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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JUNJIE JEFFREY SANG and
DALIP KUMAR KOHLI

Appeal 2015-006181
Application 13/324,049
Technology Center 1700

Before CHUNG K. PAK, PETER F. KRATZ, and LILAN REN, *Administrative Patent Judges*.

REN, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants[1] appeal under 35 U.S.C. § 134(a) from a rejection of claims 1–5 and 15.[2] We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

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[1] Cytec Technology Corp. of Wilmington, Delaware is identified as the real party in interest. (Appeal Brief, filed December 23 2014 ("App. Br."), 1.) (Page numbers are absent in the Appeal Brief. We therefore treat the brief as if its pages were numbered consecutively beginning with the page after the cover page as page 1.)

[2] Final Rejection mailed July 25 2014 ("Final Act.").

CLAIMED SUBJECT MATTER

"Prepreg is a fibrous reinforcement pre-impregnated/infused with a resin matrix used to manufacture composite structures." (Spec. ¶ 13.)[3] The claims are directed to a method "which combines a conductive surfacing film with a resin-impregnated fibrous reinforcement to form a self-surfacing, conductive prepreg." (*Id.*) Claim 1, reproduced below, is illustrative of the claimed subject matter:

> 1. A method of fabricating a composite structure having a conductive surface, said method comprising:
>
> forming a self-surfacing, conductive prepreg in the form of an elongated tape having a width of 1/16 inch to 1 inch, said self-surfacing, conductive prepreg consisting essentially of a conductive surfacing film formed on a curable prepreg ply by a lamination or coating process, wherein said conductive surfacing film comprises a conductive constituent in particulate form dispersed throughout a resin matrix and has a surface resistivity of less than 20 milliOhms, and wherein said prepreg ply comprises a fibrous reinforcement pre-impregnated with a resin matrix;
>
> *incorporating the self-surfacing, conductive prepreg in an Automated Fiber Placement (AFP) process to form a curable prepreg layup of prepreg tapes with the conductive surfacing film positioned as an outermost layer*, said AFP process comprising automatically laying up prepreg tapes directly on a molding surface for forming a composite part; and
>
> curing the prepreg layup.

(Claim Appendix, App. Br. 11 (emphasis added).)

[3] Application 13/324,049, *Method of Fabricating A Composite Structure With A Conductive Surface*, filed December 13 2011. We refer to the "'049 Specification," which we cite as "Spec."

REFERENCES

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Lunde	US 6,692,681 B1	Feb. 17, 2004
Fisher	US 2006/0105616 A1	May 18, 2006
Kruckenberg	US 2009/0227162 A1	Sept. 10, 2009
Schaaf	US 2009/0258220 A1	Oct. 15, 2009
Simmons	WO 2009/118509 A1	Oct. 1, 2009

REJECTIONS

Claims 1–5 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kruckenberg in view of Simmons, Schaaf, and Lunde. (Final Act. 6.)

Claim 15 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Kruckenberg in view of Simmons, Schaaf, Lunde, and Fisher. (Final Act. 9.)

OPINION

Findings of fact throughout this Opinion are supported by a preponderance of the evidence of record.

Claim 1

The Examiner finds that Kruckenberg discloses that "conductive polymeric sheets" "are used as the top-most layer in a laminate material used to fabricate the outer surface of the aircraft and/or aircraft component" for protection against lightning strikes. (Kruckenberg ¶ 144 (cited in Final Act. 7).) The Examiner finds that Kruckenberg discloses that the electrically conductive polymeric sheets may be "cured in-situ . . . or adhered using an adhesive layer" or "laid up dry . . . ." (Kruckenberg ¶¶ 147, 148 (cited in Final Act. 7).) The Examiner also finds that Kruckenberg discloses that a

"composite layer with lower electrical conductivity typically lies beneath the electrically conductive layer" and "various prepregs" may be in one of the layers which "may be fabricated using dry fabrics which are infused with resin . . . ." (Kruckenberg ¶¶ 147, 148 (cited in Final Act. 7).) The Examiner also finds that Kruckenberg discloses materials similar to those recited in claim 1 and therefore would have similar properties including "a surface resistivity of less than 20 milliOhms" as recited. (Final Act. 7.)

Acknowledging, however, that Kruckenberg does not teach applying the conductive layer with a prepreg as an elongated tape in an AFP process as recited in claim 1, the Examiner takes an official notice that "it is conventional to preapply prepregs to conductive materials and utilize the materials in ATP [(sic., AFP)] processes in order to avoid material laydown during application of such tapes." (*Id.* at 8.) The '049 Specification also provides that the "AFP system is conventionally used for the manufacturing of large composite aerospace structures" which "eliminates some of the intermediate processing steps . . . ." (Spec. ¶ 40.)

In addition, the Examiner finds that Simmons discloses that prepregs formed with a layer of conductive particulates "in the form of continuous [or] . . . chopped lengths of tapes" "may function as an adhesive or surfacing film" and "may be fabricated into final components using any of the known methods, for example, manual lay-up, automated tap lay-up (ATL), automated fibre placement [(AFP)] . . . ." (Simmons 24:6–12; *see also* Final Act. 8.)

Based on the collective prior art teachings, the Examiner concludes that a skilled artisan would have applied "the conductive coating of Kruckenberg to a prepreg formulated for ATP processes because doing so

would have predictably allowed automated laydown of the conductive prepreg without need to separately coat the conductive layer after laydown." (Final Act. 8.) The Examiner further supports the obviousness determination based on Schaaf which teaches the automated placement of a composite material and Lunde which teaches that prepregs may be in various sizes including the recited "width of 1/16 inch to 1 inch." (*Id.* at 8–9; *see also* App. Br. 7.)

Appellants do not dispute the prior art disclosures or that the references are analogous. (App. Br. 2–7.) Appellants, however, argue that Simmons should be limited to "prepregs that are to be used as underlying layers" as disclosed in one of Simmons' embodiments but not as an outermost layer of a composite. (App. Br. 3 (underlining removed).) Appellants argue that unlike Kruckenberg's prepregs which contain a high level of conductive particles, Simmons' prepregs contain low levels of conductive particles and therefore "are not intended to be used as outer surfacing materials for lightning strike protection." (*Id.* at 4.) Emphasizing that the issue is not whether the automated processing would be impeded or rendered inoperable by the prepregs with a high level of conductive particles, Appellants argue that the issue is rather "the evidence of record does not support" the Examiner's conclusion. (*Id.* at 6; Reply 2, 3.)[4]

"If a person of ordinary skill can implement a predictable variation [of a known work], § 103 likely bars its patentability." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). Here, given that Kruckenberg and Simmons are both directed to composites made of a prepreg and a conductive material for lighting strike protection with Kruckenberg's disclosure of applying such

[4] Reply Brief filed June 4, 2015 ("Reply").

composite on the outer surface and Simmons' disclosure of using any of the known fabricating methods, including AFP or manual lay-up, for providing such composite (Kruckenberg Abstract, ¶¶ 144–148 (cited in Final Act. 7); Simmons 1:20–21, 4:13–23, 23:3–24:22, 25:15–18 (cited in Final Act. 8)), Appellants have not adequately explained why a skilled artisan would have limited the application of AFP to only the specific embodiment of prepregs in Simmons. (App. Br. 4–5.) To limit Simmons to its specific embodiment is to ignore the collective teachings of the applied prior art, *In re Keller*, 642 F.2d 413, 425 (CCPA 1981), and "the inferences and creative steps that a person of ordinary skill in the art would employ." *KSR*, 550 U.S. at 418.

In this regard, we note that Appellants do not refute the Examiner's official notice that "it is conventional to preapply prepregs to conductive materials and utilize the materials in [AFP] processes in order avoid material laydown during application of such tapes." (*Compare* Final Act 8 *with* App. Br. 3–6.) Appellants also do not refute the Examiner's response that Simmons "provides a general motivation to apply conductive layers in association with prepregs in order to achieve more efficient laydown." (*Compare* Ans. 10 *with* Reply 2–3.)[5] Appellants further do not address the Examiner's rationale explaining that a skilled artisan would have recognized – based on Schaaf – the advantages of using automated placement of conductive prepreg materials in general. (*Compare* Ans. 12 *with* Reply 2–3.) In fact, Appellants acknowledge that the "AFP system is conventionally used for the manufacturing of large composite aerospace structures" which "eliminates some of the intermediate processing steps . . . ." (Spec. ¶ 40.) On this record, Appellants do not identify reversible error in the Examiner's

[5] Examiner's Answer mailed April 9, 2015 ("Ans.")

determination that such conventional AFP process, inclusive of that taught by Simmons, is useful for forming the outermost composite of Kruckenberg for lighting strike protection.

Appellants also argue that Simmons' teaching of applying AFP to prepregs with low levels of conductive particles "would have led away from obviousness." (App. Br. 5.) Simmons' silence of applying AFP to a particular conductivity level, however, cannot be said to "criticize, discredit, or otherwise discourage the solution claimed." *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004).

Appellants additionally argue that Schaaf's teaching of using an "embedded metal foil as the topmost material for lightning strike protection . . . would have led away from obviousness." (App. Br. 7.) However, Schaaf's silence of other possible materials for the topmost layer, such as that taught by Kruckenberg for lighting strike protection, cannot be said to "criticize, discredit, or otherwise discourage the solution claimed." *Fulton*, 391 F.3d at 1201.

Claims 15

Independent claim 15 is similar to claim 1 and additionally recites "wherein said conductive surfacing film comprises silver flakes dispersed throughout a resin matrix." (Claim Appendix, App. Br. 12.)

Appellants acknowledge that the reference Fisher is applied "for the teaching of metal flakes" but argue that Fisher is not related to the problem being solved in claim 1. (App. Br. 9–10.) Appellants, however, emphasize that they "never argue that Fisher was 'nonanalogous art'" and urge that the issue is "the evidence of record does not support the finding that silver flakes would have been a known substitute for the low-density conductive

materials disclosed by Kruckenberg, which are used in large amount for lighting strike protection." (Reply 3.)

Again, "[i]f a person of ordinary skill can implement a predictable variation [of a known work], § 103 likely bars its patentability." *KSR*, 550 U.S. at 418. Appellants in this case acknowledge that "*Fisher* discloses the use of conductive additives such as metal powder and conductive flakes in an electrically conductive composition that surrounds an uninsulated ground wire of an electric power cable" and do not address the Examiner's finding that "Fisher indicates flakes are known to achieve similar conductivities in composites as strands and wires, and thus it is predictable that when used in composites for other applications and in higher loadings (i.e. lightning-strike protection), flakes would have performed similarly as strands and wires." (*Compare* Ans. 15 *with* Reply 3.) No reversible error has been identified here.[6]

Claims 2–5

With regard to dependent claims 2–5, Appellants recite the limitations of claims 2 and 5 without providing distinct arguments beyond those for claim 1. (App. Br. 9.) "[T]he Board [has] reasonably interpreted Rule 41.37 to require more substantive arguments in an appeal brief than a mere recitation of the claim elements and a naked assertion that the corresponding elements were not found in the prior art." *In re Lovin*, 652 F.3d 1349, 1357

[6] The '049 Specification provides that conductive constituents may be in various forms including "flakes, powders, fibers, wires, microspheres, and nanospheres . . . ." (Spec. ¶ 25.) Appellants' own specification therefore does not provide that "silver flake" recited in claim 15 is distinguished from other conductive materials for the claimed invention. Additionally, Kruckenberg discloses adding silver nanowires to the polymer sheets to "provide lightning strike resistance." (¶ 19.)

(Fed. Cir. 2011). Appellants' unelaborated assertion does not address the Examiner's specific findings and rationale in rejecting these claims and no reversible error has been identified with regard to the dependent claims. (*Compare* Rely 2–3 *with* Ans. 13–14; *Compare* App. Br. 9 *with* Final Act 6–10.)

DECISION

The Examiner's rejections of claims 1–5 and 15 are affirmed.

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).

AFFIRMED