



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/881,620	06/04/2013	Yuya Tanaka	2013-0619A	1006
513	7590	03/20/2020	EXAMINER	
WENDEROTH, LIND & PONACK, L.L.P. 1025 Connecticut Avenue, NW Suite 500 Washington, DC 20036			VONCH, JEFFREY A	
			ART UNIT	PAPER NUMBER
			1781	
			NOTIFICATION DATE	DELIVERY MODE
			03/20/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ea@wenderoth.com
kmiller@wenderoth.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte YUYA TANAKA, SHINICHI YOSHIDA, HIDEAKI TANAKA,
HIDEYUKI SUZUKI, TOSHIO ABE, and MASAHIRO KASHIWAGI

Appeal 2018-005728
Application 13/881,620
Technology Center 1700

Before ROMULO H. DELMENDO, JEFFREY R. SNAY, and
MICHAEL G. McMANUS, *Administrative Patent Judges*.

SNAY, *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 and 4–9. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

¹ We use the word Appellant to refer to “applicant” as defined in 37 C.F.R. § 1.42(a). Appellant identifies Mitsubishi Heavy Industries, Ltd. as the real party in interest. Appeal Br. 2.

BACKGROUND

The invention relates to a composite material structure, such as may be used in constructing an aircraft wing. Spec. ¶ 1. According to the specification, access holes provided in fiber reinforced plastic composites can result in stress concentration at the peripheral regions of the holes. *Id.* ¶ 2. For that reason, it is known to increase strength in the hole peripheral regions by addition of thickness-increasing reinforcing layers. *Id.* ¶ 3. Described in the Specification is a construction which includes composites having fibers oriented at a specified angle relative to a longitudinal direction of the structure, located in the hole periphery regions, such that stiffness in the hole periphery is reduced. *Id.* ¶ 12. Consequently, the use of reinforcing layers may be avoided. *Id.* ¶ 10. Claim 1, reproduced below, is the sole independent claim on appeal:

1. A composite material structure that is of a composite material that is elongated in a longitudinal direction, has a plurality of holes formed therein, and is made of fiber reinforced plastic, and is subjected to a tensile load and/or a compressive load in the longitudinal direction,
 - wherein the composite material structure further comprises
 - a peripheral edge region located around each of the holes, and
 - another region consisting of an area surrounding the peripheral edge region,
 - wherein tensile stiffness and/or compressive stiffness in the longitudinal direction in the peripheral edge region around each of the holes are lower than tensile stiffness and/or compressive stiffness in the longitudinal direction in the other region,
 - wherein the composite material structure is formed by laminating a plurality of fiber sheets,
 - wherein the plurality of the fiber sheets comprise divided fiber sheets,

wherein a peripheral edge region fiber sheet and another region fiber sheet form the divided fiber sheets,

wherein a fiber orientation angle of the peripheral edge region fiber sheet is different from a fiber orientation angle of the another region fiber sheet,

wherein the divided fiber sheets are formed by placing the peripheral edge region fiber sheet and the another region fiber sheet adjacent to each other via splice positions,

wherein the divided fiber sheets are laminated at predetermined positions,

wherein the splice position of one of the divided fiber sheets is placed at a deviated position in a direction perpendicular to the longitudinal direction relative to the splice position of another one of the divided fiber sheets,

wherein, in a plan view of the laminated divided fiber sheets, an inner area between the splice positions that are furthest from the hole is the peripheral edge region,

wherein, when the longitudinal direction is the direction of 0° , the peripheral edge region is of a composite material mainly made of fiber oriented in directions of $\pm 30^\circ$ to $\pm 60^\circ$,

wherein the peripheral edge region and the another region are formed by stacking the fiber sheets in which carbon fiber reinforced plastic are oriented, and

wherein, in a laminated direction of the plurality of fiber sheets, *a member reinforcing a peripheral area of the hole is not stacked on the peripheral area of the hole.*

Appeal Br. 13–14 (Claims Appendix) (emphasis added to highlight the key recitation in dispute).

REJECTIONS

- I. Claims 1 and 4–9 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Grunwald² in view of Gaitonde.³
- II. Claims 1, 4–6, 8, and 9 stand rejected under 35 U.S.C. § 103 as unpatentable over Grunwald in view of Almeida.⁴
- III. Claim 7 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Grunwald in view of Almeida and Gaitonde.
- IV. Claims 1, 4–6, 8, and 9 stand rejected under 35 U.S.C. § 103 as unpatentable over Almeida in view of Grunwald.
- V. Claim 7 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Almeida in view of Grunwald and Gaitonde.

OPINION

Rejection I: obviousness of claim 1 over Grunwald in view of Gaitonde

With regard to the Examiner's rejection over Grunwald and Gaitonde, Appellant argues only claim 1. *See* Appeal Br. 6–8. Although claim 9 is identified under a separate heading, Appellant does not present any argument regarding that claim that is not also presented regarding claim 1. *Id.* at 8. We address Appellant's arguments in connection with independent claim 1. Each of claims 4–9 stands or falls with claim 1.

With regard to claim 1 and relevant to Appellant's arguments on appeal, the Examiner finds that Grunwald discloses an aircraft structure formed of fiber reinforced resin, in which access holes are surrounded by a

² US 5,452,867, issued September 26, 1995.

³ US 2004/0161585 A1, published August 19, 2004.

⁴ WO 2011/121340 A1, published October 6, 2011.

region of reduced stiffness. Final Act. 4. The Examiner acknowledges that Grunwald does not disclose omission of a stacked peripheral reinforcing layer surrounding the access holes. *Id.* at 6. Rather, Grunwald depicts in Figure 6 the desired peripheral region of reduced stiffness as reinforcement 17C and 17D layered on underlying composite structure 19.

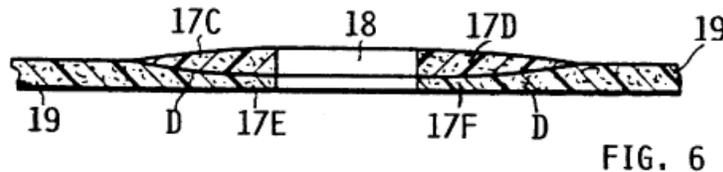


Figure 6 is an enlarged sectional view of an airplane wing panel.

The Examiner finds that Gaitonde teaches that increasing thickness surrounding access holes disadvantageously increases weight. Final Act. 6 (citing Gaitonde ¶ 5). The Examiner also finds Gaitonde teaches achieving a different stiffness property surrounding access holes by transitioning from a first to a second composite material through gradual ply replacement, to yield a lower stiffness composite material surrounding the access holes relative to the remaining composite. *Id.* at 5. In light of the foregoing teachings in Gaitonde, the Examiner finds one of skill in the art would have had a reason to form Grunwald's different composites by gradual ply replacement in the peripheral regions of the access holes, so as to avoid increased composite thickness in those regions. *Id.* at 6.

Appellant argues that Gaitonde teaches a different solution than that of Grunwald, and that modifying Grunwald to avoid thickening at the hole periphery would "eliminate its essential novel features." Appeal Br. 8. Appellant's argument is not persuasive of reversible error. Appellant does not point to persuasive evidence that Grunwald's desired difference in fiber orientation surrounding the access holes could not have been achieved by

Gaitonde's technique of gradual ply replacement. Nor does Appellant dispute the Examiner's finding that Gaitonde recognizes an advantage in avoiding thickening at an access hole periphery. The fact that Gaitonde provides an alternative technique for providing reduced stiffness surrounding access holes does not preclude its application to Grunwald's composite structure. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007) (“[W]hen a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result.”).

Rejection I as applied to claim 1 is sustained.

Rejections II and III: obviousness of claim 1 over Grunwald in view of Almeida

With regard to Rejection II, the Examiner finds that Almeida also teaches reducing stiffness in hole periphery regions as a means to increase damage tolerance. Final Act. 8. *See Almeida* 4:25–27 (“[T]he panel desirably has high stiffness inboard of the cut out, and lower stiffness, and hence improved damage tolerance, in the region adjacent the cut out.”). The Examiner also finds Almeida recognizes a desire to avoid thickness variations and teaches transitioning to a lower stiffness composite in the peripheral regions by gradual ply replacement. Final Act. 8.

As with regard to Rejection I discussed above, Appellant argues that Almeida provides a different solution than that disclosed in Grunwald. Appeal Br. 9. For the reasons set forth above, that argument is not persuasive of reversible error in the Examiner's obviousness determination based on the collective teaching of both Grunwald and Almeida.

Rejection II as applied to claim 1 also is sustained. Because Appellant does not separately argue any of claims 4–6, 8, and 9, Rejection I as applied to these claims also is sustained. Because Appellant does not separately argue Rejection III as applied to claim 7, Rejection III is sustained for the same reasons given in connection with Rejection I.

Rejection IV and V: obviousness of claim 1 over Almeida in view of Grunwald

The Examiner alternatively rejects claim 1 as obvious over Almeida as modified in light of the teachings of Grunwald. Particularly, the Examiner finds that Almeida teaches providing reduced stiffness composite material at the periphery of access holes, but does not also teach providing differently-oriented fibers in composite plies at the periphery of access holes. Final Act. 10–11. The Examiner finds Grunwald provides a reason to include differently-oriented fibers near the access holes—namely, to further achieve the desired reduced composite stiffness in that region. *Id.* at 11.

Appellant argues “there would be no reason to modify Grunwald to eliminate its essential inventive feature.” Appeal Br. 9–10. However, the Examiner’s obviousness rationale in this ground of rejection does not involve any modification to Grunwald. Appellant further argues that Almeida teaches reducing thickness buildup in the region of the holes, but does not teach eliminating buildup. *Id.* at 10. Appellant’s argument does not persuade us that Almeida’s teaching of reducing buildup would not have provided a reason to avoid thickness buildup altogether. Nor do we find any recitation in claim 1 that would preclude any amount of thickness buildup in the hole regions.

For the foregoing reasons, Appellant does not identify reversible error. Rejection IV as applied to claim 1 also is sustained. Because Appellant does not separately argue any of claims 4–6, 8, and 9, Rejection IV as applied to these claims also is sustained. Because Appellant does not separately argue Rejection V as applied to claim 7, Rejection V is sustained for the same reasons given in connection with Rejection IV.

CONCLUSION

The Examiner’s decision rejecting claims 1 and 4–9 is affirmed.

DECISION SUMMARY

In summary:

Claim(s) Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1, 4–9	103(a)	Grunwald, Gaitonde	1, 4–9	
1, 4–6, 8, 9	103(a)	Grunwald, Almeida	1, 4–6, 8, 9	
7	103(a)	Grunwald, Almeida, Gaitonde	7	
Overall Outcome			1, 4–9	

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