

The opinion in support of the decision being entered today  
is *not* binding precedent of the Board

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* KEVIN A. MCCULLOUGH

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Appeal 2007-3874  
Application 10/288,027  
Technology Center 1700

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Decided: September 25, 2007

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Before BRADLEY R. GARRIS, CHARLES F. WARREN, and  
LINDA M. GAUDETTE, *Administrative Patent Judges*.

WARREN, *Administrative Patent Judge*.

DECISION ON APPEAL

Applicant appeals to the Board from the decision of the Primary Examiner finally rejecting claims 7 and 8 in the Office Action mailed October 19, 2004. 35 U.S.C. §§ 6 and 134(a) (2002); 37 C.F.R. § 41.31(a) (2006).

We reverse the decision of the Primary Examiner.

Claim 7 illustrates Appellant's invention of a net-shaped molded heat sink, and is representative of the claims on appeal:<sup>1</sup>

7. A net-shaped molded heat sink for dissipating heat away from a heat generating object with a contact surface, said heat sink comprising:

a core plate of carbon-carbon matrix material having an outer surface;

a thermally conductive main body having a top surface and a bottom interface surface and being molded of a thermoplastic polymer composition having a base polymer matrix and a thermally conductive filler material uniformly distributed throughout said base polymer matrix; the thermally conductive main body being positioned about the core plate of carbon-carbon matrix material thereby completely surrounding the outer surface of core plate [sic], a portion of the thermally conductive main body being an interface layer including the bottom interface surface, wherein the bottom interface surface of the interface layer is in thermal communication with the contact surface fo [sic] the heat generating object; and

a plurality of thermally conductive fins integrally connected to and emanating from said top surface and being made of a polymer composition molded with thermally conductive filler material interdispersed therein.

The Examiner relies upon the evidence in these references:

Ruechardt	US 3,564,109	Feb. 16, 1971
Ross	US 5,572,070	Nov. 5, 1996
Unger	US 5,834,337	Nov. 10, 1998
Mahulikar	US 5,939,214	Aug. 17, 1999

Appellant requests review of the grounds of rejection of claims 7 and 8 advanced on appeal (Br. 3-4): under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement (Answer 3); and under 35 U.S.C. § 103(a) as unpatentable over Mahulikar in view of Unger, further in view of Ruechardt and Ross (*id.*).

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<sup>1</sup> We reproduce claim 7 as it stands of record as of the Amendment filed July 26, 2004, in view of the errors in the claim as presented in the Claim Appendix to the Brief. Br. 12.

The issues in this appeal are whether the Examiner has carried the burden of establishing a *prima facie* case in each of the grounds of rejection advanced on appeal.

The plain language of claim 7 specifies a net-shaped molded heat sink, the heat sink comprising at least a thermally conductive main body molded of a thermoplastic polymer composition having a base polymer matrix with uniformly distributed thermally conductive material; having integrally connected to and emanating from its top surface a plurality of thermally conductive fins molded of the same kind of thermoplastic composition; having a bottom interface surface being an interface layer for thermal communication with the contact surface of a heat generating object; and completely surrounding the outer surface of a core layer plate of carbon-carbon matrix material. The transitional term “comprising” opens claim 7 to include net-shaped molded heat sinks which contain additional structural elements and materials. *See, e.g., Exxon Chem. Pats., Inc. v. Lubrizol Corp.*, 64 F.3d 1553, 1555, 35 USPQ2d 1801, 1802 (Fed. Cir. 1995); *In re Baxter*, 656 F.2d 679, 686-87, 210 USPQ 795, 802-03 (CCPA 1981).

On this record, we determine the preambular language “for dissipating heat away from a said heat generating object with a contact surface” and the recitation in the body of claim 7 that the article has “a portion of the thermally conductive main body being an interface layer including the bottom interface surface, wherein the bottom interface surface of the interface layer is in thermal communication with the contact surface fo [sic] the heat generating object,” requires only that the claimed article must be capable of interfacing with a contact surface of any heat generating structure,

and does not otherwise specify any additional structure. *See, e.g., Corning Glass Works v. Sumitomo Elect. U.S.A., Inc.*, 868 F.2d 1251, 1257, 9 USPQ2d 1962, 1966 (Fed. Cir. 1989); *In re Stencil*, 828 F.2d 751, 754-55, 4 USPQ2d 1071, 1073 (Fed. Cir. 1987).

With respect to the ground of rejection under § 112, first paragraph, written description requirement, the Examiner contends the claim language “thermally conductive filler material uniformly distributed throughout said base polymer matrix” is without basis in the Specification which “does not explicitly disclose this language” and “without an explicit disclosure . . . one of ordinary skill in the art would have no guidance of the type of filler material distribution, since different types of distributions achieve different desired heat transfer characteristics.” (Answer 3 and 6.) Appellant contends “[i]t is well known and accepted within the relevant art that a filled polymer is a polymer that includes a filler material that is well dispersed throughout the matrix of the polymer material.” (Br. 4.)

We agree with Appellant. The determination of the optimum distribution of thermally conductive filler in a resin used to mold a heat sink is within the ordinary skill in this art and need not be specifically set forth in the Specification. *See, e.g., In re Howarth*, 654 F.2d 103, 105, 210 USPQ 689, 691 (CCPA 1981) (“An inventor need not . . . explain every detail [of the invention] since he is speaking to those skilled in the art. What is conventional knowledge will be read into the disclosure.”). Thus, the Examiner has not shown that the claims encompass an embodiment outside of the scope of the written description in the Specification and, therefore, has not established a *prima facie* case of non-compliance with this statutory

provision. *See, e.g., In re Alton*, 76 F.3d 1168, 1175-76, 37 USPQ2d 1578, 1583 (Fed. Cir. 1996).

In the absence of a *prima facie* case, we reverse the rejection of claims 7 and 8 under 35 U.S.C. § 112, first paragraph, written description requirement.

Turning now to the ground of rejection under § 103(a), we find Mahulikar would have disclosed to one of ordinary skill in this art the embodiment illustrated in Fig. 5 thereof showing package 78 comprises plastic housing 62 that, in addition to microelectronic device 22 on bonding pad 66 and leadframe 18, has molded into its bottom surface heat spreader 76 that consists of metal layers 80,82,84, wherein leadframe 18 can be a composite which is thermally conductive. Mahulikar col. 8, ll. 58-67. Mahulikar discloses heat spreader 76 can be completely encapsulated within plastic housing 62. *Id.* col. 9, ll. 1-7.

We find Unger would have disclosed to one of ordinary skill in this art the embodiment illustrated in Fig. 5 thereof showing heat transfer plate element 6 is mounted on heat sink 4, which has conductive fin structures integrally connected to and emanating from a surface, wherein both element 6 and heat sink element 4 can be “a single, one-unit piece” manufactured using the disclosed thermally conductive resin/fiber compound carbon-carbon matrix composite material. Unger, e.g., col. 2, ll. 9-44; col. 3, ll. 19-26 and 49-64; and col. 4, ll. 20-24. Unger discloses that after forming the combination of elements 4 and 6, IC device 8 is positioned on top of element 6. *Id.* col. 3, ll. 21-26.

A discussion of Ruechardt and Ross is not necessary to our decision.

The Examiner concludes it would have been obvious to one of ordinary skill in this art to, among other things, “employ in [Mahulikar] a core plate composed of carbon-carbon matrix for the purpose of improving heat exchange as recognized by Unger.” Answer 5. In response to Appellant’s contentions, the Examiner contends, among other things, “[t]he claims recite a subcombination, namely a heat sink not in combination with a heat generating object.” *Id.* 6. In this respect, the Examiner contends “[a]rguendo, [Mahulikar] (Figure 5 . . .) discloses a heat sink having an interface surface . . . [in the area below the bottom of bonding pad 66] in contact with heat generating object 22.” *Id.* The Examiner further contends Mahulikar “discloses a core plate/heat spreader 76 separate from the semiconductor 22 and is completely surrounded by the plastic main body.” *Id.* 7, citing Mahulikar col. 9, ll. 1-4. The Examiner determines “the device of [Mahulikar] is structurally similar to the claimed invention” because “[t]he open-ended claims do not preclude the Examiner’s reading of [Mahulikar] on the present invention.” *Id.* 7. The Examiner contends Unger is relied on only for the disclosure “heat spreader plate 6 is composed of a carbon-carbon matrix.” *Id.* 8.

Appellant contends, as claimed, the “invention is a unitary heat sink that is it self [sic] a free standing structure, which is then applied as an accessory to any heat generating object,” and “does not include an integrated circuit assembly that is formed within the heat structure itself.” Br. 5; *see also* 6. Appellant contends Mahulikar “discusses the placement of a metallic spreader plate relative to a plastic package that also contains an IC device.”

*Id.* 6. Appellant contends Unger would not have disclosed surrounding core plate 6 so as to separate the core plate from IC chip 8. *Id.* 8.

The threshold issues with respect to this ground of rejection are the construction to be given claim 7 with respect to whether an IC chip can be incorporated in the claimed heat sink because of the transitional term “comprising,” and whether the combined teachings of Mahulikar and Unger would have suggested surrounding a carbon-carbon matrix material core plate with a thermally conductive polymer composition to form a heat sink having a thermally conductive surface which can interface with the contact surface of a heat generating object. Considering first the positions of the parties with respect to the interpretation of claim 7, based on the language of the claim and the interpretation in light of the Specification as it would be interpreted by one of ordinary skill in this art, we agree with Appellant that the “net-shaped molded heat sink” as claimed is a standalone article that is not connected to a heat generating object with which it must have the capability to be employed. It is within this context that the open-ended term “comprising” must be interpreted. We are of the opinion that on this record, a heat sink dissipates heat from an object and thus, would not include within its confines, a heat generating device such as an IC chip. Accordingly, the term “comprising” does not open the claims to encompass a molded article having an IC chip and a part that dissipates heat molded together therein.

*See, e.g., In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364, 70 USPQ2d 1827, 1830 (Fed. Cir. 2004); *In re Hyatt*, 211 F.3d 1367, 1372,

54 USPQ2d 1664, 1666-67 (Fed. Cir. 2000); *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027 (Fed. Cir. 1997); *In re Zletz*, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989).

Thus, with respect to the second issue, even if one of ordinary skill in the art would have substituted Unger's carbon-carbon matrix material 4, 6 for Mahulikar's heat spreader 76 as encapsulated within plastic housing 62 as disclosed by the latter with respect to Fig. 5, the result is not an embodiment that falls within the claims. Indeed, we cannot agree with the Examiner that one of ordinary skill in the art would have found in Mahulikar any teachings of inference<sup>2</sup> suggesting that the part of plastic housing 62 below bonding plate 66 constitutes a separate heat sink. Furthermore, as Appellant points out, there is no disclosure in Unger which would have suggested encapsulating the single one-piece unit of heat sink 4 and heat transfer plate 6, which has conductive fin structures, in a thermally conductive filler containing thermoplastic material. Thus, the combined teachings of Mahulikar and Unger would not result in the basic structure of the claimed heat sink encompassed by the claims.

Accordingly, on this record, the Examiner has not established a prima facie case of obviousness, and therefore, we reverse the ground of rejection under 35 U.S.C. § 103(a).

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<sup>2</sup> It is well settled that a reference stands for all of the specific teachings thereof as well as the inferences one of ordinary skill in this art would have reasonably been expected to draw therefrom, *see In re Fritch*, 972 F.2d 1260, 1264-65, 23 USPQ2d 1780, 1782-83 (Fed. Cir. 1992); *In re Preda*, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968), presuming skill on the part of this person. *In re Sovish*, 769 F.2d 738, 743, 226 USPQ 771, 774 (Fed. Cir. 1985).

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The Primary Examiner's decision is reversed.

REVERSED

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