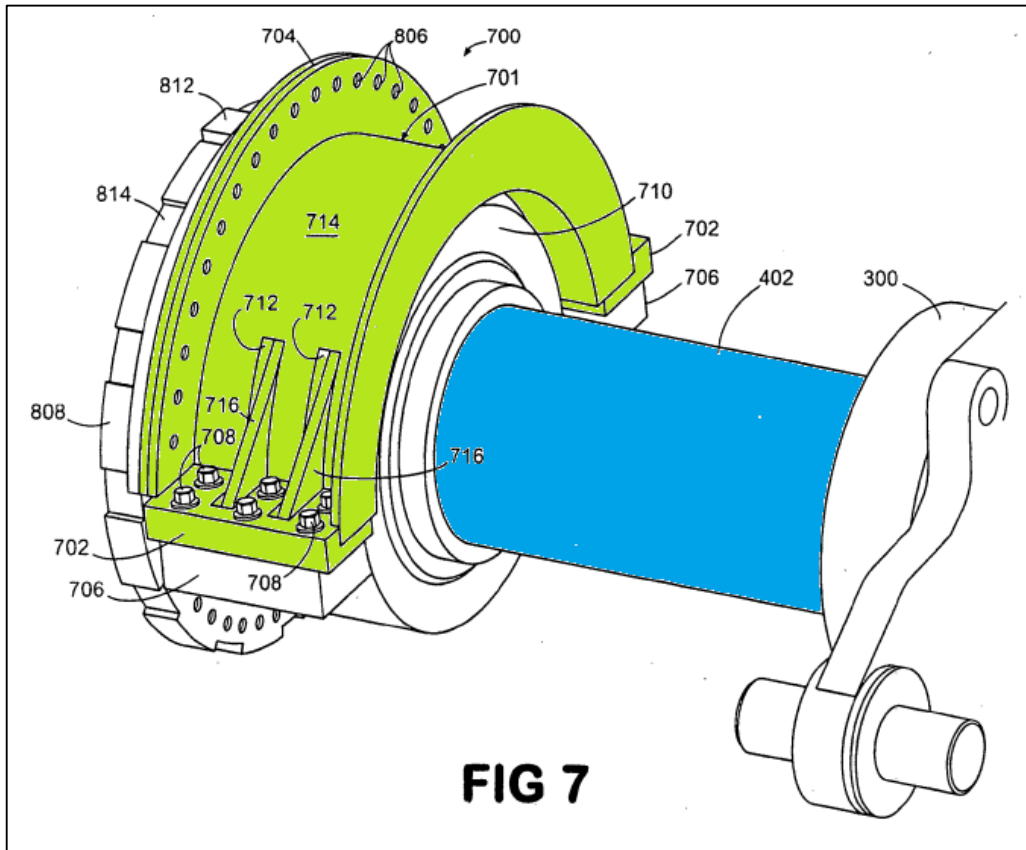
3. Claim 11: Rotor Lock and Beam-Shaped Brackets With Horizontal Pivots

The main shaft fixture of Claim 10 is taught by the Ground-1 References, also raised in Ground 3. Section VIII.A.11. Claim 11 is taught by the Ground-1 References in view of Cooper, Schaeffler, and/or Guerenbourg. Bosche ¶¶ 396-407.

A rotor lock consisting of a flange element, whose bolt circle geometry corresponds to a bolt circle geometry on the rotor is taught by Signore and Weaver. Signore discloses a “shaft support assembly 128” that “includes a drive shaft locking assembly 134 [(green)].” Signore [0031], [0022], Fig. 7; Bosche ¶¶ 397-398.



Weaver discloses a rotor lock (green) that employs bolts placed through the rotor lock and the rotor flange via mating holes in order to lock rotation of the rotor shaft (blue). Weaver [0023], Fig. 7; Bosche ¶¶ 399-400.



A POSITA would understand that it would be advantageous to be able to expand the scope of the main shaft fixture of Signore and Weaver to facilitate the repair or replacement of the main bearing by combining them with Cooper, Schaeffler, and/or Guerenbourg. Bosche ¶ 401.

Schaeffler discloses a general procedure for the fitting of a split spherical roller bearing. The process includes “[s]upport[ing] the weight of the rotor” (*e.g.*, ***raising the end of the rotor shaft*** to create clearance for the bearing replacement process) to perform the replacement and then “[l]ower[ing] the shaft in order to subject the bearing to load.” Schaeffler, 9 of 28; Ex. 1021 (frames of

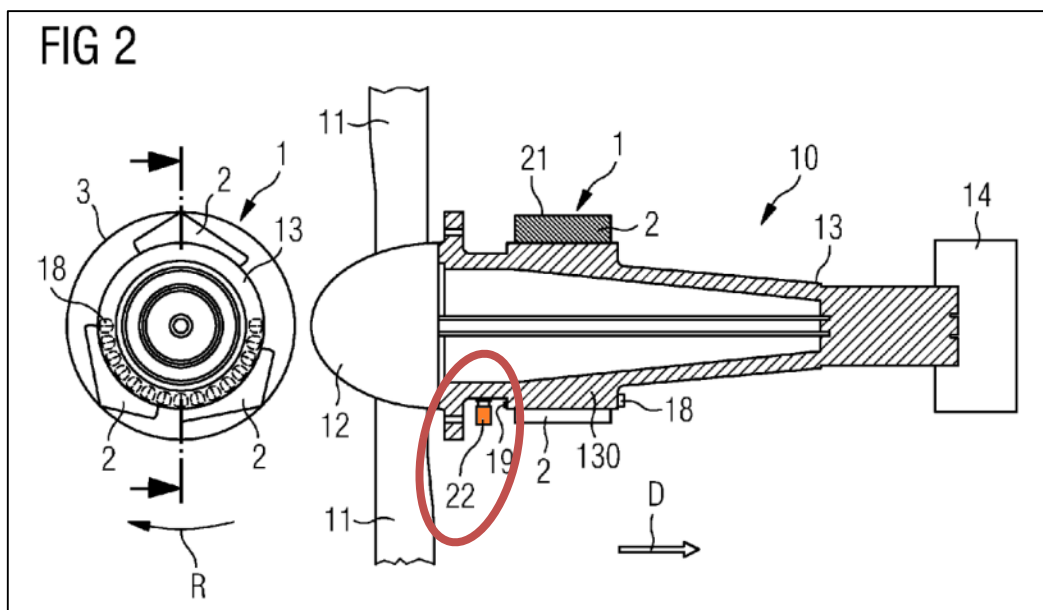
<https://www.youtube.com/watch?v=KsLRz2oaBz4>), 18-25, 47-52 of 124; Bosche

¶ 402.

Guerenbourg discloses “**a lifting arrangement such as a jack** [(orange)] **for raising a relevant part such as the main shaft** to reduce the load on the main bearing in order to facilitate [bearing] removal, insertion or maintenance.”

Guerenbourg describes this lifting arrangement as “a simple jack, as the skilled person will appreciate, is quite easily installed in a wind turbine Nacelle housing.”

Guerenbourg [0032], [0053], [0017], Fig. 2; Bosche ¶¶ 403-404.



Guerenbourg discloses lifting only one end of the shaft. A POSITA would understand that a supporting structure with a horizontal pivot point would be required to secure the shaft at one end while being raised at the other end. A POSITA would find it obvious that lifting one end of the shaft would require the

main shaft fixture, which is secured to the nacelle, to provide a hinge, or pivot point, to allow the main shaft fixture to continue to secure the shaft and prevent undesired vertical or horizontal movement while also secured to a structural element of the nacelle. Bosche ¶ 405.

Finally, Signore teaches beams 264, described as “a plurality of braces.” Signore [0056]. These braces meet the claimed “beam shaped brackets” of claim 11. A POSITA would have been motivated to add pivots to these braces, as described above, in order to allow the main shaft to tilt as it is lifted during replacement of a gearbox or a main bearing. Further, because the main shaft fixture needs to be positioned above the nacelle floor, it would be a necessary and obvious design choice for a POSITA to provide “other beam-shaped brackets” to connect to the floor of the nacelle. Bosche ¶ 406.

4. Claim 12: Rotor Actuator

The main shaft fixture with rotor lock of Claim 11 is taught by the Ground-1 References, also raised in Ground 3, in view of Cooper, Schaeffler, and/or Guerenbourg. Section VIII.C.3. The main shaft fixture of Claim 12 is taught by the same references. Bosche ¶¶ 408-411.

It would be obvious to a POSITA to include an actuator displaceable between a first passive outer position and an active outer position where the flange element is displaced vertically by use of the actuator. Bosche ¶¶ 409-410.

For example, actuators were well known to a POSITA, and Schaeffler discloses a general procedure for the fitting of a split spherical roller bearing including “[s]upport[ing] the weight of the rotor” (*e.g.*, ***raising the end of the rotor shaft*** to create clearance for the bearing replacement process). Schaeffler, 9 of 29. Guerenbourg discloses “***a lifting arrangement such as a jack***” for lifting only one end of the shaft. Section VIII.C.2; Bosche ¶¶ 409-411.

5. Claim 16:

The elements of Claim 16 are identical, or substantively identical, to the elements of Claims 1, 10 and 11 addressed above. As such, the analysis is the same:

Claim Element:	Obviousness:
[16.Pre]: Main Shaft Fixture	Section VIII.A.4.a; Bosche ¶¶ 412, 184-189
[16.a]: Divided in Sections	Section VIII.A.4.b; Bosche ¶¶ 413, 190-194
[16.b]: Adjustable Pressure Mandrels	Section VIII.A.4.c; Bosche ¶¶ 414, 195-210
[16.c]: Passive/Active Mandrel Positions	Section VIII.A.4.d; Bosche ¶¶ 415, 211-223
[16.d]: Crane Mounting Facilities	Section VIII.A.4.e; Bosche ¶¶ 416, 363-376
[16.e]: Rotor Lock	Section VIII.A.11; Bosche ¶¶ 417, 308-321
[16.f]: Rotor Lock and Beam-Shaped Brackets With Horizontal Pivots	Section VIII.C.3; Bosche ¶¶ 418, 396-407

6. Claim 17

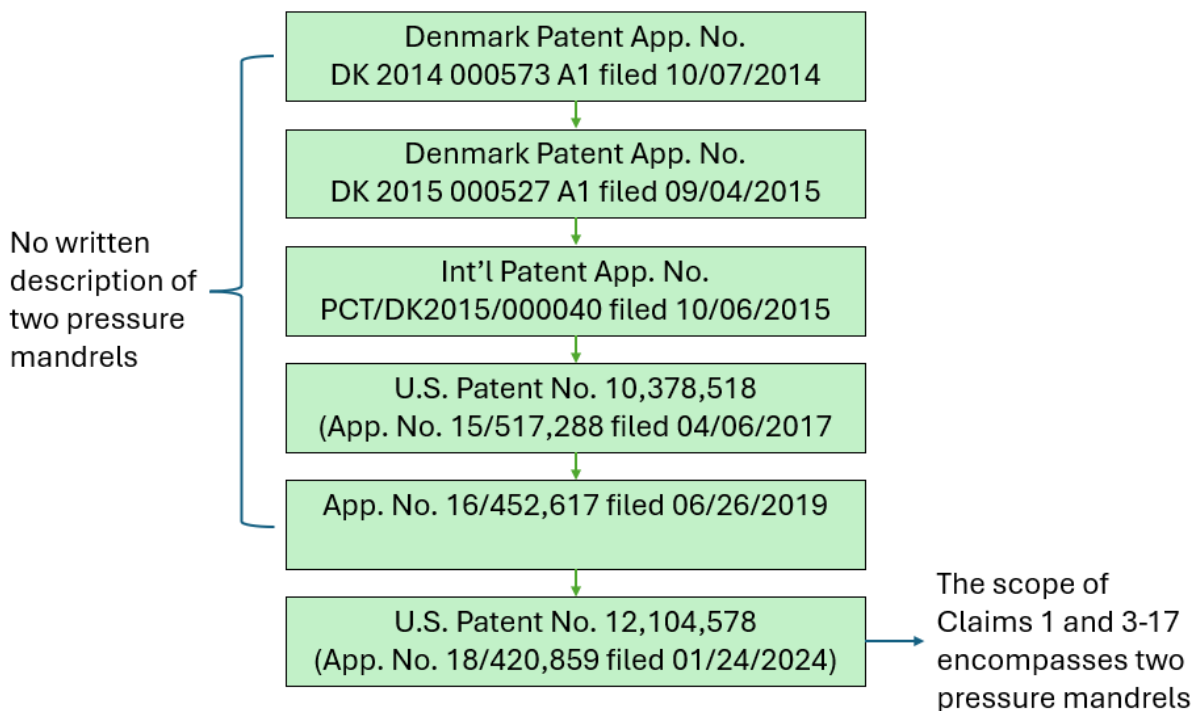
Claim 16 is taught by the Ground-1 References, also raised in Ground 3, in view of Cooper, Schaeffler, and/or Guerenbourg. Section VIII.C.5. The additional

elements of Claim 17 are identical to the elements of Claim 12. As such, the analysis is the same. Section VIII.C.4; Bosche ¶¶ 419-420, 408-411.

D. Ground 4: Claims 1 and 3-17 are Anticipated by the '518 Patent

1. The '518 Patent is Prior Art to Claims 1 and 3-17 of the '578 Patent

As described above and depicted below, the '578 Patent asserts priority through a chain of applications (together, the “Parent Applications”).⁷ '578 Patent, 1:6-15.



Importantly, while the Parent Applications share a similar specification with the '578 Patent, they exclusively teach using *at least three* adjustable pressure

⁷ The '288 Application issued as the '518 Patent.

mandrels. '617 Application, [0009] (“[T]he main shaft fixture comprises **at least three** radial displaceable pressure mandrels substantially symmetrical located around the centre axis of the main shaft....”); '288 Application, [0008] (same); '040 Application, 3:1-3 (same); Bosche ¶ 422.

This is confirmed by the figures, which exclusively show three or more (specifically, four) pressure mandrels symmetrically located around the main shaft. '617 Application, [0037] (“FIG. 2 [shows] in total **four** pressure mandrels....”); '288 Application, [0036] (same); '040 Application, 7:29-32 (same). Further, *every* claim of the '518 Patent requires “at least three radially displaceable pressure mandrels.” '518 Patent, Claims 1-8. Nowhere do the Parent Applications disclose using only **two** pressure mandrels. Bosche ¶ 423.

Indeed, during prosecution of the '518 Patent, applicant distinguished Signore on the grounds that it disclosed only **two** pressure mandrels, not three. Ex. 1006 at 68. Applicant explained that because Signore was “not concerned with adaptability to a number of various diameter of conical main shafts..., [it] would not provide a reason for [a POSITA] to use **at least 3** independent displaceable pressure mandrels” and instead a POSITA would use “only two.” *Id.* In contrast, the Parent Applications (like the '578 Patent) **are** concerned with adaptability to shafts of varying shapes and sizes. '518 Patent, 2:11-38 (“[P]urpose” is to “provide a more universal application in relating to shaft geometry....”), 6:32-47

(all embodiments include “the inventive aspect” of “caus[ing] the fixture 10 to be usable regardless of the geometry of the main shaft...”). And they do not explain how the desired adaptability can be achieved with only **two** pressure mandrels. Instead, applicant argued a POSITA would use two only if such adaptability was *not* desired. This reasoning would make sense to a POSITA, because at least three pressure mandrels symmetrically located around the main shaft provides a more secure and more adjustable attachment point for securing shafts of varying geometries. Bosche ¶ 424.

During prosecution of the '578 Patent, applicant amended the specification and ***deleted*** the limiting disclosure of “at least three radial displaceable pressure mandrels substantially symmetrical located around the centre axis of the main shaft”:

Please amend paragraph [0009], on page 3 of the description, as follows:

[0009] It is by the invention realized that this is possible by a main shaft fixture of the nature specified in the introduction, which is characterised by that the main shaft fixture comprises adjustable at least three radial displaceable pressure mandrels with tap shoes, substantially symmetrical located around the centre axis of the main shaft, the ends of said pressure mandrels facing the main shaft are furnished with a tap shoe, and said pressure mandrels being displaceable between a passive, withdrawn lockable position where the tap shoes are configured to be located at a distance from the surface of the main shaft and an advanced lockable position where the tap shoes are configured to be engaged with the main shaft and mounting facilities suitable for a lightweight crane.

Exhibit 1002 at 133. At the same time, applicant amended the independent claims, broadening their scope to encompass **two** pressure mandrels. '578 Patent, Claim 1 (“compris[ing] adjustable pressure mandrels with tap shoes,” without reciting **at least three** mandrels). This is consistent with dependent Claim 2, which must be of narrower scope, and recites “**at least three** radial displaceable pressure mandrels....” *Id.*, Claim 2. Unlike Claim 2, Claims 1 and 3-17 do not recite “at least three” pressure mandrels and therefore the full scope of those claims encompasses “two or more” pressure mandrels. *Bosche* ¶¶ 425-426.

Apparently, applicant was concerned about the impact of the Parent Applications’ limiting disclosure (requiring “**at least three**” mandrels) on its desire to obtain broader claims (covering **two** mandrels). Applicant’s amendment

highlights what applicant believed to be a distinction between the '578 Patent and the Parent Applications, bolstering the conclusion that claims covering two mandrels lack written description support in the Parent Applications.

Because the full scope of Claims 1 and 3-17 includes an apparatus with **two** pressure mandrels, but the Parent Applications exclusively disclose **at least three** pressure mandrels, there is no written description support for Claims 1 and 3-17 in the Parent Applications. There is no indication that applicant was in possession of an inventive apparatus having only two pressure mandrels prior to the filing of the '578 Patent's application on January 24, 2024. *See Motorola Mobility LLC v. Largan Precision Co., Ltd.*, IPR2022-01170, Paper 11 at 16-21 (PTAB Jan. 26, 2023) (where claims encompassed "a first lens having either a positive or negative refractive power," priority application describing a lens with only positive refractive power was insufficient to support priority); *In re Wertheim*, 541 F.2d 257, 263-64 (C.C.P.A. 1976) (claim reciting "at least 35%" lacks written description in priority application because it encompasses embodiments outside the disclosed 25-60% range); *Bosche* ¶¶ 426-430.

As a result, the '578 Patent is not entitled to a priority date before its January 24, 2024 filing date. *See Indivior UK*, 18 F.4th at 1330 (affirming Board's anticipation determination based on lack of written description support in priority application); *Bosche* ¶¶ 431-432. And because the '518 Patent was published on

August 13, 2019, years before the effective filing date of the '578 Patent, the '518 Patent is prior art under at least AIA 35 U.S.C. § 102(a)(1). *See Motorola*, IPR2022-01170, Paper 11 at 16-21 (applying parent application as anticipatory prior art).

2. Claim 1

Other than the deletion of “at least three” pressure mandrels, the '518 Patent and '578 Patent share identical, or substantially identical, material. The Challenged Claims are disclosed verbatim, or nearly verbatim, by the '518 Patent. *Bosche* ¶ 434.

a. 1[Pre]: Main Shaft Fixture

Regardless of whether the preamble of Claim 1 is limiting, the '518 Patent discloses “a main shaft fixture for the fixing of a main shaft on a wind turbine during the execution of installation and repair work in heavy parts of a wind turbine....” '518 Patent, 1:7-10, Abstract, 4:29-52, Figs. 1-5, Claim 1; *Bosche* ¶ 436.

b. 1[a]: Divided in Sections

The '518 Patent discloses that the main shaft fixture is “divided up into a number of sections for installation on stable structural parts in a nacelle in a wind turbine, including the nacelle’s bottom frame.” '518 Patent, 1:7-13, Abstract (“...formed of several sections...”), Claim 1; *Bosche* ¶ 438.

c. 1[b]: Adjustable Pressure Mandrels

The '518 Patent discloses that “[t]he main shaft fixture has adjustable pressure mandrels with tap shoes....” ’518 Patent, Abstract, 2:21-30 (“at least three radial displaceable pressure mandrels....”), 6:32-37 (“adjustable pressure mandrels”), Figs. 2, 4, 5 (items 18, 20), Claim 1; Bosche ¶ 440.

d. 1[c]: Passive/Active Mandrel Positions

The '518 Patent discloses “pressure mandrels being displaceable between a passive, withdrawn lockable position where the tap shoes are configured to be located at a distance from the surface of the main shaft and an advanced lockable position where the tap shoes are configured to be engaged with the main shaft.” ’518 Patent, 2:25-30, 2:64-3:14, 5:13-18, Claim 1; Bosche ¶ 442.

e. 1[d]: Crane Mounting Facilities

Element 1[d] does not require a specific type of crane—mounting facilities for any type of crane are sufficient. Bosche ¶¶ 444, 225-226. The '518 Patent discloses that “[t]he main shaft fixture also has facilities for mounting of a lightweight crane and a self-hoisting crane....” ’518 Patent, Abstract, 2:16-18, 2:43-63, 4:29-33, 4:57-64, 5:19-38, 5:59-61; Bosche ¶ 445.

3. Claim 3: Mounting Facilities for Self-Hoisting Crane

The main shaft fixture of Claim 1 is disclosed by the '518 Patent. Section VIII.D.2. The '518 Patent additionally discloses that “[t]he main shaft fixture also has facilities for mounting of...a self-hoisting crane with a ground-based

winch....” ’518 Patent, Abstract, 2:16-18, 2:43-63, 4:57-64, 5:19-38; Bosche ¶¶ 447-448.

4. Claim 4: Pressure Mandrel Actuators

The main shaft fixture of Claim 1 is disclosed by the ’518 Patent. Section VIII.D.2. The ’518 Patent additionally discloses that “the pressure mandrels may be provided with actuators for displacing and retaining the tap shoes in the passive position and the active position, respectively, alternatively in a selectable position between the passive and the active position.” ’518 Patent, 2:64-3:5, Claim 4; Bosche ¶¶ 450-451.

5. Claim 5: Pressure Mandrel Threaded Bolts

The main shaft fixture of Claim 1 is disclosed by the ’518 Patent. Section VIII.D.2. The ’518 Patent additionally discloses that “the pressure mandrels may be comprised of threaded bolts whose free ends facing the main shaft are furnished with tap shoes, where the threaded bolts work together with threaded holes in relevant sections of the fixture.” ’518 Patent, 3:6-11, 3:11-14; Bosche ¶¶ 453-454.

6. Claim 6: Slideway Lining

The main shaft fixture of Claim 1 is disclosed by the ’518 Patent. Section VIII.D.2. The ’518 Patent additionally discloses “slideway linings on the opposing sides of the tap shoes facing the main shaft.” ’518 Patent, 3:37-41, 5:59-61, Fig. 4; Bosche ¶¶ 456-457.

7. Claim 7: Slide Plate

The main shaft fixture of Claim 6 is disclosed by the '518 Patent. Section VIII.D.6. The '518 Patent additionally discloses that “[t]he slideway may be comprised of slide plates 42 that are fastened to the opposing free ends of the tap shoes 20 facing the main shaft 4, which in their active advanced position are engaged with the main shaft 4....” ’518 Patent, 5:62-6:5, 3:24-27, 5:59-61, Figs. 4, Claims 5-6; Bosche ¶¶ 459-460.

8. Claim 8: Multi-Part Slide Plate

The main shaft fixture of Claim 7 is disclosed by the '518 Patent. Section VIII.D.7. The '518 Patent additionally discloses “a multi-part slide plate working in conjunction with the main shaft to be mounted on the main shaft, where the multi-part slide plate in its mounted state on the main shaft cooperates with the tap shoes.” ’518 Patent, 3:28-33, 3:37-41, 5:62-6:2, Fig. 4, Claim 7; Bosche ¶¶ 462-463.

9. Claim 9: Multi-Part Bearing

The main shaft fixture of Claim 1 is disclosed by the '518 Patent. Section VIII.D.2. The '518 Patent also discloses all of the additional elements of Claim 9 verbatim. ’518 Patent, 3:42-55 4:46-52, 6:6-20, Fig. 5, Claim 1; Bosche ¶¶ 465-466.

10. Claim 10: Rotor Lock

The main shaft fixture of Claim 1 is disclosed by the '518 Patent. Section VIII.D.2. The '518 Patent additionally discloses “a rotor lock, for fixing the wind turbine rotor.” '518 Patent, 3:59-62, 5:19-30, Figs. 1 & 3, Claims 1-2; Bosche ¶¶ 468-469.

11. Claim 11: Rotor-Lock and Beam Shaped Brackets with Horizontal Pivots

The main shaft fixture of Claim 10 is disclosed by the '518 Patent. Section VIII.D.10. The '518 Patent also discloses all of the additional elements of Claim 11 verbatim. '518 Patent, 3:63-4:6, 5:19-30, Fig. 3, Claim 2; Bosche ¶¶ 471-472.

12. Claim 12: Rotor Actuator

The main shaft fixture of Claim 11 is disclosed by the '518 Patent. Section VIII.D.11. The '518 Patent also discloses all of the additional elements of Claim 12 verbatim. '518 Patent, 4:11-19, 4:39-42, 5:39-49, Figs. 1 & 3, Claim 8; Bosche ¶¶ 474-475.

13. Claim 13: Mounted Crane

The main shaft fixture of Claim 1 is disclosed by the '518 Patent. Section VIII.D.2. The '518 Patent additionally discloses that “Fig. 1 is a perspective view [including] a main shaft fixture according to the invention, with a lightweight crane and a self-hoisting crane *mounted*.” '518 Patent, 29-33, 4:57-63, Figs. 1-3; Bosche ¶¶ 477-478.

14. Claim 14: Mount for Lightweight Crane

The main shaft fixture of Claim 1 is disclosed by the '518 Patent. Section VIII.D.2. The '518 Patent additionally discloses that “[t]he main shaft fixture also has facilities for mounting of a lightweight crane....” '518 Patent, Abstract, 4:29-33, 4:57-64, 5:59-61; Bosche ¶¶ 480-481.

15. Claim 15

The elements of Claim 15 are identical, or substantively identical, to the elements of Claims 1 and 5 addressed above. As such, the analysis is the same:

Claim Element	Anticipation:
[15.Pre]: Main Shaft Fixture	Section VIII.D.2.a; Bosche ¶¶ 482, 435-436
[15.a]: Divided in Sections	Section VIII.D.2.b; Bosche ¶¶ 483, 437-438
[15.b]: Adjustable Pressure Mandrels	Section VIII.D.2.c; Bosche ¶¶ 484, 439-440
[15.c]: Passive/Active Mandrel Positions	Section VIII.D.2.d; Bosche ¶¶ 485, 441-442
[15.d]: Pressure Mandrel Threaded Bolts	Section VIII.D.5; Bosche ¶¶ 486, 452-454

[15.e]: Crane Mounting Facilities	Section VIII.D.2.e; Bosche ¶¶ 487, 443-445
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16. Claim 16:

The elements of Claim 16 are identical, or substantively identical, to the elements of Claims 1, 10 and 11 addressed above. As such, the analysis is the same:

Claim Element	Anticipation:
[16.Pre]: Main Shaft Fixture	Section VIII.D.2.a; Bosche ¶¶ 488, 435-436
[16.a]: Divided in Sections	Section VIII.D.2.b; Bosche ¶¶ 489, 437-438
[16.b]: Adjustable Pressure Mandrels	Section VIII.D.2.c; Bosche ¶¶ 490, 439-440
[16.c]: Passive/Active Mandrel Positions	Section VIII.D.2.d; Bosche ¶¶ 491, 441-442
[16.d]: Crane Mounting Facilities	Section VIII.D.2.e; Bosche ¶¶ 492, 443-445
[16.e]: Rotor Lock	Section VIII.D.10; Bosche ¶¶ 493, 467-469
[16.f]: Rotor Lock and Beam-Shaped Brackets With Horizontal Pivots	Section VIII.D.11; Bosche ¶¶ 494, 470-472

17. Claim 17

Claim 16 is disclosed by the '518 Patent. Section VIII.D.16. The elements of Claim 17 are identical to the elements of Claim 12. As such, the analysis is the same. Section VIII.D.12; Bosche ¶ 495, 473-475.

IX. CONCLUSION

For the foregoing reasons, the Petition should be instituted and the Challenged Claims should be canceled.

Respectfully submitted,

Dated: November 4, 2025

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WORD COUNT CERTIFICATION

Pursuant to 37 C.F.R. §42.24(d), I certify that this Petition contains 13,968 words (excluding the title page, table of contents, table of authorities, table of exhibits, claim listing, this certificate, and the certificate of service), as determined by Microsoft Word.

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APPENDIX A
CHALLENGED CLAIM LISTING

Claim 1	Element Abbreviation⁸
[1.Pre] Main shaft fixture for fixation of a main shaft on a wind turbine during execution of installation and repair work on heavy parts of a wind turbine,	“Main Shaft Fixture”
[1.a] where the fixture is divided up into a number of sections for mounting on stable structural parts in a nacelle of a wind turbine, including a bottom frame of the nacelle,	“Divided in Sections”
[1.b] characterised [sic] in that the main shaft fixture comprises adjustable pressure mandrels with tap shoes,	“Adjustable Pressure Mandrels”
[1.c] and the adjustable pressure mandrels being displaceable between a passive position where the tap shoes are configured to be located at a distance from a surface of the main shaft and an active position where the tap shoes are configured to be engaged with the main shaft	“Passive/Active Mandrel Positions”
[1.d] and in that the main shaft fixture further comprises mounting facilities adapted for anchoring a crane on/in a nacelle of a wind turbine.	“Crane Mounting Facilities”

⁸ The Element Abbreviations are provided only for ease of reference and are not intended as a summary of the limitation or element as claimed in the '578 Patent.

Claim 2	
Main shaft fixture according to claim 1, characterized in that the adjustable pressure mandrels with tap shoes comprise at least three radial displaceable pressure mandrels, substantially symmetrical located around a centre axis of the main shaft, ends of the adjustable pressure mandrels facing the main shaft being furnished with the tap shoes.	“At Least Three Radial Displaceable Pressure Mandrels”
Claim 3	
Main shaft fixture, according to claim 1, characterised [sic] in, that the mounting facilities are adapted for anchoring a self-hoisting crane on/in a nacelle of a wind turbine and in that a winch of the self-hoisting crane is located on a ground surface near a foot of the wind turbine.	“Mounting Facilities for Self-Hoisting Crane”
Claim 4	
Main shaft fixture, according to claim 1, characterised [sic] in, that the adjustable pressure mandrels is provided with actuators for displacing and retaining the tap shoes in the passive position and the active position, respectively, alternatively in a selectable position between the passive and the active position.	“Pressure Mandrel Actuators”

Claim 5	
Main shaft fixture, according to claim 1, characterised [sic] in, that the adjustable pressure mandrels consists of threaded bolts whose opposing free ends facing the main shaft are furnished with tap shoes, and the threaded bolts cooperates with threaded holes in relevant sections of the main shaft fixture.	“Pressure Mandrel Threaded Bolts”
Claim 6	
Main shaft fixture, according to claim 1, characterised [sic] by a slideway lining being located between opposing sides of a surface of the main shaft and tap shoes.	“Slideway Lining”
Claim 7	
Main shaft fixture according to claim 6, characterised [sic] in, that the slideway lining is configured so that of opposing free ends of the tap shoes facing the main shaft are provided with a slide plate which in the active position is engaged with the main shaft.	“Slide Plate”
Claim 8	
Main shaft fixture according to claim 7, characterised [sic] in that it comprises a multi-part slide plate cooperating with the main shaft for mounting on the main shaft, where the multi-part slide plate in its mounted position on the main shaft is cooperating with the tap shoes.	“Multi-Part Slide Plate”

Claim 9	
<p>Main shaft fixture according to claim 1, characterised [sic] in, that it comprises one of a multi-part needle bearing, roller bearing, ball bearing consisting of a multi-part inner ring fastened to the main shaft, and a therewith cooperating multi-part outer ring consisting of bowed subsegments corresponding to a number of tap shoes, mounted on opposing side of the tap shoes facing an inner ring, which in the active position of the adjustable pressure mandrels form an outer ring at a distance from an outer periphery of the multi-part inner ring, and where an appropriate number of needle rollers, rollers, or balls are arranged between the inner ring and the outer ring, and where means are present for retaining needles, rollers, or balls in position between the inner ring and outer ring.</p>	“Multi-Part Bearing”
Claim 10	
<p>Main shaft fixture, according to claim 1, characterised [sic] in, that it comprises a rotor lock for fixation of a rotor of the wind turbine.</p>	“Rotor Lock”

Claim 11	
<p>Main shaft fixture, according to claim 10, characterised [sic] in, that the rotor lock consists of a flange element, whose bolt circle geometry corresponds to a bolt circle geometry on the rotor, the flange element being fastened []⁹ to a first end of two first beam-shaped brackets extending parallel with, and on each side of the main shaft, the beam shaped brackets belonging to the main shaft fixture, and where a second end of the beam-shaped brackets are pivotally mounted with horizontally oriented bolt connections, on other beam-shaped brackets belonging to the main shaft fixture, which are adapted to be anchored on the bottom frame of the nacelle.</p>	<p>“Rotor Lock and Beam-Shaped Brackets With Horizontal Pivots”</p>
Claim 12	
<p>Main shaft fixture, according to claim 11, characterised [sic] in, that at least one actuator is located nearest the rotor lock between the bottom frame of the nacelle and an adjacent side of the first beam-shaped brackets facing the bottom frame, the actuator is displaceable between a first passive outer position and an active outer position where the flange element is displaced vertically.</p>	<p>“Rotor Actuator”</p>

⁹ “[A]t the ends” removed by an November 26, 2024 certificate of correction.

Claim 13	
Assembly for installing and repairing heavy parts of a wind turbine arranged in a nacelle of a wind turbine, the assembly comprising a main shaft fixture according to claim 1, characterized in that a crane is mounted to the main shaft fixture via the mounting facilities of the main shaft fixture.	“Mounted Crane”
Claim 14	
Main shaft fixture, according to claim 1, characterised [sic] in that the mounting facilities are adapted for anchoring a lightweight crane on/in a nacelle of a wind turbine.	“Mount for Lightweight Crane Mount”
Claim 15	
[15.Pre] Main shaft fixture for fixation of a main shaft on a wind turbine during execution of installation and repair work on heavy parts of a wind turbine,	“Main Shaft Fixture (15)”
[15.a] where the main shaft fixture is divided up into a number of sections for mounting on stable structural parts in a nacelle of a wind turbine, including a bottom frame of the nacelle,	“Divided in Sections (15)”
[15.b] characterised [sic] in that, the main shaft fixture comprises adjustable pressure mandrels with tap shoes, and	“Adjustable Pressure Mandrels (15)”

[15.c] the adjustable pressure mandrels being displaceable between a passive position where the tap shoes are configured to be located at a distance from a surface of the main shaft and an active position where the tap shoes are configured to be engaged with the main shaft,	“Passive/Active Mandrel Positions (15)”
[15.d] the adjustable pressure mandrels consisting of threaded bolts whose opposing free ends facing the main shaft are furnished with tap shoes, and the threaded bolts cooperates with threaded holes in relevant sections of the main shaft fixture,	“Pressure Mandrel Threaded Bolts (15)”
[15.e] and in that the main shaft fixture further comprises mounting facilities adapted for anchoring a crane on/in a nacelle of a wind turbine.	“Crane Mounting Facilities (15)”
Claim 16	
[16.Pre] Main shaft fixture for fixation of a main shaft on a wind turbine during execution of installation and repair work on heavy parts of a wind turbine,	“Main Shaft Fixture (16)”
[16.a] where the main shaft fixture is divided up into a number of sections for mounting on stable structural parts in a nacelle of a wind turbine, including a bottom frame of the nacelle,	“Divided in Sections (16)”
[16.b] characterised [sic] in[] that the main shaft fixture comprises adjustable pressure mandrels with tap shoes, and	“Adjustable Pressure Mandrels (16)”

<p>[16.c] the adjustable pressure mandrels being displaceable between a passive position where the tap shoes are configured to be located at a distance from a surface of the main shaft and an active position where the tap shoes are configured to be engaged with the main shaft and</p>	<p>“Passive/Active Mandrel Positions (16)”</p>
<p>[16.d] in that the main shaft fixture further comprises mounting facilities adapted for anchoring a crane on/in a nacelle of a wind turbine, and</p>	<p>“Crane Mounting Facilities (16)”</p>
<p>[16.e] further comprising a rotor lock for fixation of a rotor of the wind turbine,</p>	<p>“Rotor Lock (16)”</p>
<p>[16.f] wherein the rotor lock consists of a flange element, whose bolt circle geometry corresponds to a bolt circle geometry on the rotor, the flange element being fastened to a first end of two first beam-shaped brackets extending parallel with, and on each side of the main shaft, the two first beam shaped brackets belonging to the main shaft fixture, and where a second end of the two first beam shaped brackets are pivotally mounted with horizontally oriented bolt connections, on other brackets belonging to the main shaft fixture, which are adapted to be anchored on the bottom frame of the nacelle.</p>	<p>“Rotor Lock and Beam-Shaped Brackets With Horizontal Pivots (16)”</p>

Claim 17	
<p>Main shaft fixture, according to claim 16, wherein at least one actuator is located nearest the rotor lock between the bottom frame of the nacelle and an adjacent side of the first beam shaped brackets facing the bottom frame, the actuator is displaceable between a first passive outer position and an active outer position where the flange element is displaced vertically.</p>	<p>“Rotor Actuator”</p>

CERTIFICATE OF SERVICE

I certify that today in:

LiftWerx USA Inc. v. Liftra IP ApS, IPR2026-00102 (U.S. Patent 12,104,578)

I caused to be served a copy of:

Petition
Exhibits 1001-1043

upon:

Liftra IP ApS c/o:

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