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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte GEORG SEIDEMANN, BERND WAIDHAS,
THOMAS WAGNER, ANDREAS WOLTER,
SONJA KOLLER, and VISHNU PRASAD

Appeal 2019-006796
Application 15/475,368
Technology Center 2800

Before ROMULO H. DELMENDO, N. WHITNEY WILSON, and
MONTÉ T. SQUIRE, *Administrative Patent Judges*.

SQUIRE, *Administrative Patent Judge*.

DECISION ON APPEAL¹

Appellant² appeals under 35 U.S.C. § 134(a) from the Examiner’s decision to finally reject claims 1–9, 11–17, 20, 21, and 23–25. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

¹ This Decision refers to the Specification filed Mar. 31, 2017 (“Spec.”); Final Office Action dated Oct. 10, 2018 (“Final Act.”); Advisory Action dated Jan. 23, 2019 (“Advisory Act.”); Appeal Brief filed June 10, 2019 (“Appeal Br.”); Examiner’s Answer dated July 18, 2019 (“Ans.”); and Reply Brief filed Sept. 18, 2019 (“Reply Br. “).

² We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies Intel IP Corporation as the real party in interest. Appeal Br. 2.

CLAIMED SUBJECT MATTER

The invention relates to heat management of electronic devices and, in particular, to an electronic component assembly that includes a substrate having a first face and an opposed second face and a filler interface heat transfer system coupled with the substrate. Spec. 1, 3; Abstract. Claim 1 illustrates the subject matter on appeal and is reproduced below from the Claims Appendix to the Appeal Brief:

1. An electronic device comprising:

a device housing;

a substrate within the device housing and coupled with the device housing;

one or more electronic components coupled with the substrate, the one or more electronic components and the substrate include a composite profile; and

a filler interface heat transfer system coupled with the one or more electronic components, the filler interface heat transfer system includes:

at least one enclosure shell coupled with the substrate, the at least one enclosure shell surrounds a filler cavity, the one or more electronic components and the composite profile,

a heat transfer filler within the filler cavity, ***the heat transfer filler is a solid or liquid*** and includes a contoured filler profile of the solid or liquid conformed along and engaged along the composite profile, and

a distributive heat path including the heat transfer filler and the at least one enclosure shell, the distributive heat path is configured to distribute heat from the one or more electronic components into the heat transfer filler and the at least one enclosure shell and transfer heat from the heat transfer filler and the at least one enclosure shell to the device housing.

Appeal Br. 19 (key disputed claim language italicized and bolded).

REFERENCES

The Examiner relies on the following prior art references as evidence in rejecting the claims on appeal:

Name	Reference	Date
Reisman et al. ("Reisman")	US 4,449,580	May 22, 1984
Lai et al. ("Lai")	US 2009/0052139 A1	Feb. 26, 2009
Refai-Ahmed et al. ("Refai-Ahmed")	US 8,574,965 B2	Nov. 5, 2013
Vincent	US 2014/0078673 A1	Mar. 20, 2014

REJECTIONS

On appeal, the Examiner maintains (Ans. 3) the following rejections:

1. Claims 1–4 and 6–9 are rejected under 35 U.S.C. § 103 as being unpatentable over Reisman in view of Refai-Ahmed and further in view of Lai ("Rejection 1"). Final Act. 3.
2. Claims 12–17, 20, and 23–25 are rejected under 35 U.S.C. §103 as being unpatentable over Reisman in view of Refai-Ahmed ("Rejection 2"). Final Act. 6.
3. Claims 1, 3, 5, and 11 are rejected under 35 U.S.C. § 103 as being unpatentable over Reisman in view of Refai-Ahmed and further in view of Vincent ("Rejection 3"). Final Act. 9.
4. Claim 21 is rejected under 35 U.S.C. § 103 as being unpatentable over Reisman in view of Refai-Ahmed and further in view of Examiner's Official Notice ("Rejection 4"). Final Act. 11.

OPINION

Having considered the respective positions the Examiner and Appellant advance in light of this appeal record, we affirm the Examiner's rejections based essentially on the fact-finding and reasoning the Examiner

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provides in the Answer, Advisory Action, and Final Office Action. We add the following primarily for emphasis.

Rejection 1

The Examiner rejects claims 1–4 and 6–9 under § 103 as obvious over Reisman, Refai-Ahmed, and Lai. Final Act. 3–5. In response to the Examiner’s rejection, Appellant presents argument for the patentability of claim 1 but does not present separate argument for the patentability of claims 2–4 and 6–9. Appeal Br. 7–15. We select claim 1 as representative and claims 2–4 and 6–9 stand or fall with claim 1. 37 C.F.R. § 41.37(c)(1)(iv).

The Examiner determines that the combination of Reisman, Refai-Ahmed, and Lai suggests an electronic device satisfying the limitations of claim 1 and concludes the combination would have rendered the claim obvious. Final Act. 3–4. On this appeal record, we determine a preponderance of the evidence and sound technical reasoning support the Examiner’s findings regarding the teachings of the cited art and the Examiner’s conclusion that the combination of Reisman, Refai-Ahmed, and Lai would have rendered the device of claim 1 obvious to a person having ordinary skill in the art. Reisman, Abstract, 8:27–32, Fig. 1; Refai-Ahmed, Abstract, 4:40–45, Fig. 8; Lai, Abstract, Fig. 4.

Appellant argues the Examiner’s rejection of claim 1 should be reversed because the cited art does not teach or suggest all of the elements of the claim. Appeal Br. 7–12. In particular, Appellant contends Reisman neither teaches nor suggests that “the heat transfer filler is a solid or liquid,” as required by the claim. *Id.* at 9–10. Appellant contends that, in contrast to the claimed invention, Reisman’s heat transfer filler 40 is a pressurized gas, and not “a solid or liquid,” as recited in the claim. *Id.* at 9 (arguing “the

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Reisman system encloses a gas and pressurizes the gas to facilitate heat transfer”), 10 (arguing “the alleged heat transfer filler 40 is a pressurized gas”). Appellant further contends that, although Reisman discloses that “other acceptable fluids” may be used as the heat filler material for its device (Reisman 8:27–32), such disclosure does not clearly teach or suggest that a liquid may be used with Reisman. *Id.* at 11 (arguing “Reisman fails to mention the inclusion of any liquids, and instead focuses entirely on gases” and “does not teach that ‘any fluid could be used’”).

Appellant further argues the Examiner’s rejection should be reversed because the Examiner’s proposed combination of Reisman and Refai-Ahmed would change Reisman’s principle of operation. Appeal Br. 12–15; Reply Br. 2–8. In particular, Appellant argues that, because Reisman “repeatedly discusses the use of gases at increased pressures to realize different thermal benefits” and “notes the unexpected benefits of using gases at increased pressures,” modifying Reisman’s device to include Refai-Ahmed’s liquid heat transfer filler 45 would impermissibly change the principle of operation of Reisman. Appeal Br. 12, 14 (arguing “exchange of the gases of Reisman for the liquids of Refai changes th[e] principle of operation”); *see also* Reply Br. 6 (arguing “the Reisman principle of operation is directed to pressurized gases”).

We do not find Appellant’s arguments persuasive of reversible error in the Examiner’s rejection based principally on the fact-finding and reasoning the Examiner provides at pages 3–7 of the Answer and pages 3–4 of the Final Office Action. Regarding “the heat transfer filler is a solid or liquid” claim recitation, as the Examiner finds (Ans. 3–4; Final Act. 3), Reisman discloses a heat dissipating system for cooling electronic components (e.g., circuit chips) comprising an encased module, including, a

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heat transfer filler (gas 40) contained within an enclosed interior portion of the encased module. Reisman, Abstract, 3:40–48, 4:19–21, 4:25–26, 4:29–32, Fig. 1. As the Examiner further finds (Ans. 4; Final Act. 4), Reisman further discloses that “[a]lthough argon and helium gases are both specifically described as appropriate for filling the encased module **20**, other acceptable fluids operating at an elevated pressure may also be used.” Reisman, 8:27–30.

As the Examiner also finds (Final Act. 4), Refai-Ahmed discloses liquid thermal interface material 45 placed within the internal cavity of a device for thermal contact with certain of the device’s electronic components (e.g., semiconductor chips). Refai-Ahmed, Abstract, 4:36–45, Fig. 8. Refai-Ahmed further discloses that “it is preferred that the thermal interface material 45 readily behave as a fluid in the internal cavity 40 and fill any voids and encompass the semiconductor chip 15 for more favorable thermal conduction” and the thermal interface material’s flowability is a desirable feature. *Id.* at 4:41–45.

The Examiner also provides a reasonable basis why one of ordinary skill in the art would have had reason to combine the teachings of the Reisman and Refai-Ahmed to arrive at the claimed invention. Final Act. 4 (explaining it would have been obvious to one of ordinary skill in the art to modify Reisman’s heat dissipating system to include a liquid heat transfer filler, as Reisman suggests and Refai teaches, because doing so would provide good flowability at a desired temperature”); Reisman, 8:27–30; Refai-Ahmed, 4:40–45. *See also KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 420 (2007) (explaining that any need or problem known in the art can provide a reason for combining the elements in the manner claimed).

Appellant's arguments do not reveal reversible error in the Examiner's factual findings, analysis, and conclusions in this regard. Appellant's contentions regarding Reisman's heat transfer filler 40 being a gas and that Reisman does not teach or suggest that the heat transfer filler is a liquid (Appeal Br. 7–12) are not persuasive because Reisman's teachings are not limited to the disclosures in its examples or preferred embodiments. *In re Applied Materials, Inc.*, 692 F.3d 1289, 1298 (Fed. Cir. 2012) (“A reference must be considered for everything that it teaches, not simply the described invention or a preferred embodiment.”); *see also In re Mills*, 470 F.2d 649, 651 (CCPA 1972) (“[A] reference is not limited to the disclosure of specific working examples.”). Although Reisman describes the heat transfer filler being a gas, for example, argon or helium (Reisman, 3:38–45, 8:27–30, Fig. 1), such disclosure is exemplary or merely preferred embodiments and does not negate or take away from Reisman's broad disclosure and suggestion that other acceptable fluids may also be used. *See In re Preda*, 401 F.2d 825, 826 (CCPA 1968) (explaining that a prior art reference's disclosure must be considered for all that it teaches, including “the inferences which one skilled in the art would reasonably be expected to draw therefrom”).

Appellant's contentions in this regard are also not well-taken because they are premised on what Reisman teaches individually, and not the combined teachings of Reisman and Refai-Ahmed as a whole, and what the combined teachings of the references would have suggested to one of ordinary skill in the art. One cannot show non-obviousness by attacking references individually where the rejection is based on a combination of references. *See In re Keller*, 642 F.2d 413, 425 (CCPA 1981). The Examiner does not rely solely upon Reisman for disclosing that limitation. Rather, as

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we previously discuss above, the Examiner relies on the combination of Reisman and Refai-Ahmed for suggesting “the heat transfer filler is a solid or liquid” recitation of the claim.

Moreover, in view of Reisman’s disclosure regarding use of other acceptable fluids as a heat transfer filler for cooling electronic components within an enclosed interior portion of an electronic device (Reisman, Abstract, 3:46–48, 8:27–30, Fig. 1) and Refai-Ahmed’s disclosure regarding use of a liquid thermal interface material for thermal contact with electronic components within the internal cavity of an electronic device (Refai-Ahmed, Abstract, 4:36–45, Fig. 8), we agree with the Examiner (Ans. 3–4) that the references’ combined teachings would have reasonably suggested to one of ordinary skill in the art that the heat transfer filler is a liquid, as claimed.

Appellant’s contentions regarding Reisman repeatedly discussing and being directed to pressurized gases and that modifying Reisman’s device to include Refai-Ahmed’s liquid heat transfer filler would change Reisman’s principle of operation (Appeal Br. 12–15; Reply Br. 2–8) are not persuasive because Appellant does not identify or direct us to persuasive evidence in the record to support them. Contrary to what Appellant’s argument implies, as we previously explain above, the fact that Reisman discusses the use of gases at increased pressures and the benefits thereof and describes certain embodiments using pressurized gases as the heat transfer filler, without more, does not limit Reisman’s teachings to such use. *See* Reisman, 4:31–32 (describing using a gas “such as helium or argon”), 8:27–30; *Applied Materials*, 692 F.3d at 1298.

We also do not find Appellant’s contentions persuasive based on the fact-finding and analysis the Examiner provides at pages 3–7 of the Answer. As the Examiner finds and explains (Ans. 3–4), the basic principle of

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operation of Reisman's heat dissipating system involves the combination of convection and conduction to cool electronic components mounted on a circuit board. Reisman, Abstract, 2:43–51, 2:64–3:7, 3:40–59. As the Examiner finds (Ans. 3–4, 6), Reisman teaches that heat generated by circuit chips 30 is transferred, via convection, to gas 40 (heat transfer filler) and then transferred, via conduction, to sidewalls, including back sidewall 26 of encased module 20, which act as a heat sink to dissipate the heat and thus, cool circuit chips 30. Reisman, 3:64–4:46. As the Examiner further finds (Ans. 6), Reisman teaches that the sidewalls are tightly sealed and connected to each other and to the substrate, and together contain gas 40 within the module at an elevated pressure. Reisman, 3:43–45, 4:25–41.

As the Examiner explains (Ans. 6–7), because Reisman's sidewalls and substrate are rigid and sealed and the sidewalls' surfaces able to handle pressurized gas (gas 40) at an elevated pressure, replacing Reisman's gas heat transfer filler with a liquid heat transfer filler, as taught by Refai-Ahmed, would not change or destroy the basic principle of operation of Reisman. *See* Ans. 6 (finding “the elements appear to be tailor made for a liquid to be used since they are hermetically sealed to hold a fluid” and “substantial reconstruction and redesign” would not be required “in order to accommodate the liquid”), 6–7 (explaining “[r]eplacing the fluid (gas 40) with a different type of fluid (liquid) . . . would not materially change th[e] basic operational principle of Reisman” and may “result in enhanced cooling of the chips”); *In re Mouttet*, 686 F.3d at 1332 (rejecting argument that principle of operation would be destroyed by combination when modifications did “not affect the overall principle of operation”).

Appellant's arguments do not reveal reversible error in the Examiner's factual findings and analysis in this regard. *Cf. SmithKline*

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Beecham Corp. v. Apotex Corp., 439 F.3d 1312, 1320 (Fed. Cir. 2006)

("[M]ere statements of disagreement . . . as to the existence of factual disputes do not amount to a developed argument."). Thus, on this appeal record, we are not persuaded the Examiner's proposed modification would change Reisman's principle of operation.

Accordingly, we affirm the Examiner's rejection of claims 1–4 and 6–9 under 35 U.S.C. § 103 as obvious over Reisman, Refai-Ahmed, and Lai.

Rejections 2, 3, and 4

In response to the Examiner's Rejections 2, 3, and 4 (Final Act. 6–11), Appellant does not present any additional substantive arguments. Rather, Appellant relies on principally the same arguments previously discussed and presented above in response to the Examiner's Rejection 1. *See* Appeal Br. 15–17.

Thus, based on the fact-finding and reasoning the Examiner provides in this appeal record, and for principally the same reasons we discuss above for affirming the Examiner's Rejection 1, we affirm the Examiner's rejection of claims 12–17, 20, and 23–25 under 35 U.S.C. § 103 as obvious over Reisman and Refai-Ahmed (Rejection 2); claims 1, 3, 5, and 11 under 35 U.S.C. § 103 as obvious over Reisman, Refai-Ahmed, and Vincent (Rejection 3); and claim 21 under 35 U.S.C. § 103 as obvious over Reisman, Refai-Ahmed, and Examiner's Official Notice (Rejection 4).

CONCLUSION

In summary:

Claim(s) Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1-4, 6-9	103	Reisman, Refai-Ahmed, Lai	1-4, 6-9	
12-17, 20, 23-25	103	Reisman, Refai-Ahmed	12-17, 20, 23-25	
1, 3, 5, 11	103	Reisman, Refai-Ahmed, Vincent	1, 3, 5, 11	
21	103	Reisman, Refai-Ahmed, Examiner's Official Notice	21	
Overall Outcome			1-9, 11-17, 20, 21, 23-25	

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