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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte THOMAS MERZHAEUSER¹

Appeal 2018-004779
Application 14/308,792
Technology Center 3700

Before JAMES P. CALVE, JEREMY M. PLENZLER, and
ALYSSA A. FINAMORE, *Administrative Patent Judges*.

CALVE, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant appeals under 35 U.S.C. § 134(a) from the Final Office Action rejecting claims 1–11 and 16–20. Appeal Br. 1. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

¹ General Electric Company is identified as the real party in interest (Appeal Br. 2) and also is the applicant pursuant to 37 C.F.R. § 1.46.

CLAIMED SUBJECT MATTER

Claims 1 and 16 are independent. Claim 1 is reproduced below.

1. A wind turbine blade, comprising:

a first blade segment connected to a second blade segment where the first blade segment and the second blade segment extend in opposite directions from a chord-wise joint, each of the blade segments having a pressure side shell member, a suction side shell member, and an internal support structure;

the first blade segment comprising a beam structure extending lengthways within the first blade segment to enable structural connection with the second blade segment at a receiving section within the second blade segment, wherein the beam structure forms a portion of the internal support structure of the first blade segment and comprises a shear web connected with a suction side spar cap and a pressure side spar cap; and

one or more first bolt joints located at a first end of the beam structure for connecting with the receiving section of the second blade segment; and

a plurality of second bolt joints located at the chord-wise joint, wherein the one or more first bolt joints located at the first end of the beam structure are separated span-wise with the plurality of second bolt joints located at the chord-wise joint, and

wherein the receiving section of the second blade segment comprises a plurality of spar structures that extend lengthways within the second section to enable connection to the beam structure of the first blade segment and

wherein the spar structures comprise a first bolt joint slot and a second bolt slot suitable for alignment with a third bolt joint slot in the beam structure to enable positioning of a bolt tube or pin within each of the bolt joint slots for joining the beam structure and the spar structures.

Appeal Br. 19 (Claims App.).

REJECTIONS

Claim 3 is rejected under 35 U.S.C. § 112(a) for lack of enablement.

Claims 5 and 6 are rejected under 35 U.S.C. § 112(b) as indefinite.

Claims 1, 2, 4, 7–9, and 16–18 are rejected under 35 U.S.C. § 103 as unpatentable over Hancock (US 2011/0091326 A1, pub. Apr. 21, 2011) and Lemos (US 2014/0286780 A1, pub. Sept. 25, 2014).

Claim 3 is rejected under 35 U.S.C. § 103 as unpatentable over Hancock, Lemos, and Hibbard (WO 2015/051803 A1, pub. Apr. 16, 2015).

Claims 5 and 6 are rejected under 35 U.S.C. § 103 as unpatentable over Hancock, Lemos, and Arms (US 2011/0158806 A1, pub. June 30, 2011).

Claims 10, 11, 19, and 20 are rejected under 35 U.S.C. § 103 as unpatentable over Hancock, Lemos, and Kawasetsu (US 2011/0052403 A1, pub. Mar. 3, 2011).

ANALYSIS

Claim 3 For Lack of Enablement

Dependent claim 3 recites second bolt joints comprising “one or more flanges that are configured to distribute compression loads at the chord-wise joint.” Appeal Br. 19–20 (Claims App.). The Examiner determines that the Specification fails to enable “compression loads at the chord-wise joint” by not specifying how these loads are produced or what they are. Final Act. 4. The Examiner finds that a skilled artisan would understand the compression loads to be produced by something pressing upon something else but there are no elements such as screws or nuts. *Id.* The Examiner also finds that a skilled artisan would have to engage in undue experimentation to provide flanges for “compression loads at the chord-wise joint.” *Id.*; Ans. 17–18.

Appellant responds that a skilled artisan would understand that the compression loads on joints of a wind blade are caused by bending during operation and gravitational loads that occur in the horizontal and vertical positions during rotation of the wind blade. Appeal Br. 17.

The USPTO bears an initial burden of setting forth a reasonable explanation as to why the scope of protection provided by the claim is not adequately enabled by the description in the specification. *In re Wright*, 999 F.2d 1557, 1561–62 (Fed. Cir. 1993). *Wands* factors must be considered to determine whether undue experimentation is required. The factors include:

- (1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims.

In re Wands, 858 F.2d 731, 737 (Fed. Cir. 1988); see MPEP § 2164.04 (“The examiner’s analysis must consider all the evidence related to each of these factors”). Here, the Examiner’s analysis does not consider the *Wands* factors such as the examples that include leading and trailing edge *bolt joints* contrary to the Examiner’s finding that no such elements are disclosed. Nor has the Examiner addressed Appellant’s explanation of compression loads. Thus, we do not sustain the rejection of claim 3 for lack of enablement.

Claims 5 and 6 As Being Indefinite

Claim 5 recites the wind turbine blade comprises “a sensor element disposed on the one first bolt joint for measuring multiple parameters.” Claim 6 depends from claim 5 and recites “wherein the multiple parameters measured by the sensor element comprises blade loads or stresses.” Appeal Br. 20 (Claims App.).

The Examiner finds that claim 5 is indefinite because it is unclear what parameters are measured. Final Act. 5. In particular, the Examiner finds that claim 5 does not clearly identify what the parameters are and thus does not particularly point out or distinctly claim the invention. *Id.* The Examiner also rejects claim 6 due to its dependency from claim 5. *Id.*

Appellant argues that skilled artisans would understand the meaning of this term as evidenced by Arms and that claim 6 identifies specific parameters.

“The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.” 35 U.S.C. § 112(b). For pending applications that have not issued as a patent, “[a] claim is indefinite when it contains words or phrases whose meaning is unclear.” *In re Packard*, 751 F.3d 1307, 1310, 1314 (Fed. Cir. 2014). Merely claiming broadly does not render a claim indefinite as long as its meaning is clear, however. *See In re Gardner*, 427 F.2d 786, 788 (CCPA 1970) (“Breadth is not indefiniteness.”).

The Specification discloses that sensor element 51 in pin or bolt tube 52 can receive or send signals to a control unit to enable sensing multiple parameters including blade loads or stresses. Spec. ¶ 24. Claim 6 recites that the parameters comprise blade loads or stresses.

The Examiner finds that the sensor element in claim 5 measures multiple parameters, but it is unclear what those parameters are. Final Act. 5. The Examiner interprets the parameters to include blade load or stress. *Id.* The Examiner reasons that many parameters can be measured for a wind turbine, but it is not clear which ones are covered by claim 5. Ans. 18.

The Examiner's concerns appear to result from the breadth of claim 5. Claim 5 is broad enough to cover any parameter associated with operation of a wind turbine blade including blade loads and stresses. Appellant has not limited the types of parameters that may be sensed to any particular ones. We find the meaning of claim 5 to be broad, but clear. Accordingly, we do not sustain the rejection of claim 5, and we similarly do not sustain the rejection of claim 6 depending therefrom.

*Claims 1, 2, 4, 7–9, and 16–18
Unpatentable Over Hancock and Lemos*

Appellant argues claims 1, 2, 4, 7–9, and 16–18 as a group. Appeal Br. 4–15. We select claim 1 as representative, with claims 2, 4, 7–9, and 16–18 standing or falling with claim 1. 37 C.F.R. § 41.37(c)(1)(iv).

Regarding claim 1, the Examiner finds that Hancock discloses a wind turbine blade with all of the claimed features, including spar structures, but the spar structures lack first and second bolt joint slots that align with a third bolt joint slot in the beam structure to enable positioning of a bolt tube or pin within each of the bolt joint slots for joining the beam structure and the spar structures as claimed. Final Act. 6–7. The Examiner finds that Lemos teaches these features. *Id.* at 7–8. The Examiner determines it would have been obvious to use the known technique of Lemos to improve the similar device of Hancock in the same way. *Id.* at 8. The Examiner reasons that the slots and bolts would add another backup, redundant means of securing the two segments together. Ans. 5–6. In combination with the securing means of Hancock, the slots and bolts of Lemos would secure the two segments of Hancock in the axial direction and would result in the two segments being securely held in place against tension and shear forces and axial movement with additional support in the chordwise direction. *Id.* at 6.

Appellant argues that the Examiner has not shown that the friction fit of Hancock would be improved by the bolt joint slots of Lemos. Appeal Br. 10. Appellant argues that there is no evidence of a problem securing Hancock's blade segments so there would be no reason to modify Hancock with Lemos. Reply Br. 5. Appellant argues that the modification therefore would amount to extra work and expense for no apparent reason. *Id.*

The Examiner's reason for combining the bolts and holes securing of Lemos with the sectional wind turbine blade of Hancock is supported by a rational underpinning. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007) (“[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.”); Ans. 6 (use of known technique).

Indeed, we have repeatedly held that an implicit motivation to combine exists not only when a suggestion may be gleaned from the prior art as a whole, but when the “improvement” is technology-independent and the combination of references results in a product or process that is more desirable, for example because it is *stronger, cheaper, cleaner, faster, lighter, smaller, more durable, or more efficient*. Because the desire to enhance commercial opportunities by improving a product or process is universal—and even common-sensical—we have held that there exists in these situations a motivation to combine prior art references even absent any hint of suggestion in the references themselves. In such situations, the proper question is whether the ordinary artisan possesses knowledge and skills rendering him *capable* of combining the prior art references.

DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co., 464 F.3d 1356, 1368 (Fed. Cir. 2006) (emphasis added), *discussed in Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1361 (Fed. Cir. 2016).

As the Examiner points out, the securing means of Lemos would *supplement* the securing system of Hancock to provide a backup system for securing the two blade segments together. The finding is particularly relevant given Hancock's teachings that modern wind turbine blades weigh up to 15 tons and can extend up to 55 meters. Hancock ¶ 2. Lemos teaches blades under implementation that extend more than 80 meters. Lemos ¶ 3.

This evidence, by itself, supports the Examiner's reasoning. Wind turbine blades are extremely heavy and long, and they are expected to get larger and heavier still. Adding a second securing feature to hold two blade segments together against axial movement would improve safety. Ans. 5.

Therefore, contrary to Appellant's arguments, there is a reason to expend extra work, resources, and expense in upgrading and improving the connection of blade segments 1002, 1003 of Hancock. Lemos provides a relatively inexpensive, simple, and easy-to-implement way to do so.

But there are other reasons as well. Appellant argues repeatedly that Hancock teaches a friction fit as the means to secure blade segments 1002, 1003 together. *See* Appeal Br. 10, 12; Reply Br. 4–5. We find no express teaching of a friction fit or interference fit in Hancock, nor does Appellant cite to any such teaching in Hancock. However, if we assume for sake of argument that Hancock's drawings would be understood to teach a friction fit between blade segments, then Lemos' holes and bolts would provide an added advantage of a *different* type of securing system to a friction fit, i.e., one that may not fail for the same reasons as Hancock's system. The holes and bolts would not require the same manufacturing tolerances of a friction fit but would hold the segments securely in place against tension and shear forces and axial movement as an additional chord support. *See* Ans. 6.

Lemos uses holes and bolts to connect complementary spar sections, whereas Hancock secures segments together along a chord. *See* Ans. 5. Because Lemos' arrangement is oriented orthogonally to the chord length, it would work against different stresses than Hancock's system. *Id.* at 5–6.

The Examiner also correctly finds that Hancock and Lemos connect blade portions *similarly*. Final Act. 6–8. Both references use the spars in each blade portion to form the connection. Hancock inserts spar bridge 1005 of portion 1003 in spar cavity 1007 of portion 1002. Hancock ¶ 113, Fig. 9. Lemos inserts spar projection 210 and shear web 211 of blade 200 between spars 102 and webs 111 of tip segment 100. Lemos ¶ 45, Figs. 5–10.

Appellant's efforts to distinguish the spar structure of Lemos from that of Hancock or the claimed blade are not persuasive. Appellant discloses blade segment 30 with beam structure 40 that protrudes from spar section 42 as shown in Figure 3. Spec. ¶ 19. Beam structure 40 is an extension of spar section 42. It has spar caps 46, 48 on suction and pressure sides with shear webs 44 on the remaining sides. *Id.* The use of the term "web" by Lemos to describe part of its spar structure does not alter the fact that web 111 is part of the spar structure. Thus, the teaching in Lemos to form holes in web 111 corresponds to Hancock's spar bridge 1005 as the Examiner correctly finds.

Furthermore, the Examiner also correctly finds that Hancock teaches the use of access hatch 13 to provide access to fixing and tensioning member 10, 12 of Hancock's spar bridge 5 when it is placed inside spar section 7 as shown in Figure 2. Hancock ¶ 88. The Examiner reasons correctly that this feature would provide similar access for tightening the nuts and bolts of the Lemos connection when it is added to spar bridge 1005 and spar cavity 1007 of Hancock.

Hancock does not use hatch 13 to tighten nuts and bolts that secure a spar bridge inside spar cavity. Reply Br. 8. However, Hancock teaches to use hatches to access nuts and bolts to tighten blade sections together. Ans. 14. Access hatch 13 is used to adjust tensioning member 12 of spar bridge 5 inside spar section 7 of another blade portion 2 to pull blade portions 2, 3 together. Hancock ¶¶ 86–88. The Examiner proposes to use such a hatch to tighten bolts and nuts added to Hancock’s spar sections to hold the blade segments together in the Figure 9 embodiment of Hancock, which is relied on by the Examiner for the rejection. *See* Final Act. 6–7.

We also agree with the Examiner that Lemos is evidence of the success a skilled artisan would expect when combining Lemos’ bolts and holes with the teachings of Hancock. Ans. 14. They are employed on the same types of spar structures for the same purpose. “The reasonable expectation of success requirement refers to the likelihood of success in combining references to meet the limitations of the claimed invention.” *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir. 2016).

Here, claim 1 requires the spar structure of the second blade segment to include bolt joint slots suitable for alignment with a third bolt joint slot in the beam structure of the first blade segment “to enable positioning of a bolt tube or pin within each of the bolt joint slots for joining the beam structure and the spar structures.” Appeal Br. 19 (Claims App.). Lemos is evidence that these features can be formed in spar beams and spar structures and that a skilled artisan would have a reasonable expectation of success in forming them on the similar spar beam and spar structures of Hancock as claimed.

Moreover, Lemos teaches to use nuts, bolts, and holes 113 to secure spar beams and spar structures together in conjunction with adhesive, which can be applied between the spar beam and spar structures. Lemos ¶ 45. The Examiner proposes to use such nuts, bolts, and holes with Hancock's similar spar structures to supplement Hancock's chordwise securing system in the same way Lemos teaches to do for similar results, i.e., to prevent the blade portions from separating. Final Act. 8; Ans. 5.

For all the foregoing reasons, we sustain the rejection of claims 1, 2, 4, 7–9, and 16–18.

*Claims 3, 5, 6, 10, 11, 19, and 20
Unpatentable Over Hancock, Lemos, and Hibbard/Arms/Kawasetsu*

Appellant argues that claims 3, 5, 6, 10, 11, 19, and 20 are patentable because they depend from a nonobvious independent claim. Appeal Br. 16. Because we sustain the rejection of independent claims 1 and 16, this argument is not persuasive, and we also sustain the rejection of claims 3, 5, 6, 10, 11, 19, and 20.

DECISION

We reverse the rejection of claim 3 under 35 U.S.C. § 112(a) for lack of enablement.

We reverse the rejection of claims 5 and 6 under 35 U.S.C. § 112(b) as being indefinite.

We affirm the prior art rejections of claims 1–11 and 16–20.

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

AFFIRMED