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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte DANIEL GLEITMAN¹

Appeal 2019-001821
Application 13/724,494
Technology Center 3600

Before JILL D. HILL, LEE L. STEPINA, and ARTHUR M. PESLAK,
Administrative Patent Judges.

STEPINA, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant appeals under 35 U.S.C. § 134(a) from the Examiner's decision rejecting claims 1–6, 27–35, and 37–43. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM-IN-PART and enter a NEW GROUND OF REJECTION under 37 C.F.R. § 41.50(b).

¹ The Appeal Brief indicates that Halliburton Energy Services, Inc., Appellant, is the real party in interest. Appeal Br. 2.

CLAIMED SUBJECT MATTER

The claims are directed to downhole sensor modules distributed along a drillstring. Spec. ¶ 18. Sole independent claim 1, reproduced below, illustrates the claimed invention, with certain limitations italicized:

1. A communications system for communication along a drillstring comprising a drillpipe, the system comprising:
 - a communications medium, where at least a portion of the communications medium is disposed within the drillpipe;
 - a processor coupled to the communications medium;
 - at least two sensor modules coupled to the communications medium, where *at least one of the sensor modules is located at a drill pipe location*; and
 - at least one communications coupler to couple at least one sensor module to the communications medium.

REFERENCES RELIED ON BY THE EXAMINER²

Hall	US 7,224,288 B2	May 29, 2007
Fincher	US 2005/0024231 A1	Feb. 3, 2005

REJECTIONS

I. Claims 1–6 and 27–35 are rejected under 35 U.S.C. § 103(a) as unpatentable over Hall. Final Act. 3.

II. Claims 37–43³ are rejected under 35 U.S.C. § 103(a) as unpatentable over Hall and Fincher. Final Act. 4.

² In the rejection of each of claims 3, 5, 28, 31–35, 37, and 39–43, the Examiner takes Official Notice that certain facts are well-known in the art. Final Act. 6–10 (Response to Remarks).

³ We understand the Examiner’s omission of claim 43 from the heading of the rejection to be a typographical error in that claim 43 is discussed in the body of the rejection. *See* Final Act. 5.

OPINION

Rejection I – Hall

Claims 1, 2, 4, 6, 27, 29, and 30

Appellant argues for the patentability of claims 1, 2, 4, 6, 27, 29, and 30 as a group. Appeal Br. 4–8. We select independent claim 1 as representative of the group. *See* 37 C.F.R. § 41.37(c)(1)(iv). Claims 2, 4, 6, 27, 29, and 30 stand or fall with claim 1.

The Examiner finds that Hall discloses each of the limitations of the communications system of claim 1 including sensor modules, but does not disclose that the sensor modules are located at a drillpipe location. Final Act. 3. The Examiner determines that because Hall’s link module, or repeater, has sensors, and is within a drill pipe, Hall *suggests* sensor modules at a drillpipe location. *Id.* The Examiner concludes that it would have been obvious “to locate the sensor modules at a drill pipe as suggested by the reference since they are connected to the link module and the sensor module is the combination of the link with the sensory attachments.” *Id.*

Appellant argues that although Hall’s link module circuit 58 is at the drillpipe, Hall’s “placement of the sensors *outside* of the dotted box representing link module circuit 58 in Figure 5 demonstrates that the sensors are not located in Hall’s link module.” Appeal Br. 6. According to Appellant, because Hall discloses which subcomponents are located in the link module there is no suggestion to move the sensor to the drillpipe. *Id.* at 6–7. Appellant contends that the Examiner’s “assertion that Hall’s ‘link module’ becomes a ‘sensor module’ when it is coupled to the sensors 82a and 82b” is unfounded because “Hall separately refers to the link module and the sensors in both figures and text,” whereas claim 1 “requires a ‘sensor

module' -- not a link module or some other module -- to be located at a drillpipe location." *Id.* at 7–8.

The Examiner responds that because Hall's link module 58 is located within the drillpipe at multiple locations, each having sensors, Hall reasonably suggest sensors within the drillpipe. Ans. 3–4. The Examiner finds that because Hall's sensors are used similarly to those of the present invention, it is reasonable to "conclude that they are [in] the same place." Ans. 4. According to the Examiner, "Appellant provides no argument or reasoning where such sensors may be located other than the conclusion that they are not at a drill pipe location." *Id.* The Examiner notes that the fact that "some sensors may benefit from being outside the link module does not preclude particular sensors (i.e. accelerometers and pressure sensors) to be integrated with the link module where it makes sense." Ans. 5.

Appellant replies that the Examiner appears to conflate the drillstring and the drillpipe, and "ignores that [Hall's] sensors may be located at non-drillpipe locations along the drillstring, such as in the BHA or other generic downhole tools identified by Hall." Reply Br. 4 (citing Hall, 4:64–66). Appellant contends that "[t]here is no evidentiary support for the Answer's assertion that one would integrate the sensors 82 and link module circuit 58 into a single physical component or otherwise locate the sensor on the drillpipe." *Id.* at 6.

Appellant's arguments regarding the rejection of claim 1 are not persuasive. Hall discloses that "a repeater [] may be integrated into an existing drill pipe 16." Hall, 5:16–17; Fig. 1. Hall also discloses that a link module or repeater "may include one or several recesses 38a–c to house various components" (Hall, 5:47–48) and that "link module circuit 58, or

components 58, may be located within other recesses 38” (Hall, 6:25–26). Hall also discloses that a microcontroller 78 of link module 58 “acquire(s) data from one or a plurality of sensors 82a–c ... such as inclinometers, thermocouplers, accelerometers, imaging devices, seismic data gathering devices, or other sensors. Thus, the link module circuit 58 may include circuitry functioning as a data acquisition tool.” Hall, 7:2–9. Given that Hall’s link module circuit 58 is in a recess of the repeater that is “at the drillpipe,” and given that the repeaters with an associated link module circuit 58 that includes components that “interface to sensors 82” are arranged at various sections along the drillpipe (*see* Fig. 1), we agree with the Examiner that acquiring data along the drillpipe suggests “the location of these sensors at the drill [pipe] for proper measurements.” Ans. 5. Thus, we further agree with the Examiner that a person of ordinary skill in the art would have found it obvious to locate the sensor modules at a drill pipe.

Accordingly, we sustain the Examiner’s rejection of claim 1 as unpatentable over Hall. Claims 2, 4, 6, 27, 29, and 30 fall with claim 1.

Claim 3

Claim 3 recites “[t]he communications system of claim 2, where at least one sub aggregates signals from at least two sensor modules and transmits an aggregated signal.”

The Examiner states that one of ordinary skill would understand that sensor data may be transmitted “individually or by aggregating the data.” Final Act. 3–4. Specifically, the Examiner takes Official Notice that this is how data is transmitted. Final Act. 7. The Examiner concludes that “[i]t

would have been obvious to aggregate sensor data to permit more information to be sent with reduced bandwidth.” Final Act. 4.

Appellant argues, *inter alia*, that the Examiner’s “attempts at Official Notice are improper.” Appeal Br. 10. Specifically, Appellant contends that “the Examiner has attempted to use official notice to establish individual facts, and ... to substitute such notice for the required analysis for establishing a prima facie rejection.” Reply Br. 7.

The Examiner responds that Appellant has not explained “why the noticed fact is not considered to be common knowledge or well-known in the art,” as required to traverse Official Notice. Ans. 7. According to the Examiner, although claim 3 recites “that the data is from a specific source,” Official Notice is not based on “how the data is gathered, but ... how the data is presented.” Ans. 9.

The Examiner takes Official Notice that transmitting an aggregated signal is known, and cites to MacLeod (US 4,739,325, iss. Apr. 19, 1988) and Hall (US 2005/0035874, pub. Feb. 17, 2005) as references that teach “the aggregation of sensory data which would provide evidentiary proof to meet the Official notice requirement.” Ans. 9. However, the Examiner does not point to any particular portion of MacLeod or Hall that discloses “aggregation of sensory data.” In order to rely on Official Notice, the examiner must provide specific factual findings predicated on sound technical and scientific reasoning to support the conclusion of common knowledge. *See In re Soli*, 317 F.2d 941, 946 (CCPA 1963). Absent a specific citation to evidence in the record that aggregating signals from sensor modules and transmitting an aggregated signal is well-known in the field of oil well drilling, the Examiner’s reliance on Official Notice is not

supported. Nor does the Examiner provide any evidence supporting the rationale for the proposed modification set forth in the rejection of claim 3, namely, that aggregating sensor data “permit(s) more information to be sent with reduced bandwidth.” Final Act. 3. “The presence or absence of a motivation to combine references in an obviousness determination is a pure question of fact.” *PAR Pharm., Inc. v. TWI Pharm., Inc.*, 773 F.3d 1186, 1196 (Fed. Cir. 2014). Because the Examiner has not provided persuasive evidence that aggregating sensor data permits more information to be sent with reduced bandwidth, we are constrained to reverse the Examiner’s rejection of claim 3 as unpatentable over Hall.

Claim 5

Claim 5 recites, *inter alia*, “where each sensor module is individually addressable.”

The Examiner takes “Official notice that [a] sensor maybe [sic] individually addressable” and then states, “[i]t would have been obvious to individually address a sensor to change sensor parameters and to enable a particular sensor.” Final Act. 3.

Appellant asserts that Official Notice is only proper for facts, and the Examiner’s “attempt to officially notice the obviousness of this element is improper as a matter of law.” Appeal Br. 12.

Appellant’s argument is persuasive. Although the Examiner states that “[t]he noticed fact is that sensors are individually addressable” (Final Act. 8), the Examiner does not provide specific factual findings predicated on sound technical and scientific reasoning to support the conclusion of common knowledge. *See In re Soli*, 317 F.2d at 946. Absent evidence that

individually addressable sensors are well-known in the field of oil well drilling, the Examiner's reliance on Official Notice is not supported. Moreover, the Examiner's *reasoning*, "to change sensor parameters and to enable a particular sensor" (Final Act. 3), appears to define "addressable," which means that the fact officially noticed by the Examiner is also used as the basis for the rationale set forth in the rejection. Thus, we agree with Appellant that the Examiner has in effect Officially Noticed the obviousness of an individually addressable sensor.

Accordingly, we do not sustain the Examiner's rejection of claim 5 as unpatentable over Hall.

Claims 28 and 31–35

Claims 28 and 31–35 require the sensor modules to include specific sensors. Appellant argues that Hall does not disclose the sensors of these claims and Official Notice of these sensors is improper. Appeal Br. 10.

The Examiner responds that Official Notice is proper because the sensors are notorious in the field of oil well telemetry. Ans. 9

We agree with Appellant's on this point. A statement that modifications of the prior art to meet the claimed invention would have been obvious because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). Specifically, the Examiner's conclusion that "[i]t would have been obvious to use conventional downhole sensors in a down(hole) environment," does not provide an objective reason to modify

Hall. Although we appreciate that the Examiner cites to various references that disclose certain sensors (*see* Final Act. 9), absent an objective reason to include these sensors in Hall, we are constrained to reverse the Examiner’s rejection of claims 28 and 31–35.

Rejection II – Hall and Fincher

Claims 37–39

In the rejection of claims 37–39, the Examiner takes “Official Notice that the use of a processor to generate a property vs depth profile from sensor data is conventional.” Final Act. 4. The Examiner considers that although “Hall does not mention a property v. depth profile ... it would have been obvious to generate such a profile to determine if the drilling is successful.” *Id.* The Examiner finds that “[t]he system in Fincher is for a LWD system whose purpose is to determine formation characteristics to determine the location of oil and/or gas,” and concludes that “[i]t would have been obvious to combine the reference since they both pertain to oil well telemetry.” *Id.*

Appellant argues that Hall and Fincher do not disclose the generation of a property versus depth profile and Official Notice of this element is improper. *See* Appeal Br. 12–18. Appellant contends that the Examiner’s use of Wisler (US 5,812,068, iss. Sept. 22, 1998) in support of the Official Notice does not aid the Examiner because “Wisler [] does not disclose this element and certainly does not show that the claimed feature is well known.” Appeal Br. 18; *see also* Reply Br. 9–11.

Appellant’s argument is persuasive. Notwithstanding that being in the same field, by itself, is insufficient reason to combine Hall and Fincher, the

fact that the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300. Specifically, the Examiner’s conclusion that “generat[ing] a property vs depth profile from sensor data is conventional,” does not provide an objective reason to modify Hall. Final. Act. 4. Moreover, the Examiner’s reliance on Wisler to support Official Notice is insufficient because we agree with Appellant that the Examiner does not cite to any portion of Wisler in support of the assertion that generating a property versus depth profile is well known (*see* Appeal Br. 18). Without persuasive evidence that generating a property versus depth profile is well known, and absent an objective reason to generate a property versus depth profile in Hall, we are constrained to reverse the Examiner’s rejection of claims 37–39.

Claims 40–43

Claims 40–43 relate to various aspects of a downhole condition based on a property versus depth profile. The Examiner determines that “it would have been obvious to detect a downhole condition since that is the purpose of having sensors perform measurements during drilling and logging.” Final Act. 5. The Examiner relies on Schoonover (US 4,456,983, iss. June 26, 1984) in support of Official Notice that it is well known to “use [] logging tools to provide displays of downhole measurements to determine formation characteristics.” *Id.* at 9.

Appellant argues that the repeated challenge to the Official Notice “that this element was obvious or well-known” has been ignored by the

Examiner. Reply Br. 11 (citing March 24, 2015 Response to Office Action at pp. 11–12; May 22, 2017 Response to Office Action at pp. 27–30).

Appellant asserts that the Examiner “has provided no mapping” for each of the limitations of claims 40–43 to Schoonover. Appeal Br. 19; *see also* Reply Br. 11.

The Examiner responds that Official Notice is proper because each of the noted facts are notorious in the drilling field. Ans. 9.

Appellant’s Specification discloses that “a downhole condition may include any regular or irregular, static or dynamic, condition or event along one or both the borehole or drillstring. Example downhole conditions may include, but are not limited to, one or more of the following: a flow restriction, a cuttings build-up, a wash-out, or an influx.” Spec. ¶ 65. The Examiner does not cite to any specific portion of Schoonover that discusses a downhole condition, consistent with how this term is used in Appellant’s Specification. In addition, the Examiner does not explain adequately how Hall’s sensors including inclinometers, thermocouplers, and accelerometers would detect a downhole condition consistent with Appellant’s Specification. That is, these sensors appear to detect conditions of the drillpipe (i.e., whether the drillpipe is inclined, is overheating, or has sufficient drilling speed), which is inconsistent with the Examiner’s finding that “detect[ing] a downhole condition [] is the purpose of having sensors.” Moreover, we agree with Appellant that the Examiner does not cite to any portion of Schoonover in support of the assertion that detecting downhole conditions is well known (*see* Appeal Br. 18), and “notorious” in the field of oil well drilling. Without persuasive evidence that detecting downhole

conditions is notorious in the field of oil well drilling, we are constrained to reverse the Examiner's rejection of claims 40–43.

NEW GROUND OF REJECTION

We enter a new ground of rejection of claims 37–43 as unpatentable over Hall and Fincher.

Claims 37–39

In rejecting claims 37–39, the Examiner relies on paragraph 82 of Fincher (*see* Final Act. 4), which discloses that “multiple cross sectional profiles may be measured and compared to determine the changes in the profiles along the wellbore.” Fincher ¶ 82. In Fincher, “[s]ensors 254, for example, may measure the resistivity of the fluid passing in close proximity to each sensor 254, thereby providing a cross-sectional profile related to the fluid makeup near each sensor.” *Id.* In addressing the rejection of claims 37–39 as unpatentable over Hall, Fincher, and Official Notice, Appellant argues that these claims are “patentable over Hall and Fincher because the references do not disclose the generation of a property versus depth profile and Official Notice of this element is improper.” Appeal Br. 14 and 17. Contrary to Appellant's assertion, based on the above-noted disclosure of Fincher, Fincher discloses determining a property (resistivity) versus depth profile (along the wellbore).

Fincher also discloses why a property versus depth profile is used. *See* Fincher ¶ 82. Specifically Fincher discloses that “[c]hanges in the profile may be used to detect changes in the amount and composition of the fluid influx passing a measurement station along the wellbore ... to monitor the placement of specialty drilling fluids and/or chemicals, commonly called

pills, at a desired location in the wellbore.” *Id.* It would have been obvious to modify Hall to determine a property versus depth profile, as taught by Fincher, such that Hall’s sensors detect changes in the amount and composition of the fluid influx passing a measurement station (sensor) along the wellbore. Such a modification would provide the predictable result of monitoring the placement of specialty drilling fluids and/or chemicals at a desired location in the wellbore, based on the conditions there. As to claim 38, Fincher discloses that the fluid is “drilling mud.” Fincher ¶ 42. As to claim 39, Hall already uses a processor (microcontroller 78) to generate data from a plurality of sensors (Hall, 7:1–4) and would process/transmit the data regarding a property versus depth profile in the same manner as all other data. Hall, 5:10–12; *see also* Fincher ¶ 91 (“measurements from the present invention are telemetered to the surface and processed”).

For the reasons discussed above, we enter a new ground of rejection of claims 37–39 as unpatentable over Hall and Fincher.

Claims 40–43

As discussed above, Fincher discloses a property (resistivity) versus depth profile (Fincher ¶ 82), and the reasoning to combine Fincher with Hall is as discussed above. With respect to claim 40, Fincher also discloses that “profiles of parameters (property) such as, for example, strain, drag, and torque may be compared at different time intervals to detect time-dependent changes in drilling *conditions* along the wellbore (as a function of depth).” *Id.* ¶ 89. This is consistent with Appellant’s Specification, which discloses that “the physical property [is] (e.g., acceleration, pressure, force, strain, or stress field).” Spec. ¶ 26. In addressing the rejection of claims 40–43 as

unpatentable over Hall, Fincher, and Official Notice, Appellant argues that these claims are “patentable over Hall and Fincher because the references do not disclose the detection of a downhole condition and Official Notice of this element is improper.” Appeal Br. 18–22. Appellant’s arguments on this point are unavailing because, as a new ground of rejection, we find that Fincher’s disclosure of “detect[ing] time-dependent changes in drilling *conditions* along the wellbore (as a function of depth)” for properties such as strain, drag, and torque, qualifies as a disclosure of detecting a downhole condition based on the property profile as required by claim 40.

Claim 41 recites “determine a location of a downhole condition based on the property versus depth profile.” This is met by Fincher’s disclosure that “[t]he distributed sensor system *provides profiles* of localized torque and vibration measurements (both axial and whirl) *along the drill string* enabling the operator *to identify the problem locations* and to take corrective action.” Fincher ¶ 90.

Claim 42 recites “identify a range of likely depths for a downhole condition.” Appellant’s Specification discloses that “a downhole condition may include any regular or irregular, static or dynamic, condition or event along one or both of the borehole or drillstring. Example downhole conditions may include, but are not limited to, one or more of the following: a flow restriction, a cuttings build-up, a wash-out, or an influx.” Spec. ¶ 65. This is met by Fincher’s disclosure that “profiles may be compared at different time intervals *to detect* time-dependent changes, such as for example, *build up of drill cuttings and other operating parameters.*” Fincher ¶ 90. That is, profiles along the wellbore (depths) are compared to

detect (identify) where the conditions measured along the length are likely to occur based on the changes over time.

Claim 43 recites “characterize a downhole condition based on the property versus depth profile.” This is met by Fincher detecting changes in a condition (build up) along the wellbore. *See* Fincher ¶¶ 89 and 90.

Accordingly, we enter a new ground of rejection of claims 40–43 as unpatentable over Hall and Fincher.

DECISION

I. We affirm the Examiner’s rejection of claims 1, 2, 4, 6, 27, 29, and 30, as unpatentable over Hall. We reverse the rejection of claims 3, 5, 28, and 31–35 as unpatentable over Hall.

II. We reverse the Examiner’s rejection of claims 37–43 as unpatentable over Hall and Fincher.

III. We enter a NEW GROUND OF REJECTION of claims 37–43 as unpatentable over Hall and Fincher.

This decision contains a new ground of rejection pursuant to 37 C.F.R. § 41.50(b). Section 41.50(b) provides “[a] new ground of rejection pursuant to this paragraph shall not be considered final for judicial review.” Section 41.50(b) also provides:

When the Board enters such a non-final decision, the appellant, within two months from the date of the decision, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of the appeal as to the rejected claims:

(1) Reopen prosecution. Submit an appropriate amendment of the claims so rejected or new Evidence relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the prosecution will be

remanded to the examiner. The new ground of rejection is binding upon the examiner unless an amendment or new Evidence not previously of Record is made which, in the opinion of the examiner, overcomes the new ground of rejection designated in the decision. Should the examiner reject the claims, appellant may again appeal to the Board pursuant to this subpart.

(2) Request rehearing. Request that the proceeding be reheard under § 41.52 by the Board upon the same Record. The request for rehearing must address any new ground of rejection and state with particularity the points believed to have been misapprehended or overlooked in entering the new ground of rejection and also state all other grounds upon which rehearing is sought.

Further guidance on responding to a new ground of rejection can be found in the Manual of Patent Examining Procedure § 1214.01.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED-IN-PART; 37 C.F.R. § 41.50(b)