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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte WILL HENRY KERR and ALISTAIR WILLIAM SKUSE

Appeal 2019-003303
Application 13/963,587
Technology Center 3700

Before LINDA E. HORNER, DANIEL S. SONG, and JILL D. HILL,
Administrative Patent Judges.

SONG, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the Examiner's decision to reject claims 1–19 and 23–25. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM IN PART.

¹ We use the word Appellant to refer to “applicant” as defined in 37 C.F.R. § 1.42(a). The Appellant identifies the real party in interest as Dyson Technology Limited. Appeal Br. 2.

CLAIMED SUBJECT MATTER

The claims are directed to a cleaner head. Claim 1, reproduced below, is illustrative of the claimed subject matter:

1. A cleaner head comprising an agitator and a drive assembly for driving the agitator, the drive assembly comprising a dog for transmitting torque to the agitator, wherein one of the dog and the agitator comprises a tapered head, a shank that extends from the head, and a screw thread formed around the shank, the other of the dog and the agitator comprises a bore having a countersink and a complementary screw thread formed around a wall of the bore, the shank projects into the bore, and the two threads mate such that, as the dog rotates, the agitator screws on to the dog and the tapered head mates with the countersink.

Appeal Br. 22, Claims App.

REFERENCES

The prior art relied upon by the Examiner is:

Name	Reference	Date
Stegens et al.	US 6,591,440 B2	July 15, 2003
Rainey et al.	US 2010/0032209 A1	Feb. 11, 2010
Hahn	DE 10 2010 060 373 A1	May 10, 2012

REJECTIONS

The Examiner rejects various claims under 35 U.S.C. § 103(a) as follows:

1. Claims 1–6 and 8 as unpatentable over Hahn in view of Stegens. Final Act. 2.
2. Claim 7 as unpatentable over Hahn in view of Stegens and Rainey. Final Act. 4.
3. Claims 9–15 and 17 as unpatentable over Hahn in view of Rainey. Final Act. 5.

4. Claim 16 as unpatentable over Hahn in view of Rainey and Stegens. Final Act. 7.
5. Claims 18, 19, and 25 as unpatentable over Hahn. Final Act. 8.²
6. Claim 23 as unpatentable over Hahn in view of Rainey. Final Act. 9.
7. Claim 24 as unpatentable over Hahn in view of Stegens. Final Act. 9.

OPINION

Rejection 1: Hahn in view of Stegens

The Examiner rejects claims 1–6 and 8 as unpatentable over Hahn in view of Stegens. Final Act. 2. As to independent claim 1, the Examiner finds that Hahn discloses the invention substantially as claimed, but does not disclose the limitation “wherein one of the dog and the agitator comprises a tapered head, the other of the dog and the agitator comprises a bore having a countersink, and the tapered head mates with the countersink.” Final Act. 3. The Examiner finds that Stegens discloses “a head (38) and a shank (36) with a taper (portion between 36 & 37) there between, and a corresponding countersink to accommodate this taper.” Final Act 3–4. The Examiner concludes that it would have been obvious to a person of ordinary skill in the art to have modified the device of Hahn to provide a taper between the shank and the head to reduce the stress concentration. Final Act. 4.

² The heading for this rejection also identifies claim 21 as being rejected. Final Act. 8. However, claim 21 was canceled during prosecution. *See* Amendment, filed July 17, 2017, pg. 5.

The Appellant disagrees and argues that although Stegens discloses a taper and a corresponding countersink, it “fails to disclose or suggest that ‘the tapered head mates with the countersink.’” Appeal Br. 7. In particular, the Appellant points out that the Specification of Stegens does not describe the taper and the countersink as mating with each other, and argues that the assembled view shown in Figure 2 of Stegens is “merely schematic in nature and insufficiently detailed to show whether or not the taper and the countersink should or should not mate.” Appeal Br. 8.

In support of its position, the Appellant provides, *inter alia*, a technical argument that in Stegens, “the concentric alignment function is provided by the press fit between the stub shaft 36 and the pin 51 and the axial alignment function is provided by the abutment between the end piece 38 and the seat 58.” Appeal Br. 9, citing Stegens, col. 3, ll. 22–24; *see also* Stegens Figs. 2, 3. As such, the Appellant argues that although a person of ordinary skill may have provided a taper transition in Hahn to reduce stress, and a countersink to accommodate the added taper, there is no reason to have the taper and countersink mate. Appeal Br. 10–11.

The Examiner responds that Figure 2 of Stegens “clearly shows the taper and countersink mated with one another,” and explains that because the Appellant did not provide a “special definition of the word ‘mating’ to require two parts to exactly conform to one another, . . . insertion of the taper into the countersink is correctly considered a ‘mating’ of the two parts,” and “providing a countersink to accommodate a taper is a basic engineering design feature.” Ans. 10–11; *see also* Ans. 11 (“One of ordinary skill in the art would modify designs of Hahn to provide for flush abutment of components by designing the countersink to accommodate the entirety of the taper.”).

We are persuaded by the Appellant’s arguments. The technical basis of the Appellant’s argument as to Stegens is sound considering its specific disclosure of a bearing 37 and the raised seat 58 for the bearing. *See* Stegens Figs. 2, 3; col. 2, ll. 44–47, 59–61; col. 3, ll. 22–24. The seating of the bearing 37 on the raised seat 58 indicates that, more likely than not, the disclosed taper and countersink of Stegens do not mate with each other. The Examiner appears to acknowledge the merit of this argument in interpreting the limitation “mate” to merely require the insertion or accommodation of the taper within the countersink. Ans. 10–11. However, we agree with the Appellant that “[t]he Examiner’s interpretation of ‘mating,’ . . . is not consistent with the customary and ordinary meaning of ‘mating,’ is not consistent with the specification, and is not consistent with the claims.” Reply Br. 7; *see also* Reply Br. 6 (citing *DICTIONARY FOR MECHANICAL ENGINEERING*, 243 (1996) (4th ed., Society of Automotive Engineers) (defining “mating” as describing “interlocking of two surfaces or pieces”); Spec. 6, ll. 4–12) (“tapered head mates with and tightens against the countersink. The mating of the countersink and the tapered head acts to align concentrically the agitator and the dog.”). Thus, the Examiner’s interpretation of “mate” is unreasonably broad.

Therefore, in view of the above considerations, we reverse the Examiner’s rejection of claim 1, and claims 2–6 and 8 that ultimately depend from claim 1.

Rejection 2: Hahn in view of Stegens and Rainey

The Examiner rejects claim 7 as unpatentable over Hahn in view of Stegens and Rainey. Final Act. 4. The Appellant relies on dependency on claim 1 for patentability of claim 7. Appeal Br. 3, 14. The Examiner’s

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application of Rainey for its teaching of a screw thread having a buttress thread form does not remedy the deficiency of the combination of Hahn and Stegens discussed above relative to claim 1. Accordingly, this rejection of claim 7 is also reversed.

Rejection 3: Hahn in view of Rainey

The Examiner rejects claims 9–15, and 17 as unpatentable over Hahn in view of Rainey. Final Act. 5. Independent claim 9 differs from claim 1 in that claim 9 does not require a tapered head or a countersink, but instead, recites that “each of the screw threads has a buttress profile.” Appeal Br. 22–23, Claims App. As to independent claim 9, the Examiner finds that Hahn discloses the invention substantially as claimed, but does not disclose that each of the screw threads has a buttress profile. Final Act. 6. The Examiner relies on Rainey for disclosing “a threaded coupling between two rotatably coupled elements (102 and 136), wherein the threads are buttress threads (143b; ¶ [0092]).” Final Act. 6. Accordingly, the Examiner concludes that it would have been obvious to a person of ordinary skill in the art to have modified the device of Hahn in view of Rainey to use buttress threads, which “can resist relatively high axial forces in a preferred direction, thereby making for a robust and durable coupling of the rotatable parts.” Final Act. 6.

The Appellant disagrees and argues that there is no reason to modify Hahn because “[t]he purpose of Rainey’s use of buttress profile threads is to enable an overstrike force to be transferred without deformation of the threads,” whereas “[t]he drive mechanism of Hahn does not impart an overstrike force on the rotary brush.” Appeal Br. 16. In that regard, the Appellant argues that “there is no evidence that the threads of Hahn are

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exposed to *relatively high* axial forces” (Appeal Br. 17), or that “one of skill in the art would have thought that the threads in Hahn experience such high axial loads that buttress threads would be warranted” (Reply Br. 9). The Appellant further argues that, to the contrary, “one of ordinary skill in the art would have recognized that Hahn’s threads likely experience relatively little axial force.” Reply Br. 10; *see also* Reply Br. 9. Based thereon, the Appellant argues that “the Examiner’s rationale for modifying Hahn to include buttress threads can only be the result of impermissible hindsight.” Appeal Br. 17.

The Examiner responds that “[b]uttress threads are well known in the art of mechanical design,” and “Rainey teachings are pertinent to the particular problem of how to rotatably connect two members in a threaded manner,” and that “the members of Hahn, which are rotatably coupled, will experience axial forces due to the nature of how they operate.” Ans. 13.

We agree with the Appellant for the reasons argued. Rainey is directed to a rotary earth bit for drilling a well in which overstrike force is applied to the earth bit. Title; Abstr. Based on their application, any applied axial forces in Rainey would have been greater by many orders of magnitude as compared to axial forces in a cleaner head of Hahn. Moreover, as the Appellant argues, there is no evidence that high axial forces were of concern in the art of cleaner heads, or that one of ordinary skill in that art would have perceived Hahn as being subjected to such high axial forces. Accordingly, the Examiner’s reasoning for providing buttress threads based on the rotary earth bit of Rainey does not appear to be supported by rational underpinnings, but instead, appears to be based on impermissible hindsight.

Therefore, in view of the above, we reverse the Examiner’s rejection of claim 9, and claims 10–15, and 17 that ultimately depend from claim 9.

Rejection 4: Hahn in view of Rainey and Stegens

The Examiner rejects claim 16 as unpatentable over Hahn in view of Rainey and Stegens. Final Act. 7. The Appellant relies on dependency on claim 9 for patentability of claim 16. Appeal Br. 14, 19. The Examiner’s application of Stegens for the taper and countersink does not remedy the deficiency of the combination of Hahn and Rainey. Accordingly, this rejection of claim 16 is also reversed.

Rejection 5: Hahn

The Examiner rejects claims 18, 19, and 25 as unpatentable over Hahn. Final Act. 8. Independent claim 18 differs from claim 1 in that claim 18 does not require a tapered head or a countersink, but instead, recites that “each start turns through an angle of . . . no less than 120 degrees.” Appeal Br. 23–24, Claims App.

As to independent claim 18, the Examiner finds that Hahn discloses the invention substantially as claimed, and concludes that the angular limitations would have been obvious design choices to one of ordinary skill, and “would not yield any unexpected results.” Final Act. 8. The Examiner further finds that Figure 5 of Hahn suggests “each start turns through an angle of about 180 degrees.” Ans. 14–15; *see id.* at 15 (annotated Fig. 5 of Hahn).

The Appellant argues that “the references fail to disclose or suggest that ‘each start turns through an angle of . . . no less than 120 degrees.’” Appeal Br. 19. The Appellant also argues that the Examiner has failed to articulate adequate reasoning for the rejection, and has failed to state what design characteristics are for the design of a turn angle. Appeal Br. 20.

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Referring to its Specification, the Appellant argues that “below an angle of 120 degrees, the lengths of the starts may be insufficient to bear the torque required of a cleaner head of some embodiments.” Appeal Br. 19, citing Spec. 3, ll. 1–5.

The Appellant appears to concede that Figure 5 of Hahn suggests turning of about 180 degrees in arguing that “while the shank may include the required threads, Hahn fails to disclose or suggest that the mating threads meet the requirement that ‘each start turns through an angle of no more than 360 degrees and no less than 120 degrees.’” Reply Br. 11. In particular, the Appellant points out that “the length over which the screw threads on the bore extend is significantly less than the length over which the screw threads on the shank extend.” Reply Br. 11. Thus, the Appellant argues that “while the shank may include a screw thread that turns 180 degrees, as argued by the Examiner, there is no evidence that the bore includes such screw threads.” Reply Br. 12; *see also id.* (annotated Fig. 5 of Hahn).

We are not persuaded by the Appellant’s arguments. Figure 5 illustrates starts of the shank in Hahn that turn through an angle of approximately 180 degrees as recited in claim 18. Ans. 15 (annotated Fig. 5 of Hahn). The Appellant is correct that the mating threads of the dog of Hahn that engage the threads of the shank must turn less than 180 degrees because the bore of the dog is shorter than the shank. *See* Hahn Fig. 5. However, it is also evident from Figure 5 of Hahn that the magnitude of this difference is not great, and the length of the bore appears to be approximately one fourth shorter than the length of the shank. *See id.* This suggests that the mating threads of the dog turns approximately 120 degrees as also required by claim 18.

We are aware that extraction of quantitative values based on measurements of a drawing are of little value. *In re Wright*, 569 F.2d 1124, 1127 (CCPA 1977). However, drawings can be relied on for what they reasonably disclose and suggest to one of ordinary skill in the art. *See In re Mraz*, 455 F.2d 1069, 1072 (CCPA 1972); *In re Aslanian*, 590 F.2d 911, 914 (CCPA 1979). Thus, although we do not find that Hahn discloses threads of the dog turning 120 degrees, in view of the apparent disclosure of a bore length that is approximately one fourth shorter than the length of the shank, we agree with the Examiner that it would have been an obvious design choice to one of ordinary skill to have designed the threads of the bore to turn 120 degrees. Any deviation in Hahn from the recited 120 degrees would have been relatively minor and an obvious variation.

Although the Appellant argues that “below an angle of 120 degrees, the lengths of the starts may be insufficient to bear the torque required of a cleaner head of some embodiments” (Appeal Br. 19), the extent of thread engagement to ensure ability of a threaded joint to bear the anticipated torque would have been an obvious parameter to consider by one of ordinary skill in the design of threaded joints generally, and would have been a consideration in the design of a cleaner head such as that of Hahn specifically. Appeal Br. 19. *See In re Dailey*, 357 F.2d 669, 672–73 (CCPA 1966) (affirming design choice determination where “Appellants have presented no argument which convinces us that the particular configuration of their container is significant or is anything more than one of numerous configurations a person of ordinary skill in the art would find obvious for the purpose of providing mating surfaces in the collapsed container [of the prior art]”).

Finally, the Appellant asserts that the Examiner has improperly shifted the burden to the Appellant to establish unexpected results to prove patentability when a prima facie case of obviousness has not been established. Appeal Br. 20. However, as discussed above, we agree with the Examiner as to the rejection, and find that a prima facie case of obviousness has been shown, and as such, we see no error in the Examiner's further explanation that no unexpected results has been demonstrated. *See In re Woodruff*, 919 F.2d 1575, 1578 (Fed. Cir. 1990) (where the difference between the claimed invention and the prior art is some range or other variable within the claims, "the applicant must show that the particular range is *critical*, generally by showing that the claimed range achieves unexpected results relative to the prior art range.").

Therefore, in view of the above considerations, we affirm the Examiner's rejection of independent claim 18. The Appellant does not submit separate arguments for patentability of claims 19 and 25 that depend from claim 18. Appeal Br. 19. Accordingly, we affirm this rejection as to claims 19 and 25 as well.

Rejection 6: Hahn in view of Rainey

The Examiner rejects claim 23 as unpatentable over Hahn in view of Rainey. Final Act. 9. Claim 23 depends on claim 18 discussed above, but also requires each screw thread to have a buttress thread form. Appeal Br. 24, Claims App. The rejection of claim 23 applies Rainey in the same manner as in Rejection 3 of claim 9. Final Act. 9. Accordingly, we reverse this rejection of claim 23 for substantially the same reasons as claim 9.

Rejection 7: Hahn in view of Stegens

The Examiner rejects claim 24 as unpatentable over Hahn in view of Stegens. Final Act. 9. Claim 24 depends from claim 18, but also requires a tapered head that mates with a countersink. Appeal Br. 24, Claims App. Thus, we reverse this rejection of claim 24 for substantially the same reasons as claim 1.

CONCLUSION

The Examiner's rejections are affirmed in part. More specifically,

1. Rejection of claims 1–6 and 8 as unpatentable over Hahn in view of Stegens is reversed.
2. Rejection of claim 7 as unpatentable over Hahn in view of Stegens and Rainey is reversed.
3. Rejection of claims 9–15 and 17 as unpatentable over Hahn in view of Rainey is reversed.
4. Rejection of claim 16 as unpatentable over Hahn in view of Rainey and Stegens is reversed.
5. Rejection of claims 18, 19, and 25 as unpatentable over Hahn is affirmed.
6. Rejection of claim 23 as unpatentable over Hahn in view of Rainey is reversed.
7. Rejection of claim 24 as unpatentable over Hahn in view of Stegens is reversed.

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1–6, 8	103	Hahn, Stegens		1–6, 8
7	103	Hahn, Stegens, Rainey		7
9–15, 17	103	Hahn, Rainey		9–15, 17
16	103	Hahn, Rainey, Stegens		16
18, 19, 25	103	Hahn	18, 19, 25	
23	103	Hahn, Rainey		23
24	103	Hahn, Stegens		24
Overall Outcome			18, 19, 25	1–17, 23, 24

TIME PERIOD FOR RESPONSE

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) (2017).

AFFIRMED IN PART