The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DOUGLAS LAWRENCE ROCK

Appeal 2007-1474
Application 10/192,833
Technology Center 3600

Decided: May 30, 2007

Before MURRIEL E. CRAWFORD, JENNIFER D. BAHR, and LINDA E. HORNER, *Administrative Patent Judges*.

HORNER, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant seeks our review under 35 U.S.C. § 134 of the Examiner's final rejection of claims 1-4 and 6-10. We have jurisdiction under 35 U.S.C. § 6(b) (2002).

SUMMARY OF DECISION

We REVERSE.

THE INVENTION

Appellant's claimed invention is to a method for selecting and designing drill bits for drilling boreholes so that petroleum fluid extraction from subsurface formations is optimized (Specification 1:9-11). Claims 1 and 6, reproduced below, are representative of the subject matter on appeal.

> 1. A method for drilling a borehole through a production zone underlying an overburden of various earth formations, the method comprising:
>
> drilling the borehole through the overburden with at least one drill bit selected to optimize at least one drilling performance parameter; and
>
> drilling the borehole through at least part of the production zone with at least one other drill bit selected to optimize at least one production performance parameter.

> 6. A method for selecting parameters to optimize a production performance parameter in a drilled borehole, comprising:
>
> selecting initial bit design parameters and initial drilling operating parameters;
>
> simulating drilling of a selected earth formation, the simulating including determining at least one parameter related to production performance in the selected earth formation;

> adjusting at least one of the initial bit design parameters or at least one of the initial drilling operating parameters;
>
> repeating the simulating; and
>
> repeating the adjusting of the at least one of the bit design or drilling operating parameters and the simulating until the at least one parameter related to production performance is optimized, wherein the at least one parameter related to production performance comprises a surface area of the borehole.

THE REJECTIONS

The Examiner relies upon the following as evidence of unpatentability:

Gilman	US 1,873,757	Aug. 23, 1932
Dellinger	US 4,373,592	Feb. 15, 1983
Tibbitts	US 4,883,132	Nov. 28, 1989
Johnston, Jr.	US 6,070,677	Jun. 6, 2000
Goldman	US 6,109,368	Aug. 29, 2000
Huang	US 2004/0143427 A1	Jul. 22, 2004

The following rejections are before us for review.

1. Claims 1-4, 7, and 8 stand rejected under 35 U.S.C. § 102(e) as anticipated by Goldman.
2. Claims 1-3, 6, 9, and 10 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Goldman and Johnston.[1]

[1] The remaining listed references were cited by the Examiner as evidence of well known concepts in the art.

ISSUE

Appellant contends Goldman fails to disclose using a drill bit selected to optimize at least one production parameter, as recited in claim 1 (Appeal Br. 5-9), and fails to disclose a technique for optimizing a production performance parameter, as recited in claims 4 and 6 (Appeal Br. 10-11). Appellant further contends that Johnston likewise fails to disclose selecting a drill bit to optimize a production performance parameter (Appeal Br. 11-12).

The Examiner found that Goldman discloses optimization of hole cleaning efficiency, which is related to factors such as drill cutting size, the percentage of cutting removed from the wellbore during drilling, and the composition of the drilling mud (Answer 7)[2]. The Examiner thus determined that Goldman discloses optimizing at least one production parameter because the Specification defines drill cutting size as one production parameter (Answer 8). The Examiner further found that Johnston discloses using a drill bit 10 to drill the production zone where the drill bit is used to optimize or enhance the production of the zone by increasing the surface area of the borehole wall (Supp. Answer 6-7).

The issues before us are whether Appellant has shown that the Examiner erred in finding that Goldman anticipates claims 1-4, 7, and 8 and in holding that the combination of Goldman and Johnston renders claims 1-3, 6, 9, and 10

[2] The Examiner mailed an Answer on November 16, 2005 ("Answer") and a Supplemental Examiner's Answer on September 29, 2006 ("Supp. Answer"). The Supplemental Answer incorporates by reference the Examiner's comments on hole cleaning efficiency made in the original Answer (Supp. Answer 7).

unpatentable. More particularly, the issues before us are:

- whether Goldman discloses using a drill bit selected to optimize at least one production parameter; and
- whether the combination of Goldman and Johnston would have led one of ordinary skill in the art to optimize a production performance parameter for a drill bit in a drilled borehole.

FINDINGS OF FACT

The Specification provides "[p]roduction performance parameters include, for example, reducing or minimizing skin damage, optimizing cutting size for screening from mud, and increasing the surface area of the borehole wall" (Specification 4:25-27). The Specification describes that "[Drilling performance] parameters include, for example, maximum total footage (drilled interval) for each bit A, B, minimum cost to reach the base of the overburden 22, maximum rate of penetration of the overburden 22, and overall smoothness of the profile of the borehole 30, 5 among others" (Specification 4:1-5). The Specification further notes, "[i]t is possible that drill bits selected and/or designed to optimize a production performance parameter will provide inferior drilling performance as compared to drill bits selected and/or designed to optimize a drilling performance parameter in any particular formation" (Specification 7:1-3).

Goldman discloses a method and apparatus for predicting performance of a drilling system for the drilling of a well bore in a given formation (Goldman, Abstract). Goldman uses a hole cleaning efficiency model as part of its method to

predict performance of a drilling system, where the hole cleaning efficiency model is a measure of an effectiveness of the drilling fluid and hydraulics (Goldman, col. 11, ll. 8-10). In particular, Goldman teaches that "[i]f the hole cleaning efficiency is low, then unremoved or slowly removed cuttings may have an adverse impact upon drilling mechanics" (Goldman, col. 11, ll. 10-12). During the optimization mode, Goldman uses the hole cleaning efficiency model as a "measure of correction to the penetration rate prediction to compensate for hole cleaning that deviates from ideal behavior" (Goldman, col. 14, ll. 24-27). "Thus, the measure of hole cleaning efficiency (HCE) reflects the effects of lithology, shale plasticity, hydraulics, and drilling fluid type on penetration rate" (Goldman, col. 14, ll. 27-29). According to Appellant's Specification, rate of penetration is a drilling performance parameter. As such, Goldman discloses using hole cleaning efficiency to optimize a drilling performance parameter and does not disclose optimizing at least one production performance parameter.

Johnston discloses an apparatus for enhancing production from a well bore hole (Johnston, Abstract). Johnston's apparatus 10 includes a cutting assembly 30 that is disposed on a drill string 21 above the pilot bit 66 (Johnston, Figure 1). The cutting assembly 30 is not located at the end of the drill string 21, and as such, is not a drill bit. Johnston discloses using the cutting assembly 30 as a means to enhance production from the well bore by enlarging the size of the well bore hole (Johnston, col. 9, ll. 6-9 and 55-59). Johnston does not disclose a method of selecting parameters of a drill bit to optimize production.

PRINCIPLES OF LAW

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987), *cert. denied*, 484 U.S. 827 (1987).

In rejecting claims under 35 U.S.C. § 103(a), the examiner bears the initial burden of establishing a prima facie case of obviousness. *In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). *See also In re Piasecki*, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984). It is incumbent upon the examiner to establish a factual basis to support the legal conclusion of obviousness. *See id.* at 1073, 5 USPQ2d at 1598. In so doing, the examiner is expected to make the factual determinations set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), *viz.*, (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; and (3) the level of ordinary skill in the art. In addition to these factual determinations, the examiner must also provide "some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir 2006) (*cited with approval in KSR Int'l. Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007)). Only if this initial burden is met does the burden of coming forward with evidence or argument shift to the appellant. *See Oetiker*, 977 F.2d at 1445, 24 USPQ2d at 1444. *Id.* at 1445, 24 USPQ2d at 1444. *See also Piasecki*, 745 F.2d at 1472, 223 USPQ at 788. Obviousness is then determined on the basis of the evidence as a whole and the

relative persuasiveness of the arguments. *See Oetiker*, 977 F.2d at 1445, 24 USPQ2d at 1444; *Piasecki*, 745 F.2d at 1472, 223 USPQ at 788.

ANALYSIS

As we found *supra*, Goldman does not disclose drilling a borehole through at least part of a production zone with a drill bit selected to optimize at least one production parameter, as recited in claim 1. Goldman also fails to disclose a method for selecting parameters to optimize a production performance parameter in a drilled borehole, as recited in claim 4. As such, Goldman does not anticipate the subject matter of claims 1 and 4 or their respective dependent claims 2, 3, 7, and 8.

Further, although Johnston discloses a means to enhance production from a well bore, Johnston does not disclose achieving this enhanced production by using a drill bit selected to optimize at least one production performance parameter, as recited in claim 1, because Johnston's cutting apparatus 30 is not a drill bit. The definition of drill bit provided by the Examiner requires that "[t]he bit is on the bottom of the drill string ..." (Final Office Action 8, n. 1). Johnston's cutting apparatus 30, which is used to enhance production, is disposed above the bottom of the drill string. As such, Johnston does not disclose using a drill bit to enhance production. Similarly, Johnston does not disclose a method of selecting parameters of a drill bit to optimize production performance.

Neither Goldman nor Johnson discloses optimizing at least one production performance parameter of a drill bit. As such, we find that the Examiner's

obviousness determination is based on faulty underlying findings as to the scope and content of the prior art, and thus the Examiner has failed to present a prima facie case of obviousness of claim 1. Accordingly, the combination of Goldman and Johnston does not render claims 1 and 6, or their dependent claims 2, 3, 9, and 10, unpatentable.

CONCLUSIONS OF LAW

We conclude the Examiner erred in rejecting claims 1-4, 7, and 8 as anticipated by Goldman and erred in rejecting claims 1-3, 6, 9, and 10 as obvious in view of Goldman and Johnston.

DECISION

The decision of the Examiner to reject claims 1-4, 7, and 8 under 35 U.S.C. § 102(e) as anticipated by Goldman and claims 1-3, 6, 9, and 10 under 35 U.S.C. § 103(a) as obvious in view of Goldman and Johnston is reversed.

REVERSED

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ROSENTHAL & OSHA L.L.P.
Suite 2800
1221 McKinney
Houston, TX 77010