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Paper 29
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HELMERICH & PAYNE INTERNATIONAL DRILLING COMPANY, HELMERICH & PAYNE TECHNOLOGIES, LLC, and MOTIVE DRILLING TECHNOLOGIES, INC.,
Petitioner,

v.

NABORS DRILLING TECHNOLOGIES USA, INC.,
Patent Owner.

IPR2021-00672
Patent 7,860,593 B2

Before KEN B. BARRETT, MATTHEW S. MEYERS, and SEAN P. O'HANLON, *Administrative Patent Judges*.

O'HANLON, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. Background

Helmerich & Payne International Drilling Company, Helmerich & Payne Technologies, LLC, and Motive Drilling Technologies, Inc. (collectively, "Petitioner") filed a Petition for *inter partes* review of claims 19–27 ("the challenged claims") of U.S. Patent No. 7,860,593 B2 (Ex. 1001, "the '593 patent"). Paper 2 ("Pet."), 1. Nabors Drilling Technologies USA, Inc. ("Patent Owner") filed a Preliminary Response. Paper 7. On October 18, 2021, we instituted an *inter partes* review of the challenged claims on all grounds raised in the Petition. Paper 11 ("Institution Decision" or "Inst. Dec."), 40.

Subsequent to institution, Patent Owner filed a Patent Owner Response (Paper 16, "PO Resp."), Petitioner filed a Reply to the Patent Owner Response (Paper 19, "Pet. Reply"), and Patent Owner filed a Sur-reply to Petitioner's Reply (Paper 23, "PO Sur-reply"). An oral hearing was held on July 15, 2022. A transcript of the hearing has been entered into the record. Paper 27 ("Tr.").

In our Scheduling Order, we notified the parties that "any arguments for patentability not raised in the [Patent Owner] response may be deemed waived." *See* Paper 12, 10; *see also* Patent Trial and Appeal Board Consolidated Trial Practice Guide 66 (Nov. 2019) ("The patent owner response . . . should identify all the involved claims that are believed to be patentable and state the basis for that belief."). [1]

[1] *Available at* https://www.uspto.gov/TrialPracticeGuideConsolidated.

For the reasons that follow, we conclude that Petitioner has proven by a preponderance of the evidence that the challenged claims are unpatentable.

B. Real Parties in Interest

Petitioner identifies its three constituent entities and Helmerich & Payne, Inc. as real parties in interest. Pet. 1. Petitioner asserts that Helmerich & Payne International Drilling Company and Helmerich & Payne Technologies, LLC are subsidiaries of and wholly owned by Helmerich & Payne, Inc. *Id.*

Patent Owner identifies itself and Nabors Corporate Services, Inc. as real parties in interest. Paper 5, 2.

C. Related Matters

The parties indicate that the '593 patent is the subject of the following district court proceeding:

> *Nabors Drilling Technologies USA Inc. v. Helmerich & Payne International Drilling Co.*, No. 3-20-cv-03126 (N.D. Tex. filed October 14, 2020) ("the Texas litigation").

Pet. 1–2; Paper 5, 2. Patent Owner further notes four patents and one patent application in the priority chain of the '593 patent. Paper 5, 3.

D. The Challenged Patent

The '593 patent discloses a "project plan execution system" for a well drilling operation. Ex. 1001, 1:66–2:8.

> A well prognosis, or a well program, referred to by people in the drilling industry as a "prog," or "well prog," is generally known to be a detailed document containing the information various experts contribute to plan for and chronicle

> the steps of drilling a well, which, in general includes all aspects surrounding the creation of an operational well, including planning, drilling, and completing.

Id. at 4:9–15. The well prog contains information pertaining to events in the well drilling operation, some events being "action items that require some action to be taken to ensure that the event is performed according to the prog." *Id.* at 1:12–28; *see also id.* at 7:28–33 (indicating that an operator may elect to omit performing an action item). There is no universal standard for formatting well progs. *Id.* at 1:10–12. The '593 patent purports to provide the improvement of an automated system to identify action items in a well prog. *Id.* at 1:45–62. Figure 1 illustrates the system and is reproduced below.

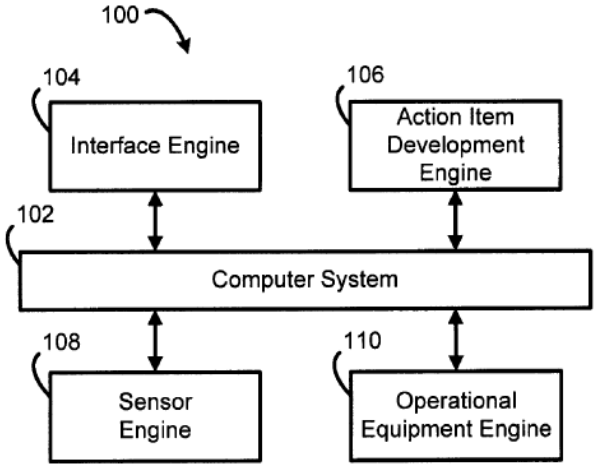


FIG. 1

Figure 1 is a schematic diagram of prog facilitation system 100, showing "a computer system 102 coupled to an interface engine 104, an action item development engine 106, a sensor engine 108, and an operational equipment engine 110." *Id.* at 2:47–49, 4:19–25. Each of these engines is a software module or routine in a computer program. *Id.* at 4:25–27. Interface engine 104 includes at least one input and output to allow a user to interact

with the computer system, such as to input data. *Id.* at 4:34–48. Action item development engine 106 includes action item identification module 202 that reviews the prog and identifies events and action item development module 204 that determines whether the identified events are action items. *Id.* at 5:8–13, 5:29–31, Fig. 2. Sensor engine 108 includes sensors, meters, detectors, or other devices that are configured to measure or sense parameters related to a prog specification of a component of the well drilling operation. *Id.* at 6:16–20. Operational equipment engine 110 is configured to receive control inputs from the computer system and control the well drilling operation. *Id.* at 6:46–48.

Figure 3 illustrates a flow diagram of using the prog facilitation system and is reproduced below.

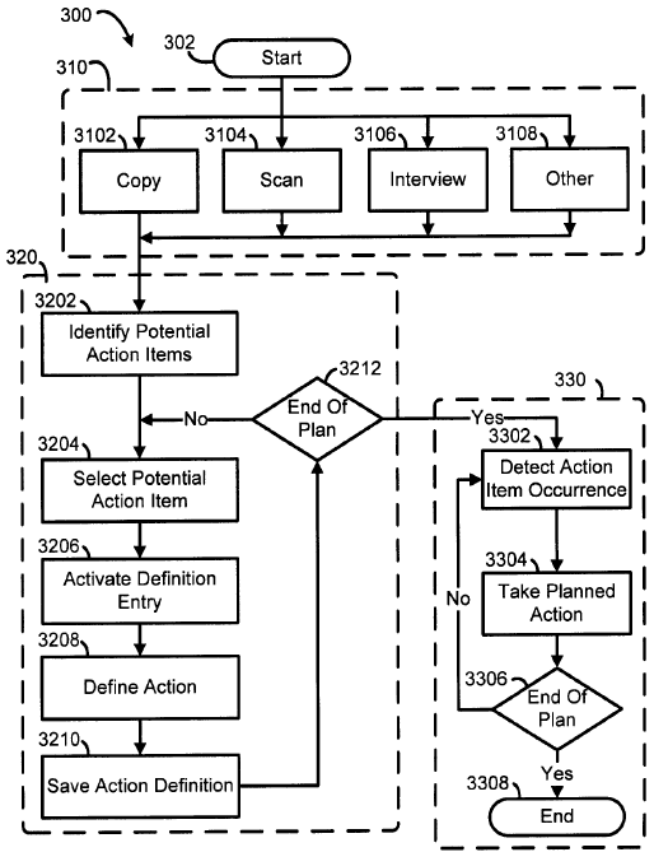


FIG. 3

Figure 3 is a flow diagram of using the prog facilitation system and shows three main steps: entering the well prog into the system (step 310), scanning or assessing the well prog to identify action items (step 320), and execution of the well prog (step 330). Ex. 1001, 2:53–55, 6:55–56, 7:20–23, 9:24–26. The well prog may be input via interface engine 104 in a number of ways, including copying a text file (step 3102), scanning a hardcopy document and performing character recognition (step 3104), and responding to an interview that asks questions about the full range of potential operations the prog may cover (step 3106). *Id.* at 6:58–7:2.

Once the well prog has been entered, action item development engine 106 identifies and assesses potential events that may occur during execution of the well prog. Ex. 1001, 7:20–28. Action item identification module 202 scans or assesses the well prog to identify potential action items (step 3202) and action development module 204 defines actions that should be taken upon the occurrence of each action item, either automatically or with user input (steps 3204, 3206, 3208). *Id.* at 7:34–8:12. This may include comparison of the identified action items with a database of known actions in response to action items. *Id.* at 8:3–6. The defined actions are saved (step 3210) and the process is repeated until the end of the well prog is reached (step 3212). *Id.* at 9:14–20.

The well prog is then executed (step 330). Ex. 1001, 9:24–26. The system monitors data from sensor engine 108 to detect the occurrence of an action item (step 3202). *Id.* Upon detecting an action item, the system follows the action definition and takes the planned action (step 3304). *Id.* at 9:26–28. This process is repeated until the end of the well prog is reached (steps 3306, 3308). *Id.* at 9:29–36.

E. The Challenged Claims

Petitioner challenges claims 19–27 of the '593 patent. Pet. 1. Claim 19 is the only independent claim challenged and is reproduced below with added bracketing as used by Petitioner.

> 19. [P] A method for controlling a well drilling operation, comprising:
>
> [a] receiving a well prog;
>
> [b] converting the well prog into a computer readable format;
>
> [c] assessing the converted well prog to identify action items;
>
> [d] associating a response with each identified action item; and
>
> [e] controlling a well drilling operation in accordance with the responses associated with each identified action item from the well prog.

Ex. 1001, 11:37–45; *see also* Ex. 1008, 3–4 (bracketing).

F. Instituted Grounds of Unpatentability

The Petition relies on the following prior art references:

Name	Reference	Exhibit
Holbrook	US 5,305,836 issued April 26, 1994	1006
King	US 2006/0041828 A1, published February 23, 2006	1007

We instituted trial based on Petitioner's sole asserted ground:

Claim(s) Challenged	35 U.S.C. §	Reference(s)
19–27	103(a)[2]	Holbrook, King

[2] The application resulting in the '593 patent was filed before the date when the Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112–29, 125 Stat. 284 (2011), took effect. Thus, we refer to the pre-AIA version of section 103.

Pet. 4. Petitioner submits a declaration of Vinod Sharma, P.E. (Ex. 1003, "the Sharma Declaration") in support of its contentions. Patent Owner submits a declaration of Eduardo Gildin, Ph.D. in support of its contentions. Ex. 2011.

II. ANALYSIS

A. Principles of Law

"In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable." *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim")). Petitioner bears the burden of persuasion to prove unpatentability of each challenged claim by a preponderance of the evidence. 35 U.S.C. § 316(e). This burden never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

A patent claim is unpatentable under 35 U.S.C. § 103(a) 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 the subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of skill in the art, and (4) when in evidence, any objective

evidence of nonobviousness.[3] *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

The level of ordinary skill in the art is "a prism or lens" through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). The person of ordinary skill in the art is a hypothetical person presumed to have known the relevant art at the time of the invention. *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). In determining the level of ordinary skill in the art, we may consider certain factors, 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." *Id.* (internal quotation marks and citation omitted).

Petitioner contends that a person having ordinary skill in the art at the time of the invention ("POSITA") "would be a person with a Bachelor of Science degree in engineering (e.g., electrical, computer, mechanical, petroleum engineering), computer science, or an equivalent degree" and, through education or experience, would have "at least two years of experience in the field of computer programming, working with computer systems, user interfaces, and control systems." Pet. 14 (citing Ex. 1003 ¶¶ 62–65).

Patent Owner does not contest Petitioner's definition or offer a definition of its own. *See generally* PO Resp. We note that Patent Owner's

[3] The parties have not directed us to any such objective evidence.

expert, Dr. Gildin, agrees with Petitioner's definition. *See* Ex. 2011 ¶ 44 ("I agree with Mr. Sharma's definition for a POSITA as of May 2007." (citing Ex. 1003 ¶ 63)).

We find Petitioner's description to be consistent with the problems and solutions disclosed in the '593 patent and prior art of record, and adopt it as our own for purposes of this Decision. *See, e.g.*, *In re GPAC Inc.*, 57 F.3d at 1579 (approving the determination of the level of ordinary skill in the art by appeal to the references of record).

C. Claim Construction

In an *inter partes* review, claims are construed using the same claim construction standard that would be used to construe the claims in a civil action under 35 U.S.C. § 282(b), including construing the claims in accordance with the ordinary and customary meaning of such claims 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). Thus, we apply the claim construction standard as set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). In addition to the specification and prosecution history, we also consider use of the terms in other claims and extrinsic evidence including expert and inventor testimony, dictionaries, and learned treatises, although extrinsic evidence is less significant than the intrinsic record. *Id.* at 1312–17. Usually, the specification is dispositive, and it is the single best guide to the meaning of a disputed term. *Id.* at 1315.

The specification may reveal a special definition given to a claim term by the patentee, or the specification may reveal an intentional disclaimer or disavowal of claim scope by the inventor. *Phillips*, 415 F.3d at 1316. If an

inventor acts as his or her own lexicographer, the definition must be set forth in the specification with reasonable clarity, deliberateness, and precision. *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998). A disavowal, if any, can be effectuated by language in the specification or the prosecution history. *Poly-America, L.P. v. API Indus., Inc.*, 839 F.3d 1131, 1136 (Fed. Cir. 2016). "In either case, the standard for disavowal is exacting, requiring clear and unequivocal evidence that the claimed invention includes or does not include a particular feature." *Id.* "Ambiguous language cannot support disavowal." *Id.* (citing *Omega Eng'g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1324 (Fed. Cir. 2003)).

In the Institution Decision, "we interpret[ed] 'well prog' to have its ordinary and customary meaning of a document containing information for planning and chronicling the steps of drilling a well, and that the well prog may be in the form of a non-computer readable document." Inst. Dec. 14. We note that the court in the Texas litigation interpreted this term in the same manner. *See* Ex. 2015, 12. During the hearing, both parties agreed with our interpretation of "well prog" as set forth in the Institution Decision. Tr. 7:16–23; 23:4–10.

Accordingly, for the reasons set forth in the Institution Decision (*see* Inst. Dec. 12–14), we reaffirm our interpretation of "well prog" to have its ordinary and customary meaning of a document containing information for planning and chronicling the steps of drilling a well, and that the well prog may be in the form of a non-computer readable document.

We determine that we need not explicitly construe any other claim term to resolve the parties' controversies. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (quoting *Vivid Techs., Inc. v. Am. Sci.*

& Eng'g, Inc., 200 F.3d 795, 803 (Fed. Cir. 1999)) ("The Board is required to construe 'only those terms that . . . are in controversy, and only to the extent necessary to resolve the controversy.'" (alteration in original)).

D. Overview of the Asserted Prior Art

1. Holbrook

Holbrook discloses "[h]ardware, software and methods for controlling the usage of well drill bits and other aspects of well drilling plans." Ex. 1006, code (57). "Before a well is drilled, a plan is developed for at least roughly projecting the timing of such activities as the replacement of the drill bit, changing the weight of the drilling mud, setting casing, etc." *Id.* at 1:10–14. Conventional drilling operations typically replace drill bits as a function of hours of operation. *Id.* at 1:14–18. Holbrook purports to improve upon conventional drilling operations by modeling bit wear as a function of "the abrasiveness of the formation which has actually been drilled by that bit." *Id.* at 1:39–43.

Figure 1 is a flow diagram of Holbrook's process and is reproduced below.

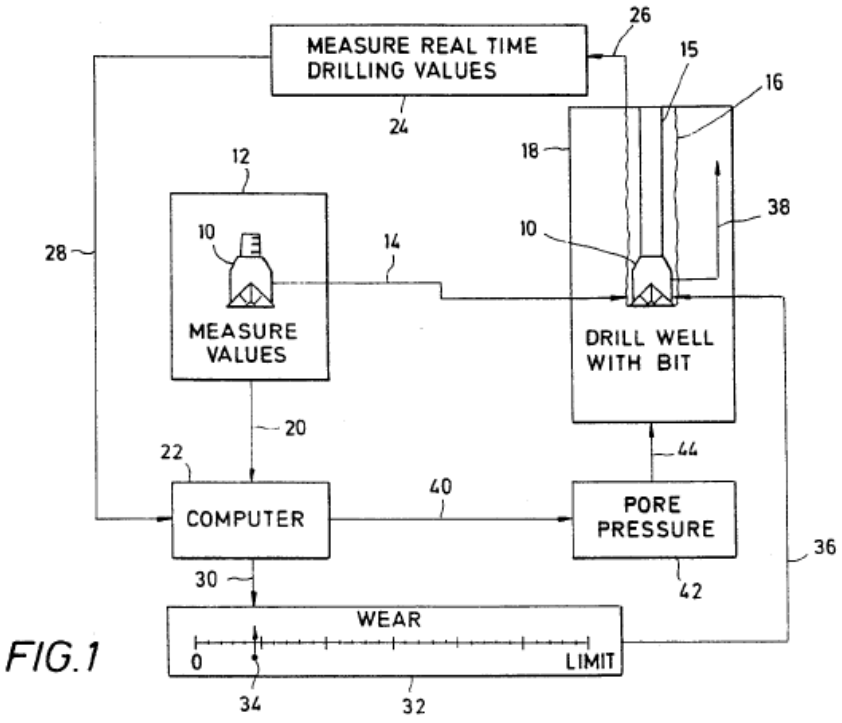


FIG.1

Figure 1 is a flow diagram for a method of controlling the usage of a drill bit as well as other aspects of the execution of a well drilling plan. Ex. 1006, 6:40–43. As an initial step before the drill bit is used, certain measurements and other information, which make up the initial bit data, are taken from the bit (box 12) and entered into computer 22. *Id.* at 6:43–47. The system obtains certain constant and real-time drilling values during the drilling operation (box 24), which make up the drilling data and are entered into the computer. *Id.* at 6:51–55. The computer calculates the current abrasive wear of the bit cutting structure on an ongoing or continual basis, and provides an indication of the wear via output device 32. *Id.* at 6:56–63. This output can be provided in various forms, including a visible scale as illustrated in Figure 1 or a numerical value. *Id.* at 7:11–23. The drill operator can use this output to determine when to replace the drill bit. *Id.* at 6:67–7:2. Holbrook's system also determines pore pressure, which "can

be used to control other aspects of the execution of the well drilling plan, e.g. whether or not, and when to change mud weight, how much to change the mud weight, and when to set casing." *Id.* at 7:24–32.

2. King

King discloses "[a] system for processing text captured from rendered documents." Ex. 1007, code (57). Figure 5 is a flow diagram of King's process and is reproduced below.

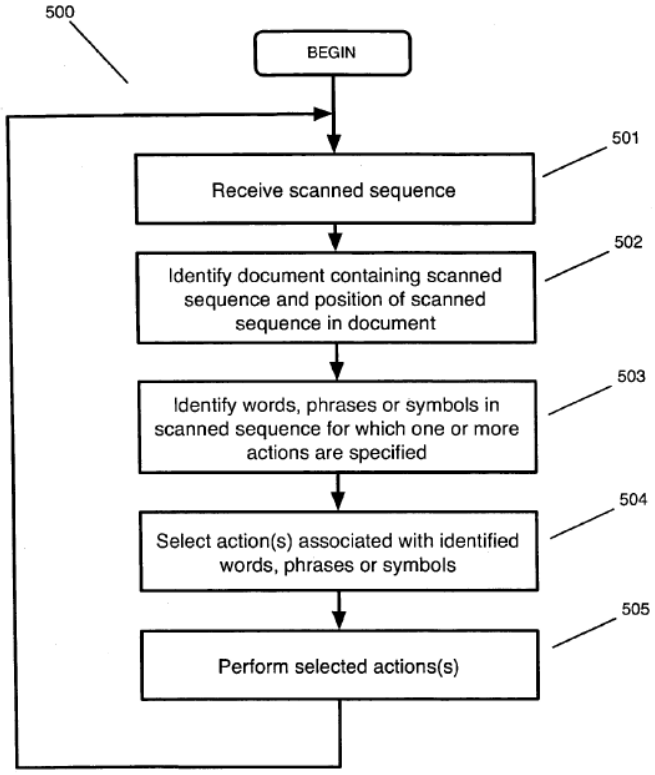


Figure 5

Figure 5 is a flow diagram showing steps typically performed by the system in order to perform an action in response to a user's capturing of a keyword. *Id.* ¶ 11. The process begins with the system receiving a sequence of words captured by a user (step 501). *Id.* ¶ 591. Optionally, the system may identify a document from which the sequence was taken (step 502). *Id.* The

system identifies keywords in the form of a word, phrase, or symbol in the captured sequence for which one or more actions are specified (step 503). *Id.*; *see also id.* ¶ 505 ("Keywords as used here means one or more words, icons, symbols, or images."). This identification may include use of a keyword server hosting a keyword action table that specifies particular actions for particular keywords. *Id.* ¶¶ 587–588. The system selects an action associated with the keyword (step 504) and performs the selected action (step 505). *Id.* ¶ 591. The system repeats this process by receiving the next captured sequence. *Id.*

E. Petitioner's Challenge

Petitioner argues that claims 19–27 would have been obvious over the combination of Holbrook and King. Pet. 23–73. In support of its showing, Petitioner relies upon the Sharma Declaration. *Id.* (citing Ex. 1003). We have reviewed the parties' briefs and the evidence of record and determine that, for the reasons explained below, Petitioner has shown, by a preponderance of the evidence, that claims 19–27 would have been obvious in view of Holbrook and King and that Petitioner has set forth reasoning with rational underpinning why it would have been obvious to combine the teachings of these references.

1. Independent Claim 19

Regarding independent claim 19, Petitioner relies on Holbrook to disclose a process of drilling a well according to a well drilling plan and on King to teach document processing techniques of converting a printed document into electronic form, identifying keywords in the document, and associating actions with the identified keywords. Pet. 23–65.

a. Preamble

Claim 19 recites "[a] method for controlling a well drilling operation." Ex. 1001, 11:37–38. Petitioner refers to this recitation as "19[P]" and argues that Holbrook discloses drilling wells according to a well drilling plan that controls drilling aspects such as usage of drill bits. Pet. 41–43.

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

Holbrook discloses hardware, software and methods for controlling the usage of well drill bits and other aspects of well drilling plans related to drilling oil and gas wells. Ex. 1006, code (57), 1:7–10.

Accordingly, on this record and to the extend the preamble is limiting, Holbrook supports Petitioner's contentions.

b. The Receiving Recitation

Claim 19 recites "receiving a well prog." Ex. 1001, 11:39. Petitioner refers to this recitation as "19[a]" and argues that Holbrook's "well drilling plan" is a well prog. Pet. 44–45 (citations omitted). Petitioner argues that King teaches receiving a document such as Holbrook's well drilling plan. *Id.* at 45–46 (citations omitted). Petitioner argues, "In the combined system, *Holbrook's* well drilling plan is scanned (e.g., using an optical scanner) as taught by *King*, which teaches 'receiving a well prog' as recited in limitation 19[a]." *Id.* at 46–47 (footnote omitted) (citing Ex. 1003 ¶ 113).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

Holbrook discloses that its well drilling plan "at least roughly project[s] the timing of such activities as the replacement of the drill bit,

changing the weight of the drilling mud, setting casing, etc." Ex. 1006, 1:10–14. King discloses "[a] system for processing text captured from rendered documents." Ex. 1007, code (57). Use of the system "typical[ly] . . . begins with using an optical scanner to scan text from a paper document." *Id.* ¶ 25.

Accordingly, on this record, Holbrook and King support Petitioner's contentions.

c. The Converting Recitation

Claim 19 recites "converting the well prog into a computer readable format." Ex. 1001, 11:40. Petitioner refers to this recitation as "19[b]" and argues that King discloses scanning a document and converting it to machine-compatible data via optical character recognition. Pet. 48–51 (citations omitted). "In the combined system, the scanned well drilling plan document is converted to computer readable format as described in *King*." *Id.* at 51 (citing Ex. 1003 ¶ 120; Pet. 44–47 (regarding the receiving recitation)).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

King discloses that "[t]ext from a rendered document is captured . . ., typically in optical form by an optical scanner . . . . A recognition process 104 such as OCR . . . or autocorrelation then converts the data into a signature, comprised in some embodiments of text, text offsets, or other symbols." Ex. 1007 ¶ 31; *see also id.* ¶ 26 (explaining that "[a] rendered document is a printed document or a document shown on a display or monitor").

Accordingly, on this record, King supports Petitioner's contentions.

d. The Assessing Recitation

Claim 19 recites "assessing the converted well prog to identify action items." Ex. 1001, 11:41. Petitioner refers to this recitation as "19[c]" and argues that Holbrook describes assessing its well drilling plan to identify action items including usage of the drill bit, changing of mud weight, and setting of casing, but does not disclose explicitly assessing a well prog that has been converted into computer-readable form. Pet. 52 (citing Ex. 1006, 1:7–18, 6:40–7:36; Ex. 1003 ¶ 123); *see also id.* at 56 (identifying additional action items in Holbrook). Petitioner relies on King to teach assessing a computer-readable document to identify action items. *Id.* at 52–56 (citations omitted). Petitioner maps King's keywords to the cited action items and argues that King assesses a computer-readable document to identify keywords through use of its keyword server. *Id.* at 52–55 (citing Ex. 1007 ¶¶ 16, 32, 37, 505, 565, 573, 575, 588, 598, Figs. 4–5; Ex. 1003 ¶¶ 123–126). Petitioner argues that it would have been obvious "to use keywords that are relevant to the well drilling operations described in *Holbrook's* well drilling plan." *Id.* at 56 (citing Ex. 1006, 1:7–18, 6:51–7:36; Ex. 1003 ¶ 130). "In the combined system, *Holbrook's* well drilling plan is assessed to identify these action items, as taught by *King*." *Id.* (citing Ex. 1003 ¶ 130).

Patent Owner argues that Holbrook does not disclose assessing action items within its well drilling plan. PO Resp. 11–16. First, Patent Owner argues that Holbrook does not disclose "timing of activities" to be contained within its well drilling plan. *Id.* at 11–12 (citing Pet. 56; Ex. 1006, 1:10–19;

Ex. 2011 ¶ 87). Patent Owner argues that, even if Holbrook's well drilling plan contains the information asserted by Petitioner (*see, e.g.*, Pet. 56, 61), none of the identified information are action items. *Id.* at 16–19; *see also id.* at 20–21 (advancing similar arguments). Patent Owner argues that Holbrook's well drilling plan is not based on "timing of activities" because Holbrook's system determines when to change its drill bit based on the abrasiveness of the formation that has been drilled. *Id.* at 16–17 (citing Ex. 1006, 1:28–43, 6:51–54; Ex. 2011 ¶¶ 96–98).

Petitioner argues that "*Holbrook* plainly states that its well drilling plan 'roughly project[s] the timing of such activities as the replacement of the drill bit, changing the weight of the drilling mud, setting casing' and other activities (evidenced by *Holbrook's* use of 'etc.')," which Petitioner argues "establishes that the 'timing' is contained in *Holbrook's* well drilling plan." Pet. Reply 8–9 (alteration in original) (citing Ex. 1006, 1:10–18; Ex. 1003 ¶ 90).

Patent Owner replies by acknowledging that Holbrook's well drilling plan roughly projects the timing of well drilling activities, but argues "*Holbrook* does not, however, teach that the well drilling plan specifies the timing when these activities are intended to occur, or the timing when the operator is intended to perform the activities." PO Sur-reply 4 (citing Ex. 2011 ¶¶ 88–89). Patent Owner argues that "[i]f the information in *Holbrook's* well drilling plan were, in fact, the claimed 'action items,' the operator would be required to follow the plan precisely." *Id.*

Holbrook discloses a "well drilling plan" (*see, e.g.*, Ex. 1006, 1:7–10), which strongly suggests that it includes timing information for the steps of drilling the well. Moreover, Holbrook expressly states that its well drilling

plan "at least roughly project[s] the timing of such activities as the replacement of the drill bit, changing the weight of the drilling mud, setting casing, etc." *Id.* at 1:10–14. Holbrook further explains that the timing of when these activities are directed to occur can be based on "hours of operation with reference to the replacement of a drill bit" or on "the depth at which certain actions are taken, especially changes in mud weight and the setting of casing." *Id.* at 1:14–18. Thus, Holbrook's well drilling plan specifies the timing of when certain well drilling activities, including changing the drill bit, changing the mud weight, and setting casing, should occur.

Next, Patent Owner argues that Holbrook's system calculates abrasive wear of the drill bit and pore pressure in real-time and, therefore, these parameters "cannot be contained in a pre-designed well drilling plan." PO Resp. 12 (citing Pet. 56; Ex. 1006, 5:1–2, 6:51–60, 7:24–26; Ex. 2011 ¶¶ 90–91).

As noted above, Holbrook's well drilling plan contains timing information regarding well drilling activities, and specifies that this timing can be based on a number of factors, including hours of operation and well depth. Ex. 1006, 1:7–18. That Holbrook measures certain parameters during the well-drilling process is no surprise, as such measurements (such as hours of operation) are needed to determine when certain activities (such as replacement of the drill bit) occur. For example, Holbrook explains that its system calculates the "current abrasive wear of the cutting structure" of the drill bit and transmits this information to the drill operator who "controls continued usage or retirement of the [drill] bit" based on this information. *See id.* at 6:56–7:2. Holbrook also explains that the pore pressure

measurement allows the operator to control certain aspects of the execution of the well drilling plan, such as "whether or not, and when to change mud weight, how much to change the mud weight, and when to set casing." *See id.* at 7:24–36.

Next, Patent Owner argues that the Petition does not demonstrate adequately that Holbrook's well drilling plan includes instructions to measure bit wear and pore pressure or that the plan even mentions bit wear or pore pressure. PO Resp. 12–14 (citing Ex. 1006, 5:1–2, 5:15–18, 6:7–10, 6:51–60, 7:24–26; Ex. 2011 ¶¶ 92–94; Ex. 2013, 21:9–21, 46:7–9, 62:19–22, 80:15–18); *see also* PO Sur-reply 5–6.

Petitioner argues that "*Holbrook* describes that the well drilling plan is developed for projecting the timing of such activities as 'replacement of the drill bit, changing the weight of the drilling mud, setting casing, etc.,'" which, Petitioner contends, "are expressly tied to bit wear and pore pressure in *Holbrook*." Pet. Reply 13 (citing Pet. 15–17, 24–25, 27, 29, 32, 42, 44–45, 48, 52, 56, 61–62; Ex. 1003 ¶¶ 46, 77–80, 89–90, 93, 95, 98, 108, 110–111, 116, 123, 130, 139, 141, 165; Ex. 1006, 1:10–18, 6:67–7:18, 7:24–36).

Patent Owner replies that Petitioner improperly presents new arguments in its Reply. PO Sur-reply 6–7 (citing Pet. Reply 12–13).

As explained above, Holbrook expressly discloses that its well drilling plan includes instructions regarding the timing of drill bit replacement. *See, e.g.*, Ex. 1006, 1:10–14. Patent Owner concedes that bit wear parameters are "ubiquitous parameters common to most, if not all well drilling operations." PO Resp. 13. Patent Owner's argument that instructions regarding drill bit replacement would not be included in a well drilling plan (or well prog)

seems to be at odds with this concession. Regardless, as explained above, the well drilling plan contains action items to be performed when these measured values meet certain thresholds.

Nor are we persuaded that Petitioner presents new arguments in its Reply. Contrary to Patent Owner's contentions (*see* PO Sur-reply 6–7), the Petition addresses action items based on bit wear and pore pressure. *See, e.g.*, Pet. 56 (expressly addressing "timing of activities," "specified bit wear parameters," and "actions triggered by changes in pore pressure"). The Petition specifically addresses replacement of the drill bit, changing mud weight, and setting casing. *See, e.g.*, Pet. 24, 25, 44–45. The Petition also links replacing the drill bit to the measured bit wear (*see id.* at 29–30) and links changing mud weight and setting casing to the measured pore pressure (*see id.* at 30–31).

Finally, Patent Owner argues that the testimony of Petitioner's expert, Mr. Sharma, regarding a bit wear limit in Holbrook is conclusory and, therefore, entitled to "little or no weight." PO Resp. 14–16 (citing Ex. 2013, 17:23–24, 18:2–4, 21:9–21, 29:25, 44:14–17, 44:21–24, 84:12–22). Specifically, Patent Owner argues that "Mr. Sharma could not identify a single instance where *Holbrook* expressly discloses that a bit wear limit is contained in *Holbrook's* well drilling plan." *Id.* at 15; *see also* PO Sur-reply 7–8.

Petitioner argues that "[t]he activities for which timing is projected in *Holbrook's* well drilling plan include 'replacement of the drill bit,' and the 'specified bit wear parameters' include the abrasive wear limit (i.e., the bit wear 'limit')." Pet. Reply 10 (citing Pet. 29, 44, 56). Petitioner argues that Mr. Sharma's testimony is supported by Holbrook as set forth in

Mr. Sharma's deposition. *Id.* at 11–12 (citing Ex. 2013, 20:14–21:25, 23:13–24:2, 27:2–28:24; 29:23–30:23, 31:14–32:10, 37:11–22, 42:15–43:18, 44:25–46:9).

Patent Owner replies that Petitioner improperly presents new arguments regarding the bit wear limit and action items in its Reply. PO Sur-reply 7. Patent Owner argues that Holbrook does not disclose that its wear limit is contained in the well drilling plan. *Id.* at 9.

Notably, Patent Owner cites to Mr. Sharma's deposition testimony, not his direct declaration testimony. Even if we were to agree with Patent Owner's assertions, such assertions would not persuade us to discount Mr. Sharma's direct testimony. Rather than arguing that Holbrook expressly discloses that its well drilling plan contains a bit wear limit, Mr. Sharma and the Petition argue that an ordinarily skilled artisan "would understand that [an] abrasive wear limit is set forth in *Holbrook's* well drilling plan." Pet. 29 (citing Ex. 1003 ¶ 95; Ex. 1006, 1:7–18, 7:15–18, 7:20–23); Ex. 1003 ¶ 95. This assertion is supported by Holbrook itself, which explains that the well drilling plan "at least roughly project[s] the timing of such activities as the replacement of the drill bit," which may be based on "a certain numerical value, identified in advance, as the limit for a given bit." Ex. 1006, 1:10–14, 7:20–23; *see also* Pet. 29 (citing same).

Nor are we persuaded that Petitioner presents new arguments in its Reply. To the contrary, the Petition argues that changing the bit is an action item based on a bit wear limit set forth in the well drilling plan. *See, e.g.*, Pet. 29 (arguing that an ordinarily skilled artisan would understand the bit wear limit to be in the well drilling plan and, when the limit is reached, the operator instructs that the bit be "removed and retired.").

Accordingly, on this record, Holbrook and King support Petitioner's contentions.

e. The Associating Recitation

Claim 19 recites "associating a response with each identified action item." Ex. 1001, 11:42. Petitioner refers to this recitation as "19[d]" and argues that King discloses using its keyword server to compare keywords to a keyword action table that specifies particular actions for particular keywords. Pet. 57 (citing Ex. 1007 ¶¶ 588–589, Fig. 4; Ex. 1003 ¶ 132). Petitioner asserts, "In the combined system, the keyword action table is modified to contain keywords that are relevant to the well drilling operations described in *Holbrook's* well drilling plan." *Id.* at 60 (citing Pet. 52–56 (regarding the assessing recitation)). Petitioner identifies examples of such operations:

> [A] POSITA would have been motivated to associate keywords related to bit wear and/or pore pressure values with actions that send the identified bit wear or pore pressure values in *Holbrook's* well drilling plan to *Holbrook's* system so that the information can be used by *Holbrook's* system to control aspects of the execution of the well drilling plan (e.g., replacing the bit, changing the mud weight, how much to change the mud weight, and when to set casing) as described in *Holbrook*.

Id. at 61 (citing Ex. 1006, 6:51–7:36; Ex. 1003 ¶ 139).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

As noted above, Holbrook discloses using measured drill bit wear and pore pressure values to control aspects of its well drilling plan. For example, Holbrook discloses that "pore pressure can be used to control other aspects of the execution of the well drilling plan, e.g. whether or not, and when to

change mud weight, how much to change the mud weight, and when to set casing." Ex. 1006, 7:28–32. We understand Petitioner to refer to such responses, including changing mud weight, when to change mud weight, and when to set casing, when referring to operations described in Holbrook's well drilling plan. *See* Pet. 52, 60.

Accordingly, on this record, Holbrook and King support Petitioner's contentions.

f. The Controlling Recitation

Claim 19 recites "controlling a well drilling operation in accordance with the responses associated with each identified action item from the well prog." Ex. 1001, 11:43–45. Petitioner refers to this recitation as "19[e]" and argues that "*Holbrook* describes 'controlling the usage of a well drill bit and other aspects of execution of a well drilling plan' based on calculated abrasive wear of the drill bit and pore pressure." Pet. 62 (emphasis omitted) (citing Ex. 1006, 1:7–10, 6:51–7:36). Petitioner relies on King to teach associating responses with action items in a computer-readable document. *Id.* at 62–63 (citing Ex. 1007 ¶¶ 591, 569, code (57), Fig. 5; Ex. 1003 ¶ 143). "In the combined system, the well drilling operation described in *Holbrook* is controlled in accordance with the responses associated with each identified action item from *Holbrook's* well drilling plan." *Id.* at 64 (citing Ex. 1003 ¶ 144).

Patent Owner argues that an operator may decline to take an action contained within the well drilling plan, and, thus, Holbrook's well drilling plan does not contain action items. PO Resp. 17–19 (citing Ex. 1006,

1:7–14, 1:19–27, 6:67–7:2; Ex. 2011 ¶¶ 89, 99–103; Ex. 2013, 52:18–19, 53:8–9, 53:14–21).

Petitioner argues that "*Holbrook* teaches that timing of activities is used in its well drilling operation because, as [Patent Owner] acknowledges, *Holbrook* discloses that the operator can 'continue following the plan, i.e. maintain the plan,'" including "replacing the drill bit when the abrasive wear limit is reached." Pet. Reply 15 (citing PO Resp. 18; Ex. 1006, 1:23–27, 7:5–8). Petitioner additionally notes that its challenge "is not based on Holbrook alone, but rather the Holbrook-King combination," and argues that "in the combined system the timing of activities in Holbrook's well drilling plan is used to control the well drilling operation in accordance with the responses." *Id.* at 15–16 (emphases omitted). Petitioner identifies sending the wear limit and pore pressure values to the operator as examples of actions performed. *Id.* at 16–18.

Patent Owner replies Petitioner's arguments are unavailing because "the operator of *Holbrook's* drilling machinery is in ultimate control of the drilling operation" and "[n]one of the information Petitioner[] identif[ies] requires the operator to take any action." PO Sur-reply 10–11; *see also id.* at 11–12 (presenting similar arguments).

We are not persuaded that the combination of Holbrook and King fails to disclose or suggest action items. As noted above, Holbrook discloses that its well drilling operation, including replacing drill bits and changing mud weight, is conducted pursuant to the well drilling plan. *See, e.g.*, Ex. 1006, 1:7–14, 7:28–32. King discloses that its system identifies within a captured sequence keywords for which one or more actions are specified. *See, e.g.*, Ex. 1007 ¶¶ 505, 591. The system selects an action associated with the

keyword and performs the selected action. *Id.* ¶ 591. Accordingly, on this record, Holbrook and King support Petitioner's contentions.

Even if we were to agree with Patent Owner that Holbrook's operator can choose not to take an action, the corollary to Patent Owner's argument is that an operator will perform all of the actions in the well prog. So, even if claim 19 requires the well drilling operation to be controlled according to the well prog without any deviation whatsoever, Holbrook still teaches controlling the well drilling operation in this manner. Patent Owner's counsel acknowledged as much during the hearing. *See* Tr. 25:19–20 ("yes, it's true that Holbrook suggests that the operator may follow the plan"), 36:17 ("Yes, it's possible that the operator can follow the plan . . . ."). We additionally note that Holbrook discloses that the operator may choose to "modify the plan by taking a planned action sooner or later, or at a greater or lesser depth, than originally planned." Ex. 1006, 1:23–27. Thus, Holbrook does not appear to indicate that the operator can ignore an action item altogether.

Furthermore, Patent Owner's arguments regarding "required" actions are not commensurate with the '593 patent, which indicates that the operator is in control of the drilling operation and may elect not to perform an action item. *See, e.g.*, Ex. 1001, 1:45–53 (explaining that the system "identif[es] *potential* action items" and "trigger[s] automated *alerts and reminders* to take the actions" to "assist an operator" (emphases added)), 7:28–33 ("An operator, through the computer system 102 and the interface engine 104, may indicate that an action is to be taken (*or omitted*) in accordance with the information presented in the prog . . . ." (emphasis added)), 7:46–50 (explaining that action development module defines "actions that *should* be

taken" (emphasis added)), 9:38–43 (indicating that the operator is in control of the drilling operation and the system identifies "actions that *should* be taken," which suggests that the operator may decide not to take such actions (emphasis added)). Thus, to the extent Patent Owner argues that we should interpret "action items" to require that such actions must always be performed, we decline to do so.

g. Rationale to Combine

Petitioner argues that it would have been obvious "to control the well drilling operation described in *Holbrook* by applying the document processing techniques of *King* to *Holbrook's* well drilling plan." Pet. 24. Petitioner argues that applying King's document processing techniques to Holbrook's well drilling plan would "facilitate controlling the drilling operations" (*id.* at 26 (citing Ex. 1003 ¶ 92)) and would have been "a combination of known techniques to a known process ready for improvement to yield predictable results" (*id.* at 27(citing Ex. 1003 ¶ 92; *KSR*, 550 U.S. at 401)).

Petitioner notes that Holbrook discloses producing an audible alarm when a drill bit reaches a certain level of wear and argues that Holbrook "does not describe how its system obtains information about the abrasive wear limit." Pet. 29 (citing Ex. 1006, 1:7–18, 6:56–7:10, 7:20–23; Ex. 1003 ¶¶ 95–96). According to Petitioner, an ordinarily skilled artisan "would have been motivated to apply *King's* technique to process the well drilling plan and obtain information about the abrasive wear limit and provide it to *Holbrook's* system to enable *Holbrook's* system to produce an audible signal or alarm when the limit is reached." *Id.* at 29–30 (citing Ex. 1003 ¶ 96).

Petitioner argues that entering the bit wear limit value in this manner into Holbrook's system, rather than manually entering it, would reduce the likelihood of human error. *Id.* at 30 (citing Ex. 1003 ¶ 96). Similarly, Petitioner notes that Holbrook discloses controlling aspects of its well drilling plan as a function of pore pressure and argues that pore pressure information in the well drilling plan could be identified using King's document processing techniques. *Id.* at 30–31 (citing Ex. 1006, 1:7–18, 7:32–36; Ex. 1003 ¶ 97).

Patent Owner argues that Petitioner has not shown sufficiently why an ordinarily skilled artisan would have combined the teachings of Holbrook and King. PO Resp. 19–21. First, Patent Owner notes that the one of Petitioner's reasons for combining the asserted references is to facilitate adhering to the timeline of Holbrook's well drilling plan and argues that Holbrook does not set out a timeline. PO Resp. 20 (citing Pet. 27–28; Ex. 2011 ¶ 107). Rather, Patent Owner argues, Holbrook discloses that its well drilling plan merely "'roughly projects the timing' of well drilling operations." *Id.* (citing Ex. 1006, 1:10–14, 1:19–27; Ex. 2011 ¶ 107).

As noted by Patent Owner, Holbrook discloses that its well drilling plan contains at least a rough projection of the well drilling operation, which includes "the timing of such activities as the replacement of the drill bit, changing the weight of the drilling mud, setting casing, etc." Ex. 1006, 1:10–14. That Holbrook acknowledges the plan is often modified during operation does not change the fact that the well drilling plan is a plan of the well drilling operation that includes the timing of well drilling activities. Nor does Patent Owner explain persuasively how Holbrook's well drilling

plan is incongruent with the recited well prog as we have interpreted the term and as agreed to by the parties.

Next, Patent Owner concedes that "the resulting combination [of Holbrook and King] would have the ability to process *Holbrook's* well drilling plan," but argues that the combination "would not, however, be able to identify any 'keywords,' as taught by *King*, in *Holbrook's* well drilling plan because . . . none of the information the Petition and Mr. Sharma contend are the claimed action items . . . are actually contained in *Holbrook's* well drilling plan." PO Resp. 20–21; *see also* Tr. 22:16–18 ("Patent Owner does not dispute that the combination of Holbrook and King would have had the ability to process Holbrook's well drilling plan.").

Patent Owner's argument against the combination of Holbrook and King are reiterations of its arguments regarding the assessing and controlling recitations discussed above. For the reasons previously discussed, we are not persuaded that the combination of Holbrook and King fails to disclose or suggest action items. As we explained, Holbrook discloses that its well drilling operation, including replacing drill bits and changing mud weight, is conducted pursuant to the well drilling plan (*see, e.g.*, Ex. 1006, 1:7–14, 7:28–32), and King discloses that its system identifies within a captured sequence keywords for which one or more actions are specified, selects an action associated with the keyword, and performs the selected action (*see, e.g.*, Ex. 1007 ¶¶ 505, 591). Accordingly, on this record, Holbrook and King support Petitioner's contentions.

Finally, Patent Owner argues that "*Holbrook* is an open-loop control system" and that "[m]odifying *Holbrook* in view of *King* would not convert *Holbrook's* open-loop system to a closed-loop system of the '593 patent."

PO Resp. 19–20. Patent Owner differentiates "open-loop" systems from "closed-loop" systems based on feedback – "[a]n open-loop system is one that operates on a received input and performs its process without receiving feedback from the system prior to generating the response," and "a closed-loop system is one that operates on a received input and also utilizes feedback from the system to arrive at the desired response." *Id.* at 5.

Petitioner contends that Patent Owner's arguments are an "attempt[] to draw a baseless distinction between *Holbrook* and the '593 Patent." Pet. Reply 19. Petitioner argues that claim 19 does not require a closed-loop control system. *Id.* at 20. Petitioner also argues that, contrary to Patent Owner's assertions, Holbrook discloses a closed-loop system. *Id.* at 21–23.

We agree with Petitioner that none of the challenged claims requires or prohibits any specific type of control system. Nor do the challenged claims require or prohibit the use of feedback. Patent Owner's "open-loop" and "closed-loop" arguments, therefore, fail to distinguish the challenged claims from the asserted references, as limitations not appearing in the claims cannot be relied upon for patentability. *In re Self*, 671 F.2d 1344, 1348 (CCPA 1982).

Accordingly, on this record, we determine that Petitioner has articulated reasoning having rational underpinning explaining why it would have been obvious to combine the teachings of Holbrook and King as set forth in the Petition.

h. Patent Owner's New Arguments in the Sur-reply

Patent Owner presents two new arguments in its Sur-reply. *See* PO Sur-reply 12–16. Although such new arguments are improper in a sur-reply

(*see* 37 C.F.R. § 42.23(b) ("[a] sur-reply may only respond to arguments raised in the corresponding reply")), even when considering the arguments, we do not find them persuasive.

First, Patent Owner argues that the Petition is inconsistent because it relies on both Holbrook and King to teach the use of action items. PO Sur-reply 12–15.

We see no inconsistency as suggested by Patent Owner. Patent Owner's arguments appear to focus on the asserted references individually rather than in combination as set forth in the Petition. As discussed in the Institution Decision and above, Petitioner relies on both Holbrook and King to disclose action items and argues that, when combining the teachings of these references, an ordinarily skilled artisan would assess Holbrook's well drilling plan as taught by King using keywords that are relevant to the well drilling operations described in Holbrook's well drilling plan. *See* Inst. Dec. 30; Pet. 52–56 (citing Ex. 1006, 1:7–18, 6:40–7:36; Ex. 1007 ¶¶ 16, 32, 37, 505, 565, 573, 575, 588, 598, Figs. 4–5; Ex. 1003 ¶¶ 123–126, 130). Moreover, as noted above, Patent Owner concedes that "the resulting combination [of Holbrook and King] would have the ability to process *Holbrook's* well drilling plan." PO Resp. 20–21; *see also* Tr. 22:16–18 ("Patent Owner does not dispute that the combination of Holbrook and King would have had the ability to process Holbrook's well drilling plan.").

Second, Patent Owner argues that the Petition is inconsistent because it relies on "different information in *Holbrook's* well drilling plan" regarding the assessing recitation (19[c]) and the controlling recitation (19[e]). PO Sur-reply 15–16.

We see no inconsistency as suggested by Patent Owner. In both instances cited by Patent Owner, the Petition describes exemplary contents of Holbrook's well drilling plan, including usage of the drill bit. Regarding the assessing recitation, Petitioner argues that Holbrook's well drilling plan contains information regarding the well drilling operation such as "specified bit wear parameters[] and actions triggered by changes in pore pressure." Pet. 56. Regarding the controlling recitation, Petitioner argues that Holbrook's well drilling plan specifies that drill bit usage and other aspects of the well drilling plan are controlled based on calculated wear of the drill bit and pore pressure. *Id.* at 62. Patent Owner fails to explain adequately, and we fail to discern, how these assertions are inconsistent.

i. Conclusion

For the foregoing reasons, on this record, Petitioner has shown, by a preponderance of the evidence, that independent claim 19 would have been obvious over the combination of Holbrook and King.

2. Dependent Claims 20–27

Claim 20 depends directly from claim 19 and further recites "wherein receiving the well prog comprises scanning a well prog document with an optical scanning device." Ex. 1001, 12:1–3. Petitioner argues that King teaches use of an optical scanner to scan text from a paper document. Pet. 65–66 (quoting Ex. 1007 ¶ 25) (citing Ex. 1007 ¶¶ 26–27, 566, 600).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

King discloses "[a] system for processing text captured from rendered documents." Ex. 1007, code (57). Use of the system "typical[ly] . . . begins with using an optical scanner to scan text from a paper document." *Id.* ¶ 25.

Accordingly, on this record, King supports Petitioner's contentions.

Claim 21 depends directly from claim 19 and further recites "wherein converting the well prog into a computer readable format comprises running an optical character recognition process on a well prog document to convert a well prog document into a computer readable format." Ex. 1001, 12:4–8. Petitioner argues that King teaches optical character recognition of a scanned document. Pet. 66 (quoting Ex. 1007 ¶ 51) (citing Ex. 1007 ¶¶ 47–52, 265).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

King discloses that "[t]ext from a rendered document is captured . . ., typically in optical form by an optical scanner . . . . A recognition process 104 such as OCR . . . then converts the data into a signature, comprised in some embodiments of text, text offsets, or other symbols." Ex. 1007 ¶ 31.

Accordingly, on this record, King supports Petitioner's contentions.

Claim 22 depends directly from claim 19 and further recites "wherein assessing the converted well prog to identify action items comprises comparing text strings in the converted well prog to a database of action items to identity action items in the well prog." Ex. 1001, 12:9–12. Petitioner argues that King's keyword server 440 stores keyword registration information and compares a sequence of recognized text to keyword action

table 441 to identify actions associated with recognized keywords. Pet. 66–67 (citing Ex. 1007 ¶¶ 51, 151, 265, 565, 588).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

King's system receives a captured sequence of words and identifies therein keywords in the form of a word, phrase, or symbol for which one or more actions are specified. Ex. 1007 ¶ 591. This identification may include use of a keyword server hosting a keyword action table that specifies particular actions for particular keywords. *Id.* ¶¶ 587–588. The system selects an action associated with the identified keywords and performs the selected actions. *Id.* ¶ 591.

Accordingly, on this record, King supports Petitioner's contentions.

Claim 23 depends directly from claim 19 and further recites "wherein associating a response with each identified action item comprises matching identified action items with corresponding responses in a database of predetermined responses." Ex. 1001, 12:13–16. Petitioner argues that "*King's* keyword action table teaches or suggests a database of predetermined responses" and "*King* teaches that 'the keyword server 440 compares the sequence to a keyword action table 441' that specifies 'particular actions for particular keywords.'" Pet. 68 (quoting Ex. 1007 ¶ 588).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

As noted above, King's system compares identified keywords with associated actions listed in a keyword action table. Ex. 1007 ¶¶ 587–588, 591. We agree with Petitioner that King's keyword action table 41 teaches

or suggests a database. *See* Pet. 68 (reproducing King Fig. 6); *see also* Ex. 1003 ¶¶ 151 ("A POSITA would understand that the keyword action table described in *King* teaches or suggests a database."), 154 ("*King's* keyword action table teaches or suggests a database of predetermined responses (e.g., columns 613 ('Action Verb') and 614 ('Action Object'))."); Ex. 1007 ¶ 565 (discussing the storing of keywords in a database).

Accordingly, on this record, King supports Petitioner's contentions.

Claim 24 depends directly from claim 19 and further recites "wherein associating a response with each identified action item comprises an operator determining a response that corresponds to the identified action items." Ex. 1001, 12:17–20. Petitioner argues that King teaches "presenting a menu of possible user-initiated actions or choices" to the user in instances when "the appropriate action to be taken by the system 'will require a choice to be made by the user.'" Pet. 69 (quoting Ex. 1007 ¶¶ 343, 515) (citing Ex. 1007 ¶ 568).

Patent Owner interprets the Petition to rely on "the correspondence between a keyword (the alleged 'action item') and its associated action verb and action item (the alleged 'response' for an 'action item')" in addressing the associating recitation of claim 19. PO Resp. 21 (citing Pet. 58–60; Ex. 2011 ¶ 111). Patent Owner interprets the Petition to rely on "*King's* disclosure of displaying a menu to the user of its system" regarding claim 24. *Id.* (citing Pet. 69). Patent Owner argues that "[t]he Petition fails to point to any of *King's* disclosure that the choices presented to the user in the menu are the 'action verb' or 'action object' entries in *King's*" table. *Id.* at 21–22 (citing Ex. 2011 ¶¶ 113, 116).

Petitioner argues that "the relied-upon portions of *King* teach that the menu of actions presented to the user (e.g., the operator in the combined system) contain[s] actions specified in the keyword action table." Pet. Reply 24.

Patent Owner replies by arguing that "Petitioner[] make[s] no connection between *King*'s 'menu of possible user-initiated actions or choices' and *King*'s 'keyword action table.'" PO Sur-reply 16.

As noted above, Petitioner maps King's association of keywords and actions to the associating recitation of claim 19. Pet. 57 (citing Ex. 1007 ¶¶ 588–589). King discloses that "keyword action table 441 . . . specif[ies] particular actions for particular keywords." Ex. 1007 ¶ 588. King further discloses that "alternative actions" may be associated with a particular keyword. *Id.* The system may use the user profile to select one of the alternatives. *Id.* King also discloses that, "[in] some embodiments the triggered actions include presenting a menu of possible user-initiated actions or choices." *Id.* ¶ 515; *see also id.* ¶¶ 37 ("In some cases the various possible actions appropriate to a capture at a specific point in a rendered document will be presented to the user as a menu on an associated display . . . ."), 343 ("Sometimes the appropriate action to be taken by the system . . . will require a choice to be made by the user. One good way to do this is through the use of 'popup menus' or, in cases where the content is also being displayed on a screen, with so-called 'contextual menus' that appear close to the content."). We see nothing incompatible with Petitioner's treatment of "associating" in addressing claims 19 and 24.

Accordingly, on this record, King supports Petitioner's contentions.

Claim 25 depends directly from claim 19 and further recites "wherein determining comprises the operator selecting the response from a list of possible responses presented to the operator on a screen." Ex. 1001, 12:21–23. Petitioner notes that "determining" does not appear in claim 19 and asserts that the file history indicates that "Claim 25 was intended to refer back to, and should depend from, Claim 24." Pet. 69 (citing Ex. 1003 ¶ 159). "Thus, Petitioner[] interpret[s] Claim 25 as depending from Claim 24 rather than independent Claim 19." *Id.*

Patent Owner does not specifically address claim 25. *See generally* PO Resp.

The file history indicates that issued claim 24 was prosecuted as claim 19 and issued claim 25 was prosecuted as claim 20. Ex. 1002, 22. The file history further indicates that, during prosecution, claim 20 (issued claim 25) depended from claim 19 (issued claim 24). *See id.* at 38, 125. We agree with Petitioner that claim 25 of the '593 patent should properly depend from claim 24 rather than from claim 19 and that the '593 patent contains an evident typographical or clerical error the true meaning of which is not subject to reasonable debate. *See Volkswagen Grp. of Am., Inc. v. Mich. Motor Techs. LLC*, IPR2020-00446, Paper 9 at 10–12 (PTAB Aug. 25, 2020) (correcting a printing error). Accordingly, we interpret claim 25 as depending from claim 24.

Petitioner relies on its mapping for claim 24 in addressing claim 25. Pet. 69–70.

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

As discussed above regarding claim 24, King discloses presenting for user selection a menu of possible actions corresponding to a particular keyword. *See, e.g.*, Ex. 1007 ¶¶ 37, 343, 515.

Accordingly, on this record, King supports Petitioner's contentions.

Claim 26 depends directly from claim 19 and further recites "sensing a parameter related to a well prog specification or a component of a well drilling operation." Ex. 1001, 12:24–27. Petitioner maps Holbrook's disclosure of "mud weight, weight-on-bit, rate of penetration of bit, measured depth of well, true vertical depth of well, abrasive wear, and pore pressure" to the recited parameters and argues that "*Holbrook's* disclosure of obtaining constant and real-time drilling values using well known techniques (e.g., a strain gauge to measure weight-on-bit), and using this data to calculate current abrasive wear of the bit and pore pressure, teaches sensing a parameter." Pet. 71–72 (citing Ex. 1006, 1:7–14, 6:51–7:36, 9:50–62, 10:35–37, Fig. 1; Ex. 1003 ¶ 165).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

Holbrook discloses "[h]ardware, software and methods for controlling the usage of well drill bits and other aspects of well drilling plans." Ex. 1006, code (57). As an initial step before the drill bit is used, certain measurements and other information, which make up the initial bit data, are taken from the bit and entered into the computer. *Id.* at 6:43–47. The system obtains certain constant and real-time drilling values during the drilling operation, which make up the drilling data and which are entered into the computer. *Id.* at 6:51–55. These values include mud weight, mud viscosity, weight-on-bit, speed of bit, rate of penetration of bit, measured

depth of the well, and true vertical depth of the well. *Id.* at 9:50–63. The computer uses this information to calculate the current abrasive wear of the bit cutting structure on an ongoing or continual basis, and provides an indication of the wear to the operator. *Id.* at 6:56–63.

Accordingly, on this record, Holbrook supports Petitioner's contentions.

Claim 27 depends directly from claim 19 and further recites "saving an action item definition." Ex. 1001, 12:28–29. Petitioner argues that "King teaches saving action item definitions in a 'keyword action table.'" Pet. 72 (citing Ex. 1007 ¶¶ 12, 593, Fig. 6).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

As discussed above, King's system uses a keyword action table that specifies particular actions for particular keywords. Ex. 1007 ¶¶ 588–589. The table includes information corresponding to each keyword, such information including the action(s) associated with the keyword, conditions that must be satisfied in order to perform the action, and the object of the action. *See id.* ¶ 593. We note that in the combination proposed by Petitioner, King's keyword action table is modified to contain keywords that are relevant to the well drilling operations described in Holbrook's well drilling plan. *See, e.g.*, Pet. 60.

Accordingly, on this record, Holbrook and King support Petitioner's contentions.

For the foregoing reasons, on this record, Petitioner has shown, by a preponderance of the evidence, that dependent claims 20–27 would have been obvious over the combination of Holbrook and King.

III. CONCLUSION[4]

Based on the evidence presented with the Petition, the evidence introduced during the trial, and the parties' respective arguments, Petitioner has shown, by a preponderance of the evidence, that claims 19–27 of the '593 patent are unpatentable. In summary,

Claim(s)	35 U.S.C. §	Reference(s)	Claims Shown Unpatentable	Claims Not Shown Unpatentable
19–27	103(a)	Holbrook, King	19–27	

IV. ORDER

Accordingly, it is

ORDERED that claims 19–27 of the '593 patent have been shown to be unpatentable; and

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

[4] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. *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).

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