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ABB - Whitmyer IP Group LLC 600 Summer Street Stamford, CT 06901			SCHOENHOLTZ, JOSEPH	
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte HEINZ LENDENMANN, THOMAS GRADINGER,
THOMAS WAGNER, TIMO KOIVULUOMA, and TOR LANERYD

Appeal 2019-003161
Application 15/409,089
Technology Center 2800

Before CAROLYN D. THOMAS, BRADLEY W. BAUMEISTER, and
ADAM J. PYONIN, *Administrative Patent Judges*.

PYONIN, *Administrative Patent Judge*.

DECISION ON APPEAL¹

Pursuant to 35 U.S.C. § 134(a), Appellant² appeals from the
Examiner's rejection. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM IN PART.

¹ An Oral Hearing was held on May 15, 2020.

² We use the word "Appellant" to refer to "applicant" as defined in
37 C.F.R. § 1.42(a). Appellant identifies the real party in interest as ABB
Schweiz AG. Appeal Br. 2.

STATEMENT OF THE CASE

Introduction

The Application is directed to arrangements for subsea cooling of semiconductor modules. Spec. 1:5. Claims 1–15 are pending; claims 1, 12, and 15 are independent. Appeal Br. 14–17. Claim 1 is reproduced below for reference:

1. An arrangement for subsea cooling of a semiconductor module, the arrangement comprising:
 - a tank, the tank being filled with a dielectric fluid; and
 - at least one semiconductor module placed in the tank, each of the at least one semiconductor module comprising semiconductor submodules and being attached to a heat sink, wherein the semiconductor submodules generate heat, thereby causing the dielectric fluid to circulate by natural convection,
 - wherein the heat sink comprises a first part having a first thermal resistance from the semiconductor module to the dielectric fluid, and a second part having a second thermal resistance from the semiconductor module to the dielectric fluid, wherein the second thermal resistance is higher than the first thermal resistance, and
 - wherein the first part is configured to lie vertically higher than the second part.

References and Rejections

Claim 15 is rejected under 35 U.S.C. § 112(b) as being indefinite. Final Act. 2.

Claims 1–15 are rejected under 35 U.S.C. § 103 as being unpatentable over Browne (US 2015/0022975 A1; Jan. 22, 2015) and Ohsawa (US 2011/0214904 A1; Sept. 8, 2011). Final Act. 3.

ANALYSIS

We have reviewed the Examiner's rejections in light of Appellant's arguments. Arguments Appellant could have made but chose not to make are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(iv) (2018).

35 U.S.C. § 112(b)

Appellant does not challenge the Examiner's indefiniteness rejection of claim 15. *See* Appeal Br. 4. We summarily sustain this rejection.

35 U.S.C. § 103

The Examiner finds the limitations of claim 1 to be obvious in view of the combined teachings of Browne and Ohsawa. *See* Final Act. 13. Particularly, the Examiner finds one of ordinary skill would have modified Browne's immersion boiling system with Ohsawa's heat sink, because "Ohsawa teaches [a] heat sink configuration [that] results in 1) suppression of the temperature in the heat generating semiconductor and 2) provides a heat sink with little loss in structural durability or reliability." Final Act. 6; Ohsawa ¶¶ 18, 19. The Examiner reasons that "[t]he use of Ohsawa's high reliability and high performance heat sink in [Browne's] environment that otherwise requires frequency maintenance of cooling for power electronics is just plain common sense." Ans. 3; *see also* Ans. 7.

Appellant argues the Examiner's rejection is in error, because "Browne's cooling device works by boiling small portions of the dielectric fluid, and then releasing the energy as the fluid condenses back to liquid," whereas "Ohsawa is designed to increase the heat flux, spreading the heat out evenly across the plane of the heat generating body" and "was not

designed to operate in a dielectric fluid.” Appeal Br. 6, 9. Appellant contends that modification of Browne with the heat-sink of Ohsawa “would no longer boil the dielectric fluid,” such that “one skilled in the art would not be motivated to use the heatsink of Ohsawa in Browne.” *Id.* at 6, 7.

We find the Examiner’s reasoning to be insufficient to support the finding of obviousness. A “patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art,” as “it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). Further, the Federal Circuit has “required that [obviousness findings] grounded in ‘common sense’ must contain explicit and clear reasoning providing some rational underpinning why common sense compels a finding of obviousness.” *Plantronics, Inc. v. Aliph, Inc.*, 724 F.3d 1343, 1354 (Fed. Cir. 2013) (*quoting In re Nouvel*, 493 Fed. Appx. 85, 92 (Fed. Cir. 2012)).

Here, the Examiner’s common sense reasoning relies on finding “Oshawa teaches . . . that the temperature gradient in the base becomes smaller,” yielding “better temperature uniformity.” Ans. 7. We agree with Appellant, however, one of ordinary skill would not have modified Browne with the better temperature uniformity provided by Ohsawa. *See* Reply Br. 4. Rather, Browne explains the system needs heat to be concentrated along parts of the heat sink, in order to effectively boil the dielectric liquid. *See* Browne ¶ 26 (Describing the angled heat sink “shape permits greater vapor area and the sharing of that vapor to additional areas rather than forcing it to flow in the channel.”).

That is, we agree with Appellant that Browne requires high temperature gradients in order to boil the dielectric liquid. *See* Browne ¶ 17 (“The design of the heat sink is non-trivial as area should be maximized for bubble nucleation sites but surface superheat must be maintained for nucleation.”); Appeal Br. 6; Reply Br. 5. In light of Browne’s particular design requirements for boiling a fluid, the Examiner does not set forth sufficient factual reasoning to support the conclusion that one of ordinary skill would have expected that using Ohsawa’s heat sink would “improve the reliability of the semiconductor device and the heatsink and so the cooling solution will require less maintenance.” Ans. 9. Accordingly, we are persuaded the Examiner’s rejection does contain rational underpinnings that compel a finding of obviousness.

Based on the foregoing, we are persuaded the Examiner errs in finding the combination of Browne and Oshawa teaches or suggests the limitations of claim 1.

CONCLUSION

We sustain the Examiner’s indefiniteness rejection of claim 15.

We are persuaded the Examiner’s obviousness rejection of independent claim 1 in error. Independent claims 12 and 15 contain similar limitations and are rejected for similar reasons. *See* Final Act. 9–12. We do not sustain the Examiner’s obviousness rejection of the independent claims, or the claims dependent thereon.

The Examiner’s decision is affirmed in part because we have affirmed at least one ground of rejection with respect to claim 15. *See* 37 C.F.R. § 41.50(a)(1).

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
15	112(b)	Indefiniteness	15	
1-15	103	Browne, Ohsawa		1-15
Overall Outcome			15	1-14

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). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED IN PART