IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF TEXAS
HOUSTON DIVISION

C&M OILFIELD RENTALS, LLC D/B/A C-MOR ENERGY SERVICES,	§	
Plaintiff,	§	
V.	§	**CIVIL ACTION NO. 4:22-CV-00965**
ENSIGN US SOUTHERN DRILLING LLC	§	
Defendant.	§	

DEFENDANT ENSIGN US SOUTHERN DRILLING LLC'S MARKMAN BRIEF ON THE ONLY DISPUTED TERM "MOUNTING POLE" IN U.S. PATENT NOS. 10,976,016 AND 10,900,626

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I. Summary of the Argument

In an effort to avoid prior art[1] that invalidates the patents at issue, Patentee C&M proposes a strained definition for "mounting pole" in U.S. Patent Nos. 10,976,016 and 10,900,626. C&M disguises its strained construction by calling it "plain and ordinary meaning", yet its proffered 19 word definition nowhere appears in the specification or file history of either patent. C&M says "mounting pole" is not simply "a pole used for mounting" but instead proposes to add uncertainty to the claim scope with four requirements:"[(1)] elongated structure [(2)] fixed at one end and [(3)] for mounting where [(4)] the length of the structure far exceeds the width." C&M's suggested added limitations "elongated", "fixed at one end", and "the length far exceeds the width" do not appear in either asserted patent.

In addition to "mounting pole" not being a specially defined term in either patent's specification, the C&M construction is also wrong because it creates greater uncertainty by the use of indefinite and vague phrases – "far exceeds the width" – and is thus the antithesis of patent construction.[2] C&M's expert confirmed the proposed construction was impermissibly indefinite and vague when he repeatedly testified that he could not provide any clarity about how much the length must "far exceed" the width, such as a percentage or number.

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[1] Defendant Ensign US has filed a Petition for *Inter Partes* Review of U.S. Patent No. 10,976,016 at the USPTO to invalidate the patent. C&M's response is due July 28, 2023. *Ensign US Southern Drilling LLC v. C&M Oilfield Rentals, LLC d/b/a C-MOR Energy Services,* PTAB-IPR2023-00804.

[2] *See Chimie v. PPG Indus. Inc.*, 402 F.3d 1371, 1377 (Fed. Cir. 2005) ("Courts construe claim terms in order to assign a fixed, unambiguous, legally operative meaning to the claim.").

He instead testified, "You show me an application and I will let you know whether it appears to be a mounting pole to a person of ordinary skill in the art."[3] However, when confronted with specific photos of lighting systems, C&M's expert repeatedly refused to answer if the picture depicted a mounting pole at the instruction of C&M's counsel.[4]

C&M's "I know it when I see it" (but will not tell you if I see it) construction is not proper and its strained "mounting pole" definition does not appear in the patents or any dictionary. It is not the "plain and ordinary meaning", and should be rejected. Ensign US's construction that a "mounting pole" is simply a pole used for mounting something should be adopted just as Judge Albright did when expressly rejecting C&M's ambiguous proposal and adopting precisely what Ensign US suggests here.[5]

II. Statement of the Issues to be Ruled Upon By the Court

Whether Patentee C&M has met its burden to show that the term "mounting pole" has some sort of special definition and means an "elongated structure fixed at one end and for mounting where the length of the structure far exceeds the width"?

III. Statement of the Nature and Stage of the Proceeding

A jury trial is set in this case for January 21, 2025.[6] Ensign US's related USPTO invalidity proceeding on the '016 Patent was filed on March 30, 2023 and by statute

[3] Exhibit 1, Wooley deposition, pp. 26-27 and p.86-89.

[4] Exhibit 1, Wooley deposition, pp. 72-76 and light photos marked as deposition Exhibits 2-3.

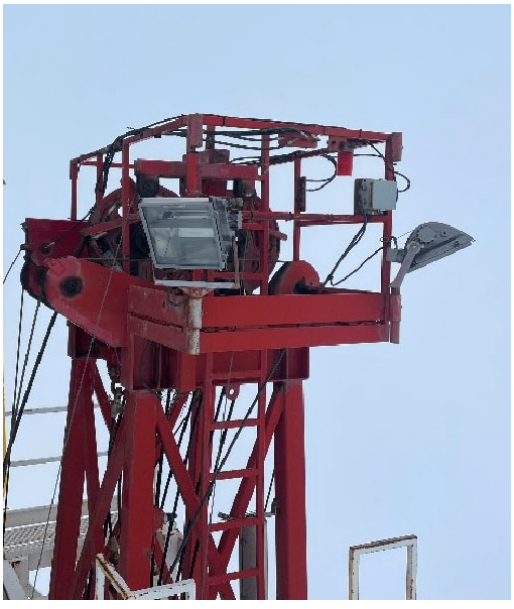
[5] Dkt. 50-8, Exhibit H to C&M's Opening Brief (Judge Albright's claim construction ruling expressly rejecting C&M's proposal that the length of the mounting pole far exceeds the width).

[6] Dkt. 35.

must be resolved by the USPTO by September 30, 2023. Nabors Drilling Technologies USA, Inc. filed a related case claiming to be the true owner of at least the '016 and '626 patent at issue here and that case is scheduled for trial May 17, 2024.[7]

IV. Overview of the Claimed "Technology"

Lights with various mounting poles and brackets have been used on handrails, rigs, and in other applications long before C&M filed for a patent in 2018. Representative prior art images from Ensign US's USPTO invalidity petition are shown below and may explain why C&M seeks its strained and ambiguous "construction for mounting pole.[8]





[7] *See* Dkt. 36 in *Nabors Drilling Technologies USA, Inc. v. C&M Oilfield Rentals, LLC d/b/a C-MOR Energy Services*, SDTX-4-22-cv-02140.

[8] 2013 YOUTUBE videos reference the same "technology" of mounting lights on rails with brackets that is patented by C&M. *See, e.g.*, https://www.youtube.com/watch?v=EWXJeKNRs00

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V. Legal Background of Claim Construction - Plain and Ordinary Meaning Is the Default

The "words of the claim" "begin" the "claim construction analysis" and are generally given their "plain and ordinary" meaning, *i.e.*, "the meaning that the term would have to a person of ordinary skill in the art at the time of the invention."[9] The Federal Circuit has instructed that one " cannot overcome the 'heavy presumption' that a claim term takes on its ordinary meaning simply by pointing to the preferred embodiment or other structures or steps disclosed in the specification or prosecution history."[10] The specification—the patent's written description and figures illustrating the invention—is the second type of intrinsic evidence and is "always highly relevant."[11] What is described, however, does not limit the claims; it merely informs the meaning of claim terms.[12] Courts "will not read unstated limitations into claim language."[13]

The Federal Circuit has instructed that there are only two circumstances where a claim term is not entitled to its ordinary and customary meaning: (1) when a patentee acts as his or her own lexicographer and sets out a definition in the written description,

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[9] *Nystrom v. Trex Co., Inc.*, 424 F.3d 1136, 1142 (Fed. Cir. 2005).

[10] *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1327 (Fed. Cir. 2002) (citing *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002)).

[11] *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996); *see also Phillips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir. 2005).

[12] *See Phillips*, 415 F.3d at 1323 ("[A]lthough the specification often describes very specific embodiments of the invention, we have repeatedly warned against confining the claims to those embodiments); *Ventana Med. Sys., Inc. v. BioGenex Labs., Inc.*, 473 F.3d 1173, 1181 (Fed. Cir. 2006) (district court reversed for limiting the scope of a claim term to the preferred embodiment).

[13] *Northern Telecom Ltd. v. Samsung Electronics Co., Ltd.*, 215 F.3d 1281, 1290 (Fed. Cir. 2000).

or (2) when the patentee unmistakably disavows the full scope of the claim term either in the specification or during prosecution.[14]

The methodology above is used below to discuss the proper construction of the disputed language. The Court, however, need not engage in this exercise except "when necessary to explain what the patentee covered by the claims."[15] The Court need not "always parse the claims for the jury," even if there is a "material dispute as to the meaning or scope of the claims."[16] Therefore, if a construction cannot improve the jury's understanding of the claim terms, those terms can be left unconstrued.

VI. Claim Construction – C&M Cannot Meet its Heavy Burden to Depart from the Plain and Ordinary Meaning of "Mounting Pole" as a Pole for Mounting Something

Ensign US's Proposed Construction	C&M's Proposed Construction
A "mounting pole" is a pole used for mounting something. Both "mounting" and "pole" have their plain and ordinary meanings. A pole can be cut shorter and still remain a pole, even if its length no longer far exceeds the width.	Plain and ordinary meaning, which is: "elongated structure fixed at one end and for mounting where the length of the structure far exceeds the width"

The term "mounting pole" is in asserted claims 1, 2, and 23 of the '016 Patent and claims 9 and 19 of the '626 Patent. It is not expressly defined in the specification of

[14] *GE Lighting Sols., LLC v. AgiLight, Inc.*, 750 F.3d 1304, 1309 (Fed. Cir. 2014), reh'g denied (June 17, 2014) (citing *Thorner v. Sony Computer Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012)) ("the specification and prosecution history only compel departure from the plain meaning in two instances: lexicography and disavowal."); *Walker Digital, LLC v. Microsoft Corp.*, 590 F. App'x 956, 958 (Fed. Cir. 2014) ("The words of a claim generally receive their ordinary and customary meaning as understood by one of ordinary skill in the art. If, however, the patentee has clearly and unmistakably disavowed claim scope or, acting as a lexicographer, has expressly defined the disputed claim term in the specification or prosecution history, then we will deviate from the claim term's ordinary and customary meaning.") (internal quotations and citations omitted)).

either patent and has its plain and ordinary meaning that was not discussed or changed during prosecution. The term "mounting pole" simply means a pole used for mounting something as Judge Albright already found when construing the same term in the same '016 Patent.[15] Judge Albright rightly rejected C&M's proposal that "length of the structure far exceeds the width" and instead found that "A pole can be cut shorter and still remain a pole, even if its length no longer far exceeds the width." There is simply no reason to look further than that.

Neither the patent specifications nor the prosecution histories suggest that "mounting pole" was somehow specially defined by C&M in the specifications or prosecution histories. As described below, C&M's proposal is not supported by the specifications or file histories and is ambiguous. What's more, C&M's extrinsic evidence in the form of its expert's declaration should not be relied upon—even C&M's own expert could not define what "far exceeds" means.

A. C&M Cannot Meet Its Burden to Depart From Plain and Ordinary Meaning and Adopt its New Definition Which is Not Plain, Not Ordinary, and Not Supported by the Intrinsic Evidence

C&M cannot meet its burden to deviate from the plain and ordinary meaning of "mounting pole" because neither circumstance where the Federal Circuit permits deviation from a term's plain and ordinary meaning is present here.[16] That is, there is

[15] Dkt. 50-8, Exhibit H to C&M's Opening Brief (Judge Albright's claim construction ruling expressly rejecting C&M's proposal that the length of the mounting pole far exceeds the width).

[16] *GE Lighting Solutions, LLC v. AgiLight, Inc.*, 750 F.3d 1304, 1309 (Fed. Cir. 2014), reh'g denied (June 17, 2014) (citing *Thorner v. Sony Computer Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012)) ("the specification and prosecution history only compel departure from the plain meaning in two instances: lexicography and disavowal.").

no lexicography or disavowal that suggests "mounting pole" has anything other than its usual meaning as "a pole for mounting something" and C&M's suggestion otherwise should be rejected.

First, the intrinsic evidence of the patent specifications do not provide the special definition offered by C&M. C&M goes through various embodiments described in the patents at pages 6-9 of its opening brief. All of the embodiments described by C&M there are consistent with Ensign US's proposed plain and ordinary meaning.[17] C&M concedes on page 9 of its brief "that the patentees did not as their own lexicographer to expressly define "mounting pole" in the Asserted Patents' specifications."[18] That alone shows C&M's 19 word, four limitation definition should be rejected.

Second, C&M admits in its brief on page 1 that intrinsic evidence includes the prosecution file histories yet C&M does not discuss either file history or submit them with its brief. Of course that is because the examiner in the '016 file history did not share C&M's view that a mounting pole's "length far exceeds the width." Nor did the examiner share C&M's view expressed on page 10 of its brief that a "mounting pole" is somehow different than a "post." Instead, the Examiner ***twice*** said in the '016 file history that the short and wide post 210 highlighted in the prior art figure below constituted a mounting pole. And the prior art reference itself referred to 210 as a "light

[17] The dictionary definitions offered by C&M are not inconsistent with Ensign US's proposal.

[18] Dkt. 50, C&M Brief p.9.

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support post" in paragraph [0043].[19] C&M never proffered the proposed specific definition it is offering now in either patent or either file history.

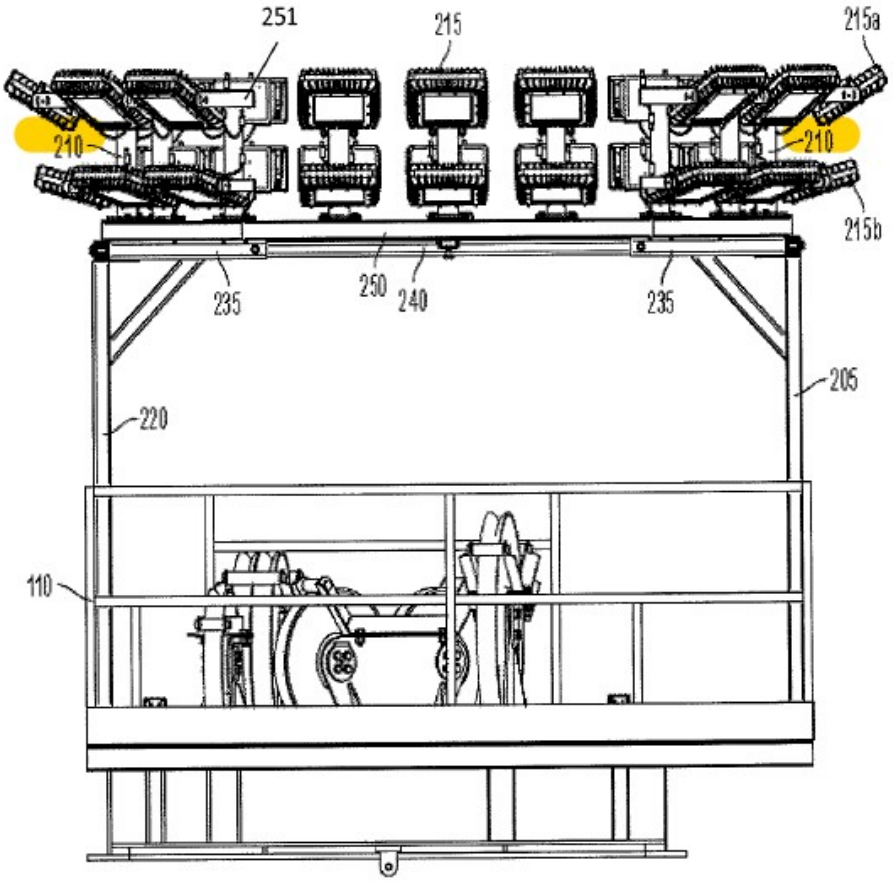


FIG. 2

This is another independent reason that C&M's contorted, litigation-created definition for the "plain and ordinary meaning" of "mounting pole" should be rejected.

[19] Exhibit 2, 1/29/2021 Final Office Action in SN 17/016,083 in '016 Patent file history; Exhibit 3 12/9/2020 Office Action in SN 17/016,083 in '016 Patent file history; and Exhibit 4, US2015/0184840.

B. C&M's Proposal for "Mounting Pole" Creates Ambiguity

Another independent reason to reject C&M's proposal is that it creates a less clear meaning, rather than resolving any ambiguity. Under C&M's strained construction, to demonstrate infringement or invalidity a party would have to show that a pole's "length far exceeds its width." Neither length, nor width, nor any ratio of length to width for a pole are provided in the patent. In fact, the terms do not appear in the patents at all. C&M's own expert confirmed the indefiniteness of C&M's proposal when he could not quantify it saying "it's not that clear. It's a matter of what the application is."[20] Thus, adding this strange requirement that the pole's "length far exceeds its width" could render the claims indefinite and vague. *See Chimie v. PPG Indus. Inc.*, 402 F.3d 1371, 1377 (Fed. Cir. 2005) ("Courts construe claim terms in order to assign a fixed, unambiguous, legally operative meaning to the claim.")

C&M's proposed claim construction is not based on claim construction principles but instead is based on a strained argument to try and escape invalidity. C&M's proposal should be rejected for this independent reason.

C. C&M's Extrinsic Evidence Should Not Be Relied Upon

C&M concedes on page 2 of its brief that extrinsic evidence is "less significant than the intrinsic record in determining the legally operative meaning of claim language."[21] Yet, C&M heavily relies on a declaration from its expert Gary Wooley to deviate from the plain and ordinary meaning of "mounting pole" to adopt its special

[20] Exhibit 1, Wooley deposition, p. 87.

[21] Dkt. 50, C&M Brief p.2.

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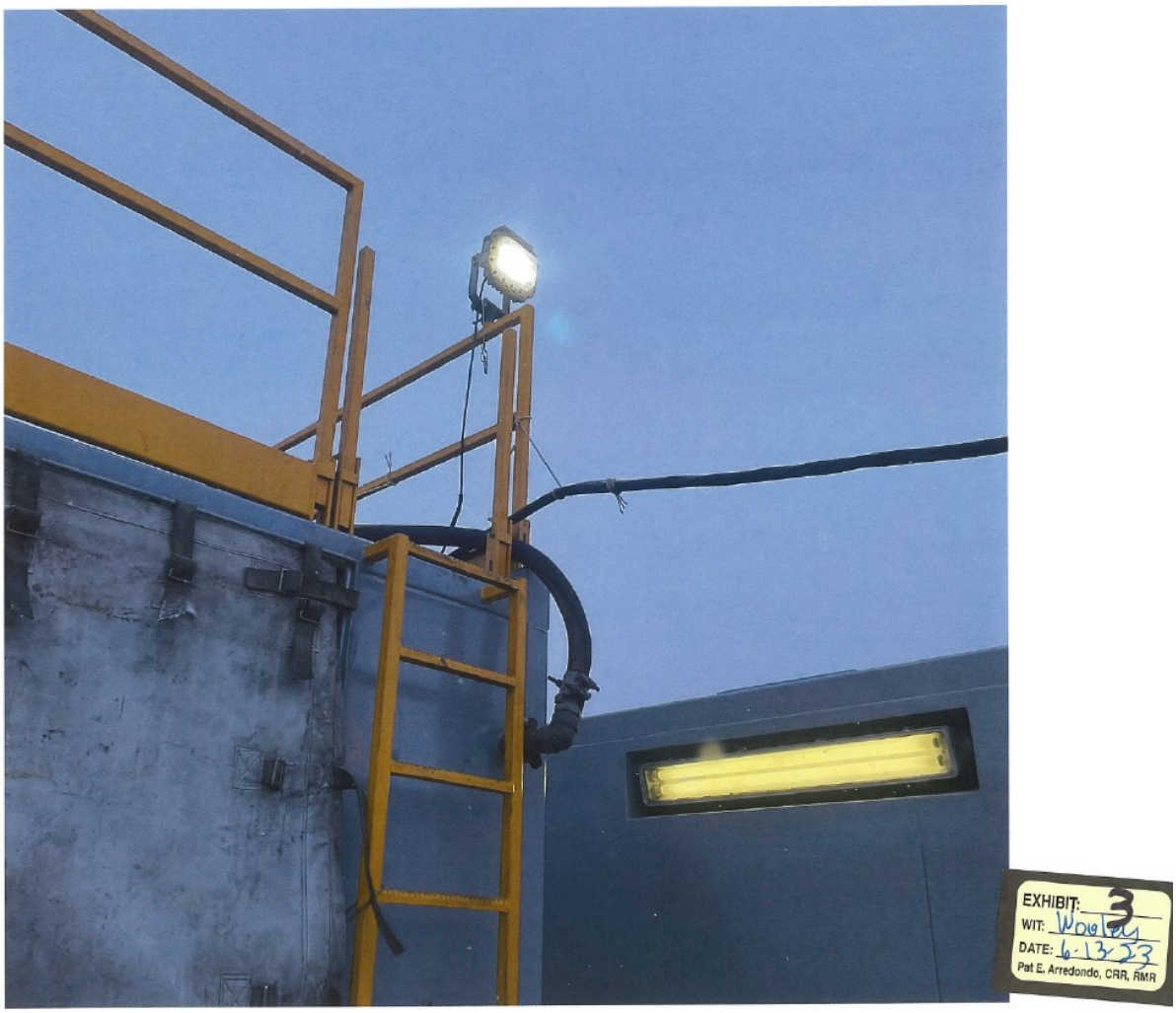
definition which is not in the intrinsic record. As explained in detail below, the Court should reject this.

Ensign US took a short deposition of Dr. Wooley in part to explore the meaning of his unsupported requirement that "the length of the structure far exceeds the width." Dr. Wooley could not and would not provide a specific percentage or number as to how much the length must "far exceed" the width. He instead said, "You show me an application and I will let you know whether it appears to be a mounting pole to a person of ordinary skill in the art."[22] Accepting Dr. Wooley's invitation, Ensign US counsel then showed him the below photos and asked whether there was a mounting pole according to his proposed claim construction.

[22] Exhibit 1, Wooley deposition, pp. 26-27 and p.86-89.

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EXHIBIT: a
WIT: Woolley
DATE: 6-13-23
Pat E. Arredondo, CRR, RMR



C&M counsel made a number of speaking objections and then improperly instructed Dr. Wooley not to answer.[23] Dr. Wooley's declaration should be stricken and not relied upon for this reason alone. Fed. R. Civ. P. 30(c)(2), (d)(3); *see also Ferring Pharm. Inc. v. Serenity Pharm., LLC*, 331 F.R.D. 75, 79 (S.D.N.Y. 2019) (holding party acted improperly and committed "deposition misconduct" by instructing the expert witness not to

[23] Exhibit 1, Wooley deposition at pp. 72-76 and light photos marked as deposition Exhibits 2-3.

answer questions related to certain claim construction positions).[24] What's more, the refusals to answer and the C&M witness's inability to quantitatively or otherwise define how much the length must "far exceed" the width further confirm that C&M's construction is not helpful to a jury and should be rejected. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1318 (Fed. Cir. 2005) ("[C]onclusory, unsupported assertions by experts as to the definition of a claim term are not useful to a court[; s]imilarly, a court should discount any expert testimony 'that is clearly at odds with the claim construction mandated by the claims themselves, the written description, and the prosecution history, in other words, with the written record of the patent.'").[25]

This Court would not be alone in disagreeing with Dr. Wooley's proposed claim constructions as Dr. Wooley is "pretty sure that's occurred" before and what's more it has occurred so frequently that as a professional witness he has "no idea" how many times.[26] A cursory search revealed that USPTO administrative law judges have rejected Dr. Wooley's proposed claim constructions on at least two occasions stating:

> On the whole, the intrinsic evidence is clearly at odds with Dr. Wooley's testimony. We find this especially because Dr. Wooley provides limited objective support for many of his statements, which rely, for example, on "common sense." Ex. 2008 ¶¶ 124, 154. Given the circumstances, we find

[24] Ensign US takes no position as to whether C&M or its counsel should be sanctioned for the improper speaking objections and instructions not to answer questions about C&M's proposed claim construction.

[25] If C&M's construction is adopted then the claims should be held invalid as indefinite because they do not inform those skilled in the art about the scope of the invention with "reasonable certainty" as required. *Nautilus, Inc. v. Biosig Instruments, Inc*, 572 U.S. 898 (2014).

[26] Exhibit 1, Wooley deposition at pp. 9-10.

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> Dr. Wooley's testimony of little persuasive value with respect to the proper constructions of the disputed claim limitations.[27]
>
> On the whole, the intrinsic evidence is clearly at odds with the position of Patent Owner and Dr. Wooley's declaration testimony that the correct claim construction excludes separation of any metal portion of the tubular member from the adjacent preexisting structure, such as by external elastomeric seals. [28]

Once again Dr. Wooley is presenting a proposed construction that is at odds with the intrinsic evidence since the specification does not provide a definition for "mounting pole" and the examiner expressly disagreed with two aspects of Dr. Wooley's proposal in the '016 Patent file history. Dr. Wooley's disguised "plain and ordinary" meaning definition for "mounting pole" that is nowhere in the specifications and contrary to the '016 Patent file history should be rejected.

VII. Conclusion

Ensign US's proposed construction should be adopted and C&M's should be rejected. Alternatively, if the Court is inclined to adopt a version of C&M's proposal it should reject the ambiguous and indefinite requirement that "the length of the structure far exceeds the width."

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[27] Exhibit 5, *Weatherford U.S., L.P. vs. Enventure Global Tech., Inc.*, No. IPR2020-01580, 42 (P.T.A.B. April 13, 2022).

[28] Exhibit 6, *Weatherford U.S., L.P. vs. Enventure Global Tech., Inc.*, No. IPR2020-01648, 41 (P.T.A.B. April 13, 2022).

Respectfully submitted,

Dated: June 30, 2023

Respectfully submitted,

HUNTON ANDREWS KURTH, LLP

/s/ Greg L. Porter
Neil D. Kelly
Texas Bar No. 00784380
Southern District ID No. 15995
Greg L. Porter
Texas Bar No. 24002784
Southern District ID No. 34185
600 Travis, Suite 4200
Houston, TX 77002
(713) 220-4200
(713) 220-4285 (Fax)
NeilKelly@HuntonAK.com
GregPorter@HuntonAK.com
ATTORNEYS FOR DEFENDANT
ENSIGN US SOUTHERN DRILLING, LLC

CERTIFICATE OF SERVICE

I hereby certify that on June 30, 2023, I electronically filed the foregoing with the Clerk of the Court using the CM/ECF system. The electronic case filing system sent a "Notice of Electronic Filing" to the attorneys of record who have consented in writing to accept this Notice as service of this document by electronic means.

/s/ Neil D. Kelly
Neil D. Kelly

EXHIBIT 1A

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF TEXAS
HOUSTON DIVISION

C&M OILFIELD RENTALS, LLC D/B/A C-MORE ENERGY SERVICES,	:	
Plaintiff,	:	CIVIL ACTION
Vs.	:	NO. 4:22-CV-00965
ENSIGN US SOUTHERN DRILLING LLC,	:	
Defendant.	:	

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ORAL and REALTIMED DEPOSITION OF
GARY R. WOOLEY, Ph.D.
JUNE 13, 2023

****

ORAL and REALTIMED DEPOSITION of GARY R. WOOLEY, Ph.D., produced as a witness at the instance of the Defendant, and duly sworn, was taken in the above-styled and numbered cause on Tuesday, the 13th day of June, 2023, from 9:02 a.m. to 11:49 a.m., before Pat English-Arredondo, CSR (TX), RMR, CRR, CLR, in and for the State of Texas, reported by machine shorthand in realtime translation to iPads, at the law offices of Morgan, Lewis & Brockius, LLP, 1000 Louisiana Street, Suite 4000, Houston, Texas, pursuant to the Federal Rules of Civil Procedure; that the Witness will read the deposition.

APPEARANCES

COUNSEL FOR PLAINTIFF C&M OILFIELD RENTALS, LLC D/B/A C-MORE ENERGY SERVICES:

Ms. Karon Fowler
MORGAN, LEWIS & BROCKIUS, LLP
110 North Wacker Drive
Chicago, Illinois 60606-1511
Phone: 312.324.1142
Karon.fowler@morganlewis.com

COUNSEL FOR DEFENDANT ENSIGN US SOUTHERN DRILLING LLC:

Mr. Greg L. Porter
HUNTON ANDREWS KURTH, LLP
600 Travis Street, Suite 4200
Houston, Texas 77002
Phone: 713.220.4200
GregPorter@HuntonAK.com

COURT REPORTER:

Ms. Pat English-Arredondo
CSR (TX), RMR, CRR, CLR

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WITNESS: GARY R. WOOLEY, Ph.D.

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(REPORTER'S NOTE: All quotations from exhibits are reflected in the manner in which they were read into the record and do not necessarily denote an exact quote from the document.)

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(Proceedings commence at 9:03 a.m.)
THE REPORTER: We are on the record at 9:03 a.m., taking this pursuant to Federal Rules.
Sir, will you raise your right hand to be administered the oath?
GARY R. WOOLEY, Ph.D.
being called as a witness, and having been duly sworn, testified as follows:
THE WITNESS: I do.
EXAMINATION
BY MR. PORTER:
Q. Good morning, Mr. Wooley.
A. Good morning.
Q. You've been deposed before. Correct?
A. I have.
Q. So you understand the procedures?
A. Yes.
Q. Will you ask me for clarification if you don't understand any of my questions?
A. I will.
Q. What did you do, if anything, to prepare for today's deposition?
A. I had a meeting yesterday for a few hours.
Q. And who was that meeting with?
A. Karon Fowler and Melissa Story.

Q. Did anybody else attend?
A. No.
Q. And how long was that meeting?
A. A few hours. Maybe two or three.
Q. Was it in the morning?
A. Yes.
Q. Did you look at any documents?
A. Yes.
Q. What documents did you review?
A. I'm not sure I can tell you all of them, but the obvious ones. I looked at my declaration, I looked at the patent-in-suit, and I maybe looked at one or two others. I don't recall.
Q. One or two other documents or one or two other patents?
A. One or two other documents.
Q. Do you recall what those other one or two documents were?
A. No. As I said, I don't recall what those were.
Q. And which patent did you review?
A. The '016.
Q. Did you review the '626 patent?
A. I don't remember.
Q. And you've written one report in this case.

Is that correct?
A. I wrote a declaration, is my understanding of the language.
Q. And is that the only thing you've done as far as this case goes?
A. In terms of writings, I believe that's correct.
Q. What else have you done in terms of this case besides that declaration?
A. Do you mean besides writing the declaration, what else have I done?
Q. Yes.
A. Well, I've read a few documents and talked on the phone and had some emails.
Q. And what documents did you review as part of this case?
A. Just -- I don't recall. I didn't prepare a list for you. The ones I mentioned I've certainly looked at.
Q. The ones mentioned in your declaration?
A. Yes.
Q. How much time did you spend in preparing the declaration?
A. I don't know. I didn't keep track of that for you for today.

Q. Are there billing records that would reflect that?
A. Oh, sure.
Q. Do you recall how much you've billed on this case, approximately?
A. Sorry. I don't.
Q. Would it be more than $20,000?
A. I just don't know the number. I could perhaps look it up for you if the client wanted to do that.
Q. Have you testified before about claim construction?
A. Yes.
Q. About how many times?
A. I don't keep track of how many times.
Q. Have you ever been excluded from testifying in any case?
A. Not that I'm aware of, no.
Q. Has a court ever declined to rely on your proposed claim constructions?
A. I'm not sure I know what that means, and I'm not sure I would be aware of whether or not the court relies on it.
Q. Are you aware of any court disagreeing with your proposed claim constructions?
A. Oh, I'm pretty sure that's occurred.

Q. About how many times has that occurred?
A. No idea.
Q. When did you first become involved in this case?
A. I don't have a date. I would have to look that up for you; and I can do that, too, if you would like.
Q. On your computer?
A. Karon's firm probably has documents; but I could look some up, too.
Q. Have you spoken with anybody from C&M about this case?
A. I don't think so, no.
Q. You haven't spoken with any of the inventors of the patents?
A. No.
Q. Are you involved in any other cases for C&M?
A. Yes.
Q. What other cases are you involved in for C&M?
A. It's my understanding there is another case referred to as C&M Nabors related to Nabors Drilling.
Q. What have you done in connection with the Nabors Drilling case?
A. With my shallow understanding they seem to be very similar, so I've done similar things. Just read a

patent and spent some time discussing constructions and -- I'm trying to recall. I think I wrote a separate declaration for that one.
Q. Is that -- is the patent in the Nabors case the same as the patents involved in the C&M case here?
A. Some, yes. There may be some differences I'm not aware of.
Q. Have you heard of Ensign before this lawsuit?
A. I don't think so. It's possible. I hear a lot of names, but I don't think so.
Q. You haven't consulted or worked for Ensign, to your recollection?
A. No.
(Marked was Wooley Exhibit 1.)
Q. (By Mr. Porter) Does that appear to be the declaration that you prepared in this case?
A. (Reviewing.) Yes, that appears to be the case.
Q. And in preparing the declaration, did you review the file history of either patent?
A. Yes, I think I saw parts of it.
Q. Do you recall which parts of the file history you saw?
A. No. I would have to look up what I've seen.
Q. Did you rely on any part of the file history

for the opinions in your report?
A. Only to the extent I referenced it in the declaration.
Q. So if there is not a reference to the file history in the declaration, then you didn't rely upon it. Is that correct?
A. I would expect that's the case, yes.
Q. What's your understanding of how courts should go about construing claims of the patent?
A. You're probably asking the wrong person. I'm an engineer. I'm not a lawyer. I have a limited understanding of what courts do.
Q. What did you do as far as construing the claim terms that you did in your declaration?
A. Well, it's my understanding that I am to interpret the claim language as a person of ordinary skill at the appropriate time.
Q. And Do you consider yourself a person of ordinary skill?
A. Yes.
Q. You construed in your report the term "mounting pole." Is that correct?
A. Yes.
Q. And what's your understanding of the dispute that surrounds that term in this case?

A. Two different interpretations of the words.
Q. What's your understanding of what impact that would have on the case as to whether one construction is adopted or the other?
MS. FOWLER: Objection, vague.
A. I don't think I can answer that question.
Q. (By Mr. Porter) So you don't know what impact it would have on the case if your construction is rejected?
A. I think that's a legal question. I don't know the answer.
Q. Now, you construed the term "mounting pole" as an "elongated structure fixed at one end and for mounting where the length far exceeds the width."
Is that right?
A. Where are you reading from?
Q. I'm reading from your report at...
MS. FOWLER: I believe it's Page 10, if that's helpful, Counsel.
PORTER: Thanks.
Q. (By Mr. Porter) It's Section 7 of your report, right below Paragraph 33.
A. Yes. And what was your question?
Q. Is your construction of "mounting pole" an "elongated structure fixed at one end and for mounting

where the length of the structure far exceeds the width"?
A. What I would suggest is that it be interpreted as the plain and ordinary meaning for a person of ordinary skill. Now, in my view, those words fit that plain and ordinary meaning.
Q. And when you say "plain and ordinary meaning," what do you mean by that?
A. I think that's pretty obvious. It's simple language. That's the common understanding of a person of ordinary skill.
Q. And when you say "fixed on one end," what do you mean by that?
A. Again, I don't think those words need interpreting. "Fixed" means not moving at one end.
Q. Could it -- under your construction, could it be fixed at both ends?
A. That's not what this says. This says fixed at one end.
Q. So fixed at only one end?
A. That's what it says.
Q. So under your interpretation, if something was fixed at both ends, then it wouldn't be covered by the claims.
A. It depends on the circumstances. If you'll

give me an example, I will be glad to discuss it with you.
Q. I guess, just so we're clear, when you say "fixed at one end," you mean only at one end.
A. Yes, that's the common understanding. Now, if there's a special case that's fixed at two ends, I would be happy to look at it; but I would not expect that to be a mounting pole.
Q. What can the mounting pole be fixed to under your construction?
A. The construction refers to this patent, and it's fixed to some portion or component of a drilling derrick.
Q. And when you say "portion or component of a drilling derrick," is there a particular portion or part that you're referring to?
A. Generally, the patent refers to the area of the crown deck; but I don't recall that it's actually limited to that. We would have to look at the patent to answer that.
Q. And which part of the patent would you look at to answer that?
A. I would have to look at the claims and the spec.
Q. Why don't we do that. I think you have the

patents in front of you as Exhibits 1 and 2.
(Reporter clarification.)
A. Yes.
Q. (By Mr. Porter) The question was: What part or portion of the derrick are you referring to that the mounting pole is affixed to?
MS. FOWLER: Objection, vague.
A. You're asking where in the spec does it refer to that? I'm not sure what your question is.
Q. (By Mr. Porter) Yes, where in the spec does it refer to the mounting pole being fixed to a part or portion of the derrick?
A. Is there a preference which patent I start with?
Q. No. You can start with either one.
A. (Reviewing.) Okay, I've briefly scanned the '016 patent, if you would like to talk about it separately; or do you want me to go ahead and continue with the next patent?
Q. No, let's go ahead and talk about the '016.
A. First, to make it clear, I have briefly scanned at your request the '016 patent. I had not studied in detail or tried to compile the list that you asked for.
But in my brief scanning I've identified

those places where it refers to mounting of the pole on the -- either the crown deck or other places.
And you asked for locations where it would be mounted, so I can give you those.
Q. Okay.
A. In the abstract -- and I should add that clearly there are -- it is likely there are other places besides the ones I've quickly scanned and identified.
In the abstract it refers to the lighting system may be used on drilling rigs, so we're talking with drilling rigs.
And other applications, including drilling production, refining, frac sites, construction and other industrial applications; so it's talking about other possibilities in addition, so you can mount the poles at other sites.
And it may be used for tower mast-type equipment. That's all in the abstract.
And then it talks to the style or design of crown section or the derrick, referring to the crown deck on a drilling derrick. Okay, that's in the abstract.
Figure 1 is an illustration that clearly shows what appears to be a crown deck. I would have to look in more detail at the labels and do that. If you

would like, I can do that.
Q. No, that's okay.
A. Figure 2 is labeled existing crown deck, so they got a mounting on a crown deck.
Figure 3 does not have that kind of label, so I would have to go read through the spec and get the label numbers identified; but I suspect that's depicting a crown deck also.
Same thing with Figures 4A and B and Figure 5. And if you would like, I can go through and get those labels, if you want, and identify them.
Q. Maybe we can do that later.
A. Okay. Figure 6 is the same.
Figure 7A is the same.
Figure 7B is the same.
Figure 8 is the same.
Figure 9 is the same.
Figure 9B is the same.
Figure 9C is the same.
Figure 9D is the same.
Figure 9E is the same.
Figure 9F appears to be a crown deck because you can see the pulleys; but again, I would have to read through the spec to see what it says about that figure.

Figure 10A, I can't tell; but as I recall there is a description that may describe that as being on a crown deck.
Figure 10B is not labeled.
Figure 10C is not labeled.
Figure 10D is not labeled.
In the background there is a reference to drilling rigs. If you like, I can give you the column and number.
Q. Okay.
A. Column 1, Line -- it looks like 12 -- a reference to drilling rigs.
Column 1, Line 17, refers to the crown of the rig.
Column 1, Line 30, refers to a derrick; so those are specific locations.
Column 1, Line 43, refers to an elevated structure mounted. It's not specific, but it's talking about an elevated structure.
Line 44 refers to -- in addition to being used on rigs, that's referring to drilling rigs in the context of this patent.
And then it goes on to talk about the different applications that are mentioned in the abstract: drilling production, refining -- refineries,

frac sites, construction and other industrial applications that may use tower mast-type equipment. So all the other types of locations that it could be mounted.
Column 1, Line 50, talks about design of crown section of a drilling rig; so that's specific about where it's located.
Column 1, Line 63, refers to a crown-mounted frame, talking about Figure 1.
Column 1, Line 67, refers to depicted relative to a crown block, talking about Figure 2.
Column 2, Line 3, it looks like, talks about depicted relative to a crown deck, referring to Figure 3.
Column 2, Line 21, refers to the crown deck of a rig, referring to Figures 10A through 10D.
Column 1, Line 31, refers to a crown or top of a drilling rig, referring again to Figure 1.
Column 2, Line 36, refers to a crown deck, referring to Figure 3.
Column 2, Line 37, refers to a lighting system that may be mounted on the crown deck of a drilling rig or other elements of a frame structure. So it's specific about the crown deck but gives other places it can be mounted.

Column 2, Line 67, refers to a crown deck of a drilling rig, talking about Figure 3 again.
Column 4, Line 4, talks about the crown decks or other structures with a wide range of different dimensions and configurations. So there it's talking about a specific crown deck and others.
Column 4, Line 60, talks about at the top of a structure such as a rig, referring to a drilling rig.
Column 4, Line 63, refers to Figures 2 through 8 and says light units will extend above the crown deck and handrails, referring to the crown deck on the drilling rig.
Column 5, Line 46, refers to the fixtures being attached to the rig or other structure using mounting poles.
Column 5, Line 54, refers to a derrick or a mast structure of a rig, referring to a drilling rig, and says it may be installed on the top, side, or bottom of the crown deck.
Column 5, Line 59, refers to the crown deck.
Column 6, Line 3, refers to the handrail of the crown deck.
Column 6, Line 4, refers to the top of a

crown deck.
Column 6, Line 5, refers to handrails on the crown deck.
Column 6, Line 18, refers to accommodate various configurations of rigs, referring to drilling rigs.
Column 6, Line 22, refers to the crown, which is reference to the crown deck on a drilling rig.
Column 6, Line 30, refers to running the power from the crown to the ground; so it's obviously intending to mount it on the crown.
Column 7, Line 2, refers to the crown deck of a drilling rig.
Column 7, Line 23, refers to the fact that it is -- the systems described here are not to be limited to the specific implementation.
So in addition to the crown deck and all the other structures, the refineries, the stimulation, it's not limited to the specific implementations disclosed; so it opens the doors to a lot of other possibilities.
Okay, Column 7, Line -- I think that's 34 -- Claim 1 refers to the crown deck of the rig.
Column 8, Line 8, refers to the rig as a drilling rig; and that's in Claim 14.

Claim 15 is Column 8, Line 9, refers to the crown deck of the rig.
Claim 16, Column 8, Line -- I think it's 12 -- refers to the crown deck of the rig.
Claim 17, Column 8, Line 14, refers to the crown deck of the rig.
Claim 19, Column 8, Line 26, refers to a crown deck of a rig.
Claim 22, Column 8, refers to the crown deck.
Claim 23, Column 8, Line 43, refers to the crown deck. Each time it refers to the crown deck it's talking about the crown deck of a drilling rig.
Claim 26, Column 8, Line 56, talks about the orientation away from the rig, talking about a drilling rig.
Claim 27, Column 8, Line 50 -- Line 60, I guess it is, talks about oriented towards the rig. So it's about orientation, but it's referring to a drilling rig.
Claim 29, Column 8, Line 64, refers to the crown deck of the rig.
And that's all I was able to catch in that very brief skimming. I am sure there are other references that I missed, and there are also all of

those labels on the drawing that we did not go through the trouble to identify.
Q. Thank you.
A. Do you want me to go on to the next patent?
Q. It shares the same specifications, so I think we can skip that one.
A. Your call.
Q. You mentioned the word "derrick" in some of your answers and the word "drilling rig" in some of your answers.
What's the difference between those two words, if there is one?
A. A derrick is usually the specific structure that holds the heavy equipment, the rotating equipment, and the crown block.
The drilling rig is the entire operation, which would include the derrick.
Q. You mentioned that the patent left room for lots of other possibilities. What did you mean when you said that?
A. Just the language of the patent.
Q. That it could go beyond drilling rigs and derricks?
A. Yes. Would you like me to read those again?
Q. I saw one in the abstract that I wanted to ask

you about. It refers, in the abstract, that the lighting system may be used on drilling rigs or with other applications, including for drilling, production, refineries, frac sites, construction and other industrial applications that may use tower mast-type equipment.
What is meant there by "tower mast-type equipment"?
MS. FOWLER: I'm going to object. We're going a little bit beyond the scope of what we're here to testify about, which is the construction and Mr. Wooley's opinion on the construction of a mounting pole.
A. Would you repeat your question?
Q. (By Mr. Porter) Yes. In the abstract it uses the term "tower mast-type equipment." What is your understanding of what is being referred to there?
MS. FOWLER: Same objection.
A. What it's suggesting in the abstract is a derrick is a tower mast-type equipment and there are other applications that use that same type of setup.
Q. (By Mr. Porter) Do you know what other applications those might be?
A. I don't know what the inventor is referring to.

Q. Coming back to your report and specifically your construction that was on Page 10, you used the word "elongated structure" and then you go on and you say that the structure far exceeds -- "the length of the structure far exceeds the width."

Why do you think the plain and ordinary meaning has to have both "elongated" and that "the length of the structure far exceeds the width"?

A. That is what my understanding that a person of ordinary skill would have for a pole, a mounting pole. It would be elongated in a sense also means that its length would be much greater than its width.

Q. But aren't they kind of the same thing, "elongated" and "the length far exceeding the width"?

A. They are similar.

Q. When you say "the length of the structure far exceeds the width," what do you mean by "far exceeds"?

A. It's what a person of ordinary skill would understand a mounting pole to mean. It would not mean something that is nearly the same length and width.

Q. Would a 5 percent difference be -- of the length being greater than the width, would that far exceed under your proposal?

A. No, I don't think that would be anywhere close. Again, show me a specific application and I will

look at it. I don't think you can narrow it down to a specific number, which is what you're attempting to do.

Q. Would a 20 percent length greater than the width meet your definition or not meet your definition?

A. That's what I was just talking about. I do not think you can pin it down to a specific number. You show me an application, and I will let you know whether it appears to be a mounting pole to a person of ordinary skill.

Q. What would you have to look at in the specific application to determine whether the length is far exceeding the width, as you propose?

A. I'd probably look at a drawing that depicts how it's used and where it's placed.

Q. And what about how it's used would you use to determine whether the length far exceeds the width?

A. I was talking about whether it would be a mounting pole or not. The length and width are just geometric dimensions.

Q. And what about where it's placed would you have to look at to determine whether the length far exceeds the width under your proposal?

A. Well, I just answered that, that that was a reference to how it would -- how it would be used and whether or not it would be a mounting pole; but the

length and width are simply geometric dimensions.

Q. So you would have to look at whether something was mounted to it to determine whether its a mounting pole?

A. No, you're not understanding what I'm saying.

The length and the width are geometric dimensions, separate from how it's used. How it's used is important in determining whether it's a mounting pole but not important in terms of determining the geometry, the dimensions.

Q. How would one determine if the length is far exceeding the width by looking at a particular application?

A. I'm pretty sure you've asked that already, and I've answered it. I don't think I've got anymore to add.

Q. Does the cross-section of the mounting pole have to be any particular shape?

A. I don't think there's a reference to that requirement; but again, I would have to go back through the patent to see if it's in there.

Typically a person of ordinary skill would expect a pole to be a circular cross-section, but it's -- in a generic sense that's certainly not a requirement.

Q. So if you're talking about a pole with a circular cross-section, then its width would be the same as its diameter?

A. Yes.

Q. What about a rectangular cross-section of a pole? Would you look at the length of the rectangle or the width of the rectangle under your proposed construction?

A. It would be fairly unusual to have either a square or a rectangular cross-section; but if you had a square cross-section, of course your question is moot because the length and the width would be the same.

Their use of length has two different meanings, so we have got to be a little careful there.

But if it's a rectangle, then I would probably be inclined to look at the larger of the two, of the width and length, of the cross-section. Not the other length we referred to.

Q. And so in that case your construction would be where the length of the structure far exceeds the longest width of the cross-section.

MS. FOWLER: Objection, vague.

A. That would -- I would have to give that some thought and maybe get a specific example from you. But I think that would be a reasonable detail to add for a

rectangular cross-section, which I've already suggested would be rather unusual.
Q. Do you think a rectangular cross-section would be covered under your definition of mounting pole?
A. Yes.
Q. So your particular definition of mounting pole is not limited by what cross-section the pole is or what type of cross-section?
A. It's not intended to limit that. That's correct.
Q. In coming to your report, the table of exhibits on II, Page II, second or third page of the report, you list there some dictionary definitions under Exhibit Nos. 5, 6 and 7.
Do you see that?
A. I do, yes.
Q. Are you referring to the most recent editions of those dictionaries?
A. I have no idea if there are more recent editions. That's your question, I'm assuming. I cited the ones that I used.
Q. And why did you select those particular dictionaries to use?
A. Just that's the ones that I looked at.
Q. And those particular dictionaries, No. 5 is

December 2021; as is No. 6. And then No. 7 is 2020.
Do you see that?
A. (Reviewing.) Yeah, I think you're mixing dates a bit. The editions for 5 and 6 are 2006 and 2003. And the edition for 7 is 2020. The most recently updated for No. 5 is December 2021. And the most recently updated for No. 6 is December 2021. There is no such date for No. 7.
Q. What's your understanding about what time frame should be looked at when trying to construe a patent claim term?
A. It's generally the time frame of the patent when it was originally filed or prior to that, if there is some history.
Q. And do you know whether these dictionary definitions that you used were the definitions at the time the patent was filed?
A. Well, there are two answers. Yes, those are the definitions at the time the patent was filed. Whether that's the exact language that was in those dictionaries, I don't know. I would have to go check.
Q. So the dictionaries at the time of filing may be different -- have different definitions than the ones that you used?
A. It's possible, but I doubt it. And certainly

the understanding of a person of ordinary skill would not have changed.
Q. Now, do those dictionaries, do they talk anywhere about fixed -- being fixed at one end for a mounting pole?
A. We would have to look at them. Do you have them?
Q. You attached them to your report, sir.
A. Oh, the actual cite? Yes.
Q. They are at Exhibits 5, 6 and 7.
A. (Reviewing.) What is your question?
Q. Whether the dictionaries you used talk about a mounting pole being fixed at one end.
A. (Reviewing.) Well, it certainly could. It doesn't specifically describe that in Definition A for Exhibit 5.
Give me a moment and I will look at B. (Reviewing) Same thing with B. It certainly could be fixed. It doesn't specifically state that it's fixed, other than the implications of how it's used. That's for B.
Give me a moment (Reviewing)
See, again, the definition doesn't cite fixed ends, but the application it describes certainly has a fixed end.

And D, I think, is a different interpretation of the word that's not related to the use in the patent.
Again, E, I think is a different use of the word, not related to the patent.
F is a different use of the word, not related to the patent.
G is related; but as it states, it's now a rare use of the word.
H does not refer to a fixed end, but in that application one end does become fixed in use.
Same thing with I. All of those letters I just recited to you were under No. 1.
Q. Exhibit 5 of your report, correct?
A. Yes, Exhibit 5. It starts with a No. 1 and then goes through the letters. Then it skips to a No. 2 and starts over with letters A. That's a different type of use. It's used as a measuring stick, if you will. That's unrelated to the application that's described in the patent. Same thing with B, 2B.
MS. FOWLER: For clarification, he's discussing the page and then Bates No. 1359.
THE WITNESS: Correct. Thank you.
A. Now on Bates 1360, there is No. 3A. It's a different use of the word, but I think it's because of

the physical pole that was used in the early days for horse racing. So I think it would -- it would be a similar structure. Same thing with B. It's used in the sense that it's used in horse racing.

Also on Bates 1360, No. 4, for hunting, is a different application. No. 5A, again, does not refer to a fixed end, specifically; but in its description that would be a fixed end.

Flipping to Bates 1361, No. 5B, Botany, I think that's a different application than what's used in the patent.

There are some colloquial interpretations on Bates 1361 that I don't think are related to the use on the patent.

On Bates 1362, the same conclusion. At the top of the page there is a P2 that refers to a pole that would be similar, but its application would probably not be fixed except with respect to the fact that it's being held by a person which could fix one end in a sense.

On Bates 1363, it's referring to a pole barn. There it's used as a -- the pole is used as a structural member. Certainly a different application than a mounting pole.

A pole bridge, similar to pole corral, a

pole end and a pole fence. I think they're all different applications than mounting poles.

On Bates 1364, a pole-top mast is again a different application, although it would probably involve a fixed end.

Pole plantation is referring to trees, which certainly would have a fixed end but a different application than a mounting pole.

Then, also on Bates 1364 is pole-balancing. That's a skill or entertainment that is unrelated to the mounting pole.

And being a pole-bearer is defined there. Again, that's not a mounting pole. Same thing with the pole-setter.

Pole-armed is an adjective. That is unrelated to a mounting pole. Pole shaped refers to something that may be used in these examples, such as a pole-shaped stick, unrelated to a mounting pole, but probably a similar shape.

A pole beam, that's really referring to beams on a pole; so I think that's completely different.

A pole board is on Bates 1365. It's a completely different interpretation of the word.

And a pole boat, on Bates 1365, refers to a means of propelling a boat; and it's certainly not a

mounting pole.

Pole-boating refers to using a boat with a pole, again, not a mounting pole. A pole bracket is used on Bates 1366 with reference to a telephone pole and a bracket for supporting, which is completely different.

A pole bullock is something completely different.

THE REPORTER: A pole what?

THE WITNESS: Bullock, B-U-L-L-O-C-K.

A. On Bates 1366 is a pole burn, referring to burning, something which is different. And there are two interpretations of that.

There is a pole cap, again referring to a telephone pole and a cap. Obviously, not a mounting pole.

Flipping to Bates 1367, there is a definition of a pole carriage, which is a certain type of carriage unrelated to a mounting pole.

There is a pole cart. It's a vehicle that's drawn by animals using a central pole, not a mounting pole.

There is a pole chain on Bates 1367, which is unrelated to a mounting pole. A pole-crab on Bates 1367, and a pole-cure, both unrelated to a

mounting pole.

Three versions of pole dance on Bates 1368. Obviously, unrelated to a mounting pole.

On Bates 1369 there is a pole dray, D-R-A-Y. Pole fishing, pole ground, a pole hedge, and a pole hook and a pole horse, none of which are related to mounting poles.

On Bates 1370 there is a pole house, analogous to a pole barn. I assume that's built with upright poles, which is obviously not a mounting pole.

There is a pole jump much like pole vault, which we've dealt with. A pole jumper is a pole vaulter. Pole jumping is related to pole vaulting. And a pole lamp, which is a lamp at the top of a pole, which is not a mounting pole.

A pole lathe on Bates 1371. Obviously, a pole lathe is a device for woodworking. That's not a mounting pole.

And then there's three versions of pole leap related to pole vault. A pole mast, again, related to the mast of a ship.

On Page 1372, pole-masted is an adjective form of pole mast. Pole mule is much like the pole for horses or wagons that we referred to earlier.

A pole net is a fishing device unrelated

to a mounting pole. A pole pad is something used for gun carriage to prevent injury to horses. Obviously not a mounting pole. A pole piece, again referred to carriages and animals.

A pole pike is a spike at the end of a pole, which is unrelated to a mounting pole.

On Bates 1373 there is a pole plate, which is an architecture term. That means a beam supported by joists, more of a structural item, not a mounting pole.

Pole position, again referring to horse racing or automobile racing.

Pole prop, again referring to carriage and horses. Pole-puller is an agriculture term, and that's the person that draws the poles in a hot field. And pole pulling, the same agricultural term; and those are unrelated to a mounting pole.

On Bates 1374 there is a pole wreck, which is a frame for holding poles. A pole railroad is for railroads or trucks with iron wheels. A pole railway is a temporary track using BART poles.

Ex 5 of Exhibit 1A, pole reed is a giant reed. Those are all unrelated to mounting pole.

On Bates 1375 there is a pole road, pole rows, pole rush, pole screen, pole shank and pole

sitter, none of which are related to mounting poles.

On Bates 1376 there is a pole sling, a pole square, a pole screamer, a pole staff, a pole strap, a pole tip, and a pole tool, in my opinion none of which is related to a mounting pole.

Bates 1377, there is a pole torpedo, a pole trailer, a pole trap, a pole trawl, T-R-A-W-L, none of which are related to mounting poles.

On Bates 1378 there is pole trawling, T-R-A-W-L-I-N-G, a pole wagon, a pole wedge, pole wood, none of which are related to mounting poles.

Bates 1379 there is pole-wound, W-O-U-N-D, with a dash. And I think it's pronounced "wound," because it's referring to a wound that would have been inflicted with a pole, unrelated to a mounting pole. That's Exhibit 5.

Q. So in Exhibit 5, most of the definitions were unrelated to a mounting pole. Is that fair to say?

A. That's correct, yes.

Q. Why did you attach those pages to your report?

A. Because that's what was cited.

Q. That's what was cited for what purpose?

A. As a dictionary definition.

Q. And in your review of the dictionary definition at Exhibit 5 you didn't find any express

support for fixed at one end, did you?

A. There wasn't any language that said that. There were applications that required that.

Q. That's your interpretation of the definitions in Exhibit 5.

A. I think that's what's at issue here, is a person of ordinary skill's understanding.

Q. Of that particular dictionary definition?

A. Okay.

MS. FOWLER: Objection, vague.

A. Of all of the language in the patents and dictionaries.

PORTER: Why don't we take a short break.

MS. FOWLER: Sure.

THE REPORTER: Off the record at 10:22.

(Recess taken at 10:22 a.m., resuming at 10:30 a.m.).

Q. (By Mr. Porter) Mr. Wooley, did you draft the report at Exhibit 1 yourself?

A. What do you mean by "draft"?

Q. Did you write it?

A. Sure, parts of it; and parts of it the lawyers wrote with respect to the legal principles.

Q. And when you say "legal principles," what are you referring to in your report? The claim construction

principles under Section 4?

A. Generally anything that starts with "I understand." But if you want me to go through, I can give you a list.

Q. No, that's helpful.

Did anybody assist you, besides the lawyers, with the report?

A. No.

Q. And looking at Paragraph 3 of your report, there is a list of agreed constructions there.

Do you see that?

A. Yes.

Q. Do you disagree with any of those constructions that are listed there?

A. I'm not sure that has any meaning. These are constructions that we're going to work with. I'm not sure...

Q. You don't see anything wrong with those, though, from a technical perspective?

A. No.

Q. What would you say that the plain and ordinary meaning of "mounted" is in that table?

MS. FOWLER: Objection, outside the scope of today's deposition.

A. Well, we will have to look at Claim 1 if you

want me to try to interpret that for you.
MS. FOWLER: Counsel, we're not here to have Mr. Wooley render opinions on-the-fly as to terms that are not in dispute and not proper for the claim construction here today.
A. (Reviewing.)
MS. FOWLER: So I will maintain by objection. It's outside the scope of today's deposition.
A. Do you want to ask your question again, please?
Q. (By Mr. Porter) Sure. What's your understanding of what the plain and ordinary meaning of "mounted" is in the context of this patent?
MS. FOWLER: Same objection.
Dr. Wooley, you may answer if you know; but as I've stated on the record, you're not here to testify as to that issue today.
A. I have not prepared an opinion on that. I've not looked into that. As my declaration clearly points out, this is what I understood to be agreed to.
And I could offer guesses as to what a person of ordinary skill might interpret the word to mean, but that's not something I'm prepared to do this morning.

Q. What would you have to do in order to understand what the plain and ordinary meaning of "mounted" was?
A. What would I have to do? I would just spend a little more time looking at the patent, the specs, and how it's used in the patent and try to understand what was intended by the word "in the claim."
Q. And you haven't done that to this point?
A. No, I have not.
Q. And if you could turn the page on Paragraph 5 of your report, you talk about, "if called as a witness to testify at a claim construction hearing."
Do you expect to testify at the claim construction hearing?
A. That's not up to me. I don't know.
Q. Do you have it on your calendar?
A. I don't --
MS. FOWLER: Objection, scope. Sorry.
THE WITNESS: Go ahead. Finish.
MS. FOWLER: Objection, scope. You can answer.
A. I don't think the date is on my calendar, no.
Q. (By Mr. Porter) And then on the compensation and prior testimony on the following page, you say there that you're compensated at your firm's usual and

customary rate of $720 per hour.
Do you see that?
A. No, that's not what that says.
Q. Is $720 your firm's usual and customary rate?
A. Yes.
Q. Is there anybody else in your firm besides yourself?
A. I have a number of associates that are not involved with this.
Q. And when you say "not involved with this," this case?
A. That's correct.
Q. And then in Paragraph 17, the last sentence, it talks about -- it says there, (as read): "It's my understanding that when an applicant's statements are amendable to multiple reasonable interpretations, they cannot be deemed clear and unmistakable."
What did you mean there?
A. Again, that's one of those "it's my understanding" phrases that a lawyer wrote. I can tell you what I think the lawyer meant, but that's a lawyer question.
Q. You didn't write Paragraph 17?
A. The parts that do not say "I understand," I did. The parts that say "I understand" or "it's my

understanding," those are legal points.
Q. So, really, the whole of Section 4, Paragraphs 15 through 18, that's not part of your testimony, then.
A. (Reviewing.) It is to the extent of my understanding. I made it clear earlier the language is something that a lawyer told me, and I have to apply that here and I used my understanding of that legal principle.
Q. And in section -- in Paragraph 20 there you talk about the factors and, again, you used the term "I understand."
Did you consider Factors 1 through 6 of Paragraph 20 in your testimony?
A. Yes.
Q. And what did you consider about the educational level of the inventors that's listed there in Factor 1?
A. I simply referred to whether or not the inventors seem to be qualified; and I don't know a lot of detail about them, but just from their writings they seem to be qualified.
Q. And what writings are you referring to?
A. The inventors wrote the patent.
Q. Did you investigate anything else about the

educational level of the inventors besides that?
A. I didn't have any motivation to try to see if they're disqualified.
Q. And Factor 2 says "the type of problems encountered in the art."
What did you do to investigate the type of problems encountered in the art?
A. Well, I have pretty good experience in the oil field. I have a good understanding of the problems encountered in the art; that is, the needs of the drilling industry.
Q. And what type of problems did you find when you studied that?
A. Well, in particular, the subject matter here is the ability to clearly see in the dark with the need for lighting systems.
Q. Anything else?
A. Well, that's the motivation for needing the lighting systems.
Q. But here you're talking about problems. Any problems with what was encountered with lighting the site?
MS. FOWLER: Counsel, it may help if you point him to the particular paragraph in which he opined on that issue.

Q. (By Mr. Porter) Did you understand my question?
A. Yes. I mean, your question is pretty general. There is a very long answer to all the problems in the drilling industry that are encountered.
Q. I was just talking about the lighting specifically. What problems were encountered in the art with respect to lighting?
A. I write about that in the declaration. If you like, we can go through that. But there are many issues of operations and safety issues related to the need to see clearly in the drilling industry.
We can spend a couple of hours on that, if you would like; but I don't know how much detail you want.
I wrote about it. It's in my declaration.
Q. Okay. So the extent of your opinions are covered in your declaration?
A. Generally, yes.
Q. We will get to that. And No. 3 factor is "prior art solutions to those problems."
Did you investigate any prior art as part of writing the declaration?
A. I didn't do any independent research. I have

a great deal of experience with what those are.
Q. And what are the prior art solutions to the lighting problems?
A. Well, it starts a long way back with flashlights and lights on safety helmets. It just goes through a long sequence of lighting systems that were implemented on drilling rigs and at well sites.
Q. What about as of the time frame of 2018 when the provisional application was filed? What types of solutions were available at that point in time?
A. I would have to go back and look at what was available at that point in time, but I have a fairly good feel that there were some -- a number of lighting systems that were available.
Q. And what types of lighting systems were available?
A. Well, there were mobile lighting systems that were brought -- and those are still used -- brought out to a well site and can be placed anywhere around a well site. And there were various means of attaching lights to a derrick. There are several of those.
Q. And what types of means were there to attach lights to a derrick?
MS. FOWLER: Objection, vague.
Q. (By Mr. Porter) As of 2018.

A. Well, you're implying something that doesn't exist, it's not true; and that is that they are all the same.
Every drilling rig at every site is different, so I can't talk about a state of the art at a point in time as if they are all the same because every drilling rig at every site is different.
Some will have spent very little expense on lighting; and others will spend a great deal on it, depending on the particular circumstances. Some use very simple systems, and others have much more sophisticated systems.
Q. And what would be an example of a sophisticated system as of 2018?
A. Systems similar to the types that are described by the invention, but not with all features that the invention has.
Q. Like what features were lacking?
MS. FOWLER: Objection, vague.
A. I can't answer that. I mean, there were a variety of floodlights and fluorescent lighting and all types of standard lighting systems that were applied to drilling rigs.
Q. Attached to various portions of the derrick?
A. Yes.

Q. With brackets, for example?
A. Yes.
Q. Mounting poles?
A. I don't know. I would have to go back and look.
Q. Factor 5 refers in Paragraph 20 to "sophistication of the technology."
Did you find that the technology described in the patents to be sophisticated technology?
A. As compared to what? These are fairly simple devices. If you compare it to something else, you would consider it not sophisticated. That doesn't say that these are very sophisticated. It simply considers the factor.
Q. And then Factor 6, the "educational level of active workers in the field," did you investigate that?
A. I don't need to investigate. I've been doing this a very long time.
Q. That's part of your background and experience?
A. Correct.
Q. You refer in Paragraph 19 to the "provisional application." Did you review the provisional application?
A. First of all, it's not about the application itself. It's about the timing. And this is something I

was provided of what the timing was, which was the filing date of the provisional application.
That's the only thing that I used here.
Q. Okay. You didn't review the provisional application?
A. I don't recall having seen it. It's possible.
Q. None of your opinions rely on anything in the provisional application?
A. I don't know. I would have to look at it. If you let me see it, I will go through it and see if any of them are based on that.
Q. Well, I will ask you as we go through the report, if that's okay.
A. Any time you would like.
Q. Okay. In Paragraph 21 you say there, in part, (as read): "It's my opinion that a POSITA would have had at least a bachelor's degree in mechanical and/or electrical engineering with at least one year of experience working on rotary drilling rigs, either a drilling rig or a well servicing rig and their associated lighting systems."
Do you see that part?
A. Yes.
Q. Are the patents here limited to rotary drilling rigs?

A. No.
Q. Why did you choose to focus on that part of -- why did you require a POSITA to have at least one year of experience working on rotary drilling rigs?
A. The patent makes it clear that's the primary focus of the invention.
Q. Even though it can also be used for other mast-type structures as we talked about?
A. I think that's the wording it used, yes.
Q. So the primary focus of the patent is "rotary drilling rigs"?
A. Yes. We're still drilling in essentially the same process as we did a hundred years ago.
Q. You mentioned mechanical and/or electrical engineering. Why did you select those particular degrees?
A. There are others that could apply.
Q. What other degrees might apply?
A. Petroleum.
Q. Petroleum engineering?
A. Yes.
Q. What about civil engineering or construction?
A. It's possible, depending on, you know, what they studied, where they studied it, and what the experience level is that goes with it.

Q. What about architecture degree? Potentially applicable?
A. Generally not. There may be exceptions.
Q. What about a person that had experience with stadium lighting, for example? Would they meet your definition of a POSITA, if they had one of those degrees?
A. Not with respect to the primary application that's listed in the patent.
Q. What's different about a rotary drilling rig as opposed to, for example, stadium lighting?
A. The operations are completely different.
Q. Of the lighting?
A. The lighting needs are completely different.
Q. What's different about the lighting needs for rotary drilling versus a stadium?
A. What's being lit up is dramatically different.
Q. In what way?
A. You know the answer to that question. I will be happy to give it to you, if you would like.
In a stadium they are playing a ball game. In the oil field operation they are conducting a -- many difficult tasks.
Q. So would you need more or less lighting on a rotary drilling rig than a stadium?

MS. FOWLER: Objection, outside the scope. Vague.
A. Yeah, I don't know what that means. I mean, you're comparing apples and oranges. People doing important work that can have safety risks versus people enjoying a game.
Now, they clearly need good lighting to catch a football, for example; but I put that in a very different category than somebody doing something safely to avoid injury or death to a person.
Q. (By Mr. Porter) Have you seen any examples of lighting systems that are covered by the patent?
A. I'm not sure what you're asking. Are you talking about physically have I been at a well site when one was installed?
Q. Yes.
A. I don't know. I've better at well sites with lighting systems installed. I don't know if they were these lighting systems.
Q. So you just don't know if you've ever seen a lighting system that's covered by the patent?
A. I can't answer that question. I don't have that information. I was at the well site for a different purpose.
Q. Have you ever seen the C&M lighting system?

A. Installed at a well site? I don't know.
Q. What other alternatives are there besides the C&M lighting system that are available?
A. I can't list those. I haven't done a market search. I'm familiar with the fact that there are a number of other lighting systems, but I can't give you a market list.
Q. Do you know any of the vendors for those other lighting systems?
A. Well, some of the drilling contractors have their own and some of them contract out to other people, third parties. But again, I haven't prepared a list for you.
Q. Can you identify any specific vendor for a lighting system?
A. "Ensign" or Ensign.
Q. Anything else?
A. Well, there's the Nabors matter that you asked about earlier.
Q. Anybody else that you can think of?
A. There are others that I've heard about. Again, I haven't prepared a list for you. So anything we do here would be an incomplete list.
Q. I'm just asking what others come to mind. Are there any others that come to mind?

A. Nothing at this point.
Q. In Paragraph 22 you say, "I've used this level of ordinary skill in the art in forming my opinions as set forth in this declaration."
And you're referring to the level that you've described in Paragraph 21, right?
A. Yes.
Q. Would your opinions change on what a mounting pole means if you change the level of ordinary skill in the art?
A. It depends on what the change is. What is your hypothetical change?
Q. What if the level of ordinary skill in the art was simply a rig hand? Would that change your opinion on what a mounting pole means?
A. Well, I think those people are covered with what's described here. It depends on who it is.
Q. What about a person with a high school degree with a couple of years of experience on a drilling rig? Would that change your opinion as to what a mounting pole means?
A. What I've expressed is an opinion of high school diploma and five years. So I assume your "couple" means two. So that would not qualify under what I have here.

Q. So that hypothetical person would have a different view of what a mounting pole would be in the context of this patent?
A. Perhaps. It depends on the person. There are people with one year of experience five times and there are people with five years of experience. It depends on the person.
Q. Then, in Paragraph 23 you refer to the "types of problems encountered in the art."
Do you see that?
A. Yes.
Q. When you refer to "hazardous substances," what particular hazardous substances are you referring to?
A. The oil field has got quite a few of them.
Q. At the crown deck of a derrick?
A. Potentially. Most of it is not that high.
Q. What potential hazardous substances would be at the crown deck?
A. Blowouts go right through the crown deck.
Q. So does the patent solve that problem of a blowout of a hazardous substance when you have lights at the crown deck?
A. I didn't say anything like that. You just made that up.
Q. That's why I asked you the question.

A. What is your question?
Q. Does the patent solve the problem having to do with hazardous substances from a blowout?
MS. FOWLER: Objection, outside the scope and vague.
A. I have no idea what that means. And it's got nothing to do with the patent, I don't think.
Q. (By Mr. Porter) When you say "the ability to withstand shock and vibrations," what are you referring to there?
A. Shock and vibrations are phenomenon that exist at a drill site.
Q. At the crown deck?
A. Throughout a derrick and at other locations throughout the well site.
Q. You say, "My opinion on the level of skill in the art takes into account the types of problems encountered in the art."
How does your opinion take these problems into account?
A. I think that's really obvious. A person would need some level of education and some experience at a rig site to understand those problems.
Q. On Paragraph 25 you say there, "I understand that at least two of the named inventors had upwards of

ten years of experience working on drilling rigs."
What's the basis for that statement?
A. Just what I've been told.
Q. Do you know which two inventors are being referred to there?
A. Well, it says "at least two," so...
That's just what I was told.
Q. Then you say (as read): "I've had the opportunity to work with persons having a broad range of education and experience in connection with drilling a well -- a well and working on drilling rigs, including persons having the education and/or experience above; and I've acted as a supervisor of or co-worker with these persons and I'm intimately aware of their knowledge and skill in the art."
Did you discuss the term "mounting pole" with any of the particular people you're referring to in that paragraph?
A. No.
Q. When you say you've "acted as a supervisor," is that with respect to your business now; or what are you referring to?
A. Now and over the last 50 years.
Q. And then in Paragraph 28 you've cited Claims 1, 17, 19, 22 and 23 and 26.

Do you see that?
A. Yes.
Q. Why did you select those claims to put in Paragraph 28?
A. Those are the ones I was asked to opine on.
Q. Those are the claims with mounting pole in the text of the claim?
A. Yes, that's what Paragraph 28 says, "The disputed claim term 'mounting pole' on which I've been asked to opine appears in the following claims."
Those are the claims that the term appears in, and I've been asked to opine on those.
Q. So in each of those claims, I guess your view would be the mounting pole must be fixed on one end as we talked about earlier and also have the length that's far longer than its width?
MS. FOWLER: Objection, misstates prior testimony.
A. I would use the exact language that I had in my testimony or in my declaration.
Q. (By Mr. Porter) The term "mounting pole" or "mounting poles" means the same thing throughout those claims that you've cited in Paragraph 28?
A. Yes, it better; otherwise, we will have a problem.

Q. And the same for the '626 patent? It has the same meaning in the '626 patent?
A. I believe that to be correct, yes.
Q. You've cited the '626, Patent Claim 1 in Paragraph 32. Do you see that?
A. What about Paragraph 32?
Q. I was looking at Claim 1 that you've cited there.
A. Yes.
Q. It refers to the "light fixture may be coupled to the mounting pole in a first position or a second position."
What is meant by that?
MS. FOWLER: Objection, vague and outside the scope.
A. What part do you want to talk about? We've talk about mounting pole. Is that your question?
Q. (By Mr. Porter) Yes. Is the light fixture coupled to the mounting pole in only one position, one of the first position or the second position? Or what's your understanding of what's coupled to the mounting pole and where?
MS. FOWLER: Objection, vague, compound and outside the scope.
A. So you're not asking about the words "mounting

pole." You're asking about the other words in that claim?
Q. (By Mr. Porter) I'm asking about what's being coupled to the mounting pole that you've opined on.
MS. FOWLER: Same objections.
A. Well, this describes that the light fixture may be coupled to the mounting pole, so that's what's coupled to it.
Q. (By Mr. Porter) And is that what you mean by "fixed at one end"?
MS. FOWLER: Objection, vague. Outside the scope.
A. I haven't said anything about that right here.
Q. (By Mr. Porter) But you agree with me that your definition of "mounting pole" includes "fixed at one end," right?
A. And other words, yes.
Q. And when you say that the mounting pole is "fixed at one end," is it coupled to the light fixture? Is that part of what it's being fixed to?
MS. FOWLER: Objection, vague. Ambiguous.
A. I guess I don't understand what you're asking. Are you asking if the mounting pole is coupled to the light fixture?

Q. (By Mr. Porter) Right. And by that, that is why you chose the term "fixed at one end" in your mounting pole definition.
MS. FOWLER: Objection, vague and ambiguous, misstates prior testimony.
You may answer if you know, Dr. Wooley.
A. That sounds a lot like the question you asked a moment ago, and I said that indeed the light fixture is coupled to the mounting pole in that claim.
Q. (By Mr. Porter) And in that claim how is the mounting pole fixed at one end?
A. You're asking apples and oranges, but I'm happy to try to figure out what it is you're trying to ask.
But I don't understand exactly what you're asking. You're asking about the proposed interpretation of the plain and ordinary meaning of the word "mounting pole."
And you want to know -- yet, you're asking, is the light fixture coupled to the mounting pole? And this claim says that it may be. And those are like apples and oranges to me. I'm not sure how to answer it.
Q. Well, at least part of your definition of mounting pole is "fixed at one end." Right?

A. At least a part of it, yes.
Q. Okay. At what point is the mounting pole fixed at one end in this particular claim?
MS. FOWLER: Objection, vague. Are you talking about Claim 1 of the '626 patent, Counsel?
PORTER: Yes.
A. What this first claim talks about are one or more lights on a light fixture that is coupled to the mounting pole, and then that light fixture may be coupled to the mounting pole in a first position or a second position; so there is more than one option in the claim language.
And it's talking about the two different positions that it could be in. Again, I'm not sure how that relates to your question.
Q. (By Mr. Porter) Well, what is the mounting pole fixed at one end to under your definition in this claim?
MS. FOWLER: Objection, vague and outside the scope.
A. This is talking about having light fixtures coupled to the mounting pole; and I think your question is asking about the other end of the mounting pole, not anything related to this claim. That's where I'm having trouble. I just don't know what you're asking.

Q. (By Mr. Porter) In the claim, what is the mounting pole fixed to, if anything?
A. There is no reference to that in this portion that you're asking me about. This portion that you're asking me about talks about the light fixture being couple to the mounting pole.
Q. So in this particular claim is the mounting pole not fixed at one end?
MS. FOWLER: Counselor, are you talking about the entirety of the claim? I think that's maybe -- if I may interject -- where there's ships passing in the night here between question and answer, versus just the singular limitation.
Q. (By Mr. Porter) I take it you don't understand my question.
A. That's true.
Q. Okay. Let me --
A. Do you want to try it again?
Q. -- break it down a little bit.
Under your definition of "mounting pole," which we looked at under Section 7, you say it's the plain and ordinary meaning, which is "elongated structure fixed at one end and for mounting where the length of the structure far exceeds the width."
Is that right so far?

A. That's what it says, yes.
Q. So as part of your definition it has to be an elongated structure fixed at one end. Now, what is the mounting pole in Claim 1 of the 626 fixed at one end to?
A. You took me to the fourth item listed underneath "comprising" in Claim 1. That's what you asked me questions about.
Are you now asking questions about the entirety of Claim 1?
Q. Yes.
A. Okay (reviewing). The third item under Claim 1 of the '626 patent describes a bracket configured to connect the mounting pole to a handrail of the rig.
I would describe that as being fixed. The bracket -- the mounting pole is fixed to the handrail with a bracket.
Q. Okay. So the end of the mounting pole is fixed to the bracket in that particular claim?
MS. FOWLER: Objection, vague.
A. By means of the bracket, to the handrail of the rig.
Q. (By Mr. Porter) Looking at Claims 9 -- Claim 9 of that particular patent, to what is the mounting pole -- where is the mounting pole fixed at one

end, or what is the mounting pole attached at one end to under Claim 9?
MS. FOWLER: Objection, vague. Compound and outside the scope.
A. So you're now in Claim 9 of the '626 there in Paragraph 32 of my declaration. You're not asking about the word "mounting pole," which I understand is the subject of this deposition.
You're, instead, asking about the entirety of Claim 9?
Q. I'm asking, as part of your definition for mounting pole, it's fixed at one end; and my question is: In the context of Claim 9, what's fixed at one end to the mounting pole?
MS. FOWLER: Objection, vague and outside the scope.
A. What's fixed at one end to the mounting pole? Would you reask that? I'm not if sure your words are what you meant to say.
Q. Okay.
A. And it could be me, but please reask it.
Q. I will try again.
As part of your definition for mounting pole, you agree it's fixed at one end.
A. Yes.

Q. Correct?
In the context of Claim 9, what is the mounting pole fixed to at the one end?
A. Oh, that's different. Thank you.
MS. FOWLER: Objection, vague and outside the scope.
Answer if you know.
A. Sure. Let me see if I can figure that out.
(Reviewing) Okay, in Claim 9 it describes light units. Light units are comprised of a mounting pole and a light fixture, and it says that a plurality of those light units attach to the handrail.
And that handrail is referring to the sentence above about a crown deck. So the plurality of light units are attached to the handrail of the crown deck in Claim 9.
Q. And what's fixed at one end to the mounting pole?
MS. FOWLER: Same objections.
A. I don't understand that.
Q. (By Mr. Porter) In regard to Claim 9, you agree that a mounting pole has to be fixed at one end as part of your definition. Correct?
A. Yes.
Q. What is it fixed to in Claim 9?

MS. FOWLER: Same objections.
A. I think I just answered that. The claim says that the "light unit comprises a mounting pole in a light fixture and the light units that comprise those two pieces are attached to the handrail of the crown deck."
Q. (By Mr. Porter) So the mounting pole is attached at one end to the handrail?
A. Yes.
Q. And is the same true for Claim 19?
MS. FOWLER: Same objections.
A. (Reviewing.) 19 is similar. It uses different words. It says, "Each of the plurality of mounting poles is attached to a handrail at the crown deck."
Q. (By Mr. Porter) So that's where the mounting pole is fixed at one end to the handrail?
A. Yes.
Q. Coming back -- or going to Paragraph 39 of your declaration, at the very bottom of Paragraph 39, you say, "A mounting pole is able to transfer loads from the lights to the crown deck" -- I'm sorry. I didn't realize you weren't there yet, Doctor.
A. (Reviewing.)
Q. At the bottom of Paragraph 39 it says, "A

mounting pole is able to transfer loads from the lights to the crown deck to which it is attached."

What do you mean by that?

A. I think the language is fairly plain.

Q. Why is the ability to transfer loads from the light to the crown deck important, if it is?

A. That's what happens when you attach something, when you fix it at one end.

Q. And would that only be in the upward direction, or would that -- could that also be in, you know, a mounting pole extending downward from the crown deck?

MS. FOWLER: Objection -- sorry. I didn't mean to interrupt. Please go ahead.

Q. (By Mr. Porter) Would the be -- would the mounting pole in that instance be transferring a load?

MS. FOWLER: Objection, vague, compound, outside the scope.

A. Are you asking if a pole is mounted vertically, would it transfer load? If it's fixed and attached, it will transfer load.

Q. Would a post do the same thing?

MS. FOWLER: Objection, vague. Outside the scope.

A. What post are you referring to? There is no

post in the patent.

Is there a place in the patent you're referring to?

Q. (By Mr. Porter) I was actually looking at your declaration, Paragraph 41. You say there, "A POSITA would understand that a post does not have a length that far exceeds its width."

What's your basis for saying that?

A. Just what it says there. Generally a person of ordinary skill would understand that.

Q. But a post would also transfer a load the same as a mounting pole. Correct?

A. Not the same as, but it will transfer a load.

Q. Would it be able to transfer more of a load or less than a load -- less load than a mounting pole would?

A. Yeah, it depends entirely on the application.

Q. On the size of the pole and the size of the post?

MS. FOWLER: Objection, vague, compound.

A. And other things.

Q. (By Mr. Porter) How do you distinguish between a mounting pole and a post?

A. That's what my declaration describes.

Q. Can you put any kind of quantitative analysis

on that as far as the size or load capability of a post versus a pole?

A. Not unless you give me the circumstances. If you create a hypothetical, I will give you some numbers.

(Marked was Wooley Exhibit 2.)

Q. You have what's -- a photo that's been marked as Exhibit 2, Dr. Wooley.

Is there a mounting pole according to your proposed construction in this photo?

MS. FOWLER: Objection, this is outside the scope. We're not having Dr. Wooley provide any sort of infringement or invalidity analysis on-the-fly here today.

You're welcome to ask him about his opinions within the scope of his declaration as to the meaning of the term "mounting pole." But we are not here to answer questions about any images of any system you're putting in front of him.

Q. (By Mr. Porter) Should I repeat my question?

A. I haven't prepared any opinions about this photograph. I've never seen it. I don't know what it is. And I don't think it's addressed in my declaration at all.

Q. So you are not able to tell us whether there is a mounting pole according to your proposed

construction here?

MS. FOWLER: Same objection, outside the scope. He's not here to render an opinion on any photos of any system that you put in front of him.

PORTER: I am just trying to understand his definition of mounting pole and what's covered.

MS. FOWLER: Same objection.

A. I think my definition of mounting pole is pretty clearly covered in the declaration, and I'm not prepared to provide opinions on Exhibit 2 or other photographs like it.

Q. (By Mr. Porter) So you can't tell us whether there's a mounting pole according to your definition.

MS. FOWLER: Same objection. Outside the scope. We're not here to answer questions about infringement, invalidity or the like, applying Dr. Wooley's construction of "mounting pole." It's outside the scope.

Q. (By Mr. Porter) Are you going to refuse to answer my question?

A. Well, I agree with her objection. That's not something I'm prepared to do; and I've never seen this photo before, so the answer is no.

Q. What would you need to do to determine whether there was a mounting pole in this photograph?

MS. FOWLER: Same objection, outside the scope.
A. Well, that's apparently a question about either infringement or invalidity, whether or not this is infringing an accused product or if it's a prior art product.
And I just haven't looked at either of those issues. This is about claim construction, as I understand it, regarding just that one phrase, "mounting pole."
Q. (By Mr. Porter) Do you see any particular pole that's fixed at one end and far longer than it is wide in that -- in Exhibit 2?
MS. FOWLER: Mr. Porter, I will object again as outside the scope. Dr. Wooley will not be offering his opinions on the application of his proposed construction of the term "mounting pole."
Q. (By Mr. Porter) Do you see any particular pole there that's fixed at one end?
MS. FOWLER: Same objection.
A. I'm not going to offer any opinions on that. It involves things other than just the claim construction that's in my declaration.
Q. (By Mr. Porter) I'm getting exactly what's in your declaration. I'm trying to understand what's fixed

at one end.
Is this particular pole that's on the light in Exhibit 2 fixed at one end?
MS. FOWLER: Objection, outside the scope. We will not be offering opinions today on whether or how Dr. Wooley's proposed construction of the term "mounting pole" applies to any particular system in the context of infringement, invalidity, or the like.
We're here only to testify with respect to Dr. Wooley's proposed construction of "mounting pole" as offered in his declaration.
A. I think we've discussed being fixed at one end at length already, and I'm not prepared to give any opinions on the photograph in Exhibit 2.
(Marked was Wooley Exhibit 3.)
Q. (By Mr. Porter) You've been handed what has been marked as Exhibit 3, which is a photo of a light.
Is there a mounting pole, according to your proposed construction, in this photo?
MS. FOWLER: Objection, outside the scope. Dr. Wooley is not here to testify as to the application of any proposed construction of the term "mounting pole."
This deposition today is limited to the opinions that he's offered in his declaration with

respect to a proposed construction of the term "mounting pole." He will not apply it to any system of any picture you put in front of him with respect to invalidity or infringement here today.
PORTER: I'm not asking about infringement or invalidity. I'm asking about whether this photo -- he asked for hypotheticals earlier; I'm giving him one.
MS. FOWLER: Same objection.
Q. (By Mr. Porter) Does this particular photo have any mounting pole according to your proposed construction?
MS. FOWLER: Same objection. Outside the scope. He will not be applying any proposed construction to any picture you put in front of him that he has not seen before today.
A. I will follow the advice of the lawyer.
Q. (By Mr. Porter) And refuse to answer?
A. Yes. I think I've fairly described a mounting pole a number of times today, and the declaration is pretty clear. I will be happy to answer any questions about the declaration, if you want to ask those.
Q. But not any about any particular photos?
A. Correct.
(Marked was Wooley Exhibit 4.)

Q. (By Mr. Porter) Do you see the drawing that's been marked as Exhibit 4, Mr. Wooley?
A. Yes, I see it.
Q. Is there any mounting pole according to your construction in this drawing?
MS. FOWLER: Objection, outside the scope. We don't even know the source of this, and it is not an image on which Dr. Wooley opines in the context of his claim construction declaration.
He will not be applying any proposed construction to any image you put in front of him.
A. I've not seen the drawing. And Exhibit 4, I don't believe it's from the patent. Would you show it to me, please? Is it in the patent?
Q. (By Mr. Porter) This is a hypothetical.
A. It's not in the patent?
Q. This is not a patent.
A. Then I don't have any opinion on it. I've not -- I don't know what it is, don't know anything about it.
Q. So you can't tell if Exhibit 4 has a mounting pole, according to your definition, or not?
MS. FOWLER: Same objection, outside the scope. This is not an exercise in application of proposed constructions.

A. I don't have any opinion on Exhibit 4.
Q. (By Mr. Porter) Well, is the structure on the right-hand side, does that -- does the length of the structure of that particular pole or post far exceed the width in Exhibit 4?
MS. FOWLER: Objection, outside the scope. Dr. Wooley is not here to testify today about the application in the proposed construction.
You're more than welcome to ask him questions about the context of his opinions related to his declaration.
A. I don't think that drawing is in my declaration or the patent. I've never seen it before and don't have any opinion on it.
Q. (By Mr. Porter) So you just don't -- you can't tell us right now whether there is a mounting pole, according to your definition, in Exhibit 4?
MS. FOWLER: Same objection.
A. I don't have any opinions on Exhibit 4.
Q. (By Mr. Porter) You mentioned earlier you would have to see an actual system to tell me whether the length far exceeds the width. You would have to see where it was used.
Exhibit 4 is an example of a system. Can you explain whether that length far exceeds the width in

Exhibit 4?
MS. FOWLER: Objection, outside the scope, vague, ambiguous.
A. I cannot. I don't know anything about that exhibit. I've never seen it before. I'm not sure what you're referring to.
Q. (By Mr. Porter) I was referring to the structure on the right-hand side, which is a pole of some sort. Is that a mounting pole, according to your construction, where the length far exceeds the width?
MS. FOWLER: Objection, outside the scope, vague and ambiguous.
A. I don't see anything in that drawing that appears to be a pole.
Q. (By Mr. Porter) What would you refer to the structure on the right hand of Exhibit 4?
MS. FOWLER: Objection, outside the scope.
A. On the right-hand side there appears something that is illustrated to be a rectangular shape with, I don't know, perhaps an illustration of an illumination. I'm not sure.
Q. (By Mr. Porter) But you don't see anything that would fit your definition of mounting pole in Exhibit 4?

A. I do not.
(Marked was Wooley Exhibit 5.)
Q. (By Mr. Porter) I've handed you a photo that's been marked as Exhibit 5. What does that photo appear to be to you?
MS. FOWLER: Objection, outside the scope.
A. (Reviewing.) It's hard to tell, but it appears it could be part of a rig site in the wintertime where it's snowing.
Q. (By Mr. Porter) And do you see anything in Exhibit 5 that would meet your proposal for what a mounting pole is?
MS. FOWLER: Objection, outside the scope. Dr. Wooley is not here to testify today about the application of the term "mounting pole" as it's recited in the asserted claims, any picture that you put in front of him.
You're more than welcome to ask him about his opinion on the plain and ordinary meaning of the term "mounting pole," which is in dispute today; but he will not be applying his proposed construction to any image you put in front of him.
A. I don't know anything about Exhibit 5.
Q. (By Mr. Porter) Do you see anything in

Exhibit 5 that looks like a handrail?
MS. FOWLER: Objection, outside the scope. Vague and ambiguous in the context of the image as well.
A. It's possible there is a handrail in that photograph.
Q. (By Mr. Porter) It's possible, or there is?
A. It looks like there may be a handrail in the photograph.
Q. And where is what -- where are you referring to a handrail?
MS. FOWLER: Objection, outside the scope.
A. I don't think that's got anything to do with the mounting pole, but there appears to be a handrail over a wall in the upper right-hand side.
Q. And the handrail you're referring to is the top yellow structure?
MS. FOWLER: Objection, outside the scope.
A. There appears to be a handrail with some stairs to climb over some cables or something I cannot identify in the photograph. And I had no idea what that is.
Q. (By Mr. Porter) Is there a bracket connected

to the handrail in Exhibit 5?
MS. FOWLER: Objection, outside the scope, vague and ambiguous. Dr. Wooley will not be offering any opinion on the application of any proposed construction to any system image you put in front of him that he's not had an opportunity to analyze before today.
A. I don't see one on the handrail I was describing.
MR. PORTER: I've got some other images here. Are you going to do the same objection to these other images that I have?
MS. FOWLER: I am.
PORTER: Let's take a short break.
THE REPORTER: We are going off the record at 11:33.
(Recess taken at 11:33 a.m., resuming at 11:40 a.m.)
Q. (By Mr. Porter) Dr. Wooley, I have no further questions, other than the ones that your counsel instruct you you not to answer?
MR. PORTER: So I pass the witness.
FURTHER EXAMINATION
MS. FOWLER:
Q. Dr. Wooley, I have a few brief questions for

you.
You recall that Mr. Porter provided you with certain images or figures marked as Exhibits 2 through 5 today, correct?
A. Yes.
Q. And in preparation for today's deposition did you form any opinion on the application of your proposed construction of the term "mounting pole" to any of the images or figures shown in Exhibits 2 through 5 to today's deposition?
A. No. I had never seen those before.
Q. If you were provided an opportunity to apply the appropriate legal principles to these images or figures marked as Exhibits 2 through 5, would you be able to form an opinion on whether anything shown in those images or figures meets your proposed construction of the term "mounting pole"?
A. Yes, I think I could.
Q. If you could please turn to Figure 9A in the '016 patent, which is Exhibit 1 to your declaration, which is marked as Exhibit 1 for today's deposition.
A. (Reviewing.)
Q. Do you recall Mr. Porter asking about the images -- strike that.
Do you recall Mr. Porter asking about the

figures in the '016 patent today?
A. Not specifically the figures, no.
Q. But you recall Mr. Porter asking you about the asserted patent's specification?
A. Yes.
Q. In your opinion, does Figure 9A show a mounting pole attached to the crown deck?
A. No.
Q. In your opinion, does Figure 9B show a mounting pole attached to the crown deck?
A. No.
Q. In your opinion, does Figure 9C of the '016 patent show a mounting pole attached to the crown deck?
A. No.
Q. In your opinion, does Figure 9D of the '016 patent show a mounting pole attached to the crown deck?
A. No.
Q. And in your opinion, does Figure 9E of the '016 patent show a mounting pole attached to the crown deck?
A. No.
MS. FOWLER: I have no further questions at this time.
(Following commenced at 11:43 a.m.)
MR. PORTER: I just wanted to follow up

on one thing.
FURTHER EXAMINATION
BY MR. PORTER:
Q. On Figures 9A through 9E, which you said did not have a mounting pole attached to the crown deck, can you explain why you do not believe there is a mounting pole attached to the crown deck in Figures 9A through 9E?
A. In my opinion, those do not show a mounting pole as the term is described in the patent.
Q. And what's missing from those particular images as reflected in your definition of mounting pole?
A. Generally in the plain and ordinary meaning that I describe in my declaration, it's the length-to-width ratio.
Q. So Figures 9A through 9E do not have a mounting pole which is longer than it is wide?
A. Well, you left some words out.
Q. Let's look at that specifically then. I think it's in Section 7 of your report.
So Figures 9A through E do not have an elongated structure. Is that correct?
A. In the sense of the length of the structure far exceeds its width.
Q. And which part are you looking at on Figure 9A

has the length not far exceeding the width?
A. Well, there is a -- on 9A there is a light and a bracket, and the bracket is directly attached to a bolted device on the -- probably a handrail or a deck.
Q. And which part -- maybe you can just mark it on your copy -- are you referring to that the length does not far exceed the width?
A. Well, there is nowhere on there that that's the case. I'm not sure I could point to where it's not.
Q. What about this structure right here (indicating)? And we can mark that.
Is that what you're referring to, that the length does not far exceed the width?
A. This part here (indicating) is how the bracket attaches to the frame (circling).
Q. And that's not a mounting pole, in your testimony?
A. That's correct.
Q. Can you just write "not a mounting pole" next to that so we have a clear record?
A. (Complying).
Q. And your answer would be the same for 9B through 9E?
A. That's correct.
Q. How much longer would that particular piece

have to be in order for the length to far exceed the width in Figure 9A?
A. That would be something that would be determined by the opinion of a person of ordinary skill, but "far exceeding" means a multiple of, not a fraction of.
Q. So it would have to be at least two times or more longer?
A. I'm not going to put a number on it. It depends on the application.
Q. And the application in Figure 9A, if you doubled the length of that particular structure, would that then meet your definition of mounting pole?
A. I'm not --
THE WITNESS: Go ahead.
MS. FOWLER: Objection, vague and ambiguous.
A. I'm not going to put a number on it. I can't tell you that.
Q. (By Mr. Porter) Well, why are you hesitant to put a number on that?
A. Because it's not that clear. It's a matter of what the application is.
Q. And I'm asking about a very specific application in Figure 9A. If you doubled the size of

that piece between the bracket and the light, would that meet your definition of a mounting pole?
MS. FOWLER: Objection, vague and ambiguous?
A. Ask your question again. If I doubled what?
Q. (By Mr. Porter) If you doubled the size of that piece that you circled in Figure 9A, if you doubled the length of that, would it then have a length that far exceeds the width?
MS. FOWLER: Same objection.
A. The part that I circled is a mounting device to mount it on the rail or the deck or whatever that structure is.
And you're wanting to extend -- if I understand your hypothetical correctly, you're wanting to extend the bracket away from the frame a much greater distance. Is that what you're asking?
Q. (By Mr. Porter) Correct.
A. I can't put a number on it, but that wouldn't -- that would not look like a mounting pole to me.
Q. What if it was ten times longer? Would it then meet your definition of a mounting pole?
MS. FOWLER: Objection, vague and ambiguous.

A. I don't know.
PORTER: No further questions.
(Following commenced at 11:49 a.m.)
FURTHER EXAMINATION
BY MS. FOWLER:
Q. One follow-up, Dr. Wooley.
With respect to Figure 9A in the '016 patent, do you see any details in Figure 9A as to the use and application of the lighting system identified therein?
PORTER: Objection, vague.
A. No. All I can see here is just the lighting fixture itself. I'm not sure what the frame behind it is.
MS. FOWLER: No further questions. Thank you.
THE REPORTER: We are off the record at 11:49.
(Proceedings concluded at 11:49 a.m.)
* * *

C&M OILFIELD RENTALS
Vs. ENSIGN US SOUTHERN DRILLING

ORAL and REALTIMED DEPOSITION OF
GARY R. WOOLEY, Ph.D.
JUNE 13, 2023

CHANGES AND SIGNATURE

PAGE	LINE	CHANGE	REASON

I, GARY R. WOOLEY, Ph.D., have read the foregoing deposition and hereby affix my signature that same is true and correct, except as noted above.

_____
GARY R. WOOLEY, Ph.D.

THE STATE OF_____:
COUNTY OF_____:

BEFORE ME, _____, on this day appeared GARY R. WOOLEY, Ph.D., known to me or proved to me on the oath of _____ or through _____ [description of identity card or other document] to be the person whose name is subscribed to the foregoing instrument and acknowledged to me that they executed the same for purposes and consideration therein expressed.

Given under my hand on this _____ day of _____, 2023.

Notary Public in and for the
State of _____
My commission expires: _____

Job No.: 5959080

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF TEXAS
HOUSTON DIVISION

C&M OILFIELD RENTALS, LLC D/B/A C-MORE ENERGY SERVICES,

Plaintiff,

Vs.

ENSIGN US SOUTHERN DRILLING LLC,

Defendant.

: CIVIL ACTION
: NO. 4:22-CV-00965

REPORTER'S CERTIFICATION TO THE
ORAL and REALTIMED DEPOSITION OF
GARY R. WOOLEY, Ph.D.
JUNE 13, 2023

I, Pat English-Arredondo, CSR, RMR, CRR, CLR, Certified Shorthand Reporter in and for the State of Texas, hereby certify to the following:

That the witness, GARY R. WOOLEY, Ph.D., was duly sworn by the officer and that the transcript of the oral deposition is a true record of the testimony given by the witness;

I further certify that pursuant to FRCP Rule 30(f)(1) that the signature of the deponent:

__X___ was requested by the deponent or a party before the completion of the deposition and returned within 30 days from date of receipt of the transcript. If returned, the attached Changes and Signature Page contains any changes and the reasons therefor;

_____ was not requested by the deponent or a party before the completion of the deposition.

I further certify that I am neither counsel for, related to, nor employed by any of the parties or attorneys in the action in which this proceeding was taken, and further that I am not financially or otherwise interested in the outcome of the action.

Certified to by me this 16th day of June, 2023.

Pat English-Arredondo

Pat English-Arredondo,
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Texas CSR 3828
Expiration Date: 4/30/2022
Independent Contract Reporter for:
Veritext Legal Solutions
Certificate No.: 571
300 Throckmorton, Suite 1600
Fort Worth, Texas 76102
817.336.3042

Job No.: 5959080

Karon.fowler@morganlewis.com
June 16, 2023
C&M Oilfield Rentals v. Ensign US Southern Drilling
DEPOSITION OF: Gary R. Wooley, Ph.D. (# 5959080)

The above-referenced witness transcript is available for read and sign.

Within the applicable timeframe, the witness should read the testimony to verify its accuracy. If there are any changes, the witness should note those on the attached Errata Sheet.

The witness should sign and notarize the attached Errata pages and return to Veritext at errata-tx@veritext.com.

According to applicable rules or agreements, if the witness fails to do so within the time allotted, a certified copy of the transcript may be used as if signed.

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Federal Rules of Civil Procedure

Rule 30

(e) Review By the Witness; Changes.

(1) Review; Statement of Changes. On request by the deponent or a party before the deposition is completed, the deponent must be allowed 30 days after being notified by the officer that the transcript or recording is available in which:

(A) to review the transcript or recording; and

(B) if there are changes in form or substance, to sign a statement listing the changes and the reasons for making them.

(2) Changes Indicated in the Officer's Certificate. The officer must note in the certificate prescribed by Rule 30(f)(1) whether a review was requested and, if so, must attach any changes the deponent makes during the 30-day period.

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VERITEXT LEGAL SOLUTIONS
COMPANY CERTIFICATE AND DISCLOSURE STATEMENT

Veritext Legal Solutions represents that the foregoing transcript is a true, correct and complete transcript of the colloquies, questions and answers as submitted by the court reporter. Veritext Legal Solutions further represents that the attached exhibits, if any, are true, correct and complete documents as submitted by the court reporter and/or attorneys in relation to this deposition and that the documents were processed in accordance with our litigation support and production standards.

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IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF TEXAS
HOUSTON DIVISION

C&M OILFIELD RENTALS, LLC D/B/A C-MOR ENERGY SERVICES,	§	
Plaintiff,	§	**Civil Action No. 4:22-cv-00965**
v.	§	
	§	**JURY TRIAL DEMANDED**
ENSIGN US SOUTHERN DRILLING LLC,	§	
Defendant.	§	

DECLARATION OF GARY WOOLEY REGARDING CLAIM CONSTRUCTION



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TABLE OF EXHIBITS

Exhibit No.	Exhibit
1	U.S. Patent No. 10,976,016
2	U.S. Patent No. 10,900,626
3	Curriculum Vitae
4	List of Recent Engagements
5	"pole, n.1," Oxford English Dictionary (3d. ed., Sep. 2006; most recently modified version published online Dec. 2021).
6	"mounting, adj.," Oxford English Dictionary (3d ed. Mar. 2003; most recently modified version published online Dec. 2021).
7	"pole," Oxford Dictionary of Construction, Surveying, & Civil Engineering (2d Ed. 2020).

I, Gary Wooley, declare and state as follows:

1. My name is Gary R. Wooley, and I am over 18 years of age.

2. I have been retained by counsel for C&M Oilfield Rentals, LLC ("C&M") as a consultant and expert in the above-captioned case. As it specifically relates to this declaration, I have been asked to opine on the meaning to a person of ordinary skill in the art ("POSITA") of certain claim terms in U.S. Patent Nos. 10,976,016 ("the '016 Patent") and 10,900,626 ("the '626 Patent") (collectively, "Asserted Patents"). The '016 Patent is attached as Exhibit 1 to this Declaration, and the '626 Patent is attached as Exhibit 2 to this Declaration.

3. I understand that the parties have agreed to the following constructions for the following terms:

Term	Agreed Construction
"crown deck" ('016 Patent claims 1, 2, and 23; '626 Patent claims 9 and 19)	a collection of structures within the crown that includes a walking surface, parts supporting the walking surface, and any associated handrail
"bracket" ('016 Patent claims 1 and 2)	Plain and ordinary meaning, which is a component or components connecting one part to another or holding a part.
"attached" ('016 Patent claims 1 and 23; '626 Patent claims 9 and 19)	Plain and ordinary meaning, which includes direct and indirect attachment, connection, and coupling.
"connected" ('016 Patent claim 2)	Plain and ordinary meaning, which includes direct and indirect attachment, connection, and coupling.
"coupled" ('016 Patent claim 23; '626 Patent claim 9)	Plain and ordinary meaning, which includes direct and indirect attachment, connection, and coupling.
"mounted" ('016 Patent claim 1; '626 Patent claim 19)	Plain and ordinary meaning
"handrail" ('626 Patent claims 9 and 19)	Plain and ordinary meaning
"bolts" ('016 Patent claim 2)	Plain and ordinary meaning

4. I have been asked to offer my opinion on the meaning to a POSITA of the term "mounting pole" as used in the asserted claims of the Asserted Patents.

5. If called as a witness to testify at a claim construction hearing, I expect to testify on the following topics and provide opinions and testimony on what is summarized in this declaration as follows:

- The Asserted Patents, their specifications, claims, prosecution histories, and the technology underlying what is disclosed in the Asserted Patents.
- The level of ordinary skill in the art to which the Asserted Patents are directed.
- My opinions on how the disputed term "mounting pole" would have been understood by a POSITA at the time of the invention.

I. Background, Experience, and Qualifications

6. The following is a brief summary of my background, experience, and qualifications. My background, experience, and qualifications are more fully described in my curriculum vitae, which is attached as Exhibit 3.

7. I am a Registered Professional Engineer in the states of Texas and Oklahoma.

8. I received a Bachelor of Science in Mechanical Engineering from Louisiana State University in 1969. I received a Master of Science in Engineering Mechanics from Louisiana State University in 1970. I received a Ph.D. in Engineering Science from Louisiana State University in 1972 with minors in Applied Mathematics and Mechanical Engineering.

9. I was an employee of four major oil and gas operating companies: Shell, Chevron, Exxon, and Arco.

10. I am a member of professional organizations including the American Society of Mechanical Engineers, Society of Petroleum Engineers, American Petroleum Institute, and ASM.

11. Since 1978, I have served as a consultant for oil and gas operators, drilling contractors, service and supply companies, manufacturers, and others for onshore and offshore wells around the world.

II. Compensation and Prior Testimony

12. My firm is being compensated for my time spent on this matter at my firm's usual and customary rate of $720 per hour, plus reasonable expenses. My firm's compensation is not dependent on the outcome of this proceeding, or the content or specifics of any of my opinions, statements, or testimony.

13. I have previously testified as an expert. A list of my recent engagements is attached as Exhibit 4.

III. Materials Considered

14. In preparing this declaration, I have considered the Asserted Patents, their prosecution history, the parties' claim construction disclosures, and all facts, data, or material identified in this Declaration. I also relied upon my over 50 years of experience in the oil and gas industry, along with my education, training, research, and knowledge, though the testimony I offer is from the perspective of a POSITA.

IV. Claim Construction Principles

15. I understand that claim construction is the process by which a court determines, as a matter of law, the scope and meaning of terms used in the claims of a patent. I further understand that the goal of this process is to give claim terms the ordinary and customary meaning they would have had to a POSITA at the time of the invention, after reading the entire patent and prosecution history.

16. I understand that the specification may aid in interpreting the meaning of disputed claim language, but particular embodiments and examples appearing in the specification will not

generally be read into the claims. I further understand that it is improper to read limitations from a preferred embodiment described in the specification (even if it is the only embodiment) into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited.

17. I understand that there are two exceptions to the general rule that claim terms are construed according to their plain and ordinary meaning. First, a patentee can become his or her own "lexicographer" by clearly setting forth a definition of the disputed term and clearly expressing an intent to define the term. Second, a patentee may disavow the full scope of the claim term either in the specification or during prosecution. To disavow the full scope of a claim term, the patentee's statements in the specification or prosecuting history must represent a clear disavowal of claim scope. It is my understanding that when an applicant's statements are amendable to multiple reasonable interpretations, they cannot be deemed clear and unmistakable.

18. I understand that, in some cases, the court may consider extrinsic evidence, such as technical dictionaries, treatises, and expert opinions, to understand the underlying technology and the way in which claim terms would be understood by a POSITA at the relevant time.

V. Level of Skill in the Art

19. For purposes of this declaration, I understand the time of the invention to be March 15, 2018, which is the filing date of the provisional application to which the Asserted Patents claim priority (provisional application no. 62/643,663).

20. I understand that several factors are relevant to determining the level of ordinary skill in the art at the time of the claimed invention. I understand that those factors include: (1) the educational level of the inventor(s); (2) the type of problems encountered in the art; (3) prior art solutions to those problems; (4) the rapidity with which innovations are made; (5) sophistication of the technology; and (6) the educational level of active workers in the field.

21. Having reviewed and considered the Asserted Patents, their prosecution history, the state of the art at the time of the inventions, including the level of skill of the persons with whom I worked, and the above-listed factors, it is my opinion that a POSITA would have had at least a bachelor's degree in Mechanical and/or Electrical Engineering with at least one year of experience working on rotary drilling rigs—either a drilling rig or a well servicing rig—and their associated lighting systems, and/or the installation and application of lighting systems used to illuminate wellsites where rotary drilling or well servicing operations are occurring. Alternatively, it is my opinion that a POSITA would have at least a high school diploma and five years of hands-on or design experience on rotary drilling rigs and their associated lighting systems and/or the installation and application of lighting systems used to illuminate rotary drilling operations.

22. I have used this level of ordinary skill in the art in forming my opinions as set forth in this declaration. My opinions are from the perspective of this level of ordinary skill in the art. I meet this level of skill in the art because I have at least a bachelor's degree in Mechanical Engineering, and I have had at least one year of experience working on rotary drilling rigs and with their associated lighting systems.

23. My opinion on the level of skill in the art takes into account the types of problems encountered in the art and the prior art solutions to those problems. In my opinion, the types of problems encountered in the art include problems involving exposure to hazardous substances, exposure to harsh weather conditions, ability to withstand shock and vibrations, stability of power supply, drop hazards, ease of installation, ease of maintenance or serviceability, fire and explosive hazards, cost effectiveness, downtime, risk of corrosion, and general and specific safety conditions, to name a few, nonlimiting examples.

24. My opinion on the level of skill in the art also takes into account the rapidity with which innovations are made and the sophistication of the technology. In my experience, the industry is hesitant to adopt overly progressive transformations. In my opinion, the hesitancy is related, at least in part, to how even the smallest changes to the design of any portion of a drilling rig or systems for a drilling rig can affect the overall structural stability and performance. In addition, any changes to a rig's configuration or systems attached to the rig poses potential safety risks, and designs must be approved before use. Of course, the rapidity with which innovations are made and the sophistication of the technology depends at least in part on the complexity of the particular design, the scope of the innovation at issue, internal resources available to innovators and companies (e.g., budget, time, etc.). This may vary project to project.

25. My opinion on the level of skill in the art also takes into account the experience and educational level of the inventor, as well as the experience and educational level of active workers in the field. For example, I understand that at least two of the named inventors had upwards of 10 years of experience working on drilling rigs. In addition, in my career, I have had the opportunity to work with persons having a broad range of education and experience in connection with drilling a well and working on drilling rigs, including persons having the education and/or experience outlined above. I have acted as a supervisor of or coworker with these persons, and I am intimately aware of their knowledge of and skill in the art.

VI. The Asserted Patents and Relevant Technology

A. The '016 Patent

26. The '016 Patent is titled "Elevated structure-mounted lighting system" and generally relates to lighting systems that may be used for drilling applications. It names Joshua C. Allison, Josh Haaland, and Jessica Ivanoff as inventors.

27. The '016 Patent contains 29 total claims, 3 of which are independent claims and the remainder of which are dependent claims. I understand that C&M presently asserts claims 1, 2, and 23 of the '016 Patent in this matter.

28. The disputed claim term "mounting pole" on which I have been asked to opine appears in the following claims (emphasis added):

> 1. A modular lighting system mounted on a rig, the modular lighting system comprising:
>
> a plurality of light units, each light unit separately attached to a crown deck of the rig, and each light unit comprising:
>
> a **mounting pole**;
>
> a light fixture comprising one or more lights; and
>
> a bracket configured to attach the **mounting pole** to the crown deck of the rig.
>
> 17. A method of illuminating a wellsite, comprising the steps of:
>
> attaching a plurality of **mounting poles** to a crown deck of a rig, wherein each of the plurality of **mounting poles** is separately attached to the crown deck;
>
> mounting a plurality of lights to the plurality of **mounting poles**, wherein each of the plurality of **mounting poles** supports at least one of the plurality of lights, and each of the plurality of lights is mounted to only one of the plurality of **mounting poles**; and
>
> illuminating the wellsite using the plurality of lights.
>
> 19. The method of claim 17, wherein attaching a plurality of **mounting poles** on a crown deck of a rig comprises:
>
> attaching a removable bracket to one or more of the **mounting poles**; and
>
> using the removable bracket to attach one or more of the **mounting poles** to the rig.
>
> 22. The method of claim 17, wherein each of the plurality of **mounting poles** is directly attached to the crown deck.
>
> 23. A rig comprising:
>
> a derrick;
>
> a crown deck at the top of the derrick; and
>
> a plurality of light units, each light unit separately attached to the crown deck, each light unit comprising:

a **mounting pole**, wherein each light unit comprises a separate **mounting pole**, such that the system comprises a plurality of **mounting poles**; and

a light fixture comprising one or more lights, the light fixture coupled to the **mounting pole**.

26. The rig of claim 23, wherein the light fixture may be coupled to the **mounting pole** in a first position or a second position and, when the light fixture is in the first position, the one or more lights of the light fixture are oriented away from the rig.

29. I have reviewed the entirety of the specification in forming my opinions as set forth in this declaration. The portions of the specification most pertinent to the disputed term on which I opine in this declaration are discussed below.

B. The '626 Patent

30. The '626 Patent is titled "Elevated structure-mounted lighting system" and generally relates to lighting systems that may be used for drilling applications. It names Joshua C. Allison, Josh Haaland, and Jessica Ivanoff as inventors.

31. The '626 Patent contains 26 total claims, 3 of which are independent claims and the remainder of which are dependent claims. I understand that C&M presently asserts claims 9 and 19 of the '626 Patent in this matter.

32. The disputed claim term "mounting pole" on which I have been asked to opine appears in the following claims (emphasis added):

1. A lighting system mounted on a rig; the lighting system comprising:

a plurality of light units, each light unit comprising:

a mounting pole comprising a continuous structure, wherein each light unit comprises a separate **mounting pole**, such that the system comprises a plurality of **mounting poles**;

a bracket configured to connect the **mounting pole** to a handrail of the rig; and

a light fixture comprising one or more lights, the light fixture coupled to the **mounting pole**, wherein the light fixture may be coupled to the **mounting pole** in a first position or a second position; and

wherein the light fixture is proximate to the handrail of the rig in both the first position and the second position.

7. The lighting system of claim 1, wherein the **mounting pole** and bracket are connected to the rig using U-shaped bolts.

9. A rig comprising:

a derrick;

a crown deck at the top of the derrick, the crown deck comprising a handrail; and

a plurality of light units attached to the handrail, each light unit comprising:

a mounting pole, wherein each light unit comprises a separate **mounting pole**, such that the system comprises a plurality of **mounting poles**; and

a light fixture comprising one or more lights, the light fixture coupled to the **mounting pole**.

12. The rig of claim 9, wherein the light fixture may be coupled to the **mounting pole** in a first position or a second position and, when the light fixture is in the first position, the one or more lights of the light fixture are oriented away from the rig.

14. The rig of claim 9, further comprising a bracket configured to connect the **mounting pole** to the handrail.

15. The rig of claim 14, wherein the **mounting pole** and bracket are connected to the rig using U-shaped bolts.

17. The rig of claim 9, wherein one or more of the plurality of **mounting poles** comprises a continuous structure.

19. A method for illuminating a wellsite, comprising:

mounting a plurality of **mounting poles** on a crown deck of a rig, wherein each of the plurality of **mounting poles** is attached to a handrail of the crown deck;

mounting a plurality of lights to the plurality of **mounting poles**, wherein each of the plurality of **mounting poles** supports at least one of the plurality of lights, and each of the plurality of lights is mounted to only one of the plurality of **mounting poles**; and

illuminating the wellsite using the plurality of lights.

21. The method of claim 19, wherein mounting a plurality of **mounting poles** on a crown deck of a rig comprises:

attaching a removable bracket to one or more of the **mounting poles** on the rig; and

using the removable bracket the attach one or more of the **mounting poles** to the rig.

22. The method of claim 19, wherein each of the plurality of lights mounted at the one or more of the plurality of **mounting poles** attached to the handrail of the crown deck of the rig is proximate to the handrail.

23. The method of claim 22, wherein one or more of the plurality of **mounting poles** comprises a continuous structure.

26. The method of claim 19, wherein one or more of the plurality of **mounting poles** comprises a continuous structure.

33. I have reviewed the entirety of the specification in forming my opinions as set forth in this declaration. The portions of the specification most pertinent to the disputed term on which I opine in this declaration are discussed below.

VII. Term: "mounting pole"

Term	C&M's Proposed Construction	Ensign's Proposed Construction
"mounting pole"	Plain and ordinary meaning, which is: "elongated structure fixed at one end and for mounting where the length of the structure far exceeds the width"	A "mounting pole" is a pole used for mounting something. Both "mounting" and "pole" have their plain and ordinary meanings. A pole can be cut shorter and still remain a pole, even if its length no longer far exceeds the width.

34. In my opinion, the term "mounting pole" retains its plain and ordinary meaning, which is "elongated structure fixed at one end and for mounting where the length of the structure far exceeds the width."

35. The term "mounting pole" appears in certain claims of the Asserted Patents as reproduced above. I understand that C&M is currently asserting claims 1, 2, and 23 of the '016 Patent and claims 9 and 19 of the '626 Patent.

36. In my opinion, the plain language of the disputed term and the surrounding claim language confirms the term's plain and ordinary meaning. For example, claim 1 of the '016 Patent requires that "each light unit" comprise a "mounting pole" where "a bracket" is "configured to attach the mounting pole to the crown deck of the rig." Independent claim 17 of the '016 Patent recites "mounting a plurality of lights to the plurality of mounting poles, wherein each of the

plurality of mounting poles supports at least one of the plurality of lights, and each of the plurality of lights is mounted to only one of the plurality of mounting poles." And claim 23 recites, among other things, "a light fixture comprising one or more lights, the light fixture coupled to the mounting pole." Similarly, claim 9 of the '626 Patent recites "a mounting pole, wherein each light unit comprises a separate mounting pole, such that the system comprises a plurality of mounting poles," and "a light fixture comprising one or more lights, the light fixture coupled to the mounting pole." As another example, claim 19 of the '626 Patent recites "mounting a plurality of mounting poles on a crown deck of a rig, wherein each of the plurality of mounting poles is attached to a handrail of the crown deck."

37. Based on this use of "mounting pole" in the claims, it is my opinion that a POSITA would understand a "mounting pole" to mean a structure that is (i) fixed at one end (e.g., "a bracket" is "configured to attach the mounting pole to the crown deck of the rig"; "mounting a plurality of mounting poles on a crown deck of a rig, wherein each of the plurality of mounting poles is attached to a handrail of the crown deck") and (ii) used for mounting something (e.g., "mounting a plurality of lights to the plurality of mounting poles"; "each of the plurality of mounting poles supports at least one of the plurality of lights"; "each of the plurality of lights is mounted to only one of the plurality of mounting poles"; "the light fixture coupled to the mounting pole"). And, in my opinion, the use of "mounting pole" across the remaining claims of the Asserted Patents is consistent with this understanding of a POSITA.

38. The plain and ordinary meaning of a "mounting pole" as an "elongated structure fixed at one end and for mounting where the length of the structure far exceeds the width" is similarly confirmed by the specification of the Asserted Patents. For example, the specification explains that "FIG. 3 illustrates an elevation view of three embodiments of the improved elevated

structure-mounted lighting system that are depicted relative to a crown deck." Ex. 1 at 2:1-3. It further explains that, "[a]s shown in FIG. 3, the light units 210, 220, and 230 may include a mounting pole 240, a bracket for a top rail 242, a bracket for a bottom rail 244, a cap 246, and a light fixture 248." *Id.* at 2:62-65. "The bracket for a top rail 242 and bracket for a bottom rail 244 may be used to attach the light mounting pole 240 to rails 205 of a crown deck of a drilling rig using U-shaped bolts or straps, as shown in FIG. 2." *Id.* at 2:65-3:1. In addition, the specification explains that "FIG. 6 is a side view of an embodiment of a light fixture mounting pole." *Id.* at 2:10-11. The specification explains that, as shown in Figure 6 (below), "mounting pole 240 may be attached to the crown deck or other structure using brackets 300 and 310 that attach to a top rail 242 and bottom rail 246 respectively." *Id.* at 3:5-8. And, "[a]s shown in FIGS. 2-8, it is also preferable that mounting pole 240 be formed of a single unitary piece, rather than multiple separate portions that are joined together using bolts, screws, hinges, or other similar constructions," thereby "naturally contribut[ing] to the structural stability of the light unit." *Id.* at 5:1-6. In other words, mounting pole 240 (i) is an elongated structure, (ii) is fixed at one end to the crown deck; (iii) is used for mounting the lights, and (iii) has a length that far exceeds its width.

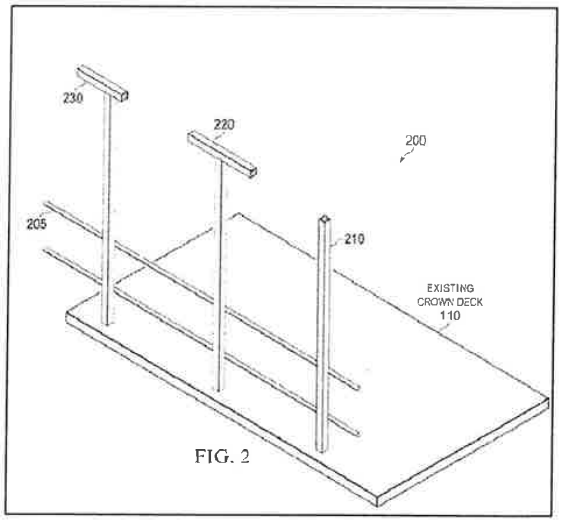


FIG. 2

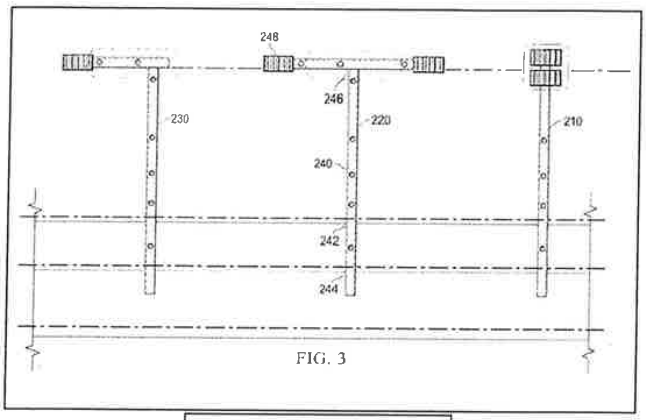


FIG. 3

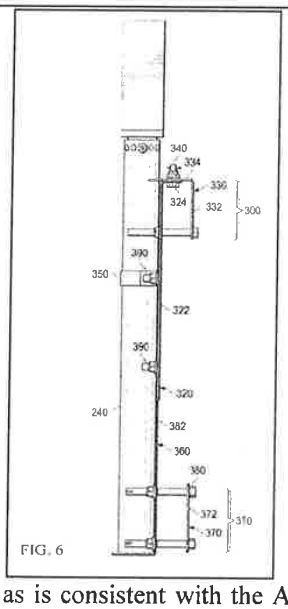


FIG. 6

39. In my opinion, and as is consistent with the Asserted Patents, a POSITA would further understand a "mounting pole" to be fixed at one end or in multiple places towards one end because it provides mounting functionality as a vertical, load-bearing element. For example, one could have a piece of pipe lying on the ground that is longer than it is wide but it is not being used or functioning as a mounting pole in this capacity because it is not fixed at one end or being used as a vertical, load-bearing element—i.e., it is not being used for mounting. In this way, and as a POSITA would understand, a "mounting pole" is able to transfer loads from the lights to the crown deck to which it is attached.

40. This meaning aligns with dictionary definitions. For example, the Oxford English Dictionary defines "pole" as "a long, straight, slender, and more or less cylindrical piece of wood or another material, used in scaffolding, as a support or for various other purposes." Ex. 5. This definition's reference to use "as a support or for various other purposes" is consistent with a POSITA's understanding of a "mounting pole" as being a structure for mounting. As another example, the adjective "mounting" is defined by the Oxford English Dictionary as "[r]ising, ascending, soaring. (*literal* and *figurative*)." Ex. 6. This is consistent with the elongated aspect of a "mounting pole" that is longer than it is wide so as to, in the context of the Asserted Patents, transfer the loads from the lights at height to the crown deck. And the definitions of the two words (i.e., "mounting," "pole") when combined align with a POSITA's understanding that a "mounting pole" is fixed at one end or in multiple places towards one end because it provides mounting functionality as a vertical, load-bearing element. Consider, for example, a common flag pole.

41. The intrinsic and extrinsic evidence also comports with my opinion that a POSITA would further understand a "mounting pole" to have a length that far exceeds its width in order to distinguish a "mounting pole" from other structural members. For example, a POSITA would understand that a "post" does not have a length that far exceeds its width. Generally, a post is a shorter or more "squat" structural member that has a lesser slenderness ratio than a pole. As a result, a shorter "post" would typically have less buckling tendency and greater load-bearing capacity than a pole. In contrast, a pole would offer flexibility with the ability to sustain bending movements. This distinction is important in the context of the Asserted Patents specifically where a "mounting pole" is meant to mount a light at height for greater light distribution.

42. This meaning aligns with dictionary definitions. For example, the Oxford Dictionary of Construction, Surveying, & Civil Engineering defines "pole" as "[a] long, usually

circular in section, piece of a material." Ex. 7. This definition affirms the length aspect of "mounting pole." As another example, and as described above, the Oxford English Dictionary defines "pole" as "a long, straight, slender, and more or less cylindrical piece of wood or another material, used in scaffolding, as a support or for various other purposes." Ex. 5. This definition affirms the length aspect of "mounting pole" (i.e., "long") as well as the length far exceeding its width (i.e., "long" and "slender").

43. I understand that Ensign contends this term should be construed as follows: "A 'mounting pole' is a pole used for mounting something. Both 'mounting' and 'pole' have their plain and ordinary meanings. A pole can be cut shorter and still remain a pole, even if its length no longer far exceeds the width."

44. I agree in part and disagree in part with Ensign's proposed construction. For example, I agree that a "mounting pole" is a pole used for mounting something. And I agree that "mounting" and "pole" maintain in the Asserted Patents their plain and ordinary meaning to a POSITA. But I disagree with Ensign's proposed construction insofar as it states that "[a] pole can be cut shorter and still remain a pole, even if its length no longer far exceeds the width" because, in my opinion, it does not reflect a POSITA's understanding of the term and does not provide any clarity or insight into the meaning to a POSITA. For example, although there may be varying lengths of a "pole," it is my opinion that a POSITA would understand a "mounting pole" as used in the Asserted Patents to be an elongated structure with a length that far exceeds the width for the reasons discussed above. Ensign's proposed construction also fails to take into account that a "mounting pole," as understood by a POSITA, is an elongated structure fixed at one end and for mounting, as discussed above.

45. To illustrate the problem with Ensign's proposed construction, consider a stub column or a pedestal, which a POSITA would not understand to be the same as a "mounting pole." Although a POSITA would understand a stub column or a pedestal to be a structural component likely fixed at one end for mounting in the sense that it transfers a vertical load and raises something, a POSITA would not understand either a stub column or pedestal to be an elongated structure where the length of the structure necessarily far exceeds the width.

46. I reserve the right to offer opinions regarding Ensign's proposed construction for this term based on Ensign's arguments, the evidence it cites, and any opinions offered by any other expert in these proceedings.

VIII. Supplementation

47. I reserve the right to supplement this declaration based on additional information, including but not limited to Ensign's claim construction arguments and any opinions offered by any other expert in these proceedings.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct. Executed on the 15th day of May 2023 in Houston, Texas.

Gary R. Wooley

EXHIBIT 1B

EXHIBIT 1

US010976016B2

(12) **United States Patent**
Allison et al.

(10) **Patent No.: US 10,976,016 B2**
(45) **Date of Patent: Apr. 13, 2021**

(54) **ELEVATED STRUCTURE-MOUNTED LIGHTING SYSTEM**

(71) Applicant: **C&M OILFIELD RENTALS, LLC.**, Cody, WY (US)

(72) Inventors: **Joshua C. Allison**, Cody, WY (US); **Josh Haaland**, Cody, WY (US); **Jessica Ivanoff**, Cody, WY (US)

(73) Assignee: **C&M OILFIELD RENTALS, LLC.**, Cody, WY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **17/016,083**

(22) Filed: **Sep. 9, 2020**

(65) **Prior Publication Data**

US 2020/0408373 A1 Dec. 31, 2020

Related U.S. Application Data

(63) Continuation-in-part of application No. 16/571,527, filed on Sep. 16, 2019, now Pat. No. 10,900,626, (Continued)

(51) **Int. Cl.**

F21V 21/116	(2006.01)
F21S 8/08	(2006.01)
F21V 33/00	(2006.01)
E21B 41/00	(2006.01)
F21W 131/402	(2006.01)
F21W 131/403	(2006.01)
F21W 131/10	(2006.01)

(52) **U.S. Cl.**

CPC ***F21S 8/088*** (2013.01); ***E21B 41/00*** (2013.01); ***F21V 21/116*** (2013.01); ***F21V 33/00*** (2013.01); *F21W 2131/1005* (2013.01); *F21W 2131/402* (2013.01); *F21W 2131/403* (2013.01)

(58) **Field of Classification Search**

CPC F21S 8/088; F21V 21/116; F21V 33/00

See application file for complete search history.

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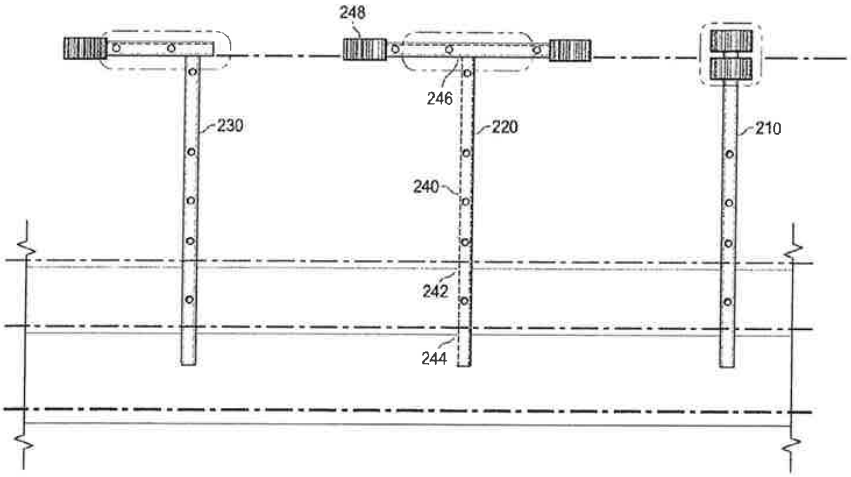
Swivelpole Brochure: Swivelpole Product Catalogue NEC V2-4. Printed Mar. 2014. pp. 5-9.

Primary Examiner — Anne M Hines
(74) *Attorney, Agent, or Firm* — Morgan, Lewis & Bockius LLP

(57) **ABSTRACT**

An improved elevated structure-mounted lighting system is disclosed. The lighting system may be used on drilling rigs, or with other applications, including for drilling, production, refineries, frac sites, construction, and other industrial applications that may use tower/mast type equipment. The improved elevated structure-mounted lighting system may accommodate any style or design of crown section or the derrick of a drilling rig and may be mounted on a pole or independent mount system.

29 Claims, 18 Drawing Sheets



Related U.S. Application Data

which is a continuation of application No. 16/138,723, filed on Sep. 21, 2018, now Pat. No. 10,473,282, which is a continuation-in-part of application No. 16/009,032, filed on Jun. 14, 2018, now Pat. No. 10,711,961.

(60) Provisional application No. 62/643,663, filed on Mar. 15, 2018.

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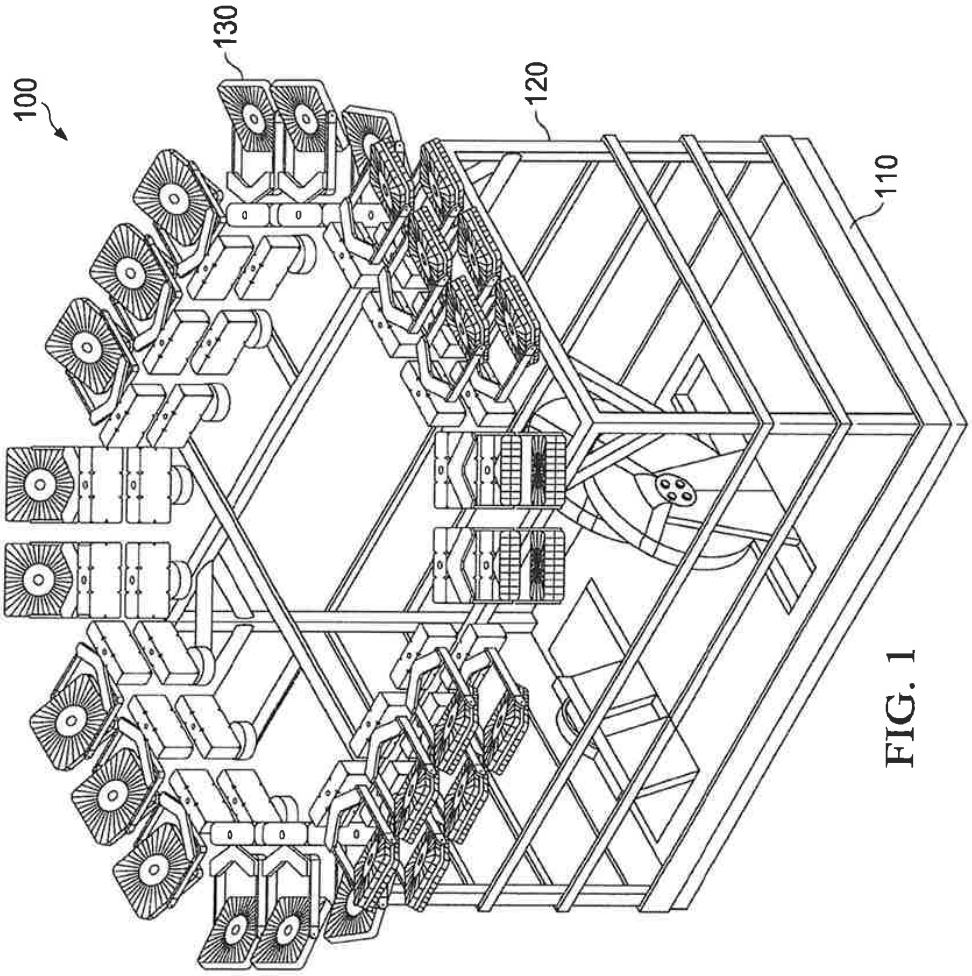


FIG. 1

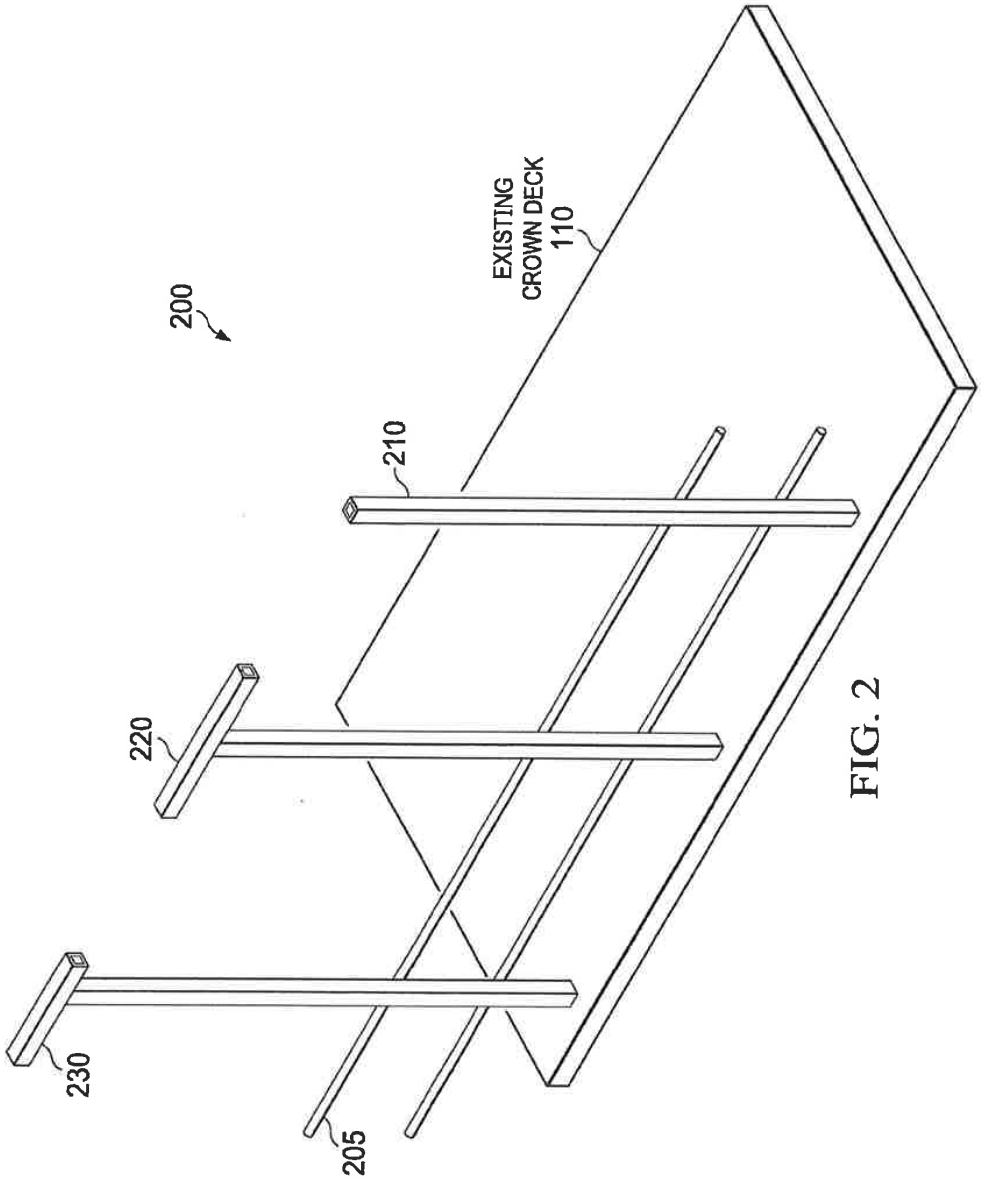


FIG. 2

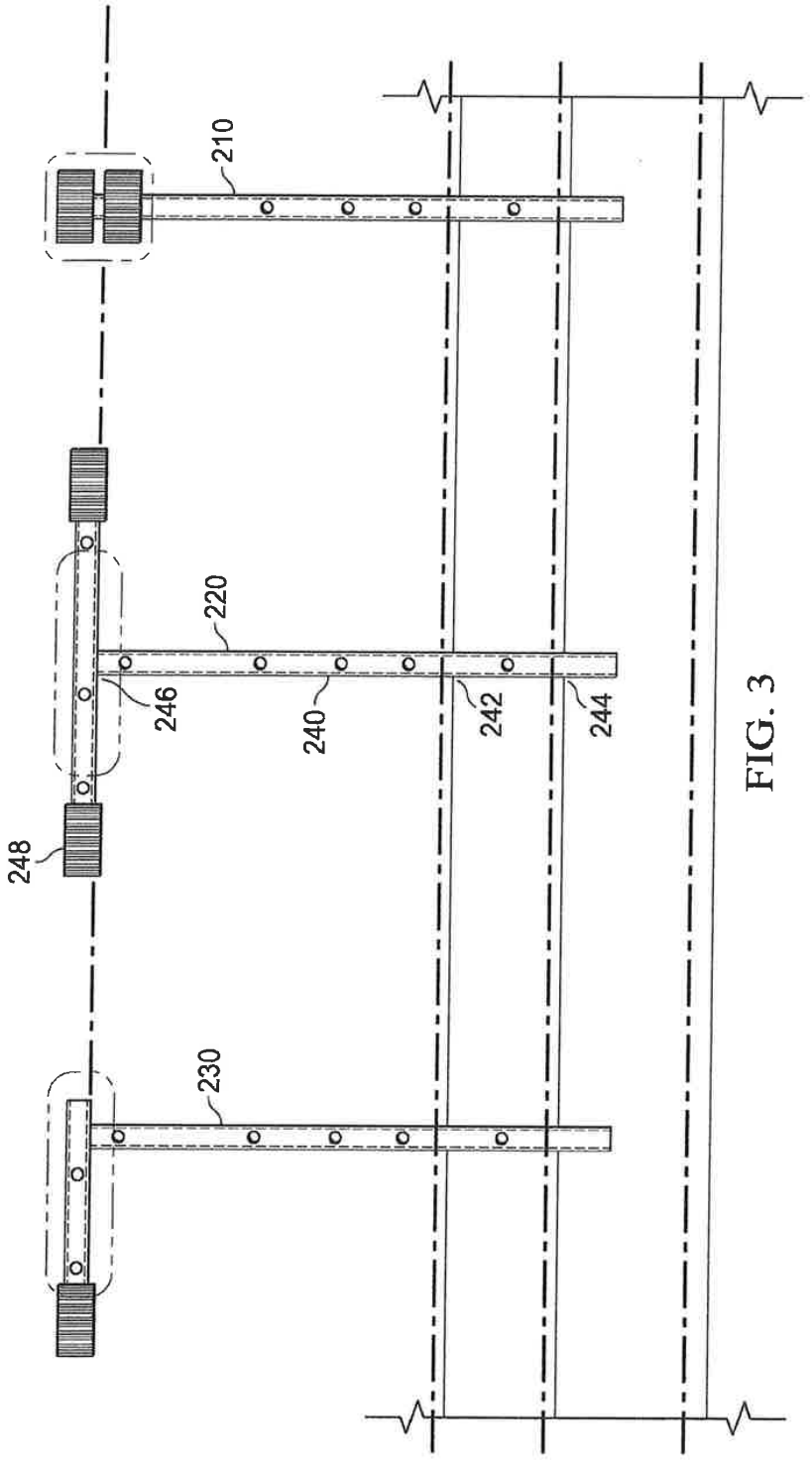


FIG. 3

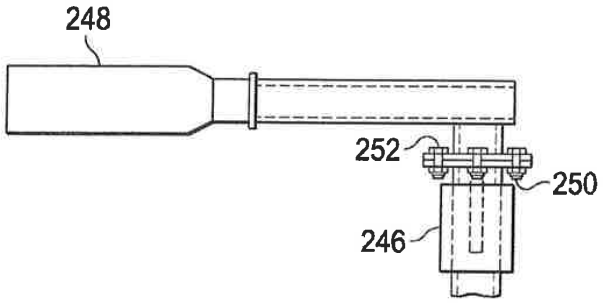


FIG. 4A

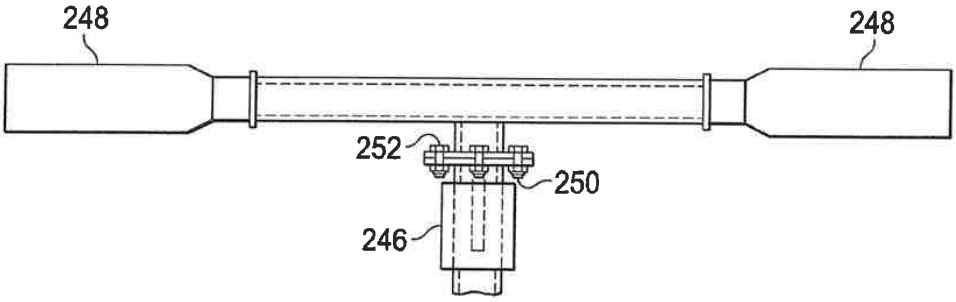


FIG. 4B

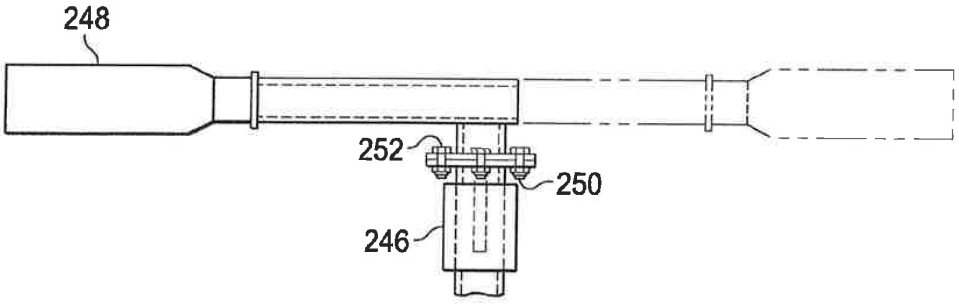


FIG. 5

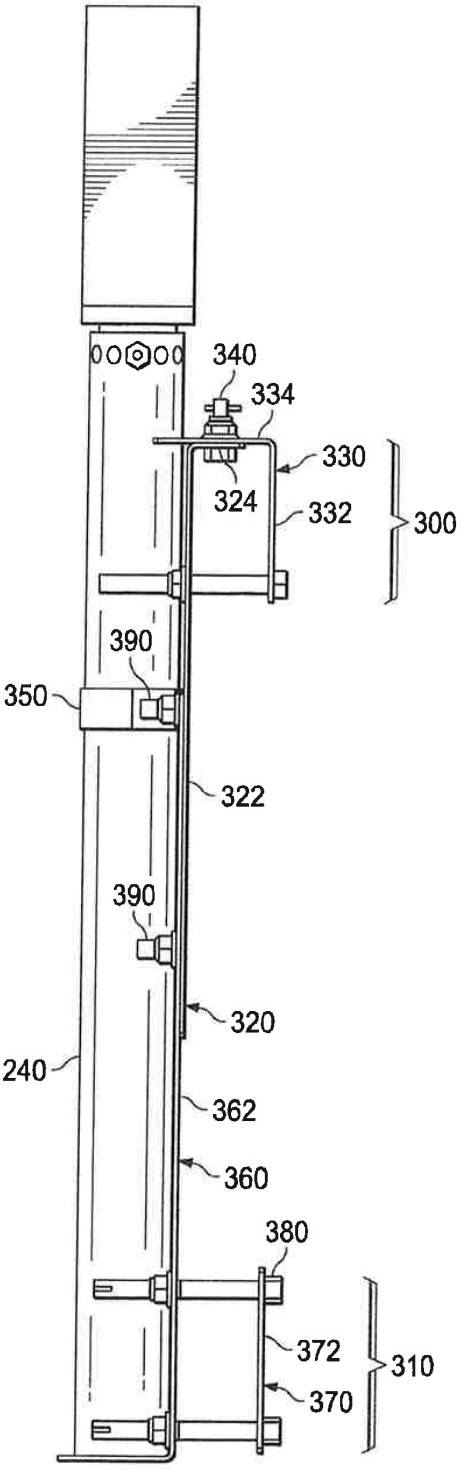

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FIG. 6

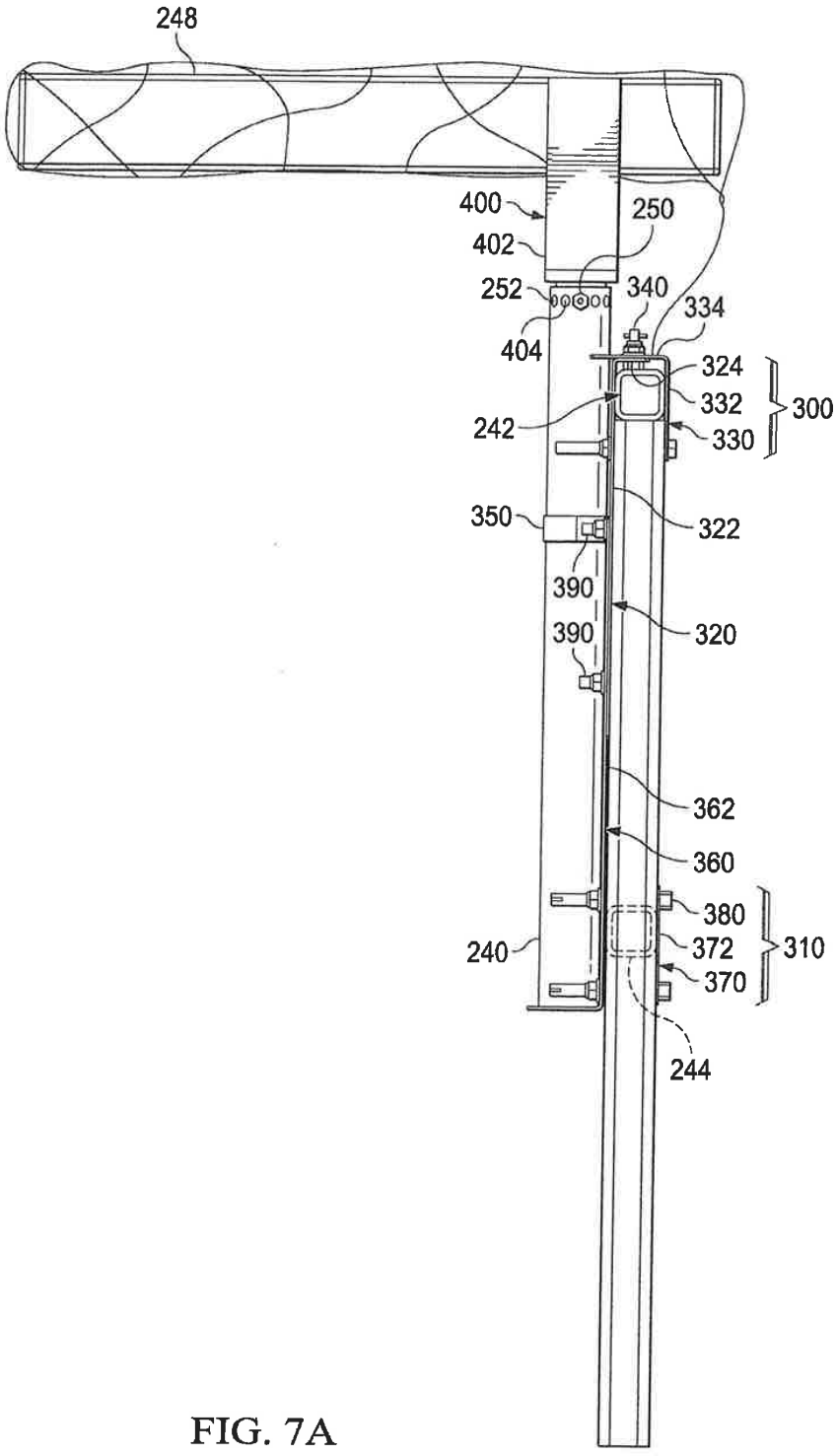

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FIG. 7A

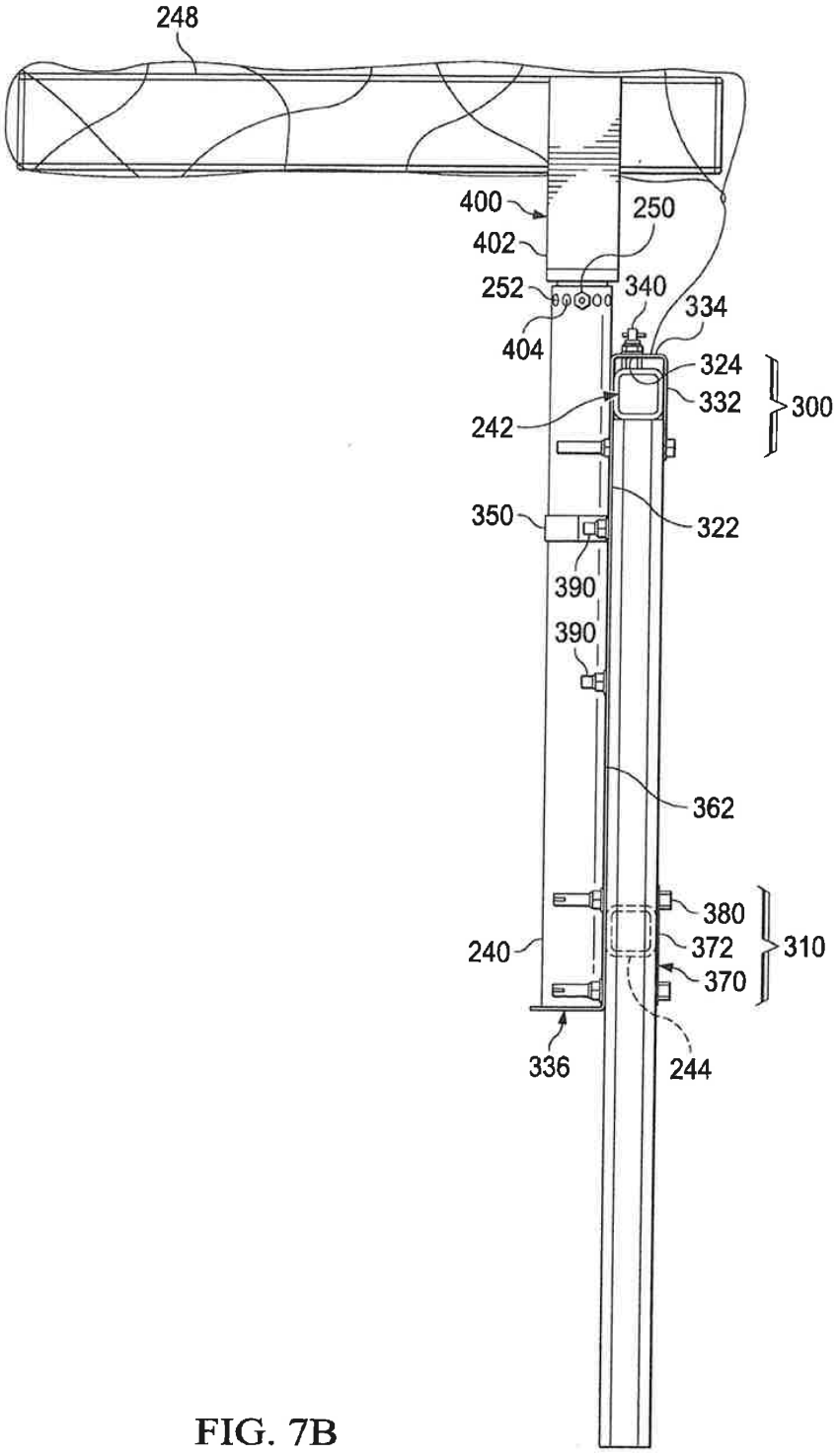

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FIG. 7B

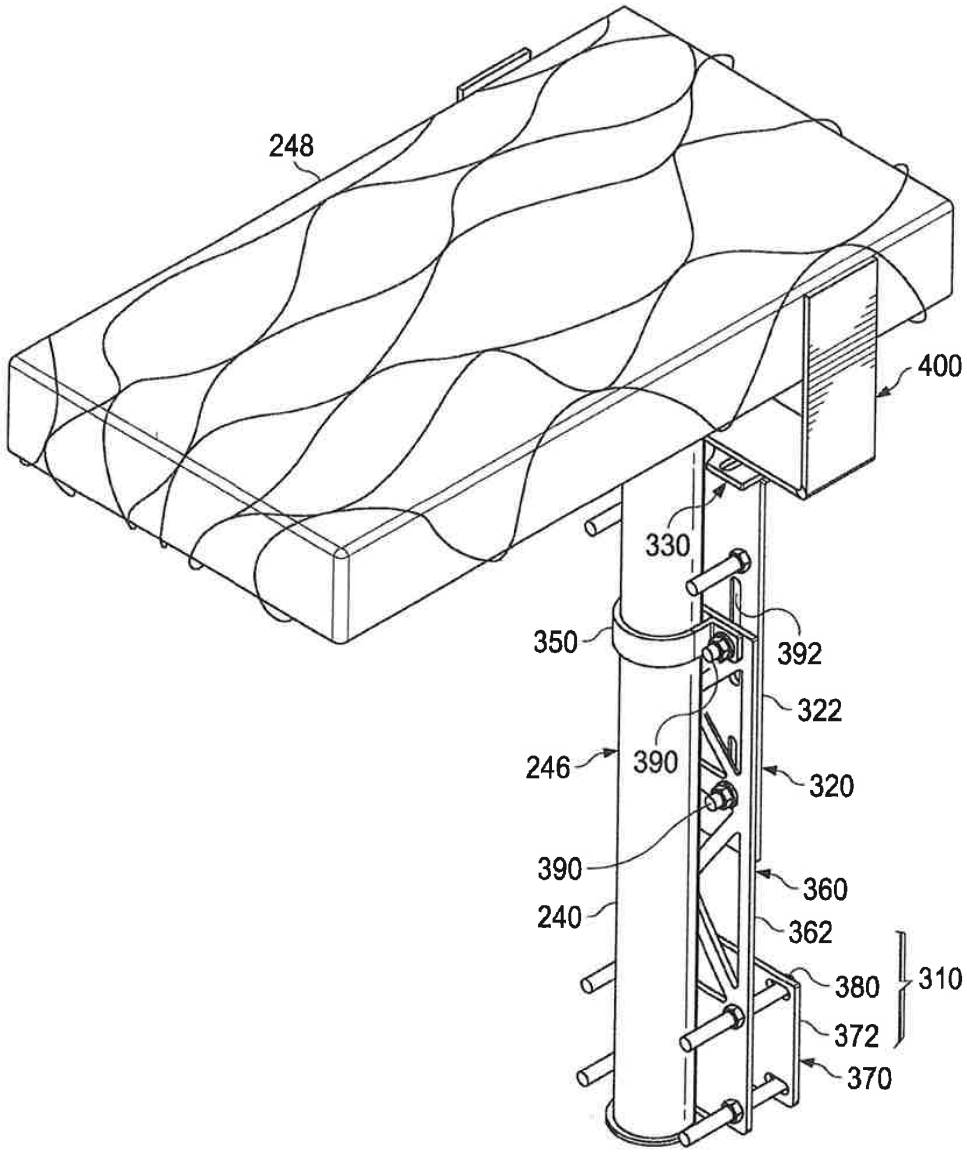

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FIG. 8

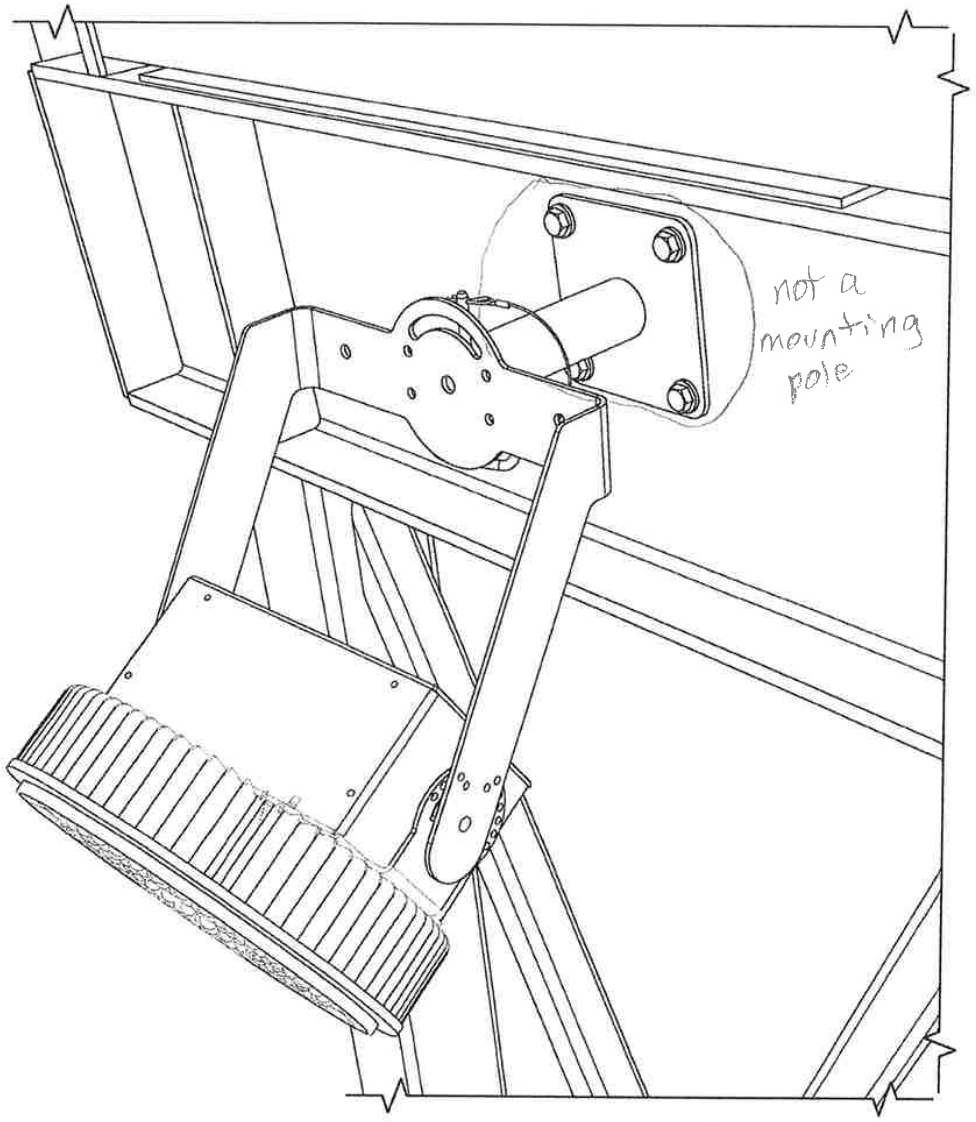


FIG. 9A

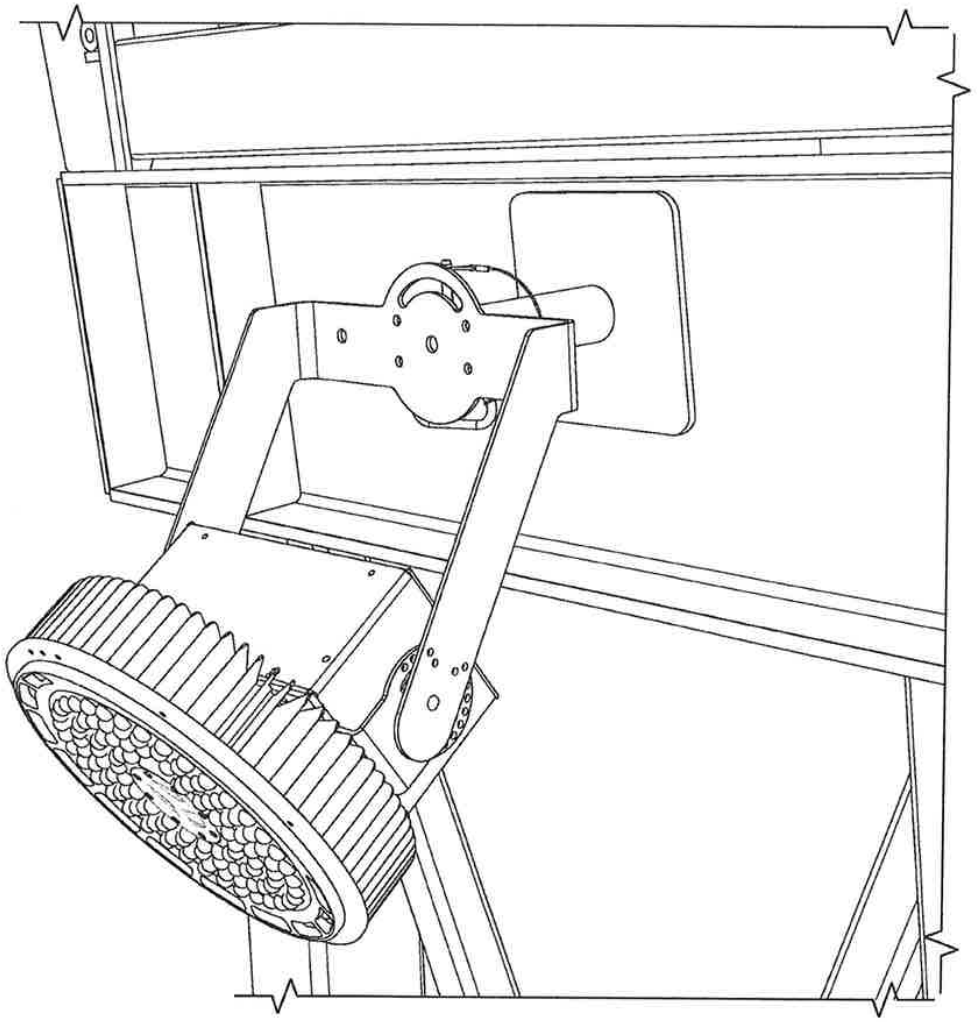


FIG. 9B

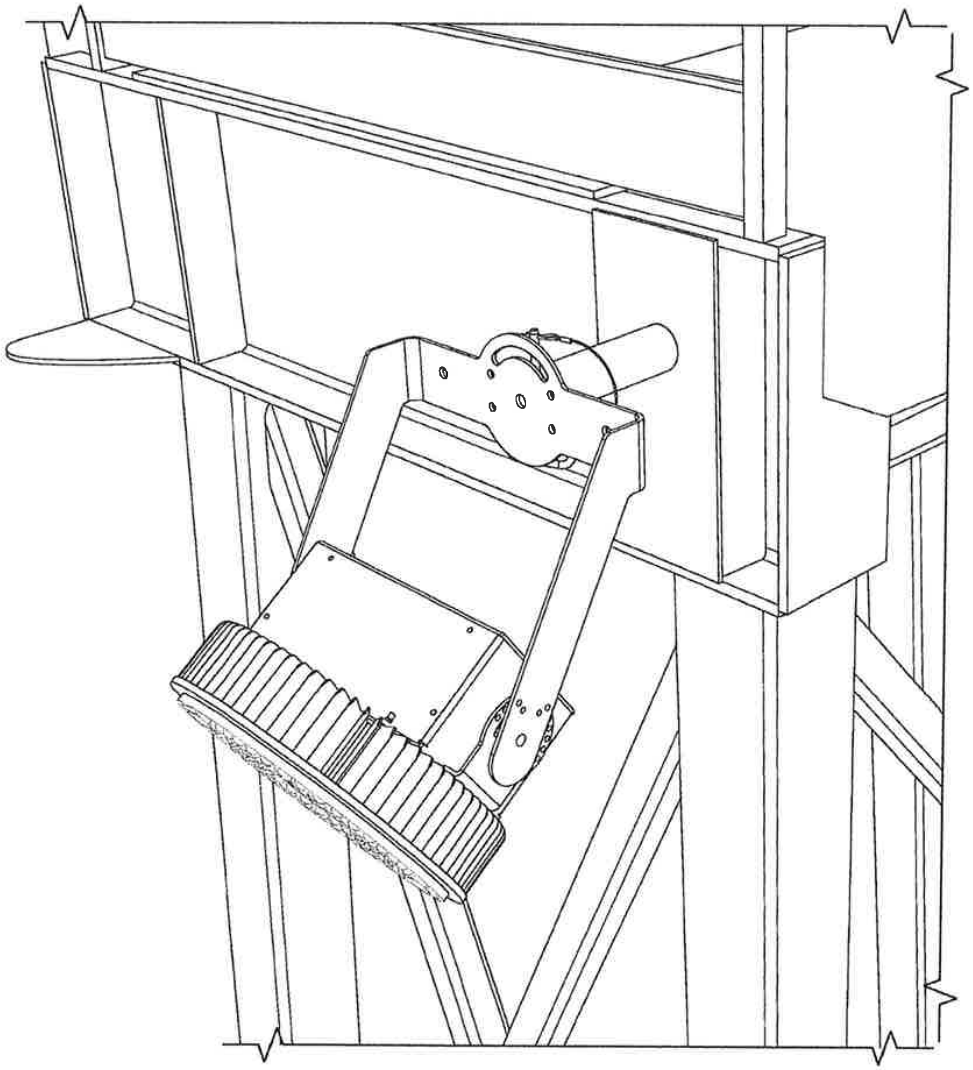


FIG. 9C

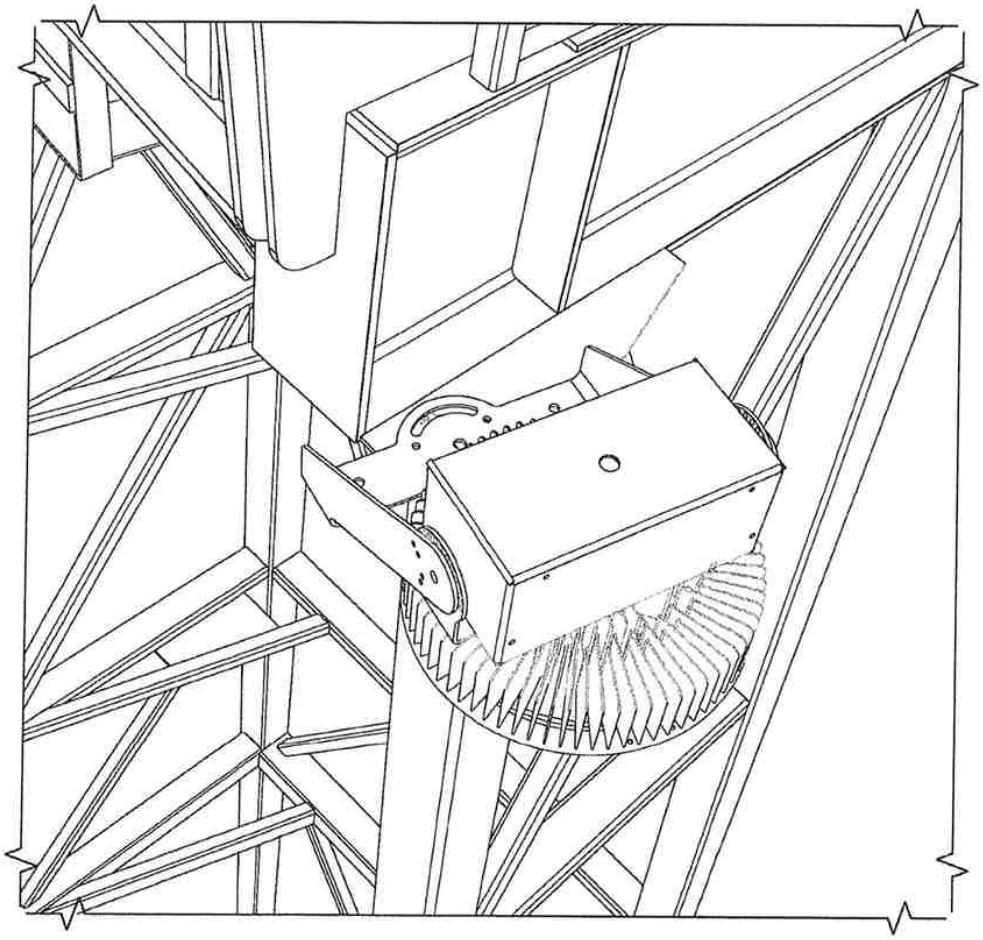


FIG. 9D

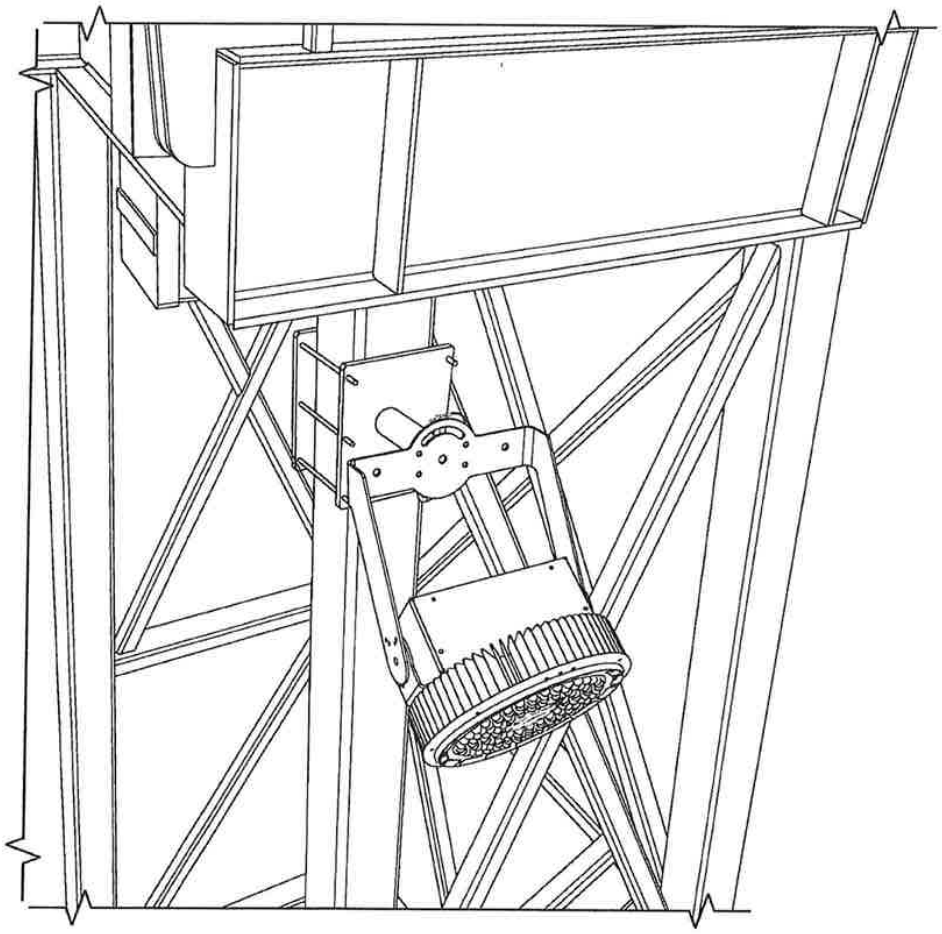


FIG. 9E

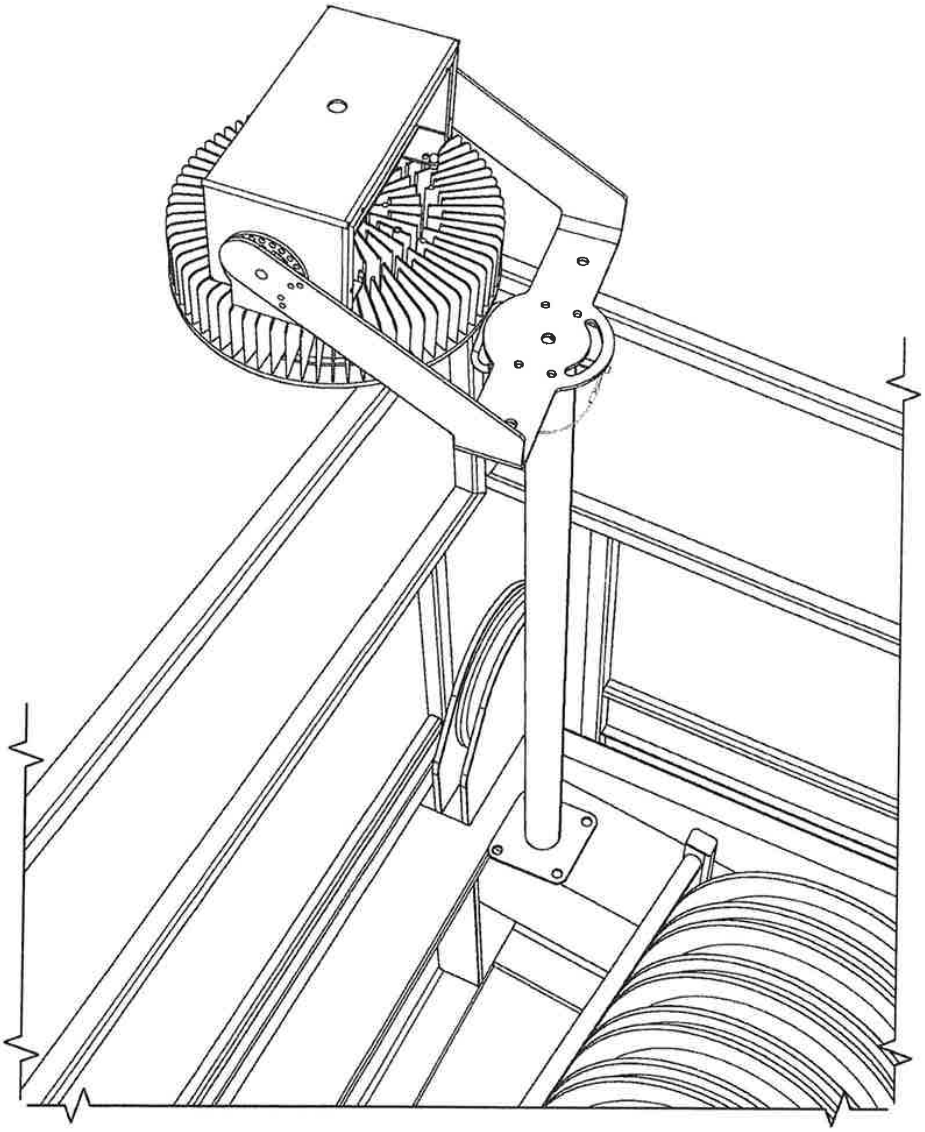


FIG. 9F

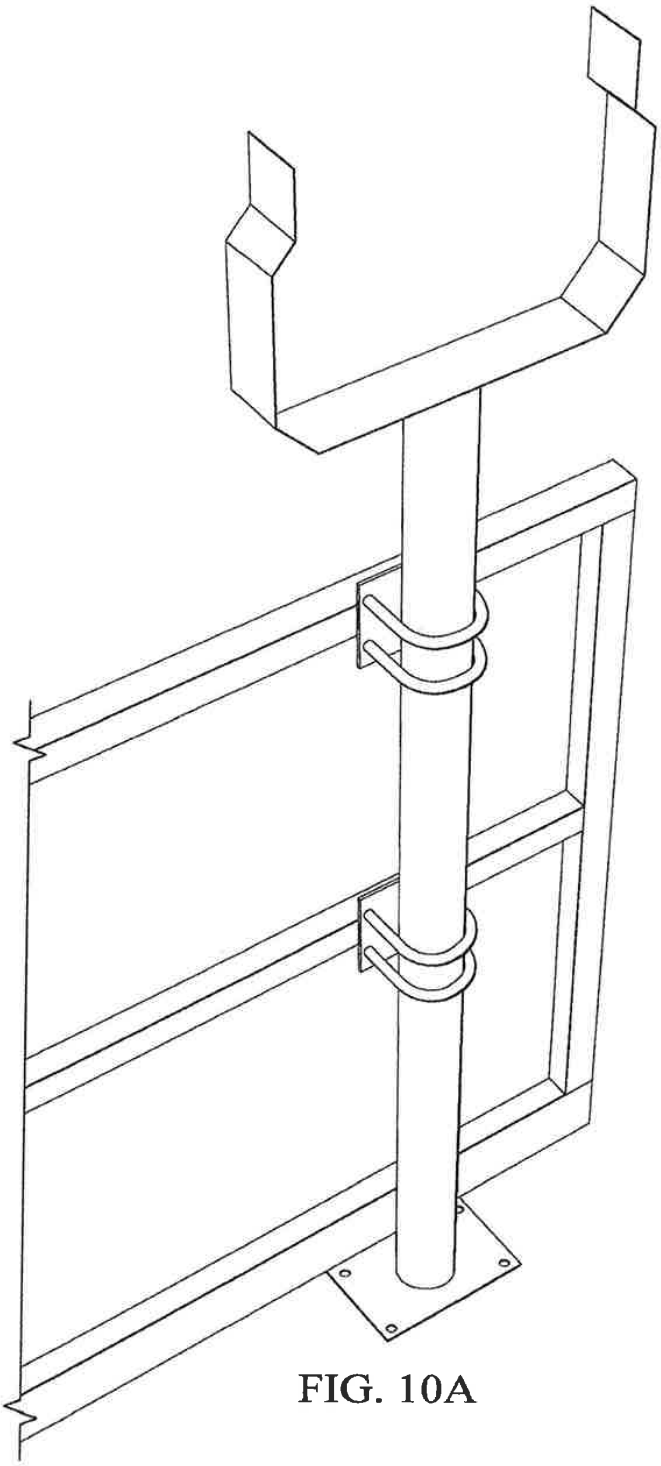


FIG. 10A

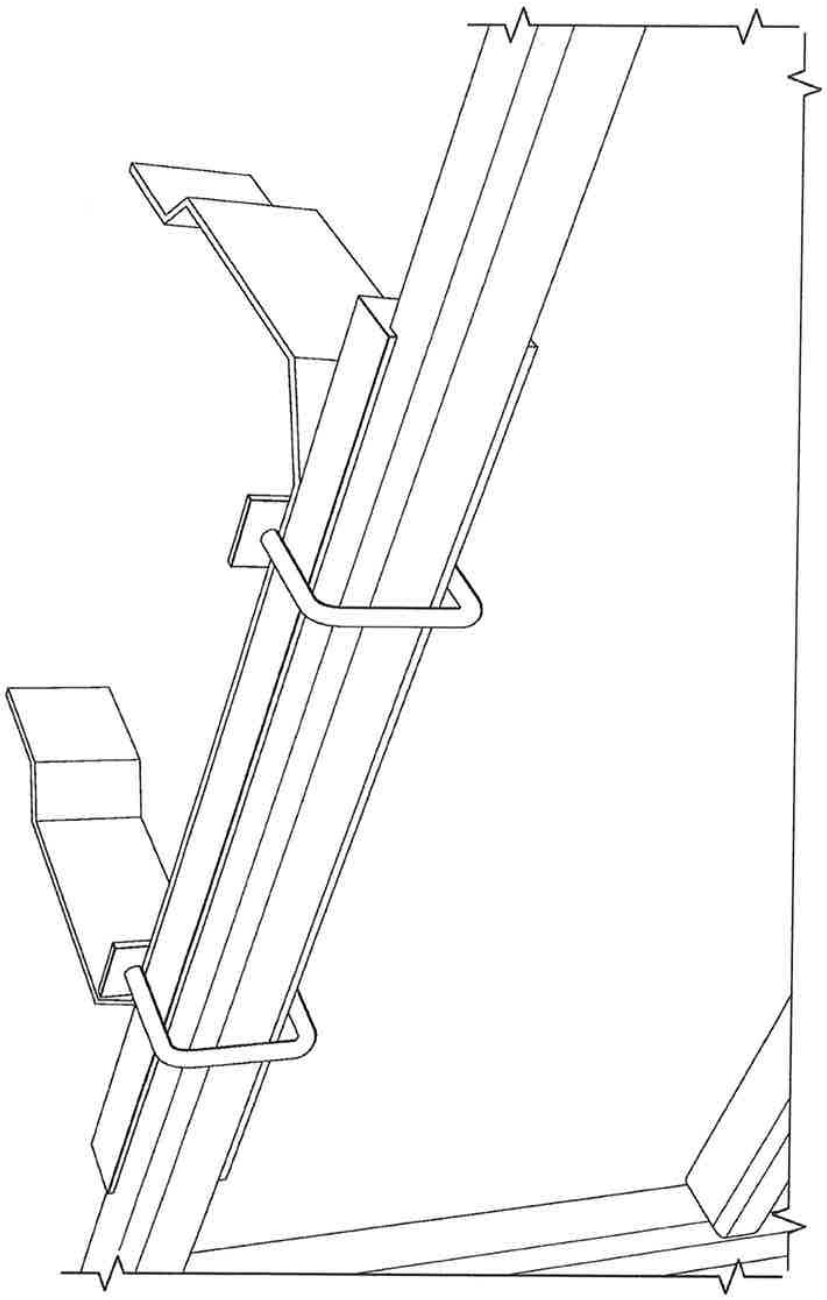


FIG. 10B

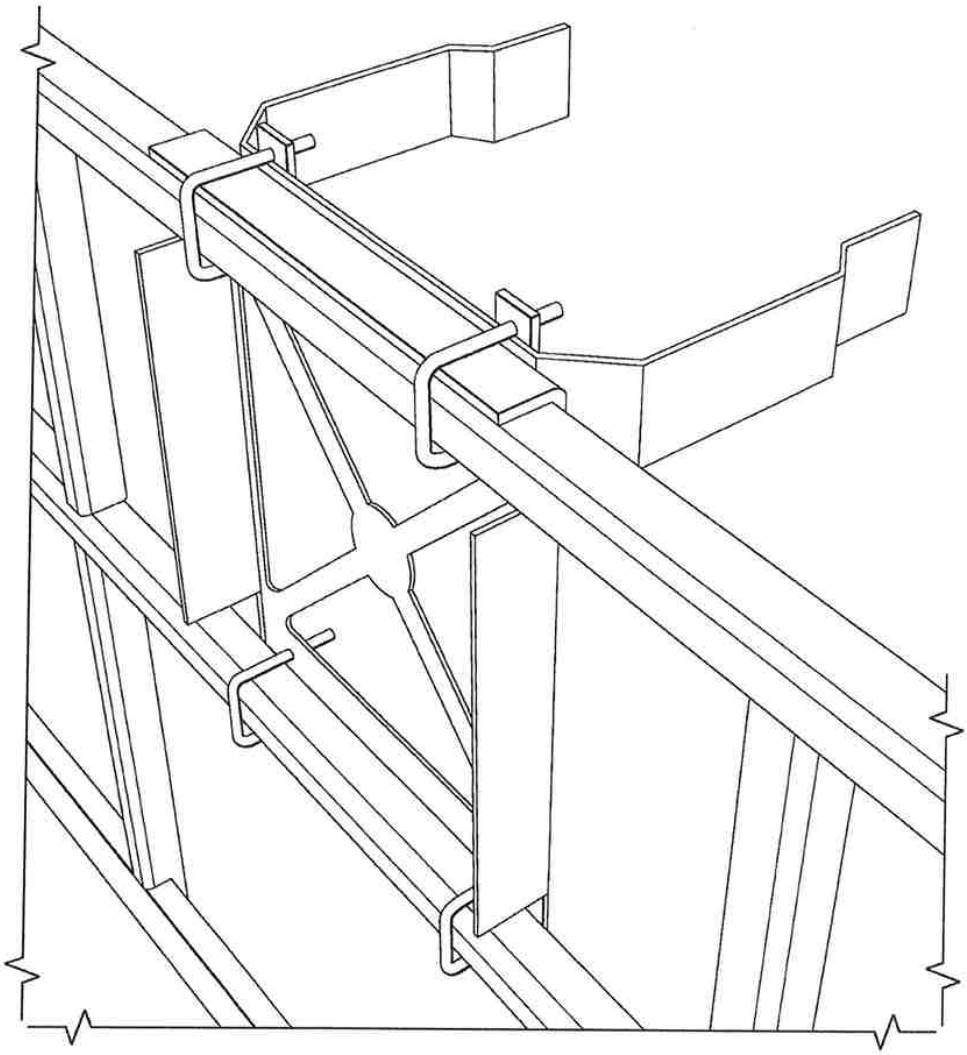


FIG. 10C

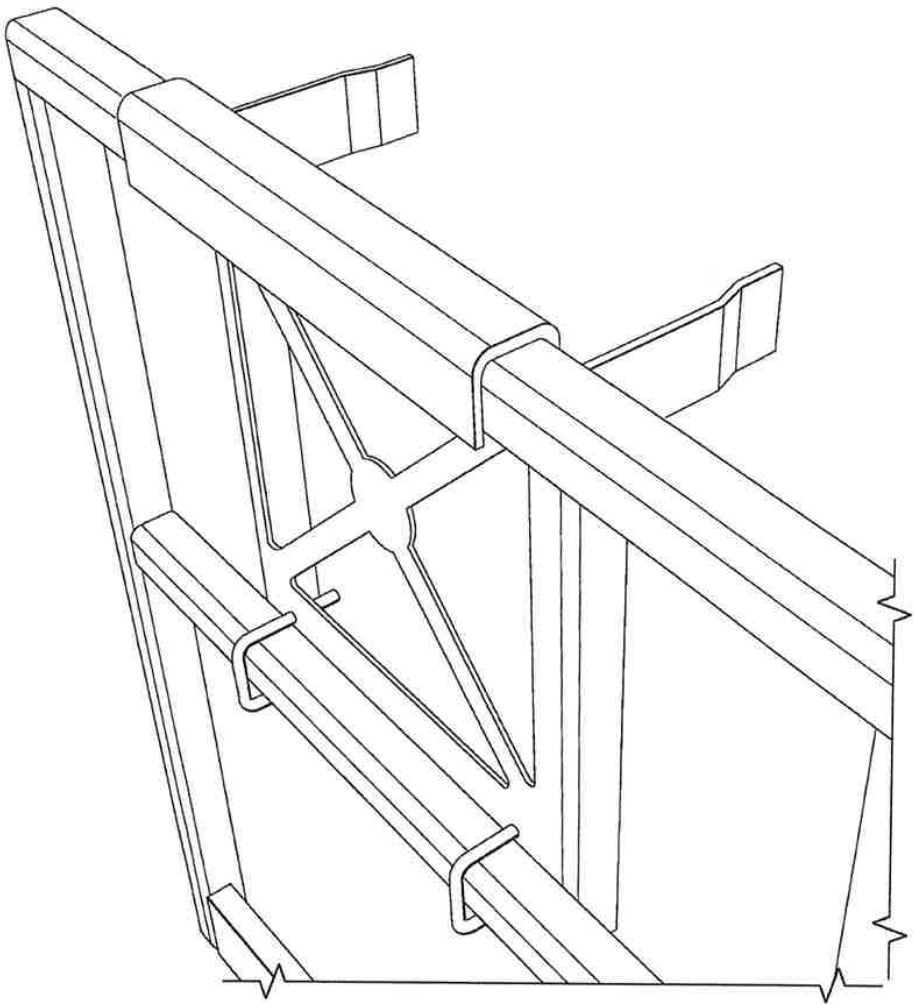


FIG. 10D

ELEVATED STRUCTURE-MOUNTED LIGHTING SYSTEM

TECHNICAL FIELD

The present application relates to lighting systems, and more particularly, to lighting systems that may be used for a drilling application.

BACKGROUND

Lighting systems for drilling rigs and their surrounding areas are critical to ensure continuous and safe operation of well sites. To ensure even and effective lighting of the well site, lighting systems have previously been installed on the uppermost portion of the drilling rig, also referred to as the "crown" of the rig. Prior art crown-mounted lighting systems developed for oil rigs are limited in several ways. Their designs are complicated and designed for specific rigs or rig types. Typically, once they are designed for a particular rig or a particular type of rig, the lighting systems designs are limited and are not able to be adapted for other uses.

Prior art lighting systems for drilling rigs are fixed, monolithic structures that are typically crown or frame systems, with a single size and layout accommodating one type of light and rig. Because they are a single structural unit, they are heavy and typically require cranes along with multiple workers for installation, removal, and adjustments. A typical rig lighting frame system may require between 6 and 12 hours for installation. Further, before a derrick can be moved, the lighting systems must be removed—again with all of the necessary equipment and personnel—and a similar amount of time may be required for uninstallation. These installation and uninstallation times extend the time needed between rig deployments. Due to the high cost of operating a rig, any such delay is extremely inefficient for the operator of a wellsite. These factors also increase the time required to be spent on maintaining these systems, which also increases safety risk.

SUMMARY

An improved elevated structure-mounted lighting system is disclosed. In addition to being used on rigs, embodiments of the lighting system may be used with different applications, including for drilling, production, refineries, frac sites, construction, and other industrial applications that may use tower/mast type equipment. The improved elevated structure-mounted lighting system may accommodate any style or design of crown section of a drilling rig and may be mounted on a pole or independent mount system.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the present invention are described with reference to the following figures. The same numbers are used throughout the figures to reference like features and components. Various embodiments may utilize elements and/or components other than those illustrated in the drawings, and some elements and/or components may not be present in various embodiments. Elements and/or components in the figures are not necessarily drawn to scale.

FIG. **1** illustrates a prior art crown-mounted frame-based lighting system.

FIG. **2** shows a three-dimensional isometric view of three embodiments of the improved elevated structure-mounted lighting system that are depicted relative to a crown deck.

FIG. **3** illustrates an elevation view of three embodiments of the improved elevated structure-mounted lighting system that are depicted relative to a crown deck.

FIGS. **4**A and **4**B are enlarged views of two embodiments of a light fixture and cap of a light unit of the improved elevated structure-mounted lighting system.

FIG. **5** is an enlarged view of an embodiment of a light fixture and a cap of a light unit illustrating different positions of the light fixture.

FIG. **6** is a side view of an embodiment of a light fixture mounting pole.

FIG. **7**A is a side view of the embodiment of FIG. **6** with a light fixture that is attached to rails.

FIG. **7**B is a side view of the embodiment with a single mounting plate.

FIG. **8** is a perspective view of the embodiment of FIG. **6**.

FIGS. **9**A-**9**F show various configurations of light fixture mounting embodiments on a rig.

FIGS. **10**A-**10**D show various configurations of light fixture mounting embodiments on the crown deck of a rig.

DETAILED DESCRIPTION

FIG. **1** illustrates a prior art lighting system **100**. The prior art lighting system is built from a single frame **120** which includes multiple frame lights **130**. The frame lights **130** are rigidly fixed onto the frame **120** and cannot be adjusted or repositioned. The frame **120** includes the electrical connections for the lights. The frame **120** may be installed on the crown **110**, or top, of a drilling rig such that the ground around the drilling rig is illuminated when in use.

FIG. **2** shows a three-dimensional isometric view and FIG. **3** shows an elevation view of three embodiments of the improved elevated structure-mounted lighting system **200** that are depicted relative to a crown deck. The embodiments of the lighting system **200** may be mounted on the crown deck of a drilling rig or on other elements of a frame structure. The lighting system **200** is lightweight in design and may be manufactured using any type of metal, including aluminum, steel, carbon, hot roll, etc. The frame structure may be hollow to reduce weight. The lighting system is also modular, which allows it to be assembled on site without the use of heavy equipment, cranes, harnesses, supports, cables, etc. This reduces the risk of accidents and the time and costs associated with the same. In an embodiment, a pole-mounted design may be set up by two people in under one hour. The system may accommodate a variety of different light types, with differing luminosities and power consumption, that may be selected based on the particular application. Variations of light types may include combustion-proof and/or LED lights.

The lighting system **200** is modular and assembled using multiple standalone pieces that may be configured to different structures. Three lighting unit embodiments from FIGS. **2** and **3** are shown in an I-shape **210**, T-shape **220**, and L-shape **230**, but this is not limiting and other configurations or modifications may be used, due in part to the modular nature of the system. There is no master frame or master support structure, which allows for configurability and customization.

As shown in FIG. **3**, the light units **210**, **220**, and **230** may include a mounting pole **240**, a bracket for a top rail **242**, a bracket for a bottom rail **244**, a cap **246**, and a light fixture **248**. The bracket for a top rail **242** and bracket for a bottom rail **244** may be used to attach the light mounting pole **240** to rails **205** of a crown deck of a drilling rig using U-shaped

bolts or straps, as shown in FIG. **2**. The straps are wrench-type straps that may be made out of a plastic composite. In another embodiment, the mounting pole **240** may be welded directly to the drilling rig crown or other structure.

In the alternative embodiment shown in FIG. **6**, mounting pole **240** may be attached to the crown deck or other structure using brackets **300** and **310** that attach to top rail **242** and bottom rail **246** respectively. In this particular embodiment, bracket **300** comprises a top mount plate **320** and a top rail clamp **330**, while bracket **310** comprises bottom mount plate **360** and clamp plate **370**. One benefit of this alternative embodiment is allowing the use of shorter mounting poles, which thereby reduces the overall weight of the system. As shown more clearly in FIG. **7**A, top mount plate **320** includes a vertical portion **322** that is substantially parallel to the central axis of mounting pole **240** and a horizontal portion **324** that is substantially parallel to the top surface of top rail **242**. Similarly, top rail clamp **330** includes a vertical portion **332** that is substantially parallel to the central axis of mounting pole **240** and a horizontal portion **334** that is substantially parallel to the top surface of top rail **242**. The horizontal portions of top mount plate **320** and top rail clamp **330** are connected together, as for example by one or more bolts, as shown in FIG. **7**. Alternatively, as shown in FIG. **7**A, top mount plate **320** and top rail clamp **330** may be combined into a single component that hooks over the top of top rail **242**.

Mounting pole **240** is held in place and attached to top rail **242** by the use of one or more bolts **340**, which are inserted through both top mount plate **320** and top rail clamp **330**. In the embodiment of FIG. **7**A with no separate top rail clamp, bolt(s) **340** are inserted through both vertical portions of top mount plate **320**.

Mounting pole **240** may be further held in position using one or more tube clamps **350**, which are bolted or otherwise connected to top mount plate **320** and/or bottom mount plate **360**.

Also as shown in FIG. **7**A, bottom mount plate **360** includes a vertical portion **362** that is substantially parallel to the central axis of mounting pole **240**. Optionally (but not shown), bottom mount plate **360** may also include a horizontal portion that is substantially parallel to the bottom of bottom rail **244**. Clamp plate **370** also includes a vertical portion **372** that is substantially parallel to the central axis of mounting pole **240**. Also, optionally (but not shown), clamp plate **360** may include a horizontal portion that is substantially parallel to the bottom of bottom rail **244**. Alternatively, as shown in FIG. **7**B, bottom mount plate **360** and clamp plate **370** may be combined into a single component **336** that hooks over the bottom of bottom rail **242**. In FIG. **7**B, bolt **340** may be optional.

Mounting pole **240** is held in place and attached to bottom rail **244** by the use of one or more bolts **380**, which are inserted through both bottom mount plate **360** and clamp plate **370**. In the embodiment of FIG. **7**A with no separate clamp plate, bolt(s) **380** are inserted through both vertical portions of bottom mount plate **360**. Mounting pole **240** may be further held in position using tube clamp **350**, which is also bolted or otherwise connected to mount plate **320**.

As shown in FIG. **6**, top mount plate **320** and bottom mount plate **360** are also connected to each other, using one or more bolts **390** or other fastening devices, providing further stability and for this alternative embodiment.

In addition, top mount plate **320** and bottom mount plate **360** may be configured with one or more vertically extending apertures **392** (as shown in FIG. **8**), allowing the two mount plates to be moved vertically in relation to each other, while still providing the ability to insert bolt(s) **390** or other fastening devices through both mount plates. The vertically extending apertures **392** thus allow this alternative embodiment to be used on crown decks or other structures with a wide range of different dimension and configurations.

The light fixture **248** connects structurally and electrically to the cap **246**, which houses wiring to accommodate any light fixture **248** that may be attached. The shape or configuration of cap **246** is not limited to that reflected in the figures, and other designs may be used as long as the cap is capable of being coupled to the light fixture **248**. For example, cap **246** may be a metal bracket onto which the light fixture **248** is attached. Referring to FIGS. **4**A and **4**B, the light fixture **248** may be bolted to the cap **246**, but is preferably connected to the cap using a pin-based engagement. The pins **250** may be removable. Once the light fixture **248** is engaged with the cap **246** such that pinholes **252** are aligned, one or more pins **250** may be inserted to securely connect the light fixture **248** to the cap **246**. Because the pins **250** are removable, the light fixture **248** may be disconnected and removed from the cap **246** by removing the pins **250**. The light fixture **248** and cap **246** are preferably structured so that the light fixture **248** may be engaged with the cap **246** to face outward (as shown in FIG. **4**A) or to face inward (as shown in FIG. **5**). This may be accomplished by aligning the pinholes **252** in at least a first position or in a second position. The light fixture **248** may be configured in the outward position for use and installed in the inward position for transport.

Based on the design, more than two positions may be contemplated. For example, as shown in FIG. **7**A, mounting pole **240** may be configured with a plurality of pinholes **252**. In this embodiment, where mounting pole **240** is cylindrical, pinholes **252** may be radially spaced around the circumference of mounting pole **240**. In addition, light fixture **248** may be connected to cap **246** by the use of light bracket **400**. In this embodiment, as shown in FIG. **7**A, light bracket **400** comprises a generally cylindrical portion **402**, which extends telescopically into at least the upper portion of mounting pole **240**. In addition, cylindrical portion **402** is configured with one or more pinholes **404** which are configured to be aligned with the one or more pinholes **252** on mounting pole **240**. In this way, pin(s) **250** may be used to maintain light fixture **248** in a plurality of different positions simply by removing pin **250** rotating the light bracket **400** until pinhole **404** aligns with a different pinhole on mounting pole **240**, and reinserting pin **250** in the new position. While the cap **246** and light fixture **248** are preferably proximate to the brackets that couple the light unit **210**, **220**, or **230** to the structure, an extension may be used between the cap **246** and the light fixture **248** to extend the light fixture **248** away from the structure to which the light unit **210**, **220**, or **230** is mounted.

Safety cables connected between the light fixture **248** and cap **246** may be used as a backup in the event that pins **250** back out or are sheared during an extreme weather condition.

Generally, the light units **210**, **220**, and **230** have a low profile to minimize the wind shear forces that may be experienced by the light units at the top of a structure (such as a rig) to which they are mounted. In a preferred embodiment, as shown in FIGS. **2**-**8**, the light units **210**, **220**, and **230** will extend above the crown deck and handrails(s) only as far as reasonably necessary for light fixture **248** to be configured such that it is able to illuminate the ground in the area surrounding the structure upon which the light unit is mounted.

As shown in FIGS. **2-8**, it is also preferable that mounting pole **240** be formed of a single unitary piece, rather than multiple separate portions that are joined together using bolts, screws, hinges, or other similar connections. Such a design naturally contributes to the structural stability of the light unit.

With prior art lighting systems, when a square frame is mounted, the lights are also fixed and cannot be moved as they are attached to the frame as a single unit. In contrast, in the improved elevated structure-mounted lighting system, each light may be mounted on a standalone base, and does not have to be attached to a master frame. Referring back to FIGS. **2** and **3**, multiple light units **210**, **220**, and **230** may be installed on a crown in different configurations.

Accordingly, the lights may be individually shifted up, down, left, or right. Based on the location of a light unit **210**, **220**, or **230**, if more surface area is required to be lit on a particular side, the lights may be configured and directed in that direction, or the light pole may be adjusted to achieve optimal surface lighting. Individual LED bulbs may be angled in a way to produce the greatest amount of light without dissipation. The lights or LED bulbs may be used with visors that are able to direct light in various directions. In an embodiment, efficient lights allow the lighting system to be run from 120V or 240V. The lights may come with dimmer, solar, and/or sensor options. Using sensors, the lights may be configured to illuminate when a particular ambient light threshold is reached, such as at dusk, dawn, or in overcast conditions. The lights may also utilize dimmer controllers, such that the lumen output may be adjusted to accommodate different conditions or configurations. Using both dimmable lights and sensors, the lights may be configured to gradually increase lumen output as ambient light decreases, which would promote efficient power consumption. The lights may also be configured for remote operation, such that the lights could be turned off or on using a wired or wireless controller from the base of the rig deck. As explained in further detail below, the lights may also be powered using a backup battery, and the backup battery may be charged using solar power. These factors allow for lighting to be achieved more efficiently than prior art lighting systems.

As one of skill in the art would understand from reading the foregoing description, it is not necessary that the light fixtures **248** be attached to the rig or other structure using mounting poles that have the particular configuration shown in FIGS. **2-8**. Consistent with the modular design that is central to the present invention, light fixtures may be connected to the structure using mounting brackets or other similar means of attachment.

For example, as shown in the embodiments in FIGS. **9A-9F**, the light fixtures **248** may be installed onto the derrick or mast structure of a rig (FIG. **9E**), or they may be installed on the top (FIG. **9F**), side (FIGS. **9A-9C**), or bottom (FIG. **9D**) of the crown deck. As shown in FIG. **9A**, the light fixture may be mounted onto a rig using a rig mounting bracket that directly bolts onto the side of the crown deck. The light fixture may be mounted onto a light fixture bracket that structurally connects to the rig mounting bracket. As shown in FIGS. **9B** and **9C**, the rig mounting bracket may be mounted to the side of the crown deck using one or more magnets. Rare earth magnets, such as neodymium magnets, are able to exert a significant magnetic pull force over even relatively small surface areas. For example, two four-inch diameter neodymium magnets would be rated for up to 2,600 lbs of pull force.

As shown in FIGS. **10A-10D**, various other configurations of rig mounting brackets may be used to connect light fixtures **248** to the handrail of the crown deck. FIG. **10A** shows a mounting pole secured to the top of a crown deck of a rig and also secured to two handrails using U-shaped bolts. FIG. **10B** shows a mounting bracket attached to a single square handrail using two U-shaped bolts. FIGS. **10C** and **D** show two different examples of a rig mounting bracket that spans two handrails and uses multiple U-shaped bolts. The rig mounting brackets may be secured to the rig structure using other configurations of bolts, and, as mentioned above, may also be welded directly to the rig structure. Rig mounting brackets that span multiple rig structural elements, such as the ones shown in FIGS. **10B** and C that span two handrails, may be able to more easily support multiple loads, including multiple light fixtures **248**, or a combination of light fixtures **248** and solar panels. To accommodate various configurations of rigs and illumination requirements, the light fixtures **248** may be mounted to the structure using any combination of the mounting examples above.

Metal safety nets may also be affixed to the crown below the light units **210**, **220**, and **230**. In additional to its modular frame design, the lighting system **200** may use consistent nut and bolt sizes, which allows flexibility and interoperability in its structural design and assembly.

The modular nature of the improved elevated structure-mounted lighting system also allows for it to be serviced or adjusted while it is erect and installed. There is a single cable to connect to a power source from crown to ground. At the lighting junction box, 12 quarter turn Appletons may be used. Woodhead plugs may also be used on the junction box. Further, the improved elevated structure-mounted lighting system does not have to be removed or taken down when the derrick or other applications are being transported or moved, which is allowed because the cords may be disconnected, rather than removed, during transport. Once transport is complete, the cords may be reconnected. Other features, such as an explosion-proof control panel on the ground with power switches may be used. As noted above, due to the high costs of rig operation, reducing time for installation and maintenance and improving safety are significant factors to reducing operation costs.

In an embodiment, the light fixtures **248** may be partially or completely powered by a solar array. A solar array may include solar panels, a battery unit, a step converter, and a power inverter. The solar panels capture solar energy and generate electricity that can be either used to power light fixtures **248** (and/or other equipment) or stored in the battery unit. In a common configuration, the light fixtures **248** would operate at night and draw electricity from the battery unit, using energy collected by the solar panels during the day and stored in the battery unit. When ambient light is low, such as during dawn, dusk, or in overcast conditions, or when additional illumination is needed, the light fixtures **248** may operate concurrently while solar energy is being collected. In instances in which light fixtures **248** require direct current (DC), a DC-DC step converter may be used to match the correct voltage input needed by the light fixtures **248**. In instances in which alternating current (AC) is needed, a power inverter could be used to convert DC power, such as the output from the solar panels or the output from the battery unit, to usable AC, which may be used by light fixtures **248** or other equipment. Various combinations of battery units, step converters, and power inverters may be used to accommodate different configurations and requirements of the lighting system **200**.

In an embodiment, the solar panels may be mounted to the handrails of the crown deck of a drilling rig. The solar panels may be mounted on their own or share mounting hardware with the light units **210**. In that sense, one or more solar panels may be mounted to the mounting pole **240**, to the top rail (**242**) or bottom rail (**244**) brackets, or to another point on mounting hardware for the light unit. Each solar panel could be mounted in a position that would optimize solar collection. In an embodiment, the solar panels mounted such that they may be moved into more than one position. One position may preferably serve as an operating position, while another position may preferably serve as a travel position. The solar panels may be configured in the operating position for use and in the travel position for transport or storage. In one embodiment, the solar panels may be separately mounted on other portions of the rig or on other structures.

Many modifications and other implementations beyond those set forth herein will be apparent having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the systems and methods described herein are not to be limited to the specific implementations disclosed and that modifications and other implementations are intended to be included within the scope of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense and not for purposes of limitation.

The invention claimed is:

1. A modular lighting system mounted on a rig, the modular lighting system comprising:

a plurality of light units, each light unit separately attached to a crown deck of the rig, and each light unit comprising:

a mounting pole;

a light fixture comprising one or more lights; and

a bracket configured to attach the mounting pole to the crown deck of the rig.

2. The lighting system of claim **1**, wherein the bracket is connected to the crown deck of the rig using bolts.

3. The lighting system of claim **1**, wherein the bracket is connected to the crown deck of the rig using a magnet.

4. The lighting system of claim **3**, wherein the magnet is a neodymium magnet.

5. The lighting system of claim **1**, wherein the bracket is configured to be connected to an underside of the base of the crown deck of the rig.

6. The lighting system of claim **1**, wherein the lighting system further comprises a plurality of solar panels.

7. The lighting system of claim **6**, wherein one or more of the plurality of solar panels is configured to be connected to either the base or the side of the crown deck of the rig.

8. The lighting system of claim **6**, wherein the lighting system further comprises a battery.

9. The lighting system of claim **6**, wherein one or more of the plurality of solar panels is structurally coupled to either the base or the side of the crown deck of the rig in a first position or a second position.

10. The lighting system of claim **9**, wherein when the one or more of the plurality of solar panels is in the first position, the one or more of the plurality of solar panels are oriented in an operational position.

11. The lighting system of claim **10**, wherein when the one or more of the plurality of solar panels is in the second position, the one or more of the plurality of solar panels are oriented in a transport position.

12. The lighting system of claim **6**, wherein the lighting system further comprises a power inverter.

13. The lighting system of claim **6**, wherein the lighting system further comprises a step converter.

14. The lighting system of claim **1**, wherein the rig is a drilling rig.

15. The lighting system of claim **1**, wherein the bracket is welded to the crown deck of the rig.

16. The lighting system of claim **1**, wherein each light unit is directly attached to the crown deck of the rig.

17. A method of illuminating a wellsite, comprising the steps of:

attaching a plurality of mounting poles to a crown deck of a rig, wherein each of the plurality of mounting poles is separately attached to the crown deck;

mounting a plurality of lights to the plurality of mounting poles, wherein each of the plurality of mounting poles supports at least one of the plurality of lights, and each of the plurality of lights is mounted to only one of the plurality of mounting poles; and

illuminating the wellsite using the plurality of lights.

18. The method of claim **17**, further comprising individually adjusting each of the plurality of lights.

19. The method of claim **17**, wherein attaching a plurality of mounting poles on a crown deck of a rig comprises:

attaching a removable bracket to one or more of the mounting poles; and

using the removable bracket to attach one or more of the mounting poles to the rig.

20. The method of claim **17**, further comprising:

coupling each light of the plurality of lights to one or more cables; and

coupling the one or more cables to the rig.

21. The method of claim **17**, further comprising installing a safety net below one of the plurality of lights.

22. The method of claim **17**, wherein each of the plurality of mounting poles is directly attached to the crown deck.

23. A rig comprising:

a derrick;

a crown deck at the top of the derrick; and

a plurality of light units, each light unit separately attached to the crown deck, each light unit comprising:

a mounting pole, wherein each light unit comprises a separate mounting pole, such that the system comprises a plurality of mounting poles; and

a light fixture comprising one or more lights, the light fixture coupled to the mounting pole.

24. The rig of claim **23**, further comprising safety nets connected to the rig.

25. The rig of claim **23**, wherein the light fixture is coupled to the rig using a cable.

26. The rig of claim **23**, wherein the light fixture may be coupled to the mounting pole in a first position or a second position and, when the light fixture is in the first position, the one or more lights of the light fixture are oriented away from the rig.

27. The rig of claim **26**, wherein, when the light fixture is in the second position, the one or more lights of the light fixture are oriented towards the rig.

28. The rig of claim **23**, wherein the rig is a drilling rig.

29. The rig of claim **23**, wherein each light unit is directly attached to the crown deck of the rig.

* * * * *

Exhibit 2

EXHIBIT 2

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(12) **United States Patent**
Allison et al.

(10) **Patent No.: US 10,900,626 B2**
(45) **Date of Patent: Jan. 26, 2021**

(54) **ELEVATED STRUCTURE-MOUNTED LIGHTING SYSTEM**

(71) Applicant: **C&M OILFIELD RENTALS, LLC**, Cody, WY (US)

(72) Inventors: **Joshua C. Allison**, Cody, WY (US); **Josh Haaland**, Cody, WY (US); **Jessica Ivanoff**, Cody, WY (US)

(73) Assignee: **C&M Oilfield Rentals, LLC**, Cody, WY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 9 days.

(21) Appl. No.: **16/571,527**

(22) Filed: **Sep. 16, 2019**

(65) **Prior Publication Data**

US 2020/0011496 A1 Jan. 9, 2020

Related U.S. Application Data

(63) Continuation of application No. 16/138,723, filed on Sep. 21, 2018, now Pat. No. 10,473,282, which is a continuation-in-part of application No. 16/009,032, filed on Jun. 14, 2018, now Pat. No. 10,711,961.

(60) Provisional application No. 62/643,663, filed on Mar. 15, 2018.

(51) **Int. Cl.**

F21S 8/08	(2006.01)
F21V 21/116	(2006.01)
F21V 33/00	(2006.01)
E21B 41/00	(2006.01)
F21W 131/403	(2006.01)
F21W 131/10	(2006.01)
F21W 131/402	(2006.01)

(52) **U.S. Cl.**

CPC ***F21S 8/088*** (2013.01); ***E21B 41/00*** (2013.01); ***F21V 21/116*** (2013.01); ***F21V 33/00*** (2013.01); *F21W 2131/1005* (2013.01); *F21W 2131/402* (2013.01); *F21W 2131/403* (2013.01)

(58) **Field of Classification Search**

CPC F21S 8/088; F21V 21/116; F21V 33/00; F21B 41/00

See application file for complete search history.

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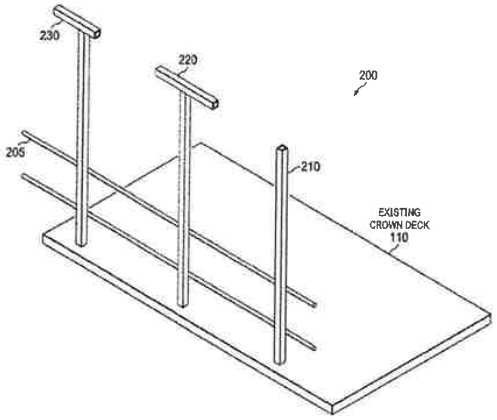
Swivelpole Brochure; Swivelpole Product Catalogue NEC V2-4, Printed Mar. 2014, pp. 5-9.

Primary Examiner — Anne M Hines
(74) *Attorney, Agent, or Firm* — Morgan, Lewis & Bockius LLP

(57) **ABSTRACT**

An improved elevated structure-mounted lighting system is disclosed. The lighting system may be used on drilling rigs, or with other applications, including for drilling, production, refineries, frac sites, construction, and other industrial applications that may use tower/mast type equipment. The improved elevated structure-mounted lighting system may accommodate any style or design of crown section of a drilling rig and may be mounted on a pole or independent mount system.

26 Claims, 8 Drawing Sheets



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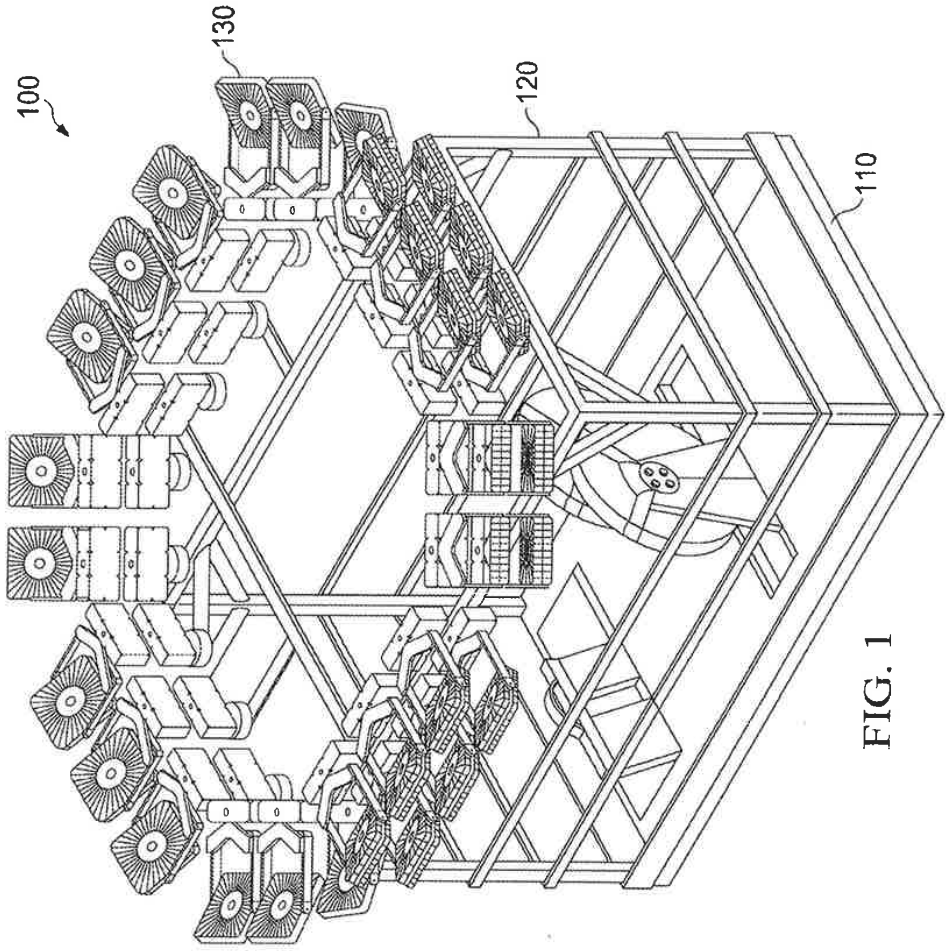


FIG. 1

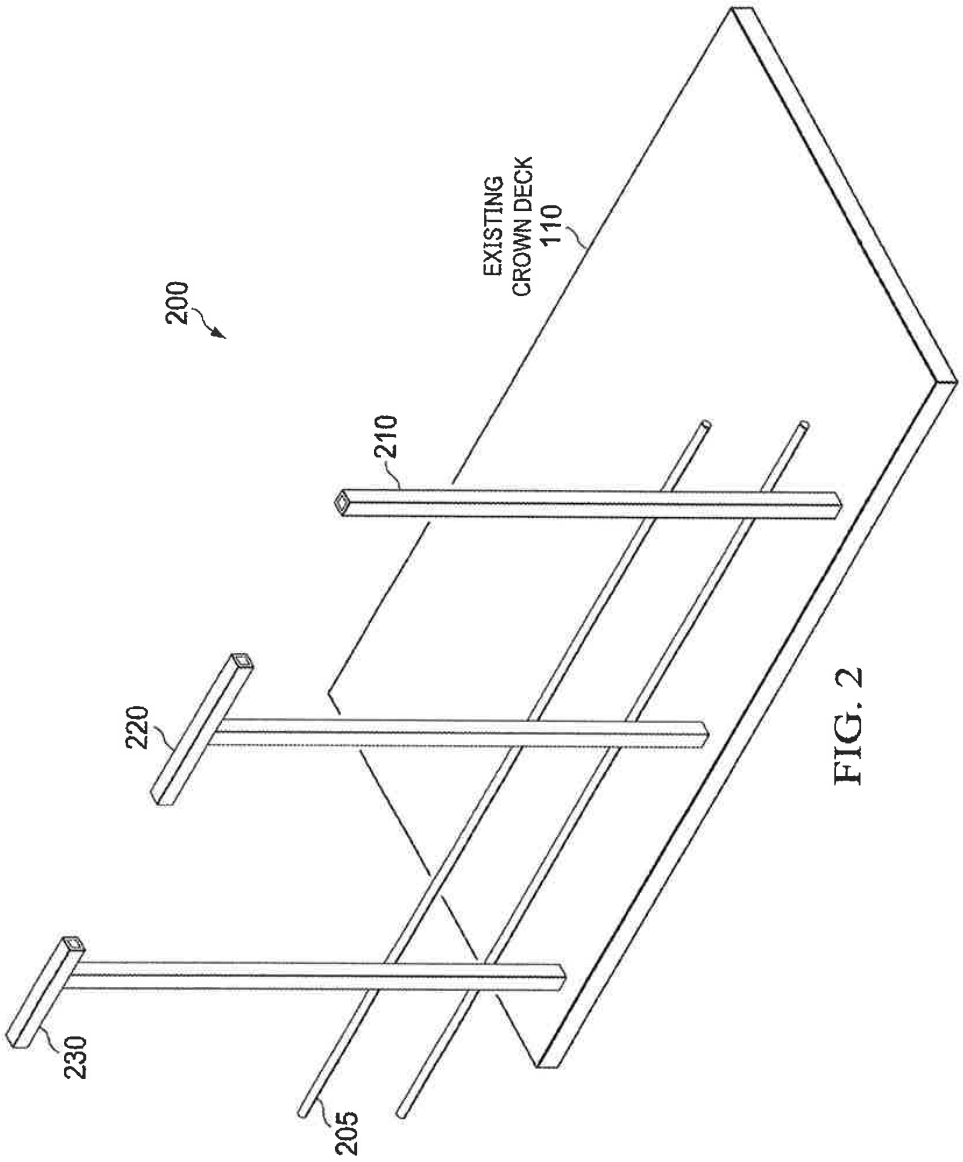


FIG. 2

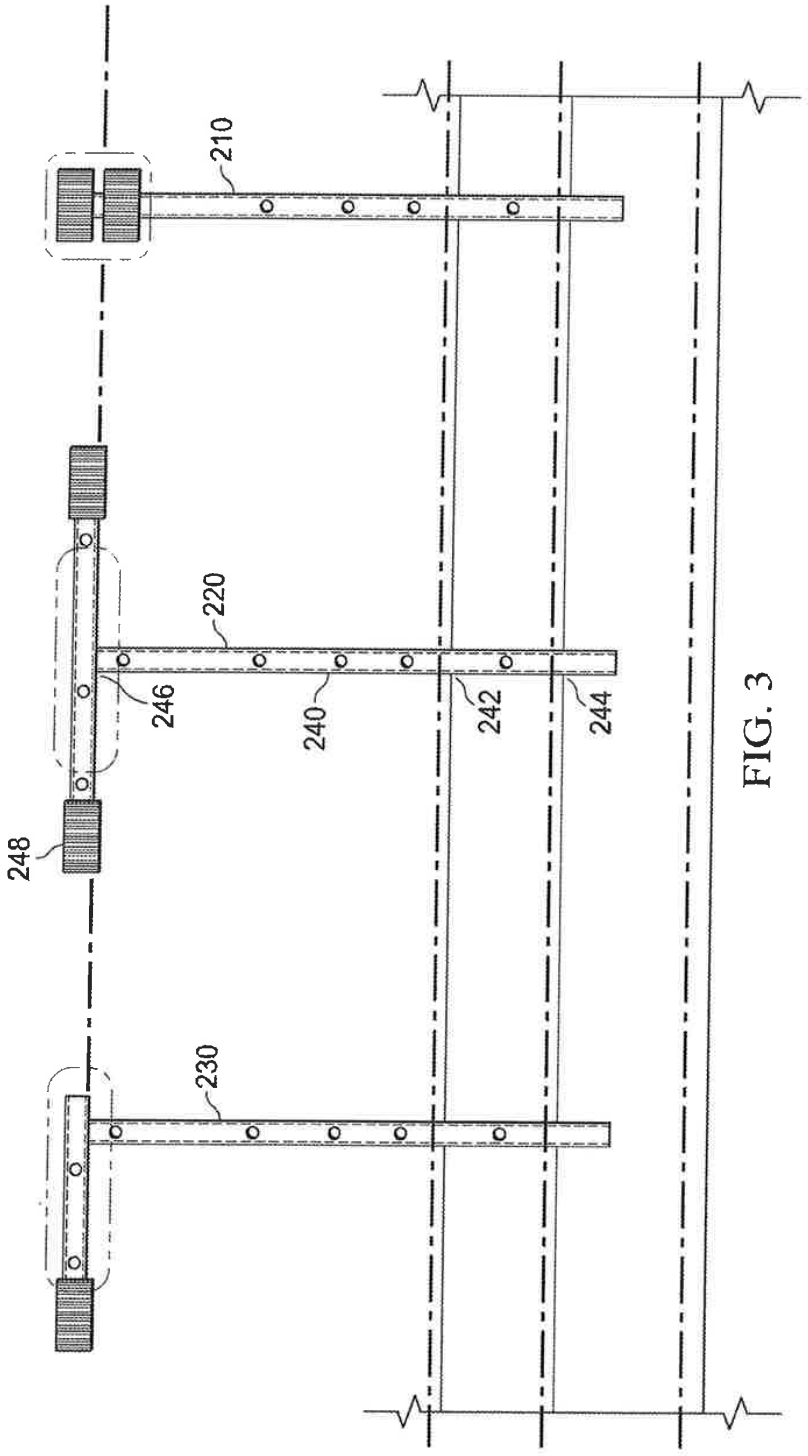


FIG. 3

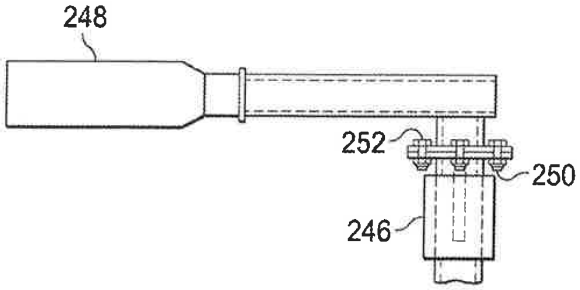


FIG. 4A

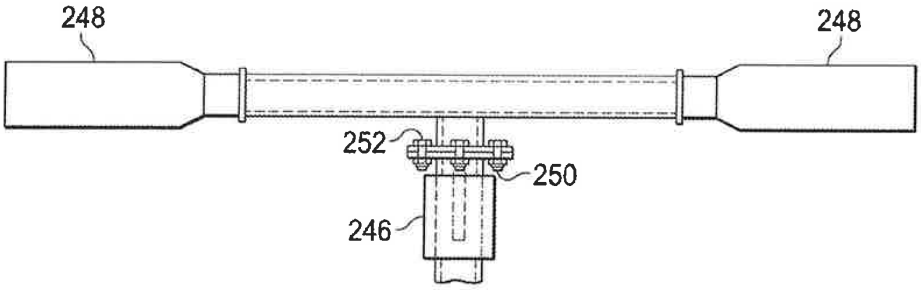


FIG. 4B

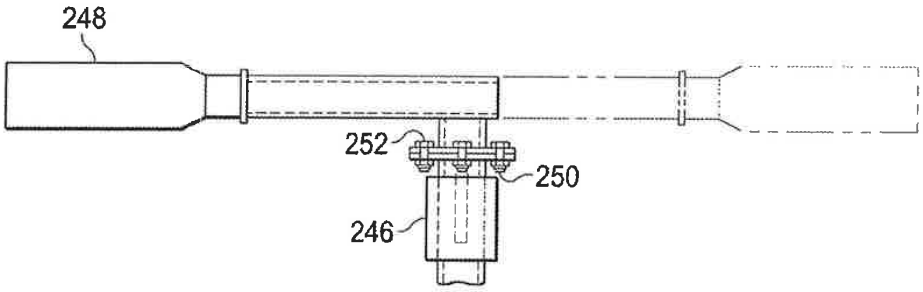


FIG. 5

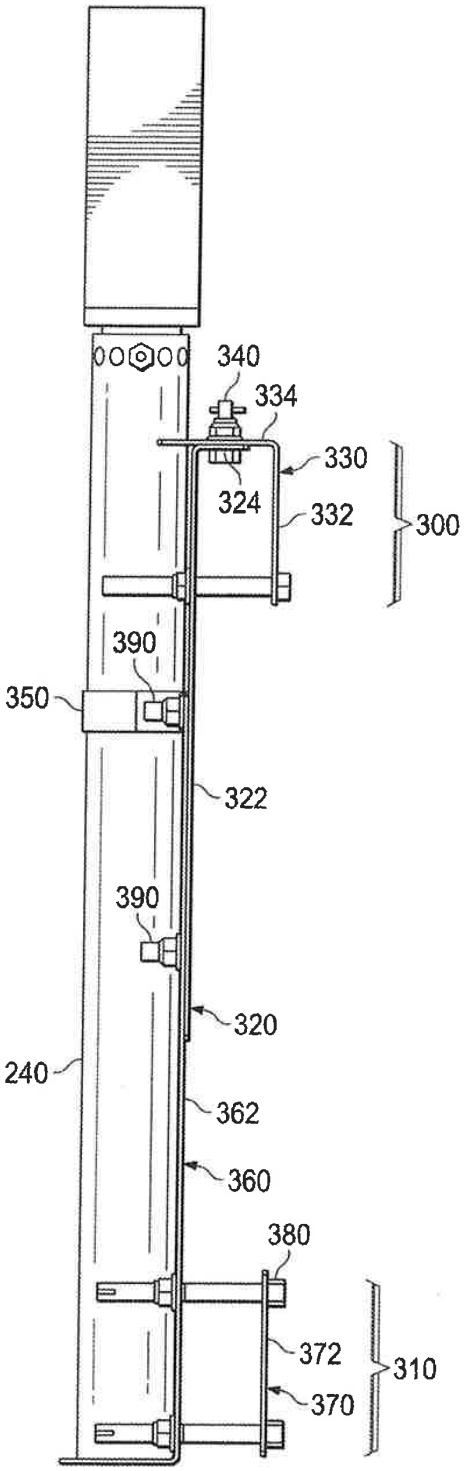

340
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324
332
300
390
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322
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380
372
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370

FIG. 6

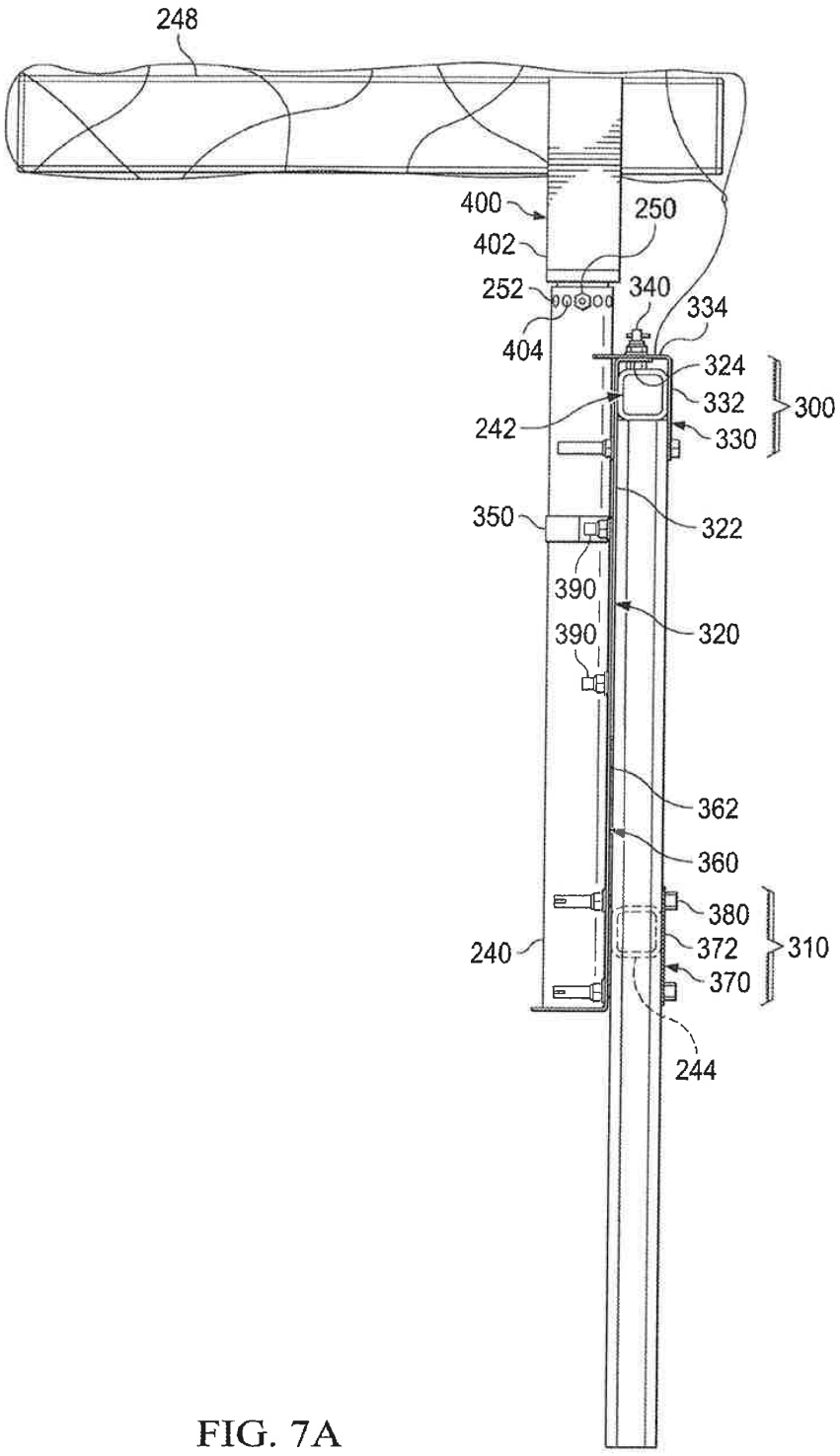

248
400
250
402
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404
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372
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244

FIG. 7A

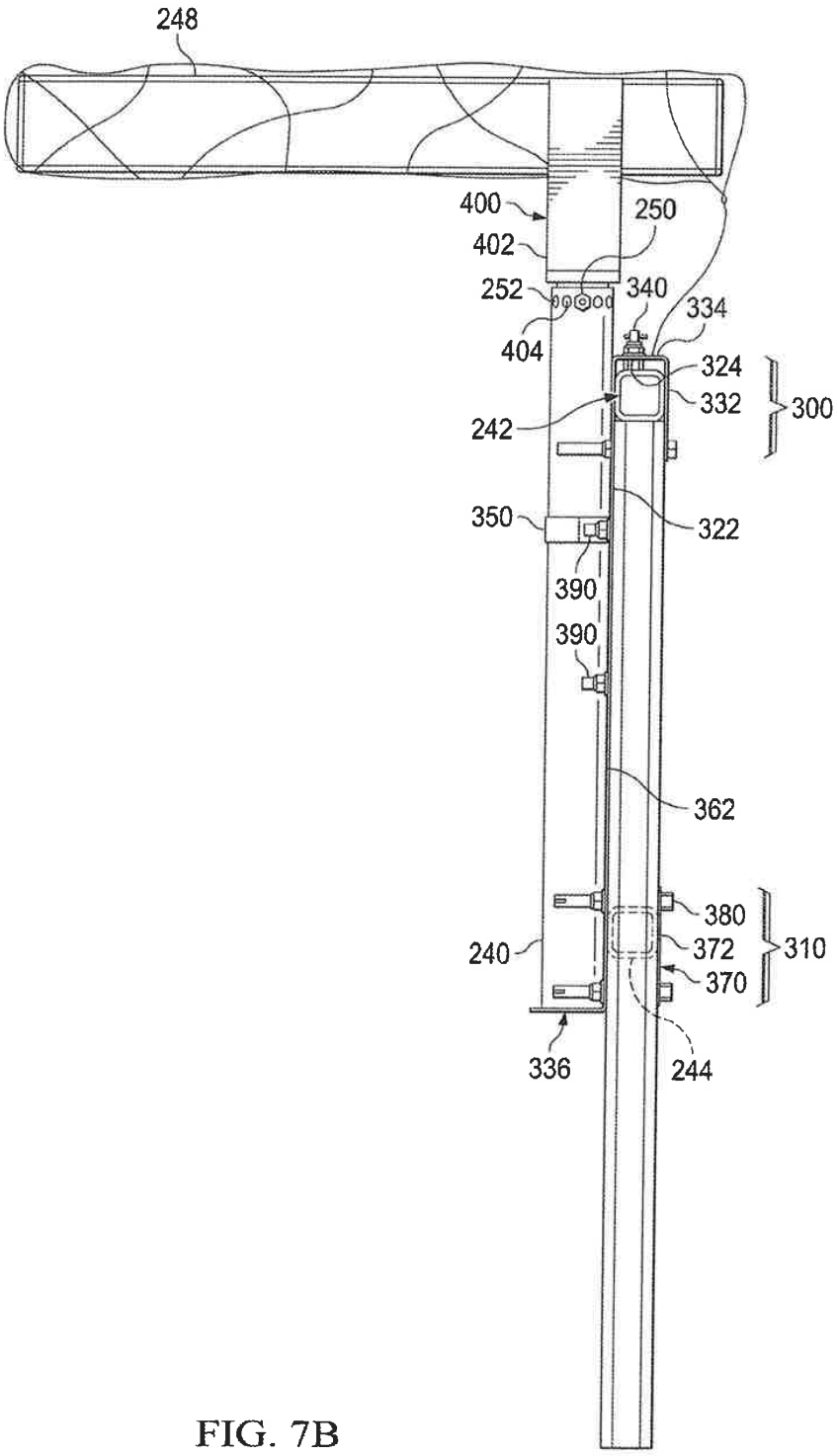

248
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244

FIG. 7B

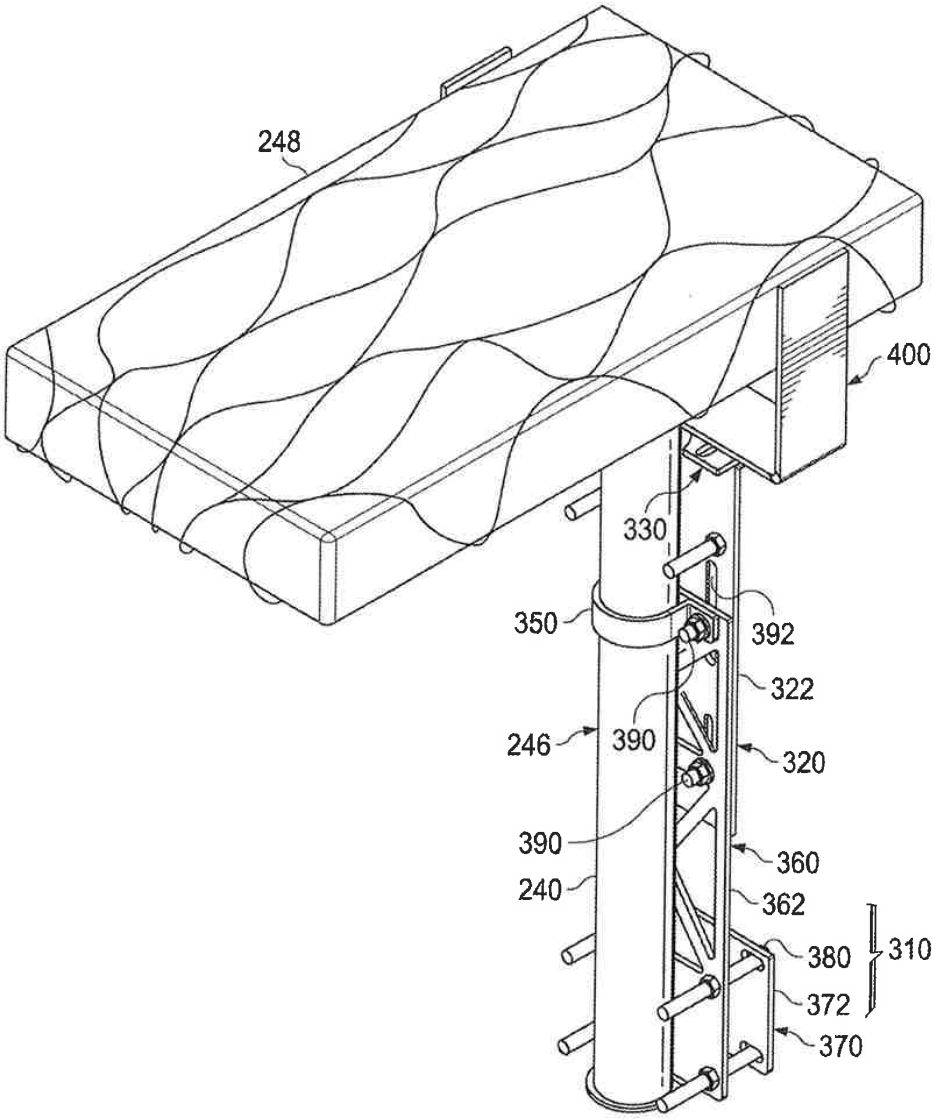

248
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330
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392
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246
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320
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360
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310
372
370

FIG. 8

ELEVATED STRUCTURE-MOUNTED LIGHTING SYSTEM

TECHNICAL FIELD

The present application relates to lighting systems, and more particularly, to lighting systems that may be used for a drilling application.

BACKGROUND

Lighting systems for drilling rigs and their surrounding areas are critical to ensure continuous and safe operation of well sites. To ensure even and effective lighting of the well site, lighting systems have previously been installed on the uppermost portion of the drilling rig, also referred to as the "crown" of the rig. Prior art crown-mounted lighting systems developed for oil rigs are limited in several ways. Their designs are complicated and designed for specific rigs or rig types. Typically, once they are designed for a particular rig or a particular type of rig, the lighting systems designs are limited and are not able to be adapted for other uses.

Prior art lighting systems for drilling rigs are fixed, monolithic structures that are typically crown or frame systems, with a single size and layout accommodating one type of light and rig. Because they are a single structural unit, they are heavy and typically require cranes along with multiple workers for installation, removal, and adjustments. A typical rig lighting frame system may require between 6 and 12 hours for installation. Further, before a derrick can be moved, the lighting systems must be removed—again with all of the necessary equipment and personnel—and a similar amount of time may be required for uninstallation. These installation and uninstallation times extend the time needed between rig deployments. Due to the high cost of operating a rig, any such delay is extremely inefficient for the operator of a wellsite. These factors also increase the time required to be spent on maintaining these systems, which also increases safety risk.

SUMMARY

An improved elevated structure-mounted lighting system is disclosed. In addition to being used on rigs, embodiments of the lighting system may be used with different applications, including for drilling, production, refineries, frac sites, construction, and other industrial applications that may use tower/mast type equipment. The improved elevated structure-mounted lighting system may accommodate any style or design of crown section of a drilling rig and may be mounted on a pole or independent mount system.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the present invention are described with reference to the following figures. The same numbers are used throughout the figures to reference like features and components. Various embodiments may utilize elements and/or components other than those illustrated in the drawings, and some elements and/or components may not be present in various embodiments. Elements and/or components in the figures are not necessarily drawn to scale.

FIG. **1** illustrates a prior art crown-mounted frame-based lighting system.

FIG. **2** shows a three-dimensional isometric view of three embodiments of the improved elevated structure-mounted lighting system that are depicted relative to a crown deck.

FIG. **3** illustrates an elevation view of three embodiments of the improved elevated structure-mounted lighting system that are depicted relative to a crown deck.

FIGS. **4**A and **4**B are enlarged views of two embodiments of a light fixture and cap of a light unit of the improved elevated structure-mounted lighting system.

FIG. **5** is an enlarged view of an embodiment of a light fixture and a cap of a light unit illustrating different positions of the light fixture.

FIG. **6** is a side view of an embodiment of a light fixture mounting pole.

FIG. **7**A is a side view of the embodiment of FIG. **6** with a light fixture that is attached to rails.

FIG. **7**B is a side view of the embodiment with a single mounting plate.

FIG. **8** is a perspective view of the embodiment of FIG. **6**.

DETAILED DESCRIPTION

FIG. **1** illustrates a prior art lighting system **100**. The prior art lighting system is built from a single frame **120** which includes multiple frame lights **130**. The frame lights **130** are rigidly fixed onto the frame **120** and cannot be adjusted or repositioned. The frame **120** includes the electrical connections for the lights. The frame **120** may be installed on the crown **110**, or top, of a drilling rig such that the ground around the drilling rig is illuminated when in use.

FIG. **2** shows a three-dimensional isometric view and FIG. **3** shows an elevation view of three embodiments of the improved elevated structure-mounted lighting system **200** that are depicted relative to a crown deck. The embodiments of the lighting system **200** may be mounted on the crown deck of a drilling rig or on other elements of a frame structure. The lighting system **200** is lightweight in design and may be manufactured using any type of metal, including aluminum, steel, carbon, hot roll, etc. The frame structure may be hollow to reduce weight. The lighting system is also modular, which allows it to be assembled on site without the use of heavy equipment, cranes, harnesses, supports, cables, etc. This reduces the risk of accidents and the time and costs associated with the same. In an embodiment, a pole-mounted design may be set up by two people in under one hour. The system may accommodate a variety of different light types, with differing luminosities and power consumption, that may be selected based on the particular application. Variations of light types may include combustion-proof and/or LED lights.

The lighting system **200** is modular and assembled using multiple standalone pieces that may be configured to different structures. Three lighting unit embodiments from FIGS. **2** and **3** are shown in an I-shape **210**, T-shape **220**, and L-shape **230**, but this is not limiting and other configurations or modifications may be used, due in part to the modular nature of the system. There is no master frame or master support structure, which allows for configurability and customization.

As shown in FIG. **3**, the light units **210**, **220**, and **230** may include a mounting pole **240**, a bracket for a top rail **242**, a bracket for a bottom rail **244**, a cap **246**, and a light fixture **248**. The bracket for a top rail **242** and bracket for a bottom rail **244** may be used to attach the light mounting pole **240** to rails **205** of a crown deck of a drilling rig using U-shaped bolts or straps, as shown in FIG. **2**. The straps are wrench-type straps that may be made out of a plastic composite. In another embodiment, the mounting pole **240** may be welded directly to the drilling rig crown or other structure.

In the alternative embodiment shown in FIG. **6**, mounting pole **240** may be attached to the crown deck or other structure using brackets **300** and **310** that attach to top rail **242** and bottom rail **246** respectively. In this particular embodiment, bracket **300** comprises a top mount plate **320** and a top rail clamp **330**, while bracket **310** comprises bottom mount plate **360** and clamp plate **370**. One benefit of this alternative embodiment is allowing the use of shorter mounting poles, which thereby reduces the overall weight of the system. As shown more clearly in FIG. **7A**, top mount plate **320** includes a vertical portion **322** that is substantially parallel to the central axis of mounting pole **240** and a horizontal portion **324** that is substantially parallel to the top surface of top rail **242**. Similarly, top rail clamp **330** includes a vertical portion **332** that is substantially parallel to the central axis of mounting pole **240** and a horizontal portion **334** that is substantially parallel to the top surface of top rail **242**. The horizontal portions of top mount plate **320** and top rail clamp **330** are connected together, as for example by one or more bolts, as shown in FIG. **7**. Alternatively, as shown in FIG. **7A**, top mount plate **320** and top rail clamp **330** may be combined into a single component that hooks over the top of top rail **242**.

Mounting pole **240** is held in place and attached to top rail **242** by the use of one or more bolts **340**, which are inserted through both top mount plate **320** and top rail clamp **330**. In the embodiment of FIG. **7A** with no separate top rail clamp, bolt(s) **340** are inserted through both vertical portions of top mount plate **320**.

Mounting pole **240** may be further held in position using one or more tube clamps **350**, which are bolted or otherwise connected to top mount plate **320** and/or bottom mount plate **360**.

Also as shown in FIG. **7A**, bottom mount plate **360** includes a vertical portion **362** that is substantially parallel to the central axis of mounting pole **240**. Optionally (but not shown), bottom mount plate **360** may also include a horizontal portion that is substantially parallel to the bottom of bottom rail **244**. Clamp plate **370** also includes a vertical portion **372** that is substantially parallel to the central axis of mounting pole **240**. Also, optionally (but not shown), clamp plate **360** may include a horizontal portion that is substantially parallel to the bottom of bottom rail **244**. Alternatively, as shown in FIG. **7B**, bottom mount plate **360** and clamp plate **370** may be combined into a single component **336** that hooks over the bottom of bottom rail **242**. In FIG. **7B**, bolt **340** may be optional.

Mounting pole **240** is held in place and attached to bottom rail **244** by the use of one or more bolts **380**, which are inserted through both bottom mount plate **360** and clamp plate **370**. In the embodiment of FIG. **7A** with no separate clamp plate, bolt(s) **380** are inserted through both vertical portions of bottom mount plate **360**. Mounting pole **240** may be further held in position using tube clamp **350**, which is also bolted or otherwise connected to mount plate **320**.

As shown in FIG. **6**, top mount plate **320** and bottom mount plate **360** are also connected to each other, using one or more bolts **390** or other fastening devices, providing further stability and for this alternative embodiment.

In addition, top mount plate **320** and bottom mount plate **360** may be configured with one or more vertically extending apertures **392** (as shown in FIG. **8**), allowing the two mount plates to be moved vertically in relation to each other, while still providing the ability to insert bolt(s) **390** or other fastening devices through both mount plates. The vertically extending apertures **392** thus allow this alternative embodiment to be used on crown decks or other structures with a wide range of different dimension and configurations.

The light fixture **248** connects structurally and electrically to the cap **246**, which houses wiring to accommodate any light fixture **248** that may be attached. Referring to FIGS. **4A** and **4B**, the light fixture **248** may be bolted to the cap **246**, but is preferably connected to the cap using a pin-based engagement. The pins **250** may be removable. Once the light fixture **248** is engaged with the cap **246** such that pinholes **252** are aligned, one or more pins **250** may be inserted to securely connect the light fixture **248** to the cap **246**. Because the pins **250** are removable, the light fixture **248** may be disconnected and removed from the cap **246** by removing the pins **250**. The light fixture **248** and cap **246** are preferably structured so that the light fixture **248** may be engaged with the cap **246** to face outward (as shown in FIG. **4A**) or to face inward (as shown in FIG. **5**). This may be accomplished by aligning the pinholes **252** in at least a first position or in a second position. The light fixture **248** may be configured in the outward position for use and installed in the inward position for transport.

Based on the design, more than two positions may be contemplated. For example, as shown in FIG. **7A**, mounting pole **240** may be configured with a plurality of pinholes **252**. In this embodiment, where mounting pole **240** is cylindrical, pinholes **252** may be radially spaced around the circumference of mounting pole **240**. In addition, light fixture **248** may be connected to cap **246** by the use of light bracket **400**. In this embodiment, as shown in FIG. **7A**, light bracket **400** comprises a generally cylindrical portion **402**, which extends telescopically into at least the upper portion of mounting pole **240**. In addition, cylindrical portion **402** is configured with one or more pinholes **404** which are configured to be aligned with the one or more pinholes **252** on mounting pole **240**. In this way, pin(s) **250** may be used to maintain light fixture **248** in a plurality of different positions simply by removing pin **250** rotating the light bracket **400** until pinhole **404** aligns with a different pinhole on mounting pole **240**, and reinserting pin **250** in the new position.

Safety cables connected between the light fixture **248** and cap **246** may be used as a backup in the event that pins **250** back out or are sheared during an extreme weather condition.

With prior art lighting systems, when a square frame is mounted, the lights are also fixed and cannot be moved as they are attached to the frame as a single unit. In contrast, in the improved elevated structure-mounted lighting system, each light may be mounted on a standalone base, and does not have to be attached to a master frame. Referring back to FIGS. **2** and **3**, multiple light units **210**, **220**, and **230** may be installed on a crown in different configurations.

Accordingly, the lights may be individually shifted up, down, left, or right. Based on the location of a light unit **210**, **220**, or **230**, if more surface area is required to be lit on a particular side, the lights may be configured and directed in that direction, or the light pole may be adjusted to achieve optimal surface lighting. Individual LED bulbs may be angled in a way to produce the greatest amount of light without dissipation. In an embodiment, efficient lights allow the lighting system to be run from 120V or 240V. The lights may come with dimmer, solar, and/or sensor options. These factors allow for lighting to be achieved more efficiently than prior art lighting systems.

Metal safety nets may also be affixed to the crown below the light units **210**, **220**, and **230**. In additional to its modular frame design, the lighting system **200** may use consistent nut

and bolt sizes, which allows flexibility and interoperability in its structural design and assembly.

The modular nature of the improved elevated structure-mounted lighting system also allows for it to be serviced or adjusted while it is erect and installed. There is a single cable to connect to a power source from crown to ground. At the lighting junction box, 12 quarter turn Appletons may be used. Woodhead plugs may also be used on the junction box. Further, the improved elevated structure-mounted lighting system does not have to be removed or taken down when the derrick or other applications are being transported or moved, which is allowed because the cords may be disconnected, rather than removed, during transport. Once transport is complete, the cords may be reconnected. Other features, such as an explosion-proof control panel on the ground with power switches may be used. As noted above, due to the high costs of rig operation, reducing time for installation and maintenance and improving safety are significant factors to reducing operation costs.

Many modifications and other implementations beyond those set forth herein will be apparent having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the systems and methods described herein are not to be limited to the specific implementations disclosed and that modifications and other implementations are intended to be included within the scope of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense and not for purposes of limitation.

The invention claimed is:

1. A lighting system mounted on a rig; the lighting system comprising:

a plurality of light units, each light unit comprising:

a mounting pole comprising a continuous structure, wherein each light unit comprises a separate mounting pole, such that the system comprises a plurality of mounting poles;

a bracket configured to connect the mounting pole to a handrail of the rig; and

a light fixture comprising one or more lights, the light fixture coupled to the mounting pole, wherein the light fixture may be coupled to the mounting pole in a first position or a second position; and

wherein the light fixture is proximate to the handrail of the rig in both the first position and the second position.

2. The lighting system of claim 1, further comprising safety nets connected to the rig.

3. The lighting system of claim 1, wherein the light fixture is secondarily coupled to the rig using a cable.

4. The lighting system of claim 1, wherein, when the light fixture is in the first position, the one or more lights of the light fixture are oriented away from the rig.

5. The lighting system of claim 4, wherein, when the light fixture is in the second position, the one or more lights of the light fixture are oriented towards the rig.

6. The lighting system of claim 1, wherein the bracket is welded to the rig.

7. The lighting system of claim 1, wherein the mounting pole and bracket are connected to the rig using U-shaped bolts.

8. The lighting system of claim 1, wherein the rig is a drilling rig.

9. A rig comprising:

a derrick;

a crown deck at the top of the derrick, the crown deck comprising a handrail; and

a plurality of light units attached to the handrail, each light unit comprising:

a mounting pole, wherein each light unit comprises a separate mounting pole, such that the system comprises a plurality of mounting poles; and

a light fixture comprising one or more lights, the light fixture coupled to the mounting pole.

10. The rig of claim 9, further comprising safety nets connected to the rig.

11. The rig of claim 9, wherein the light fixture is coupled to the rig using a cable.

12. The rig of claim 9, wherein the light fixture may be coupled to the mounting pole in a first position or a second position and, when the light fixture is in the first position, the one or more lights of the light fixture are oriented away from the rig.

13. The rig of claim 12, wherein, when the light fixture is in the second position, the one or more lights of the light fixture are oriented towards the rig.

14. The rig of claim 9, further comprising a bracket configured to connect the mounting pole to the handrail.

15. The rig of claim 14, wherein the mounting pole and bracket are connected to the rig using U-shaped bolts.

16. The rig of claim 9, wherein the rig is a drilling rig.

17. The rig of claim 9, wherein one or more of the plurality of mounting poles comprises a continuous structure.

18. The rig of claim 9, wherein the light fixture is proximate to the handrail in both the first position and the second position.

19. A method for illuminating a wellsite, comprising:

mounting a plurality of mounting poles on a crown deck of a rig, wherein each of the plurality of mounting poles is attached to a handrail of the crown deck;

mounting a plurality of lights to the plurality of mounting poles, wherein each of the plurality of mounting poles supports at least one of the plurality of lights, and each of the plurality of lights is mounted to only one of the plurality of mounting poles; and

illuminating the wellsite using the plurality of lights.

20. The method of claim 19, further comprising individually adjusting each of the plurality of lights.

21. The method of claim 19, wherein mounting a plurality of mounting poles on a crown deck of a rig comprises:

attaching a removable bracket to one or more of the mounting poles on the rig; and

using the removable bracket the attach one or more of the mounting poles to the rig.

22. The method of claim 19, wherein each of the plurality of lights mounted at the one or more of the plurality of mounting poles attached to the handrail of the crown deck of the rig is proximate to the handrail.

23. The method of claim 22, wherein one or more of the plurality of mounting poles comprises a continuous structure.

24. The method of claim 19, further comprising:

coupling each light of the plurality of lights to one or more cables; and

coupling the one or more cables to the rig.

25. The method of claim 19, further comprising installing a safety net below one of the plurality of lights.

26. The method of claim 19, wherein one or more of the plurality of mounting poles comprises a continuous structure.

* * * * *

Exhibit 3

EXHIBIT 3

Technical Resumé for Gary R. Wooley



Personal

Born New Orleans, Louisiana
Married with three children, three grandchildren
Member, director, board member or officer of various educational, civic, and religious organizations

Education

Louisiana State University:
BS: Mechanical Engineering, January 1969
MS: Engineering Mechanics, May 1970
PhD: Engineering Science, December 1972, with Minors in Applied Mathematics and Mechanical Engineering
Honors: NSF Fellow, LSU Dissertation Fellow, Dean's List, Phi Kappa Phi (Phi Beta Kappa), Sigma Xi, Tau Beta Pi, Pi Tau Sigma

Various Petroleum Professional Short Courses

Technical Experience

1966-68	Shell Oil and Chevron Oil - Summer Engineer
1969	Humble Oil (Exxon) - Offshore Field Engineer
1969-72	Louisiana State University - Instructor
1972-78	Atlantic Richfield Co. - Senior Research Engineer
1978-86	Enertech Engineering - Vice President
1986-Present	Wooley & Associates, Inc. - President

Professional

ASME, SPE, API, ASM: Member, Invited Speaker, Technical Committee Chairman, Standardization Committees.

Registered Professional Engineer in State of Texas 40049
Registered Professional Engineer in State of Oklahoma 31627
Numerous publications in professional literature
Advisory Council for LSU Dean of Engineering
2010 LSU Engineering Hall of Distinction
2010 LSU ME Alumni Achievement Lecture Club
2020 LSU Alumni Association HOD and Alumnus of the Year
Listed in various publications of Who's Who

18 April 2023

3100 South Gessner Road, Suite 325, Houston, Texas 77063 Phone (713)781-8974 Email gary@wooley.com

EXHIBIT 4

Recent Wooley Testimony

6 April 2023

The following list of recent testimony by Gary R. Wooley is compiled from available information. It is possible there may be additional testimony not included in this list:

1. 2/8/2018 and 2/16/2018 trial, Houston, Texas, Enventure Global Technology, Inc. (Kevin O'Brien, Baker McKenzie) vs. Mohawk Energy, Ltd., et al, No. 15-1053, U. S. District Court, Southern District of Texas, Houston Division.

2. 7/18/2018 deposition, Dallas, Texas, and 10/8/2018 trial, Marshall, Texas, Geodynamics, Incorporated (Marcus Rabinowitz, McKool Smith) vs. Dynaenergetics US, Inc., et al, No. 2:17-cv-00371-RSP, U. S. District Court, Eastern District of Texas, Marshall Division.

3. 9/13/2018 deposition, Houston, Texas, Sandbox Logistics, LLC, et al vs. Grit Energy Solutions, LLC and Proppant Express Investments, LLC (Charles Walker, Norton Rose), No. 3:16-cv-00012 and No. 4:17-cv-00589, U.S. Southern District of Texas.

4. 11/8/2018 and 8/7/2019 depositions, Houston, Texas, Baker Hughes Oilfield Operations LLC vs. Smith International, Inc. (Michelle Replogle, Winston & Strawn), No. 4:16-cv-1956, U.S. Southern District of Texas, Houston Division.

5. 5/8/2019 deposition, Houston, Texas, Smith International, Inc. (Michele Replogle, Winston & Strawn) vs. Baker Hughes, A GE Company, LLC, No. 16-56-ER, U. S. District Court for the District of Delaware.

6. 10/2/2019 deposition, Houston, Texas, and 1/23/2020 trial, McAlester, Oklahoma, Julie Smith, et al, vs. National Oilwell Varco, LP, et al (Robert Gum, Gum, Puckett, Kevin Leyendecker, AZA), No. CJ-2018-60, District Court of Pittsburg County, State of Oklahoma.

3100 South Gessner Road, Suite 325, Houston, Texas 77063 Phone (713)781-8974 Email gary@wooley.com

7. 10/17/2019 deposition, and 3/4/2020 trial, Houston, Texas, Daewoo International (America) Corp., vs. Atlas Tubular, LLC and Atlas Tubular, LP (Tim Hightower, Hightower - Capellan), No. 2015-68733, 113th Judicial District Court of Harris County, Texas.

8. 10/31/2019 deposition, Houston, Texas, Ultra Premium Services, LLC (Erik Hawes, Morgan Lewis) vs. OFS International, LLC, et al, No. 4:19-cv-2277, U. S. District Court for the Southern District of Texas, Houston Division.

9. 2/21/2020 deposition, Houston, Texas, Nitro Fluids, LLC vs. Cameron International Corporation (William Logan, Winston), No. IPR2019-00852, Patent 9,932,800, US PTO, PTAB.

10. 10/22/2020 hearing, 12/17/2020 deposition, 3/4/2021 deposition, 3/8/2021 hearing, 4/19/2021 trial, Houston, Texas, FMC Technologies, Inc. (Weining Bai, AZA) vs. Richard Murphy and Dril-Quip, Inc., No. 2020-63081, 127th Judicial District Court of Harris County, Texas.

11. 4/27/2021 deposition, Tubular Rollers, LLC, et al, (Phil Free, Phillip Free Law) vs. Maximus Oilfield Products, LLC, et al, No. 4:19-cv-03113-ASH-FHS, U. S. District Court for the Southern District of Texas, Houston Division.

12. 5/11/2021 deposition, 9/7/2021 and 9/8/2021 trial, Houston, Texas, Hunting Energy Services, Inc. (Brandon Renken, Locke Lord) vs. Borusan Mannesmann Pipe, U.S., Inc., No. 2020-38984, 80th Judicial District Court of Harris County, Texas.

13. 5/19/2021 deposition, Houston, Texas, Enventure Global Technology, Inc. (Lisa Meyerhoff, Seyfarth Shaw) vs. Weatherford U.S. L.P., et al, No. 4:19-cv-02397, U. S. District Court for the Southern District of Texas, Houston Division.

14. 7/22/2021 deposition, Houston, Texas, Forum US, Inc. vs. Odessa Separator, Inc. (Jeff Tinker, Bell Nunnally & Martin), No. 6:20-cv-00150-ADA, U.S. Western Dist. of Tx., Waco Division.

15. 9/2/2021 deposition, Houston, Texas, Dynaenergetics Europe GMBH, et al, vs. SWM International, LLC (Erik Hawes, Morgan Lewis), No. 3:21-cv-00192-G, U. S. District Court for the Northern District of Texas, Dallas Division.

16. 9/16/2021 deposition, Houston, Texas, Weatherford US LP vs. Enventure Global Technology, Inc. (Lisa Meyerhoff, Seyfarth Shaw), Inter Partes Review No. IPR2020-01648 on Patent No. 7,290,616, USPTO before the Patent Trial and Appeal Board, regarding declaration in Inter Partes Review No. IPR2020-01684 on Patent No. 7,240,729, and Inter Partes Review No. IPR2020-01700 on Patent 6,892,819.

17. 9/21/2021 deposition, Houston, Texas, Enventure Global Technology, Inc. (Lisa Meyerhoff, Seyfarth Shaw) vs. Weatherford US LP, Civil Action No. 4:19-cv-02397, U.S. District Court for the Southern District of Texas, Houston Division, regarding declaration in Inter Partes Review No. IPR2020-01648 on Patent No. 7,290,616, and Inter Partes Review No. IPR2020-01580 on Patent No. 6,409,175.

18. 11/2/2021 deposition, Houston, Texas, Weatherford US LP vs. Enventure Global Technology, Inc. (Lisa Meyerhoff, Seyfarth Shaw), Inter Partes Review No. IPR2020-00107 on Patent No. 6,604,763, USPTO before the Patent Trial and Appeal Board.

19. 12/9/2021 deposition, Houston, Texas, U.S. Well Services, LLC vs. VoltaGrid LLC, Nathan Ough (Erik Hawes, Morgan Lewis), Certarus (USA) Ltd., and Jared Oehring, Case No. 4:21-cv-3441, U.S. District Court, Southern District of Texas, Houston Division.

20. 3/15/2022 deposition, Houston, Texas, SWM International (Erik Hawes, Morgan Lewis), et al, petitioner vs. DynaEnergetics Europe GmbH, patent owner, Case No. PGR2021-00097, Patent 10,844,697, U. S. Patent and Trademark Office, Before the Patent Trial and Appeal Board.

21. 3/29/2022 deposition, Houston, and 8/25/2022 trial, Waco, Texas, NCS Multistage Inc., et al vs. TCO AS (Jonathan Spivey, Posinelli), Case No. 6:20-cv-00622-ADA, U. S District Court for the Western District of Texas, Waco Division.

22. 12/7/2022 deposition, Houston, Texas, Kerr Machine Co., vs. SPM Oil & Gas, et al, (T. J. Gohn, McGuire Woods), Case No. 4:21-cv-1191-O, U. S. District Court for the Northern District of Texas, Fort Worth Division.

23. 1/24/2023 deposition, Houston, Texas, COG Operating LLC vs. Borusan Mannesmann Pipe, and Hunting Energy Services, Inc. (Darryl Vereen, Mounce Green), Case No. CV57699, 441st Judicial District, Midland County, Texas.

EXHIBIT 1C

Exhibit 5

EXHIBIT 5

Oxford English Dictionary | The definitive record of the English language

pole, *n.1*

Pronunciation: ' Brit. /pəʊl/, U.S. /poʊl/

Forms: ...

Frequency (in current use):

Origin: A borrowing from Latin. **Etymon:** Latin *pālus*.

Etymology: < classical Latin *pālus* PALE *n.*1 ...

1.

a. In early use: a stake, stave, or stick, regardless of length or thickness; *spec.* the straight stem of a slender tree stripped of its branches. Now: a long, straight, slender, and more or less cylindrical piece of wood or another material, used in scaffolding, as a support, or for various other purposes.

The modern sense emerges in late Middle English.

OE ÆLFRIC *Gloss.* (St. John's Oxf.) 318 *Palus*, pal.

*a*1325 *St. Blaise* (Corpus Cambr.) 107 in C. D'Evelyn & A. J. Mill *S. Eng. Legendary* (1956) 50 (*MED*) Wiþ hokes and polles [*c*1300 *Laud* poles] þis wretche men hore godes faste soȝte..& vnneþe hi hom to londe broȝte.

▸ *a*1387 J. TREVISA tr. R. Higden *Polychron.* (St. John's Cambr.) (1865) I. 369 ȝif a pole [*Higd.(2)* staffe or a thynge of a tree; L. *palus*] is i-piȝt þerynne, þat partie of þe pole [Caxton shaft or pool, *Harl. MS.* that tre] þat is in þe erthe schal turne in to iren.

*c*1400 (▸ *c*1378) W. LANGLAND *Piers Plowman* (Laud 581) (1869) B. XVIII. 52 (*MED*) Poysoun on a pole þei put vp to his lippis.

1458 in W. H. Stevenson *Rec. Borough Nottingham* (1883) II. 365 (*MED*) For c allor polls, v s. iiij d.

1488 (▸ *c*1478) HARY *Actis & Deidis Schir William Wallace* (Adv.) (1968–9) II. l. 33 He bar a sasteing in a boustous poille.

1548 *Hall's Vnion: Henry VI* f. clx The Capitayne..caused his head to be cut of, and pitched it on a highe poole.

1616 SIR C. MOUNTAGU in *Buccleuch MSS* (Hist. MSS Comm.) (1899) I. 250 Lest a man be like a hop without a pole.

1638 T. HERBERT *Some Yeares Trav.* (rev. ed.) III. 325 Pepper..in the growth supported by poles or canes, about which it entwines and duplicates with many embraces.

1717 M. PRIOR *Alma* II. 12 If, after some distinguish'd leap, He drops his pole, and seems to slip.

1791 J. BOSWELL *Life Johnson* anno 1775 I. 478 A certain celebrated actor was just fit to stand at the door of an auction-room, with a long pole, and cry, 'Pray, gentlemen, walk in.'

1864 E. A. PARKES *Man. Pract. Hygiene* I. ix. 287 A conical tent, with a single pole.

1876 W. H. PREECE & J. SIVEWRIGHT *Telegraphy* (1905) 286 On the earliest telegraph lines square poles..were employed.

1930 L. G. D. ACLAND *Early Canterbury Runs* i. 5 Platforms on poles or in cabbage trees from which the shepherds could see where the sheep were.

1959 I. Opie & P. Opie *Lore & Lang. Schoolchildren* xii. 262 The children customarily carry round a large flower garland on a pole.

1991 *Pract. Gardening* Dec. 80/2 Plant against tall poles 10ft (3m) high and train against horizontal wires 1 ft..apart from 6ft..upwards.

b. A shaft used in hitching a draught animal to a cart, carriage, etc.; *esp.* a long tapering wooden shaft fitted to the fore-carriage of a horse-drawn vehicle and attached to the yokes or collars of the draught-animals, serving to guide and control the vehicle, and sometimes also bearing the swingletrees.

1391 in L. T. Smith *Exped. Prussia & Holy Land Earl Derby* (1894) 7 Cum emptione poles, girthes, sursengles et aliis necessariis.

1411 in J. Raine *Charters Priory Finchale* (1837) p. clvii (*MED*) Stabulum..Item, j sella pro valectis cum freno novo cum singulis pro predictis et polys.

1634 J. Shirley *Triumph of Peace* 5 They were mounted on carriages, the Spring trees, Pole and Axle-trees, the Charioters seate, and standers, wheeles, with the fellyes, spokes, and naves all wrought with Silver.

1683 A. Wood *Life & Times* (1894) III. 79 The pole of a coach hit against his brest.

1761 J. Newton *Diary* 6 Oct. in *Deserted Village* (1992) 138 Took Mrs Rock in my Landau to Spring Garden..& the Poll broke.

1796 C. R. Hopson tr. C. P. Thunberg *Trav.* (ed. 3) II. 109 Black iron wood..is hard and strong; it is used for axle-trees and the poles of waggons.

1813 *Sketches of Character* (ed. 2) I. 114 The pole of our carriage ran against the splendid chariot of the Marchioness of Arrangford.

1883 W. H. Cope *Gloss. Hampshire Words* 61 *Neb*, the pole of an ox-cart or ox-waggon.

1923 G. Sturt *Wheelwright's Shop* Gloss. 220 *Pole*, (i) the long beam which, in timber-carriage and farm-waggon, joined together the two under parts, viz. the fore-carriage and the hind-carriage. (ii) In later times a pole was used (as with omnibuses) instead of double shafts, for harnessing a pair of horses side by side.

1994 D. J. Smith *Discovering Horse-drawn Vehicles* ii. 10 Lydian chariots..used a separate pole for each of three horses abreast, from which side shafts may have developed.

c. *Nautical.* A ship's mast; (also) the upper end of a mast rising above the rigging. ***under bare poles*** and variants: with no sail set; with furled sails.

?c1450 *Trivet's Life of Constance* in F. J. Furnivall *Originals & Analogues Canterbury Tales* (1876) 229 (*MED*) In that shyp that ungoodly Morderes, the Sowdans Moder, put that mayd Constaunce withoute pooles [Fr. *sigle*] or Orys.

1669 S. Sturmy *Mariners Mag.* I. ii. 17 We may have..to spoon before the Sea with our Powles.

1697 W. Dampier *New Voy. around World* xv. 415 We scudded..before the wind very swift, tho only with our bare Poles.

1799 *Hull Advertiser* 20 July 2/4 The brig is painted black, with..no pole to her fore top gallant-mast.

1816 'Quiz' *Grand Master* II. 22 The vessel rolls, At ocean's mercy under poles.

1867 W. H. Smyth & E. Belcher *Sailor's Word-bk.* at *Storms* That is a storm which reduces a ship to her storm stay-sails, or to her bare poles.

1904 J. LONDON *Sea-wolf* xviii. 174 Wolf Larsen ran out of it and to the southward, first under a double-reefed jib, and finally under bare poles.

1990 T. CUNLIFFE *Easy on Helm* vi. 50 Drop the headsail as well and 'blow' along under bare poles.

d. A post used as the sign of a particular trade, business, or profession. Chiefly and now only: = *barber's pole* n. at BARBER *n.* Compounds 2. Cf. ALE-POLE *n.*

[*a*1475 (▸ ?*a*1430) J. LYDGATE tr. G. Degnileville *Pilgrimage Life Man* (Vitell.) 20398 (*MED*) Maystres off dyvers crafftys Hang out, on polys and on raffys, Dyuers sygnys hih and lowe.]

1533 J. FRITH *Bk. answeringe Mores Let.* sig. Bij The Alepoles are not the ale itselfe whiche they do signifye or represent.

1566 in S. Young *Ann. Barber-surgeons London* (1890) 181 No Barber shall..put out any bason or basons..upon his poule on Sundays or Holy days.

1654 in E. Gayton *Pleasant Notes Don Quixot* sig. *2v And 'stead of Speare, his hand he flatters With ravisht Pole from Barbers Platters.

1754 *Adventurer* (ed. 2) I. ix. 79 That particoloured staff of an enormous length, which is now called a Pole, and appropriated only to barbers.

1797 LD. THURLOW in W. Hone *Every-day Bk.* (1826) I. 1269 By a statute still in force, the barbers and surgeons were each to use a pole.

1842 *Times* 21 July 4/3 A barber who carries on business in the house has his pole hung out at the door.

1887 T. HARDY *Woodlanders* I. i. 8 A master-barber that's left off his pole because 'tis not genteel.

1938 *Zanesville (Ohio) Signal* 18 June Two stores beyond the corner the red and white pole of the barber shop revolved invitingly.

2003 *Sunday Mail (Scotland)* (Nexis) 16 Nov. 51 Why is there a red and white pole outside barber shops?

e. *Angling.* *(a)* A rudimentary fishing rod used without fittings other than a line attached to the tip; (also) any fishing rod (now chiefly *North American*); *(b)* = *roach pole* n. at ROACH *n.*[1] Compounds 2.

1577 *Arte of Angling* sig. Di Either your pole or cane, be pulled in with some good fishe.

1645 E. REYNOLDS *Israels Prayer* I. ii. 64 Like..fishes avoiding the pole wherewith the water is troubled, by swimming into the net.

1688 R. HOLME *Acad. Armory* III. 103/1 A Snapper, or Snap Rod, is a strong Pole, peculiar for a Pike.

1740 R. BROOKES *Art of Angling* 86 When you have put the Plummet on your Line you must fasten it to a strong, stiff, taper Pole of about three Yards long.

1782 T. B. HAZARD *Nailer Tom's Diary* (1930) 32/1 Robert gave me a pole for Greans to ketch Fish.

1830 *New Hampsh. Hist. Soc. Coll.* (1832) III. 84 They [*sc.* pickerel] are taken three ways: 1st. A pole of from 12 to 20 feet, with a line about the same length is provided with a hook [etc.].

1897 F. MATHER *Men I have fished With* 30 You h'ist 'em out too quick with a pole, throw that away..and when you get a fish haul him in hand under hand.

1917 S. LEACOCK in *Maclean's* Sept. 21/3 He carries a pole that he cut in the bush himself, with a ten cent line wrapped round the end of it.

1962 K. KESEY *One flew over Cuckoo's Nest* iii. 235 I sat down and held the pole and watched the line swoop out into the wake.

1982 D. CARR *Success with Pole* 9 Twenty years ago, around 2% of match anglers would have carried poles; now 99% have them.

2001 *Mode* Aug. 48/2 The overnight fishing expedition he and his brother Walter took, rigging up homemade cane poles.

f. *coarse slang*. The penis, esp. when erect.

c1600 in E. J. Burford *Bawdy Verse* (1982) 49 It is a stiffe shorte flesshly pole.

1776 *Frisky Songster* (new ed.) 111 When first he began to thrust his pole in, He made all my members to quiver.

1865 'PHILOCOMUS' *Love Feast* IV. 27 He oil'd his long and rampant pole, And tried to thrust it in the hole.

1926 in A. W. Read *Lexical Evid. Folk Epigraphy* (1935) 69 I'll stick my pole in your dirty old hole Now work your ass to save your soul.

1980 E. JONG *Fanny* II. i. 165 'Won't ye have a Nestlecock?' cries the second Tart, 'a Climber fer yer Pole.'

1994 P. BAKER *Blood Posse* vi. 72 Bertha wrestled away my clothes and pushed me on my back, intent on riding my pole until it submitted to a lifeless state.

g. *English regional* (chiefly *north-western*). The long handle of a scythe or similar implement. Now *rare*.

1828 W. CARR *Dial. Craven* (ed. 2) *Pow*, a pole, a scythe pow, the long handle of a scythe.

1887 *Times* 23 June 13/3 The peasant who is foremost carries a scythe of portentous length of pole, with nothing or next to nothing in the way of a blade.

a1903 S. BRADBURY in *Eng. Dial. Dict.* (1903) IV. 571/2 [S. Lancs.] Scythe pow, stang pow.

h. *Athletics*. The long, flexible rod used by a competitor in the pole vault.

1868 H. F. WILKINSON *Mod. Athletics* viii. 88 The leaping pole should be made of fir or ash.

1891 W. M'COMBIE SMITH *Athletes & Athletic Sports of Scotl.* viii. 88 From the moment he takes hold of the pole as he commences his run till he lets it go as he crosses the bar the pole-vaulter never shifts his hands.

1955 *Track & Field Athletics* (Achilles Club) 228 The new tapered metal poles are as springy as the heavier bamboo ones.

2001 *N.Y. Times* 15 Nov. A28/1 Like many contemporaries, he wanted fiberglass poles banned.

i. *Skiing*. = *ski pole n.* at SKI *n.* Compounds 2.

1920 *Literary Digest* 14 Feb. 115 I need not describe these poles to you, as any dealer will know what you mean by ski-poles.

1963 S. PLATH *Bell Jar* viii. 101 I'd have been knocked over and stuck full of skis and poles the minute I let go.

2002 *Philadelphia Inquirer* 29 Dec. M7/5 Barry went off to the resort's shop to rent skis and poles.

2.

a. A pole (sense 1a) of definite length used as a measure in surveying; a linear measure of land; = PERCH *n.*[1] 2. Now *historical.*

See note on U.K. usage at ROD *n.*[1] 8a.

*a*1500 *Tracts Eng. Weights & Meas.* 14 in *Camden Misc.* (1929) XV (*MED*) Odyr dyuers places in this land, thai mete grownd by the Polys, Goodys, and Roddys; and sum of thame be of xviij fote, sum of xx fote, and sum of xxi fote.

1579 J. STUBBS *Discouerie Gaping Gulf* sig. Fiij Thold English liberall measure of syxtene foote and a halfe to the pole.

1603 G. OWEN *Descr. Penbrokshire* (1892) 133 In some place the pole is but ix foote, and in some place xij foote.

1706 *Phillips's New World of Words* (new ed.) *Pole*, a long Stick: In measuring, it is the same with Pearch or Rod, or as some call it Lugg: By Stat. 35 Eliz. this Measure is a length of 16 Foot and a half, but in some Countries it consists of 18 Foot and is called Woodland-Measure.

1725 R. BRADLEY *Chomel's Dictionaire Œconomique* at *Mile* Every Furlong forty Lugs or Poles..every Pole sixteen Foot and a Half.

1811 T. DAVIS *Gen. View Agric. Wilts.* (new ed.) 268 A rod, pole, [or] perch..is of three lengths in this county: 15, 18, and 16½ feet.

*a*1827 R. PATTERSON in H. Howe *Hist. Coll. Ohio* (1847) 373 After going about 100 poles, we were obliged to stop and rest.

1867 O. W. HOLMES *Guardian Angel* xviii. 202 My father used to carry a chain for a surveyor sometimes, and there is a ten-foot pole in the house he used to measure land with.

1989 D. H. FISCHER *Albion's Seed* 658 It was taken from an old unit of measure variously called a rod, lug, pole, or perch, normally five and a half yards long.

1991 M. SCOTT *Nudists may be Encountered* (BNC) 99 To my mind the yard, foot and inch are as antiquated as the rod, pole and perch.

b. An area measure of land equal to a square pole; = PERCH *n.*[1] 3. Now *historical.*

1637 in *Quarter Sessions Rec.* (N. Riding Rec. Soc.) (1886) IV. 77 To be rated by acree and powle.

1660 R. SHARROCK *Hist. Propagation & Improvem. Veg.* 19 A rod or pole of ground, which is the square of sixteen feet and a half.

1754 in H. H. Metcalf & O. G. Hammond *Probate Rec. New Hampsh.* (1915) III. 493 We have set off to ye widow Thirty Six acres & fifty four Poles as her full third part in ye Lands of sd Deceasd.

1802 *Times* 5 July 3/4 (*advt.*) A valuable freehold inclosure..within the Manor of Bretts, wherein it is described as containing 4 acres and 6 poles.

1856 *Times* 26 Aug. 12/4 (*advt.*) Also a Freehold Property called Glyn Llan Mountain..containing 83 acres, 3 roods, and 24 poles of excellent sheep pasture.

1963 *Scotsman* 2 Sept. Croft extends to 2 acres 35 poles arable, 32 poles outrun, together with share in the common grazing.

2003 *Daily News Leader* (Staunton, Virginia) (Nexis) 20 Aug. 2 A Colin B. Hester to Eric W. Stewart, 1 acre and 3 acres, 32 poles, $168,000.

3.

a. *Horse Racing.* The rails; (hence) the starting position closest to them. Frequently in ***to have (also draw) the pole***: to start a race in this position. Now *Australian.*

1851 *Fraser's Mag.* **43** 657/1 The distance round is calculated at a mile,..for a saddle horse that has the pole, it comes practically to a little less.

1868 H. Woodruff & C. J. Foster *Trotting Horse Amer.* xxiv. 206 I had the pole with Kemble Jackson, and soon took the lead.

1902 A. D. McFaul *Ike Glidden* xxii. 198 Drawing the pole was a position in favor of the colt.

1969 *Australian* 24 May 34/4 Won Mobile 12½f event here four starts back. Place claims from the 'pole'.

2000 *Herald Sun* (Melbourne) (Nexis) 19 July 77 The barrier draw..saw New South Wales Sires Stakes winner Pelicanrama draw the pole.

b. *Motor Racing.* The position on the front row of the starting grid nearest to the inside of the first bend. Cf. ***pole position*** *n.* at Compounds 2.

1976 *Milton Keynes Express* 11 June 42/7 Colin Hawker's Cosworth Grand Prix-engined VW was on pole.

1988 *Road & Track* Sept. 146/2 Senna..seemed hellbent on making the pole every race this year.

1999 *F1 Racing* Nov. 132/3 They lined up on the front row, Schumacher on pole.

4. *Hunting.* The tail of an otter, pheasant, or other quarry. Now *rare.*

1864 J. C. Atkinson *Stanton Grange* 202 His hand missed the otter's hind-quarters, but closed upon its pole (or tail).

1900 *Shooting Times* 15 Dec. 15/2 *Pole*, the tail of a pheasant.

1904 *Westmorland Gaz.* 2 July 5/5 Captain T. presented the pole to Miss L., the pads to the Misses C.,..and the mask most deservedly to..the huntsman.

1990 H. Williams *Self-portrait with Slide* 7 He reached up to them with an otter's tale called a 'pole' and found he could touch his toes.

5.

a. *Forestry.* A young tree, *esp.* one in an even-aged stand; *spec.* *(a)* one during a stage of growth beginning when the lower branches start to die and ending when the rate of upwards growth slows markedly; *(b)* (chiefly *U.S.*) a tree with a diameter of between four and twelve inches (approx. 10 to 30 cm) at breast height. Frequently *attributive*, esp. in **pole stage** *n.* such a stage of growth, esp. after the first thinning.

1882 E. E. Fernandez & A. Smythies tr. G. Bagneris *Elem. Sylviculture* I. 4 When the diameter of the stem at the foot of a young tree varies from four to eight inches, the forest is said to be in the low pole stage.

1888 T. Bright *Pole Plantations & Underwoods* i. 1 A pole plantation is an assemblage of young trees, the produce of plants that have been inserted in the soil at regular distances, or of the stems formed from such plants after their having been cut for poles.

1905 C. E. Curtis *Elem. Forestry* xii. 75 In the stage known as pole stage, actual measurement may not be required, the value being arrived at by number of poles.

1955 *Jrnl. Ecol.* **43** 18 Under the evergreen conifers..the ground flora is usually completely destroyed at the thickest and early pole stages.

1993 *Forestry* **66** 184 Pole pruning samples were collected from the crowns of trees at heights of between 6 and 9 m.

b. *Botany*. A tall fleshy flowering stem produced by some agaves.

1887 *Bull. Misc. Information* (Royal Gardens, Kew) Mar. 7 Any appearance of the 'pole', or flowering spike, is watched, and when 3 or 4 feet high it is cut out.

1947 L. WEINDLING *Long Vegetable Fibers* vi. 76 The sisal plant, like the American century plant, blooms only once in its lifetime; it dies after inflorescence. Before dying, it throws up a 'pole' or flowering stem, twenty to thirty feet high.

1979 M. L. VICKERY & B. VICKERY *Plant Products Trop. Afr.* xiv. 75/1 Agaves only flower at the end of their lives, so that when the sisal flower stem (pole) is produced all the leaves are cut.

PHRASES

colloquial.

P1. *up the (also a) pole.*

†**a.** *Military slang*. In favour or good repute; strait-laced. *Obsolete.*

1890 A. BARRÈRE & C. G. LELAND *Dict. Slang* II. 137/2 *Pole, up the* (military), thought well of by your superiors. Also applied to strict, strait-laced people, who are or like to be considered 'goody-goody'.

b. In confusion or error.

1896 *Daily News* 1 Apr. 7/6 She remonstrated with the latter, and told him he was 'up a pole'—i.e. in the wrong.

1965 W. DICK *Bunch of Ratbags* vi. 92 Curly..generally thought Ronnie was all up the pole when giving advice to someone.

1974 G. MOFFAT *Corpse Road* x. 142 'Do you really suspect that Pilgrim—*Pilgrim*!—killed the girl?..' 'You're up the pole,' Mrs Kent said to Page.

c. In trouble or difficulty.

1897 A. R. MARSHALL *'Pomes' from Pink 'Un* 73 He heard himself alluded to as being 'up the pole'.

1899 *Daily Mail* 29 Mar. 5/1 When there are nineteen Frenchmen to four Englishmen they were slightly up the pole.

1932 D. L. SAYERS *Have his Carcase* xxii. 295 I think we may take it for granted that our friend Weldon is a bit up the pole financially.

1970 R. BEILBY *No Medals for Aphrodite* vi. 244 We'd 'a' been up the pole without him, that's why we didn't send him on his way.

d. Drunk. Now *rare*.

1897 *Daily Tel.* 11 Dec. 10/4 Plaintiff:..but your little girl was frequently saying that you were 'up the poll [*sic*]'... The Judge: Up the what?.. The High Bailiff explained that the term was a slang one for being intoxicated.

1917 W. MUIR *Observ. Orderly* xiv. 230 The words for drunkenness are innumerable—'jingled', 'oiled', 'tanked to the wide', 'well sprung', 'up the pole', 'blotto', etc.

e. Crazy; at one's wits' end.

1904 *Westm. Gaz.* 19 Mar. 7/2 Plaintiff's definition of the phrase 'up the pole' differed from that of her cousin..who said it meant being drunk. Mrs. Frasier said that it..meant being crazy.

1916 E. V. LUCAS *Vermilion Box* 165 It must require an awful lot of pluck... Either pluck or so much panic that one was practically up the pole with it.

1992 I. PATTISON *More Rab C. Nesbitt Scripts* 20 It's driving me up the pole.

f. *Irish English.* Pregnant. Frequently in ***to put* (also *stick*) *up the pole***.

1918 J. JOYCE *Ulysses* Telemachus in *Little Rev.* Mar. 21 That red Carlisle girl? Lily... Is she up the pole?—Better ask Seymour that.

1961 'F. O'BRIEN' *Hard Life* v. 37 A lot of crooked Popes..putting duchesses and nuns up the pole, and having all Italy littered with their bastards.

1995 J. MURPHY *Brothers of Brush* II. 59 The only reason he gave you a job was because you stuck his sister up the pole!

2001 J. MURPHY *Kings of Kilburn High Road* II. in *Two Plays* 58 Seventeen's all she is, seventeen and she's up the pole.

P2. ●riginally *U.S.* ***I wouldn't touch it* (also *him, her,* etc.) *with a ten-foot* (also *forty-foot*) *pole***: I refuse to have anything to do with (a person or thing). Cf. *I wouldn't touch him (or it) with (the end of) a bargepole* at BARGEPOLE *n.*

1838 *Huron Reflector* (Norwalk, Ohio) 19 June She was jest as good as mine, till you com a goin arter her, and now I can't touch her with a forty foot pole.

1843 *Ohio Repository* (Canton, Ohio) 5 Oct. Senator Lahm, and Representatives Kilgore and Martin,..would not touch it [*sc.* a piece of legislation] with a ten foot pole. They knew it would not work.

1864 R. MORRIS *Banks of New York* 31 Wouldn't touch it with a ten-foot pole. Bad line.

1903 'T. COLLINS' *Such is Life* 22 The young feller he used to come sometimes an' just shake hands with her, but otherways he wouldn't touch her with a forty-foot pole.

1958 E. O. SCHLUNKE *Village Hampden* 26 Attracting a lot of business of the more or less shady sort that our reputable men wouldn't touch with a forty-foot pole.

1991 'W. TREVOR' *My House in Umbria* in *Two Lives* (1992) x. 337 It was then that Mrs Chubbs conveniently turned up her toes, and after that the other lady wouldn't touch him with a pole.

COMPOUNDS

C1.
a. General *attributive*.

pole barn *n.*

1886 *Semi-Weekly Age* (Coshocton, Ohio) 23 July 1/3 The primative [*sic*] hewed log cabin, the pole barn and the rail corn crib are observed on every hand.

1992 *Down East* Feb. 67/1 (*advt.*) Farm pond, pole barn. Pleasant rural neighborhood with fishing and hunting at your door.

pole bridge *n.*

1785 *Acts, Ordinances, & Resolves Gen. Assembly State S.-Carolina* 4 A public road shall be laid out..from McCord's ferry, to the fork of the road above the pole bridge.

1850 *Congress. Globe* 29 Jan. 240/1 Contingencies of travel over corduroy roads, pole bridges, mud turnpikes, etc.

2001 *Edmonton* (Alberta) *Jrnl.* (Nexis) 22 Aug. F5 Heat waves danced and distorted the pole bridge that spanned the creek.

pole corral *n.*

1882 *Blackwood's Edinb. Mag.* Dec. 766/1 I passed a half broken-down pole-corral.

1992 C. McCarthy *All Pretty Horses* (1993) 1. 49 A pole corral where five scrubby horses with big heads stood.

pole-end *n.*

1692 in A. W. C. Hallen *Acct. Bk. Sir J. Foulis* (1894) 147 For..a mainshekell, a houkit clout to the poull end.

*a*1753 P. Drake *Memoirs* (1755) II. xvii. 265 Just at the Turning the Corner of a Street, a Coach coming on smartly, the Pole End hit her so hard on the Flank, that threw her down, and killed her on the Spot.

1802 W. Dyott *Diary* 27 Apr. (1907) 1. 204 He drove as postillion the wheelers, and the pole-end mules he drove with reins.

1988 *Jrnl. Hellenic Stud.* **108** 195/2 Adding the yoke-and-pole binding to the so-called pole-end support.

pole fence *n.*

1754 J. Hempstead *Diary* 25 Apr. (1901) 628 In the aftern[oon] I was Setting up Pole fence next the highway over Long bridge.

1838 T. C. Haliburton *Clockmaker* 2nd Ser. viii. 125 Who should I see but Bobbin in his waggon ag'in the pole fence.

1959 W. R. Bird *These are Maritimes* x. 278 We saw..many ancient pole fences crossing the fields.

2003 *Arizona Republic* (Nexis) 30 Mar. T1 Continue climbing for a couple of miles and several hundred feet in elevation until you reach a bend where a pole fence has been erected.

pole-futchel *n.* [< POLE *n.*[1] + FUTCHEL *n.*] now *rare*

1875 E. H. KNIGHT *Amer. Mech. Dict.* III. 1761/2 *Pole-futchel*, the jaws between which the hinder end of a carriage-tongue is inserted.

1903 'T. COLLINS' *Such is Life* i. 7 Presently the tea leaves were thrown out of the billies; the tucker-boxes were packed on the pole-fetchels; and the teams got under way.

pole topmast *n.*

1769 W. FALCONER *Universal Dict. Marine* Transl. French Terms *Maté en caravelle*, fitted with pole top-masts.

1853 L. LYON *Treat. Lightning Conductors* 136 A very small metallic wire was led along the pole topmast.

2005 *www.gartsideboats.com* 10 Mar. (O.E.D. archive) The mast is hollow with a pole topmast to make handling the topsail simple.

pole plantation *n.* (see sense 5b).

1888 T. BRIGHT *Pole Plantations & Underwoods* i. 1 A pole plantation is an assemblage of young trees, the produce of plants that have been inserted in the soil at regular distances, or of the stems formed from such plants after their having been cut for poles.

1964 *Time* 20 Nov. 12/7 We went down through the pole plantation (plenty of sycamore for the brish back and turnery works) to the bottom.

b.
(a) Objective.

pole balancing *n.*

1886 *Times* 3 Feb. 1/4 (*advt.*) Wire walking and top spinning, pole balancing, and other characteristic Japanese performances.

1990 *Managem. Computing* Nov. 113/1 Yam had to face enduring tests and assault courses such as..pole balancing and climbing over telephone books.

pole bearer *n.*

1795 W. FELTON *Treat. Carriages* II. ix. 179 (*table*) A curricle harness... Bar stands and pole bearers.

1900 G. C. BRODRICK *Mem. & Impr.* ii. 38 In the early summer of 1844 I took part as a 'pole-bearer' in the last Montem.

2003 *Sunday Times* (Johannesburg) (Nexis) 23 Feb. 10 I was neither asked nor offered to be a pole bearer.

pole setter *n.*

1859 T. P. SHAFFNER *Telegr. Man.* 674 One of the two pole-setters fills in the earth, and the other rams it to a solid state.

1996 *Fort Worth* (Texas) *Star-Telegram* (Nexis) 23 July 8-9 Raymond R. 'Ace' Riojas, 64, a retired pole setter for TU Electric, died Saturday in Fort Worth.

pole-setting *n.*

1858 *Times* 14 Sept. 7/5 For some hundreds of miles of the whole distance no pole-setting whatever would be required.

2002 *Ledger* (Lakeland, Florida) (Nexis) 16 Nov. A1 Willy Pinkston, a lineman, warned the pole-setting crew that the crane should be moved.

(b) Instrumental and similative.

pole-armed *adj.*

1906 *Westm. Gaz.* 24 Apr. 2/1 He passes before the youth, pole-armed, who stands upon the bank.

1972 *Stevens Point* (Wisconsin) *Daily Jrnl.* 11 Apr. 11/2 The reigning Olympic heavyweight Champion, George Foreman, a 6-3 pole-armed puncher who has never lost a fight.

pole-shaped *adj.*

1887 *Pall Mall Gaz.* 10 Sept. 7/1 An elderly man..fights with a pole-shaped stick against a constable.

1992 *Jrnl. Ecol.* **80** 640/1 If the stem is pole-shaped..the stem diameter must increase as the 3/2 power of its height.

C2.

pole bean *n. North American* a climbing bean (which has to be supported on poles as it grows).

1770 *Boston Gaz.* 12 Mar. 4/3 (*advt.*) Broad Winsor, broad White Pole, dwarf yellow and dwarf speckled Beans, with a general Assortment of Garden Seeds.

*a*1813 J. H. St. J. de Crèvecoeur *More Lett. from Amer. Farmer* (1995) 47 I had once some Hops &.. Pole Beans, about 20 feet high.

1865 *Trans. Illinois State Agric. Soc. 1861–4* **5** 758 Pole Beans—Amongst these the Limas deservedly rank the highest.

1994 *Harrowsmith* Mar. 66 When the weather warms, I seek even cooler locations, such as the shaded side of staked tomatoes, Brussels sprouts or pole beans.

pole-board *n. rare* a board or placard carried on poles like a banner.

1909 *Westm. Gaz.* 29 Dec. 6/4 Others, again, carrying pole-boards setting forth all deceased's honours and titles.

pole-boat *n. North American* a riverboat propelled by means of a pole or poles.

1788 J. Fitch *Orig. Steam-boat Supported* 19 His first setting pole boat 'Bore the pelting of ignorance and ill-nature'.

1835 W. G. Simms *Partisan* II. ii. 12 At this point the river ceased to be navigable even for the common poleboats of the country.

1990 *Syracuse* (N.Y.) *Herald Jrnl.* 11 Nov. K5/1 William Kernan..took the long trip by pole boat up the Mohawk to Utica in the pre-Erie canal days.

1997 *Countryside & Smallstock Jrnl.* (Electronic ed.) May–June 40/3 Jayhawk Ranch sets on the southern end of that island. Maybe you can take a pole-boat out to see us sometime.

2000 *Palm Beach (Florida) Post* (Nexis) 4 May 7 C They also are considering a pole-boat trail.

pole-boating *n.*

1837 A. SHERWOOD *Gazetteer Georgia* (ed. 3) 193 The slow, tedious and expensive process of pole-boating will be exploded.

2000 *Sun-Sentinel* (Fort Lauderdale, Florida) (Nexis) 16 Sept. 8 B The plan..will allow pole-boating and camping along the canoe trail.

† **pole-bracket** *n. Obsolete* a bracket on a telegraph pole for supporting the wires.

1876 W. H. PREECE & J. SIVEWRIGHT *Telegraphy* 211 Pole-brackets..are of a tubular form..and made of malleable iron.

pole bullock *n. Australian* and *New Zealand* a bullock that is harnessed to the pole of a carriage or wagon; = POLER *n.* 4a.

1844 *Sydney Morning Herald* 29 July 2/7 He was kicked by one of the pole bullocks, and the wheel passed over his chest.

1930 L. G. D. ACLAND *Early Canterbury Runs* 1st Ser. vii. 158 In 1868 Strawberry, one of the pole-bullocks, died after working ten years and seven months on the station.

1988 *Sunday Mail* (Queensland) (Nexis) 7 Feb. The display of intelligence and obedience from these beasts is outdone only by Ranger, one of the pole bullocks at the back of the team.

pole burn *n.* decay of tobacco during the curing process as a result of excessive moisture when it is hung on poles too close together.

1868 *New Eng. Homestead* 22 Aug. 116/4 Another thing to guard against, which occurs after the tobacco is hung for curing, is sweating, or 'pole burn'.

1905 G. M. ODLUM *Culture of Tobacco* 72 Pole burn in the tobacco barn is due to excessive humidity, and is very likely to be present during warm wet weather.

1967 M. R. KEY *Tobacco Vocab.* 33 *Pole-burn*, spoils the leaf for almost anything.

† **pole burn** *v. Obsolete* (*intransitive*) (of tobacco) to discolour and lose flavour by pole burn.

1876 *Amer. Cycl.* XV. 782/1 If hung too close, the tobacco will 'pole burn'.

† **pole cap** *n. Obsolete* the insulating cap of a telegraph pole.

1884 *Internat. Health Exhib. Official Catal.* 78/1 Insulators. Pole Cap.

pole carriage *n.* now *rare* = *pole cart n.*

1863 *Times* 21 Nov. 16/6 (*advt.*) Mr. Roberts..will sell by auction, on Thursday, Nov. 28, at 12, about 2,400 hop poles, pole carriage, horsehair cloth for drying cloths, bagging machine.

1954 *Times* 22 May 12/3 Trailers, Loaders, Drags, Pole Carriages, &c.

pole cart *n.* a vehicle drawn by animals hitched to a central pole, rather than to a pair of shafts.

1824 E. CURR *Acct. Colony Van Diemen's Land* 97 A pair or two of strong broad wheels and iron axles for a pole cart.

1942 *Times* 8 Dec. 6/1 A strongly made pole cart, with lath sides, painted in bright colours.

1984 G. RILEY *Women & Indians on Frontier 1825–1915* (1998) iv. 131 Some were amused by the sight of native American villages moving from one campsite to another on pole carts pulled by dogs.

pole chain *n.* *(a)* a measuring chain; = CHAIN *n.* 9 (now chiefly *historical*); *(b)* the chain by which the end of a carriage-pole is connected with the collar of a draught animal (now *rare*).

[1671 J. BROWN *Descr. & Use Trianguler-quadrant* viii. 195 One hundred thousand Square Links of a 4 Pole Chain, make a Square Acre.

1715 W. LEYBOURN *Gunter's Line* xii. 58 By the One Pole-Chain.]

1725 R. BRADLEY *Chomel's Dictionaire Œconomique* at *Surveying* The surveyor..furnish'd..with a well divided pole chain or off set rod.

1826 *Sporting Mag.* **18** 393 A pole-chain may be unhooked, or a hame strap get loose.

1853 R. S. SURTEES *Mr. Sponge's Sporting Tour* xxxvi. 278 The rattle of Puff's pole-chains brought..the usual rush of shirt-sleeved helpers.

1888 F. T. ELWORTHY *W. Somerset Word-bk.* *Pole-pieces*...the strong straps by which the horses' collars are attached to the front of the pole, to enable them to guide and to keep back the carriage. If of chain, they are pole-chains.

2004 *Topeka* (Kansas) *Capital-Jrnl.* (Nexis) 30 May A quadrant, a magnet, pole chains for surveying, a sextant and several thermometers.

pole crab *n.* now *rare* a double metal loop affixed to the end of a carriage-pole to receive the breast-straps of the harness.

1851 C. CIST *Sketches & Statistics Cincinnati* xiii. 196 In this department are made carriage wrenches, staples, pole crabs, nuts [etc.].

1937 *Sheboygan* (Wisconsin) *Press* 2 Sept. 15/6 The..pole hook, pole crab, corner horns, and side arm braces.

† **pole-cure** *v.* *Obsolete* (*transitive*) to cure (tobacco) by hanging it on poles.

[1897 *Atlanta Constit.* 12 Sept. 5/2 In which condition they go through the pole curing process.]

1899 *Rep. U.S. Dept. Agric.* No. 62. 30 The present method of manipulating these tobaccos after they are pole-cured is quite different from what it was years ago.

pole dance *n.* any of various dances performed on or involving a pole; (now) *spec.* an erotic dance or striptease performed while moving around a specially constructed pole, usually in a strip club.

1819 G. HIPPISLEY *Narr. Exper. Orinoco* xii. 312 The pole dance in general closes the diversion of the afternoon; a dance so called from the production of a pole about ten feet high, and about four or five inches in circumference.

1865 *Hunt's Yachting Mag.* Oct. 450 The sports of this day were confined to the vicinity of Ryde pier, and consisted of boat racing, duck hunts, pole dances on the water, and other amusements, which were viewed with great delight by the fair sex.

1912 *Atlanta Constit.* 19 May M2 Those taking part in the pole dances will be Misses Helen Stewart, [etc.].

1992 *Chicago Tribune* (Nexis) 2 Oct. Girls soliciting, performing naked pole dances and erotic carnival tricks in the bars that blanket the area.

2000 *N.Y. Times* 31 Dec. IX. 2/1 For Dr. Dre's and Snoop Doggy Dogg's [song] 'Next Episode', the prize move is to mime a pole dance.

pole dance *v. intransitive* to perform a pole dance.

1991 *Music & Dancing* in *alt.sex* (Usenet newsgroup) 24 July You play a little funk and start pole-dancing..with your partner's body... It's safe to say that I'm ready!

2004 *Guardian* 6 Jan. II. 4/5 A woman who wears buttock-less trousers and pole-dances as if the activity were devised by Phil Redmond (kind of suburban and uncomfortable).

pole dancer *n.* a person who performs a pole dance.

1900 *Evening Democrat* (Warren, Pa.) 3 Nov. The subjects represented by the puppets were 'The Fisherwoman', 'The Italian Pole Dancer', 'The Plantation Negro', and the 'Last Day'.

1952 *Chron.-Telegram* (Elyria, Ohio) 30 Sept. 9/2 (*headline*) Pole dancer dies in 137-foot fall.

2003 *Time* 4 Aug. 58/1 A sluttish young woman battles with her mother over her aspiration to become a pole dancer.

pole dancing *n.* the action or practice of performing a pole dance.

1877 *Times* 31 Jan. 5/6 The amusements..commenced with a performance of marionettes in ten scenes, including in these quadrilles and hornpipes, pole-dancing and juggling.

1952 *Chron.-Telegram* (Elyria, Ohio) 30 Sept. 9/2 Known as Jackie Teeters during her 16 years of pole dancing, Miss Teeters fell while rehearsing for a show.

1994 *Philadelphia Daily News* (Nexis) 28 Apr. 31 Pole dancing and writhing on the floor are out.

2001 *Cosmopolitan* Dec. 58/3 I will assume the job begins and ends with tending bar and does not include pole dancing, lap dancing, or stripping.

pole dray *n. Australian* and *U.S.* (now *rare*) a small cart fitted with a central pole rather than a pair of shafts.

1843 A. CASWALL *Hints from Jrnl.* 33 Two indifferent ones [*sc.* animals] suffice for a pole dray.

1915 *Bulletin* (Sydney) 4 Nov. 26/4 Before pole-drays appeared many families navigated themselves in drays drawn by bullocks... Then followed the horse dray and the spring-cart.

1948 *Wisconsin Eng. Lang. Survey Suppl.* in *Dict. Amer. Regional Eng.* (2002) IV. 251/2 Pole dray—like a stoneboat but without sideboards. Seen at the centennial exhibit.

pole fishing *n.* the action, practice, or art of fishing with a pole (sense 1e).

1927 *Coshocton* (Ohio) *Tribune* 16 June 2/5 Only pole fishing will be permitted at the basin.

1988 *Coarse Fishing Handbk.* June–July 6/3 Pole fishing is..a means of taking big bags of fish at high speed—ideal for those early season attacks on roach with hemp and tares.

2004 *Lincolnshire Echo* (Nexis) 8 Apr. 45 The competitors found the strong wind made it difficult for pole fishing, and most of the leading weights fell to the maggot feeder.

† **pole ground** *n. Obsolete rare* river bed suitable for poling a boat.

1773 in R. Crisp *Richmond & Inhabitants* (1866) 316 From the depth of water, the want of Pole ground would render it difficult..to work the Craft.

pole hedge *n. Horticulture* = ESPALIER *n.* 1.

1658 J. EVELYN tr. N. de Bonnefons *French Gardiner* 8 Of this I purpose to treate hereafter, in the planting of pole-hedges and the Kitchen-garden.

1706 G. LONDON & H. WISE *Retir'd Gard'ner* I. i. 91 The Cultivation of Vines in Vineyards, on Pole-Hedges.

1998 *San Francisco Chron.* (Nexis) 9 Sept. (Home section) 1 A classical French device known as a 'stilt hedge' or a 'pole hedge'.

pole hook *n.* a hook on the end of a pole, esp. a carriage-pole; (also) a pole with a hook on its end, a boathook (now *rare*).

1794 W. FELTON *Treat. Carriages* I. v. §9 123 A pole-hook, a strong long hook, fixed on the end of a pole...to hang the middle splinter-bar to, when four horses are used.

1817 M. EDGEWORTH *Ormond* I. viii. 178 Moriarty and Ormond with pole, net, and pole-hook, swinging and leaping from one ledge of rock to another.

1891 *Scribner's Mag.* July 107/2 Rathbone with his pole-hook was guiding the boat's nose to the rickety ladder that went down into the water.

1996 *Railroading* Oct. 83/2 One possibility may be that your trolley pole is not making good contact with the pole hook.

pole horse *n.* a horse that is harnessed to the pole of a carriage or wagon; a wheeler (WHEELER *n.* 3).

1725 W. BROOME in A. Pope et al. tr. Homer *Odyssey* I. iv. Observ. 272 The Ancients..used one Pole-horse and two leaders.

1823 J. F. COOPER *Pioneers* I. iv. 52 The leaders were of gray, and the pole-horses of a jet black.

1995 *Amer. Jrnl. Archael.* **99** 635/1 The two middle horses, the pole horses, were attached to the chariot pole by means of a yoke that rested on the back of each horse.

pole house *n.* originally *U.S.* *(a)* a house built from upright wooden poles; *(b)* a house supported on poles, rather than having a foundation constructed below the ground.

*a*1816 F. ASBURY *Jrnl.* (1821) II. 245 At a pole-house I talked awhile..and administered the sacrament.

1949 *Amer. Jrnl. Archaeol.* **53** 184/2 Foundations of small pole houses were discovered.

2004 *Home Mag.* (Queensland) (Nexis) 8 May 16 We hate pole houses and wanted this one to have a solid base so that you didn't look up at its underbelly.

pole jump *n.* = POLE VAULT *n.*

1866 *Times* 22 Feb. 5/6 Pole Jump.—This was entirely a new feature at Oxford, and but few members of the society had practised it.

1898 *Daily News* 22 Feb. 3/4 A party of his pupils are exercising at the pole-jump, across a ditch.

2001 *Buffalo (N.Y.) News* (Nexis) 6 Feb. 5 E Senior Heather Brough of West Seneca West looks to add to the WNY pole jump record she owns at 9-feet-6.

pole jumper *n.* = POLE-VAULTER *n.*

1865 *Morning Post* 21 Nov. 6/4 High Pole Leap.—This was won by that magnificent pole jumper, Milvain, who cleared seven feet.

1908 *Westm. Gaz.* 1 July 8/4 Quite recently, Szathmary, the pole-jumper, broke the Hungarian record.

2000 *Vancouver Sun* (Nexis) 24 June J6 Hidden talents emerge when I cross paths with a snake—like my vertical leap, rather like a pole jumper without a pole.

pole jumping *n.* = POLE-VAULTING *n.*

1864 *Times* 30 Apr. 11/6 Pole Jumping.—1. M. Mackenzie and B. Ottley (equal), 8ft. 3in.

1912 E. H. RYLE *Athletics* 19 'Field events' (*i.e.*, long-, high- and pole-jumping, weight-putting, hammer- and discus-throwing, and hurdling).

2003 *Chicago Tribune* (Nexis) 14 Dec. 2 C Athlete after athlete..failed to even get over the bar in the pole jumping competition.

pole lamp *n.* chiefly *North American* a light (or series of small lights) attached to or suspended from a pole.

1907 *Atlanta Constit.* 9 June 48/2 (*advt.*) Lost—One automobile pole lamp.

1994 *Makahat Rev.* Spring 75 Johanne's sister was sitting in a wingback chair, under the protective glow of a pole lamp.

pole-lathe *n. Woodworking* a lathe in which the work is turned by a cord passing round it, and fastened at one end to the end of an elastic pole and at the other to a treadle.

1815 J. SMITH *Panorama Sci. & Art* I. 66 The pole lathe..made of the cheapest materials, and in the simplest manner.

1879 J. J. HOLTZAPFFEL *Turning & Mech. Manip.* IV. 20 The turner using the pole lathe..requires the back rest to steady and support his body.

1932 G. M. BOUMPHREY *Story of Wheel* 38 When the lathe came here, it was altered into what is called the pole-lathe.

1995 *Countryman* Summer 21 During this waiting time beside the kiln, Pip practises turnery on a pole-lathe, specialising in the making of one-legged stools.

pole leap *n.* now *rare* = POLE VAULT *n.*

1857 *Edinb. Evening Courant* 21 June Pole Leap for pupils under five feet.

1958 *Times* 22 Aug. 10/4 In the pole leap a 19-year-old record was broken when A. Jamieson of Drumoak, cleared 12 feet.

2002 *Leicester Mercury* (Nexis) 2 Aug. 14 There were long distance races and sprints, the pole leap (pole vault), long and high jump classes.

pole-leaper *n. rare* = POLE-VAULTER *n.*

1886 *Pall Mall Gaz.* 23 Aug. 4/1 I was a pole-leaper..and could clear five feet.

pole-leaping *n.* now *rare* = POLE-VAULTING *n.*

1842 *Chambers's Information for People* (new ed.) II. 531/2 The knack of pole-leaping is, like all other kinds, dependent on the spring of the feet.

1885 F. GALE *Mod. Eng. Sports* vi. 67 Running, jumping, and pole-leaping were often the outcome of a very old-fashioned sport, 'Follow my leader'.

1972 *Times* 20 Jan. 24/4 The visitor may watch Cumberland and Westmorland wrestling, fell racing, the hound trails or pole leaping.

pole mast *n. Shipbuilding* (now chiefly *historical*) a mast formed of a single spar; a mast made of one piece.

1672 J. NARBROUGH *Jrnl.* 2 Oct. in R. C. Anderson *Jrnls. & Narr. Third Dutch War* (1946) (modernized text) 204 I saw a pole-mast vessel to the N.E'ward of me.

1769 W. FALCONER *Universal Dict. Marine* at *Mast* A mast..is either formed of one single piece, which is called a pole-mast, or composed of several pieces joined together.

1824 in *Patents Specific., Masts* (1874) 19 Double pole masts.

1994 *Smithsonian* (Nexis) Oct. 145 A Predynastic vase of a reed boat with a pole mast and square sail proves that wind power surely was used as early as 3500 B.C.

pole-masted *adj.* having a pole mast.

1666 T. ALLIN *Jrnl.* 1 Aug. (1940) (modernized text) I. 280 Langley came off with a small pole-masted gribane.

1894 *Daily News* 22 Feb. 2/1 The Britannic is rigged as a pole-masted schooner.

1970 *Mariner's Mirror* **56** 165 Evidence for the pole-masted brigantine rig was found at the Dubrovnik museum.

† **pole mule** *n. U.S. Obsolete* a mule harnessed to the pole of a wagon.

1862 O. W. NORTON *Army Lett.* (1903) 106 A driver riding the near pole mule and guiding his team with one line.

1898 *Naugatuck (Connecticut) Daily News* 17 Aug. The driver rides the near pole mule and guides the entire six by means of a single leather rein.

pole net *n.* chiefly *Fishing* a net attached to a pole or poles.

1858 P. L. SIMMONDS *Dict. Trade Products* *Pole-net*, a net attached to a pole for illegal fishing in rivers.

1885 G. C. BOMPAS *Life F. Buckland* 163 Imagine an old fashioned, bag-shaped night-cap, with a stick fastened on each side of it, and you have a pole net.

2003 *Virginian Pilot* (Norfolk, Virginia) (Nexis) 2 Feb. E1 Walton fetched a large pole net and hauled the seal out.

† **pole-pad** *n. Gunnery Obsolete* a stuffed leather pad fastened on the point of the pole of a gun carriage to prevent injury to the horses.

1864 E. D. TOWNSEND *Gen. Orders* 2 Feb. in *War of Rebellion* (U.S. War Dept.) 3rd Ser. IV. 65 Pole-straps and pole-pads of field limbers, not belonging in horse batteries, are to be kept in the implement room or in the trays of the limber chest.

pole piece *n.* *(a)* a heavy strap which attaches the end of a carriage-pole to a draught animal's collar; *(b) Roofing* a ridge pole (*rare*).

1619 in G. Ornsby *Select. from Househ. Bks. Nawerth Castle* (1878) 108 For a paer of duble cotch rains and 2 poolpeseis.

1794 W. FELTON *Treat. Carriages* I. 221 Pole pieces, Are the straps which couple the horses to the pole, and are also regulated by the size and weight of the carriage.

1901 J. BLACK *Illustr. Carpenter & Builder Ser.: Home Handicrafts* 22 Deal rafters..the lower ends of which rest on the wall plates,..and the upper extremities..abut on the 'ridge' or 'pole piece'.

1983 M. STANSFIELD *New Herdsman's Bk.* i. 11 When fitting a halter it is best to put the poll piece over the ears first, before tightening the loop around the nose.

† **polepike** *n. Obsolete rare* (perhaps) a spike fixed to the end of a pole, or a long-handled pick, a pikestaff.

1451–2 in J. T. Fowler *Extracts Acct. Rolls Abbey of Durham* (1898) I. 147 (*MED*) Proj polepike et quinque Sholyrnez, 2 s. 2 d.

pole plate *n. Architecture* a beam supported by joists (or similar props) at certain points along its length.

1787 W. Pain *Builder's Golden Rule* (ed. 3) 5 The pole-plate for the small rafters to stand on.

1889 *Catholic Househ.* 30 Nov. 4 Bold king-post principals and traceried windbraces to the purlins and pole plates.

1997 *Sunday Mail (S. Afr.)* (Nexis) 14 Sept. The pole plate is rarely used today. It sits on top of the ceiling joists and provides a pitching plate for the rafters.

pole position *n.* *(a) Horse Racing* the position of the horse running at the front of the field close to the rails (now *rare*); *(b) Motor Racing* the position on the front row of the starting grid nearest to the inside of the first bend; also *figurative.*

1888 *N.Y. Times* 7 Sept. 3/2 In the final heat Richardson took another short run around the first turn, but held his pole position, leading all the way around to the stretch, where he made a wild break for over 100 yards.

1904 *Chicago Tribune* 1 Oct. 5/1 The two were well matched and sped around the track in a single dust cloud..the former making frantic efforts to gain the coveted pole position from the Detroit chauffeur as each turn was made.

1939 H. Hodges *City Managem.* iv. 75 The provisional appointee takes pole position.

1977 *News of World* 17 Apr. 24/7 Ipswich relinquished their hold on the pole position to champions Liverpool.

2000 *Observer* 18 June (Sport section) 12/5 Pole position has become something of a poisoned chalice.

† **pole-prop** *n.* chiefly *Gunnery Obsolete*, a bar for supporting the end of the pole of a carriage when the horses are unhitched.

1841 *Ordnance Man. for Use of Officers* (U.S. Army Ordnance Dept.) iii. 36 1 pole-prop socket, fastened by 1 rivet.

*a*1877 E. H. Knight *Pract. Dict. Mech.* II. 1761/2 *Pole-prop*, a bar for supporting the end of the pole or tongue, especially used for various carriages of the artillery service.

pole-puller *n. Agriculture* a person who draws the poles in a hop field.

1756 T. Turner *Diary* 20 Sept. (1984) (modernized text) 64 Mr. Porter's hoppers bought their pole-pullers' neckcloth.

1915 W. S. Maugham *Of Human Bondage* cxix. 629 A huge bag called a poke..the measurer and the pole-puller carried off between them and put on the waggon.

2003 *Kent & Sussex Courier* (Nexis) 3 Oct. 58 When I married we spent our honeymoon hop-picking me as a pole-puller and my wife joined her mum, gran, aunts and uncles with her own bin.

pole-pulling *n. Agriculture rare* the action or practice of drawing the poles in a hop field.

1776 *Thoughts on Present State of Poor* 38 What he may get extraordinary by mowing, harvest, and pole-pulling.

1882 E. L. CHAMBERLAIN *Gloss. W. Worcs. Words* 23 *Pole-pulling*, Taking out the poles at the end of the season.

pole rack *n.* a frame for supporting or holding a pole or poles of various types; (also) a frame constructed from poles.

1907 *N.E.D.* at *Pole* sb.1 *Pole-rack*, a rack on which drying-poles are supported in dyeing, tanning, and other trades.

1941 R. H. WESTVELD *Forestry in Farm Managem.* xii. 219 The posts are then piled on a pole rack with the small ends slightly above the ground surface.

1957 *Econ. Geogr.* **33** 233 Rice is tied into small bundles and hung on pole racks to dry.

1998 *Canal Boat & Inland Waterways* June 124/2 (*advt.*) British brassware. Range of ports, Hopper style and static, mushroom vents, tiller bars, pole racks, [etc.].

pole railroad *n.* = *pole railway n.*

1878 *Lumberman's Gaz.* 6 Apr. 302/3 They use on these pole railroads trucks with iron wheels.

1976 *Nevada State Jrnl.* 11 Aug. A skid road and a pole railroad, plus two locomotives used to haul the log-loaded flat cars.

pole railway *n. North American* (now *historical*) a temporary track constructed with two parallel lines of barked poles serving as rails, used esp. for the transportation of timber.

1907 *N.E.D.* at *Pole* sb.1 Pole-railway.

1931 *Daily Northwestern* (Oshkosh, Wisconsin) 4 Aug. 5/6 Paul Reynolds, who built a pole railway to transport logs from Oconto County to the Wolf river.

2000 *Halifax* (Nova Scotia) *Daily News* (Nexis) 20 Mar. 4 It was a pole railway, made from skinned maple trees laid end-to-end.

pole-reed *n.* *(a)* the giant reed, *Arundo donax* (now *rare*); *(b)* a phragmites, *esp.* the common reed, *Phragmites communis* (also called *pool reed*).

1578 H. LYTE tr. R. Dodoens *Niewe Herball* IV. liv. 514 This plante is called in..English, Common Pole Reede, Spier, or Cane Reede.

1597 J. GERARD *Herball* I. 34 *Arundo Cypria*..in English Pole reede, and Cane, or Caues.

1879 R. C. A. PRIOR *On Pop. Names Brit. Plants* (ed. 3) 187 *Pole-reed*,..in our western counties, Pool-reed.

1892 E. R. LANKESTER tr. E. Haeckel *Hist. Creation* (ed. 4) I. 317 Ferns or Filicinæ (ferns, pole-reeds, scale-plants, etc.).

1976 *Amer. Jrnl. Philol.* **97** 330 The latter are pole-reeds (*Arundo donax*) which Theophrastus describes as 'very bushy'.

pole road *n.* †*(a)* a road constructed from closely-fitted transverse poles or rails (*obsolete*); *(b)* = *pole railway n.*

1864 in *War of Rebellion* (U.S. War Dept.) (1891) 1st Ser. XXXVI. ii. 909 Wagon train took pole road in direction of Sycamore.

1983 W. L. MONTELL *Don't go up Kettle Creek* 93 Some logging operations were large enough to merit construction of tram roads or pole roads from the river or railhead to the logging camps.

† **pole rose** *n. Obsolete* = *pillar rose n.* at PILLAR *n.* Compounds 2.

1848 W. PAUL *Rose Garden* 67 Pillar or Pole Roses.

1870 *Times* 18 Mar. 4/6 Pole roses, or pillars, will not be lost sight of in appropriate situations under our proposed arrangements.

† **pole rush** *n. Obsolete* the common clubrush, *Schoenoplectus lacustris*.

1578 H. LYTE tr. R. Dodoens *Niewe Herball* IV. lii. 511 The fourth [kind of Rush] is called..in English, the pole Rushe, or bull Rushe, or Mat Rushe.

1611 R. COTGRAVE *Dict. French & Eng. Tongues* *Jonc à cabas*, the pole-rush, mat-rush, fraile-rush.

pole-screen *n.* now *historical* a screen mounted on an upright pole or rod.

1789 J. CHRISTIE *Catal. Houshold Furnit. Duchess of Kingston* 28 A set of fire irons, 2 green mixed damask festoon window curtains and a pole screen.

1870 M. OLIPHANT *Autobiogr. & Lett.* (1899) 225 I have just finished the most enchanting pole-screen.

1937 *Burlington Mag.* Apr. p. xxiv/1 A mahogany Polescreen on a beautifully carved tripod stand.

2000 *Daily Tel.* 10 Mar. 28/4 Some of Kirsty's mother's furniture had been taken, a Sheraton side-table... ormolu candlesticks and a Regency pole-screen.

† **pole-shank** *n. Obsolete rare* the shaft of a fishing net.

1888 G. B. GOODE *Amer. Fishes* 250 In this is inserted the end of the pole-shank.

pole-sitter *n.* *(a)* a person who participates in pole-sitting; = *flagpole sitter n.* at FLAG *n.*[4] Compounds 2; *(b)* a person occupying pole position.

1927 *Lancaster (Ohio) Daily Eagle* 1 Sept. 5/4 (*headline*) Girl pole sitter.

1977 *Washington Post* (Nexis) 28 May B4 For Sunday's auto race, Harrah's Reno-Tahoe Racebook lists Bobby Unser as favorite, 4 to 1; polesitter Tom Sneva 5 to 1.

2003 *Times Colonist* (Victoria, Brit. Columbia) (Nexis) 2 Sept. A2 Victoria's own Mark Sutton, who endured untold hardships as a record-breaking pole-sitter 18 years ago.

pole-sitting *n.* the action or an instance of sitting (on a small platform) on top of a tall pole, esp. for a long time as a feat of endurance.

1927 *Appleton* (Wisconsin) *Post-Crescent* 2 July 3/3 Joe (Hi) Powers..will attempt to sit for 20 days and shatter the non-stop pole-sitting record.

2003 *Times Colonist* (Victoria, Brit. Columbia) (Nexis) 2 Sept. A2 An American illusionist attempting a pole-sitting in London.

† **pole sling** *n. Obsolete rare* a type of travelling seat suspended from a pole or poles carried by bearers.

1887 *N. Amer. Rev.* Oct. 361 A pole sling is a long pole, about twenty-five feet, from which is suspended a leather seat and a board on which to rest the feet.

† **pole square** *n. Obsolete* an area of one square pole or perch; = sense 3b.

1707 J. MORTIMER *Whole Art Husbandry* 71 Allowing a Bushel to a Pole square, or a 160 Bushels to an Acre.

† **poles-screamer** *n. Obsolete rare* (probably) a tradesman with a shop (cf. sense 1d).

1651 J. TATHAM *Distracted State* IV. i. 22/2 *Scotch Apothecary*... I ha not ben a Poles-Screamer this twenty yeers far naught.

† **pole-staff** *n. Obsolete* *(a)* a pikestaff; *(b)* the shaft of a fishing net.

1851 P. DONALDSON *Life Sir William Wallace* 20 Wallace being dexterous and strong parried it off with his pole-staff and laid him on the ground.

1890 *Cent. Dict.* *Pole-staff*, the pole of a net.

pole strap *n.* = *pole piece n.* (a).

1841 *Ordnance Man. for Use of Officers* (U.S. Army Ordnance Dept.) iii. 36 1 pole-strap ring, fastened by 3 rivets.

1983 L. R. MILLER & K. GILMAN *Horses at Work* 101 (*caption*) The pole strap drops down to a chain hooked ahead to the Rake frame for backing.

pole tip *n.* a metal cap covering the point of a carriage-pole.

1868 *Sci. Amer.* 30 May 348/2 I claim the pole tip, A, B, substantially as and for the purpose described.

1944 *Times* 7 Mar. 2/1 The bollard or pole-tip, a heavy but finely modelled bronze casting which was one of the metal fixtures of a wheeled vehicle.

pole tool *n. Mining* *(a)* each of a series of rods that can be linked together to support a drilling bit; *(b)* a tool with the working end at the end of a pole, so that it can be operated at a distance from the work.

1871 W. P. BLAKE *Notices Mining Machinery* 65 The cumbrous pole-tools have been rejected, and the cable, upon the ancient Chinese system, substituted.

1994 *Dayton (Ohio) Daily News* 12 June 4 F/3 A pole saw..can be either a curved pruning saw or lopping shears on top of a pole... Both types of pole tools allow you to operate the tools from the ground so that you don't have to use a ladder.

2003 *Painting & Wallcovering Contractor* Sept.–Oct. 102/1 The Anglemaster, an adjustable spray pole tool that will bring increased productivity while painting complete surfaces.

† **pole torpedo** *n. U.S. Weaponry Obsolete* a torpedo carried on the end of a pole projecting from the bows of a vessel; = *spar torpedo n.* at SPAR *n.*[1] Compounds 2.

1877 *Ohio Democrat* (New Philadelphia, Ohio) 28 June The launches pushed ahead and exploded their pole torpedoes, sinking the gunboat.

1898 *Newark (Ohio) Daily Advocate* 23 June 2/2 The superb enthusiasm..which took Cushing and his clumsy pole torpedo to the iron-clad sides of the Albemarle.

pole trailer *n.* a trailer supported by a single pole attached to a vehicle by a coupling device at the forward end.

1919 *Atlanta Constit.* 17 Aug. B11/4 The Warner pole trailer made by this company is the leader in this class of trailer attachments.

1936 *Times* 17 Aug. 16/7 Five three-ton rigid pole trailers, nine six-ton sliding pole trailers.

2002 *Tulsa (Oklahoma) World* (Nexis) 2 Sept. A11 (*caption*) Company President Gary Chandler poses in front of an expandable steerable pole trailer.

pole trap *n.* a circular steel trap fixed on the top of a post or pole for catching birds.

1879 *Times* 14 July 13/2 Their natural enemies—the weasels, stoats, owls, kestrels, and other hawks—are most cruelly destroyed by pole-traps and others set on the ground.

1909 *Westm. Gaz.* 17 Feb. 5/1 The catching of birds with hooks in Cornwall has been stopped by an Act passed last year, and efforts have been made to abolish entirely the illegal pole-trap.

1991 *Shooting Times* 18 Apr. 10/3 He had little time for fellow keepers who continued to control birds of prey with poison baits and pole traps.

pole trawl *n. Fishing* (now *rare*) a trawl net, the mouth of which is kept open with a pole.

1836 *First Rep. Irish Fisheries* 166 The pole-trawl, used in shoal water, is the only one known here.

1872 *Chambers's Encycl.* IX. 525/1 A kind of trawl called the pole-trawl was formerly in use in some parts of England, but is now used only in the south of Ireland.

1998 *Oceans '98* 1514 Specimens were obtained using..a Honfleur pole trawl.

pole trawling *n. Fishing* (now *rare*) the action or practice of trawling with a pole trawl.

1774 *Philos. Trans.* (Royal Soc.) **64** 471 Small vessels, with which they practise pole-trawling.

1776 *Med. & Philos. Comm.* **4** 52 At Ring, a small fishing village where pole-trawling is practised, they are acquainted with it.

1998 *Oceans '98* 1512 (*abstr.*) For larger areas, pole trawling was the most suitable method.

pole wagon *n.* *(a)* a wagon with a single draught pole; *(b)* a wagon for transporting poles, esp. for a circus tent; *(c)* a wagon with a long heavy central pole as chassis, used to transport timber; = *timber-wain n.* at TIMBER *n.*[1] Compounds 1a.

1836 G. HEAD *Home Tour* 255 The manner in which the pole-waggons are driven is not common.

1851 *Times* 3 Jan. 5/1 In the pole-waggon, in which two are yoked abreast as in a carriage,..the horses trot briskly along.

1908 S. FORD *Side-stepping with Shorty* vi. 90 The pole waggon brings up the rear.

1947 H. L. EDLIN *Forestry & Woodland Life* 118 The typical timber carriage or pole waggon consists of two pairs of wheels united by a single pole: the forward pair of wheels is free to swivel, for steering purposes.

1968 J. ARNOLD *Shell Bk. Country Crafts* v. 76 The pole-wagon, which was the fore-runner of the present-day motor-hauled trolley, had iron stanchions at its four corners of two transverse beams, each above its respective axle.

1985 *Nation* 9 Mar. 268/2 An honest-to-goodness mud scene of the 1930s depicted twenty horses trying to budge a pole wagon that had got mired to the axles.

2004 R. WALTON *Hopscotch, Hobos & Foxholes* 87 There were wagons for tents, wagons for stakes, pole wagons, wardrobe wagons, ticket wagons, shop wagons.

2014 *TVEyes* (Nexis) (transcript of TV programme) 30 May The army used pole wagons. The only place in the country that was still using pole wagons was in the Wolds.

† **pole wedge** *n. Agriculture Obsolete* a wedge used in holding the coulter of a plough in place.

1733 J. TULL *Horse-hoing Husbandry* xxi. 143 The Coulter, which is wedged tight up to it [*sc.* the Coulter-hole] by the Poll-Wedge.

1757 T. HALE et al. *Compl. Body Husbandry* (new ed.) II. v. xxviii. 76 It is fixed in this Mortise by a Pole Wedge in the same Manner as the Coulter is in other Plows.

pole wood *n.* wood from small or immature trees; sapling wood.

*a*1552 J. LELAND *Itinerary* (1711) IV. 87 It is yonge Pole Wood easy to be cloven.

1652 W. BLITH *Eng. Improver Improved* xxv. 159 It was much Pole-wood, yea a good part of it made Spars, and some part of it small building Timber.

1742 in *N.E.D.* (1907) (at cited word) [Lessee] to fall or cut all the large or pole wood grounds.

1847 H. MILLER *First Impressions Eng.* x. 184 Six thousand loads of the young pole-wood..being used twelvemonthly.

1999 *Wasau (Wisconsin) Daily Herald* (Nexis) 5 Dec. 1 D I'd forget to put in the pole wood to keep it burning.

pole-wound *n. rare* a wound that has been inflicted with a pole.

1908 T. HARDY *Dynasts: Pt. 3rd* IV. vi. 163 Who knows but that we should have been kings too, but for my crooked legs and your running pole-wound?

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Exhibit 6

EXHIBIT 6

Oxford English Dictionary | The definitive record of the English language

mounting, *adj.*

Pronunciation: Brit. /ˈmaʊntɪŋ/, U.S. /ˈmaʊn(t)ɪŋ/

Forms: see MOUNT *v.* and -ING *suffix*².

Frequency (in current use):

Origin: Formed within English, by derivation. **Etymons:** MOUNT *v.*, -ING *suffix*².

Etymology: < MOUNT *v.* + -ING *suffix*².

1.

a. Rising, ascending, soaring. (*literal* and *figurative*). Frequently in poetic collocation ***mounting lark*** (cf. MOUNTAIN LARK *n.*, and etymological note at).

1550 N. UDALL tr. P. M. Vermigli *Disc. Sacrament Lordes Supper* sig. Aa3 For this is a table for mounting Eagles, and not for pratlying Iaies.

1563 B. GOOGE *Eglogs Epytaphes & Sonettes* sig. L.iii We flewe, my Guyde & I, with mowntyng flyght apace.

1577 G. WHETSTONE *Remembraunce Gaskoigne* sig. A.ij^{v} The mounting minde had rather sterue in need.

1590 E. SPENSER *Faerie Queene* I. XI. sig. L6 With mery note her lowd salutes the mounting larke.

1664 J. DRYDEN *Rival Ladies* I. ii. 13 I am no more affraid of flying Censures, Than Heav'n of being Fir'd with mounting Sparkles.

1709 A. POPE *Winter* in *Poet. Misc.: 6th Pt.* VI. 749 No more the mounting Larks, while Daphne sings, Shall list'ning in mid Air suspend their Wings.

1713 J. GAY *Rural Sports* 19 While with the mounting sun the meadow glows.

1792 M. DEVERELL *Mary, Queen of Scots* V. vi. 116 Now sing a requiem To my mounting soul.

1859 'G. ELIOT' *Adam Bede* I. I. vii. 153 Straining your eyes after the mounting lark.

1919 *Outing* Mar. 296/2 A narrow defile of jagged, bare palisades high above the mounting forest-smothered lane, seem almost to touch sides across the narrow gap.

1987 R. HALL *Kisses of Enemy* (1990) II. XXXVII. 190 When the mounting water reached the roof garden it swirled, lifelike, between embankments thick with plants.

b. *Heraldry.* Of a beast of the chase or a reptile: standing on the left hind foot with the forefeet in the air. *rare.*

1688 R. HOLME *Acad. Armory* II. 175/2 He beareth Sable, a demy Ram mounting, Argent.

1731 N. BAILEY *Universal Etymol. Eng. Dict.* II *Mounting* signifies the same spoken of beasts of chase, as rampant does of beasts of prey.

1847 H. GOUGH *Gloss. Terms Brit. Heraldry* 229 *Mounting*, a term equivalent to rampant, applied to beasts of chase, and sometimes to reptiles.

†**2.** Amounting, cumulative. *Obsolete. rare.*

?*a*1560 L. DIGGES *Geom. Pract.: Pantometria* (1571) II. xxiv. sig. Piij^{v} If ye sqnare the perpendicular, the mounting summe will be [etc.].

3. Esp. of an emotion, sensation, sound, etc.: increasing in volume, pitch, or intensity.

1882 F. W. H. MYERS *Renewal of Youth* II. 222 What spirit heard That mounting cry which died upon a word.

1898 G. B. SHAW *Candida* I. in *Plays* II. 91 *Burgess (severely, in spreading, mounting tones)* Woy helse should I do it?

1929 E. O'NEILL *Lazarus Laughed* IV. i. 132 I am sick, Lazarus, sick of cruelty..and all the imbecilities of pleasure—the unclean antics of half-witted children! (*With a mounting agony of longing*) I would be clean!

1954 W. FAULKNER *Fable* 46 The division commander..read the title and then read it again in mounting exasperation.

1963 *Daily Tel.* 20 Nov. 14/2 The hydra-headed challenge of London's mounting traffic congestion.

1991 J. SAYERS *Mothering Psychoanal.* V. vii. 247 A baby whose feed is unavoidably delayed becomes so torn apart by crying that it cannot feed, so much has the breast seemingly become fragmented and bad with the baby's mounting frustration.

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Exhibit 7

EXHIBIT 7

A Dictionary of

Construction, Surveying, and Civil Engineering

SECOND EDITION

CHRISTOPHER GORSE, DAVID JOHNSTON, AND MARTIN PRITCHARD

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Further Reading 634

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polariscope An instrument used to study polarized light.

polarization The direction of oscillation waves, e.g. light waves oscillate perpendicular to the path they travel.

polar second moment of area Defines the ability of a section (e.g. a beam) to resist torsion about an axis.

polder Low-lying land that has been reclaimed from a body of water (sea, lake, or flood plain) by constructing *embankments or *dykes, and *dewatered. Polders have a high risk of flooding.

pole A long, usually circular in section, piece of a material.

pole-frame construction (post-frame construction) A construction method where the building is supported on vertical poles or posts that can either be driven into the ground or supported on a slab or footing.

pollute To cause *pollution.

pollution The introduction of any contaminants into an environment.

polyamide (nylon) A polymer containing monomers of amides. Polyamides are renowned for retaining excellent mechanical properties at elevated temperatures.

polycarbonate (PC) A *thermoplastic polymer material made from carbonate. PCs are commonly used as an unbreakable glass substitute especially as bullet-proof or vandal-proof windows utilized in banks, public transport stations, high-risk (federal government) buildings, etc. It has half the density of glass and transmits more light in comparison.

polychlorinated biphenyls (PCBs) A polymeric material based on chlorine. PCBs have a variety of uses, most common applications are in electrical wiring and components.

polyethylene (PE) A widely utilized thermoplastic polymeric material. In construction applications it is used for interior plumbing pipes, and waterproof sheets for damp-proof applications as polyethylene is impermeable to the passage of water (waterproof). It is available in many different densities, which determines its application.

polyfusing Heat fusing of plastics.

polygon A closed figure that is contained by closed straight lines.

polygonal roof See PAVILION ROOF.

polygon of forces If more than three forces act through one point and are in one plane (termed coplanar forces) they can be represented in magnitude and direction by the sides of a *polygon. If the polygon closes, the forces are in equilibrium.

polymer A material usually composed of hydrocarbon compounds with extensive applications and usage. Polymers are widely utilized in construction, and are generally low-density materials used mainly in non-load-bearing applications. Approximately 20% of polymers produced in the UK go into construction. The most commonly used polymer is *polyvinyl chloride (PVC), and this material finds use as

pipe materials for rainwater, waste and sewage systems, electrical cable sheathing, cladding, window frames and doors, and flooring applications. Polymers are generally classified into three categories based on their mechanical properties, they are *thermoplastics, *thermosets, and *elastomers.

polymerization The process whereby polymers are formed due to a chain reaction of *mers. The process of polymerization is a complex chemical reaction but in simplistic terms involves the repetition of the base chemical block of a polymer 10,000–100,000 times depending on the desired density and application of the polymer.

polymethylmethacrylate (PMMA, perspex, acrylic resin) A polymer material based on methyl methacrylate. Perspex (PMMA) is a transparent plastic, most commonly used as a shatterproof replacement for glass, especially in municipal buildings and windows in bus stops. PMMA has excellent transmission properties and toughness in comparison with glass, it has half the density and transmits more light.

polynomial A mathematical expression for the sum of a number of terms, each of which is a constant multiplied by at least one variable raised to a positive integral power, e.g. $2x^2 + 3y^3 - 7$.

polypropylene (PP) A *thermoplastic polymeric material. PP has properties which are similar to low density and high density polypropylene. In construction it is used for sewer pipes or lavatory seats.

polystyrene (polystyrene foam) A polymeric material based on styrene. Polystyrene foam has low thermal conductivity making it ideal for cavity-wall insulation; however, it needs protection due to its flammability.

polytetrafluoroethylene (PTFE, Teflon) A polymeric material with a very low coefficient of friction. PTFE is thus commonly used in containers and pipework for reactive (corrosive or hazardous) substances.

polythene See POLYETHYLENE.

polyurethane (PU) A polymeric material made from urethane, usually utilized in foam form. Polyurethane is widely used in the construction industry, particularly as thermal insulation panels in cavity wall insulation. Polyurethane-based glue is also used as an adhesive. Polyurethane-based coatings and varnishes are used in carpentry or woodworking as this results in a hard, inflexible coat that is especially popular for protecting floors. Another common use of polyurethane foams is in commercial and domestic furniture.

polyvinyl acetate (PVA or PVAc) A polymer material based on vinyl acetate monomer commonly used as wood glue, and in paints and industrial coatings.

polyvinyl butyral (PVB) A polymer resin used to bind glass; this further improves the toughness of glass panels.

polyvinyl chloride (PVC, uPVC) A common thermoplastic polymer based on vinyl used extensively in the construction industry. UPVC (unplasticized polyvinylchloride) is used as window frames, doors, and pipes in most dwellings

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WIT: Wooley
DATE: 6-13-23
Pat E. Arredondo, CRR, RMR



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DATE: 6-13-23
Pat E. Arredondo, CRR, RMR

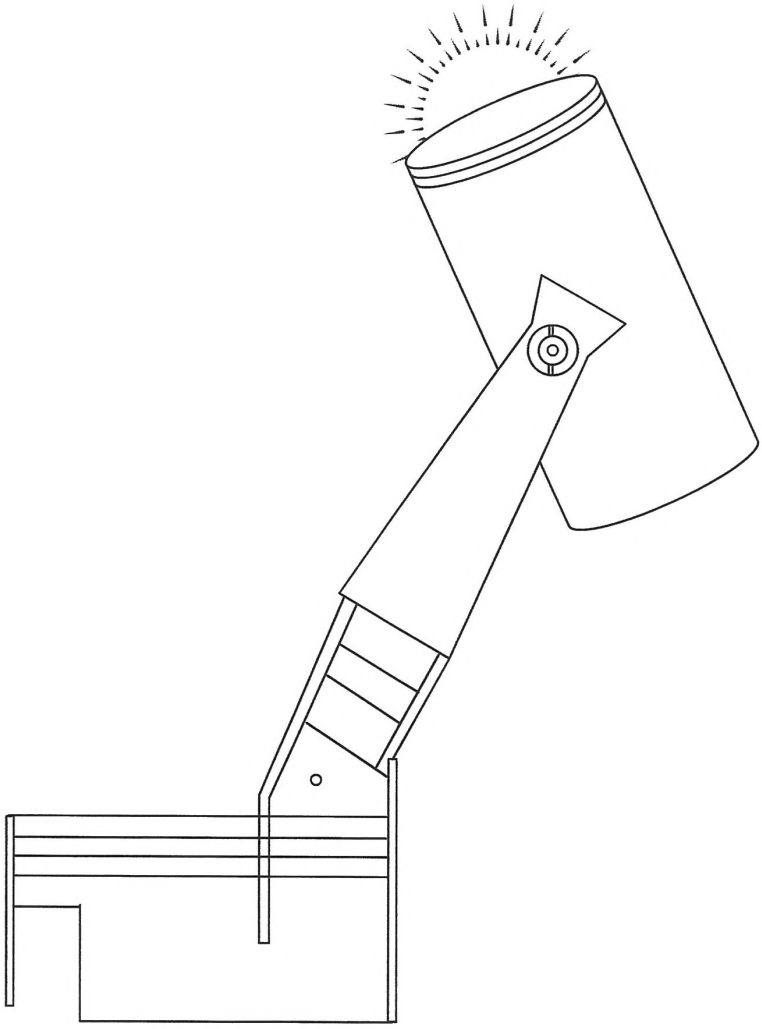


EXHIBIT: 4
WIT: Wooley
DATE: 6-13-23
Pat E. Arredondo, CRR, RMR



EXHIBIT: 5
WIT: Woolley
DATE: 6-13-23
Pat E. Arredondo, CRR, RMR

EXHIBIT 2

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/016,083	09/09/2020	JOSHUA C. ALLISON	120257-5001 US04	6643

9629 7590 01/29/2021

Morgan, Lewis & Bockius LLP (WA)
1111 Pennsylvania Avenue, N.W.
Washington, DC 20004

EXAMINER	
HINES, ANNE M	

ART UNIT	PAPER NUMBER
2879	

NOTIFICATION DATE	DELIVERY MODE
01/29/2021	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

karen.catalano@morganlewis.com
patents@morganlewis.com

Office Action Summary	Application No. 17/016,083	Applicant(s) ALLISON et al.	
	Examiner ANNE M HINES	Art Unit 2879	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 1/8/2021.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☑ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-14 and 22-33 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-2,14,22-24,27,30-31 and 33 is/are rejected.

8) ☑ Claim(s) 3-13,25-26 and 28-29 is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on 9/9/2020 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Petitioner Ensign
Exhibit 1057 - 186 of 338

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Claim Rejections - 35 USC § 102

In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention.
>
> (a)(2) the claimed invention was described in a patent issued under section 151, or in an application for patent published or deemed published under section 122(b), in which the patent or application, as the case may be, names another inventor and was effectively filed before the effective filing date of the claimed invention.

Claim(s) 1-2, 14, 22-24, 21, 30-31, and 33 is/are rejected under 35 U.S.C. 102(a)(1) and 102(a)(2) as being anticipated by Gowanlock et al. (US 2015/0184840).

Regarding claim 1, Gowanlock discloses a lighting system mounted on a rig, the lighting system comprising a plurality of light units (210 & 215; Paragraph [0043]), each light unit comprising a mounting pole (210; Paragraph [0043]), a light fixture comprising one or more lights (215; Paragraph [0043]), and a bracket configured to attach the mounting pole to a crown deck of the rig (285; Paragraph [0048]).

Regarding claim 2, Gowanlock further discloses wherein the bracket is connected to the crown deck of the rig using bolts (Paragraph [0050]).

Regarding claim 14, Gowanlock further discloses wherein the rig is a drilling rig (Paragraph [0042]).

Regarding claim 22, Gowanlock discloses a method of illuminating a wellsite comprising the steps of mounting a plurality of mounting poles on a crown deck of a rig (210; Paragraph [0043]), mounting a plurality of lights to the plurality of mounting poles (215; Paragraph [0043]), wherein each of the plurality of mounting poles supports at least one of the plurality of lights, and each of the plurality of lights is mounted to only one of the plurality of mounting poles, and illuminating a wellsite using the plurality of lights (Paragraph [0043]).

Regarding claim 23, Gowanlock further discloses individually adjusting each of the plurality of lights (Paragraph [0043]).

Regarding claim 24, Gowanlock further discloses attaching a removable bracket to one or more of the mounting poles, and using the removable bracket to attach one or more of the mounting poles to the rig(285; Paragraph [0044,0048]).

Regarding claim 27, Gowanlock discloses a rig comprising a derrick (Fig. 7; Paragraph [Paragraph [0004], Paragraph [0042]), and a plurality of light units attached to the crown deck, each light unit comprising a mounting pole (210; Paragraph [0043]), wherein each light unit comprises a separate mounting pole, such that the system comprises a plurality of mounting poles, and a light fixture comprising one or more lights (215; Paragraph [0043]), the light fixture coupled to the mounting pole.

Regarding claim 30, Gowanlock further discloses wherein the light fixture may be coupled to the mounting pole in a first position or a second position and, when the light fixture is in the first position, the one or more lights of the light fixture are oriented away from the rig (Paragraph [0043]).

Regarding claim 31, Gowanlock further discloses wherein when the light fixture is in the second position, the one or more lights of the light fixture are oriented towards the rig (Paragraph [0043]).

Regarding claim 32, Gowanlock further discloses wherein the rig is a drilling rig (Paragraph [0042]).

Regarding claim 33, Gowanlock further discloses wherein the bracket is welded to the crown deck of the rig (Paragraph [0048]).

Allowable Subject Matter

Claims 3-13, 25-26, and 28-29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant's arguments filed January 8, 2021 have been fully considered but they are not persuasive.

With respect to the Gowanlock reference, Applicant argues that Gowanlock's invention is materially different from Applicant's claimed invention and that Gowanlock discloses a lighting system that is the same as the rig lighting frame systems that Applicant's invention distinguishes itself over. Applicant argues that their claimed invention is modular and assembled using multiple standalone pieces that may be configured to different structures and that Gowanlock's disclosure does not disclose the invention of claim 1 of the application because the 'light support posts' and 'light holding platforms' are not attached to the crown deck of the rig but to the outer structural frame which is attached to the adjustable frame portion which is attached to the crown deck of the rig via corner support posts. Applicant argues that their invention has been commercially successful.

The Examiner respectfully disagrees. The Examiner notes that claim 1 does not require that the bracket and mounting pole be directly attached to the crown deck of the rig; as such, Gowanlock's disclosure of a plurality of light units with mounting poles, a light fixture comprising one or more lights, and a bracket that are attached to the crown deck of the rig via the outer structural frame and the adjustable frame portion is considered as meeting the claimed limitations. Further the Examiner notes that the feature of a modular system that is assembled using multiple standalone pieces is not claimed in the claims and that claims are treated based on their broadest reasonable interpretation and that limitations cannot be read in from the specification. Finally, with regards to commercial success, the Examiner notes that no evidence has been provided to support this argument and that arguments of Applicant's attorney cannot take the place of evidence in the record.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANNE M HINES whose telephone number is (571)272-2285. The examiner can normally be reached on M-F: 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Epps can be reached on 571-272-2328. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Anne M Hines/
Primary Examiner
Art Unit 2879

EXHIBIT 3

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/016,083	09/09/2020	JOSHUA C. ALLISON	120257-5001 US04	6643

9629 7590 12/09/2020

Morgan, Lewis & Bockius LLP (WA)
1111 Pennsylvania Avenue, N.W.
Washington, DC 20004

EXAMINER	
HINES, ANNE M	

ART UNIT	PAPER NUMBER
2879	

NOTIFICATION DATE	DELIVERY MODE
12/09/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

karen.catalano@morganlewis.com
patents@morganlewis.com

Office Action Summary	Application No. 17/016,083	Applicant(s) ALLISON et al.	
	Examiner ANNE M HINES	Art Unit 2879	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

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- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 11/19/2020.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-14 and 22-32 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-2,14,22-24,27 and 30-32 is/are rejected.

8) ☑ Claim(s) 3-13,25-26 and 28-29 is/are objected to.

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Application Papers

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on 9/9/2020 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Claim Rejections - 35 USC § 102

In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention.
>
> (a)(2) the claimed invention was described in a patent issued under section 151, or in an application for patent published or deemed published under section 122(b), in which the patent or application, as the case may be, names another inventor and was effectively filed before the effective filing date of the claimed invention.

Claim(s) 1-2, 14, 22-24, 27, and 30-31 is/are rejected under 35 U.S.C. 102(a)(1) and 102(a)(2) as being anticipated by Gowanlock et al. (US 2015/0184840).

Regarding claim 1, Gowanlock discloses a lighting system mounted on a rig, the lighting system comprising a plurality of light units (210 & 215; Paragraph [0043]), each light unit comprising a mounting pole (210; Paragraph [0043]), a light fixture comprising one or more lights (215; Paragraph [0043]), and a bracket configured to attach the mounting pole to a crown deck of the rig (285; Paragraph [0048]).

Regarding claim 2, Gowanlock further discloses wherein the bracket is connected to the crown deck of the rig using bolts (Paragraph [0050]).

Regarding claim 14, Gowanlock further discloses wherein the rig is a drilling rig (Paragraph [0042]).

Regarding claim 22, Gowanlock discloses a method of illuminating a wellsite comprising the steps of mounting a plurality of mounting poles on a crown deck of a rig (210; Paragraph [0043]), mounting a plurality of lights to the plurality of mounting poles (215; Paragraph [0043]), wherein each of the plurality of mounting poles supports at least one of the plurality of lights, and each of the plurality of lights is mounted to only one of the plurality of mounting poles, and illuminating a wellsite using the plurality of lights (Paragraph [0043]).

Regarding claim 23, Gowanlock further discloses individually adjusting each of the plurality of lights (Paragraph [0043]).

Regarding claim 24, Gowanlock further discloses attaching a removable bracket to one or more of the mounting poles, and using the removable bracket to attach one or more of the mounting poles to the rig (285; Paragraph [0044, 0048]).

Regarding claim 27, Gowanlock discloses a rig comprising a derrick (Fig. 7; Paragraph [Paragraph [0004], Paragraph [0042]), and a plurality of light units attached to the crown deck, each light unit comprising a mounting pole (210; Paragraph [0043]), wherein each light unit comprises a separate mounting pole, such that the system comprises a plurality of mounting poles, and a light fixture comprising one or more lights (215; Paragraph [0043]), the light fixture coupled to the mounting pole.

Regarding claim 30, Gowanlock further discloses wherein the light fixture may be coupled to the mounting pole in a first position or a second position and, when the light fixture is in the first position, the one or more lights of the light fixture are oriented away from the rig (Paragraph [0043]).

Regarding claim 31, Gowanlock further discloses wherein when the light fixture is in the second position, the one or more lights of the light fixture are oriented towards the rig (Paragraph [0043]).

Regarding claim 32, Gowanlock further discloses wherein the rig is a drilling rig (Paragraph [0042]).

Allowable Subject Matter

Claims 3-13, 25-26, and 28-29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Epps can be reached on 571-272-2328. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Anne M Hines/
Primary Examiner
Art Unit 2879

EXHIBIT 4

US 20150184840A1

(19) **United States**

(12) **Patent Application Publication**

GOWANLOCK et al.

(10) **Pub. No.: US 2015/0184840 A1**

(43) **Pub. Date: Jul. 2, 2015**

(54) **ATTACHABLE LIGHTING SYSTEM FOR DRILLING RIG**

(71) Applicant: **APOLLO ENERGY SERVICES CORP.**, Airdrie (CA)

(72) Inventors: **Matthew GOWANLOCK**, Airdrie (CA); **Darcy K. DUPUIS**, Calgary (CA)

(73) Assignee: **APOLLO ENERGY SERVICES CORP.**, Airdrie (CA)

(21) Appl. No.: **14/632,592**

(22) Filed: **Feb. 26, 2015**

Related U.S. Application Data

(63) Continuation-in-part of application No. 14/093,097, filed on Nov. 29, 2013.

Publication Classification

(51) **Int. Cl.**

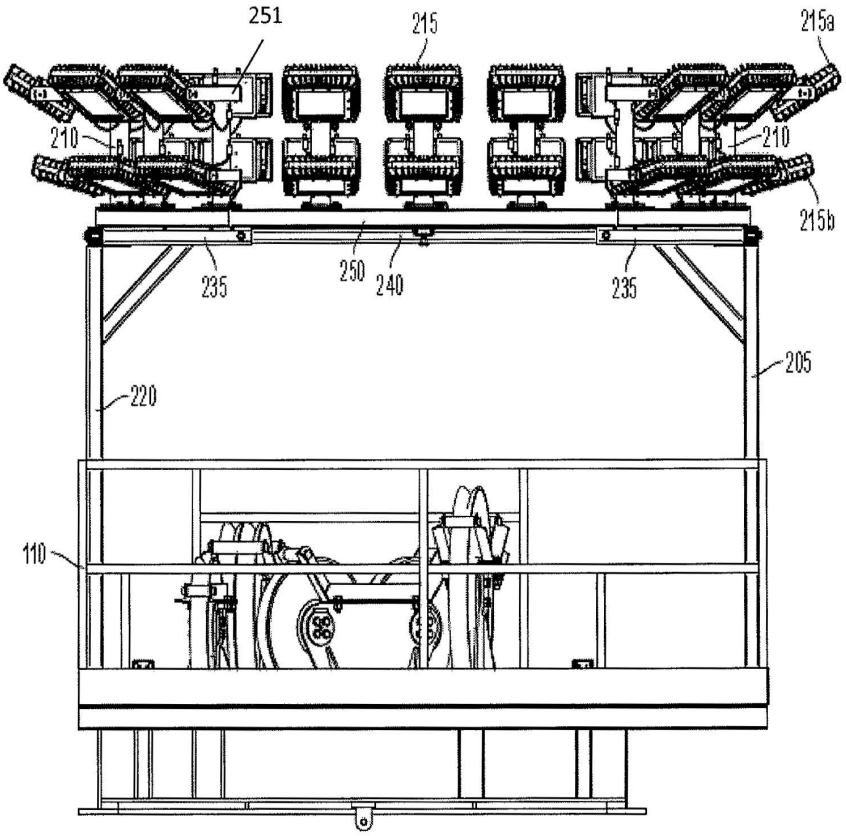
F21V 21/30	(2006.01)
F21V 14/02	(2006.01)
E21B 15/00	(2006.01)
F21V 21/116	(2006.01)

(52) **U.S. Cl.**

CPC ***F21V 21/30*** (2013.01); ***F21V 21/116*** (2013.01); ***F21V 14/02*** (2013.01); ***E21B 15/00*** (2013.01); *F21W 2131/40* (2013.01)

(57) **ABSTRACT**

A lighting system for a drilling rig including a lighting frame attachable to a crown of the drilling rig, wherein the lighting frame includes a fixed or adjustable frame portion attached to the crown of the drilling rig and a light bearing frame portion supported by the frame portion. Also provided is at least one light support post attached to the light bearing frame portion for holding a lighting fixture and at least one lighting fixture attached to each light support post.



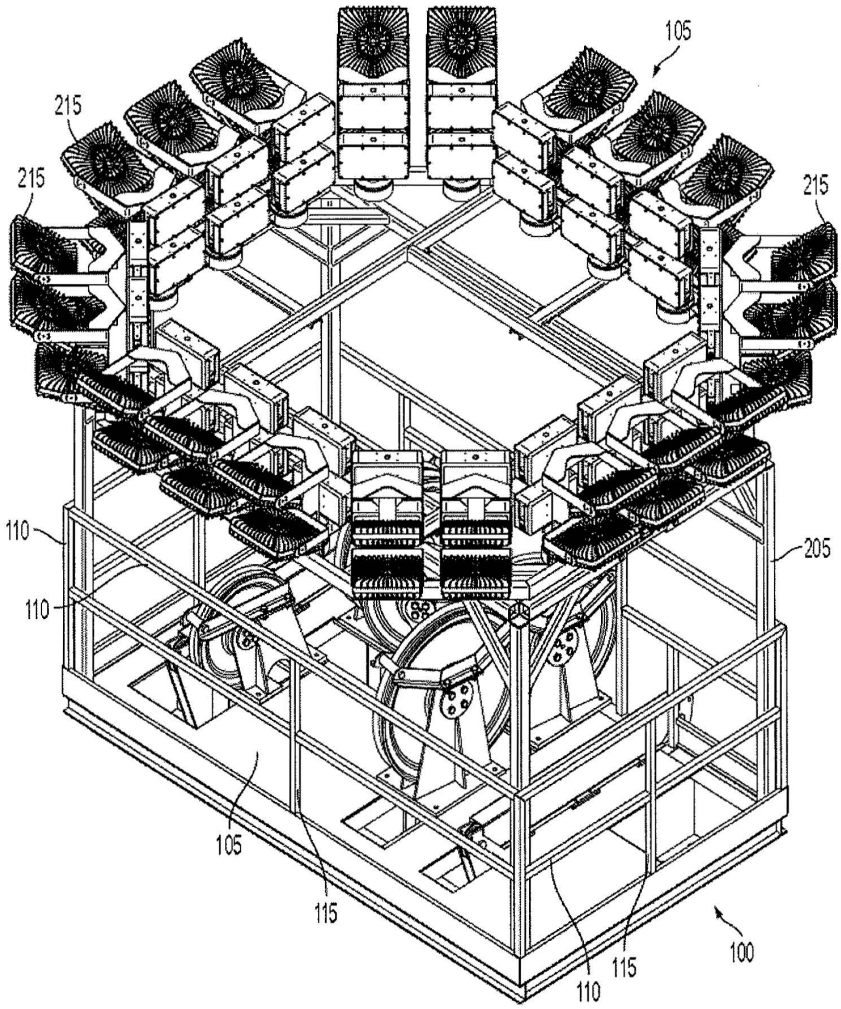


FIG. 1

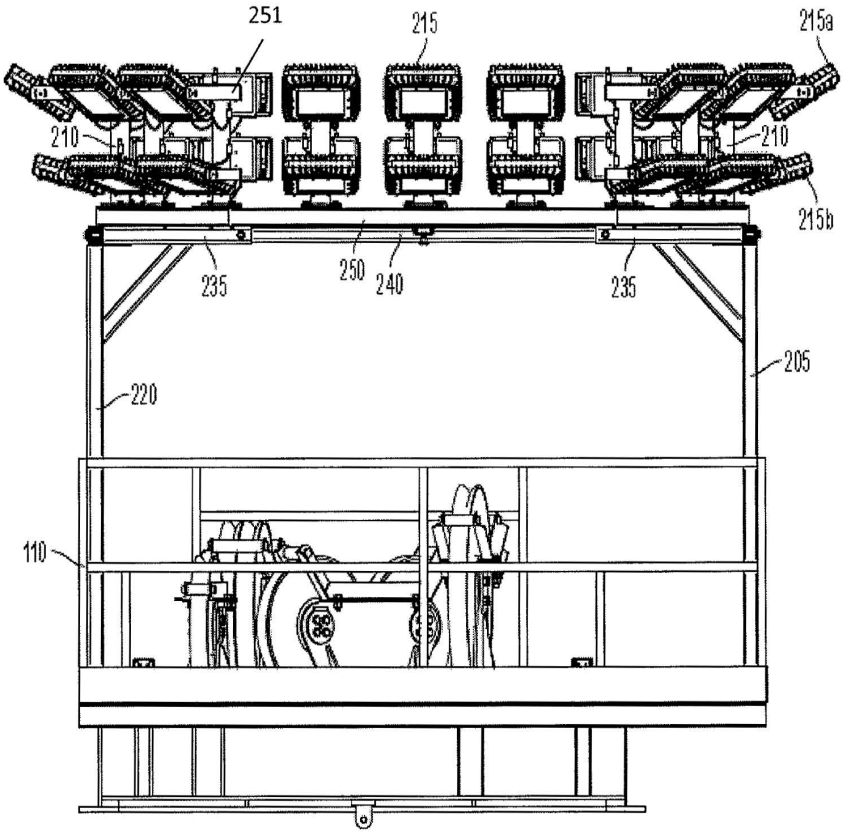


FIG. 2

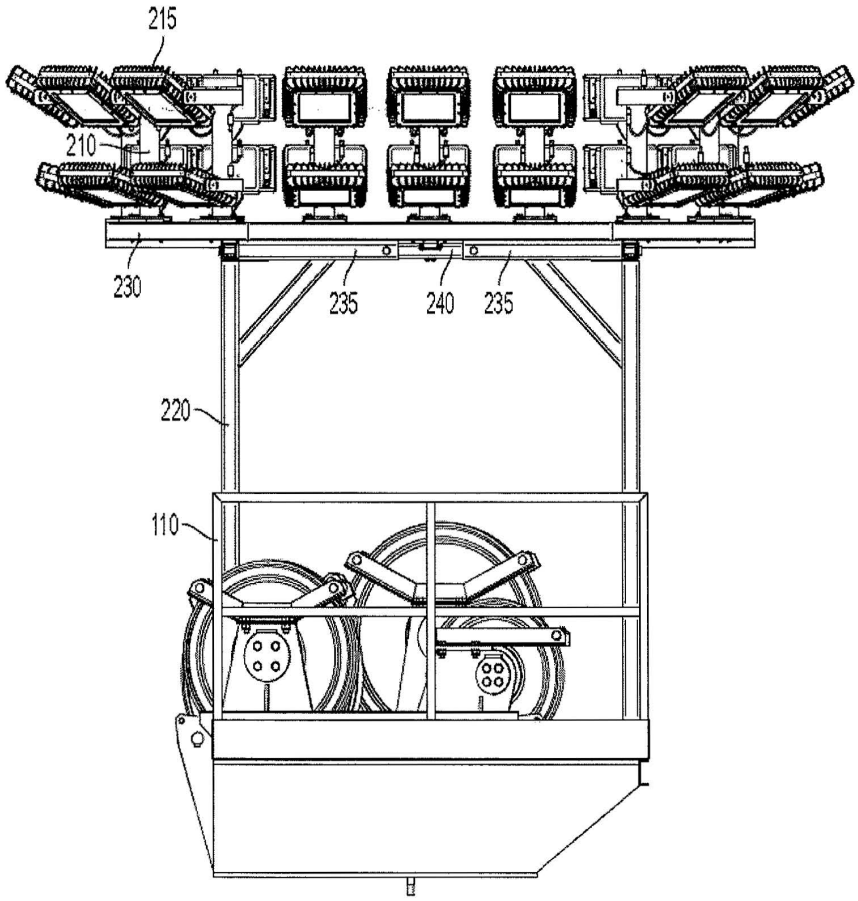


FIG. 3

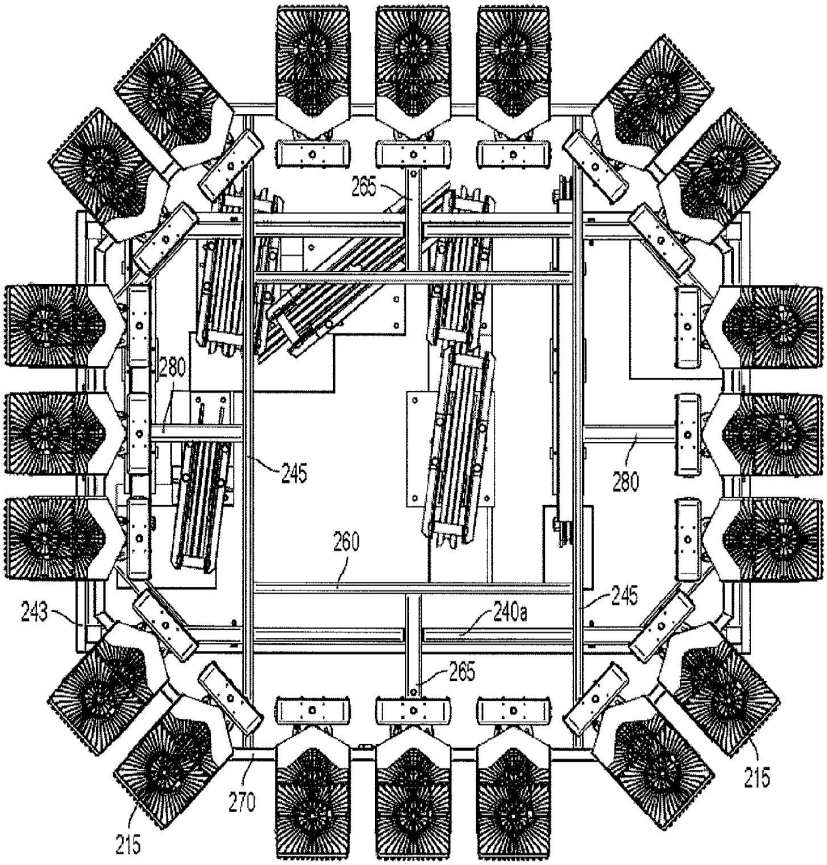


FIG. 4

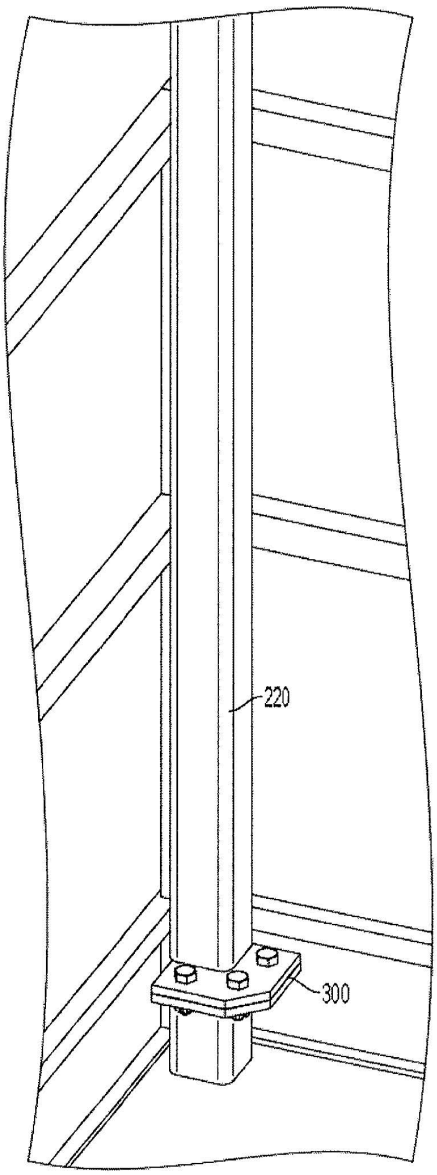


FIG. 5

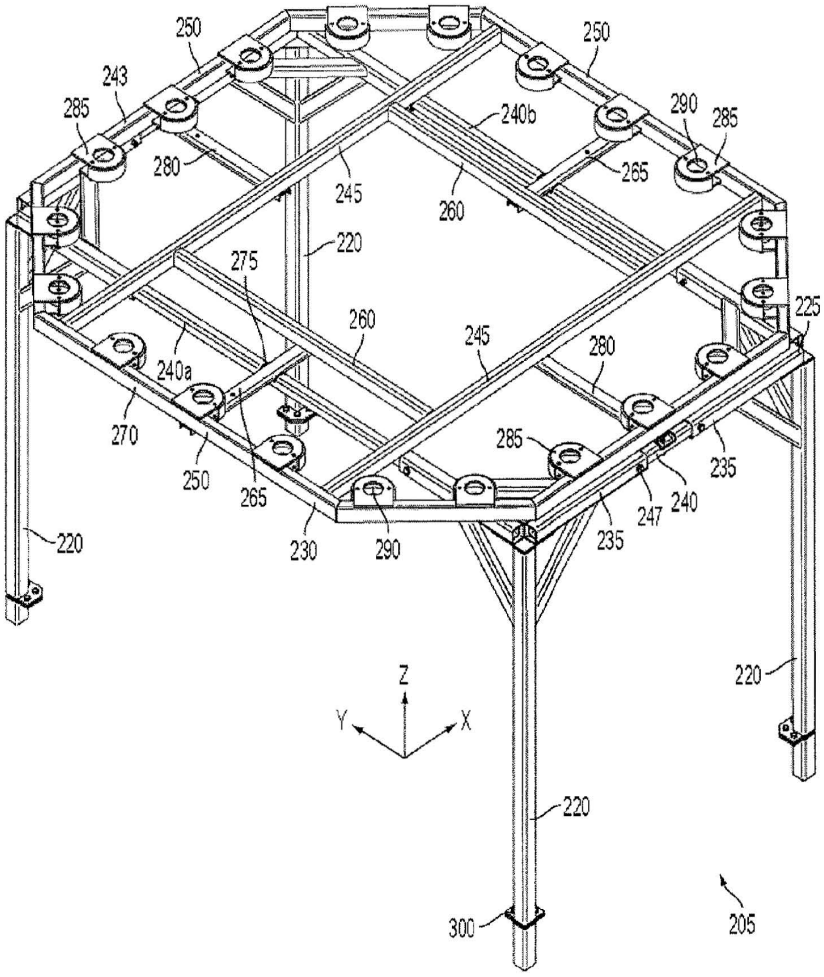

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FIG. 6

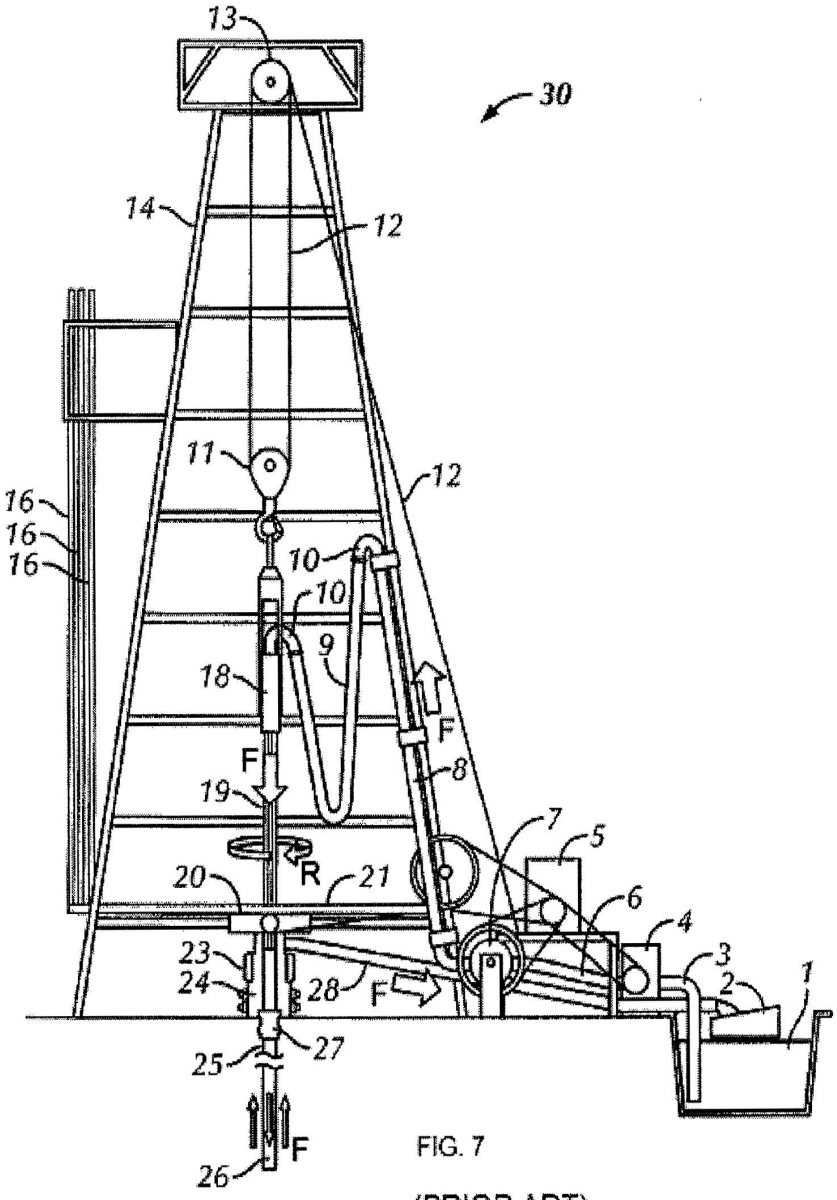


FIG. 7

(PRIOR ART)

ATTACHABLE LIGHTING SYSTEM FOR DRILLING RIG

CROSS-REFERENCE TO RELATED APPLICATION

[0001] The present application is a continuation-in-part of U.S. patent application Ser. No. 14/093,097 filed Nov. 29, 2013, the disclosure of which is expressly incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention relates generally to the field of drilling apparatuses, such as oil drilling rig arrangements, and in particular to a lighting system for use in an oil drilling rig.

BACKGROUND OF THE INVENTION

[0003] Drilling rigs are used to form wellbores for the purpose of extracting oil, natural gas or other fluids from subsurface deposits. Drilling rigs can also be used for sampling subsurface mineral deposits, testing rock or ground fluid properties and for installing subsurface utilities, instrumentations, tunnels or wells. In implementation, drilling rigs may be mobile equipment transportable by truck, rail, trailers, or similar, rigs may also be semi-permanent and permanent fixtures as in the case for oil drilling of large wells. Marine-based structures are also widely known. Generally, the term drilling rig refers to an arrangement of equipment that is used to penetrate the subsurface of the earth's crust.

[0004] A conventional drilling rig **30** is illustrated in FIG. **7**, where the drilling rig **30** includes a derrick **14**, which provides a support structure for a majority of the equipment used to raise and lower drillstring **25** into and out of a wellbore. The drillstring **25** may be an assembled collection of drillpipe, drill collars, or any other assembled collection of assorted tools and equipment connected together and run into the wellbore to facilitate the drilling of a well. The drillstring **25** may be raised and lowered into an dout of the wellbore by the draw-works **7**, which includes a spool powered by a motor or other power source **5**. A drill line **12**, which may be a thick, stranded metal cable, is run through a travelling block **11**. Typically, the crown block **13** remains stationary while travelling block **11** moves vertically with the drillstring **25**. The combination of the crown block **13** and the travelling block **11** provides a significant mechanical advantage for lifting the drillstring **25**. Further, a swivel **18** may be attached to the travelling block **11** to allow rotation of the drillstring **25** without twisting the travelling block **11**. Drill pipes **16** and hole casing **26** are also shown.

[0005] The drilling rig **30** further includes a rotary table **20** mounted in a rig floor **21**, which is used to rotate the drillstring **25** along with a kelly drive **19**. Kelly drive **19**, attached at an upper end to the swivel **18** and at a lower end to the drillstring **25**, is inserted through the rotary table **20** to rotate the drillstring **25** (drillstring rotation shown by arrow "R"). Kelly drive **19** may be square, hexagonal, or any other polygonal-shaped tubing and is able to move freely vertically while the rotary table **20** rotates it. Alternatively, drilling rig **30** may include a top drive (not shown) in place of kelly drive **19** and rotary table **20**. Additionally, blowout preventers ("BOPs") may be located below the rig floor **21** and installed atop a wellhead **27** to prevent fluids and gases from escaping from the wellbore. An annular BOP **23** and one or more ram BOPs **24** are shown and are commonly understood in the art.

[0006] During drilling operations, drilling fluid may be circulated through the system to carry cuttings away from the bottom of the wellbore as drilling progresses. Drilling fluid may be stored in mud tanks **1** before being drawn through suction line **3** by mud pumps **4**. Drilling fluid (drilling fluid route is indicated by arrows "F") is then pumped from mud pumps **4** through a hose **6**, up a stand pipe **8**, through a flexible hose **9**, and down into the wellbore. Drilling fluid returning from the wellbore is routed through a flow line **28** to shakers **2**, which are used to separate drill cuttings from the drilling fluid before it is pumped back down the wellbore.

[0007] Drilling operations typically occur during daylight hours and visibility in and around the drilling rig has historically only been required when manual work is being done, inspection and calibration, for example. There is a desire to increase productivity by providing visibility during hours of low daylight, and this has thus far been accomplished by providing mobile lighting arrangements on vehicles proximate the drilling rig, or otherwise manually adding impromptu lighting arrangements.

[0008] These arrangements are inadequate and not readily adaptable to systematic visibility improvements in appropriate locations around a drilling rig.

SUMMARY OF THE INVENTION

[0009] It is an object of the invention to improve upon one or more of the aforementioned deficiencies with the prior art. Accordingly, in one embodiment of the invention, there is provided a lighting system for a drilling rig including a lighting frame attached to a crown of the drilling rig, wherein the lighting frame includes a fixed or adjustable frame portion attached to the crown of the drilling rig and a light bearing frame portion supported by the frame portion; at least one light support post attached to the light bearing frame portion for holding a lighting fixture; and, at least one lighting fixture attached to each the light support post.

[0010] According to an aspect of this first embodiment, the frame portion is adjustable and includes at least four support posts for rigidly fixing the adjustable frame portion to the crown, and further includes, between at least two adjacent support posts, a first tubular load bearing member connected to one of the adjacent support posts; a second tubular load bearing member connected to the other of the adjacent support posts; an extendable frame member extending between and into each of the first and second tubular members; such that the first and second tubular load bearing members are moveable with respect to the extendable frame member to thereby adjust a distance between adjacent support posts.

[0011] Another aspect of this first embodiment, includes a pin extending through the respective tubular load bearing member and the extendable frame member for fixing each of said first and second tubular members with respect to said extendable frame member.

[0012] According to another aspect of this first embodiment, the at least two adjacent support posts comprises all of the at least four support posts; wherein the at least four support posts are arranged to form a generally rectangular shape.

[0013] According to another aspect of this first embodiment, the light bearing frame portion comprises an outer structural frame consisting of a plurality of connected beams fainting a perimeter around which the at least one light fixture is attached.

[0014] According to another aspect of this first embodiment, the light bearing frame portion further includes at least

two cross-braces connecting a first side of the outer structural frame to a second side of the outer structural frame; the first and second sides being generally parallel to each other; at least one support brace connecting the at least two cross-braces to each other; and a locating brace connecting one of the at least one support brace to a third side of the outer structural frame; the third side being generally perpendicular to the first and second sizes.

[0015] According to another aspect of this first embodiment, there is provided a second locating brace connecting a second of the at least one support brace to a fourth size of the outer structural frame; the fourth side being generally perpendicular to the first and second sizes.

[0016] According to another aspect of this first embodiment, at least one of the extendable frame members comprise a recess at a midpoint thereof sized and otherwise dimensioned to receive a main body portion of the locating brace, such that the recess restricts movement of the locating brace in a direction parallel to the extendable frame member.

[0017] According to another aspect of this first embodiment, at the at least of the extendable frame members comprises two of the extendable frame members positioned parallel to each other.

[0018] According to another aspect of this first embodiment, the light bearing portion further comprises a plurality of light holding platforms spaced around a perimeter of the outer structural frame; the light holding platforms each comprising a first portion for attaching to the outer structural frame and a second portion for holding the light support posts.

[0019] According to another aspect of this first embodiment, each of the light support posts are adapted to hold at least two light fixtures.

[0020] According to another aspect of this first embodiment, the at least two light fixtures are spaced vertically from each other.

[0021] According to another aspect of this first embodiment, the corner support posts are rigidly affixed to the crown by a bracket positioned proximate a bottom end of each the corner support posts; the bracket being attachable to a body of the crown, proximate a base of the crown.

[0022] According to another aspect of this first embodiment, each lighting fixture can swivel or tilt.

[0023] According to a second embodiment of the invention, there is provided a frame for holding at least one light fixture in a drilling rig arrangement; the frame including a fixed or adjustable frame portion, a light bearing frame portion supported by the frame portion, at least one light support post attached to the light bearing frame portion for holding a lighting fixture, and at least one lighting fixture attached to each the light support post.

[0024] According to one aspect of this second embodiment, the frame portion is adjustable and includes at least four support posts for rigidly fixing the adjustable frame portion to the crown, and further includes, between at least two adjacent support posts: a first tubular load bearing member connected to one of the adjacent support posts; a second tubular load bearing member connected to the other of the adjacent support posts; an extendable frame member extending between and into each of the first and second tubular members; such that the first and second tubular load bearing members are moveable with respect to the extendable frame member to thereby adjust a distance between adjacent support posts.

[0025] Another aspect of this second embodiment includes a pin extending through the respective tubular load bearing member and the extendable frame member for fixing each of said first and second tubular members with respect to said extendable frame member.

[0026] According to another aspect of this second embodiment, the at least two adjacent support posts comprises all of the at least four support posts; wherein the at least four support posts are arranged to form a generally rectangular shape.

[0027] According to another aspect of this second embodiment, the light bearing frame portion comprises an outer structural frame consisting of a plurality of connected beams forming a perimeter around which the at least one light fixture is attached.

[0028] According to another aspect of this second embodiment, the light bearing frame portion further includes at least two cross-braces connecting a first side of the outer structural frame to a second side of the outer structural frame; the first and second sides being generally parallel to each other; at least one support brace connecting the at least two cross-braces to each other; and, a locating brace connecting one of the at least one support brace to a third side of the outer structural frame; the third side being generally perpendicular to the first and second sizes.

[0029] According to another aspect of this second embodiment, there is further provided a second locating brace connecting a second of the at least one support brace to a fourth size of the outer structural frame; the fourth side being generally perpendicular to the first and second sizes.

[0030] According to another aspect of this second embodiment, at least one of the extendable frame members comprise a recess at a midpoint thereof sized and otherwise dimensioned to receive a main body portion of the locating brace, such that the recess restricts movement of the locating brace in a direction parallel to the extendable frame member.

[0031] According to another aspect of this second embodiment, at the at least of the extendable frame members comprises two of the extendable frame members positioned parallel to each other.

[0032] According to another aspect of this second embodiment, the light bearing portion further comprises a plurality of light holding platforms spaced around a perimeter of the outer structural frame; said light holding platforms each comprising a first portion for attaching to said outer structural frame and a second portion for holding said light support posts.

[0033] According to another aspect of this second embodiment, each lighting fixture can swivel and/or tilt.

BRIEF DESCRIPTION OF THE DRAWINGS

[0034] Embodiments will now be described, by way of example only, with reference to the attached Figures, wherein:

[0035] FIG. **1** is a perspective view of a lighting system mounted on a drilling rig according one embodiment of the invention.

[0036] FIG. **2** is a front view of the embodiment of FIG. **1**.

[0037] FIG. **3** is a side view of the embodiment of FIG. **1**.

[0038] FIG. **4** is a top view of the embodiment of FIG. **1**.

[0039] FIG. **5** is a detail perspective view of an example of how the lighting system may be connected to the drilling rig.

[0040] FIG. **6** is a perspective view of an exemplary lighting frame according to an embodiment of the invention.

[0041] FIG. **7** is a prior art drawing depicting a general drilling rig.

DETAILED DESCRIPTION

[0042] Referring now to FIGS. **1** to **4**, a crown **100** of a drilling rig is illustrated in combination with the lighting system **200** of the present invention. Crown **100** includes a base **105** and an outer frame structure **110** including vertical **115** and horizontal **120** frame members arranged to extend from the base **105** such that the base **105** provides an internal floor to the crown **100**. Various drilling rig functional elements are illustrated, as previously described with respect to FIG. **7**, but these are not described herein in additional detail. The invention is not limited to particular types of drilling rig functional elements and may be used in various drilling rig applications. The crown **100** as herein illustrated and described is an exemplary crown intended to show those features and elements interacting with the lighting system **200**. The lighting system in combination with other crown arrangements as are known in the art are equally contemplated by the invention.

[0043] Lighting system **200** generally includes a lighting frame **205** (shown in FIG. **6**, and described in more detail herein below), a plurality of light support posts **210**, which are rotatable so as to allow each individual light fixture to swivel, arranged around a perimeter of the lighting frame and extending vertically such that one or more light fixtures **215**, **215***a* and/or **215***b*, may be connected to each light support post **210**. Light fixture brackets **251** are also structured so as to allow each light fixture to tilt up and down. The plurality of light fixtures **215** arranged and separated vertically from each other by their positioning on the light support posts **210** permits for light to be directed in a predetermined region proximate the crown **100** and at a predetermined region encompassing a ground area surrounding the drill rig. That is, one group of lights may be directed towards particular equipment on the drilling rig, while another group may be directed to an area surrounding the drilling rig to provide maximum lighting for personnel working in or around the drilling rig. The light to weight ratio of the light fixture should be as high as possible. For example, about 1000 lumens per pound could typically be used.

[0044] Referring also to FIG. **6**, there is shown an exemplary lighting frame **205** includes four corner support posts **220** extending from the base of the crown, or from a position proximate the base of the crown. The corner support posts **220** prop up, or otherwise raise above the base of the crown an adjustable frame portion **225**. The adjustable frame portion **225** supports a light bearing frame portion **230**, which will be described in further detail below. Adjustable frame portion **225** is provided such that the lighting system can be employed on crowns of various sizes. Providing the adjustable frame portion **225** in a manner independent of the light bearing frame portion **230** permits adjustment of the lighting frame **205** to fit various sized crowns without having to adjust the attachment of the individual lights **215** or adjust the number of lights **215** being attached to the fixture. In this manner, the lighting system can be readily retrofitted to an existing crown for long term use, or moved from one crown to another where short term use is required.

[0045] More particularly, the adjustable frame portion **225**, includes along each of its outer portions, a pair of load bearing members **235** rigidly connected to respective corner support posts **220**: Each pair of load bearing members **235** has positioned therebetween an extendable frame member **240**. Each of the load bearing members **235** are tubular, such as tubular steel, and are positioned and otherwise arranged such that the extendable frame member **240** extends into the tubular portion of each pair of load bearing members **235**. A pin or other protruding element **247** is arranged on the load bearing members **235** and is adapted to extend through a hole in the extendable frame member **240** to thereby fix the positioning of the load bearing members **235** with respect to the extendable frame member. In operation, the load bearing members **235** are slidable along the extendable frame member **240** to a desired point, where they can be locked in place by extending the pin **247** through the hole in the extendable frame member **240**, and though a rear portion of the load bearing member **235** to lock the load bearing member **235** with respect to the extendable frame member **240**. This permits the lighting frame **205** to be linearly adjustable in a rectangular manner along the x and y axis shown in FIG. **6**. For completeness and clarity, it will be apparent that the frame **205** includes four pairs of the load bearing members **235** described above, adjustable about four respective extendable frame members **240**. Extendable frame members **240***a* and **240***b* located on the longer sides of the frame **205** include a recess **275** proximate a midpoint thereof, the purpose of which will be described further below. Optionally, a similar recess may be provided in each of the extendable frame members **240**.

[0046] The light bearing frame portion **230** is positioned atop the load bearing members **235** which provide support for the light bearing frame portion **230**. The light bearing frame portion **230** includes an outer structural frame **243** consisting of a plurality of tubular or solid beams **250** forming a perimeter around which the series of lights are to be mounted. The bearing frame portion **245** further includes cross-braces **255** holding the structure together, where such cross-braces **255** are preferably perpendicular to a side of the lighting system having a longer length, for example perpendicular to the y axis shown in FIG. **6**. Connecting the pair of cross-braces are one, and preferably two support braces **260**. The support braces **260** are positioned internally to the outer structural frame **245** and each have at a midpoint thereof a locating brace **265** connecting the support brace **260** to one member **270** of said outer structural frame **245**.

[0047] In order to locate the light bearing frame portion **230** with respect to the adjustable frame portion **225**, a recess **275** is provided in the extendable frame members **240***a* and **240***b*, into which the locating braces **265** are positioned. Fixing braces **280** connect the outer structural frame members **245** to the extendable frame members **240** along the shorter side of the frame, that is along the x axis of FIG. **6**. With this arrangement, the adjustable frame portion **225** can be installed in a crown of varying sizes while the light bearing frame portion **230** is held centered upon the lighting frame, resulting in it being centered with respect to the crown on which it is placed. One skilled in the art will appreciate that various addition means for fixing the light bearing portion are also contemplated, including clamps, screws or additional locating pins.

[0048] Atop the light bearing frame portion **230**, spaced along the perimeter of the tubular or solid beams **250** are a plurality of light holding platforms **285**. The light holding platforms **285** are preferably welded, or otherwise attached, to the beams **250**. The light holding platforms **285** generally comprise a portion attaching them to the beams **250** and a portion adapted to hold the light support posts **210**, onto which each of the lights **215** are mounted. In the illustrated embodiment, the portion adapted to hold the light support posts **210** includes a recess or hole **290** into which the light support posts **210** can be friction-fit, clamped, screwed into,

or otherwise attached. It is also contemplated that the light support posts **210** can be welded into the recess or hole **290**.

[0049] Light support posts **210** preferably comprise a vertically extending post onto which a variety of styles of light fixtures **215** may be mounted. As discussed earlier, in a preferred embodiment two light fixtures may be mounted on each light support post **215**, spaced vertically from each other, thus allowing light to be directed to a plurality of key positions around the drilling rig.

[0050] As shown in FIG. **5**, in order to fix the lighting frame **205** with respect to the crown **100**, brackets **300** may be provided proximate a bottom portion of each corner support post **220**. The brackets **300** may be adapted to be connected to corresponding brackets (not shown) on the crown **100** or alternatively, to be attached directly to a portion of the crown itself. For example, bolts may fix the brackets **300** directly into a portion of the crown.

[0051] The base frame which is attached to the crown, is typically made of carbon steel, for example, for strength, especially in cold weather. The light frame is typically made of aluminum, for weight reasons. And while the frame has primarily been described above as adjustable, the pieces described above can also be fixed, for example, where a specific frame is pre-designed for a particular sized crown, rendering the need for the adjustable pieces unnecessary.

[0052] The scope of the claims should not be limited by the preferred embodiments set forth in description of the preferred embodiments or in the examples, but should be given the broadest interpretation consistent with the description as a whole.

1. A lighting system for a drilling rig comprising:

a lighting frame attached to a crown of the drilling rig, wherein the lighting frame includes a fixed or adjustable frame portion attached to the crown of the drilling rig and a light bearing frame portion supported by said frame portion;

at least one light support post attached to said light bearing frame portion for holding a lighting fixture; and,

at least one lighting fixture attached to each said light support post.

2. The lighting system according to claim **1**, wherein said frame portion is adjustable and includes at least four support posts for rigidly fixing said frame portion to the crown, and further comprises, between at least two adjacent support posts:

a first tubular load bearing member connected to one of said adjacent support posts;

a second tubular load bearing member connected to the other of said adjacent support posts;

an extendable frame member extending between and into each of said first and second tubular members;

such that said first and second tubular load bearing members are moveable with respect to said extendable frame member to thereby adjust a distance between adjacent support posts.

3. The lighting system according to claim **2**, including at least one pin extending through said respective tubular load bearing member and said extendable frame member for fixing each of said first and second tubular members with respect to said extendable frame member.

4. The lighting system according to claim **2**, wherein said at least two adjacent support posts comprises all of said at least four support posts; wherein said at least four support posts are arranged to form a generally rectangular shape.

5. The lighting system according to claim **2**, wherein said light bearing frame portion comprises an outer structural frame consisting of a plurality of connected beams forming a perimeter around which said at least one light fixture is attached.

6. The lighting system according to claim **5**, wherein said light bearing frame portion further comprises:

at least two cross-braces connecting a first side of said outer structural frame to a second side of said outer structural frame; said first and second sides being generally parallel to each other;

at least one support brace connecting said at least two cross-braces to each other;

a locating brace connecting one of said at least one support brace to a third side of said outer structural frame; said third side being generally perpendicular to said first and second sizes.

7. The lighting system according to claim **6**, further comprising a second locating brace connecting a second of said at least one support brace to a fourth size of said outer structural frame; said fourth side being generally perpendicular to said first and second sizes.

8. The lighting system according to claim **6**, wherein at least one of said extendable frame members comprise a recess at a midpoint thereof sized and otherwise dimensioned to receive a main body portion of said locating brace, such that said recess restricts movement of said locating brace in a direction parallel to said extendable frame member.

9. The lighting system according to claim **8**, wherein at said at least of said extendable frame members comprises two of said extendable frame members positioned parallel to each other.

10. The lighting system according to claim **5**, wherein said light bearing portion further comprises a plurality of light holding platforms spaced around a perimeter of said outer structural frame; said light holding platforms each comprising a first portion for attaching to said outer structural frame and a second portion for holding said light support posts.

11. The lighting system according to claim **10**, wherein said each of said light support posts are adapted to hold at least two light fixtures.

12. The lighting system according to claim **11**, where said at least two light fixtures are spaced vertically from each other.

13. The lighting system according to claim **2**, wherein said corner support posts are rigidly affixed to said crown by a bracket positioned proximate a bottom end of each said corner support posts; said bracket being attached to the body of the crown, proximate the base of the crown.

14. The lighting system according to claim **1**, wherein each lighting fixture can swivel and/or tilt.

15. A frame for holding at least one light fixture in a drilling rig arrangement; the frame comprising:

A fixed or adjustable frame portion;

a light bearing frame portion supported by said frame portion;

at least one light support post attached to said light bearing frame portion for holding a lighting fixture; and,

at least one lighting fixture attached to each said light support post.

16. The frame according to claim **14**, wherein said frame portion is adjustable and includes at least four support posts

for rigidly fixing said adjustable frame portion to the crown, and further comprises, between at least two adjacent support posts:

a first tubular load bearing member connected to one of said adjacent support posts;

a second tubular load bearing member connected to the other of said adjacent support posts;

an extendable frame member extending between and into each of said first and second tubular members;

such that said first and second tubular load bearing members are moveable with respect to said extendable frame member to thereby adjust a distance between adjacent support posts.

17. The frame according to claim **15**, including at least one pin extending through said respective tubular load bearing member and said extendable frame member for fixing each of said first and second tubular members with respect to said extendable frame member.

18. The frame according to claim **15**, wherein said at least two adjacent support posts comprises all of said at least four support posts; wherein said at least four support posts are arranged to form a generally rectangular shape.

19. The frame according to claim **15**, wherein said light bearing frame portion comprises an outer structural frame consisting of a plurality of connected beams forming a perimeter around which said at least one light fixture is attached.

20. The frame according to claim **18**, wherein said light bearing frame portion further comprises:

at least two cross-braces connecting a first side of said outer structural frame to a second side of said outer structural frame; said first and second sides being generally parallel to each other;

at least one support brace connecting said at least two cross-braces to each other;

a locating brace connecting one of said at least one support brace to a third side of said outer structural frame; said third side being generally perpendicular to said first and second sizes.

21. The frame according to claim **19**, further comprising a second locating brace connecting a second of said at least one support brace to a fourth size of said outer structural frame; said fourth side being generally perpendicular to said first and second sizes.

22. The frame according to claim **19**, wherein at least one of said extendable frame members comprise a recess at a midpoint thereof sized and otherwise dimensioned to receive a main body portion of said locating brace, such that said recess restricts movement of said locating brace in a direction parallel to said extendable frame member.

23. The frame according to claim **21**, wherein at said at least of said extendable frame members comprises two of said extendable frame members positioned parallel to each other.

24. The frame according to claim **18**, wherein said light bearing portion further comprises a plurality of light holding platforms spaced around a perimeter of said outer structural frame; said light holding platforms each comprising a first portion for attaching to said outer structural frame and a second portion for holding said light support posts.

25. The lighting system according to claim **15**, wherein each lighting fixture can swivel and/or tilt

* * * * *

EXHIBIT 5

PUBLIC VERSION – REDACTED

Trials@uspto.gov
Tel: 571-272-7822

Paper 45
Entered: April 13, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

WEATHERFORD U.S., L.P.,
Petitioner,

v.

ENVENTURE GLOBAL TECHNOLOGY, INC.,
Patent Owner.

IPR2020-01580
Patent 6,409,175 B1

Before MEREDITH C. PETRAVICK, HYUN J. JUNG, and NEIL T. POWELL, *Administrative Patent Judges*.

POWELL, *Administrative Patent Judge*.

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

Dismissing Petitioner's Motion to Exclude (Paper 31)
Denying-in-Part and Dismissing-in-Part Patent Owner's Motion to Exclude (Paper 32)
37 C.F.R. § 42.64(c)

Granting Petitioner's Motions to Seal (Papers 24, 39)
37 C.F.R. § 42.64(c)

PUBLIC VERSION – REDACTED

PUBLIC VERSION – REDACTED

I. INTRODUCTION

A. BACKGROUND

Weatherford U.S., L.P. ("Petitioner") filed a Petition for *inter partes* review of claims 4, 6, 35, 36, 39, and 43 of U.S. Patent No. 6,409,175 B1 (Ex. 1001, "the '175 patent"). Paper 2 ("Pet."). Enventure Global Technology, Inc. ("Patent Owner") filed a Preliminary Response. Paper 6 ("Prelim. Resp."). Pursuant to 35 U.S.C. § 314, we instituted an *inter partes* review of claims 4, 6, 35, 36, 39, and 43 of the '175 patent on all presented challenges. Paper 14 ("Institution Decision" or "Inst. Dec."), 2, 34, 37.

After institution, Patent Owner filed a Response (Paper 17, "PO Resp."), to which Petitioner filed a Reply (Papers 22, 23[1], "Pet. Reply"), and Patent Owner thereafter filed a Sur-reply (Paper 26, "PO Sur-reply").

With its Reply, Petitioner filed a Motion to Seal. (Paper 24).

Additionally, Petitioner filed a Motion to Exclude (Paper 31, "Pet. Mot. Excl."); Patent Owner filed a Response to Petitioner's Motion to Exclude (Paper 34, "Resp. Pet. Mot. Excl."); and Petitioner filed a Reply to Patent Owner's Response (Paper 35, "Reply Pet. Mot. Excl.").

Also, Patent Owner filed a Motion to Exclude (Paper 32, "PO Mot. Excl."); Petitioner filed an Opposition to Patent Owner's Motion to Exclude (Paper 33 "Opp. PO Mot. Excl."); and Patent Owner filed a Reply to Petitioner's Opposition (Paper 36, "Reply PO Mot. Excl.").

[1] Paper 22 is a private, unredacted version of the Reply, and Paper 23 is a public, redacted version of the Reply.

PUBLIC VERSION – REDACTED

An oral hearing was held in this proceeding on January 20, 2022. Papers 42, 43[2] ("Tr.").

With its demonstrative exhibits (Exhibit 1054), Petitioner filed another Motion to Seal. Paper 39.

We have jurisdiction under 35 U.S.C. § 6. This Decision is a final written decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons below, we determine that Petitioner has shown by a preponderance of the evidence that claims 4, 6, 35, 36, 39, and 43 are unpatentable.

B. RELATED PROCEEDINGS

The parties note that the '175 patent is involved in *Enventure Global Technology, Inc. v. Weatherford U.S., L.P. and Weatherford Technology Holdings, LLC*, Civil Action No. 4:19-cv-02397 (S.D. Tex. 2019) ("the Litigation"). Pet. 6; Paper 4, 1. The parties also identify as related matters IPR2020-01648, IPR2020-01661, IPR2020-01666, IPR2020-01684, IPR2020-01700, and IPR2021-00107. Pet. 6; Paper 4, 1; Paper 12, 2.

C. THE '175 PATENT

The '175 patent "relates generally to methods and apparatus for connecting tubular bodies" and more particularly "to methods and apparatus for effecting a secure mechanical engagement and seal in the connected ends of pipe sections that are expanded radially to form an increased internal diameter pipe string." Ex. 1001, 1:5–10. Conventionally, casing strings include "a series of individual pipe joints secured together at their ends by threaded connections." *Id.* at 1:24–26. "Typically, a joint of casing is

[2] Paper 42 is a private, unredacted version of the Transcript, and Paper 43 is a public, redacted version of the Transcript.

approximately 40 feet in length and has a threaded male 'pin' connection at one end of the joint and a threaded female 'box' connection at the opposite joint end." *Id.* at 1:27–30. Some threaded connections use deformable seal rings captured in the thread area to seal the threaded joints between sections. *Id.* at 1:50–54.

The '175 patent also discloses that a new approach for casing well bores includes lowering the casing pipe into the well bore, followed by radially expanding the casing pipe. *Id.* at 1:12–14. "The casing string is enlarged radially by moving an oversized forging tool, or 'pig,' through the string, causing the string to expand radially beyond its original radial dimensions." *Id.* at 1:14–17. The '175 patent identifies certain problems that can result from this process. *Id.* at 1:55–2:44. For example, "[c]onnectors that employ an elastomeric, annular seal ring between the engaged surfaces of the pin and box are . . . subject to leakage when the connection expands radially." *Id.* at 2:16–18. Accordingly, the '175 patent endeavors "to provide an engaged pin and box connection having a seal assembly that can be expanded radially to compress the seal assembly between the pin and box to form a seal in the expanded connection." *Id.* at 5:50–54.

The '175 patent illustrates one embodiment in Figures 7, 7A, and 7B. *Id.* at 6:29–35. Figure 7 is reproduced below.

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FIG. 7

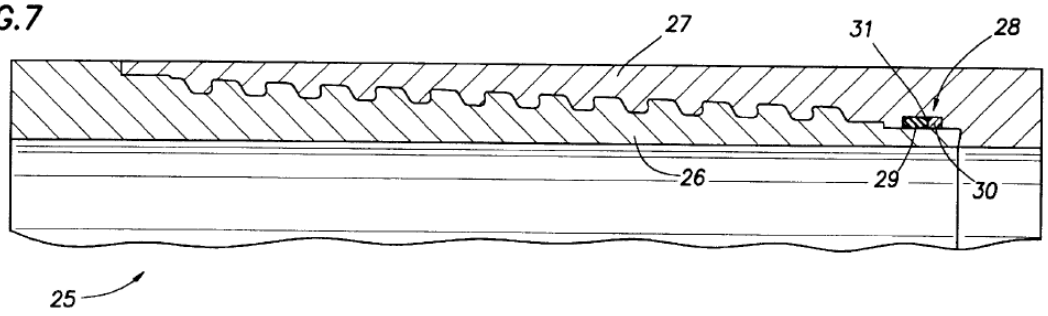


Figure 7 is a sectional view of connector 25, which includes pin section 26 and box section 27. *Id.* at 8:49–51.

Connector 25 includes pin section 26 and box section 27 threadedly engaged to one another. *Id.* at 8:50–53. Connector 25 includes annular seal assembly 28, which includes annular elastomeric seal ring 29 and annular spacer 30. *Id.* at 8:60–62. Box section 27 includes annular groove 31 disposed in the base of its threads. *Id.* at 8:62–64. Annular elastomeric seal ring 29 and annular spacer 30 reside in annular groove 31. *Id.* at 8:60–62. Seal ring 29 and spacer 30 are part of annular seal assembly 28. *Id.* at Figure 7A is reproduced below.

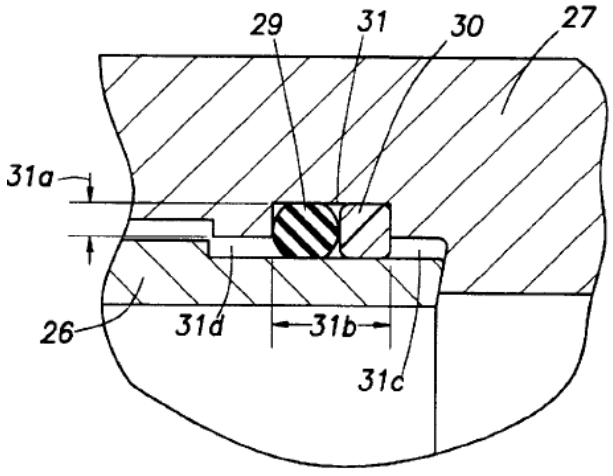


FIG. 7A

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Figure 7A "is an enlarged sectional view illustrating details in the construction of the unexpanded box seal." *Id.* at 6:32–33.

As shown in Figure 7A, annular groove 31 "has a depth 31*a* and a width 31*b*." *Id.* at 9:9. Gap 31*c* neighbors annular groove 31 on one side. *See id.* at 9:29–32, Fig. 7A. Gap 31*d* neighbors annular groove 31 on the other side. *See id.* at 9:46–48; Fig. 7A. Figure 7B is reproduced below.

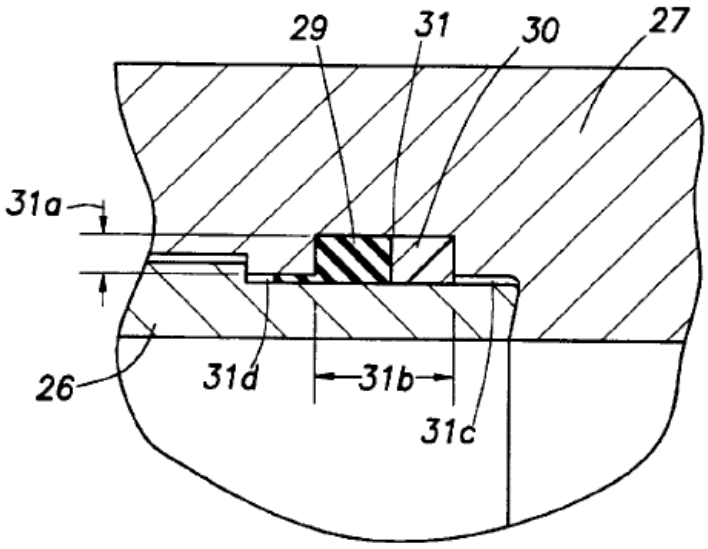


FIG. 7B

Figure 7B "is an enlarged sectional view illustrating details in an expanded box seal." *Id.* at 6:34–35.

Figure 7B shows that the expansion process reduces the groove volume. *Id.* at 9:40–41. As a result, seal ring 29 overfills annular groove 31. *Id.* at 9:41–42. Expansion ring 30 prevents seal ring 29 from entering gap 31*c*. *Id.* at 9:42–46. The '175 patent explains that

> The seal ring is free, however, to expand into the gap 31d at the opposite end of the groove. The extrusion into the gap 31d may occur during the initial expansion and may also occur after the

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> pin 26 shrinks away from the box 27 following passage of the expansion tool. The resulting extruded sealing area 29a of the seal ring 29 assists in providing the seal between the expanded pin and box.

Id. at 9:46–53. The Abstract summarizes the '175 patent's disclosure:

> Methods and apparatus are provided for obtaining a secure mechanical connection and a pressure-tight seal in the overlapping area of two telescoping tubular bodies. The two bodies, including the overlapping area, are radially expanded to increase the inside diameter of the bodies. The expansion forces an annular seal in the overlapping area into a pressure-sealing engagement between the bodies. A string of pipe assembled from joints secured to each other by telescoping, threadedly engaged expanded pin and box connections may be radially expanded into a surrounding well bore to provide a cased well having an internal diameter greater than the original internal diameter of the pipe string. The seal in the connection comprises an annular elastomeric seal ring and an annular Teflon spacer ring carried in a specially dimensioned groove formed in either the box or the pin, or both members of the connection. Radial expansion of the connection causes axial contraction of the groove, which acts with the spacer ring to expand the seal ring radially to seal the annular space created between the expanded pin and box.

Id. at code (57).

D. ILLUSTRATIVE CLAIMS

Of the challenged claims, claims 4 and 35 are independent. Claim 6 depends from claim 4. Claims 36, 39, and 43 depend from claim 35. Claims 4 and 35 are illustrative and are reproduced below with certain reformatting:[3]

[3] We have numbered the claim limitations with the same numbers used by the Petition to identify claim 4's limitations and claim 35's limitations.

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> 4. A method for forming a seal between telescopically and threadably engaged, tubular bodies comprising:
>
> [4a] disposing a seal component in an overlapping annular area between first and second telescopically and threadedly engaged tubular bodies; and
>
> [4b] radially expanding said first and said second tubular bodies to compress said seal component for forming a seal between said first and second tubular bodies in said overlapping annular area.

Ex. 1001, 14:36–44.

> 35. A method for sealing a connection between adjoining tubular pipe bodies in a string of well pipe for use in a wellbore, comprising:
>
> [35a] disposing a sealing component on one or both of a first axial end of a first tubular pipe body and a second axial end of a second tubular pipe body;
>
> [35b] engaging said first axial end of said first tubular pipe body within said second axial end of said second tubular pipe body whereby an annular area containing said sealing component is defined between said first and said second axial ends;
>
> [35c] disposing said string of well pipe in a surrounding well bore; and
>
> [35d] radially expanding said first and said second axial ends toward said surrounding well bore to compress said sealing component between said first tubular pipe body and said second tubular pipe body to seal the annular area between said first tubular pipe body and said second tubular pipe body.

Id. at 17:49–18:8.

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E. ASSERTED GROUNDS OF UNPATENTABILITY

Petitioner challenges the patentability of claims 4, 6, 35, 36, 39, and 43 of the '175 patent on the following grounds (Pet. 7–8):

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
4, 6, 35, 36, 39, 43	102(e)[4]	Cook[5]
4, 6, 35, 36, 39, 43	103(a)	Cook, "in view of the knowledge of a person of ordinary skill in the art"
4, 6, 35, 36, 39, 43	103(a)	Cook, "in view of the knowledge of a [person of ordinary skill in the art], Abdrakhmanov[6]
4, 6, 35, 36, 39, 43	102(b)	Abdrakhmanov
4, 6, 35, 36, 39, 43	103(a)	Abdrakhmanov, "in view of the knowledge of a [person of ordinary skill in the art]," the '799 Publication[7]
4, 6, 35, 36, 39, 43	102(b)	Owen[8]
4, 6, 35, 36, 39, 43	103(a)	Owen, "in view of the knowledge of a person of ordinary skill in the art"

In support of its unpatentability contentions, Petitioner also relies on the Declaration of Michael Roy Chambers Sr. (Ex. 1002), as well as the

[4] The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) ("AIA"), amended 35 U.S.C. §§ 102, 103. Because the '175 patent has an effective filing date prior to the effective date of the applicable AIA amendments, we refer to the pre-AIA versions of §§ 102, 103.

[5] Cook et al., U.S. 6,604,763 B1, iss. Aug. 12, 2003 (Ex. 1003, "Cook").

[6] Abdrakhmanov et al., U.S. 5,083,608, iss. Jan. 28, 1992 (Ex. 1004, "Abdrakhmanov").

[7] Worrall et al., WO 93/25799, pub. Dec. 23, 1993 (Ex. 1012, "the '799 Publication").

[8] Owen et al., U.S. 3,712,376, iss. Jan. 23, 1973 (Ex. 1005, "Owen").

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Supplemental Declaration of Mr. Chambers (Ex. 1048). Patent Owner relies on the Declaration of Gary R. Wooley, Ph.D. Ex. 2008.

II. PETITIONER'S MOTION TO EXCLUDE

Petitioner's Motion to Exclude seeks exclusion of Exhibits 2012–2016. We do not rely on these exhibits. Therefore, we dismiss as moot Petitioner's Motion to Exclude.

III. PATENT OWNER'S MOTION TO EXCLUDE

In its Motion to Exclude, Patent Owner seeks exclusion of Exhibit 1048 (PO Mot. Excl. 4–9), "the cited portions of [Exhibit 1049]" (*id.* at 9–10), Exhibit 1051 (*id.* at 10–11), Exhibit 1052 (*id.* at 11–12), and Exhibit 1053 (*id.* at 13).

1. *Exhibit 1048*

Exhibit 1048 is Mr. Chambers' Supplemental Declaration, filed with Petitioner's Reply. Patent Owner argues that the Supplemental Declaration "contains new matter outside the scope of the Petition, and goes beyond merely 'replying' to [Patent Owner]'s Response. Specifically, Mr. Chambers provided new information on his credentials and new bases attempting to save Petitioner's argument concerning radial expansion and plastic deformation." PO Mot. Excl. 4.

Patent Owner argues that the testimony in Mr. Chambers' Supplemental Declaration about his background goes beyond the scope of the Petition and beyond responding to arguments in Patent Owner's Response. *Id.* at 4–5. Patent Owner also argues that the testimony in Mr. Chambers' Supplemental Declaration about his background is misleading, confusing, and unfairly prejudicial. *Id.* at 7–8.

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Patent Owner also argues that testimony in Mr. Chambers' Supplemental Declaration about "tubulars" goes beyond the scope of the Petition and beyond responding to arguments in Patent Owner's Response. *Id.* at 5–6. Patent Owner adds that this testimony is misleading, confusing, and unfairly prejudicial. *Id.* at 8–9.

In response, Petitioner asserts that "[i]n its Patent Owner Response, [Patent Owner] proposed constructions adding new limitations to the challenged claims and a narrow definition of a [person of ordinary skill in the art]." Opp. PO Mot. Excl. 1. Petitioner argues that Patent Owner's complaints about Exhibit 1048 going beyond the scope of the Petition and beyond responding to the Patent Owner Response are not properly the subject of a motion to exclude. *Id.* at 2–3. Instead, Petitioner asserts, Patent Owner should have sought authorization for a motion to strike. *Id.* Additionally, Petitioner argues that Mr. Chambers' Supplemental Declaration is directly responsive to the arguments in Patent Owner's Response that "Mr. Chambers lacks the appropriate insight of a [person of ordinary skill in the art] regarding drilling technology at the time of the invention." *Id.* at 4 (quoting PO Resp. 16). Petitioner similarly argues that Mr. Chambers' testimony about "tubular members" and pre-expansion seals is proper rebuttal to arguments in Patent Owner's Response and testimony in Dr. Wooley's declaration. *Id.* at 5. Petitioner also argues that, contrary to Patent Owner's assertions, the testimony in Mr. Chambers' Supplemental Declaration is relevant, not unfairly prejudicial, and not confusing. *Id.* at 8–11.

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Patent Owner counters that the testimony in Mr. Chambers' Supplemental Declaration regarding his background relates to experience after the relevant timeframe of the claimed invention. Reply PO Mot. Excl. 2–3. Patent Owner adds that "Mr. Chambers' newly-identified experience does not tend to make his insight of a [person of ordinary skill in the art] more or less probable, and it is cumulative, confusing, and misleading, thereby outweighing any probative value of such evidence." *Id.* at 3.

Patent Owner does not persuade us that exclusion of any portion of Mr. Chambers' Supplemental Declaration is warranted. Weighing the parties' arguments, Petitioner persuades us that the testimony in Mr. Chambers' Supplemental Declaration does not go beyond the scope of a proper response to the arguments in Patent Owner's Response. Regarding Patent Owner's concerns about the extent of Mr. Chambers' relevant experience and the allegedly confusing, misleading, and unfairly prejudicial nature of the testimony, we determine those arguments go to the proper weight to be afforded the testimony. In an *inter partes* review in which we both decide admissibility and serve as the fact-finder, we are well-positioned to determine and assign appropriate weight to evidence presented, and we recognize that a complete record of the evidence is preferable to facilitate public access as well as appellate review. *See, e.g.*, *Sony Computer Entm't Am. LLC v. Game Controller Tech. LLC*, IPR2013-00634, Paper 32 at 31 (PTAB Apr. 14, 2015). Cognizant of all of Patent Owner's concerns about Mr. Chambers' background and testimony, we have given his testimony appropriate weight when weighing the record evidence.

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2. *Exhibit 1049*

Exhibit 1049 is a transcript of a deposition of Dr. Wooley. Patent Owner argues that

> the cited portions of Dr. Wooley's deposition transcript . . . contain irrelevant information that is beyond the scope of the Petition. Even if it were relevant (it is not), the information is unfairly prejudicial, confusing, misleading to the fact finder, a waste of time and/or cumulative, and should be excluded.

PO Mot. Excl. 9. Patent Owner argues that Petitioner cites Dr. Wooley's testimony to support new positions not presented in the Petition or in Mr. Chambers' first Declaration. *Id.* Patent Owner also objects that the portions of Dr. Wooley's deposition testimony are irrelevant, confusing, misleading to the fact finder and/or prejudicial to Patent Owner, and should be excluded. *Id.*

Petitioner responds that it used Dr. Wooley's deposition testimony to demonstrate Dr. Wooley had less experience than Mr. Chambers, to show Dr. Wooley received a lot of money from Patent Owner for his opinions, and to assail Dr. Wooley's credibility. Opp. PO Mot. Excl. 11–12. Petitioner also argues that Patent Owner's Motion to Exclude does not identify Petitioner's allegedly "new positions," much explain how it is true that Petitioner cited Dr. Wooley's deposition testimony in support of those "new positions." *Id.* at 12.

In reply, Patent Owner maintains that "[t]he testimony Petitioner cited is irrelevant, and the confusing, misleading nature outweighs any purported probative value." Reply PO Mot. Excl. 4. For instance, Patent Owner argues that "Dr. Wooley's fees are not based on the outcome of the proceeding, but on his extensive experience." *Id.*

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Patent Owner's concerns do not warrant excluding any of Exhibit 1049. Patent Owner's arguments go to the proper weight to be afforded Dr. Wooley's deposition testimony. Cognizant of all of Patent Owner's concerns about Dr. Wooley's deposition testimony, we have given his testimony appropriate weight when weighing the record evidence.

3. *Exhibits 1051–1053*

We do not rely on Exhibit 1051, Exhibit 1052, or Exhibit 1053. Therefore, we dismiss as moot Patent Owner's request to exclude these exhibits.

IV. PETITIONER'S MOTIONS TO SEAL

Petitioner's first unopposed Motion to Seal asks us to seal certain portions of Petitioner's Reply and Exhibits 1049 and 1052. Paper 24, 1. Petitioner's second unopposed Motion to Seal asks us to seal portions of Exhibit 1054. Paper 39, 1. With each unopposed Motion to Seal, Petitioner submits a copy of the Board's default protective order as "Exhibit 1," seeking entry of that protective order. Paper 24, 1; Paper 39, 1. We find Petitioner's first unopposed Motion to Seal and its second unopposed Motion to Seal persuasive. Accordingly, we grant both motions, and we enter the accompanying protective order in this proceeding.

V. ANALYSIS

A. LEVEL OF SKILL

Petitioner asserts that one of ordinary skill in the art "would have been a person with a bachelor of science degree in mechanical or petroleum engineering or a similar technical discipline, with at least five years of experience in oil or gas well drilling, completion, and/or subsurface

production operations or in technical support of such operations." Pet. 37 (citing Ex. 1002 ¶ 41). Petitioner also indicates that "[a]dditional education in a relevant technical discipline can compensate for less experience in the relevant field and vice versa." *Id.*

Patent Owner states that its "analysis assumes the level of ordinary skill Dr. Wooley articulated, . . . which comports with that asserted by Petitioner's expert Mr. Chambers." PO Resp. 15 (citing Ex. 1002 ¶ 41; Ex. 2008 ¶¶ 25–27). Patent Owner "agrees with the degree qualifications and the experience level for oil or gas well drilling." *Id.*

Patent Owner disputes the "remaining portions" of Petitioner's proposed level of skill because those portions are "far too broad, and show a misunderstanding about the technology at issue." *Id.* at 15–16. According to Patent Owner, "[a]t the time of the invention, solid expandables was a drilling technology," and "an engineer having experience in 'completion, and/or subsurface production operations or in technical support of such operations,' especially at the time of the invention in the late 1990s, would lack sufficient relevant knowledge about drilling, the problems associated with 'nested' casing, and how they could be solved." *Id.* at 16.

Patent Owner argues that Petitioner's declarant "is an experienced engineer when it comes to conventional operations (i.e., after drilling is done and the well needs to be 'completed' so it can begin producing oil or gas)" but "lacks the appropriate insight of a [person of ordinary skill in the art] regarding drilling technology at the time of the invention." PO Resp. 16. Patent Owner contends that Petitioner's declarant conflates the term "expandables" as used during the relevant time to include both conventional

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operations and drilling and inappropriately mixes the term. *Id.* at 16–17 (citing Ex. 2008 ¶¶ 48–50).

Petitioner replies that the '175 patent is not limited to drilling technology, that "the '175 Patent describes installing pipe string as well completion.," and that "[Patent Owner's] expert also repeatedly refers to expandables in the context of well completion." Pet. Reply 17–18 (citing PO Resp. 15–17; Ex. 1001, 7:40, 7:51–52; Ex. 2008 ¶¶ 203, 205–207; Ex. 1050, 11:5–12:1). Petitioner also replies that its declarant "has extensive prior experience with both drilling and expandables" with citations to the record. *Id.* at 3 (citing Ex. 1002 ¶¶ 7, 12, 13, 16–18; Ex. 1048 ¶¶ 5–7).

[redacted]

In determining the level of ordinary skill in the art, various factors may be considered, including the "type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field." *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (citation and internal quotation marks omitted).

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The full record makes clear that the parties do not dispute the portion of Petitioner's proposed level of ordinary skill regarding education and years of experience. Pet. 37; PO Resp. 15; Ex. 1002 ¶ 41; Ex. 2008 ¶¶ 25–27. Regarding the parties' dispute over relevant experience, as Petitioner points out, the '175 patent states that "[Figure] 1 indicates a conventional completion of a well bore" and that "[Figure] 1 illustrates a conventional liner-type casing completion." Ex. 1001, 7:40, 7:51–52. A paper titled "Towards a Mono-Diameter Well – Advances in Expanding Tubing Technology" indicates in a section directed to "Markets and Applications," that "[e]xpanding tubing can be applied in three markets or application segments" that include "Remediation," "Wellbore Construction," and "Completions." Ex. 1039, 2 (emphasis omitted); *see also id.* at 2–3 (describing "[t]he development of expandable tubing technology towards the mono-diameter well").

In view of the above, we agree with Petitioner that one of ordinary skill in the art would have had "experience in oil or gas well drilling, completion, and/or subsurface production operations or in technical support of such operations." Pet. 37; Ex. 1002 ¶ 41. Weighing the parties' arguments and cited evidence, we determine that one of ordinary skill in the art would have had Petitioner's asserted experience and that experience does not need to be narrowed in the manner argued by Patent Owner. Pet. 37; PO Resp. 15–17; Pet. Reply 4–5; Ex. 1001, 7:40, 7:51–52; Ex. 1039, 2; Ex. 2008 ¶¶ 25–27.

Thus, we determine that one of ordinary skill in the art would have had "a bachelor of science degree in mechanical or petroleum engineering or

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a similar technical discipline, with at least five years of experience in oil or gas well drilling, completion, and/or subsurface production operations or in technical support of such operations" and that "[a]dditional education in a relevant technical discipline can compensate for less experience in the relevant field and vice versa." Pet. 37; Ex. 1002 ¶ 41; Ex. 2008 ¶¶ 25–27. This level of skill in the art is consistent with the disclosure of the '175 patent and the prior art of record. *GPAC*, 57 F.3d at 1579.

B. CLAIM INTERPRETATION

In an *inter partes* review proceeding, a claim of a patent is construed using the same standard used in federal district court, including construing the claim in accordance with the ordinary and customary meaning of the claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. § 42.100(b) (2020). According to the applicable standard, claim terms "are generally given their ordinary and customary meaning" as understood by a person of ordinary skill in the art in question at the time of the invention. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc). "In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence." *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17). Extrinsic evidence is "less significant than the intrinsic record in determining 'the legally operative meaning of claim language.'" *Phillips*, 415 F.3d at 1317. Only those terms that are in controversy need be construed, and only to the extent necessary to resolve

the controversy. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (citing *Vivid Techs., Inc. v. America Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

The parties disagree about the proper constructions of claim limitations 4a, 4b, 35a, 35b, and 35d. The arguments about these limitations frame a key dispute over whether independent claims 4 and 35 require a seal formed prior to the "radially expanding" steps recited in limitations 4b and 35d.[9] In other words, the parties disagree about whether claims 4 and 35 require a "pre-expansion seal" or "an initial seal."[10] According to Petitioner the challenged claims do not require a "pre-expansion seal" or "an initial seal."[11] *E.g.*, Pet. 30–34; Pet. Reply 4–16. According to Patent Owner, the claims do require a "pre-expansion seal" or "an initial seal." *E.g.*, PO Resp. 17–30; PO Sur-reply 9–14.

In the Petition, Petitioner argues that the claims exclude a "pre-expansion seal." Pet. 30–31. In our Institution Decision, we explained that resolving the parties' patentability disputes would require determining whether the claims require a pre-expansion seal, but would not require determining whether the claims preclude a pre-expansion seal. Inst. Dec. 23. This still applies, as Patent Owner does not argue in this proceeding that any of Petitioner's prior art references discloses a pre-expansion seal. Our

[9] Unless otherwise noted, we use the noun "seal" to refer to a closure, as opposed to a component like the '175 patent's seal ring 29.

[10] We use these terms interchangeably to refer to a seal formed prior to the "radially expanding" steps recited in limitations 4b and 35d.

[11] In the Petition, Petitioner argues that the claims exclude a "pre-expansion seal" or "initial seal." Pet. 30–31. In our Institution Decision, we

Institution Decision also noted that "the arguments and evidence Petitioner presents to support its position that the claims exclude a pre-expansion seal are also relevant to whether the claims require a pre-expansion seal." *Id.* at 24. Consistent with the arguments in the Petition that the claims preclude a pre-expansion seal, Petitioner argues in its Reply that the claims do not require a pre-expansion seal. Pet. Reply 11–16.

We now turn to discussing the parties' claim-construction arguments in detail. Limitations 4a and 4b and the parties' arguments about them interrelate to a degree that warrants addressing these limitations together. The same applies with limitations 35b and 35d. Additionally, the claim-construction disputes for claim 35 do not raise any significantly different issues than the claim-construction disputes for claim 4. Accordingly, we address limitations 4a, 4b, 35b, and 35d together to determine whether the claims require a pre-expansion seal, which is the ultimate issue permeating the parties' arguments about these limitations' proper constructions.

1. *The Parties' Arguments*

a) Petition

In the Petition, Petitioner argues that the plain meaning of limitations 4b and 35d is that "the seal component does not form a seal until it is compressed from radial expansion."[12] Pet. 30. This meaning "is consistent with the '175 Patent's Abstract and specification," Petitioner adds. *Id.* at 32. Along with other examples from the Specification, Petitioner cites the Abstract's statement that "[t]he expansion forces an annular seal in the overlapping area into a pressure-sealing engagement

between the bodies." Ex. 1001, code (57); Pet. 32. "That description does not apply to an annular seal that was *already* in a pressure-sealing engagement prior to expansion," Petitioner contends. Pet. 32. Additionally, "[Patent Owner] confirmed this plain meaning construction—and disclaimed a broad meaning—during prosecution of the '175 Patent, which is also consistent with the understanding of a [person of ordinary skill in the art]," Petitioner asserts. *Id.* at 33. Petitioner adds that

> [Patent Owner] also represented to the Office in the prosecution of U.S. Patent No. 7,740,076 ("Costa," EX1018) that the '175 Patent excludes threaded connections where the sealing component forms a seal prior to radial expansion. The Examiner had rejected the Costa application based on a prior art combination including the '175 Patent, and (incorrectly) stated that Evans (the '175 Patent) "taught that a seal 29 is provided within the connection to provide a fluid tight seal **before, during, and after** radial expansion (Figs. 7A and 7B)." EX1017 at 9 (emphasis added). In response, [Patent Owner] expressly stated that the '175 Patent "teaches that radial expansion of the connection **is required to expand the seal ring for sealing**. Thus, it is unclear how [the '175 Patent] teaches a fluid tight seal **before or during** radial expansion." *Id.* at 3 (emphasis added). This clear and unmistakable statement is a binding admission and is consistent with the plain language of the claims and the '175 prosecution.

Id. at 33–34.

b) Patent Owner Response

Patent Owner responds that "**the '175 Patent does teach and claim a pre-expansion seal**." PO Resp. 2 (emphasis in original). Patent Owner alleges that the '175 patent claims a pre-expansion seal in limitation 4a, as well as in limitation 35b. *Id.* at 18–23.

According to Patent Owner, limitation 4a's recitation of "disposing a seal component in an overlapping annular area between first and second telescopically and threadedly engaged tubular bodies" (Ex. 1001, 14:39–41), "should be construed to mean 'securing a seal component in an overlapping area between the first and second telescopically and threadedly engaged tubular bodies such that an initial seal is formed'" (PO Resp. 18). Patent Owner asserts that

> [t]he meaning of the claimed phrase, when read in conjunction with the Specification and prosecution history, requires that the seal component is disposed between first and second tubular bodies so the seal component is initially compressed, at least partially, by engagement of the threaded connection of the first and second tubulars, thus forming a seal.

PO Resp. 18 (citing Ex. 2008 ¶¶ 89–91).

Patent Owner argues that the challenged claims solve certain problems of known threaded connections and seal rings. "[W]hen those connections were radially expanded, seals formed during engagement of the threaded connections were severely compromised or 'disabled,'" Patent Owner argues. *Id.* at 19 (citing Ex. 1001, 1:55–58, 2:16–29; Ex. 2008 ¶ 76). According to Patent Owner, it was unknown "how to radially expand threaded connections with sealing O-rings so the seal was maintained before, during, and after expansion." *Id.*

Patent Owner contends that "[t]he Specification consistently identifies the role the seal component plays in joining, sealing, and radial expansion of two tubulars." *Id.* Patent Owner quotes certain passages of the Specification as allegedly consistently disclosing creating an initial seal between connected tubulars before radially expanding the tubulars. *Id.* at

19–21. For example, Patent Owner quotes the following passage from the Specification:

> The annular seal ring of the present invention is positioned between the engaged pin and box **in a way to prevent or reduce passage of well bore fluids** from the inside of the pipe, **even after the connection has been expanded radially**. The dimensions of the annular seal ring are selected to **maintain** an adequate "squeeze" after the expansion of the connection to create and maintain a desired seal between the engaged pin and box.

Ex. 1001, 4:37–44 (emphases added by Petitioner); PO Resp. 20–21. According to Patent Owner, this passage "specifies how the elastomeric, annular seal is 'disposed in the overlapping annular area' to form an initial seal during makeup – a seal that is maintained 'even after' radial expansion." PO Resp. 20–21.

Patent Owner also argues that the Specification and Figures 7A and 14 disclose compressing a seal ring in the interface between tubulars when connecting the tubulars to one another, before radial expansion. *Id.* at 21–22. According to Patent Owner this results in "no open fluid path," creating an initial seal. *Id.*

Citing the foregoing arguments, Patent Owner contends that limitation 35b must "be interpreted as 'engaging the first axial end of the first tubular pipe within said second axial end of said second tubular pipe body to form an initial seal, whereby an annular area containing said sealing component is defined between said first and said second axial ends." *Id.* at 22–23. Patent Owner adds that "[a]s Dr. Wooley discussed, the 'engaging' step in the '175 Patent includes the formation of the initial seal during makeup, which is

integral to the '175 Patent's inventive, novel solution over the prior art." *Id.* at 23 (citing Ex. 2008 ¶¶ 120–128).

In support of its claim construction, Patent Owner also argues that Mr. Chambers acknowledged certain things about the use of tubulars. *Id.* For example, Patent Owner asserts that "Mr. Chambers admits he would 'hope' there to be a pre-expansion seal, formed at make-up, in the connection of two tubulars prior to running the string to depth." *Id.*

After addressing limitations 4a and 35b, Patent Owner turns to limitations 4b and 35d. *Id.* at 24–30. Regarding limitation 4b's recitation of "radially expanding said first and said second tubular bodies to compress said seal component for forming a seal between said first and second tubular bodies in said overlapping annular area," Patent Owner contends that

> [t]he proper construction of this phrase, when viewed in the context of the previous claim elements, written description, figures and '175 Patent prosecution history, should be "radially expanding the first and the second tubular bodies to compress the seal component for further forming or maintaining a seal between the first and second tubular bodies in the overlapping annular area."

Id. at 24. It appears Patent Owner believes this is also the proper construction of claim limitation 35d. *See id.* (addressing "(claim 4/claim 35)" with same proposed claim construction). Patent Owner argues its construction is logical. *Id.*

Patent Owner contends that Petitioner reads limitations 4b and 35d in an "improperly restrictive" manner. *Id.* at 25. Patent Owner argues that Petitioner "ignores the entire Specification's teachings that the sealing component is necessarily compressed during makeup of the connection, such

forming an initial seal." *Id.* According to Patent Owner, "Petitioner points to the Abstract and various statements in the Specification that radial expansion compresses the O-rings and further fills open spaces in the groove and surrounding voids." *Id.* Patent Owner argues that the '175 patent does not suggest that forming a seal requires filling the entire groove with a compressed O-ring. *Id.* at 25–26. Noting that Petitioner cited the '175 patent's discussion of Figure 20, Patent Owner contends that "Figure 20 below, unambiguously shows that the O-ring is substantially compressed **prior** to radial expansion." *Id.* at 26. Pointing to evidence cited by Petitioner, Patent Owner argues that a seal component, such as an O-ring, can "form[] a sufficient seal" without filling all of the space in an annular groove. *Id.* at 27.

Patent Owner also disagrees with Petitioner's arguments regarding the '175 patent's prosecution history. *Id.* at 27–29. According to Patent Owner, "[s]tatements Petitioner excerpted simply confirm that an inventive aspect of the claims is providing a seal in a connection that is being radially expanded." *Id.* at 29.

Additionally, Patent Owner faults Petitioner's arguments about the prosecution of Costa as "improperly attempt[ing] to import statements made in an entirely unrelated patent into the intrinsic record of the '175 patent." *Id.* at 29–30 (citing *Abbott Laboratories v. Dey, L.P.*, 287 F.3d 1097, 1105 (Fed. Cir. 2005); *Texas Digital Sys. v. Telegenix, Inc.*, 308 F.3d 1193, 1211 (Fed. Cir. 2002); *Goldenberg v. Cytogen Inc.*, 373 F.3d 1158, 1167–68 (Fed. Cir. 2004)).

c) Petitioner's Reply

Petitioner replies that "there is no support for [Patent Owner's] constructions." Pet. Reply 4. Petitioner argues that the claim language itself does not support Patent Owner's construction of limitations 4a and 35b as requiring forming a seal. *Id.* Contrary to Patent Owner's position, Petitioner argues that claim 4 recites forming a seal only in the "radially expanding" step of limitation 4b, after completion of the "disposing a seal component" step of limitation 4a:

> [t]he disputed term, which is the first method step, does not mention *forming* a seal. EX1001, 14:39-41. It is not until the second method step, *after* the tubular bodies are already threadably engaged, that the claim does so: "radially expanding said first and said second tubular bodies to compress said seal component ***for forming a seal***...." *Id.*, 14:42-45. The Preamble confirms the claim covers forming a seal between two already engaged pipes. *Id.*, 14:37-38 ("A method for forming a seal between … ***engaged***, tubular bodies….").

Id. (alterations in original). Petitioner similarly argues that claim 35 only mentions forming a seal in the "radially expanding" step of limitation 35d, after limitation 35b's step of engaging tubular bodies to one another. *Id.* at 9.

Petitioner also argues that Patent Owner's arguments about Dr. Wooley's and Mr. Chambers' testimony fail to support Patent Owner's position. *Id.* at 9–10. Petitioner faults Patent Owner for failing to explain the cited testimony of Dr. Wooley. *Id.* at 9. Petitioner adds that Dr. Wooley cites portions of the Specification that "describe sealing during or after radial expansion." *Id.* Addressing Patent Owner's arguments that Mr. Chambers acknowledged certain things about the use of tubulars (PO Resp. 23),

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Petitioner argues (1) the exhibit cited by Patent Owner does not contain the statements that Patent Owner attributes to Mr. Chambers, (2) "whether it is good practice to seal a pipe string at makeup is irrelevant to whether ***claim 35 of the '175 Patent*** requires forming an 'initial seal,'" and (3) Mr. Chambers testifies that a pre-expansion seal can be effected with "metal shouldering and thread interference." Pet. Reply 9–10 (emphasis in original). Expanding on the third point, Petitioner asserts that "[w]hile the '175 Patent expressly teaches [metal shouldering and thread interference] seals . . . , it also teaches against using seal components to form an initial seal because subsequent radial expansion will cause them to leak." *Id.* at 10 (citing Ex. 1001, 1:50–53, 2:16–29).

Petitioner also argues that the Specification does not support Patent Owner's interpretation of limitations 4a and 35b. *Id.* at 5–7. Petitioner contends that "[t]o depart from the plain claim language, 'the patentee must clearly express an intent to redefine the term.'" *Id.* at 5 (citing *Thorner v. Sony Comput. Entm't Am.*, 669 F.3d 1362, 1365 (Fed. Cir. 2012)). Accordingly, "[t]o show claim 4 requires an "initial seal,' [Patent Owner] would therefore have to show the specification redefined 'disposing a seal component' to mean 'forming an initial seal,'" Petitioner explains. *Id.* Petitioner argues that "[Patent Owner] cannot do so, elaborating that "[t]he specification repeatedly describes forming a seal by the seal component through radial expansion, not at makeup." *Id.* Patent Owner admitted this during prosecution of Costa, Petitioner reiterates. *Id.* at 5–6.

Petitioner also argues that none of the portions of the Specification cited by Patent Owner discloses forming a seal before radial expansion. *Id.*

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at 6–7. Instead, Petitioner argues, "[e]ach passage describes maintaining seals *during or after radial expansion*." *Id.* at 6.

Addressing Patent Owner's argument that Figures 7A and 14 each show compressing a seal ring, Petitioner argues that "the specification teaches that an O-ring forms a seal when radial expansion extrudes the O-ring into the gap between the pin and the box." *Id.* at 7. Arguing that "[t]he specification also teaches that the groove is sized to ensure there is insufficient compression to extrude the O-ring during initial makeup," Petitioner contends that "[a]ny compression at makeup is insufficient to seal." *Id.*

Petitioner also argues that the prosecution history of the '175 patent does not support Patent Owner's claim construction. *Id.* at 7–8. Petitioner cites prosecution statements of Patent Owner and the Examiner. *Id.*

Additionally, according to Petitioner, Patent Owner argues that the claims require "an 'initial seal' by the seal component because its expert said so." *Id.* at 10. Petitioner adds that claim construction does not work that way. *Id.* (citing *Phillips*, 415 F.3d at 1318).

After addressing limitations 4a and 35b, Petitioner disputes Patent Owner's arguments regarding limitations 4b and 35d. *Id.* at 11–15. Petitioner notes that "[Patent Owner] asks the Board to rewrite 'for forming a seal' to read 'for further forming or maintaining a seal.'" *Id.* at 11.

"The claim language does not support [Patent Owner's] construction," Petitioner argues. *Id.* (emphasis omitted). According to Petitioner, by reciting "forming a seal," as opposed to "the seal" or "said seal," limitation 4b "signals that it is the first seal covered by the claim." *Id.* Similarly,

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Petitioner argues that limitation 35d's recitation of "'to seal the annular area' would not make sense if the annular area were already sealed." *Id.*

Petitioner also argues that "the specification does not support [Patent Owner's] construction." *Id.* at 12 (emphasis omitted). Petitioner disagrees with Patent Owner's position that construing "forming" to mean "further forming or maintaining" is "consistent with the inventive notion of using radial expansion to maintain or further form the seal (initially formed at makeup) without 'disabling' 'or damaging' the seal." PO Resp. 24; Pet. Reply 12. Patent Owner's explanation is circular and incorrectly assumes a pre-expansion seal, Petitioner argues. Pet. Reply 12.

Petitioner also disputes Patent Owner's arguments that the Specification and drawings of the '175 patent "unambiguously" and "necessarily" disclose pre-expansion compression of a seal component to form a pre-expansion seal. *Id.* at 12–14. Petitioner disagrees with Patent Owner's contention that Figure 20 shows substantial compression before expansion. PO Resp. 26. Petitioner explains that Figure 20 shows "only a maximum limit" for compression before expansion. Pet. Reply 13. Petitioner elaborates that, "as stated by Mr. Chambers . . . 'when an o-ring is not sufficiently compressed against a sealing surface, fluid will leak past the o-ring, preventing a seal.'" *Id.* at 14 (citing Ex. 1002 ¶ 152; Ex. 1008, 3). Petitioner maintains that a person of ordinary skill in the art would understand that the '175 patent does not disclose sufficiently compressing a seal component to form a seal until after radial expansion. *Id.*

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d) Patent Owner's Sur-reply

In its Sur-reply, Patent Owner argues that its "solution to the nested pipe problem requires a pre-expansion seal so wellbore fluid does not leak in before the permanent expansion and cause catastrophic failure." PO Sur-reply 9. Patent Owner asserts argues that "[t]he intrinsic evidence for a construction having a pre-expansion seal is contained throughout the specification of the '175 patent. *See* Patent Owner Response, pp. 7-14, 17-24. For example, the specification clearly states that if there is no pre-expansion seal, 'well bore fluids' can pass into the pipe." *Id.* at 10 (citing Ex. 1001, 4:37–40). Patent Owner adds that the '175 patent's background section discloses conventional connections with O-rings that became "disabled" when an operator radially expanded the connections. *Id.* at 10–11 (citing Ex. 1001, 1:55–58, 2:16–19).

Patent Owner contends that "the figures and detailed description in the specification demonstrate the pre-expansion seal time and time again." *Id.* at 11. Patent Owner reiterates that the drawings show a seal component compressed before radial expansion and compressed more after radial expansion. *Id.* at 12. Patent Owner also disagrees with Petitioner's understanding of Figure 20. *Id.* at 13 (citing Pet. Reply 12). Patent Owner asserts that the symbol "<" indicates any value less than the associated number. *Id.* Based on that, Patent Owner argues that Figure 20 "could mean the o-ring is squeezed 25%, or 20%, or 22%, etc." *Id.* Citing the Petition's discussion of Exhibit 1008, Patent Owner also argues that "[e]ven an article Petitioner cited (despite not being applicable, *see* Patent Owner Response, p. 27) shows that a 'squeeze' from an O-ring creates a seal." *Id.* at 13–14

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(citing Pet. 50). Patent Owner concludes that "[a]ccordingly, as discussed at length in Patent Owner's Response, the specification, claims, and Dr. Wooley's declaration and testimony all confirm that the '175 Patent teaches the existence of a pre-expansion seal by the o-ring." *Id.* at 14.

2. *Analysis*

To resolve whether claims 4 and 35 require a pre-expansion seal or an initial seal, we first look to the claim language itself. Claim limitation 4[a] recites "disposing a seal component in an overlapping annular area between first and second telescopically and threadedly engaged tubular bodies." Ex. 1001, 14:39–41. This says nothing about compressing the seal component, much less forming a seal. The claim language specifies the location of the seal component, but it says nothing about the seal component's state or its function in that location prior to expansion of the recited tubular bodies. Thus, we find that the plain meaning of limitation 4a does not require forming a pre-expansion seal or an initial seal.

Following limitation 4a's recitation of disposing the seal component between the engaged tubular bodies, limitation 4b recites "radially expanding said first and second tubular bodies *to compress said seal component for forming* a seal between said first and second tubular bodies in said overlapping annular area." *Id.* at 14:42–45 (emphasis added). The plain meaning of this language is that "radially expanding" is for generating a seal that did not previously exist. As we explained in the Institution Decision, "forming a seal" logically does not refer to a seal that previously existed. Inst. Dec. 26. Additionally, Petitioner's observation that "forming a seal" uses an indefinite article further demonstrates that limitation 4b's

plain meaning is that the seal did not exist prior to "radially expanding said first and second tubular bodies." Pet. Reply 11.

As noted above, Patent Owner believes it "logical" to rewrite the claim language "for forming a seal" as "for further forming or maintaining a seal." PO Resp. 24. Patent Owner considers this logical "because the later, radial expansion of the first and second tubulars causes further compression of the seal, which in turn causes increased pressure on the existing seal." *Id.* This reasoning does not rest on logic; it assumes a seal existed prior to radial expansion to rewrite the claim language in a way that changes its meaning. By adding the adverb "further" and the verb "maintaining," Patent Owner deviates markedly from the plain meaning of the claim language.

With respect to the parties' dispute, the plain meaning of the recitations in claim 35 does not differ meaningfully from the plain meaning of the recitations of claim 4. As with limitation 4b, the plain meaning of limitation 35d's recitation of "radially expanding said first and said second axial ends . . . to compress said sealing component . . . to seal the annular area" is that this process creates a seal that did not previously exist. Consistent with this, neither limitation 35b, nor any other limitation preceding limitation 35d mentions a seal.

On the whole, the plain meaning of claim 4's and claim 35's limitations contradicts Patent Owner's claim-construction position. The plain meaning of each of limitations 4a and 35b does not support Patent Owner's position. And the plain meaning of each of limitations 4b and 35d contradicts Patent Owner's position.

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Petitioner argues that, consistent with the plain meaning of the claims, "the specification repeatedly describes forming a seal by the seal component through radial expansion, not at makeup." Pet. Reply 5. In support of its position, Petitioner cites a number of passages in the Specification. For example, Petitioner cites the Abstract, which discloses that:

> Methods and apparatus are provided for obtaining a secure mechanical connection and a pressure-tight seal in the overlapping area of two telescoping tubular bodies. *The two bodies, including the overlapping area, are radially expanded to increase the inside diameter of the bodies. The expansion forces an annular seal in the overlapping area into a pressure-sealing engagement between the bodies*. A string of pipe assembled from joints secured to each other by telescoping, threadedly engaged expanded pin and box connections may be radially expanded into a surrounding well bore to provide a cased well having an internal diameter greater than the original internal diameter of the pipe string. The seal in the connection comprises an annular elastomeric seal ring and an annular Teflon spacer ring carried in a specially dimensioned groove formed in either the box or the pin, or both members of the connection. *Radial expansion of the connection causes axial contraction of the groove, which acts with the spacer ring to expand the seal ring radially to seal the annular space created between the expanded pin and box*.

Ex. 1001, code (57) (emphases added). The leading paragraph of the Summary of the Invention also discloses using radial expansion to provide a seal that did not exist prior to the expansion:

> An annular, elastomeric seal is carried in a non-standard annular groove formed within the threaded box of a tubular connector. An annular, spacer ring is positioned adjacent the seal ring within the groove. *The dimensions of the groove and the seal ring and spacer ring are functionally related so that the seal ring is compressed axially and radially* ***when*** *the pin of the connection*

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> *is expanded radially into the box and both the box and pin are then further expanded radially. Radial expansion of the connection causes the groove in the box to contract axially, forcing the spacer ring against the seal ring to compress the seal ring between the spacer and the opposing wall of the groove. The spacer ring* assists in retaining the seal ring within the groove and also *serves as a compressive wall surface to trap the seal ring and force it to expand within the groove as the groove contracts during the expansion of the connection. The expanded seal ring is extruded into the gap between the pin and box at the groove wall opposite the expansion ring to* ***provide*** *a pressure-tight seal*.

Id. at 2:47–65 (emphases added). Consistent with this, the Specification goes on to disclose that "the seal ring expands radially *into sealing engagement between the pin and box during the expansion process*." *Id.* at 4:57–59. Further down, the Specification emphasizes a desire to use radial expansion to produce a seal that did not previously exist, stating that "*[a]n important object of the present invention* is to provide a seal assembly that can be employed between superimposed, inner, and outer tubular bodies *to* ***produce*** *a seal when the inner body is expanded radially into the outer body and both bodies are then together radially expanded*." *Id.* at 5:44–48. Similarly, the Specification discloses that "[i]t is also an object of the present invention to provide an engaged pin and box connection having a seal assembly *that can be expanded radially to compress the seal assembly between the pin and box to form a seal in the expanded connection*. *Id.* at 5:49–53.

Patent Owner counters Petitioner's citation of these passages, in part, by suggesting that the disclosures are "residue." *See* PO Sur-reply 1. We do not agree. Instead, we find that the numerous disclosures Petitioner cites

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from the Abstract and the Summary of the Invention amply and prominently convey that the invention encompasses using radial expansion of tubulars to create a seal that did not previously exist.

Patent Owner also argues that portions of the Specification not cited by Petitioner support a claim construction that requires a pre-expansion seal. PO Resp. 8–14, 17–27; PO Sur-reply 8–14. Patent Owner also relies on other passages that disclose things like "maintaining sealing integrity." *E.g.*, PO Resp. 19–21 (citing Ex. 1001, 3:20–25, 5:1–5, 5:35–43).

We find that these portions of the Specification do not provide persuasive support for Patent Owner's position. Many of the passages Patent Owner cites contain ambiguity not acknowledged by Patent Owner. One example is the Specification's disclosure that "[t]he annular seal is dimensioned to accommodate the radial expansion and axial contraction of the connection during the expansion process while maintaining sealing integrity." Ex. 1001, 3:22–25. This disclosure does not convey clearly when sealing integrity started. The passage can be read as "describ[ing] maintaining seals *during or after radial expansion*," as Petitioner argues. Pet. Reply 6. Similarly, contrary to Patent Owner's suggestion, the Specification's passing mention of positioning "[t]he annular seal ring . . . to prevent or reduce passage of well bore fluids from the inside of the pipe even after the connection has been expanded radially" is too equivocal to warrant rewriting the claims to require a pre-expansion seal. *See, e.g.*, PO Resp. 20 (citing Ex. 1001, 4:37–44) (emphasis omitted); Pet. Reply 5–6.

In contrast, a number of the Specification's passages cited by Petitioner unambiguously disclose using radial expansion to create a seal

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that did not exist previously. For example, the Specification's disclosures of radially expanding "to seal" and to "provide," "produce," and "form" a seal clearly convey creation of a seal that did not exist prior to radial expansion. Ex. 1001, code (57), 2:62–65, 5:45–48, 5:50–53. Moreover, to the extent one or more of the passages cited by Patent Owner discusses providing a seal before radial expansion, that does not negate the Specification's discussion of using radial expansion to create a seal that did not exist previously.

Additionally, with respect to whether the '175 patent's disclosures of compressing a seal component before expansion disclose forming a pre-expansion seal, we find Petitioner's arguments and evidence more persuasive than Patent Owner's. Petitioner persuades us that "a deformable seal ring will not provide a seal until it is *sufficiently* compressed." Pet. 14–15 (emphasis added) (citing Exs. 1007, 1008, 1034, 1038); *see also* Pet. Reply 14 (citing Ex. 1002 ¶ 152; Ex. 1008, 3). Patent Owner does not argue otherwise. *See, e.g.*, PO Resp. 25–27; PO Sur-reply 11–14.

Yet, Patent Owner argues that the Specification "teach[es] that the sealing component is necessarily compressed during makeup of the connection, thus forming an initial seal." PO Resp. 25. In connection with this argument, Patent Owner relies on an annotated version of Figure 20, arguing that "Figure 20 and related description unmistakably indicate that a significant 'squeeze' or compression of the O-ring is present 'BEFORE EXPANSION.'" *Id.* at 26. Patent Owner's annotated version of Figure 20 is reproduced below.

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FIG.20

PERCENT EXPANSION OF PIPE BODY	O-RING CROSS SECTION	GROOVE WIDTH (W/POSITION RING)	% SQUEEZE BEFORE EXPANSION	REQUIRED % SQUEEZE AFTER EXPANSION
10%	0.070"±0.003"	0.156"±0.002"	<28.0%	>26.0%
20%	0.070"±0.003"	0.156"±0.002"	<28.0%	>16.0%
10%	0.103"±0.003"	0.205"±0.002"	<28.0%	>25.0%
20%	0.103"±0.003"	0.205"±0.002"	<28.0%	>16.5%
10%	0.139"±0.003"	0.250"±0.002"	<26.5%	>20.0%
20%	0.139"±0.003"	0.250"±0.002"	<26.5%	>15.0%

The '175 patent describes Figure 20 as "a table showing the relationship between the pipe body expansion and the characteristics and dimensions of the expanded components of the seal assembly of the present invention." Ex. 1001, 7:20–23. Patent Owner's annotated version of Figure 20 includes a red box around the table column labeled "% SQUEEZE BEFORE EXPANSION." *See* PO Resp. 26.

In that column, the table lists "<28.0%" in some rows and "<26.5%" in other rows. Ex. 1001, Fig. 20; PO Resp. 26. Based on this, Petitioner argues that "Figure 20 only shows that the initial squeeze is *less than* 28% or 26.5%." Pet. Reply 12. Patent Owner counters "that could mean the o-ring is squeezed 25%, or 20%, or 22%, etc." PO Sur-reply 13. Petitioner persuades us that Figure 20 only conveys that the amount of squeeze before expansion is less than 28.0% or 26.5%. Thus, to the extent the disclosed range discloses that the amount of pre-expansion squeeze could be 25%, it also discloses that the amount of pre-expansion squeeze could be significantly less. Such a disclosure does not support deviating from the plain meaning of the claims to require a pre-expansion seal.

Patent Owner also argues that "Figure 7A shows that [annular seal ring] 29 becomes **flattened** as it is pressed between pin 26 and box 27" with

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"no open fluid path between the outside of the connection to the inside of the connection." PO Resp. 12. Patent Owner adds that Dr. Wooley "explain[s] that a [person of ordinary skill in the art] would understand as a matter of common sense that a seal is required in the connection before it is expanded to avoid debris or unwanted fluids leaking into the connection downhole." *Id.* at 12–13 (citing Ex. 2008 ¶¶ 77, 79). Assuming Figure 7A does show some compression of annular seal ring 29 without any apparent fluid path, that in itself does not convey sufficient compression to actually form a seal. And we find Dr. Wooley's opinion, allegedly based on "common sense," does not persuade us to read a disclosure of a pre-expansion seal into the limited information provided by Figure 7A and the related disclosure. PO Resp. 12–13; Ex. 2008 ¶¶ 77, 79. Accordingly, like Figure 20, Figure 7A and the related disclosure do not support a claim construction requiring a pre-expansion seal.

Patent Owner further cites Figure 14 and the related disclosure as showing compression of a seal component prior to expansion, arguing that this discloses a pre-expansion seal. PO Resp. 21–22; PO Sur-reply 12–13. For reasons similar to the reasons that Petitioner persuades us Figure 7A and the related disclosure do not support Patent Owner's narrow claim construction, Figure 14 and the related disclosure do not support construing the claim to require a pre-expansion seal.

Patent Owner also argues that the '175 patent discloses inventive solutions to a number of problems, contending that supports a narrow claim construction. For example, Patent Owner argues that the '175 patent solved "the nested pipe problem." PO Sur-reply 9. Patent Owner explains that in

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prior art methods "as the wellbore runs deeper, the deeper tubulars become successively smaller," which "mean[s] that the ultimate oil production is restricted." PO Resp. 7–8. "Patent Owner's solution to the nested pipe problem requires a pre-expansion seal so wellbore fluid does not leak in before the permanent expansion and cause catastrophic failure." PO Sur-reply 9.

Patent Owner's arguments about problems solved do not persuade us that the Specification contains disclosure that supports a claim construction deviating from the claims' plain meaning. The Specification expresses concern about the lack of a seal after expansion, stating that "[w]hen the casing string is enlarged radially, a conventional connection changes dimensionally in a way that can prevent the engaged components of the connection from properly engaging and sealing." Ex. 1001, 1:37–46. This disclosure tends to support construing the claims to require a seal after radially expanding the tubulars, consistent with claims' plain meaning. But neither this disclosure nor any of the other disclosures Patent Owner cites provides a persuasive reason to rewrite the claims to require a pre-expansion seal. Patent Owner does not provide persuasive evidence that the Specification discloses even a logical connection between a pre-expansion seal and solving "the nested pipe problem." *See, e.g.*, PO Resp. 7–8; PO Sur-reply 9. As discussed above, the Specification's passing mention of "prevent[ing] or reduc[ing] passage of well bore fluids . . . even after the connection has been radially expanded" does not rise to the level of compelling us to rewrite the claims. Ex. 1001, 4:37–40.

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Turning to the prosecution history of the '175 patent, the record arguments and evidence do not reveal a basis in the prosecution history for construing the challenged claims as requiring a pre-expansion seal. Petitioner cites a number of statements from the prosecution history, including the following statement from a response to a claim rejection:

> An important part in the novelty of Applicants' invention is the provision of a seal in a connection that is being radially expanded. There has been no art cited that suggests that in such an application, the squeeze of the seal is a function to be regulated in order to obtain a suitable seal.

Ex. 1016, 125. Petitioner argues "[t]hus, [Patent Owner] emphasized that its purported invention required that the sealing component form a seal due to (not before) the radial expansion." Pet. 29.

Patent Owner counters that "both Applicant's and Examiner's statements confirm that both parties were aware that a pre-expansion seal existed. For example, the Examiner referred to the 'squeeze' causing the pre-expansion seal, and the 'better securing' following expansion of the existing seal." PO Resp. 15. In support of this assertion, Patent Owner cites Dr. Wooley's testimony that

> in an Office Action dated February 8, 2001 (mailed February 13, 2001), the Examiner asserted that the prior art of "Ose, Maples and Evans disclose the claimed invention except for a squeeze of the seal ring before expansion of the tubular bodies is greater than 15%. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the squeeze of the seal ring before expansion of the tubular bodies is greater than 15%, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art." *See* EX1016, p. 101. In the foregoing rejection during prosecution of the '175 Patent, the Examiner is

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> acknowledging that there is a seal ring that before expansion is subject to an amount of "squeeze." In other words, the occurrence of a "squeeze" pre-expansion means there is a pre-expansion seal because the seal component is under pressure.

Ex. 2008 ¶ 110. Similarly, Patent Owner argues that Petitioner overlooked the Applicants' prosecution statement that "[i]t is also respectfully submitted that it is not obvious to one having ordinary skill in the art to provide a method or seal in which *the squeeze of the seal* **before expansion** *of the tubular body is greater than 15%*." PO Resp. 28–29 (quoting Ex. 1016, 125).

Dr. Wooley's testimony and Patent Owner's arguments do not recognize that the cited prosecution statements specifically referred to express limitations in certain claims, such as the recitation in then-pending claim 27 that "the squeeze of said seal element is greater than 15%," as well as similar express recitations of squeeze greater than 15% in other claims. Ex. 1016, 34–36, 79, 98–101, 108–109, 112–113, 124–125. For example, Patent Owner does not acknowledge that Applicants were arguing about "a squeeze percentage of the seal ring before expansion of the tubular bodies being greater than 15% *as called for in claims 16, 17, and 21* or a seal wherein a squeeze percentage of said seal element is greater than 15% *as called for in claims 27 and 28*." *Id.* at 124–125 (emphases added). Dr. Wooley and Patent Owner do not provide a persuasive reason that the cited prosecution statements would apply more broadly to other claims, such as challenged claims 4 and 35.

To the contrary, certain prosecution history statements cited by Petitioner tend to support construing claims 4 and 35 as not requiring a pre-

expansion seal. For example, traversing a rejection of claim 4, Applicants argued that "[c]learly, *Saikai* does not teach or suggest radially expanding threaded axial ends threadedly engaged tubulars in *forming* a seal between the adjoined bodies." *Id.* at 117 (emphasis added).

For the foregoing reasons, the intrinsic evidence does not support Patent Owner's claim-construction position. The plain meaning of claims 4 and 35 is that they do not require a pre-expansion seal. And Petitioner cites ample evidence demonstrating that the Specification, drawings, and prosecution history support a construction that does not require a pre-expansion seal. At most, the intrinsic evidence Patent Owner cites may support construing claims 4 and 35 as encompassing both methods that use a pre-expansion seal and methods that omit a pre-expansion seal.

On the whole, the intrinsic evidence is clearly at odds with Dr. Wooley's testimony. We find this especially because Dr. Wooley provides limited objective support for many of his statements, which rely, for example, on "common sense." Ex. 2008 ¶¶ 124, 154. Given the circumstances, we find Dr. Wooley's testimony of little persuasive value with respect to the proper constructions of the disputed claim limitations.

Additionally, we find unpersuasive Patent Owner's arguments that Mr. Chambers admitted or acknowledged certain things allegedly supporting Patent Owner's claim construction. PO Resp. 23. The evidence Patent Owner cites for these arguments does not support Patent Owner's contentions. *See id.*

In sum, weighing the parties' arguments and evidence, we conclude that the disputed claim limitations do not, individually or collectively,

require a pre-expansion seal. We reach this result irrespective of the parties' dispute regarding the Costa prosecution.

Although Petitioner persuades us that Patent Owner's claim construction is incorrect even without Petitioner's arguments and evidence regarding the Costa prosecution history, we deem it warranted to also consider the dispute regarding the Costa prosecution history. During Costa's prosecution, pending claims of the Costa application were rejected "as being unpatentable over US 6,273,634 of Lohbeck in view of US 6,409,175 of Evans et al [(the '175 patent)]." Ex. 1017, 8. In other words, the '175 patent was cited as prior art against pending claims of the Costa application. Responding to this rejection, Patent Owner argued that "[the '175 patent] teaches that radial expansion of the connection is required to expand the seal ring for sealing. Thus, it is unclear how [the '175 patent] teaches a fluid tight seal before or during radial expansion." *Id.* at 3. Petitioner's position is that this statement by Patent Owner, entered under a duty of candor, is a binding admission that contradicts Patent Owner's argument in this proceeding that the challenged claims require a pre-expansion seal. Pet. 33; Pet. Reply 15. Patent Owner's position is that "[t]he Federal Circuit has unambiguously held that prosecution history statements from an unrelated and separate application **cannot** be imputed into another application." PO Resp. 29–30 (citing *Abbott*, 287 F.3d at 1105; *Texas Digital*, 308 F.3d at 1211; *Goldenberg*, 373 F.3d at 1167–68).

Petitioner has the more persuasive position. *Abbott* involved application of prosecution history estoppel to the claims of a second patent based on a statement from the prosecution history of a first patent. 287 F.3d

at 1104–05. The application from which the second patent issued "was not filed as a continuation, continuation-in-part, or divisional application of the [application from which the first patent issued]." *Id.* at 1105. The first and second patents did not have a sufficient relationship "to render particular arguments made during prosecution of the [first patent] equally applicable to the claims of the [second patent]." *Id.* at 1104. *Texas Digital* also involved statements from the prosecution history of an unrelated patent. 308 F.3d at 1210–1211. *Goldenberg* involved statements in an unrelated patent. 373 F.3d at 1166–68. Similar to the facts of these cases, Costa and the '175 patent appear unrelated to one another, as neither Costa nor the '175 patent appears to relate to the other formally as a continuation, continuation-in-part, or divisional. *See e.g.*, Ex. 1001, 1; Ex. 1018, 1.

But the facts here differ in at least one significant way from those of *Abbott*, *Texas Digital*, *and Goldenberg*. Here, when prosecuting the Costa application, Patent Owner made representations about the contents of the '175 patent itself. Ex. 1017, 3, 8. In contrast, in *Abbott*, the prosecution statement included only representations about claims of an unrelated application and unrelated prior art. 287 F.3d at 1104. *Texas Digital* also did not involve prosecution statements about the very patent whose claims were being construed. 308 F.3d at 1210–1211. In *Goldenberg*, the court deemed it improper to base claim constructions for a patent on an unrelated patent's statements, which were not representations about the very patent whose claims were being construed. 373 F.3d at 1166–68. In this proceeding, because Patent Owner's Costa prosecution statements made representations about the contents of the '175 patent itself, we find it inappropriate to ignore

those statements merely because they occurred as part of the prosecution of an unrelated application.

As Petitioner argues, the cited statements made by Patent Owner during the Costa prosecution contradict Patent Owner's argument here that we should construe the challenged claims as requiring a pre-expansion seal. Pet. 33–34; Pet. Reply 15. Accordingly, Petitioner's arguments and evidence regarding Patent Owner's Costa prosecution statements provides another reason, beyond those discussed above, that we do not construe the challenged claims as requiring a pre-expansion seal.

C. GROUND 1 – ALLEGED ANTICIPATION BY COOK

1. *Overview of Cook*

Cook discloses "[a]n expandable threaded connection includes a first tubular member, a second tubular member and a threaded connection for coupling the tubular members that includes one or more seal members." Ex. 1003, code (57). Cook shows one embodiment in Figure 28. *Id.* at 10:66–67, 152:29–31. Figure 28 is reproduced below.

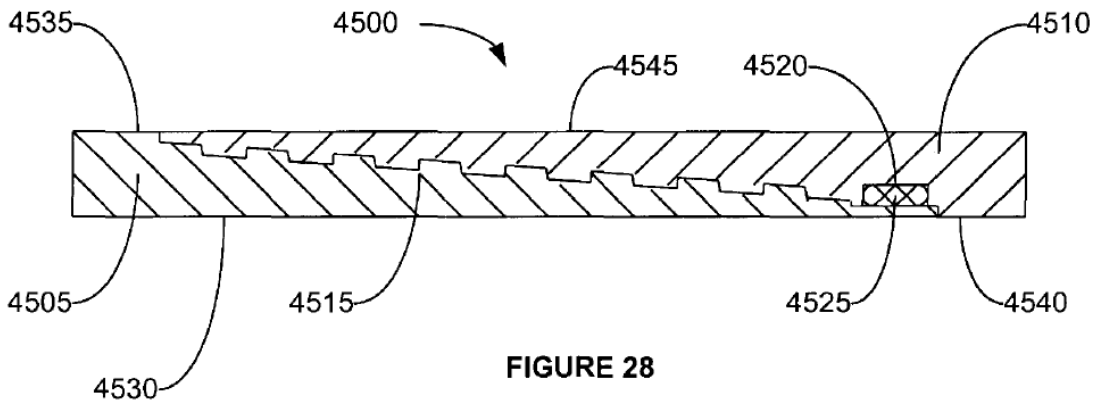


FIGURE 28

Figure 28 shows a cross-section of expandable threaded connection 4500, which comprises first tubular member 4505, second tubular member 4510,

threaded connection 4515, O-ring groove 4520, and O-ring 4525. *Id.* at 10:66–67, 152:29–34.

Cook discloses that "threaded connection 4515 may comprise any number of conventional threaded connections suitable for use with tubular members. In a preferred embodiment, the threaded connection 4515 comprises a pin-and-box threaded connection. In this manner, the assembly of the first tubular member 4505 to the second tubular member 4510 is optimized." *Id.* at 152:51–56.

O-ring groove 4520 preferably has a configuration "to receive and support one or more O-rings." *Id.* at 152:61–63. Additionally,

> The volumetric size of the O-ring groove 4520 is preferably selected to permit the O-ring 4525 to expand at least approximately 20% in the axial direction during the radial expansion process. In this manner, deformation of the outer surface 4545 of the second tubular member 4510 during and upon the completion of the radial expansion process is minimized.

Id. at 152:63–153:2. Cook further explains that "[t]he O-ring 4525 is supported by the O-ring groove 4520. The O-ring 4525 optimally ensures that a fluid-tight seal is maintained between the first tubular member 4505 and the second tubular member 4510 throughout and upon the completion of the radial expansion process." *Id.* at 153:3–7.

Cook discloses "expandable threaded connections 4300, 4500, 4700, and/or 4900 are used in combination with one or more of the embodiments illustrated in FIGS. 1–24E in order to optimally expand a plurality of tubular members coupled end to end using the expandable threaded connections

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4300, 4500, 4700 and/or 4900." *Id.* at 154:58–63. Figure 1 is reproduced below.

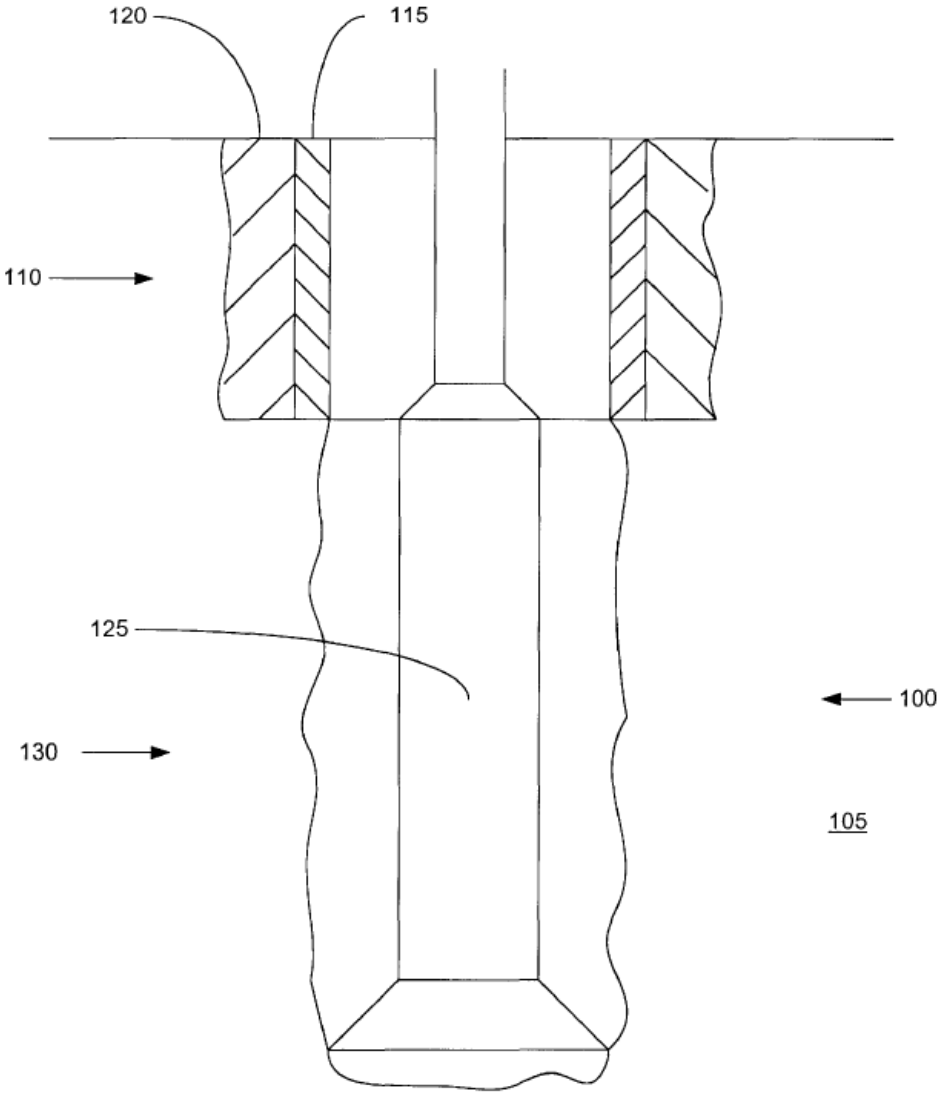


FIGURE 1

Figure 1 shows a cross-section of wellbore 100 within subterranean formation 105. *Id.* at 8:45–46, 12:56–57. "[W]ellbore 100 includes an

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existing cased section 110 having a tubular casing 115 and an annular outer layer of cement 120." *Id.* at 12:57–59. Figure 1 also shows drill string 125 extending wellbore 100 by forming new section 130. *Id.* at 12:60–63. Figure 2 is reproduced below.

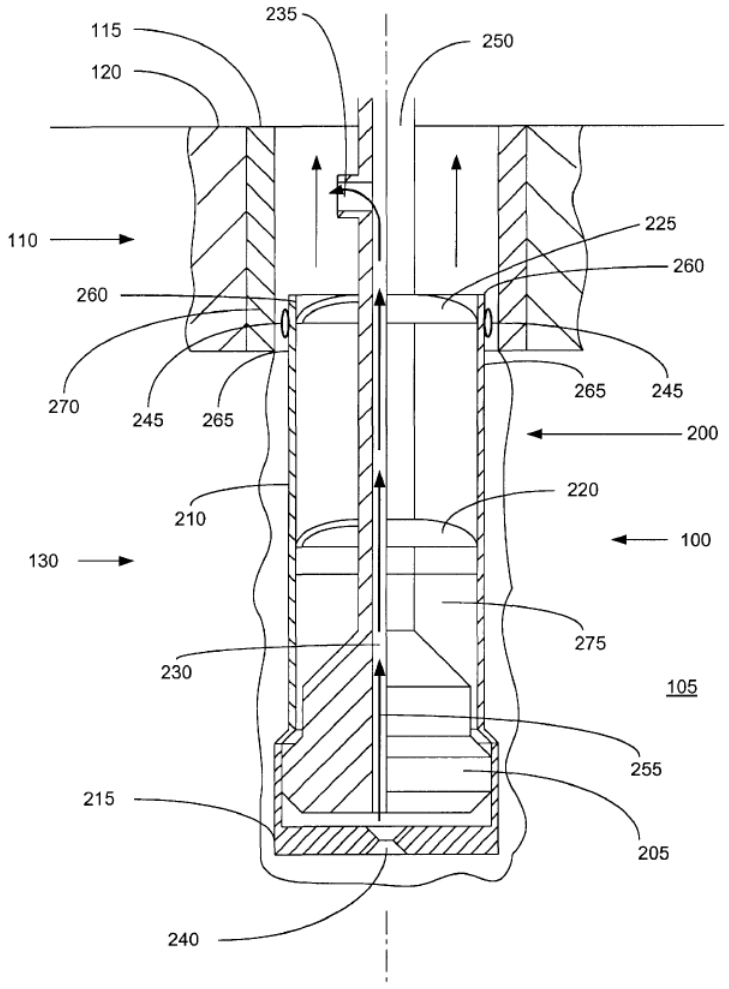


FIGURE 2

Figure 2 shows "apparatus 200 for forming a wellbore casing" disposed in new section 130 of wellbore 100. *Id.* at 12:64–66. "Apparatus 200 preferably includes an expandable mandrel or pig 205, a tubular member 210, a shoe 215, a lower cup seal 220, an upper cup seal 225, a fluid passage

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230, a fluid passage 235, a fluid passage 240, seals 245, and a support member 250." *Id.* at 12:66–13:4. "For typical tubular member 210 materials, the length of the tubular member 210 is preferably limited to between about 40 to 20,000 feet in length." *Id.* at 13:39–42. Figure 4 is reproduced below.

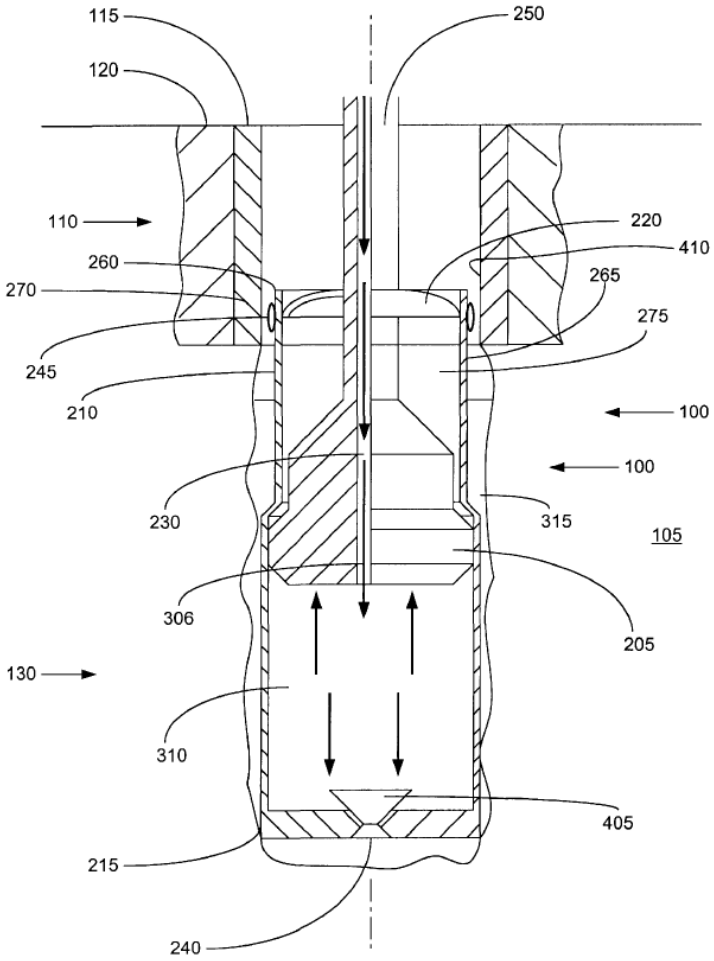


FIGURE 4

Figure 4 shows non-hardenable fluidic material 306 pumped into and pressurizing interior region 310. *Id.* at 17:5–7.

Cook explains that

> Once the interior region 310 becomes sufficiently pressurized, the tubular member 210 is extruded off of the expandable mandrel 205. During the extrusion process, the expandable mandrel 205 may be raised out of the expanded portion of the tubular member 210. In a preferred embodiment, during the extrusion process, the mandrel 205 is raised at approximately the same rate as the tubular member 210 is expanded in order to keep the tubular member 210 stationary relative to the new wellbore section 130.

Id. at 17:13–22. Cook also discloses that

> an apparatus is provided that includes a tubular assembly having a first tubular member, a second tubular member, and a threaded connection for coupling the first tubular member to the second tubular member. The threaded connection includes one or more sealing members for sealing the interface between the first and second tubular members. The tubular assembly is formed by the process of radially expanding the tubular assembly.

Id. at 8:30–38.

2. *Discussion*

Petitioner asserts that Cook discloses all of the limitations of claims 4, 6, 35, 36, 39, and 43. Pet. 37–48. Based on its position that claims 4 and 35 require a pre-expansion seal (as discussed above in Section V.B), Patent Owner argues that Petitioner has not shown that Cook anticipates any of the challenged claims. PO Resp. 37–41. Patent Owner does not otherwise dispute Petitioner's assertion that Cook anticipates claims 4, 6, 35, 36, 39, and 43.[13] *See generally id.*

[13] Patent Owner mentions secondary considerations of non-obviousness, but this is inapposite to Petitioner's anticipation challenge. *See* Prelim. Resp. 70.

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Having reviewed the parties' arguments and evidence, we determine Petitioner has shown by a preponderance of the evidence that Cook anticipates the challenged claims. We turn first to independent claim 4, followed by independent claim 35 and the challenged dependent claims.

a) Claim 4

(1) Preamble

Claim 4's preamble recites "[a] method for forming a seal between telescopically and threadedly engaged, tubular bodies comprising." Ex. 1001, 14:37–38. Arguing that Cook discloses this, Petitioner explains that

> Cook discloses connections that form a seal between telescopically and threadably engaged tubular bodies. EX1003 152:30-33 ("[t]he expandable threaded connection 4500 includes a first tubular member 4505, a second tubular member 4510, a threaded connection 4515, an O-ring groove 4520, and an O-ring 4525."); EX1003 8:30-38 ("The threaded connection includes one or more sealing members for sealing the interface between the first and second tubular members."); EX1032 293:6-9, 17:15-17.

Pet. 38 (alterations in original). Petitioner argues that Cooks first tubular member 4505 and second tubular member 4510 correspond to the tubular bodies recited in the preamble. *Id.* at 39. To the extent the preamble of claim 4 is limiting, we determine that Petitioner has shown by a preponderance of the evidence that Cook discloses the preamble.[14]

[14] Neither party presents an argument regarding whether the preamble is limitation, so we need not and do not determine whether the preamble is limiting.

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(2) Claim limitation 4a

Claim limitation 4[a] recites "disposing a seal component in an overlapping annular area between first and second telescopically and threadedly engaged tubular bodies." Ex. 1001, 14:39–41. In asserting that Cook discloses this limitation, Petitioner argues that "O-ring 4525 (the 'seal component') is disposed in a 'pin-and-box threaded connection' (the 'overlapping annular area') of tubular members 4505 and 4510. EX1003 152:43-62; EX1032 293:16-294:5 EX1002 ¶¶117-18." Pet. 39.

Patent Owner argues that Petitioner fails to show that Cook discloses claim limitation 4[a] because "Petitioner expressly admits Cook fails to form a seal prior to radial expansion." PO Resp. 38. This argument rests on Patent Owner's argument that claim 4 requires a pre-expansion seal. For the reasons explained in Section V.B above, claim 4 does not require a pre-expansion seal. Given this, based on the full record, we determine that Petitioner has shown by a preponderance of the evidence that Cook discloses limitation 4a.

(3) Claim limitation 4b

Claim limitation 4b recites "radially expanding said first and said second tubular bodies to compress said seal component for forming a seal between said first and second tubular bodies in said overlapping annular area." Ex. 1001, 14:42–45. Petitioner argues that Cook discloses this limitation because

> [a person of ordinary skill in the art] would understand Cook teaches that O-ring 4525 is compressed to form a seal during the radial expansion (*i.e.*, the o-ring does not provide a pre-expansion seal). EX1002 ¶¶119-23. The specification states that "[t]he volumetric size of the O-ring groove 4520 is preferably

> selected to permit the O-ring 4525 to expand at least approximately 20% in the axial direction during the radial expansion process."

Pet. 40 (second alteration in original).

Patent Owner argues that "because Petitioner fails to show in Cook a pre-expansion seal, Cook can also not teach or suggest the 'radially expanding' element 4[b]." PO Resp. 38. This argument rests on Patent Owner's argument that claim 4 requires a pre-expansion seal. For the reasons explained in Section V.B above, claim 4 does not require a pre-expansion seal. Given this, based on the full record, we determine that Petitioner has shown by a preponderance of the evidence that Cook discloses limitation 4b.

3. *Independent Claim 35*

a) Preamble

Claim 35's preamble recites "[a] method for sealing a connection between adjoining tubular pipe bodies in a string of well pipe for use in a wellbore, comprising." Ex. 1001, 17:49–51. Arguing that Cook discloses this, Petitioner refers to the Petition's discussion of claim 4's preamble, explaining that

> [t]he threadedly engaged first tubular member 4505 and second tubular member 4510 are the "adjoining tubular pipe bodies." The threaded connection, which is sealed after expansion (EX1003 153:4- 7; EX1032 294:11-14), is the connection.
>
> Cook further teaches connecting multiple tubular members in a "string of well pipe" as claimed: "[T]he expandable threaded connections 4300, 4500, 4700, and/or 4900 are used in combination with one or more of the embodiments illustrated in FIGS. 1-24E in order to optimally **expand a plurality of tubular members coupled end to end**…." EX1003 154:58-62

> (emphasis added); 12:43-48 (similar); EX1032 297:23-27, 26:3-7. Many of these embodiments are used to form "wellbore casings," (EX1003 11:6-12:53; EX1032 23:2-26:9), which consist of adjoining tubular pipe bodies in a string of casing (*i.e.*, well pipe). EX1002 ¶¶130.

Pet. 43–44 (second two alterations in original). To the extent the preamble of claim 35 is limiting, we determine that Petitioner has shown by a preponderance of the evidence that Cook discloses the preamble.[15]

b) Limitation 35a

Limitation 35a recites "disposing a sealing component on one or both of a first axial end of a first tubular pipe body and a second axial end of a second tubular pipe body." Ex. 1001, 17:52–54. Addressing this limitation, Petitioner refers to the Petition's arguments about limitation 4a, explaining that

> O-ring 4525 (the "sealing component") is disposed in O-ring groove 4520 that is formed on the interior wall 4540 of the box connection of the second tubular member 4510 (the claimed "second axial end of a second tubular pipe body"). The "threaded connection 4515 [of the first and second tubular members] comprises a pin-an-box threaded connection." EX1003 152:53- 55; EX1032 293:23-26. This is shown in annotated Fig. 28 . . . .

Pet. 44–45 (first alteration in original). Based on the full record, we determine that Petitioner has shown by a preponderance of the evidence that Cook discloses limitation 35a.

[15] Neither party presents an argument regarding whether the preamble is limiting, so we need not and do not determine whether the preamble is limiting.

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c) Limitation 35b

Limitation 35b recites "engaging said first axial end of said first tubular pipe body within said second axial end of said second tubular pipe body whereby an annular area containing said sealing component is defined between said first and said second axial ends." Ex. 1001, 17:55–59. Addressing this limitation, Petitioner refers to the Petition's discussion of limitation 35a, explaining that "[t]he pin of first tubular member 4505 is engaged within the box of second tubular member 4510. Further, O-ring 4525 is contained within the threaded connection 4515 (which is the annular area defined between the pin-and-box connection). This too is shown in annotated Fig. 28 . . . ." Pet. 45.

Patent Owner argues that Petitioner fails to show that Cook discloses claim limitation 35b because "Petitioner expressly admits Cook fails to form a seal prior to radial expansion." PO Resp. 41. This argument rests on Patent Owner's argument that claim 35 requires a pre-expansion seal. For the reasons explained in Section V.B above, claim 35 does not require a pre-expansion seal. Based on the full record, we determine that Petitioner has shown by a preponderance of the evidence that Cook discloses limitation 35b.

d) Limitation 35c

Limitation 35c recites "disposing said string of well pipe in a surrounding well bore." Ex. 1001, 18:1–2. Addressing this limitation, Petitioner refers to the Petition's discussion of claim 35's preamble, explaining that, "[t]he disclosed wellbore casings that form a string of well pipe are disposed in a surrounding wellbore." Pet. 46 (citing Ex. 1002

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¶¶ 135–136; Ex. 1003, Fig. 4). Patent Owner does not argue that Cook fails to disclose limitation 35c. Based on the full record, we determine that Petitioner has shown by a preponderance of the evidence that Cook discloses limitation 35c.

e) Limitation 35d

Limitation 35d recites "radially expanding said first and said second axial ends toward said surrounding well bore to compress said sealing component between said first tubular pipe body and said second tubular pipe body to seal the annular area between said first tubular pipe body and said second tubular pipe body." Ex. 1001, 18:3–8. Addressing this limitation, Petitioner refers to the Petition's discussion of limitation 35a, arguing that Cook "teach[es] the pin and box ends of tubular members 4505 and 4510 are the claimed first and second axial ends." Pet. 46. Referring to the Petition's discussion of limitation 4b, the Petition adds that Cook "teach[es] radially expanding tubular members 4505, 4510 toward the wellbore and compressing O-ring 4525 during the radial expansion so that it forms a seal in the threaded connection 4515." *Id.* at 46–47.

Patent Owner argues that "because Petitioner fails to show in Cook a pre-expansion seal, Cook can also not teach or suggest the 'radially expanding' element 35[d]." PO Resp. 41. This argument rests on Patent Owner's argument that claim 35 requires a pre-expansion seal. For the reasons explained in Section V.B above, claim 35 does not require a pre-expansion seal. Given this, based on the full record, we determine that Petitioner has shown by a preponderance of the evidence that Cook discloses limitation 35d.

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4. *Dependent Claims 6, 36, 39, and 43*

Petitioner explains in detail why it believes Cook anticipates dependent claims 6, 36, 39, and 43, citing documentary and testimonial evidence. Pet. 43, 47–48. Aside from its arguments regarding independent claims 4 and 35, Patent Owner does not dispute Petitioner's argument that Cook anticipates dependent claims 6, 36, 39, and 43. *See generally* PO Resp. Based on the full record, we determine Petitioner has shown by a preponderance of the evidence that Cook anticipates claims 6, 36, 39, and 43.

D. GROUNDS 2–7

Grounds 2–7 challenge the patentability of claims 6, 36, 39, and 43. Pet. 7–8. Because we determine that all of these claims are unpatentable as anticipated by Cook, we do not reach Grounds 2–7. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding a petitioner "is entitled to a final written decision addressing all of the claims it has challenged").

E. MOOT ARGUMENTS REGARDING ANTICIPATION BY COOK

As discussed above in Sections V.B and V.C, Petitioner persuades us that the challenged claims do not require a pre-expansion seal (contrary to Patent Owner's arguments), and that Cook anticipates the challenged claims so-construed. Additionally, Petitioner argues in the alternative that "[Patent Owner] [c]oncedes [a]ntipation [e]ven [u]nder [i]ts [c]onstructions." Pet. Reply 19–20. In other words, Petitioner argues in the alternative that Patent Owner concedes Cook anticipates the challenged claims, even if the challenged claims require a pre-expansion seal, as asserted by Patent Owner. Petitioner advances multiple bases for this position.

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For example, Petitioner argues that "during prosecution of Cook, [Patent Owner] copied Challenged Claims 4, 6, 35, 36, 39, and 43 into Cook as new claims 25, 27, 38, 39, 40, and 43, respectively, and represented that 'new claims 23-56 recite additional aspects of [Cook's] invention.'" *Id.* (second alteration in original). According to Petitioner, this constitutes a representation to the Office that Cook contained written description support for claims 4, 6, 35, 36, 39, and 43 of the '175 patent. *Id.* at 19. Accordingly, Petitioner argues that "[w]hatever the Challenged Claims cover, Cook necessarily anticipates them." *Id.* Petitioner adds that

> [s]econd, in the Litigation, PO provided a sworn interrogatory answer that Cook teaches an initial seal at makeup that is further formed or maintained during radial expansion. EX1052. Interrogatory 36 requests that PO identify every passage in Cook that supports the following claim limitation in Cook: "one or more ***sealing members*** disposed within the annular chamber ***for sealing*** the interface between the first and second tubular members ***before, during, and after a radial expansion*** and plastic deformation of the first and second tubular members." *Id.*, 7. PO's sworn answer under oath identifying multiple passages in Cook teaching this limitation is a binding admission that Cook anticipates even under PO's untenable constructions. Moreover, PO's own expert also testified that Cook discloses the "initial seal" limitation and that he did not evaluate whether Cook anticipates based on his own understanding of Cook. EX1050, 16:5-17:2, 17:20-18:1, 20:22-22:10.

Id. at 20.

Patent Owner counters that

> Petitioner argued in its Petition that the o-ring at issue in Cook (U.S. Patent No. 6,604,763) "does not provide a seal prior to expansion" *See* Paper 2, pp. 40-41. The Board instituted this proceeding on this theory. Further, Patent Owner relied on

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> Petitioner's theory to develop its arguments of validity to the Board, which it presented months ago. Petitioner now argues that there **is** a seal in the Cook reference, a 180-degree change in position. This is improper under PTAB procedure, and it is prejudicial to Patent Owner (not to mention to the Board, which instituted on Petitioner's earlier theory that Cook **lacked** a pre-expansion seal). In its Reply, Petitioner has now submitted additional evidence to "prove" its new theory. *See* Reply, pp. 18-20 (citing, evidence from the parallel litigation, including Dr. Wooley's testimony). This is improper and should be rejected.

PO Sur-reply 2–3 (footnote omitted). These arguments are moot, given that Petitioner persuades us that Patent Owner's proposed construction of independent claims 4 and 35 is not correct.

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VI. CONCLUSION[16]

In summary:

Claim(s)	35 U.S.C. §	References/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
4, 6, 35, 36, 39, 43	102(e)	Cook	4, 6, 35, 36, 39, 43	
4, 6, 35, 36, 39, 43	103(a)	Cook, "in view of the knowledge of a person of ordinary skill in the art"[17]		
4, 6, 35, 36, 39, 43	103(a)	Cook, "in view of the knowledge of a [person of ordinary skill in the art], Abdrakhmanov[18]		
4, 6, 35, 36, 39, 43	102(b)	Abdrakhmanov[19]		
4, 6, 35, 36, 39, 43	103(a)	Abdrakhmanov, "in view of the		

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

[17] As explained above in Section V.D, we do not reach this challenge.

[18] As explained above in Section V.D, we do not reach this challenge.

[19] As explained above in Section V.D, we do not reach this challenge.

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		knowledge of a [person of ordinary skill in the art]," the '799 Publication[20]		
4, 6, 35, 36, 39, 43	102(b)	Owen[21]		
4, 6, 35, 36, 39, 43	103(a)	Owen, "in view of the knowledge of a person of ordinary skill in the art"[22]		
Overall Outcome			4, 6, 35, 36, 39, 43	

VII. ORDER

In consideration of the foregoing, it is:

ORDERED that claims 4, 6, 35, 36, 39, and 43 have been shown, by a preponderance of the evidence, to be unpatentable;

FURTHER ORDERED that Petitioner's Motion to Exclude is *dismissed as moot*;

FURTHER ORDERED that Patent Owner's Motion to Exclude is *dismissed-in-part* and *denied-in-part*;

FURTHER ORDERED that Petitioner's first Motion to Seal is *granted*;

[20] As explained above in Section V.D, we do not reach this challenge.

[21] As explained above in Section V.D, we do not reach this challenge.

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FURTHER ORDERED that Petitioner's second Motion to Seal is *granted*;

FURTHER ORDERED that the default Protective Order submitted with Petitioner's first Motion to Seal and Second Motion to Seal is entered; and

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

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IPR2020-01580
Patent 6,409,175 B1

PETITIONER:

Leslie Payne
James Baxter
HEIM PAYNE & CHORUSH, LLP
lpayne@hpcllp.com
bbaxter@hpcllp.com

Douglas R. Wilson
ARMOND WILSON LLP
doug.wilson@armondwilson.com

PATENT OWNER:

George Haight
Brian Michaelis
Lisa Meyerhoff
SEYFARTH SHAW LLP
ghaight@seyfarth.com
bmichaelis@seyfarth.com
lmeyerhoff@seyfarth.com

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EXHIBIT 6

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Trials@uspto.gov
Tel: 571-272-7822

Paper 60
Entered: April 13, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

WEATHERFORD U.S., L.P.,
Petitioner,

v.

ENVENTURE GLOBAL TECHNOLOGY, INC.,
Patent Owner.

IPR2020-01648
Patent 7,290,616 B2

Before MEREDITH C. PETRAVICK, HYUN J. JUNG, and NEIL T. POWELL, *Administrative Patent Judges.*

POWELL, *Administrative Patent Judge.*

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

Granting Patent Owner's Motion to Deem the Filing of Its Exhibits As Timely (Paper 28)
37 C.F.R. § 42.5(c)(3)

Dismissing Petitioner's Motion to Submit Supplemental Information (Papers 39, 40)
37 C.F.R. § 42.123(b)

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Dismissing Petitioner's Motion to Exclude (Paper 45)
Denying-in-Part and Dismissing-in-Part Patent Owner's Motion to Exclude (Paper 46)
37 C.F.R. § 42.64(c)

Granting Motions to Seal (Papers 4, 5, 12, 33, 41, 43, 54)
37 C.F.R. § 42.64(c)

I. INTRODUCTION

A. BACKGROUND

Weatherford U.S., L.P. ("Petitioner") filed a Petition for *inter partes* review of claims 1 and 5 of U.S. Patent No. 7,290,616 B2 (Ex. 1001, "the '616 patent"). Papers 2, 3[1] ("Pet."). Enventure Global Technology, Inc. ("Patent Owner") filed a Preliminary Response. Papers 10, 11[2] ("Prelim. Resp."). Pursuant to 35 U.S.C. § 314, we instituted an *inter partes* review of claims 1 and 5 of the '616 patent on all presented challenges. Paper 20 ("Institution Decision" or "Inst. Dec."), 2, 35–36, 40–41.

After institution, Patent Owner filed a Response (Paper 23, "PO Resp."), to which Petitioner filed a Reply (Papers 31, 32[3], "Pet. Reply"), and Patent Owner thereafter filed a Sur-reply (Paper 35, "PO Sur-reply").

[1] Paper 2 is a private, unredacted version of the Petition, and Paper 3 is a public, redacted version of the Petition.

[2] Paper 10 is a private, unredacted version of the Preliminary Response, and Paper 11 is a public, redacted version of the Preliminary Response.

[3] Paper 31 is a private, unredacted version of the Reply, and Paper 32 is a public, redacted version of the Reply.

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Patent Owner also filed a Motion to Deem the Filing of Its Exhibits As Timely (Paper 28), and Petitioner filed a Non-Opposition to Patent Owner's Motion to Deem the Filing of Its Exhibits As Timely (Paper 29).

Petitioner also filed a Motion to Submit Supplemental Information. (Papers 39, 40[4], "Mot. Sub. Sup. Inf."); Patent Owner filed a Response to Petitioner's Motion to Submit Supplemental Information (Paper 42, "Resp. Mot. Sub. Sup. Inf."); and Petitioner filed a Reply in Support of Motion to Submit Supplemental Information (Paper 48, "Rep. Mot. Sub. Sup. Inf.").

Additionally, Petitioner filed a Motion to Exclude (Paper 45, "Pet. Mot. Excl."); Patent Owner filed a Response to Petitioner's Motion to Exclude (Paper 49, "Resp. Pet. Mot. Excl."); and Petitioner filed a Reply to Patent Owner's Response (Paper 50, "Reply Pet. Mot. Excl.").

Also, Patent Owner filed a Motion to Exclude (Paper 46, "PO Mot. Excl."); Petitioner filed an Opposition to Patent Owner's Motion to Exclude (Paper 47, "Opp. PO Mot. Excl."); and Patent Owner filed a Reply to Petitioner's Opposition (Paper 51, "Reply PO Mot. Excl.").

The parties also submitted a number of unopposed Motions to Seal. Papers 4, 5, 12, 33, 41, 43, 54.

An oral hearing was held in this proceeding on January 20, 2022. Papers 57, 58[5] ("Tr.").

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[4] Paper 39 is a private, unredacted version of the Motion to Submit Supplemental Information, and Paper 40 is a public, redacted version of the Motion to Submit Supplemental Information.

[5] Paper 57 is a private, unredacted version of the Transcript, and Paper 58 is a public, redacted version of the Transcript.

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We have jurisdiction under 35 U.S.C. § 6. This Decision is a final written decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons below, we determine that Petitioner has shown by a preponderance of the evidence that claims 1 and 5 are unpatentable.

B. RELATED PROCEEDINGS

The parties note that the '616 patent is involved in *Enventure Global Technology, Inc. v. Weatherford U.S., L.P. and Weatherford Technology Holdings, LLC*, Civil Action No. 4:19-cv-02397 (S.D. Tex. 2019) ("the Litigation"). Pet. 8; Paper 9, 1. The parties also identify as related matters IPR2020-01580, IPR2020-01661, IPR2020-01666, IPR2020-01684, and IPR2020-01700. Pet. 8; Paper 9, 1.

C. THE '616 PATENT

The '616 patent relates to wellbore casings. Ex. 1001, 10:7. The '616 patent explains that, conventionally, wellbore casings are installed in a wellbore to hold the wellbore open and prevent undesirable fluid transmission between the wellbore and the surrounding formation. *Id.* at 10:10–14. The '616 patent elaborates that

> [t]he borehole is drilled in intervals whereby a casing which is to be installed in a lower borehole interval is lowered through a previously installed casing of an upper borehole interval. As a consequence of this procedure the casing of the lower interval is of smaller diameter than the casing of the upper interval. Thus, the casings are in a nested arrangement with casing diameters decreasing in downward direction. Cement annuli are provided between the outer surfaces of the casings and the borehole wall to seal the casings from the borehole wall. As a consequence of this nested arrangement a relatively large borehole diameter is required at the upper part of the wellbore. Such a large borehole diameter involves increased costs due to heavy casing handling

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> equipment, large drill bits and increased volumes of drilling fluid and drill cuttings. Moreover, increased drilling rig time is involved due to required cement pumping, cement hardening, required equipment changes due to large variations in hole diameters drilled in the course of the well, and the large volume of cuttings drilled and removed.

Id. at 10:14–33. The '616 patent then states that "[t]he present invention is directed to overcoming one or more of the limitations of the existing procedures for forming wellbores and wellheads." *Id.* at 10:34–36.

The '616 patent discloses a method and apparatus for deforming plastically a tubular liner inside a wellbore. *Id.* at 11:51–52. This method and apparatus serve to couple a radially expandable tubular member to a cased or open hole section of a wellbore. *Id.* at 11:53–56. It allows forming or repairing a pipeline, a wellbore casing, or a structural support. *Id.* at 11:56–58.

The '616 patent discusses details of an embodiment in connection with Figures 1 and 1*a*–1*d*. Figures 1 and 1*a*–1*d* are reproduced below.

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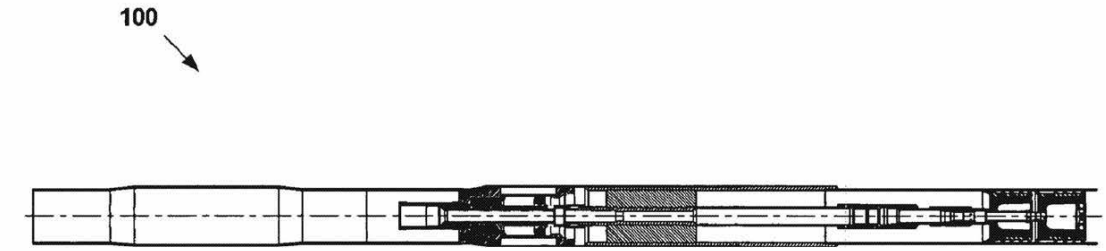


FIG. 1

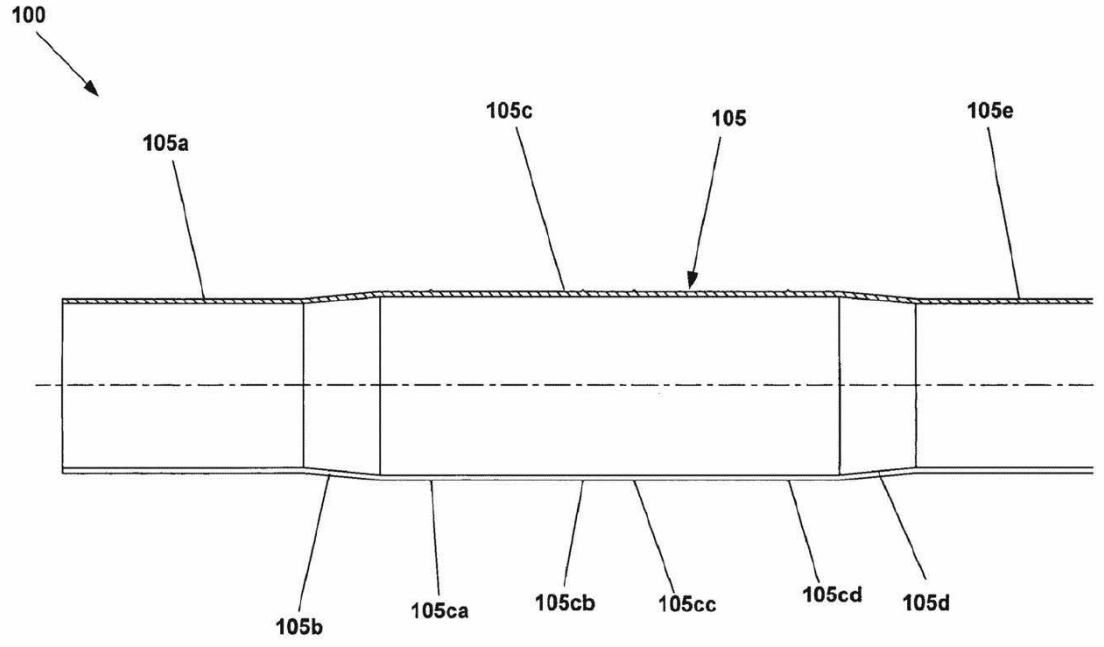


FIG.1a

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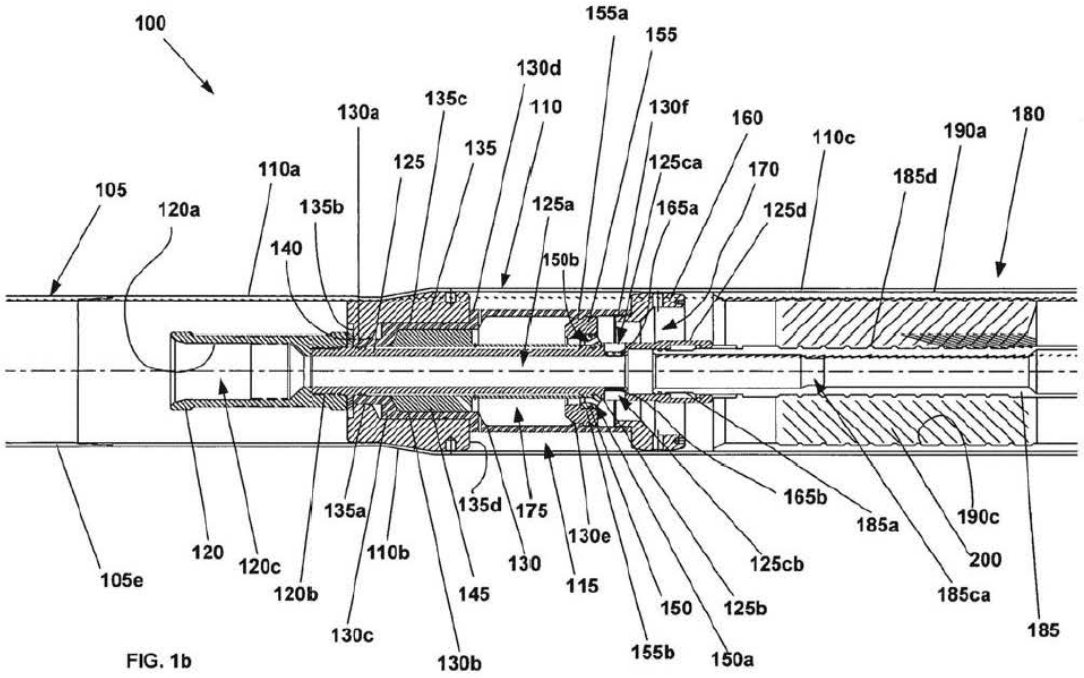


FIG. 1b

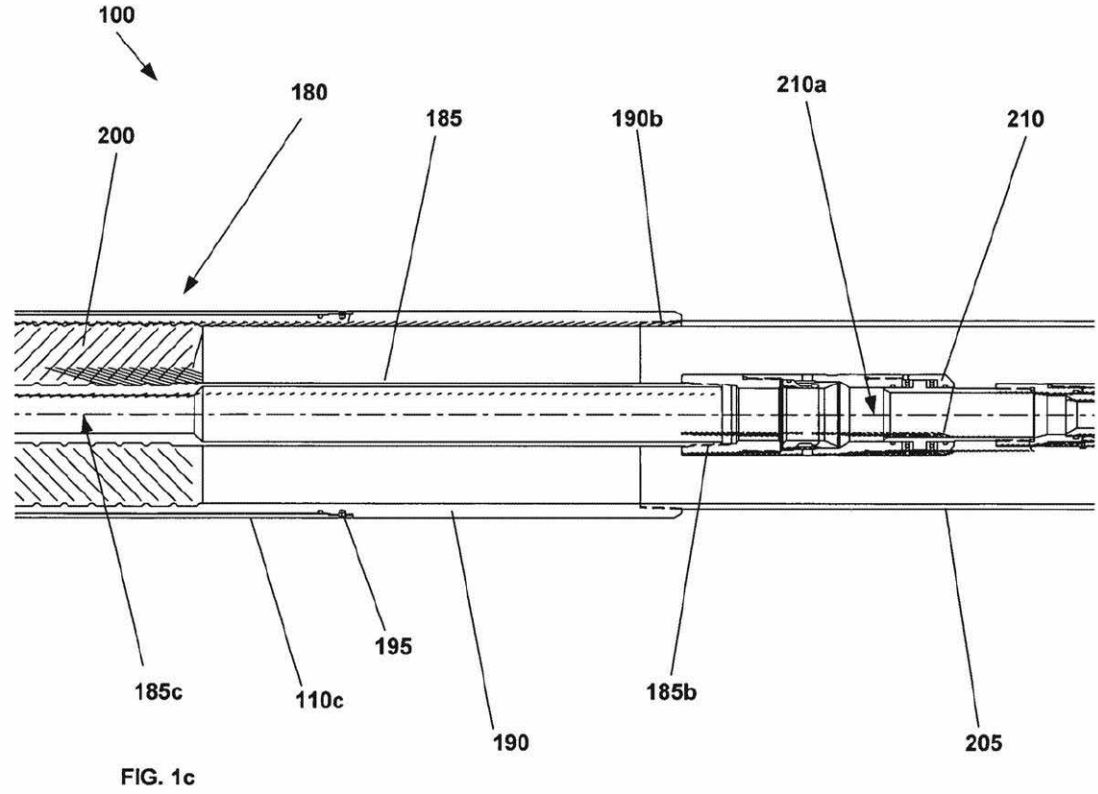


FIG. 1c

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"[Figures 1 and 1*a*–1*d*] are fragmentary cross-sectional illustrations of an embodiment of a liner hanger." *Id.* at 11:24–25.

Figure 1 shows apparatus 100 as a whole, and Figures 1*a*–1*d* provide enlarged views of different portions of apparatus 100. *See id.* at Figs. 1, 1*a*–1*d*, 11:60–13:58. Apparatus 100 includes tubular hanger joint 105 and tubular expansion cone launcher 110 coupled to one another. *Id.* at 11:60–63.

As shown in Figure 1a, tubular hanger joint 105 includes first section 105*a*, first transition section 105*b*, intermediate section 105*c*, second transition section 105*d*, and second section 105*e*. *Id.* at 11:63–66. "The outside diameter of the first and second sections, 105*a* and 105*e*, are preferably less than the outside diameter of the intermediate section 105*c*." *Id.* at 11:67–12:2.

As shown in Figure 1b, expansion cone launcher 110 comprises upper tubular portion 110*a*, intermediate tubular portion 110*b*, and lower tubular portion 110*c*. *Id.* at 12:9–11. Expansion cone launcher 110 holds expansion cone assembly 115. *Id.* at 12:20–21. Expansion cone 135 mates with the inside of expansion cone launcher 110. *Id.* at 12:39–41. Internal passages 120*c* and 125*a* extend through tubular coupling 120 and first tubular support 125, respectively. *Id.* at 12:26–30. Tubular support 125 also includes openings 125*ca* and 125*cb*. *Id.* at 12:29–31. Additionally, longitudinal passages 150*a* and 150*b* extend through fourth tubular support 150. *Id.* at 12:56–60. The '616 patent explains that

> [b]urst discs 165*a* and 165*b* are received within the openings 125*ca* and 125*cb* of the first tubular support member 125 in order

> to controllably permit fluidic materials to pass from the passage 125 into a first annular region 170 defined by the annular region between the first tubular support member 125, the second tubular support member 130, and the sixth tubular support member 160, the passages 150*a* and 150*b*, and a second annular region 175 defined by the annular region between the second tubular support 130, the third tubular support 145 and the fifth tubular support 155.

Id. at 13:4–13.

Expansion cone launcher 110 and expansion cone assembly 115 also couple to shoe assembly 180. *Id.* at 13:14–16. Shoe assembly 180 includes tubular support member 185. *Id.* at 13:16–17. "The tubular support member 185 further includes an internal passage 185*c* for conveying fluidic materials that includes a restriction 185*ca* for receiving a conventional wiper plug, or other similar device, and a plurality of radially directed ribs 185*d*." *Id.* at 13:25–29.

In use, apparatus 100 is placed within a wellbore. *Id.* at 14:29–31. The '616 patent discusses this use in connection with Figures 2*a*–2*d*. Figures 2*a* and 2*b* are reproduced below.

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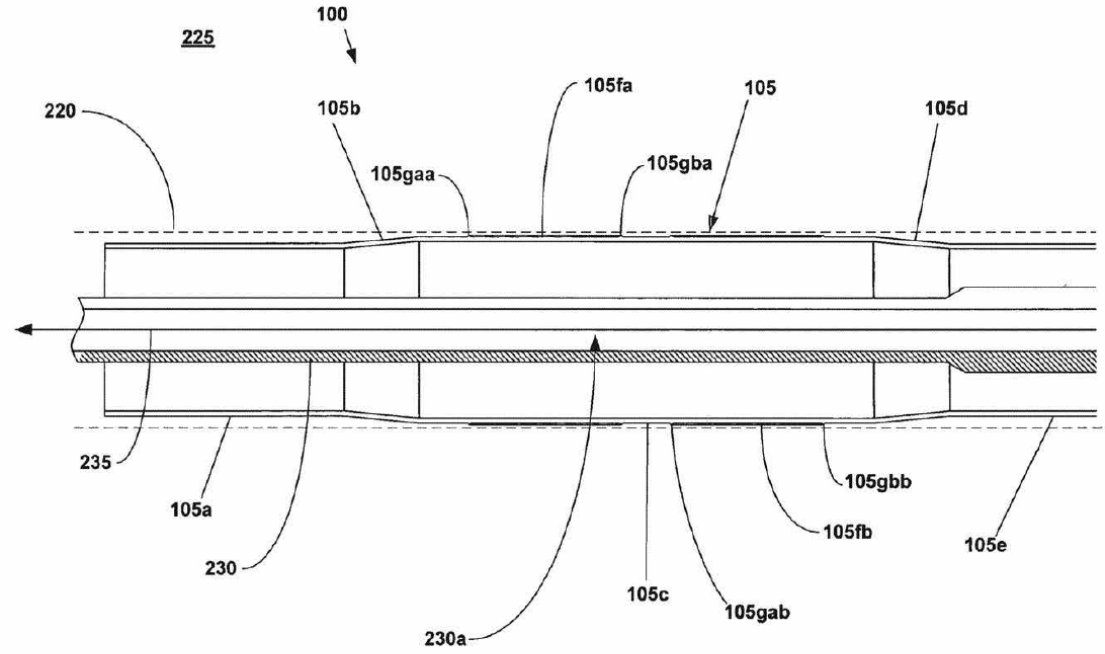


FIG. 2a

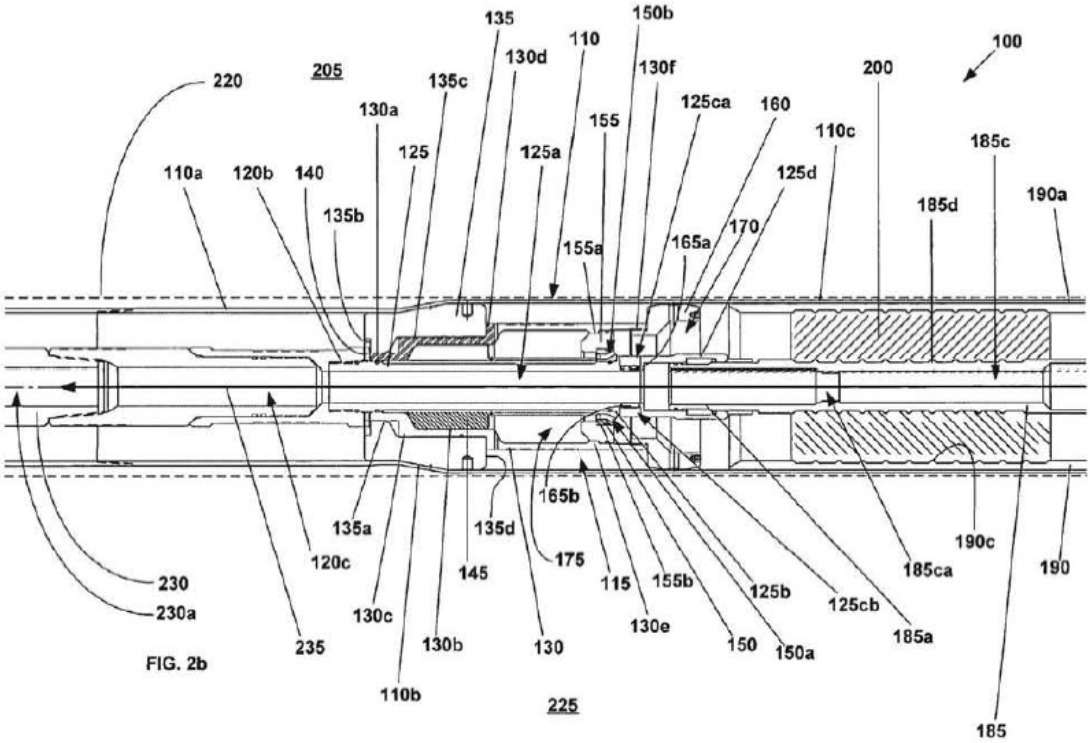


FIG. 2b

Figures 2*a* and 2*b* are fragmentary cross-sectional views of apparatus 100

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placed within wellbore 220 in subterranean formation 225. *Id.* at 11:26–28, 14:29–31.

> Figure 2*a* illustrates an embodiment in which
>
> the intermediate section 105*c* of the tubular hanger joint 105 includes sealing members, 105*fa* and 105*fb*, positioned between corresponding pairs of ribs, 105*gaa* and 105*gba,* and 105*gab* and 105*gbb*, respectively, for sealing the interface between the intermediate section of the tubular hanger joint and another preexisting structure such as, for example, a wellbore casing. In an exemplary embodiment, the ribs, 105*gaa*, 105*gba*, 105*gab*, and 105*gbb*, are formed integrally to the intermediate section 105*c* of the tubular hangar joint 105.

Id. at 14:50–60.

After apparatus 100 is placed within wellbore 220, a process may be undertaken to radially expand expansion cone launcher 110 and expandable tubular member 105.[6] *Id.* at 14:61–15:41. A stage of this process is shown in Figure 5*b*. Figure 5*b* is reproduced below.

[6] The '616 patent uses the terms "tubular hanger joint 105" and "tubular member 105" interchangeably. *E.g.*, Ex. 1001, 14:44–57. We also use these terms interchangeably.

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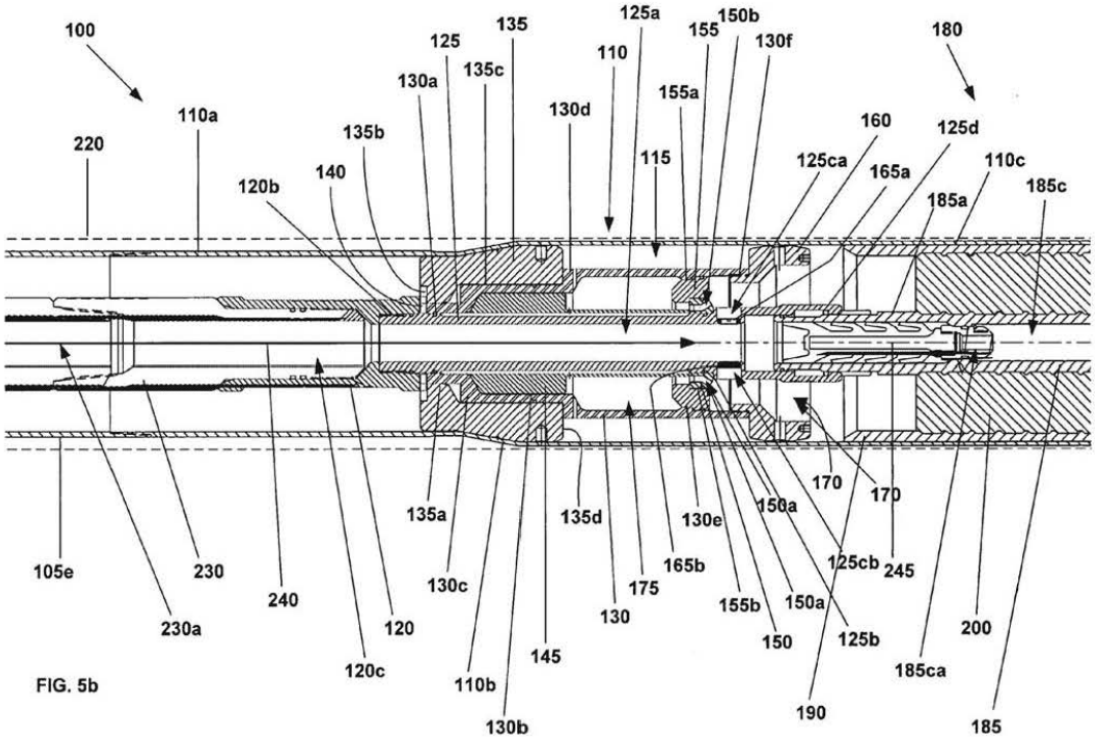


Figure 5b shows "a conventional dart, ball or other similar device 245 . . . positioned in the restriction 185*ca* in the passage 185*c* of the tubular support 185." *Id.* at 15:9–12. As a result, "the region above the restriction 185*ca* is fluidicly isolated from the region below the restriction." *Id.* at 15:13–14.

Then, injection of fluidic material continues, raising the pressure upstream of restriction 185*ca*. *Id.* at 15:14–18. This ruptures at least one of rupture discs 165*a* and 165*b*. *Id.* at 15:18–20. This allows pressurized fluid to "flow through the passages 125*ca* and 125*cb* into the passages 170, 150*a*, 150*b*, and 175." *Id.* at 15:20–22.

Then, after certain releasable couplings decouple, continued application of fluid pressure moves expansion cone assembly 115 in the longitudinal direction away from shoe assembly 180. *Id.* at 15:23–27.

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According to the '616 patent,

> [i]n this manner, the expansion cone launcher 110 and the expandable tubular member 105 are radially expanded and thereby plastically deformed. In a preferred embodiment, the expansion cone launcher 110 and the expandable tubular member 105 are radially expanded into contact with the interior surface of the wellbore 220, or other tubular member such as, for example, a wellbore casing, a pipeline, or a structural support.

Id. at 15:27–35.

D. ILLUSTRATIVE CLAIM

Of the challenged claims, claim 1 is independent. Claim 5 depends from claim 1. Claim 1 is illustrative and is reproduced below with certain reformatting:[7]

> 1. A method of coupling a radially expandable tubular member to a preexisting structure, comprising:
>
> [1a] positioning the tubular member and an expansion device within the preexisting structure;
>
> [1b] injecting fluidic materials into the tubular member;
>
> [1c] sensing the operating pressure of the fluidic materials; and
>
> [1d] radially expanding the tubular member into contact with the preexisting structure when the sensed operating pressure exceeds a predetermined amount by displacing the expansion device relative to the tubular member.

Ex. 1001, 17:16–26.

[7] We have numbered the claim limitations with the same numbers used by the Petition to identify claim 1's limitations.

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E. ASSERTED GROUNDS OF UNPATENTABILITY

Petitioner challenges the patentability of claims 1 and 5 of the '616 patent on the following grounds (Pet. 10):

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
1, 5	102(b)[8]	SPE 59151[9]
1, 5	102(b)	Offshore Article[10]
1, 5	103(a)	Offshore Article, "knowledge of a [person of ordinary skill in the art]"
1, 5	103(a)	Offshore Article, "knowledge of a [person of ordinary skill in the art]," SPE 59151
1, 5	102(a), (e)	Vercaemer[11]

In support of its unpatentability contentions, Petitioner also relies on the Declaration of Michael Roy Chambers Sr. (Ex. 1002), as well as the Supplemental Declaration of Mr. Chambers (Ex. 1048). Patent Owner relies on the Declaration of Gary R. Wooley, PhD. Ex. 2006.

[8] The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) ("AIA"), amended 35 U.S.C. §§ 102, 103. Because the '616 patent has an effective filing date prior to the effective date of the applicable AIA amendments, we refer to the pre-AIA versions of §§ 102, 103.

[9] Lohoefer et al., "Expandable Liner Hanger Provides Cost-Effective Alternative Solution," IADC/SPE Drilling Conference, 2000 (Ex. 1003, "SPE 59151").

[10] Furlow, "Expandable casing program helps operator hit TD with larger tubulars," Offshore Magazine, Jan. 2000 (Ex. 1004, "Offshore Article").

[11] Vercaemer et al., U.S. 6,085,838, issued July, 11, 2000 (Ex. 1005, "Vercaemer").

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II. PATENT OWNER'S MOTION TO DEEM THE FILING OF ITS EXHIBITS AS TIMELY

Patent Owner filed an unopposed Motion to Deem the Filing of Its Exhibits as Timely. Paper 28; Paper 29. Patent Owner explains that it timely served Petitioner with Exhibits 2006–2011, but did not file those Exhibits with the Board until fifteen minutes after midnight of the due date, as a result of "technical problems with counsel's home connection to the secured VPN and shared network drive where the Exhibits were located." Paper 28, 2, 4. Patent Owner persuades us that good cause exists to deem Patent Owner's filing of the exhibits timely. Patent Owner's Motion to Deem the Filing of Its Exhibits as Timely is granted.

III. PETITIONER'S MOTION TO SUBMIT SUPPLEMENTAL INFORMATION

Petitioner filed a Motion to Submit Supplemental Information. Papers 39, 40. In this Motion, Petitioner seeks to submit an excerpt from Dr. Wooley's expert report from the Litigation. *Id.* at 1. Petitioner argues that the excerpt from Dr. Wooley's expert report undermines Patent Owner's arguments in this proceeding. *Id.* at 2–3. As explained below in Section VII, Petitioner has demonstrated by a preponderance of the evidence that challenged claims 1 and 5 are unpatentable, without the need to rely on Dr. Wooley's expert report from the Litigation. Accordingly, we dismiss Petitioner's Motion to Submit Supplemental Information as moot.

IV. PETITIONER'S MOTION TO EXCLUDE

Petitioner's Motion to Exclude seeks to exclude Exhibits 2009–2011. Pet. Mot. Excl. 1. Because we do not rely on these exhibits, we dismiss Petitioner's Motion to Exclude as moot.

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V. PATENT OWNER'S MOTION TO EXCLUDE

In its Motion to Exclude, Patent Owner seeks exclusion of Exhibit 1048 (PO Mot. Excl. 2–7), "the cited portions of [Exhibit 1049]" (*id.* at 8–9), and Exhibit 1051 (*id.* at 9).

A. EXHIBIT 1048.

Exhibit 1048 is Mr. Chambers' Supplemental Declaration, filed with Petitioner's Reply. Patent Owner argues that the Supplemental Declaration "contains new matter outside the scope of the Petition, and goes beyond merely 'replying' to [Patent Owner]'s Response. Specifically, Mr. Chambers provided new information on his credentials and new bases attempting to save Petitioner's argument concerning radial expansion and plastic deformation." *Id.* at 3.

Patent Owner argues that the testimony in Mr. Chambers' Supplemental Declaration about his background goes beyond the scope of the Petition and beyond responding to arguments in Patent Owner's Response. *Id.* at 3–4. Patent Owner also argues that the testimony in Mr. Chambers' Supplemental Declaration about his background is misleading, confusing, and unfairly prejudicial. *Id.* at 5–6.

Patent Owner also argues that testimony in Mr. Chambers' Supplemental Declaration about "into contact with" goes beyond the scope of the Petition. *Id.* at 4. Patent Owner adds that this testimony is misleading, confusing, and unfairly prejudicial. *Id.* at 7.

In response, Petitioner asserts that "[i]n its Patent Owner Response, [Patent Owner] proposed constructions adding new limitations to the challenged claims and a narrow definition of a [person of ordinary skill in

the art]." Opp. PO Mot. Excl. 1. Petitioner argues that Patent Owner's complaints about Exhibit 1048 going beyond the scope of the Petition and beyond responding to the Patent Owner Response are not properly the subject of a motion to exclude. *Id.* at 2–3. Instead, Petitioner asserts, Patent Owner should have sought authorization for a motion to strike. *Id.* Additionally, Petitioner argues that Mr. Chambers' Supplemental Declaration is directly responsive to the arguments in Patent Owner's Response that "Mr. Chambers lacks the appropriate insight of a [person of ordinary skill in the art] regarding drilling technology at the time of the invention." *Id.* at 3 (quoting PO Resp. 24). Petitioner similarly argues that Mr. Chambers' testimony about "direct contact" and "plastic deformation" is proper rebuttal to arguments in Patent Owner's Response and testimony in Dr. Wooley's declaration. *Id.* at 4–5. Petitioner also argues that, contrary to Patent Owner's assertions, the testimony in Mr. Chambers' Supplemental Declaration is relevant, not unfairly prejudicial, and not confusing. *Id.* at 6–9.

Patent Owner counters that the testimony in Mr. Chambers' Supplemental Declaration regarding his background relates to experience after the relevant timeframe of the claimed invention. Reply PO Mot. Excl. 1–2. Patent Owner adds that "Mr. Chambers' newly-identified experience does not tend to make his insight of a [person of ordinary skill in the art] more or less probable, and it is cumulative, confusing, and misleading, thereby outweighing any probative value of such evidence." *Id.* at 2.

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Patent Owner does not persuade us that exclusion of any portion of Mr. Chambers' Supplemental Declaration is warranted. Weighing the parties' arguments, Petitioner persuades us that the testimony in Mr. Chambers' Supplemental Declaration does not go beyond the scope of a proper response to the arguments in Patent Owner's Response. Regarding Patent Owner's concerns about the extent of Mr. Chambers' relevant experience and the allegedly confusing, misleading, and unfairly prejudicial nature of the testimony, we determine those arguments go to the proper weight to be afforded the testimony. In an *inter partes* review in which we both decide admissibility and serve as the fact-finder, we are well-positioned to determine and assign appropriate weight to evidence presented, and we recognize that a complete record of the evidence is preferable to facilitate public access as well as appellate review. *See, e.g.*, *Sony Computer Entm't Am. LLC v. Game Controller Tech. LLC*, IPR2013-00634, Paper 32 at 31 (PTAB Apr. 14, 2015). Cognizant of all of Patent Owner's concerns about Mr. Chambers' background and testimony, we have given his testimony appropriate weight when weighing the record evidence.

B. EXHIBIT 1049

Exhibit 1049 is a transcript of a deposition of Dr. Wooley. Patent Owner argues that

> the cited portions of Dr. Wooley's deposition transcript . . . contain irrelevant information that is beyond the scope of the Petition. Even if it were relevant (it is not), the information is unfairly prejudicial, confusing, misleading to the fact finder, a waste of time and/or cumulative, and should be excluded.

PO Mot. Excl. 8. Patent Owner argues that Petitioner cites Dr. Wooley's testimony to support new positions not presented in the Petition or in Mr.

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Chambers' first Declaration. *Id.* Patent Owner also objects that the portions of Dr. Wooley's deposition testimony are "irrelevant to the Petition, confusing and/or misleading to the fact finder, and should be excluded." *Id.* at 8.

Petitioner responds that it used Dr. Wooley's deposition testimony to demonstrate Dr. Wooley had less experience than Mr. Chambers, to show Dr. Wooley received a lot of money from Patent Owner for his opinions, and to assail Dr. Wooley's credibility. Opp. PO Mot. Excl. 9–10. Petitioner also argues that Patent Owner's Motion to Exclude does not identify Petitioner's allegedly "new positions," much less explain how it is true that Petitioner cited Dr. Wooley's deposition testimony in support of those "new positions." *Id.* at 10–11.

In reply, Patent Owner maintains that "[t]he testimony Petitioner cited is irrelevant, and the confusing, misleading nature outweighs any purported probative value." Reply PO Mot. Excl. 4. For instance, Patent Owner argues that "Dr. Wooley provided the full technical services reflected by his fees. Moreover, his fees were reasonable given the scope of his work and his experience." *Id.*

Patent Owner's concerns do not warrant excluding any of Exhibit 1049. Patent Owner's arguments go to the proper weight to be afforded Dr. Wooley's deposition testimony. Cognizant of all of Patent Owner's concerns about Dr. Wooley's deposition testimony, we have given his testimony appropriate weight when weighing the record evidence.

C. EXHIBIT 1051

We do not rely on Exhibit 1051. Therefore, we dismiss as moot Patent Owner's request to exclude this exhibit.

VI. MOTIONS TO SEAL

The parties filed a number of unopposed Motions to Seal. Papers 4, 5, 12, 33, 41, 43, 54. In connection with these, the parties have submitted a copy of the Board's default protective order. *E.g.*, Paper 4, 1. We find the Motions to Seal persuasive. Accordingly, we grant them, and we enter the accompanying protective order in this proceeding.

VII. ANALYSIS

A. LEVEL OF SKILL

Petitioner asserts that one of ordinary skill in the art "would have been a person with a bachelor of science degree in mechanical or petroleum engineering or a similar technical discipline, with at least five years of experience in oil or gas well drilling, completion, and/or subsurface production operations or in technical support of such operations." Pet. 35–36 (citing Ex. 1002 ¶ 41). Petitioner also indicates that "[a]dditional education in a relevant technical discipline can compensate for less experience in the relevant field and vice versa." *Id.* at 36.

Patent Owner states that its "analysis assumes the level of ordinary skill Dr. Wooley articulated, . . . which comports with that asserted by Petitioner's expert Mr. Chambers." PO Resp. 23 (citing Ex. 1002 ¶ 41; Ex. 2006 ¶¶ 25–27). Patent Owner "agrees with the degree qualifications and the experience level for oil or gas well drilling." *Id.*

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Patent Owner disputes the "remaining portions" of Petitioner's proposed level of skill because those portions are "far too broad, and show a misunderstanding about the technology at issue." *Id.* at 23. According to Patent Owner, "[a]t the time of the invention, solid expandables was a drilling technology," and "an engineer having experience in 'completion, and/or subsurface production operations or in technical support of such operations,' especially at the time of the invention in the late 1990s, would lack sufficient relevant knowledge about drilling, the problems associated with 'nested' casing, and how they could be solved." *Id.* at 23–24.

Patent Owner argues that Petitioner's declarant "is an experienced engineer when it comes to conventional operations (*i.e.*, after drilling is done and the well needs to be 'completed' so it can begin producing oil or gas)" but "lacks the appropriate insight of a [person of ordinary skill in the art] regarding drilling technology at the time of the invention." PO Resp. 24. Patent Owner contends that Petitioner's declarant conflates the term "expandables" as used during the relevant time to include both conventional operations and drilling and inappropriately mixes the term. *Id.* at 24(citing Ex. 2007 ¶¶ 48–50).

Petitioner replies that its declarant "has extensive prior experience with both drilling and expandables" with citations to the record. Pet. Reply 3 (citing Ex. 1002 ¶¶ 7, 12, 13, 16–18; Ex. 1048 ¶¶ 5–7). [redacted]

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Patent Owner replies that its declarant's "experience in oil drilling is vastly more substantial than undergraduate summer internships" and lists other work he has done. PO Sur-reply 3. Regarding Patent Owner's declarant's involvement in prior litigation, Patent Owner argues that, "given his experience and knowledge of the technology and the intrinsic," his "inclusion is this proceeding is common sense." *Id.* (citing Pet. Reply 9). Patent Owner also argues that Petitioner's declarant testimony "cannot make up for the substantial missing elements." *Id.* at 4.

In determining the level of ordinary skill in the art, various factors may be considered, including the "type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field." *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (internal quotation marks omitted).

The full record makes clear that the parties do not dispute the portion of Petitioner's proposed level of ordinary skill regarding education and years of experience. Pet. 35–36; PO Resp. 23; Ex. 1002 ¶ 41; Ex. 2008 ¶¶ 25–27. Regarding the parties' dispute over relevant experience, a paper titled "Towards a Mono-Diameter Well – Advances in Expanding Tubing Technology" indicates in a section directed to "Markets and Applications," that "[e]xpanding tubing can be applied in three markets or application segments" that include "Remediation," "Wellbore Construction," and "Completions." Ex. 1037, 2; *see also id.* at 2–3 (describing "[t]he development of expandable tubing technology towards the mono-diameter well").

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In view of the above, we agree with Petitioner that one of ordinary skill in the art would have had "experience in oil or gas well drilling, completion, and/or subsurface production operations or in technical support of such operations." Pet. 35–36; Ex. 1002 ¶ 41. Weighing the parties' arguments and cited evidence, we determine that one of ordinary skill in the art would have had Petitioner's asserted experience and that experience does not need to be narrowed in the manner argued by Patent Owner. Pet. 35–36; PO Resp. 23–25; Ex. 1037, 2; Ex. 2006 ¶¶ 25–27.

Thus, we determine that one of ordinary skill in the art would have had "a bachelor of science degree in mechanical or petroleum engineering or a similar technical discipline, with at least five years of experience in oil or gas well drilling, completion, and/or subsurface production operations or in technical support of such operations" and that "[a]dditional education in a relevant technical discipline can compensate for less experience in the relevant field and vice versa." Pet. 35–36; Ex. 1002 ¶ 41; Ex. 2006 ¶¶ 25–27. This level of skill in the art is consistent with the disclosure of the '616 patent and the prior art of record. *GPAC*, 57 F.3d at 1579.

B. CLAIM INTERPRETATION

In an *inter partes* review proceeding, a claim of a patent is construed using the same standard used in federal district court, including construing the claim in accordance with the ordinary and customary meaning of the claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. § 42.100(b) (2021). According to the applicable standard, claim terms "are generally given their ordinary and customary meaning" as understood by a person of ordinary skill in the art in

question at the time of the invention. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc). "In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence." *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17). Extrinsic evidence is "less significant than the intrinsic record in determining 'the legally operative meaning of claim language.'" *Phillips*, 415 F.3d at 1317. Only those terms that are in controversy need be construed, and only to the extent necessary to resolve the controversy. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (citing *Vivid Techs., Inc. v. American Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

The parties raise issues regarding various aspects of the meanings of multiple portions of claim 1. *E.g.*, Pet. 45–49; PO Resp. 25–49; Pet. Reply 4–18; PO Sur-reply 4–18. In order to resolve the parties' dispute regarding the patentability of claims 1 and 5, we need to address the proper construction of limitation 1[d].

Patent Owner contends that limitation 1[d]'s recitation of "radially expanding the tubular member into contact with the preexisting structure" means "radially expanded and **plastically deformed** into **direct contact** with the preexisting structure." PO Resp. 27. Patent Owner also presents a narrower interpretation, arguing that limitation 1[d] "requires the portions of the tubular member within the preexisting structure are radially expanded

and plastically deformed into **direct** continuous contact with the preexisting structure." *Id.*

The key issue relates to Patent Owner's position that the tubular member must be radially expanded "into direct contact" or "into direct continuous contact" with the preexisting structure.[12] Patent Owner reads these constructions narrowly, as reflected in its arguments regarding the asserted prior art and limitation 1[d]. For example, Patent Owner argues that, in the prior art, the presence of elastomers, ribs, or an annulus where the radially expanded tubular member interfaces with the preexisting structure does not meet limitation 1[d]. *E.g., id.* at 59–64. Thus, Patent Owner appears to understand limitation 1[d] as excluding any separation of any metal portion of the tubular member from the adjacent preexisting structure. Petitioner disagrees. *E.g.*, Pet. Reply 5–12, 19–21. We turn now to the details of this dispute.

1. *The Parties' Arguments*

In the Petition, Petitioner indicates that limitation 1[d] "should be given [its] plain meaning in light of the specification." *See* Pet. 45. Additionally, addressing claim 1's preamble, the Petition discusses certain disclosures of the '616 patent regarding radially expanding a tubular member into contact with a preexisting structure, likening those disclosures to those of the prior art. *Id.* at 51–52.

In its Response, Patent Owner argues that "Petitioner improperly asserts the Board should import unclaimed elements into Challenged

[12] Resolution of the parties' patentability dispute does not turn on Patent Owner's addition of the language "plastically deformed."

Claims 1 and 5." PO Resp. 1. According to Patent Owner, "Petitioner's basis for importing an elastomer into the claims is a single embodiment in the Specification." *Id.* Patent Owner asserts that "a single embodiment reflected in a single figure is not sufficient basis to import an unrecited limitations into claims." *Id.* (citing *Williamson v. Citrix Online, LLC*, 793 F.3d 1339, 1346–47 (Fed. Cir. 2015)). Patent Owner argues that "[u]nlike systems known in the art, the expanded portions of the tubular member in the '616 Patent do not rely on ribs or elastomerics to contact the preexisting structures." *Id.* at 22.

Patent Owner contends that "[t]he proper meaning of the term 'into contact with,' when read in the context of the Patent as a whole, requires the portions of the tubular member within the preexisting structure are radially expanded and plastically deformed into **direct** continuous contact with the preexisting structure." *Id.* at 27 (emphasis in original) (citing Ex. 2006 ¶ 84). Patent Owner elaborates that "[t]he '616 Patent sought to resolve, among other things, the loss of internal diameter in a wellbore as successive liners and casings were installed." *Id.* (citing Ex. 1001, 10:14–33). According to Patent Owner "[t]he technology is most effective, when there is no material preventing the expandable tubular from contacting the existing casing." *Id.* at 28 (citing Ex. 2006 ¶ 95). After discussing prior art approaches to the problem of decreasing diameter in wellbores (*id.* at 28–30), Patent Owner argues that "[t]he '616 Patent and the recited claims provide for expanding tubulars into direct contact with the preexisting structure, establishing an internal diameter substantially equal to that of the preexisting structure" (*id.* at 30 (citing Ex. 2006 ¶ 109)).

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Patent Owner argues that claim 1 does not recite the word "seal." *Id.* Patent Owner argues Mr. Chambers points to the term "coupling" in claim 1's preamble in an attempt to inject a seal into claim 1. *Id.* at 30–31 (citing Ex. 2008, 33:18–34:10).

Citing Mr. Chambers' deposition testimony, Patent Owner argues that Mr. Chambers relied on the '616 patent's Figures 1 and 1*a*–1*c* "for a sealing/coupling element," but could not "identify in those figures the coupling/seal elements positioned between the expandable tubular and the preexisting structure." *Id.* at 31–32 (citing Ex. 2008, 36:25–38:6, 47:22–49:25). Patent Owner argues that "Figure 1a **doesn't show** coupling elements between the expandable tubular and a preexisting casing, and Figures 6a through 6c **don't show** coupling elements or elastomeric materials." *Id.* at 32 (emphases in original).

Patent Owner contends that the Specification "expressly describ[es] **all** embodiments with a liner hanger (expandable tubular member 105 that is expanded into direct continuous contact with the preexisting structure, either a wellbore or casing." *Id.* at 33–34 (citing Ex. 1001, 10:45–48, 14:44–49, 15:30–35). Patent Owner contends that the '616 patent's Figure 6a shows that "it is the expanded tubular member 105 that comes into direct contact with the interior surface of the wellbore 220." *Id.* at 36 (citing Ex. 2006 ¶¶ 111–112). Patent Owner argues that Figure 7a also "show[s] the expandable tubular member 105 **in direct contact** with the wellbore 220 (*i.e.*, no intervening components)." *Id.* at 36 (emphasis in original) (citing Ex. 2006 ¶¶ 113–114). Patent Owner adds that "those sections of the tubular hanger

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joint do not include coupling elements (105ca, 105cd) or sealing members 105fa and 105fb." *Id.* (citing Ex. 2006 ¶ 114).

Petitioner responds that "[g]iven the clarity of the claim language, [it] should be given its plain and ordinary meaning." Pet. Reply 4. Petitioner notes the claim does not include the word "direct." *Id.* at 5.

Petitioner adds that "the specification broadly recites 'into contact with' and never mentions 'direct contact.'" *Id.* (citing Ex. 1001, 10:45–47, 11:12–14, 14:47–49, 15:30–33). Petitioner asserts that "Dr. Wooley conceded at his deposition that every '616 embodiment includes tubulars with either coupling elements or sealing members between ribs—the very features [Patent Owner] hopes to exclude with its construction." *Id.* (citing Ex. 1050, 13:11–14:15, 24:8–18, 27:18–28:2, 28:17–25, 29:14–23, 36:15–38:10, 39:11–40:7). Petitioner argues that "Dr. Wooley admitted that none of the embodiments disclosed in the '616 Patent would satisfy his narrow interpretation of claim 1." *Id.* at 6 (citing Ex. 1050 41:6–17). Thus, "Dr. Wooley's construction . . . cannot be correct," Petitioner asserts. *Id.* at 6–7 (citing *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1583 (Fed. Cir. 1996)).

Petitioner notes that "the '616 Patent teaches an embodiment in Figure 2a that expressly includes elastomeric sealing members 105fa and 105fb." *Id.* at 8 (citing Ex. 1001, 14:50–57; Inst. Dec. 9, 31). Petitioner adds that "Figures 3-7 include the same sealing members because they depict the same structure as Figure 2a." *Id.* (citing Ex. 1001, 11:29–43, Figs. 3a, 4a, 5a, 6a, 7a; Ex. 1050, 24:8–18, 27:18–28:2, 28:17–25, 29:14–23, 36:15–38:10, 39:11–40:7). Accordingly, Petitioner argues, "the '616 Patent

contradicts [Patent Owner's] interpretation of 'direct' contact and does not disclose that such 'direct' contact solved any problems stemming from sealing elements that are part of the expandable tubular." *Id.* at 8–9.

Asserting that Patent Owner ultimately has only Dr. Wooley's declaration testimony on its side, Petitioner argues "that testimony is not credible." *Id.* at 9. Petitioner argues that Dr. Wooley does not adequately support his declaration testimony. *Id.* Indeed, Petitioner argues, the objective evidence and Dr. Wooley's own deposition testimony contradict his declaration testimony. *Id.* at 9–12.

Patent Owner replies that "[c]laim 1 does not recite an elastomeric component, and the '616 Patent is directed to an improved tubular that does not rely on an elastomeric component." PO Sur-reply 1. Patent Owner argues that "[i]t is irrelevant that the specification may or may not contain the phrase 'direct contact.'" *Id.* at 5. Patent Owner reiterates that "the '616 Patent sought to resolve, among other things, the loss of internal diameter in a wellbore as successive liners and casings were installed." *Id.* Patent Owner argues that anything "added to the annular space between a liner top and existing casing" unavoidably increases the liner's inside diameter. *Id.* at 5–6. Patent Owner reiterates that "the specification expressly describes **preferred** embodiments with a liner hanger (expandable tubular member 105) that is expanded into direct contact with the preexisting structure, either a wellbore or casing." *Id.* at 6 (emphasis in original).

Additionally, Patent Owner contends that Petitioner misrepresents Dr. Wooley's deposition testimony. *Id.* at 7–8. Patent Owner asserts that Dr. Wooley qualified his statements and "never admitted that none of the

embodiments are covered by [Patent Owner's] construction of the claim term." *Id.* at 7. Patent Owner cites Dr. Wooley's deposition testimony that "[y]ou're asking if, indeed, the embodiment in Figure 1a satisfies Claim 1 and if it indeed applies the method of Claim 1 to that embodiment. The answer is yes. It's in contact with the preexisting structure without anything in between the two." Ex. 1050, 19:17–23; PO Sur-reply 7.

Finally, Patent Owner argues that

> [w]hile certain embodiments and certain figures may include a sealing member or coupling element, those are not limiting. Indeed, as mentioned above, the '616 Patent describes a preferred embodiment as having the tubular member "expanded into contact with the interior surface of the wellbore." EX1001, 15:30-35. Interceding elastomers and coupling elements, while part of some embodiments, do not allow the tubular member to be expanded into contact with the interior surface. Only direct continuous contact between the tubular and the wellbore (or preexisting structure) would satisfy this preferred embodiment.

PO Sur-reply 8.

2. *Analysis*

To resolve the parties' claim-construction dispute, we first look to the claim language itself. Limitation 1[d] recites, in relevant part, "radially expanding the tubular member into contact with the preexisting structure." Ex. 1001, 17:22–26. The plain and ordinary meaning of this language is radially expanding the tubular member with the result that the tubular member is in contact with the preexisting structure. The plain and ordinary meaning of the claim language does not require any particular type or extent of contact between the tubular member and the preexisting structure. Patent Owner's proposal to rewrite "into contact with the preexisting structure" as

"into direct continuous contact with the preexisting structure" deviates from the plain and ordinary meaning of the claim language. *See* PO Resp. 27.

Additionally, the claim language's plain and ordinary meaning comports with Petitioner's position that the tubular member may include external structures, such as external elastomers, sealing members, coupling elements, or ribs, in contact with the preexisting structure after radial expansion. *E.g.*, Pet. 50–52, 57–58; Pet. Reply 5–12, 19–21. This position does not "import unclaimed elements into the claims," as Patent Owner contends. *E.g.*, PO Resp. 26, 30–33. For example, contrary to Patent Owner's suggestion, the claim's silence regarding external seals does not convey that the tubular member cannot have them; it only conveys that the tubular member does not necessarily have them. *See id.* at 30 ("Notably, claim 1 does not include the word 'seal' in the body of the claim or in the preamble.").

We turn next to the Specification and drawings. This evidence does not support Patent Owner's position that the proper claim construction excludes any separation of any metal portion of the tubular member from the adjacent preexisting structure. To the contrary, the Specification and drawings support Petitioner's position that the proper claim construction encompasses embodiments in which at least some metal of the tubular member is separated from the adjacent preexisting structure, such as by coupling elements and/or ribs.

For example, Petitioner persuades us that the Detailed Description and drawings of the '616 patent exclusively disclose using a tubular member that includes either external coupling elements or external sealing members

between ribs. Pet. Reply 5–12. Petitioner also persuades us that the Detailed Description and drawings convey radially expanding such external coupling elements and sealing members between ribs into contact with the adjacent preexisting structure. *Id.*

In support of its contrary position, Patent Owner cites the '616 patent's Figures 6*a* and 7*a*. PO Resp. 33–36. Patent Owner argues that Figure 7*a* shows portions of tubular member 105 contacting wellbore 220. *Id.* at 36 (citing Ex. 2006 ¶¶ 113–114). Patent Owner contends that the contacting portions "do not include coupling elements (105ca, 105cd) or sealing members 105fa and 105fb." *Id.* (citing Ex. 2006 ¶ 114).

The disclosures of the '616 patent and Dr. Wooley's deposition testimony belie Patent Owner's position. As noted above, when discussing Figure 2*a*, the '616 patent discloses that

> intermediate section l05*c* of the tubular hanger joint 105 includes sealing members, 105*fa* and 105*fb*, positioned between corresponding pairs of ribs, 105*gaa* and 105*gba,* and 105*gab* and 105*gbb*, respectively, for sealing the interface between the intermediate section of the tubular hanger joint and another preexisting structure. In an exemplary embodiment, the ribs, 105*gaa*, 105*gba*, 105*gab*, and 105*gbb*, are formed integrally to the intermediate section 105*c* of the tubular hangar joint 105.

Ex. 1001, 14:50–60. This passage discloses that sealing members 105*fa* and 105*fb* and ribs 105*gaa*, 105*gba*, 105*gab*, and 105*gbb* are part of tubular member 105.

Petitioner persuades us that "Figures 3-7 include the same sealing members because they depict the same structure as Figure 2a." Pet. Reply 8. In his deposition, Dr. Wooley testified that Figures 3*a*–3*d* show the same tubular hanger as Figures 2*a*–2*d*. Ex. 1050, 27:18–21. He also agreed that

the '616 patent discloses that Figures 4*a*–4*d* "are fragmentary cross-sectional illustrations of the release of the top SSR plug from the apparatus of Figures 3a-3d." Ex. 1001, 11:32–34; Ex. 1050, 28:8–16. He further agreed that the '616 patent discloses that Figures 5*a*–5*d* "are fragmentary cross-sectional illustrations of the initiation of the radial expansion process for the apparatus of [Figures] 4a-4d." Ex. 1001, 11:35–37; Ex. 1050, 29:6–13. Additionally, he acknowledged that the '616 patent discloses Figures 6*a*–6*c* "are fragmentary cross-sectional illustrations of the continuation of the radial expansion process for the apparatus of [Figures 5a–5c]." Ex. 1001, 11:38–40; Ex. 1050, 33:22–34:9. He also testified that Figure 7*a* shows the same apparatus as Figure 6*a* "[f]ollowing drill-out of the collar," acknowledging the '616 patent's disclosure that Figures 7*a*–7*c* "are fragmentary cross-sectional illustrations of the drilling out of the collar upon completion of radial expansion process for the apparatus of Figures 6a-6c." Ex. 1001, 11:41–3; Ex. 1050, 38:21–39:4.

Consistent with these statements, when asked if Figures 3*a*, 4*a*, 5*a*, 6*a*, and 7*a* show the same sealing members that Figure 2*a* does, Dr. Wooley indicated he believes they do. Ex. 1050, 27:22–28:2, 28:17–25, 29:14–23, 36:15–38:10, 39:11–40:7. He did so, for example, in the following exchange regarding Figure 3*a*:

> Q. And looking at Figure 3a in the '616 Patent, you can see the sealing members, which are depicted as dark lines on the outside diameter of the intermediate section 105c of the tubular liner hanger 105; correct?
>
> A. That appears to be correct, yes.

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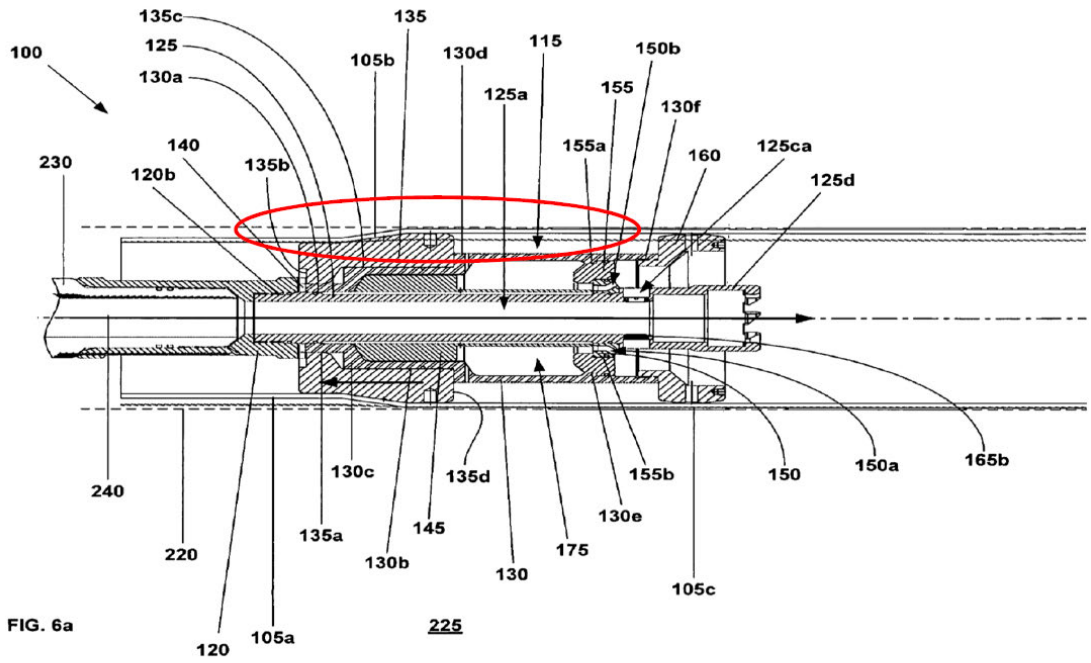
Id. at 27:22–28:2. Accordingly, we find that the '616 patent discloses, in connection with Figures 2*a*, 3*a*, 4*a*, 5*a*, 6*a*, and 7*a*, tubular member 105 having external sealing members and ribs.

Petitioner further persuades us that the '616 patent discloses radially expanding the same tubular member 105 and its external sealing members and ribs into contact with the adjacent preexisting structure. Pet. 51–52; Pet. Reply 5–13. As Petitioner argues, Dr. Wooley conceded in his deposition that Figure 6*a* shows sealing members and ribs expanded into contact with wellbore 220. Ex. 1050, 38:3–10.

Petitioner explains that an annotated version of Figure 6a in Dr. Wooley's Declaration comports with Dr. Wooley's deposition testimony that the '616 patent discloses radially expanding the sealing members and ribs of tubular member 105 into contact with wellbore 220. Pet. Reply 11. The annotated version of Figure 6*a* in Dr. Wooley's Declaration is reproduced below.

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EX1001, FIG. 6a (annotated)

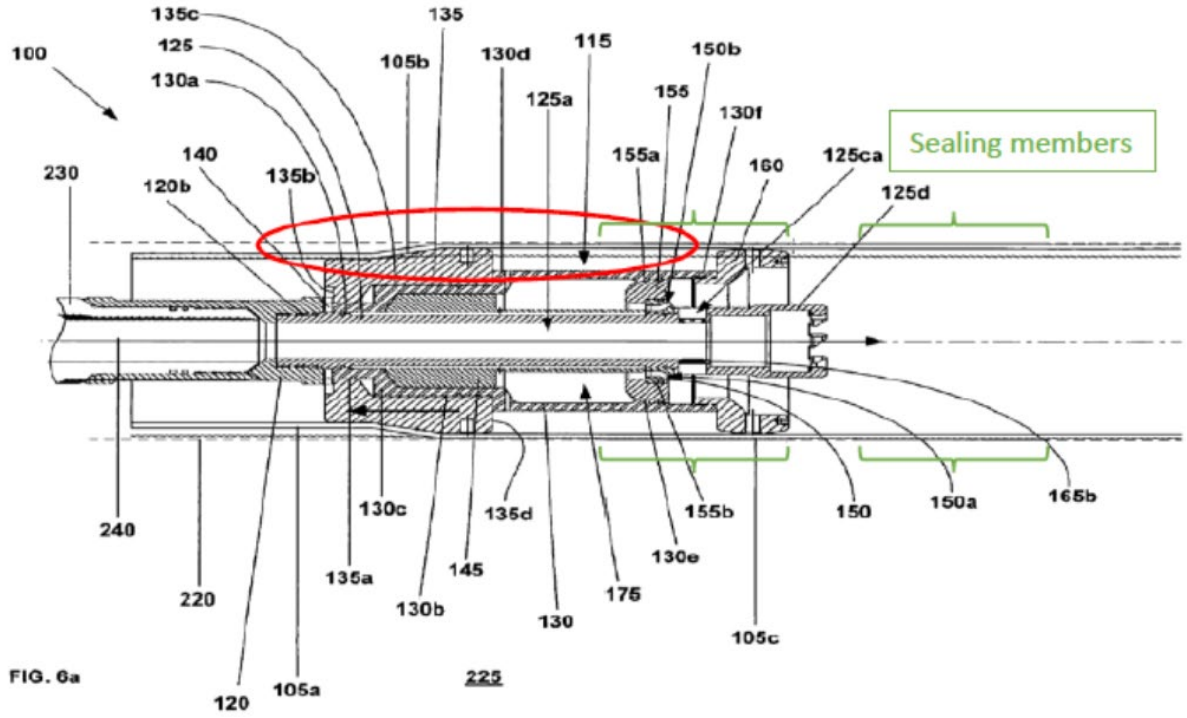
Dr. Wooley's annotated version of Figure 6*a* is annotated with a red oval surrounding a portion of the drawing. Ex. 2006 ¶ 110. Dr. Wooley explains that "[d]uring the expansion process depicted in Figure 6a, the expandable tubular member 105 is '**radially expanded into contact with the interior surface** of the wellbore 220, or other tubular members such as, for example, a wellbore casing, a pipeline, or a structural support.'" *Id.* ¶ 111 (quoting Ex. 1001, 15:28–35). Dr. Wooley elaborates that "[a]s shown in Figure 6a, and highlighted by the [red oval], it is the expanded tubular member 105 that comes into direct contact with the interior surface of the wellbore 220." *Id.* ¶ 112.

Petitioner explains that Dr. Wooley's red oval surrounds a portion of a solid line that shows a sealing member in contact with wellbore 220. Pet. Reply 11–12. Petitioner illustrates this by further annotating Dr. Wooley's

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annotated version of Figure 6a. *Id.* Petitioner's further-annotated version of Figure 6a is reproduced below.



Petitioner's further-annotated version of Figure 6*a* adds green annotations to identify the solid lines that Petitioner contends show sealing members in contact with wellbore 220. *Id.* at 11. Petitioner persuades us that, consistent with Dr. Wooley's deposition testimony, the red oval Dr. Wooley used to identify where tubular member 105 contacts wellbore 220 surrounds part of a solid line showing a sealing member contacting wellbore 220. This comports with the '616 patent's description of the purpose the sealing members serve: "tubular hanger joint 105 includes sealing members, 105*fa* and 105*fb* . . . for sealing the interface between the intermediate section of the tubular hanger joint and another preexisting structure such as, for example, a wellbore casing." Ex. 1001, 14:51–57; Pet. 51–52. In order to

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serve this purpose, the sealing members seemingly would contact the adjacent preexisting structure.

Additionally, Petitioner persuades us that the sealing members contact the adjacent preexisting structure as a result of radially expanding tubular member 105. In his deposition, Dr. Wooley testified that figures showing tubular member 105 prior to radial expansion illustrate the solid lines showing the sealing members spaced from adjacent portions of wellbore 220. Ex. 1050, 25:10–25, 27:18–28:6, 29:1–5. For example, Dr. Wooley agreed that Figure 2*a* includes "a discernable space between the sealing members and the wellbore 220." *Id.* at 25:23–25. This comports with the '616 patent's disclosures that "tubular member 105 may be radially expanded into contact with the preexisting wellbore casing" (Ex. 1001, 14:48–49; Pet. 51–52) and that "the expansion cone liner 110 and expandable tubular member 105 are radially expanded into contact with the interior surface of the wellbore 220" (Ex. 1001, 15:30–35). Facially, these statements disclose radially expanding all portions of tubular member 105, including its sealing members and ribs, into contact with the preexisting structure.

The '616 patent similarly conveys that the method involves radially expanding all portions of tubular member 105 in other statements. For example, the '616 patent does so in the disclosure that

> [t]he intermediate section 105c preferably further includes radially directed coupling elements 105ca-105cd affixed to the outside surface of the intermediate section 105c ***for enhancing the connection of the tubular hanger joint 105 to a preexisting structure following the radial expansion of the tubular hanger joint*** using the apparatus 100.

Ex. 1001, 12:2–8 (emphasis added). As Petitioner explains, this passage conveys that "the 'radially directed coupling elements' enhance the connection to the preexisting structure ***after radial expansion*** because they are expanded into contact with the preexisting structure." Pet. Reply 10. The intrinsic evidence contradicts Dr. Wooley's conclusory testimony in his Declaration that

> [t]he only portions of the tubular described in the '616 Patent that are expanded are those with a smaller diameter: first and second sections 105a and 105e, respectively, transition sections 105b and 105d, and an upper portion 110a of the expansion launcher. *Id.*, 11:60-12:19. As such, it is those sections that are expanded "into contact" with the preexisting structure.

Ex. 2006 ¶ 108.

In concert with the foregoing issues, we have also considered Patent Owner's argument that the '616 patent's stated objectives preclude any separation of metal portions of a tubular member from the preexisting structure, such as by external elastomers, seals, coupling elements, and/or ribs and coupling elements that get radially expanded into contact with the adjacent preexisting structure. PO Resp. 13–18, 27–30, 35–38. We do not agree with this argument. Indeed, as explained above, the Detailed Disclosure and drawings exclusively disclose using a tubular member with either external coupling elements or external sealing members between ribs that get radially expanded into contact with the preexisting structure. This disclosure of using either coupling elements or external sealing members between ribs demonstrates that such an approach comports with the '616 patent's goals, including avoiding large differences in successive tubulars' diameters. Ex. 1001, 10:10–36. It also demonstrates that the disclosure of

the '616 patent does not exclude any separation of any metal portion of the tubular member from the adjacent preexisting structure in order to "establish[] an internal diameter substantially equal to that of the preexisting structure." PO Resp. 30. Indeed, it conveys the opposite: that some separation of metal portions of the tubular member from the adjacent preexisting structure and some corresponding loss of diameter does not conflict with the objective of avoiding large differences in diameter. Consistent with this, Dr. Wooley testified that he does not understand limitation 1[d] to require "continuous contact." Ex. 1050, 63:18–64:6.

Patent Owner's counter arguments about Dr. Wooley's deposition testimony do not persuasively rebut Petitioner's evidence and arguments. For example, Patent Owner's objection that "Dr. Wooley qualified" his testimony is unavailing. PO Sur-reply 7. On the whole, the cited testimony demonstrates that, in the candid setting of a deposition, Dr. Wooley agreed with Petitioner's reading of the '616 patent's disclosure, regardless of whether he was absolutely certain. We find the disclosures and the drawings of the '616 patent consistent with Dr. Wooley's deposition testimony that the portions of the '616 patent related to Figures 2*a*–2*d*, 3*a*–3*d*, 4*a*–4*d*, 5*a*–5*c*, 6*a*–6*c*, and 7*a*–7*c* consistently disclose tubular member 105 including sealing members between ribs. *See, e.g.*, Ex. 1001, 11:26–43, 14:50–60, Figs. 2*a*, 3*a*, 4*a*, 5*a*, 6*a*, 7*a*. The intrinsic evidence does not support Patent Owner's counter arguments.

Additionally, we find unavailing Patent Owner's argument that Dr. Wooley views the '616 patent's discussion of Figures 1 and 1*a*–1*d* as representative of the claimed subject matter. PO Sur-reply 7 (citing

Ex. 1050, 19:17–23). Dr. Wooley's testimony on this matter is less clear than Patent Owner suggests, as he waffled about whether an embodiment with coupling elements would satisfy claim 1. Ex. 1050, 19:17–23:8. Moreover, even if we agreed with Patent Owner's position that Figures 1 and 1*a*–1*d* satisfy Patent Owner's proposed claim construction, this argument would still be unavailing. This argument implies that we should construe claim 1 as encompassing Figures 1 and 1*a*–1*d*, but excluding Figures 2*a*–2*d*, 3*a*–3*d*, 4*a*–4*d*, 5*a*–5*c*, 6*a*–6*c*, and 7*a*–7*c*. Neither Patent Owner nor Dr. Wooley provides a persuasive basis to construe claim 1 as excluding the subject matter of the bulk of the Detailed Description and drawings.

Also, the portions of Mr. Chambers' deposition cited by Patent Owner do not contradict the Specification, drawings, and Mr. Wooley's deposition testimony about them. Mr. Chambers' deposition testimony confirms that the claim language itself does not use the word "seal." Ex. 2008, 33:18–34:10. Additionally, Mr. Chambers' deposition testimony establishes that the '616 patent does not say expressly that "coupling elements" constitute "seals." *Id.* at 38:9–15. Aside from demonstrating those two things, the cited portions of Mr. Chambers' deposition lack sufficient clarity to support Patent Owner's assertions about it. *See* PO Resp. 30–32; Ex. 2008, 32:12–35:18, 36:25–38:6, 38:9–15, 47:22–49:25.

We next consider the prosecution history of the '616 patent. Neither party argues that anything in the prosecution history affects the proper claim construction.

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On the whole, the intrinsic evidence is clearly at odds with the position of Patent Owner and Dr. Wooley's declaration testimony that the correct claim construction excludes separation of any metal portion of the tubular member from the adjacent preexisting structure, such as by external elastomeric seals. We find this especially so, given that Dr. Wooley provides limited objective support for many of his opinions. For example, Dr. Wooley does not cite objective support for his opinion that "[t]he '616 Patent overcomes this issue in the prior art by removing the component/layer, such as an elastomeric seal, between an expandable tubular and a preexisting casing, to enable direct contact between the two and recovering the otherwise sacrificed internal diameter." Ex. 2006 ¶ 99. Indeed, as discussed above, Dr. Wooley's deposition testimony contradicts his Declaration.

We also find that Patent Owner's arguments about other extrinsic evidence does not persuasively rebut Petitioner's arguments about the intrinsic evidence. For example, in view of the ample intrinsic evidence supporting Petitioner's claim-construction position, we find unavailing Patent Owner's suggestion that the disclosures of prior art references support its claim-construction position. PO Resp. 28–30, 34–35.

We conclude that limitation 1[d] requires what it recites: "radially expanding the tubular member into contact with the preexisting structure." Ex. 1001, 17:22–23. The evidence does not support Patent Owner's various claim-construction positions. The evidence does not support rewriting the claim to require radially expanding the tubular member "into direct contact" or "direct continuous contact." Nor does the evidence support a construction

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that excludes any separation of any metal portion of the tubular member from an adjacent portion of the preexisting structure.

C. GROUND 1 – ALLEGED ANTICIPATION BY SPE 59151

1. *Overview of SPE 59151*

SPE 59151 discusses an "expandable-liner-hanger system." Ex. 1003, 2. SPE 59151 discloses that the system includes "an expandable-liner-hanger joint," "an expandable-liner-hanger running tool," "a cementing wiper-plug system," and "a crossover sub from the expandable-liner-hanger joint to the liner." *Id.* SPE 59151 elaborates that

> The expandable-liner-hanger joint is machined from 4140-grade materials. Several bands of elastomeric material are coated to the joint, with the bands being separated by ribs that are an integral part of the hanger body (**Fig. 6**). When the liner hanger is expanded, the elasotomer provides the primary anchoring force for the hanger and attached liner, with the ribs furnishing a secondary anchoring force (**Fig. 7**).

Id. Figure 6 is reproduced below.



Fig. 6—When the expandable hanger joint is expanded, the elastomer coating on the joint provides a hydraulic seal and helps anchor the liner system to the previous casing string.

Figure 6 provides one view of SPE 59151's expandable liner hanger. *Id.* at 8.

In providing a summary of expandable-tubular technology, SPE 59151 explains the process of expanding the tubulars by stating that "[h]ydraulic pressure applied directly to the pig, or a pushing or pulling

force applied through the workstring attached to the pig, propels the pig through the pipe, thereby deforming the pipe's metal into its plastic region." *Id.* at 2. SPE 59151 describes its "running sequence for the expandable-liner-hanger system" as follows:

1. Make up cement float shoe to liner, run in liner to total length of liner required, and hang off liner in slips.
2. Install a swivel and dual-wiper-plug set onto expandable-liner-hanger running tool. Use PBR option as required.
3. Install crossover sub between conventional liner casing and expandable-liner-hanger running tool.
4. Make up liner to expandable- liner-hanger running tool.
5. Make up workstring to expandable-liner-hanger running tool
6. Run assembly in hole to setting depth. Rotate and circulate as required.
7. Drop sealing dart for drilling-fluid wiper plug.
8. Displace required cement volume and drop sealing dart for cement wiper plug
9. Drop primary setting ball into running tool.
10. Increase pressure to shear pins in crossover ports and divert flow into flow paths to pig. (Note: Three crossover ports provide triple redundant fluid flow for setting operation.)
11. Pressure up until pig propagation pressure is obtained.
12. Maintain expansion pressure and clad liner hanger to previous string of casing.
    - Observe pressure readout on surface pumping unit for indications of cladding.
    - Note that full travel of the pig mandrel will result in a shifting of the bypass port and a consequent pressure drop.
13. Set down on workstring to release running tool.

14. Pressure test liner-top seal.
15. Pull out of hole with running tool (**Fig. 13**).

Id. at 3–4. Figure 12 is reproduced below.

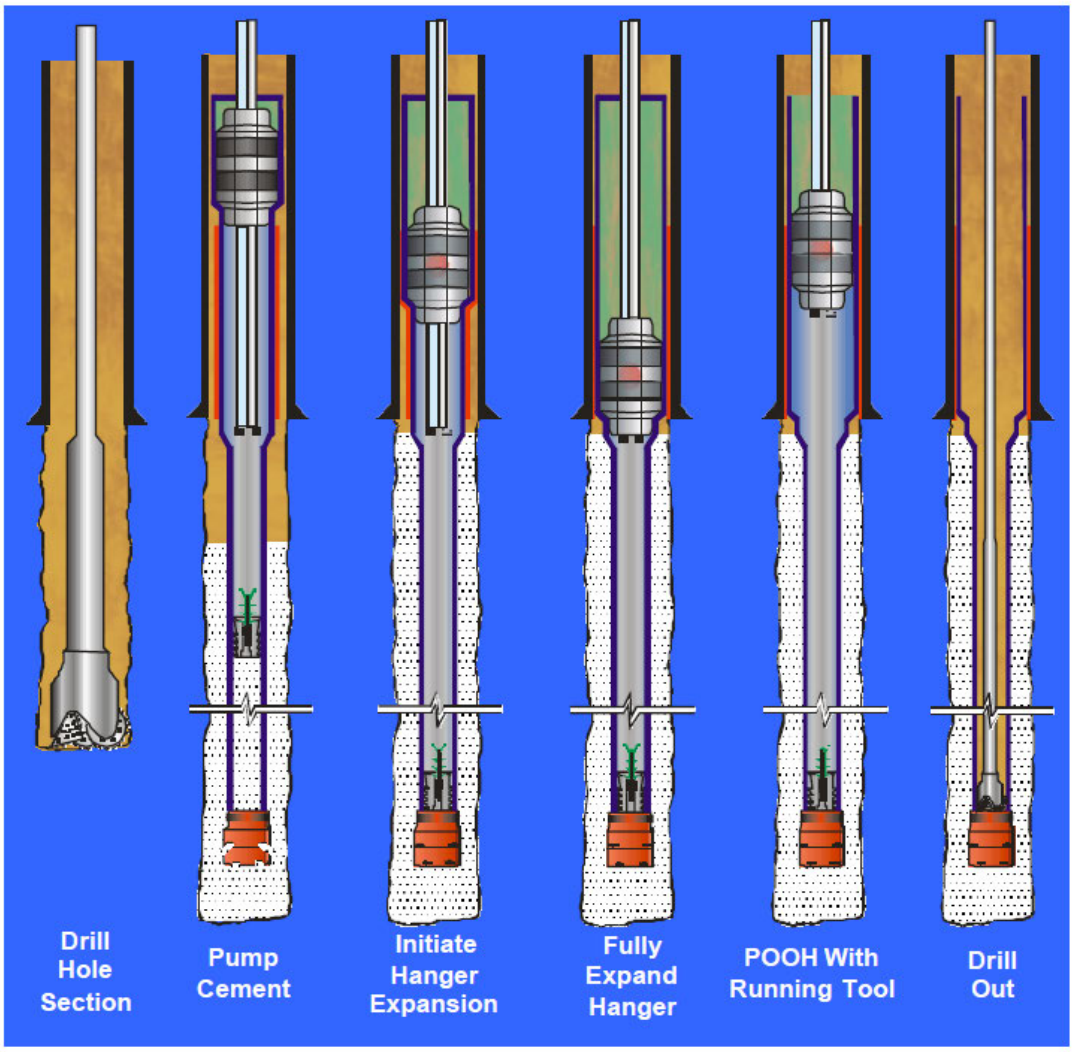


Fig. 12—The running procedure for the expandable-liner-hanger system involves a top-down expansion method.

Figure 12 illustrates SPE 59151's running procedure. *Id.* at 11. Figure 7 is reproduced below.

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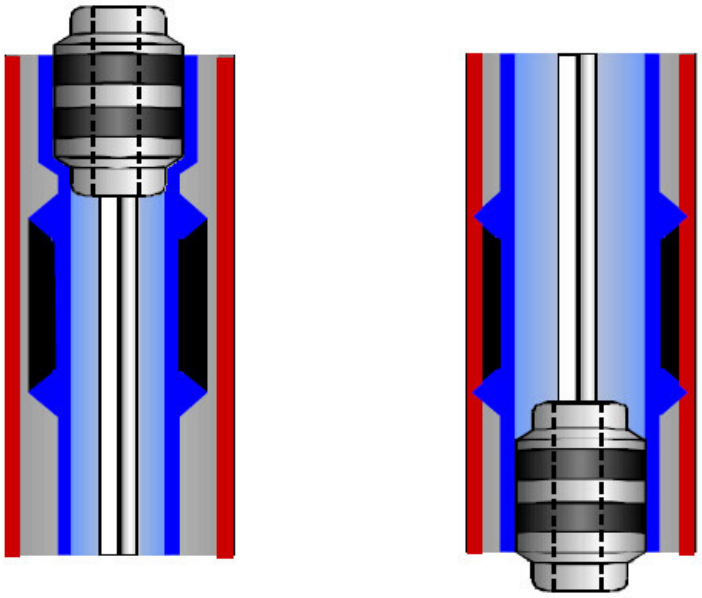


Figure 7—Upon expansion of the expandable liner hanger, ribs machined on the surface of the hanger engage the previous casing string, providing an anchor for the liner string.

Figure 7 shows the expandable liner hanger engaged to the previous casing string after expansion. *Id.* at 8.

2. *Discussion*

Petitioner asserts that SPE 59151 discloses all of the limitations of claims 1 and 5. Pet. 49–60; Pet. Reply 18–22. Patent Owner argues that Petitioner has not shown that SPE 59151 discloses claim limitation 1[d]. PO Resp. 59–64; PO Sur-reply 16–18. Patent Owner does not otherwise dispute Petitioner's assertion that SPE 59151 anticipates claims 1 and 5.[13] *See generally* PO Resp.; PO Sur-reply.

[13] Patent Owner mentions secondary indicia of non-obviousness, but this is inapposite to Petitioner's anticipation challenge. *See* Prelim. Resp. 75.

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Having reviewed the parties' arguments and evidence, we determine Petitioner has demonstrated by a preponderance of the evidence that SPE 59151 anticipates claims 1 and 5. In the following sections, we discuss the parties' contentions regarding SPE 59151 as it relates to the limitations of claims 1 and 5.

a) Claim 1

(1) Preamble

Claim 1's preamble recites "[a] method of coupling a radially expandable tubular member to a preexisting structure, comprising." Ex. 1001, 17:16–17. Petitioner argues that SPE 59151's "expandable liner hanger" corresponds to the "expandable tubular member" recited in claim 1. Pet. 50. Petitioner argues that "[as SPE 59151's] pig propagates, the expandable liner hanger is coupled (cladded) to the casing." *Id.* Petitioner argues that SPE 59151's use of ribs and elastomer seals to engage the expandable liner hanger to the casing matches the '616 patent's disclosed use of coupling elements and seals on its expandable tubular member 105. *Id.* at 51–52 (citing Ex. 1001, 12:2–8, 14:44–49, 14:50–60). To the extent the preamble of claim 1 is limiting, we find Petitioner has shown sufficiently that SPE 59151 discloses the preamble.

(2) Claim limitation 1[a]

Claim limitation 1[a] recites "positioning the tubular member and an expansion device within the preexisting structure." Ex. 1001, 17:18–19. In asserting that SPE 59151 discloses this limitation, Petitioner cites steps 4–6 of the disclosed running sequence. Pet. 52. Petitioner adds that SPE 59151's Figures 4 and 12 show "positioning the expandable liner hanger and

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expansion device downhole within the preexisting casing." *Id.* At this stage, we find that Petitioner has shown sufficiently that SPE 59151 discloses claim limitation 1[a].

(3) Claim limitation 1[b]

Claim limitation 1[b] recites "injecting fluid materials into the tubular member." Ex. 1001, 17:20. In asserting that SPE 59151 discloses claim limitation 1[b], Petitioner cites steps 9 and 10 of SPE 59151's running sequence. Pet. 53–54. Petitioner argues that "Step 10 discloses pressurizing the tubular member by injecting fluid." *Id.* at 54. Petitioner also cites SPE 59151's disclosure that "[h]ydraulic pressure applied directly to the pig . . . propels the pig through the pipe." *Id.* at 53–54 (alterations in original). Petitioner explains that "[a]pplying 'hydraulic pressure' to the 'pig' involves injecting fluidic material into the tubular member." *Id.* at 54. At this stage, we find Petitioner has shown sufficiently that SPE 59151 discloses claim limitation 1[b].

(4) Claim limitation 1[c]

Claim limitation 1[c] recites "sensing the operating pressure of the fluidic materials." Ex. 1001, 17:21. Petitioner argues that the shear pins disclosed in step 10 of SPE 59151's running sequence serve to sense the operating pressure of the fluidic materials. Pet. 55–56. Petitioner explains that

> [a]s pressure increases due to the presence of the setting ball, the shear pins in the crossover ports sense the increased pressure and are sheared (at their known failure rating, EX1002 ¶143), which causes fluid flow to be diverted into areas around and above the pig. *Id.* at 4 ("Increase pressure to shear pins in crossover ports and divert flow into flow paths to pig.").

Id. at 55.

Petitioner argues in the alternative that SPE 59151 discloses claim limitation 1[c] because "SPE 59151 teaches a surface gauge 'on [the] surface pumping unit' that provides a 'pressure readout' of the injected fluidic materials." *Id.* at 56 (alterations in original). Petitioner notes that SPE 59151 discloses in step 12 of the running sequence to "[o]bserve pressure readout on surfacing pumping unit for indications of cladding." *Id.* at 56–57. At this stage, we find Petitioner has shown sufficiently that SPE 59151 discloses claim limitation 1[c].

(5) Claim limitation 1[d]

Claim limitation 1[d] recites "radially expanding the tubular member into contact with the preexisting structure when the sensed operating pressure exceeds a predetermined amount by displacing the expansion device relative to the tubular member." Ex. 1001, 17:22–26. Petitioner argues that "SPE 59151 discloses radially expanding the liner hanger into contact with the previous casing when the sensed operating pressure exceeds a predetermined amount (*i.e.*, when the pins are sheared) by displacing the pig relative to the liner hanger." Pet. 57. Petitioner elaborates that the shear pins will fail at a predetermined pressure, after which fluid pressure will move the pig through the expandable liner hanger. *Id.* at 57–58. Petitioner quotes step 12 of SPE 59151's running sequence, which discloses "[m]aintain expansion pressure and clad liner hanger to previous string of casing." Ex. 1003, 4. Petitioner explains that "[m]aintaining the fluidic pressure would cause the region upstream of the pig to pressurize and force the pig down the liner hanger, which causes radial expansion of the liner into

contact with the previous casing." Pet. 58. Petitioner asserts that Figure 12 of SPE 59151 shows the pig moving down the expandable liner hanger and radially expanding it into contact with the surrounding casing. *Id.*

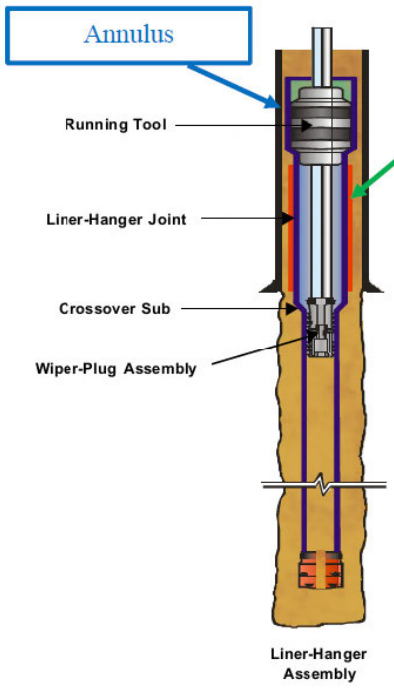
Patent Owner argues that Petitioner has not shown that SPE 59151 discloses claim limitation 1[d]. PO Resp. 59–64. Patent Owner does not dispute that SPE 59151 discloses radially expanding the expandable liner hanger when sensed operating pressure exceeds a predetermined amount by moving the pig relative to the expandable liner hanger. *See id.* Rather, Patent Owner argues that this process does not produce the type of contact required by Patent Owner's construction of claim limitation 1[d].[14] *See id.* Patent Owner reiterates that "the proper construction of element 1[d] includes 'radially expanding and plastically deforming the portions of the tubular member within the preexisting structure into direct contact with the preexisting structure.'" *Id.* at 59.

Patent Owner then argues that SPE 59151 "does not and cannot teach or suggest direct continuous contact between the tubular member and the previous casing string. Instead, it is the elastomer and external steel ribs that contact the previous casing string and form the required anchoring force." *Id.* at 60. In connection with this argument, Patent Owner provides annotated versions of SPE 59151's Figures 4 and 7, as well as an annotated

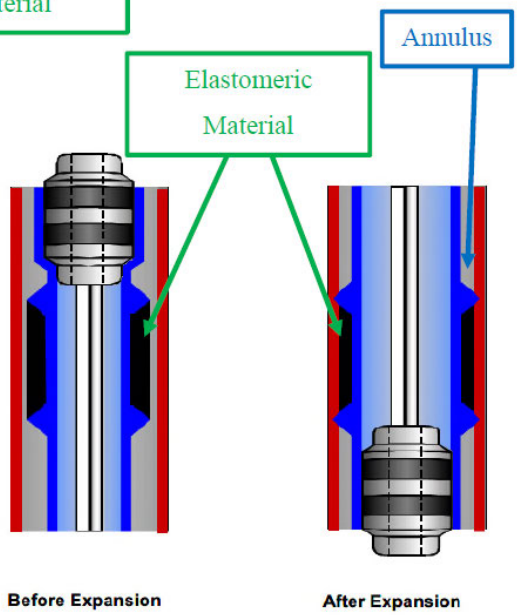
[14] In its claim-construction arguments, Patent Owner contends that limitation 1[d] requires plastic deformation of the tubular member. *E.g.*, PO Resp. 27. Patent Owner does not, however, argue that SPE 59151 lacks a disclosure of plastically deforming a tubular member. *See generally* PO Resp.; PO Sur-reply.

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version of an excerpt of Figure 12. *Id.* at 61–62. Patent Owner's annotated versions of the drawings are reproduced below.



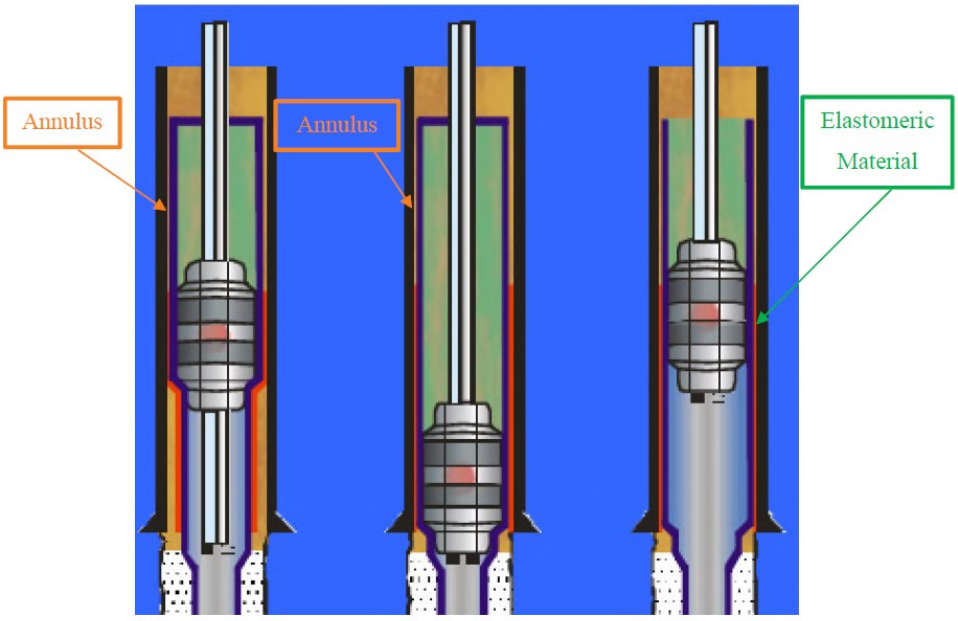
EX1003, Fig. 4 (annotated)



EX1003, Fig. 7 (annotated)

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EX1003, Fig. 12, excerpted (boxed annotations added)

Patent Owner's annotated versions of SPE 59151's drawings include annotations identifying elastomeric material and points where Patent Owner contends an annulus exists. *Id.* According to Patent Owner, "[a]ll of the figures unambiguously indicate that the annulus between the liner itself and the existing casing remains after expansion." *Id.* at 62. Patent Owner adds that "[t]he language of SPE59151 further confirms, '[w]hen the liner hanger is expanded, the elastomer provides the primary anchoring force for the hanger and attached liner . . . When the liner hanger is expanded, the elastomer furnishes the desired hydraulic seal between the hanger and the previous casing string.'" *Id.* (quoting Ex. 1003, 2) (second two alterations in original).

Additionally, Patent Owner reiterates that "[t]he '616 Patent sought to remove components such as elastomers, steel rings, and annular regions between the tubular member and the preexisting casing," which Patent

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Owner argues "cause a loss of internal diameter." *Id.* at 63. Patent Owner contends that

> [a]s shown in Figure 7 of SPE59151, reproduced above, even the portions of the tubular between the ribs have an internal diameter **less** than the internal diameter of the casing, which is precisely the problem the Challenged Claims overcome. EX2006, ¶182. That is, even after expansion, the internal diameter is significantly reduced because the tubular itself is not expanded into direct continuous contact with the existing casing.

Id.

Addressing SPE 59151's disclosure of ribs, Patent Owner contends that "those ribs provide only a secondary anchoring force and, in any event, do not amount to 'the portions of the tubular member within the preexisting structure' as claim 1 requires." *Id.* Patent Owner adds that "[t]he single point contact of the ribs with the preexisting casing does not amount to radially expanding and plastically deforming the tubular member into direct continuous contact with the preexisting structure." *Id.*

Patent Owner also argues that "a [person of ordinary skill in the art] would not be motivated to remove the elastomer to enable direct contact between an expandable tubular liner and a preexisting casing." *Id.* at 64. Patent Owner explains that SPE 59151's elastomer "is the 'primary anchoring force' for the liner." *Id.* Patent Owner adds that "SP59151 describes its elastomer as overcoming failures to create hydraulic integrity suffered by previous methods." *Id.*

Petitioner responds that "[Patent Owner] cannot distinguish the Challenged Claims over the prior art." Pet. Reply 1. Petitioner asserts that Patent Owner's arguments rest on incorrect claim constructions. *Id.*

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Petitioner adds that "[e]ven under [Patent Owner's] narrow construction requiring 'direct contact,' SPE 59151 anticipates." *Id.* at 19. Petitioner explains that "[l]ike the '616 preferred embodiment (EX1001, 12:2-8, 14:50-57), SPE 59151 discloses the concept of expanding alternating elastomeric and steel bands on a tubular, as shown in Figure 6 of the reference." *Id.* Petitioner elaborates that "SPE 59151 expressly discloses expanding both the elastomeric and steel portions of the tubular 'into contact with'—indeed 'intimate contact' with—the preexisting casing." *Id.* (citing Ex. 1003, 1–2, 4, 8). [redacted]

Petitioner faults Patent Owner's attempts to distinguish limitation 1[d] based on SPE 59151's use of elastomeric bands and ribs. *Id.* at 20–21. Petitioner reiterates that "every coupling in the '616 Patent occurs either by coupling elements or seal members between ribs." *Id.* at 20. According to Petitioner, "[t]hat SPE 59151 describes the elastomeric bands as the 'primary anchoring force' is irrelevant." *Id.* Petitioner faults Patent Owner's argument that SPE 59151's ribs "do not amount to 'the portion of the tubular member within the preexisting structure' as claim 1 requires" as unclear and unavailing. *Id.* (citing PO Resp. 63).

In doing so, Petitioner argues that it is unclear what Patent Owner means when it argues claim 1 requires "continuous" contact. *Id.* at 20–21. Petitioner adds that "[Dr. Wooley] disagrees that 'continuous' is a requirement of claim 1." *Id.* (citing Ex. 1050, 63:18–64:6). Additionally, Petitioner argues that

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> to the extent it would exclude elastomeric contact or contact points by the ribs, it cannot be correct for all the reasons explained above regarding "direct." *See* Section III.A.1 above. Also, contrary to PO's repeated arguments about "annuli" based on cartoon figures (POR, 51, 61-62), the quoted portions above of SPE 59151 make clear that every portion of the elastomeric bands, ribs, and steel bands shown in Figure 6 are expanded into contact with the casing (*i.e.*, in practice, there are no annuli between the portions of liner that have been expanded and the prior casing). EX1048, ¶¶ 24-27.

Id. at 21. Moreover, Petitioner argues, "any amount of 'direct contact' . . . would meet [Patent Owner's] initial construction," and SPE 59151 "clearly discloses 'direct contact.'" *Id.* at 21–22.

In response, Patent Owner reiterates that SPE 59151 "does not and cannot teach or suggest direct continuous contact between the tubular member and the previous casing string." PO Sur-reply 16. In connection with this, Patent Owner explains that

> Petitioner points to Fig. 6 where SPE59151 discloses expanding elastomeric and steel portions of the tubular into direct contact with the casing. [Pet. Reply 19]. However, SPE59151 discloses using an elastomeric material on the outside of the liner hanger to make contact with and secure the hanger to the preexisting casing.

Id. Addressing SPE 59151's ribs, Patent Owner reiterates a number of its arguments from the Response, including its positions that "a [person of ordinary skill in the art] would not consider those ribs to be "the tubular member" and "the steel ribs provide only a secondary anchoring force." *Id.* at 17.

Patent Owner adds that

> [i]n SPE59151, the portions of the tubular between the ribs have an external diameter **less** than the internal diameter of the casing

> due to the presence of the ribs and the elastomer. EX1003, p.2. Thus, even after expansion of the tubular, the internal diameter of the tubular is significantly reduced because the tubular itself is not expanded into direct continuous contact with the existing casing.

Id. at 18. Finally, Patent Owner argues that "[i]mportantly, SPE59151 cannot simply be modified to remove the elastomer." *Id.*

Petitioner persuades us that SPE 59151 discloses limitation 1[d]. Pet. 18–27, 50–52, 57–59; Pet. Reply 1–2, 18–22. With respect to the dispute framed by the parties' arguments, Petitioner convinces us that SPE 59151 discloses radially expanding both the metal and elastomeric portions of its expandable liner hanger into direct contact with the surrounding casing. *E.g.*, Pet. Reply 19–20. As Petitioner notes, SPE 59151 discloses that its "new liner system . . . into *intimate contact* with the casing from which the liner being hung." Ex. 1003, 1 (emphasis added). SPE 59151 adds that "[t]he combination of the metal-to-metal and elastomer-to-metal contacts that are created during expansion of the liner hanger produce a very reliable seal." *Id.* at 4. Consistent with these disclosures, Patent Owner concedes "SPE 59151 discloses expanding elastomeric and steel portions of the tubular into direct contact with the casing." PO Sur-reply 16.

[redacted]

Patent Owner's attempts to distinguish limitation 1[d] from SPE 59151 based on arguments about elastomers, ribs, annuli, and internal diameters all rest on Patent Owner's narrow understanding of limitation 1[d]. These arguments do not persuasively rebut Petitioner's position, as the

evidence supports Petitioner's claim construction positions, not Patent Owner's. For the reasons discussed above in Section VII.B, the proper construction of limitation 1[d] does not exclude external ribs and elastomeric seals, or any of the other things that Patent Owner contends SPE 59151 discloses.

Moreover, Patent Owner does not provide persuasive support for many of its allegations of what SPE 59151 discloses. For example, Patent Owner does not provide persuasive support for its assertion that

> [i]n SPE59151, the portions of the tubular between the ribs have an external diameter **less** than the internal diameter of the casing due to the presence of the ribs and the elastomer. EX1003, p.2. Thus, even after expansion of the tubular, the internal diameter of the tubular is significantly reduced because the tubular itself is not expanded into direct continuous contact with the existing casing.

PO Sur-reply 18. In support of these arguments, Patent Owner cites only page 2 of SPE 59151. Ex. 1003, 2. On this page, SPE 59151 discloses that "it affords a means of progressing from one casing string to a smaller string *with minimal reduction in internal diameter, i.e., the technology conserves hole size*." *Id.* (emphasis added). This does not support Patent Owner's position that SPE 59151's tubular member has a "significantly reduced" internal diameter after expansion. PO Resp. 63.

Nor does Dr. Wooley's testimony that SPE 59151 "shows that the portions of the tubular with ribs have an internal diameter **less than** the internal diameter of the casing" support Patent Owner position that the diameter is "significantly reduced." Ex. 2006 ¶ 182. Neither Dr. Wooley nor Patent Owner explains how a tubular member disposed inside a

preexisting structure could have an internal diameter identical to that of the preexisting structure. The tubular member seemingly would have to have an internal diameter smaller than the surrounding preexisting structure, due to the thickness of the tubular member. Given this, Patent Owner does not provide persuasive evidence that SPE 59151's liner hanger has a "significantly reduced" internal diameter. As discussed above in Section VII.B, the '616 patent's disclosure of using external ribs and elastomers indicates that some reduction in internal diameter comports with the patent's objectives.

We also find Patent Owner does not provide persuasive evidence in support of many of its assertions about SPE 59151's ribs. For example, Patent Owner does not persuade us that the ribs "provide only a secondary anchoring force and, in any event, do not amount to 'the portions of the tubular member within the preexisting structure' as claim 1 requires." PO Resp. 63. In support of this, Patent Owner cites two paragraphs of Dr. Wooley's Declaration. *Id.* One paragraph says exactly the same thing Patent Owner says. PO Resp. 63; Ex. 2006 ¶ 180. The other paragraph offers the conclusory opinion that "[a]n elastomer and external steel ribs would not be understood by a [person of ordinary skill in the art] to form the contact necessary in 'radially expanding the tubular member into contact with the preexisting structure.'" Ex. 2006 ¶ 181. Neither Patent Owner nor Dr. Wooley provides persuasive, objective evidence for Patent Owner's position that SPE 59151's ribs do not constitute portions of the tubular member within "the portions of the tubular member within the preexisting structure." PO Resp. 63; Ex. 2006 ¶¶ 180–181.

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Regarding the dispute about whether SPE 59151 discloses an annulus and therefore fails to disclose limitation 1[d], Petitioner again has the more persuasive position. First, as explained above in Section VII.B, the '616 patent's disclosure of using ribs and elastomers belies Patent Owner's apparent position that limitation 1[d] excludes any separation of any metal portion of the tubular member from the surrounding preexisting structure. Indeed, as Petitioner notes, Dr. Wooley conceded that he does not understand limitation 1[d] as requiring continuous contact. Ex. 1050, 63:18–64:6. Thus, we do not agree with Patent Owner's suggestion that the claim precludes an annulus. Moreover, Petitioner persuades us that the text of SPE 59151 conveys that no significant annulus exists between the liner hanger and the casing after expansion. Pet. Reply 21; Ex. 1048 ¶¶ 24–27.

b) Claim 5

Claim 5 adds certain limitations regarding the geometry of the tubular member prior to radial expansion. Ex. 1001, 17:41–47. Petitioner explains its position that SPE 59151 teaches the limitations of claim 5, citing record evidence. Pet. 59–60. Aside from its arguments regarding independent claim 1, Patent Owner does not dispute Petitioner's argument that SPE 59151 anticipates claim 5. *See generally* PO Resp. Based on the full record, we determine Petitioner has shown by a preponderance of the evidence that SPE 59151 anticipates claim 5.

D. GROUNDS 2–5

As noted above in Section I.E, Petitioner also argues that claims 1 and 5 are unpatentable as (a) anticipated by the Offshore Article, (b) "obvious over the Offshore Article in view of a [person of ordinary skill in the art],"

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(c) "obvious over the Offshore Article in view of the knowledge of a [person of ordinary skill in the art] and further in view of SPE 59151," and (d) anticipated by Vercaemer. Pet. 10, 60–90. Because we determine that claims 1 and 5 are anticipated by SPE 59151, we do not reach Grounds 2–5.

VIII. CONCLUSION[15]

In summary:

Claim(s)	35 U.S.C. §	References/Basis	Claim(s) Shown Unpatent-able	Claim(s) Not Shown Unpatent-able
1, 5	102(b)	SPE 59151	1, 5	
1, 5	102(b)	Offshore Article[16]		
1, 5	103(a)	Offshore Article, "knowledge of a [person of ordinary skill in the art]"[17]		
1, 5	103(a)	Offshore Article, "knowledge of a [person of ordinary		

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

[16] As explained above in Section VII.D, we do not reach this challenge.

[17] As explained above in Section VII.D, we do not reach this challenge.

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		skill in the art],” SPE 59151[18]		
1, 5	102(a), (e)	Vercaemer[19]		
Overall Outcome			1, 5	

IX. ORDER

In consideration of the foregoing, it is:

ORDERED that claims 1 and 5 have been shown, by a preponderance of the evidence, to be unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Deem the Filing of Its Exhibits As Timely is *granted*;

FURTHER ORDERED that Petitioner's Motion to Submit Supplemental Information is *dismissed as moot*;

FURTHER ORDERED that Petitioner's Motion to Exclude is *dismissed as moot*;

FURTHER ORDERED that Patent Owner's Motion to Exclude is *dismissed-in-part* and *denied-in-part*;

FURTHER ORDERED that the Motions to Seal are *granted*;

FURTHER ORDERED that the default Protective Order submitted with the Motions to Seal is entered; and

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

[18] As explained above in Section VII.D, we do not reach this challenge.

[19] As explained above in Section VII.D, we do not reach this challenge.

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IPR2020-01648
Patent 7,290,616 B2

PETITIONER:

Leslie Payne
James Baxter
HEIM PAYNE & CHORUSH, LLP
lpayne@hpcllp.com
bbaxter@hpcllp.com

Douglas R. Wilson
ARMOND WILSON LLP
doug.wilson@armondwilson.com

PATENT OWNER:

George Haight
Brian Michaelis
Lisa Meyerhoff
SEYFARTH SHAW LLP
ghaight@seyfarth.com
bmichaelis@seyfarth.com
lmeyerhoff@seyfarth.com

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