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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte VERNON M. BENSON, DAVID R. MACHAC, and
BRYAN J. LOVELESS

Appeal 2019-004479
Application 15/342,998
Technology Center 1700

Before DONNA M. PRAISS, MONTÉ T. SQUIRE, BRIAN D. RANGE,
Administrative Patent Judges.

PRAISS, *Administrative Patent Judge.*

DECISION ON APPEAL¹

Pursuant to 35 U.S.C. § 134(a), Appellant² appeals from the Examiner’s decision to reject claims 1–5 and 7–20. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

¹ In this Decision, we refer to the Specification filed Nov. 3, 2016 (“Spec.”), the Final Office Action dated Sept. 13, 2018 (“Final Act.”), the Appeal Brief filed Feb. 19, 2019 (“Appeal Br.”), the Examiner’s Answer dated Mar. 27, 2019 (“Ans.”), and the Reply Brief filed May 20, 2019 (“Reply Br.”).

² We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies Northrop Grumman Innovation Systems, Inc. as the real party in interest. Appeal Br. 2.

STATEMENT OF THE CASE

The invention relates to composite products made from plies of pre-impregnated (pre-preg) material, and, more particularly, to a method of consolidating pre-preg material ply layers to form a composite product. Spec. ¶¶ 2, 7. Claims 1 and 18, reproduced below, are illustrative of the subject matter on appeal (disputed limitations *italicized*).

1. A method of consolidating composite material ply layers, the method comprising:

laying-up at least one first composite material ply layer over at least one second composite material ply layer on a contoured surface of a forming tool;

inductively heating an area of at least one of fibers or matrix in the at least one first composite material ply layer to soften the matrix in the heated area with an induction heater positioned within a compaction member;

compacting the heated area of the at least one first composite material ply layer during the lay-up of the at least one first composite material ply layer over the at least one second composite material ply layer;

while compacting the heated area, *extracting heat energy from the at least one first composite material ply layer and the at least one second composite material ply layer with an active cooling member that is part of the compaction member and that is separate from the induction heater;*

actively cooling the compaction member with the active cooling member while compacting the heated area to extract the heat energy; and

joining the at least one first composite material ply layer and the at least one second composite material ply layer in a compact state.

18. A method of consolidating material, the method comprising:
- laying-up a material over a surface of a forming tool;
 - laying-up another material comprising fibers and matrix over the material and the forming tool;
 - inductively heating a portion of the another material with an induction heater of a compaction member; and
 - compacting the heated area of the another material *solely with the compaction member* while actively extracting heat from the another material with an active cooling member within the compaction member.

Appeal Br. 21, 25 (Claims Appendix).

ANALYSIS

We review the appealed rejections for error based upon the issues Appellant identifies, and in light of the arguments and evidence produced thereon. *Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential) (cited with approval in *In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011) (“[I]t has long been the Board’s practice to require an applicant to identify the alleged error in the examiner’s rejections.”). After considering the argued claims and each of Appellant’s arguments, we are not persuaded of reversible error in the appealed rejections.

The Examiner maintains the following rejections:³

³ The Examiner’s rejections of claim 8 under 35 U.S.C. § 112 have been withdrawn. Ans. 11.

Claim(s) Rejected	35 U.S.C. §	References/Basis
1–4, 7–10, 18, 19	103(a)	Schmidt, ⁴ Sandusky, ⁵ Arp ⁶
5	103(a)	Schmidt, Sandusky, Arp, Kouno ⁷
11–19	103(a)	Schmidt, Murphy ⁸
8, 12, 14, 16, 17, 20	103(a)	Schmidt, Sandusky, Arp, Murphy

Rejection of Claims 1–4, 7–10, 18, and 19 over Schmidt, Sandusky, and Arp

Appellant argues claims 1–4 and 7–10 subject to the rejection as a group and claims 18 and 19⁹ as a group. Appeal Br. 12–16. Therefore, claims 2–4 and 7–10 stand or fall with independent claim 1 and claim 19 stands or falls with independent claim 18, from which it depends. 37 C.F.R. § 41.37(c)(1)(iv). We separately address claims 1 and 18 below.

Claim 1

Appellant contends the Examiner erred in rejecting claim 1 because Schmidt does not teach “extracting heat energy . . . with an active cooling member” and “actively cooling the compaction member . . . to extract the heat energy” as recited in the claim. Appeal Br. 13. Specifically, Appellant contends Schmidt’s passing cooling water through coil portion 27 of induction coil 26 in order to cool coil 26 is not an active cooling mechanism

⁴ US 4,978,825, issued Dec. 18, 1990.

⁵ US 5,587,041, issued Dec. 24, 1996.

⁶ US 2012/0057018 A1, published Mar. 8, 2012.

⁷ US 5,832,354, issued Nov. 3, 1998.

⁸ US 4,410,385, issued Oct. 18, 1983.

⁹ We understand Appellant’s heading “Claims 18 and 20” to be a typographical error because claim 20 is not subject to this rejection. Appeal Br. 15.

that can be applied to the compaction member. *Id.* Appellant also contends that Schmidt's cooling feature is not separate from the induction coil because induction coil 26 itself acts as the cooling assembly. *Id.* at 14. Appellant argues that the combination of Schmidt with Sandusky's lone internal cooling member is based on improper hindsight because Sandusky's embodiment that also includes a heater with a cooling member externally locates both the heater and the cooling member external. *Id.* at 14–15.

The Examiner regards Appellant's arguments as asserting no single reference specifically discloses a cooling device with an internal heater. Ans. 13. The Examiner finds that, although Schmidt does not disclose direct cooling of the pressing surface, Schmidt teaches that it is desirable to keep the pressing surface cool in order to prevent sticking of the heated thermoplastic composite to the pressing surface. *Id.* (citing Schmidt 1:23–32). Based on Schmidt's teaching, the Examiner determines it would have been obvious to a person having ordinary skill in the art to cool Schmidt's roller surface with Sandusky's active cooling of the pressing surface for the purpose taught by both Schmidt and Sandusky, namely to cool the surface of the pressing member to prevent sticking. *Id.* at 14.

Appellant's arguments do not persuade us that the Examiner reversibly erred in rejecting claim 1 as obvious over the teachings of Schmidt as modified by Sandusky and Arp.

Appellant's argument that none of the cited references teach precisely the active cooling member that is part of the compaction member and separate from the induction heater as claimed is not persuasive because the rejection is based on the references' combined teachings. An obviousness analysis "need not seek out precise teachings directed to the specific subject

matter of the challenged claim.” *KSR Int’l Co. v. Teleflex, Inc.*, 440 U.S. 398, 418 (2007). Appellant does not dispute the Examiner’s finding (Final Act. 10) that Schmidt teaches induction heating of thermoplastic composite materials to form a continuous bonded joint. Nor does Appellant dispute the Examiner’s finding (Final Act. 12) that Schmidt teaches it is undesirable for the pressing surface of a compaction roller to become heated causing sticking to the material being pressed. The Examiner’s findings are supported by the record. Schmidt Abstract, 1:24–30, 2:5–15. Based on these teachings, the Examiner reasonably determines (Final Act. 12) any method of actively cooling Schmidt’s compacting surface would have predictably been suitable to prevent sticking. Therefore, the Examiner’s modification of Schmidt’s cooling system by either adding to or replacing Schmidt’s system with the active cooling systems disclosed by Sandusky and Arp would have been predictably suitable to prevent sticking because Schmidt teaches a benefit to preventing the pressing surface from becoming heated.

Appellant’s argument (Appeal Br. 14–15) that modifying Schmidt with the secondary references would not result in a device that can perform claim 1’s method because Sandusky’s embodiment with an internal cooling member does not also include an internal heater member is not persuasive of error because Appellant does not adequately explain why one skilled in the art would understand Sandusky’s teaching alternative active cooling system locations in a composite prepreg application device to be limited by Sandusky’s disclosed heater design. In a determination of obviousness, a reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill in the art. *Merck & Co. v. Biocraft Labs.*, 874 F.2d 804, 807 (Fed. Cir. 1989) (“That the [prior art] patent discloses a

multitude of effective combinations does not render any particular formulation less obvious.”). Moreover, “a reference is not limited to the disclosure of specific working examples.” *In re Mills*, 470 F.2d 649, 651 (CCPA 1972) (citation omitted). Thus, we are not persuaded that a person having ordinary skill in the art would understand Sandusky’s alternative embodiments to be limited to only those devices.

The preponderance of the evidence in this appeal record therefore supports the Examiner’s conclusion that the claimed subject matter would have been obvious in view of Schmidt’s method that uses an induction heater located within a compaction member and the separate active cooling systems internally located within a compaction member taught by Sandusky and Arps. Accordingly, we affirm the Examiner’s rejection of claim 1 under 35 U.S.C. § 103(a) over for the above reasons and those provided by the Examiner.

Because we find Appellant’s arguments unpersuasive of error in the Examiner’s rejection of claim 1 for the reasons discussed above, we likewise affirm the Examiner’s rejection of claims 2–4 and 7–10 for the same reasons.

Claim 18

Appellant contends the Examiner erred in rejecting claim 18 because neither Schmidt nor Sandusky discloses compacting “solely with the compaction member” and with a cooling member positioned within the compaction member as required by claim 18. Appeal Br. 15. According to Appellant, Schmidt does not teach actively cooling the material being compacted and Sandusky discloses a separate shoe for compacting. *Id.* Appellant asserts the Examiner ignores without reason Sandusky’s teaching

of a separate shoe combined with Sandusky's internal active cooling system.
Id.

We agree with the Examiner there is no reason Sandusky's shoe needs to be imparted to Schmidt's device when performing internal cooling, which cooling the Examiner equates to the recited "extracting heat." Ans. 15–16. "The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference. . . . Rather, the test is what the combined teachings of those references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425 (CCPA 1981); *see KSR*, 550 U.S. at 417 ("if 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.").

Accordingly, we affirm the Examiner's rejection of claim 18 under 35 U.S.C. § 103(a). Because we find Appellant's arguments unpersuasive of error in the Examiner's rejection of claim 18 for the reasons discussed above, we likewise affirm the Examiner's rejection of claim 19 for the same reasons.

Rejection of Claim 5 over Schmidt, Sandusky, Arp, and Kouno

Appellant contends that the Examiner erred in rejecting claim 5 for the same reasons presented with respect to claim 1. Appeal Br. 16. Because we find Appellant's arguments with respect to claim 1 unpersuasive for the reasons discussed above, we likewise affirm the Examiner's rejection of claim 5 for the same reasons.

Rejection of Claims 11–19 over Schmidt and Murphy

Appellant argues claims 11 and 13–17 subject to the rejection as a group and claims 18 and 19 as a group. Appeal Br. 17–18. Therefore, claims 13–17 stand or fall with claim 11 and claim 19 stands or falls with claim 18. 37 C.F.R. § 41.37(c)(1)(iv). We separately address claims 11, 12, and 18 below.

Claim 11

Independent claim 11 is directed to a method of consolidating composite material similar to claim 1, but, instead of requiring active cooling, claim 11 requires that inductive heating is “with an induction heater of a compaction foot,” compacting is “with a stamp member of the compaction foot,” and “extracting heat energy . . . with a cooling member of the compaction foot.” Appeal Br. 23 (Claims Appendix).

Appellant contends the Examiner erred in rejecting claim 11 because, even though Murphy is relied upon for disclosing a platen for compacting, Schmidt and Murphy do not disclose a compaction foot including a stamp member, an induction heater, and a cooling member as required by claim 11. Appeal Br. 17.

The Examiner finds any platen-type press is a compression foot wherein the pressing surface of the platen-type press is a stamp member. Ans. 17. The Examiner further finds converting Schmidt’s roller to a platen-type press would have been within the level of skill and an obvious modification to a skilled artisan. *Id.* The Examiner also finds Schmidt’s active cooling of its induction coil will at least indirectly extract heat from the composite since more heat would be present without such cooling. *Id.*

In the Reply Brief, Appellant asserts “Schmidt is entirely silent to actually cooling the material being compacted with the already present cooling system.” Reply Br. 2.

Appellant’s arguments do not persuade us that the Examiner reversibly erred in rejecting claim 11 over the cited prior art references. Appellant does not dispute the Examiner’s finding that it would have been within the level of skill of a person having ordinary skill in the art to modify Schmidt’s roller type press with Murphy’s platen-type press. Nor does Appellant adequately rebut the Examiner’s reasoning that Schmidt’s cooling system extracts heat from the material being compacted because more heat would be expected in the absence of Schmidt’s cooling system.

Accordingly, we affirm the Examiner’s rejection of claim 11 over the combination of Schmidt and Murphy for these reasons and those the Examiner provides in the Final Office Action and Answer. Because we find Appellant’s arguments unpersuasive of error in the Examiner’s rejection of claim 11 over the combination of Schmidt and Murphy for the reasons discussed above, we likewise affirm the Examiner’s rejection of claims 13–17 for the same reasons.

Claim 12

Claim 12 depends from claim 11 and recites “cooling the stamp member of the compaction foot with the cooling member positioned within the compaction foot.” Appeal Br. 24 (Claims Appendix). Appellant contends the Examiner erred in rejecting claim 12 because Schmidt and Murphy do not disclose methods including such a compaction foot. *Id.* at 18.

The Examiner responds “the reasons for including the heater and cooler internal to the pressing member are the same as for the roller,” thus

there is no practical reason to change the general organization of the pressing member when using a roller or a platen. Ans. 18.

We do not find Appellant's arguments persuasive of error because Appellant does not adequately rebut the Examiner's finding that it would have been within the level of skill of a person having ordinary skill in the art to make the necessary modifications to Schmidt's device to change a roller with a platen-type compaction member. Accordingly, we affirm the rejection of claim 12 over the combination of Schmidt and Murphy.

Claim 18

Appellant contends the Examiner erred in rejecting independent claim 18 because, even though Murphy generally describes the use of a platen member, it does not remedy the deficiency of Schmidt with respect to teaching an active cooling member. Appeal Br. 18.

We do not find Appellant's argument persuasive of error. As the Examiner finds (Ans. 18) and Appellant does not adequately rebut, flat type presses and roller-type presses are obvious alternative pressing mechanisms for applying heat and pressure to thermoplastic laminate stacked plies. Nor does Appellant adequately rebut the Examiner's reasoning that Schmidt's cooling system extracts heat from the material being compacted because more heat would be expected in the absence of Schmidt's cooling system. Accordingly, we affirm the rejection of claim 18 over the combination of Schmidt and Murphy for the above reason and those provided by the Examiner in the Final Office Action and Answer. We likewise affirm the rejection of claim 19 for the same reasons.

*Rejection of Claims 8, 12, 14, 16, 17, and 20 over
Schmidt, Sandusky, Arp, and Murphy*

Appellant contends that the Examiner erred in rejecting claims 8, 12, 14, 16, 17, and 20 over Schmidt, Sandusky, Arp, and Murphy because Murphy does not satisfy the deficiencies of Schmidt, Sandusky, and Arp as discussed in connection with claim 1. Appeal Br. 19. Appellant additionally argues that the cited references fail to teach a compaction foot as required by claim 20, which recites “the cooling member positioned within the compaction foot” and “the induction heater that is positioned within the compaction foot.” *Id.*

We agree with the Examiner that Appellant does not raise any new arguments in connection with the rejection of claims 8, 12, 14, 16, 17, and 20. As discussed above in connection with claim 1, the preponderance of the evidence cited in this appeal record supports the Examiner’s determination that the claimed subject matter would have been obvious in view of Schmidt’s device comprising an induction heater located within a compaction member and the separate active cooling systems internally located within a compaction member taught by Sandusky and Arps.

Accordingly, we affirm the Examiner’s rejection of claims 8, 12, 14, 16, 17, and 20 for the reasons provided in the Final Office Action, Answer, and discussed above in connection with claim 1.

CONCLUSION

For these reasons and those the Examiner provides, we uphold the Examiner’s rejection of claims 1–5 and 7–20 under 35 U.S.C. § 103(a) as obvious over the cited prior art.

DECISION SUMMARY

In summary:

Claim(s) Rejected	35 U.S.C. §	References/Basis	Affirmed	Reversed
1-4, 7-10, 18, 19	103(a)	Schmidt, Sandusky, Arp	1-4, 7-10, 18, 19	
5	103(a)	Schmidt, Sandusky, Arp, Kouno	5	
11-19	103(a)	Schmidt, Murphy	11-19	
8, 12, 14, 16, 17, 20	103(a)	Schmidt, Sandusky, Arp, Murphy	8, 12, 14, 16, 17, 20	
Overall Outcome			1-5, 7-20	

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)(1)(iv).

AFFIRMED