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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte SERGEY V. FROLOV, MICHAEL CYRUS, and
ALLAN J. BRUCE

Appeal 2018-007336
Application 14/602,560
Technology Center 1700

Before ROMULO H. DELMENDO, GRACE KARAFFA OBERMANN,
and MICHAEL G. MCMANUS, *Administrative Patent Judges*.

OBERMANN, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant¹ seeks relief from the Examiner's final rejection of claims 1–20 under 35 U.S.C. § 103(a). Appeal Br. 6–17. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM-IN-PART.

¹ Appellant is the Applicant, Sunlight Photonics Inc., which according to the Appeal Brief, is also the real party in interest. Appeal Br. 3.

CLAIMED SUBJECT MATTER

The Inventors describe the invention as relating generally to photovoltaic devices and, more particularly, stretchable photovoltaic devices. Spec. ¶ 2. According to the Inventors, known photovoltaic cells are constructed rigidly or to allow a limited amount of flexing or bending. *Id.* ¶ 10. The Inventors assert that there is a need for a photovoltaic source more suitable for applications that require nonplanar or arbitrary form factors. *Id.* ¶ 11.

Claim 1, reproduced below, is illustrative of the subject matter.

A carrier comprising:

a stretchable part having a stretchable-part length, wherein the stretchable-part length is operable to change a length dimension of the carrier in response to a force being applied to the carrier, wherein the stretchable part comprises a plurality of corrugations, and wherein the change in the stretchable-part length is produced by a change in an amplitude and width of at least some of the plurality of corrugations; and

a mounting site having a flat foundation surface located between at least some of the plurality of corrugations on which to affix at least one photovoltaic cell.

REJECTION

The Examiner rejects the subject matter of claims 1–20 as obvious over Arora² in view of Murphy.³ Final Action 3–8.

FACTUAL FINDINGS AND ANALYSIS

The Examiner finds that Arora discloses a carrier comprising a stretchable part, including interconnects 104 (shown in Figure 7) that

² US 8,389,862 B2 (issued March 5, 2013).

³ US 2006/0174930 A1 (published Aug. 10, 2006).

accommodate stretching, and a plurality of corrugations as specified in claim 1. *Id.* at 3 (citing Arora, 4:63–65, 5:20). The Examiner also finds that Arora discloses a mounting site having a flat foundation surface (i.e., discrete islands 102), but does not disclose that the mounting site is located between the corrugations. *Id.* (citing Arora, 3:11–12). The Examiner relies on Murphy’s illustration of interconnects 60 for a teaching of locating interconnects on either side of a solar cell – a configuration that would suggest locating Arora’s foundation surface between a plurality of corrugations. *Id.* (citing Murphy, Fig. 9A).

Appellant argues that the proposed combination of Arora and Murphy does not teach a “stretchable part compris[ing] a plurality of corrugations” where a mounting site is “located between at least some of the plurality of corrugations.” Appeal Br. 6–9. Appellant contends that Murphy teaches an interconnected solar cell in which positively charged pads are placed on a top side of a solar cell to connect with negatively charged pads on a bottom side of an adjacent solar cell. *Id.* at 7–9; Reply Br. 3–8. Appellant also contends that Murphy’s interconnects are not stretchable, but rather, are rigid – and, as a result, the combination of Arora and Murphy would cause Arora to lose stretching capabilities. Appeal Br. 8–9; Reply Br. 6, 8. Appellant further asserts that the Examiner fails to provide a reason to combine Arora and Murphy, indicating that the proposed rejection is based on improper hindsight. Appeal Br. 13–14, 16; Reply Br. 11–12, 14–15.

Appellant’s arguments are not persuasive. We agree with the Examiner that Figure 9A of Murphy illustrates interconnects located on both sides of a solar cell. *See* Murphy, Fig. 9A (illustrating cells 24B and 24C located between interconnects 60); *see also* Appeal Br. 7 (acknowledging

that Murphy teaches “interconnects on a top side and a bottom side of solar cells to interconnect a plurality of adjacent solar cells in series”). Arora also discloses interconnects (Arora, 4:7), and as the Examiner cogently explains, the combined teachings of the applied prior art references would have suggested the proposed modification of Arora in view of Murphy as follows:

[T]he Final Office Action does not propose interchanging or substituting one interconnect for the other, but simply relies on Murphy for the teaching which discloses the placement of interconnects on either side of a photovoltaic cell. Based on the teaching of Murphy, it would have been obvious to place the interconnects of Arora on either side of the photovoltaic cell as set forth in the Final Office Action. The result of the modification proposed in the Final Office Action is a mounting site having a flat foundation surface (a mounting site is disclosed in Arora) located between at least some of the plurality of corrugations (the location of the interconnects (plurality of corrugations) in Arora is modified in view of the teaching of Murphy).

Answer 10–11. We find no error in that explanation. Further, we agree with the Examiner that the combined teachings of Arora and Murphy would have suggested locating Arora’s mounting site between a plurality of corrugations of Arora’s stretchable part.

Appellant appears to misunderstand the Examiner’s rejection in arguing that Murphy teaches rigid interconnects and that using Murphy’s interconnects in Arora would result in lost stretching capabilities. The Examiner does not rely on a bodily incorporation of Murphy’s rigid interconnects into the configuration of Arora’s carrier. In that regard, the Examiner twice reiterates that the rejection is not based on “interchanging or substitution one interconnect for the other.” Answer 9, 10. On the contrary, as the Examiner explains, the Final Action “simply relies on Murphy for the

teaching which discloses the placement of interconnects on either side of a photovoltaic cell.” *Id.* at 9. The Examiner further explains:

It is the location of the interconnects (the location of the plurality of corrugations) in Arora that is modified in view of the teaching of Murphy. Rigid interconnects do not result from the proposed modification of Arora. Placing the stretchable plurality of corrugations (interconnects) of Arora on either side of the photovoltaic cell, as proposed in the modification, does not result in the electronic device losing its stretching capabilities as asserted by Appellant.

Id. at 9; *see In re Keller*, 642 F.2d 413, 425 (CCPA 1981) (“The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference.”). Appellant does not show reversible error in the Examiner’s reasoning.

We understand the Examiner’s rejection to propose duplicating the stretchable interconnects and corrugations of Arora in accordance with the concept illustrated in Murphy of locating interconnects on both sides of a mounting site. We find no error in the Examiner’s finding that rearranging the interconnects of the prior art would have been an obvious modification in which there is no change to the operation of the prior art device. Final Action 4 (citing *In re Japikse*, 181 F.2d 1019 (CCPA 1950)); *see KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007) (“[W]hen a patent ‘simply arranges old elements with each performing the same function it had been known to perform’ and yields no more than one would expect from such an arrangement, the combination is obvious.” (quoting *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 282 (1976))).

Appellant similarly argues, unpersuasively, that modifying Arora with a rigid non-stretchable interconnected solar cell array as taught in Murphy would destroy the utility of invention of Arora and undermine the operation

or purpose of Arora to provide extremely stretchable electronics, such that there is no motivation to combine Arora and Murphy. Appeal Br. 13–15; Reply Br. 13. Here again, Appellant appears to misunderstand the basis of the Examiner’s rejection. The Examiner plainly does not propose substituting Murphy’s interconnects for Arora’s interconnects. Final Action 4 (first paragraph); Answer 9 (second paragraph), 10 (last paragraph). The Examiner relies on Murphy only for an illustration that, in this particular field of endeavor, it would have been obvious to arrange Arora’s components so that Arora’s mounting site is located between at least some of the plurality of Arora’s corrugations as specified in claim 1. *Id.*

Appellant further argues that Murphy’s interconnects are not designed to be stretchable because stretchable interconnects could damage or compromise the wiring and any physical connection between adjacent cells. Appeal Br. 15; Reply Br. 14. That argument is unpersuasive for the same reasons explained above. The Examiner does not propose replacing Murphy’s interconnects with stretchable components, but instead relies on Arora for the stretchable feature. *See* Final Action 3–4; Answer 9.

Appellant further argues that, even if Murphy teaches placing interconnects on either side of a photovoltaic cell, one of ordinary skill in the art would not look to combine Murphy’s teachings (which pertain to a rigid, non-stretchable solar cell array) with Arora (which pertains to extremely stretchable electronics). Reply Br. 11. We disagree. Both Arora and Murphy provide teachings directed to electrical interconnects. Appellant seeks to limit the availability of secondary references to those specifically involving *stretchable* interconnects, but the obviousness analysis is not so narrow. *See KSR*, 550 U.S. at 418 (“As our precedents make clear, however,

the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.”).

For the above reasons, we sustain the Examiner’s rejection of claim 1.

Claims 2, 4–17, 19, and 20

Appellant does not separately argue claims 2, 4–17, 19, and 20, apart from claim 1. *See* Appeal Br. 6–16. Accordingly, we consider those claims together with claim 1. *See* 37 C.F.R. § 41.37(c)(1)(iv). We sustain the Examiner’s rejection of claims 2, 4–17, 19, and 20 for the reasons set forth above.

Claims 3 and 18

Appellant argues claims 3 and 18 separately and as a subgroup. We select claim 3 as representative. *See* Appeal Br. 10–11. Claim 3 states:

The carrier of claim 1, wherein the stretchable part comprises first and second stretchable parts having respective first and second stretchable part lengths, wherein the first stretchable part is oriented orthogonally to the second stretchable part, and wherein the first stretchable part length is operable to change independently from the second stretchable part length.

Appellant argues that Arora does not disclose a “first stretchable part” that “is oriented orthogonally to the second stretchable part.” *Id.* at 10. In the Examiner’s view, that limitation is directed only to the intended use of the claimed apparatus and, therefore, does not distinguish the claimed apparatus from a prior art device having the capability to perform the intended use. Final Action 5–6; *see* Answer 11 (finding that Arora’s device is “capable of being oriented in the manner claimed”). We agree with

Appellant that the claim limitation, requiring that “the first stretchable part *is oriented* orthogonally to the second stretchable part,” is not a recitation of intended use, but rather, describes the structure of the carrier. Appeal Br. 10 (emphasis added); *see* Spec. ¶ 109, Fig. 9 (illustrating a stretchable carrier in which stretchable parts 904 are orthogonally positioned).

On that point, the Examiner relies on the following disclosure in Arora: “The stretching may be a rotational stretching, where the rotation may be greater than a certain rotation angle, such as 90°, 180°, 270°, 360°, and the like, where the stretching may be in all three axes.” Answer 11 (quoting Arora 7:58–61). We agree with Appellant, however, that this disclosure in Arora discusses the angles at which two pads on opposite sides of an interconnect may be oriented. Reply Br. 8–9. Specifically, when read in context, that disclosure addresses how electronic components 102A–B are oriented in Arora relative to one another in rotational stretching – but does not address the orientation of a first stretchable part in relation to a second stretchable part. *See* Arora 7:48–60 (disclosing rotational stretching in the same discussion as to how electronic components 102A–B separate from each other in translational stretching). In other words, the Examiner relies on a disclosure that, at best, suggests that electronic components 102A–B in Arora may undergo rotational stretching relative to one another to achieve the disclosed angles. But electronic components 102A–B correspond to the claimed mounting sites in the Examiner’s rejection (*see* Final Action 3 (citing Arora, 3:11–12)), not the first and second stretchable parts to which

the claim limitation at issue pertains. The Examiner identifies no disclosure that relates to any angle of orientation of two stretchable parts.

We observe that the Examiner separately finds that Arora discloses first and second stretchable parts, but that finding does not end the inquiry. *Id.* at 5 (citing Arora, 5:20). The Examiner provides no reasons how or why Arora's disclosure, pertaining to the rotational stretching capabilities of electronic components 102A–B, would have suggested a first stretchable part that is oriented orthogonally to a second stretchable part as required by claims 3 and 18. *See* Spec. ¶ 109, Fig. 9 (illustrating a stretchable carrier where the stretchable parts 904 are orthogonally positioned).

Accordingly, we cannot sustain the Examiner's rejection of claim 3 or claim 18.

CONCLUSION

Claims Rejected	Basis	Affirmed	Reversed
1, 2, 4–17, 19, 20	§ 103 over Arora in view of Murphy	1, 2, 4–17, 19, 20	
3, 18	§ 103 over Arora in view of Murphy		3, 18
Overall Outcome		1, 2, 4–17, 19, 20	3, 18

The Examiner's decision to reject claims 1, 2, 4–17, 19, and 20 is affirmed.

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The Examiner's decision to reject claims 3 and 18 is reversed.

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).

AFFIRMED-IN-PART