

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FLOWCO PRODUCTION SOLUTIONS LLC,
Petitioner,

v.

WELL MASTER CORPORATION,
Patent Owner.

IPR2022-01386
Patent 8,627,892 B2

Before JAMES P. CALVE, PATRICK R. SCANLON, and
ERIC C. JESCHKE, *Administrative Patent Judges*.

CALVE, *Administrative Patent Judge*.

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

I. BACKGROUND

Flowco Productions Solutions LLC (“Petitioner”) filed a petition for an *inter partes* review of claims 1–11, 13, 15, 16, 18–21, 23, and 24 (the “challenged claims”) of U.S. Patent No. 8,627,892 B2 (“the ’892 patent”). Paper 2 (“Pet.”). Well Master Corporation (“Patent Owner”) timely filed a Preliminary Response. Paper 6 (“Prelim. Resp.”).

We have authority to determine whether to institute *inter partes* review. *See* 35 U.S.C. § 314 (2018); 37 C.F.R. § 42.4(a) (2022) (“The Board institutes the trial on behalf of the Director.”). *Inter partes* review may not be instituted “unless . . . the information presented in the petition . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a). Upon consideration of the evidence and arguments in the record, we determine that the information presented does not show a reasonable likelihood that Petitioner would prevail with respect to at least one of the challenged claims. We therefore deny institution of *inter partes* review.

A. Related Proceedings

The parties identify the following proceeding with the ’892 patent: *Well Master Corporation v. Flowco Production Solutions, LLC*, Case No. 21:cv-02145-CMA-KLM, (D. Col. Aug. 9, 2021). Pet. 1; Paper 5, 2.

B. Real Parties in Interest

Petitioner identifies Flowco Production Solutions, LLC as the real party in interest. Pet. 1. Patent Owner identifies Well Master Corporation as the real party in interest. Paper 5, 2.

C. The '892 Patent

The '892 patent claims plunger lift systems used to provide artificial lift to remove fluids in a well that produces natural gas. Ex. 1001, 1:16–32. Figure 1 of the '892 patent is reproduced below to illustrate such a system.

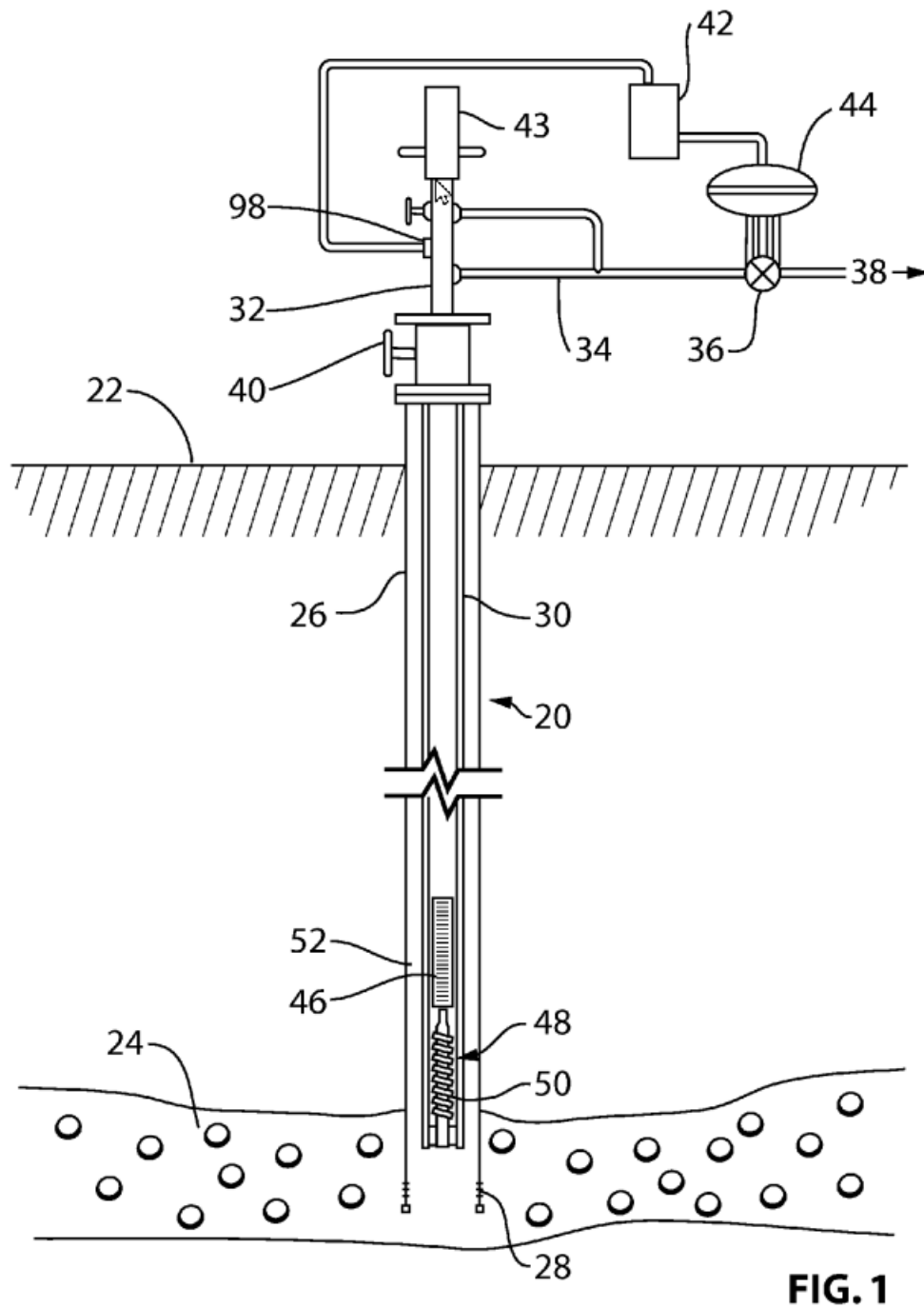


Figure 1 depicts plunger 46 on stop 48 before gas pressure in tubing 30 below plunger 46 lifts plunger 46 and a liquid load above it (not shown) to surface 22 where it exits via tubing 34 (arrow 38). *Id.* at 2:2–18, 5:3–40. A plunger lift system removes fluids from a well that produces some natural gas and will not work in wells that produce no gas.¹ *Id.* at 1:27–32, 2:39–41.

As the gas flow rate and pressure decline in a well over time, the gas produced in the well no longer can carry fluid to the surface. *Id.* at 1:37–46. As the flow continues to slow, the gas phase cannot support liquid in slug or droplet form and liquid falls to the bottom of the well, where it accumulates. Any gas that bubbles through this liquid flows to the surface at low velocity so that little-to-no liquid is carried to the surface. *Id.* at 1:37–56.

To reactivate such a well, well 20 is closed at the surface by closing a master valve 40 and control valve 36, and plunger 46 is inserted in tubing at lubricator 32 at the surface. *Id.* at 5:3–15. While control valve 36 is closed, plunger 46 falls freely by gravity to the bottom of well 20, where it rests on bottom-hole stop 48. *Id.* at 5:16–20. Pressure in well 20 then rises as gas enters the well. *Id.* at 2:2–4. When control valve 36 is opened, gas pressure in annulus 52 between casing 26 and tubing 30 flows into tubing 30 below plunger 46 and lifts plunger 46 to surface 22. *Id.* at 2:5–19, 5:32–40. As plunger 46 rises, it lifts liquid that accumulated above it to surface 22 where it exits the system via tubing 34. *Id.* at 5:37–40. Figures 2 and 3 of the '892 patent are reproduced below to illustrate this single-piece plunger 46.

¹ The '892 patent defines a “gas producing well” as “an oil or gas well that is producing a sufficient quantity of gas for the implementation of a plunger lift system.” Ex. 1001, 2:41–44.

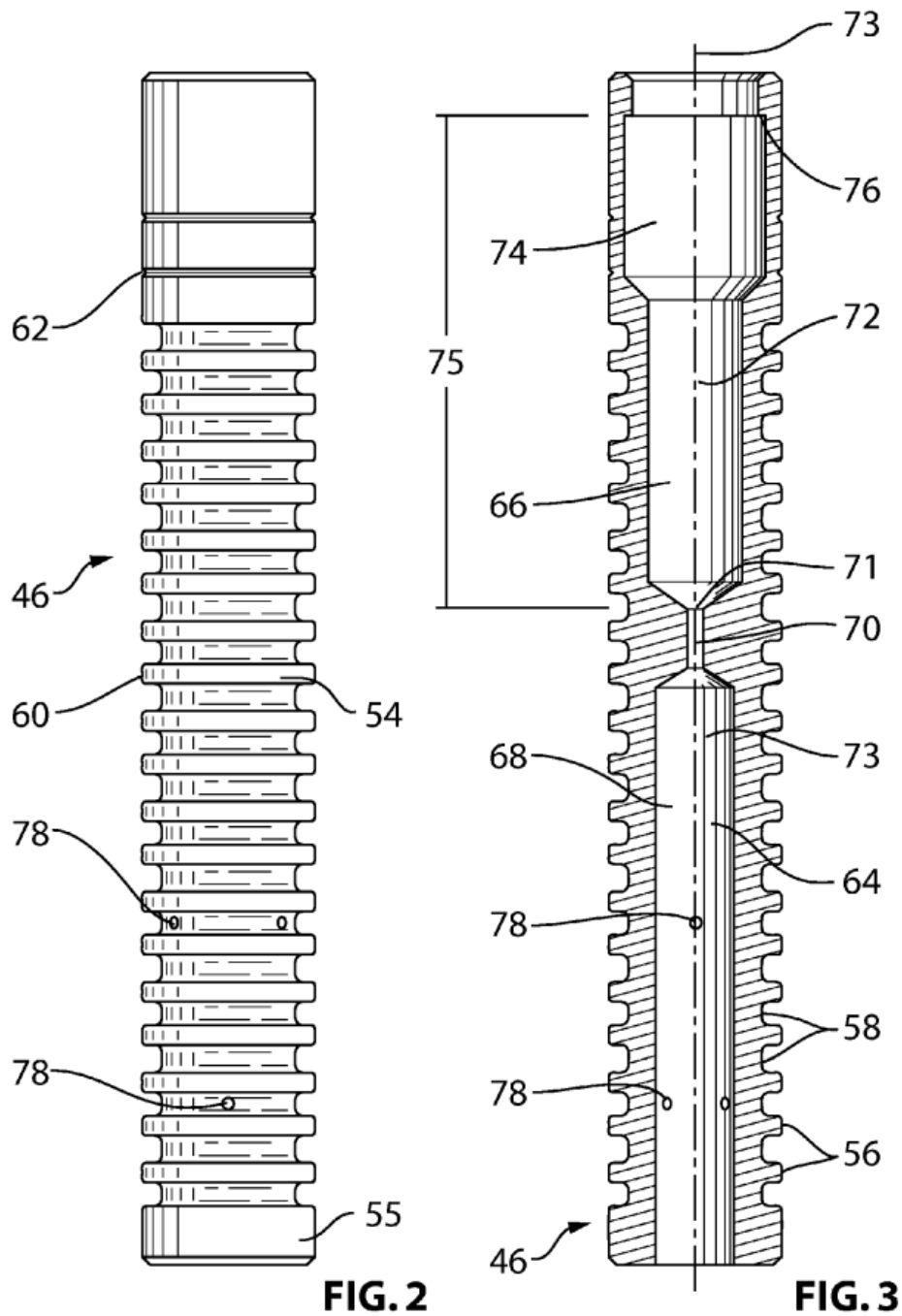


Figure 2 and 3 depict plunger body 54 and outer surface 60 with ribs 56 and grooves 58 that seal with tubing 30 so plunger 46 acts as a piston for plunger lift. *Id.* at 6:18–46. Figure 3 also depicts bore 64 with upper 66 and lower chamber 68 joined by passageway 70 and orifice 71. *Id.* at 6:47–7:10.

If plunger 46 is dropped down a well, chambers 66, 68 and passage 70 provide a fluid path allowing gas and liquid to pass through interior bore 64 of plunger 46. *Id.* at 8:9–12. This fluid path permits a faster rate of descent compared to solid body plungers without using any special valves or moving components to alter or regulate the flow and rate of descent. *Id.* at 8:12–22. Other fluid passages 78 can assist the descent of plunger 46. *Id.* at 8:18–19.

When control valve 36 is opened, high pressure gas accumulated in annulus 52 of well 20 enters tubing 30 and forces fluid into lower chamber 68 where it encounters resistance as it enters narrow passageway 70 to exert upward force on plunger 46. *Id.* at 8:23–30. Fluid exits passageway 70 and orifice 71 at an accelerated velocity and a lower pressure compared to fluid flow in lower chamber 68, creating a positive differential pressure between lower chamber 68 and the region above plunger 46 to lift plunger 46 and the liquid and gas load above it. *Id.* at 8:31–45. As fluid exits passageway 70 and orifice 71 at increased velocity, it also expands radially outwardly in a V-shape to impact against upper lip 76 and provide additional upward force on plunger 46. *Id.* at 8:46–56. The turbulent fluid flow from lower chamber 68 through passageway 70 cleans upper chamber 66 of debris such as sand, scale, salt, and paraffin, maintains the venturi effect of passageway 70, and keeps fishing neck 74 clear and accessible. *Id.* at 8:57–65.

D. Challenged Claims

Petitioner challenges claims 1–11, 13, 15, 16, 18–21, 23, and 24 with claims 1, 18, and 23 being independent. Pet. 1, 7–8. Claims 2–11, 13, 15, and 16 depend from claim 1. Claims 19–21 depend from claim 18. Claim 24 depends from claim 23. Ex. 1001, 14:44–16:33. Claim 1 is reproduced below with Petitioner’s annotations added to identify each limitation:

1. [1p] A plunger for performing plunger lift in a gas producing well, the plunger comprising:
- [1a] a plunger body for sealingly engaging a tubing of the well;
 - [1b] an unimpeded fluid path through the plunger body;
 - [1c] a narrow passageway within the fluid path; and
 - [1d] a central orifice at an end of the narrow passageway.

Ex. 1001, 14:38–43.²

E. Asserted Grounds of Unpatentability

Petitioner asserts that the challenged claims are unpatentable on the following grounds (Pet. 8):

Claim(s)	35 U.S.C. §	Reference(s)/Basis
1–11, 13, 15, 16, 18–21, 23, 24	103(a) ³	Gray, ⁴ Victor ⁵
1, 2, 4–7, 10, 11, 23, 24	102(b)	Wells ⁶
1–11, 13, 15, 16, 18–21, 23, 24	103(a)	Victor, Wells

² We adopt and apply below in our analysis Petitioner’s designations for the elements of the challenged claims. *See* Pet. 16–17, 38–39.

³ The Leahy-Smith America Invents Act (“AIA”) included revisions to 35 U.S.C. §§ 102, 103 that became effective on March 16, 2013. Pub. L. No. 112-29, §§ 3(b)–3(c), 3(n)(1), 125 Stat. 284, 285–87 (2011) took effect on September 16, 2011. Changes made to 35 U.S.C. §§ 102 and 103 in the AIA do not apply to any application for patent filed before March 16, 2013. Because the ’892 patent has an effective filing date before March 16, 2013, we refer to the pre-AIA versions of § 103 and § 102.

⁴ U.S. Application No. US 2005/0056416 A1, published March 17, 2005 (Ex. 1005, “Gray”).

⁵ U.S. Patent No. 7,513,301 B2, issued April 7, 2009 (Ex. 1004, “Victor”).

⁶ U.S. Application No. US 2007/0267189 A1, published November 22, 2007 (Ex. 1006, “Wells”).

II. DISCUSSION

A. *Level of Ordinary Skill in the Art*

Petitioner contends that a person of ordinary skill in the art “would have at least a bachelor’s degree in physics or an appropriate engineering discipline, as well as at least three years of experience in designing well plungers.” Pet. 5–6. Patent Owner does not dispute Petitioner’s contention. Prelim. Resp. 2; Ex. 2001 ¶ 38. We adopt Petitioner’s proposed level of skill in the art for purposes of this Decision.

B. *Claim Interpretation*

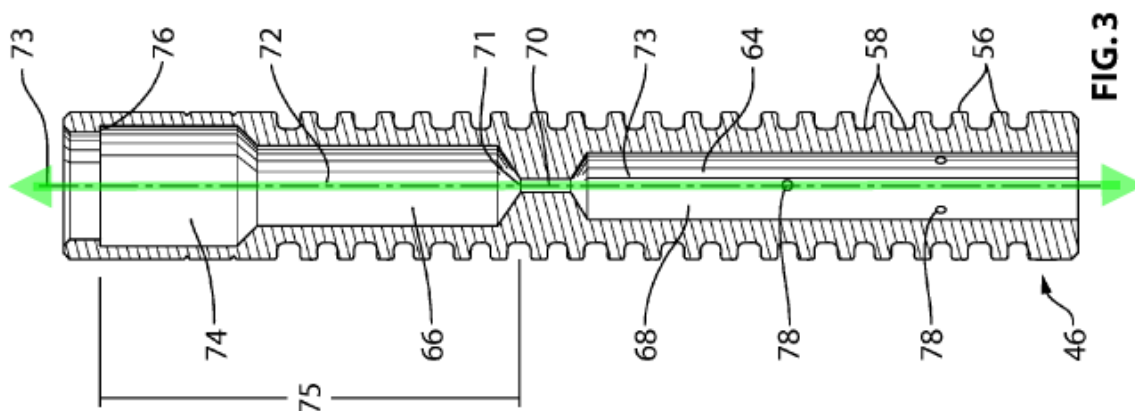
We interpret claims “using the same claim construction standard that would be used to construe the claims in a civil action held under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b). Under this standard, we construe claims “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” *Id.* We construe the claims only to the extent necessary to determine whether to institute *inter partes* review. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

1. *“unimpeded fluid path” / “unimpeded narrow passageway”*

Petitioner contends that claim 12, which depends from claim 1, recites a one-way valve in the fluid path and therefore “unimpeded” in the claims “must be construed sufficiently broadly so as not to preclude the one-way valve element in claim 12.” Pet. 7. Petitioner provides no other argument or evidence in support of its proposed interpretation of “unimpeded.” *See id.*

Patent Owner argues that a person of ordinary skill in the art “would understand the term ‘unimpeded’ to mean that the fluid path or passageway does not contain any valves or other moving components for altering or regulating fluid flow.” Prelim. Resp. 9. Patent Owner also contends:

The ‘892 patent specification and figures describe a plunger having a longitudinal fluid path through the plunger without any valves or other moving components. For example, the specification states “[w]ith reference to FIG. 3, plunger body 54 defines a fluid path through a bore 64 of plunger 46. In the illustrated embodiment, bore 64 has an upper chamber 66, a lower chamber 68, and a connecting passageway 70.” (‘892 patent, Col. 6, ll. 47-50.) As highlighted in green in Figure 3 below, the fluid path enters one end of the plunger body and exits from the other end of the plunger body:



The ‘892 patent specification also describes that the fluid path is free of any valves or other moving components to alter or regulate fluid flow. (‘892 patent, Col. 8, ll. 19-23.)

Id. at 9–10 (alteration in original). Patent Owner asserts that the claims were amended to clarify that the fluid path through the plunger is unimpeded, and that the prior art (Brown, US 8,256,504 B2) did not anticipate the amended claims because “[t]he alleged fluid path through the body of the plunger disclosed by Brown . . . is not unimpeded due to the presence of valves 76 and 102/104.” *Id.* at 11 (quoting Ex. 1002 (‘892 prosecution history), 66).

Claims 1 and 23 recite a plunger comprising “a plunger body for sealingly engaging a tubing of the well” and “an unimpeded fluid path through the plunger body.” Ex. 1001, 14:40–41, 16:21–22.⁷ Claim 18 recites a method of using a plunger for plunger lift by “allowing a plunger having a fluid path therethrough to fall within a tubing of a well to the bottom of the well” and, “while the plunger is moving upwardly, allowing fluid to pass through an unimpeded narrow passageway within the fluid path, the narrow passageway having a central orifice at one end.” *Id.* at 15:31–16:4. No valve is claimed as part of the fluid path and passageway.

The claims thus recite “an unimpeded fluid path” “through the plunger body” in claims 1 and 23 and “an unimpeded narrow passageway” within the fluid path in the plunger in claim 18. The plunger body is “for sealingly engaging a tubing of the well” in claims 1 and 23. *Id.* at 14:40, 16:21.

The plain meaning of the claim language indicates that the plunger has a body that sealingly engages well tubing and an unimpeded fluid path through the plunger body (claims 1 and 23) or an unimpeded narrow passageway within the fluid path through the plunger (claim 18).

This meaning is consistent with the ’892 patent specification, which describes plunger body 54 as a single-piece member with outer ribs 56 and grooves 58 that sealingly engage the inner surface of well tubing 30 and an inner fluid passageway 66, 68, 70 extending through plunger body 54. *Id.* at 6:15–9:45. Figures 1–3 reproduced above and Figures 4–6 of the ’892 patent depict a single-piece plunger 46/46B/46C and plunger body 54.

⁷ Claim 23 further recites “the fluid path having a lower chamber and an upper chamber.” *Id.* at 16:22–23.

The dependent claims also recite features of a single-piece plunger. The radially inwardly directed lip (claims 2 and 6), distance between the lip and central orifice (claim 3), upper and lower chambers (claims 4–7), two or more connecting channels (claim 8), fishing neck (claims 9–11), and plunger dimensions/attributes (claims 13–17) are elements of a single-piece plunger body. *See* Ex. 1001, 14:44–15:28. The ’892 patent specification describes these features as elements of a single-piece plunger 46, 46B, 46C. Ex. 1001, 6:47–7:62, 8:46–9:37, Figs. 3, 4, 6.

Claiming a valve in claim 12 raises a presumption that a valve is not necessarily present in claim 1. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1316, 1315 (Fed. Cir. 2005) (en banc) (“[T]he presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim.”); *AK Steel Corp. v. Sollac & Ugine*, 344 F.3d 1234, 1242 (Fed. Cir. 2003) (“Under the doctrine of claim differentiation, dependent claims are presumed to be of narrower scope than the independent claims from which they depend.”).

The presumption is at its strongest where, as here, Petitioner seeks to read a limitation from a dependent claim into an independent claim. *E.g.*, *SanDisk Corp. v. Kingston Tech. Co., Inc.*, 695 F.3d 1348, 1361 (Fed. Cir. 2012) (“Where, as here, the sole difference between the independent claim and the dependent claims is the limitation that one party is trying to read into the independent claim ‘the doctrine of claim differentiation is at its strongest.’”) (citation omitted); *Seachange Int’l, Inc. v. C-COR Inc.*, 413 F.3d 1361, 1368–69 (Fed. Cir. 2005) (the presumption is strongest “‘where the limitation sought to be “read into” an independent claim already appears in a dependent claim’”) (citations omitted); *see also* Prelim. Resp. 12.

Petitioner offers no evidence or argument to counter a presumption that claim 1 does not necessarily include a one-way valve.⁸ Pet. 7. Grounds of unpatentability compare plungers of Gray and Wells to solid plunger 46 of the '892 patent. Pet. 10, 37. These assertions indicate an understanding that claims 1, 18, and 23 cover a single-piece plunger. *See id.* at 16–17, 47.

Patent Owner argues that “[t]he '892 patent is directed to a one-piece quick drop plunger with no moving parts that falls fast in the tubing” and cites to testimony of its expert, Mr. David Cosby. Prelim. Resp. 8 (citing Ex. 2001 ¶ 65). Mr. Cosby testifies:

The '892 plunger is a quick drop plunger that does not require or contain a valve that opens and closes the flow passageway. The flow passage of the '892 plunger is always open. The fixed flow passageway allows the plunger to fall fast when the well is closed and rise to the surface when the well is open. The flow passage in the '892 plunger contains a central orifice that jets gas into the upper chamber, inside the valve body, above this orifice. The venturi effect of the jetted gas lowers the pressure in the upper cavity, thus creating more differential pressure above and below the plunger. Additionally, the jetted gas creates turbulence when it impacts the lip in the upper chamber required by the internal fishing neck design. This turbulence and the increase in differential pressure provide additional lift for the '892 plunger. In a strong well, this plunger is able to rise faster to the surface, by creating more differential pressure above and below the plunger, thus allowing the plunger to make more cycles per day.

Ex. 2001 ¶ 65; *id.* ¶ 58 (testifying that “[t]he '892 patent discloses a quick drop plunger.”).

⁸ We do not need to interpret claim 12 because claim 12 is not among the challenged claims. *See* Pet. 7; Prelim. Resp. 13; *Nidec*, 868 F.3d at 1017.

Mr. Cosby testifies that the fluid path and flow passageway are part of a one-piece quick drop plunger. The plunger lacks valves in the fluid path and passage that extends through the plunger body. *Id.* ¶ 65. Mr. Cosby’s testimony is evidence that claims 1, 18, and 23 do not encompass plungers that include valves in the fluid path or passageway to control fluid flow in the plunger as in the bypass plungers of Gray, Victor, and Wells.

The ’892 patent prosecution history evidences that an *unimpeded* fluid path does not include valves. During prosecution, Patent Owner amended the independent claims to claim “an unimpeded fluid path” in claims 1 and 23 and “an unimpeded narrow passageway within the fluid path” in claim 18. Ex. 1002, 61–64 (emphasis in original). Patent Owner argued that,

The Applicant has amended independent claims 1, 18, and 23 to clarify that the fluid path is unimpeded. The alleged fluid path through the body of the plunger disclosed by Brown identified at page 4 of the Office Action is not unimpeded due to the presence of valves 76 and 102/104. Thus, Brown cannot anticipate claims 1, 2, 4–8, 12, 18, 19 or 23 of the present application.

Id. at 66. In response, the Examiner issued a Notice of Allowability but did not provide a Statement of Reasons for Allowance. *Id.* at 43.

“Prosecution disclaimer can arise from both claim amendments and arguments.” *Tech. Props. Ltd. v. Huawei Techs. Co.*, 849 F.3d 1349, 1357 (Fed. Cir. 2017). Here, Patent Owner’s amendments to claim an unimpeded fluid path/passageway and arguments distinguishing Brown’s fluid path as being impeded by valves 76, 102/104 (versus unimpeded as claimed) clearly and unmistakably disclaimed coverage of plungers having bypass valves in the fluid path and narrow passageway through the plunger body.

We reproduce Figure 6 of Brown below to illustrate the valved fluid path that Patent Owner's amendment distinguished to obtain the '892 patent.

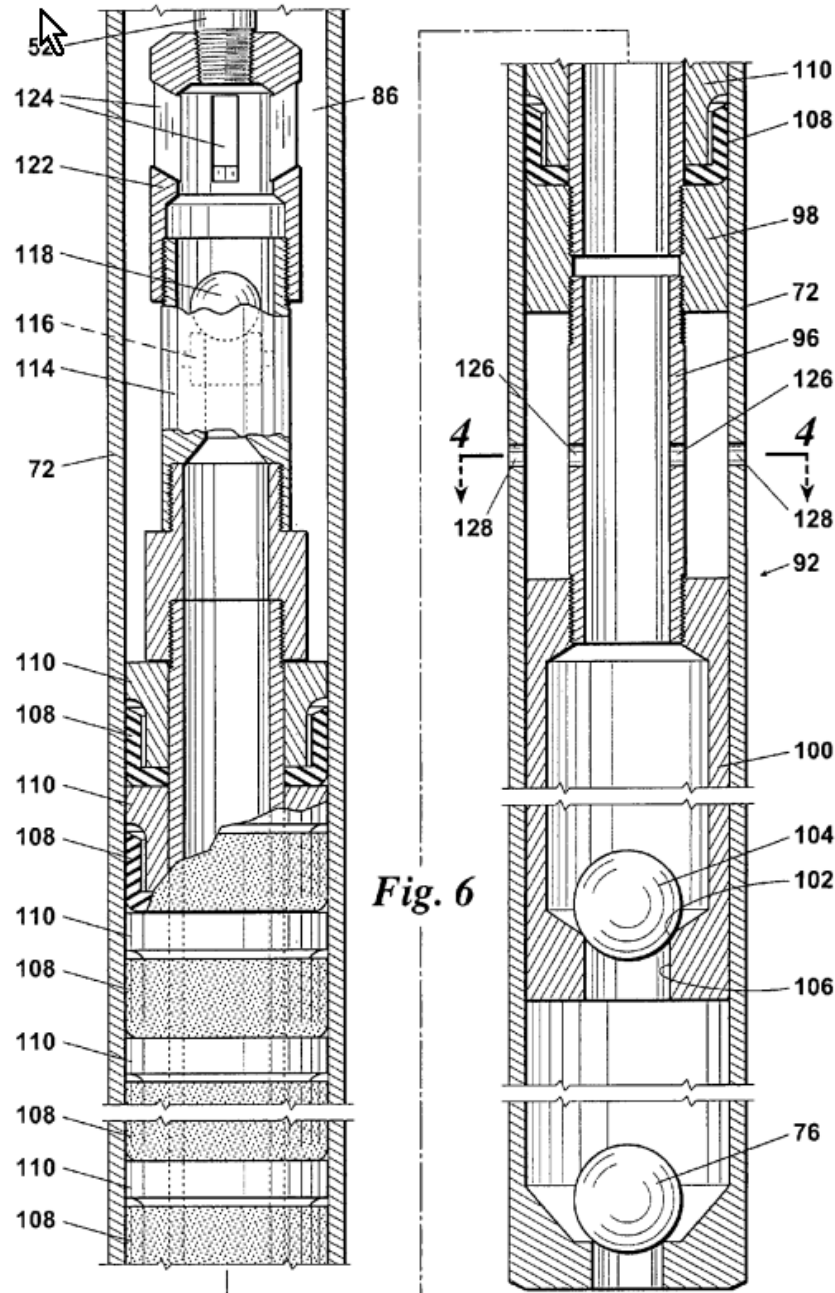


Figure 6 of Brown illustrates plunger 92 with narrow passage 96 in the fluid path and one-way valve 104 and standing valve 76 that control fluid flow in the fluid path. Ex. 2010, 11:13–32, 12:30–43; Prelim. Resp. 10–11.

In addition to evidencing Patent Owner’s disclaimer of fluid paths with valves, the ’892 patent prosecution history includes a double patenting rejection that evidences the ’892 patent claims do not cover bypass valves.

The Examiner rejected the ’892 patent application for nonstatutory double patenting over claims 1–12 and 24–27 of U.S. Patent No. 8,464,798 B2 (“the ’798 patent”).⁹ Ex. 1002, 76, 81. Notably, independent claims 17, 20, and 22 of the ’798 patent, which were not part of the double patenting rejection, recite a plunger comprising a plunger body, a fluid path, a narrow passageway, a central orifice, *and a bypass valve*. See Ex. 3001, 15:31–37, 15:57–16:6, 16:9–16. The bypass valve of claim 17 comprises a cage coupled to the bottom end of the plunger body and a pin slidably retained in the cage and movable between open and closed positions to limit liquid and gas flow through the fluid path. *Id.* at 15:31–48. In claim 20, the bypass valve has a seat at the bottom end of the plunger for receiving a seal. *Id.* at 15:57–16:6. In claim 22, the plunger body includes fluid channels to permit fluid flow through the narrow passageway when the bypass valve is closed. *Id.* at 16:9–19. These recitals of bypass valves that impede the fluid path contrast with the challenged claims, which do not recite any bypass valves.

For the foregoing reasons, we interpret “unimpeded fluid path” and “unimpeded narrow passageway” as fluid passages in plungers that lack bypass valves that control the flow of fluid through the plunger body.

2. “narrow” passageway

We do not need to construe “narrow” to resolve Petitioner’s grounds of unpatentability. See Pet. 7; Prelim. Resp. 13–18; *Nidec*, 868 F.3d at 1017.

⁹ A copy of the ’798 patent is entered as Board Exhibit 3001. Ex. 1002, 81.

C. Principles of Law

A “prior art reference—in order to anticipate under 35 U.S.C. § 102—must not only disclose all elements of the claim within the four corners of the document, but must also disclose those elements ‘arranged as in the claim.’” *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008) (quoting *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983)). “A single prior art reference may anticipate without disclosing a feature of the claimed invention if such feature is necessarily present, or inherent, in that reference.” *Allergan, Inc. v. Apotex Inc.*, 754 F.3d 952, 958 (Fed. Cir. 2014).

A patent claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. 35 U.S.C. § 103(a); *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). “[W]hen a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result.” *KSR*, 550 U.S. at 416 (citing *United States v. Adams*, 383 U.S. 39, 50–51 (1966)). The question of obviousness is resolved based on underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in evidence, objective evidence of non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

D. Ground 1: Alleged Obviousness Based on Gray and Victor

Petitioner contends that claims 1–11, 13, 15, 16, 18–21, 23, and 24 are unpatentable under 35 U.S.C. § 103(a) over Gray and Victor. *See* Pet. 8–36. Patent Owner disputes Petitioner’s contentions. *See* Prelim. Resp. 28–55.

1. Overview of Gray (Ex. 1005)

Gray discloses a bypass plunger with bypass valve 600 in the fluid path as illustrated in Figures 1A and 37, which are reproduced below.

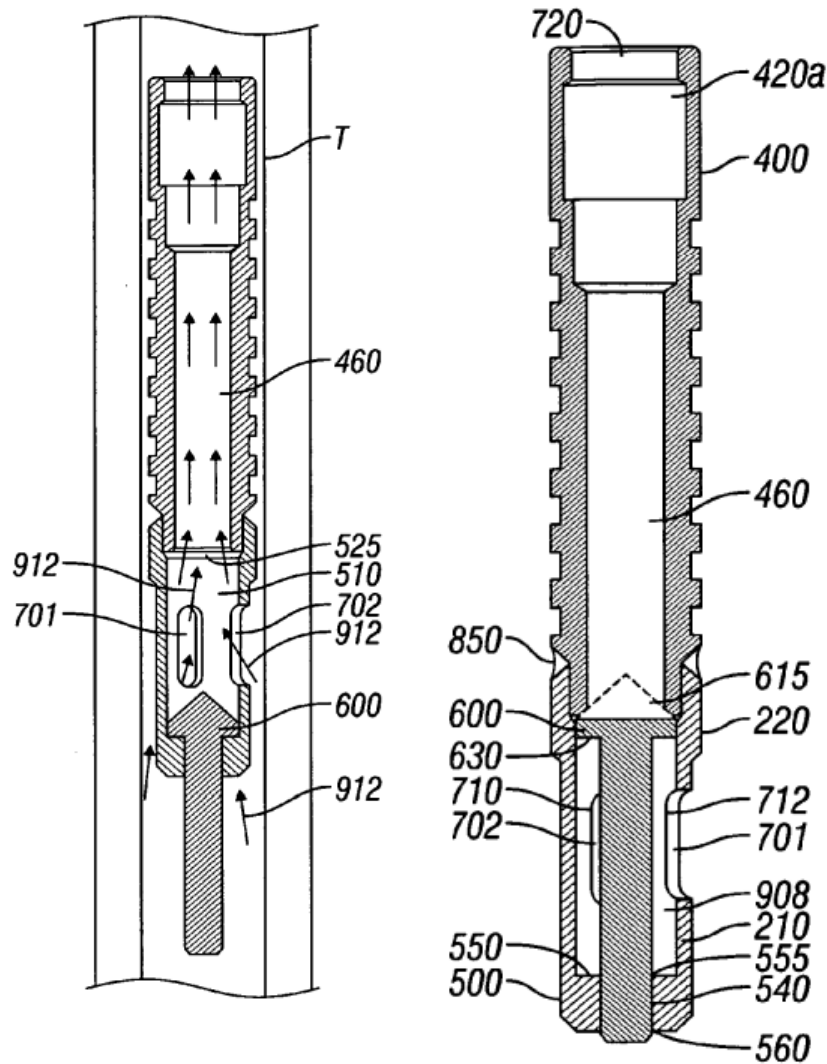


FIG. 1A

FIG. 37

Figure 1A of Gray illustrates a plunger descending in well tube T with valve chamber 510 attached to the plunger. Closure member 600 is held in an open position by its weight to permit fluids 912 in tube T to enter valve chamber 510 through ports 701, 702 and flow into inner passage 460 and out through the top opening of the plunger body to permit a rapid descent of the plunger. *Id.* ¶¶ 52–54, 62, 107. The larger inner passage 460 permits a rapid descent in an open well and creates a choking effect/back pressure that holds stopper 600 open during descent as shown. *Id.* ¶¶ 57, 91, 98, 107, 111, 112.

Figure 37 of Gray depicts a plunger with end cap 220 attached to the bottom end of the plunger to contain bypass valve 600 that stops fluid flow through ports 701, 702 into inner passage 460. *Id.* ¶¶ 102, 106. Stopper 600 moves to a closed position at the well bottom when a well stop pushes the stem of stopper 600 upwardly to seat on the roof of end cap 220, which increases pressure below the plunger and lifts the plunger to the surface. *Id.* ¶¶ 47, 63, 106, 107. Stopper 600 is held in a closed position during ascent by the gas pressure that builds up below the plunger. *Id.* ¶¶ 61, 91.

2. Overview of Victor (Ex. 1004)

Victor discloses plungers with narrow fluid passages that propel gas jets into liquid above the plungers to aerate the load so the plungers can lift heavier loads faster. Ex. 1004, 1:6–11, 3:23–4:20. Victor uses such narrow passages 74 in actuator rods 25C of bypass valves. *Id.* at 6:23–37, 7:16–8:48. Figures 8B, 9B, and 10B of Victor, reproduced below, illustrate a prior art bypass plunger modified by adding narrow passage 74 to its bypass valve stopper 25C so gas below the plunger can exit aperture 88 when the plunger valve is in a closed position to aerate the liquid above the plunger and thereby lift heavier loads at greater velocities. *Id.* at 7:6–8:17.

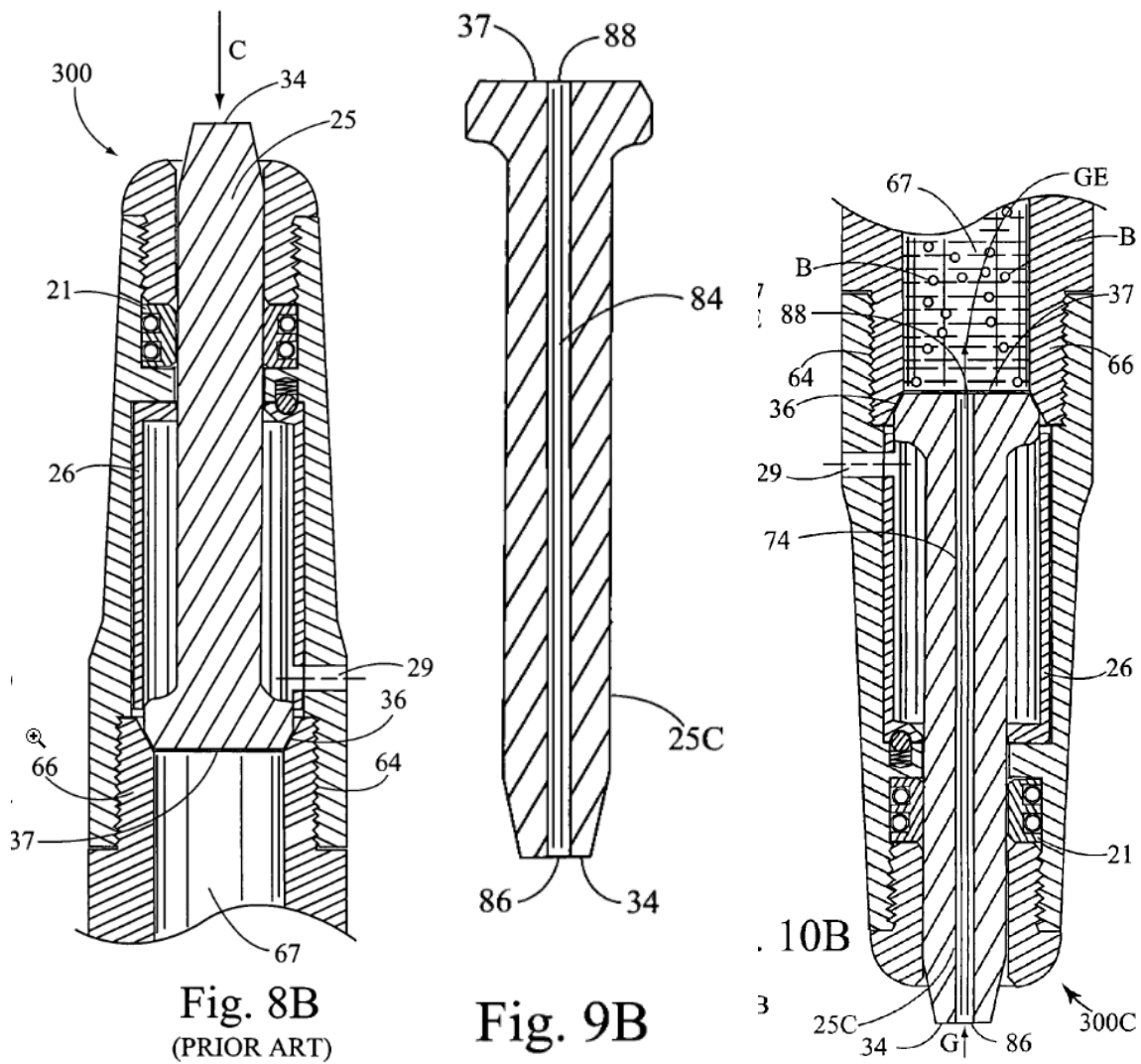


Figure 8B of Victor illustrates a prior art bypass valve with actuator rod 25 held in a closed (no bypass) position by brake clutch 21. *Id.* at 7:6–15. In the closed position, rod top end 37 closes the fluid path at top section 66 to enable the plunger to rise back to the well top. *Id.* at 7:10–15.

Figure 9B of Victor illustrates a modification to the prior art actuator rod 25. The modification provides a central through orifice 84 so gas below the plunger enters through aperture 86 of bottom surface 34 and exits from aperture 88 at top surface 37 to jet through the valve when actuator rod 25C is in a closed (i.e., a no bypass) position. *Id.* at 7:52–62.

Figure 10B of Victor illustrates actuator rod 25C in a variable orifice bypass valve (VOBV) 300C. *Id.* at 8:12–13. Actuator rod 25C is illustrated in a closed position with upper end 36 of actuator rod 25C sealed against the slant surface 36 of the plunger to impede the fluid path. *Id.* at 7:16–28. A reduced, impeded flow of gas G exits from aperture 88 of actuator rod 25C of the bypass valve in direction GE into liquid load L to provide liquid lift assist in the bypass plunger. *See id.* at 8:12–17; *see also id.* at 7:6–28.

3. Motivation to Combine Gray and Victor

Petitioner contends that the '892 patent claims the use of a narrowed portion of an internal passageway to generate turbulence in the upper portion of the plunger, “which is nothing more than a direct consequence of well-known principles.” Pet. 14. Petitioner asserts that Victor teaches the same improvement by using a narrowed passageway to generate turbulence in the upper portion of the plunger to improve its lifting capabilities. *Id.* Petitioner asserts that Victor teaches the improvements are applicable to prior art solid (i.e., no moving parts) plungers and to *bypass plungers like those in Gray*. *Id.* Petitioner contends that “[t]he improvements are simple to implement, requiring only minor machining operations to modify existing solid plungers (Ex-1004, Victor, Fig. 6) and bypass plunger actuator rods/stoppers (Ex-1004, Victor [*sic*] Figs. 37, 38).” *Id.* at 15. Petitioner further contends that:

The combination of Gray with Victor is the combination of known elements according to known methods to achieve predictable results. The disclosures of Gray and Victor were directed at similar problems encountered in the same area of use and were compatible with each other. The combination is therefore motivated and proper.

Id. Gray’s bypass valve is modified with Victor’s narrow passage.

4. Independent Claims 1, 18, and 23

Each of independent claims 1, 18, and 23 includes a limitation to an unimpeded fluid path through the plunger body. Claims 1 and 23 recite “an unimpeded fluid path through the plunger body.” Ex. 1001, 14:41, 16:22. Claim 18 recites “allowing fluid to pass through an unimpeded narrow passageway within the fluid path” of the plunger. *Id.* at 16:1–3. Petitioner asserts that Gray and Victor teach this feature for claims 1 and 23:

Gray discloses a plunger with a fluid path (shown by arrows in Ex-1005, Gray Fig. 1A) without any blockages or impediments through the inner passageway 460 plunger body. Ex-1005, Gray ¶ 62, Fig. 1A.

Victor discloses a fluid path through pathway 44/44A, 67 through the plunger body 2000, 300. Ex-1004, Victor 5:47-67; 6:43-8:17.

Pet. 16 (claim 1), 34 (claim 23).

For the narrow passageway within the fluid path, Petitioner asserts that Gray and Victor disclose this feature in claims 1 and 23:

Gray discloses that the passageway 460 is narrower than lower chamber 510 (disclosed as being “enlarged”) and the upper chamber 420a formed by the internal fishing neck (also called a fishing “part” or “piece”). Ex-1005, Gray ¶¶ 101, 102, Figs. 1A, 37, 38.

Victor discloses that the fluid passageway 67 has a narrow passageway 74. Ex-1004, Victor 7:16-8:17; Figs. 9B, 10B.

Pet. 17 (claim 1), 34 (claim 23).

For claim 18, Petitioner asserts that Victor improves prior art bypass plungers such as Gray by adding internal passageway 74 to the actuator rod to allow gas to pass through even when the actuator rod is in the “closed” position during ascent of the plunger so gas passes and exits a central orifice 88 of the passageway 74. *Id.* at 30 (citing Ex. 1004, 7:63–8:17, Fig. 10B).

5. *Patent Owner's Arguments*

a. *unimpeded fluid path / unimpeded narrow passageway*

Patent Owner argues that Gray does not disclose “an unimpeded fluid path through the plunger body” in claims 1 and 23 or “an unimpeded narrow passageway in the fluid path” in claim 18 because Gray’s plunger includes a bypass valve in the fluid path (contrary to the construction discussed above), and the bypass valve restricts/impedes the upward flow of liquids and gases through the plunger body to allow pressure to build up below the plunger. Prelim. Resp. 41 (citing Ex. 2001 ¶¶ 67–69), 54–55 (presenting the same argument for claim 18). Patent Owner argues that Victor discloses a plunger with a VOBV that uses a moving valve in the fluid path in the plunger body to alter and regulate the fluid flow. *Id.* at 42–43 (citing Ex. 2001 ¶¶ 82–86), 54–55 (presenting the same argument for claim 18).

Mr. Cosby testifies that Gray’s bypass plunger includes end cap 220 with stopper 600. Ex. 2001 ¶¶ 66, 67. Mr. Cosby testifies that when stopper 600 is in its closed position, no gas moves into plunger passageway 460 and the increase in differential pressure across the plunger causes the plunger to rise. *Id.* ¶¶ 67–69. Mr. Cosby testifies that Victor’s bypass valve includes a passage in actuator rod 25, and closing the bypass valve creates a differential pressure across the plunger to move the plunger upwardly. *Id.* ¶¶ 81, 82, 86. Mr. Cosby testifies, “Victor and Gray teach that a bypass valve must impede the passageway for the plunger to rise.” *Id.* ¶ 106.

Gray and Victor impede the fluid paths through their plungers via Gray’s stopper 600 and Victor’s actuator rod 25C. As modified, Gray’s bypass plunger includes Victor’s rod 25C in the fluid path. Pet. 16–17 (citing Victor 7:16–8:17, Figs. 9B, 10B), 30, 34; Prelim. Resp. 41–43.

Gray's bypass plunger lacks an unimpeded fluid path before and after modification with Victor's actuator rod 25C. Although Petitioner identifies an unimpeded pathway 44/44A in Victor's plunger 2000, Ground 1 modifies Gray's bypass valve stopper 600 with aperture 74 of Victor's bypass valve actuator rod 25C. Pet. 16–17, 30, 34. Petitioner compares Victor's actuator rod 25C to bypass valve 360A in Figure 10 of the '892 patent to illustrate the similarity. *Id.* at 12. Yet, as discussed in our construction of “unimpeded,” Patent Owner disclaimed plungers with bypass valves to distinguish Brown and obtain the '892 patent. Claims 1, 18, and 23 thus do not cover bypass valve embodiments described in the '892 patent. Petitioner has failed to show a reasonable likelihood of demonstrating the unpatentability of any of claims 1–11, 13, 15, 16, 18–21, 23, and 24 under Ground 1 because Gray's modified bypass valve plunger lacks “an unimpeded fluid path” as recited in claims 1 and 23 and “an unimpeded narrow passageway within the fluid path” as recited in claim 18.

b. Motivation to Combine

Further, we are persuaded by Patent Owner's argument that a skilled artisan would not have modified Gray's bypass valve with Victor's stopper because their different principles of operation would render Gray's plunger unsuitable for its intended purpose of providing lift in early stage wells. *See* Prelim Resp. 35–38 (citing Ex. 2001 ¶¶ 66–75, 103–107, 111). Mr. Cosby testifies that Gray and Victor operate differently so adding a narrow passage of Victor to Gray's plunger would reduce the ability of Gray's plunger to work in high pressure wells. Ex. 2001 ¶¶ 103–07; *see* Ex. 1005 ¶¶ 57, 91, 98, 111–12. The record supports Mr. Cosby's testimony, and Petitioner's attorney arguments do not address the arguments and evidence. Pet. 14–15.

For this additional reason, Petitioner has failed to show a reasonable likelihood of demonstrating the unpatentability of any of claims 1–11, 13, 15, 16, 18–21, 23, and 24 under Ground 1.

E. Ground 3: Alleged Obviousness Based on Wells and Victor

Petitioner contends that claims 1–11, 13, 15, 16, 18–21, 23, and 24 are unpatentable under 35 U.S.C. § 103(a) over Wells and Victor. Pet. 45–65. Patent Owner disputes Petitioner’s contentions. Prelim. Resp. 28–55.

1. Overview of Wells (Ex. 1006)

Wells discloses a bypass plunger with a bypass valve (ball 40) in the fluid path as illustrated in Figure 3, reproduced below without ball 40.

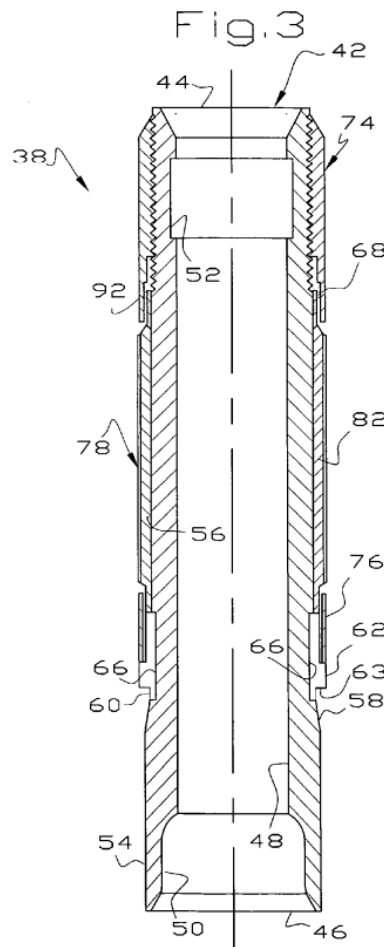


Figure 3 of Wells illustrates bypass plunger 26 (unnumbered) with sleeve 38 and compartment 50 configured to seat ball 40 (not shown) to close fluid passage 48 in sleeve 38 and create a pressure difference across bypass plunger 26 to move it upwardly in the well. Ex. 1006 ¶¶ 24, 26. The pressure difference across the plunger biases seal pads 78 to engage the well tubing. *Id.* ¶¶ 26, 27. In operation, ball 40 is dropped into the well and falls rapidly through a rising stream of produced products until it reaches bottom bumper 34. Then, sleeve 38 falls to the well bottom to unite with ball 40 to close passage 48 and begin upward movement. *Id.* ¶¶ 37, 38.

2. Motivation to Combine Wells and Victor

Petitioner contends that “Wells discloses a two-piece plunger of the ball and sleeve type.” Pet. 45. Petitioner asserts that “[a] ball and sleeve plunger is similar in concept to a bypass plunger, except the movable valve means is not captive within a cage structure.” *Id.* Petitioner contends that the ’892 patent discloses such a ball and sleeve bypass valve embodiment in Figure 12. *Id.* Regarding the combination with Victor, Petitioner contends:

A POSITA would have understood that Victor’s teachings of creating a passageway through a plunger that is otherwise in the “closed” position offers numerous benefits, as described above, and that would be equally applicable to other types of plungers. Victor discloses multiple times that its teachings are broadly applicable to numerous well-known plunger designs. Ex-1004, Victor 6:38-54, 8:31-36, 8:49-58. Specifically, a POSITA would understand that, due to the close similarity in function between a bypass plunger and a ball and sleeve plunger, Victor’s teachings could be directly applied to ball and sleeve plungers to achieve the same benefits over prior art ball and sleeve plungers.

Id. at 45–46.

3. Independent Claims 1, 18, and 23

Independent claims 1 and 23 recite “an unimpeded fluid path through the plunger body.” Ex. 1001, 14:41, 16:22. Claim 18 recites “allowing fluid to pass through an unimpeded narrow passageway within the fluid path.” *Id.* at 16:1–3. Petitioner asserts that Wells and Victor disclose this feature:

Wells discloses a fluid path through passageway 48 that extends through the plunger body 38.

Victor discloses a fluid path through pathway 44/44A, 67 through the plunger body 2000, 300. Ex-1004, Victor 5:47-67; 6:43-8:17.

Pet. 47 (claim 1), 62 (claim 23).

For the narrow passageway within the fluid path, Petitioner asserts:

Wells discloses that the middle portion of the fluid path is narrower than both the upper chamber (internal fishing neck area 52) and lower chamber (compartment 50). The ‘892 patent similarly discloses the upper chamber being formed by the internal fishing neck area (Ex-1001, ‘892 patent 12:35-41) and a lower chamber being formed from the ball seat (Ex-1001, ‘892 patent Figs. 12, 13).

Victor discloses that the fluid passageway 67 has a narrow passageway 74. Ex-1004, Victor 7:16-8:17; Figs. 9B, 10B.

Pet. 47 (claim 1), 63 (claim 23).

For claim 18, Petitioner asserts that Victor discloses an actuator rod with an internal passageway 74 that allows gas to pass through even when the actuator rod is in a “closed” position as it is during the plunger’s ascent. Pet. 59 (citing Ex. 1004, 7:63–8:17, Fig. 10B). Petitioner asserts that the ball’s orientation is not guaranteed so Victor’s raised burrs could be added to the ball to leave a gas flow opening, or Victor’s grooves 94 could be formed in the valve seat instead of the ball to control the gas flow. *Id.* at 59–60.

4. Patent Owner's Arguments

a. unimpeded fluid path / unimpeded narrow passageway

Patent Owner argues that Wells does not disclose “an unimpeded fluid path through the plunger body” as recited in independent claims 1 and 23 or “an unimpeded narrow passageway in the fluid path” in claim 18 because Wells discloses a ball and sleeve bypass valve that must be closed to restrict the upward flow of liquids through the plunger to provide lift in the system. Prelim. Resp. 42 (citing Ex. 2001 ¶¶ 91–95), 54–55 (same argument for claim 18). Patent Owner argues that Victor discloses a plunger and VOBV that provides a moving valve in the fluid path in the plunger body to alter and regulate the fluid flow. *Id.* at 42–43 (citing Ex. 2001 ¶¶ 82–86), 54–55 (same argument for claim 18).

Mr. Cosby testifies that Wells teaches a two-piece plunger lift system, comprising an upper sleeve 38 with a passageway through its center, to allow the sleeve to fall against a high upward flow of gas and liquids and a ball 40 to block the passage. Ex. 2001 ¶¶ 88–92. Mr. Cosby testifies that when the ball valve closes the passage and blocks the flow rate through the sleeve, the plunger rises. *Id.* ¶ 93. Mr. Cosby testifies that Victor's aeration device allows the bypass plunger to rise when the bypass valve is closed by increasing the differential pressure across the valve. *Id.* ¶¶ 81–83, 86. Mr. Cosby testifies that “Victor and Wells teach that a bypass valve must close a large portion of the passageway for the plunger to rise.” *Id.* ¶ 114.

Wells and Victor teach bypass valve plungers that impede the fluid path with a valve (ball 40 in Wells, rod 25C in Victor) in the plunger's fluid path, and Wells's modified plunger impedes the fluid flow in the closed position. Pet. 47 (citing Victor, Figs. 9B, 10B); Prelim. Resp. 42–43.

Because we interpret an unimpeded fluid path or narrow passageway as a fluid path or passageway without any valves, neither Wells nor Victor, alone or in combination, teaches or suggests such an unimpeded fluid path or passageway. Ground 3 modifies Wells' bypass valve 40, which is located in the plunger's fluid path/passage 40, to include narrow passage 74 of Victor's rod 25C for claims 1 and 23 (Pet. 47, 63) and Victor's burrs to Wells' ball valve 40 or grooves 94 in the valve seat for claim 18 (*id.* at 59). Wells' ball valve 40, with or without Victor's passage 74, burrs, or grooves, impedes the plunger's fluid path/passage 48. Patent Owner disclaimed such bypass valve plungers to obtain the '892 patent, as discussed above. Petitioner has failed to show a reasonable likelihood of demonstrating the unpatentability of any of claims 1–11, 13, 15, 16, 18–21, 23, and 24 because Petitioner failed to establish that Wells and Victor teach or suggest “an unimpeded fluid path” in claims 1 and 23 or “an unimpeded narrow passageway within the fluid path” in claim 18.

b. Motivation to Combine

Further, we are persuaded by Patent Owner's arguments that a skilled artisan would not have been motivated to modify Wells' bypass valve with a narrow passage because the ball and sleeve allow Wells' plunger to fall quickly in a strong gas flow and maximize sealing for lift so adding Victor's narrow passage would undermine this design. Prelim Resp. 38–41 (citing Ex. 2001 ¶¶ 88–102, 109–116). Mr. Cosby testifies that the Wells' sleeve would not fall against a high gas flow and the pads would not seal as well if a narrow passage was added to the bypass valve. Ex. 2001 ¶¶ 108–111. In addition, Mr. Cosby testifies that a narrow passageway formed through ball 40 would not be assured of aligning with the sleeve's fluid path. *Id.* ¶ 112.

The record supports Mr. Cosby's testimony, and Petitioner's attorney arguments do not address these arguments or evidence. *See* Pet. 45–46. For this additional reason, Petitioner has failed to show a reasonable likelihood of demonstrating the unpatentability of any of claims 1–11, 13, 15, 16, 18–21, 23, and 24 under Ground 3.

F. Ground 2: Alleged Anticipation by Wells

Petitioner contends that claims 1, 2, 4–7, 10, 11, 23, and 24 are anticipated by Wells. *See* Pet. 36–44. Patent Owner disputes Petitioner's contentions. *See* Prelim. Resp. 56–59.

Regarding independent claims 1 and 23, Petitioner asserts that Wells provides an unimpeded fluid path through the plunger body as passageway 48 that extends through plunger body 38. Pet. 38, 43. Patent Owner argues that Wells does not disclose “an unimpeded fluid path through the plunger body” for the same reasons as discussed above with regards to Ground 3, namely, the fluid path in Wells is impeded by ball valve 40. Prelim. Resp. 56 (citing Prelim. Resp. § VIII.C.1. at 42 for Ground 3). We find Patent Owner's argument to be persuasive for the reasons discussed above for Ground 3 based on our claim construction of an “unimpeded” fluid path. Petitioner has not adequately established that Wells discloses a plunger with “an unimpeded fluid path through the plunger body” as recited in claim 1 and 23 because Wells' plunger has a ball valve 40 that closes passageway 48 to create a pressure differential that allows the plunger to rise in the well as discussed above for Ground 3. *See* Prelim. Resp. 42. Thus, Petitioner has failed to show a reasonable likelihood of demonstrating the unpatentability of any of claims 1, 2, 4–7, 10, 11, 23, and 24 as anticipated by Wells under Ground 2.

III. CONCLUSION

For the reasons discussed above, we are not persuaded that Petitioner has demonstrated a reasonable likelihood of prevailing in proving any of claims 1–11, 13, 15, 16, 18–21, 23, and 24 to be unpatentable.

IV. ORDER

For the foregoing reasons, it is

ORDERED that the Petition is denied and no trial is instituted.

IPR2022-01386
Patent 8,627,892 B2

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