

The opinion in support of the decision being entered today was *not* written for publication and 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* RICHARD MONTGOMERY, WILLIAM E. BERRY  
and STEPHEN W. MONTGOMERY

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Appeal 2007-0599  
Application 10/822,054  
Technology Center 2800

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ON BRIEF

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Before MILLS, LEBOVITZ, and GREEN, *Administrative Patent Judges*.

LEBOVITZ, *Administrative Patent Judge*.

**DECISION ON APPEAL**

The final rejection of claims 1-20 is on appeal. We have jurisdiction under 35 U.S.C. § 6(b). We affirm.

**STATEMENT OF CASE**

The claims are directed to an apparatus for cooling microprocessor chips and other electrical components which are used in computers. “Many of these components generate heat during normal operation.” (Specification at ¶ 2.) To dissipate the heat, heatsinks and other cooling devices (such as

“cold plates”) may be thermally coupled to the electrical component to absorb the heat from it (*id.* at ¶¶ 3 to 5).

“One aspect . . . of the invention relates to providing radial flow paths in a cold plate. Another aspect . . . of the invention relates to providing an impinging flow point near a relatively hotter spot of a heat source.” (*Id.* at ¶ 20.)

Claims 1-20, all the pending claims, are finally rejected and on appeal (Br. 1). The Examiner relies on the following prior art as evidence of unpatentability:

Anderson	U.S. Pat. 5,412,536	May 2, 1995
Doll	U.S. Pat. 6,796,370	Sep. 28, 2004

Claims 1-20 stand rejected under 35 U.S.C. § 103(a) as obvious over Doll in view of Anderson (Br. 2). Appellants separately argue the following groupings of claims: 1) claims 1-3, 7-9, 13-15, 19, and 20 (Br. 3); 2) claims 4, 10, and 16 (Br. 5); 3) claims 5, 11, and 17 (Br. 6); and 4) claims 6, 12, and 18 (Br. 6). Within each grouping, the claims stand or fall together because Appellants have not provided arguments for any individual claim. 37 C.F.R. § 41.37(c)(1)(vii). We select claims 1, 4, 5, and 6 as representative of each grouping for the purpose of deciding this appeal. They read as follows:

1. An apparatus, comprising:
  - an enclosure having a fluid inlet and a fluid outlet in fluid communication with the fluid inlet; and
  - a channel structure inside the enclosure between the inlet and the outlet defining a plurality of radial flow paths, wherein an impingement point for cooling fluid in the enclosure is located at a position corresponding to an expected relatively hotter spot of a heat source.

4. The apparatus of claim 2, wherein the impingement point is offset from a central region of the fins.
5. The apparatus of claim 2, wherein the channel walls provides a high fluid channel aspect ratio.
6. The apparatus of claim 1, wherein the fluid inlet and the fluid outlet are co-located on the enclosure.

### CLAIM INTERPRETATION

The body of claim 1 recites two specific elements: 1) an enclosure having an inlet and outlet; and 2) a channel structure inside the enclosure which defines “a plurality of radial flow paths.” The claim also has a “wherein” clause which requires that “an impingement point for cooling fluid in the enclosure is located at a position corresponding to an expected relatively hotter spot of a heat source.” A key issue in this appeal is the interpretation of the “wherein” clause.

In addition to the enclosure and channel structure, the “wherein” clause further requires the claimed apparatus to have an “impingement point.” The impingement point is described in the specification as the position where the fluid strikes<sup>1</sup> the base member of the cold plate enclosure (Specification ¶ 27). The channels radiate outwardly from the impingement point P (*id.* at ¶¶ 21, 23; Fig. 4) to form the claimed “channel structure . . . defining a plurality of radial flow paths.”

The “wherein” clause also states that the impingement point “is

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<sup>1</sup> Impinge: to strike; dash; collide. *The Random House College Dictionary* 667 (1982).

located at a position corresponding to an expected relatively hotter spot of a *heat source.*” (Emphasis added.) However, a heat source is *not* recited as an element of the claim. For this reason, we interpret the stated location of the impingement point with respect to the heat source to be an intended use of the claimed apparatus which does not limit the scope of the claim.

Our interpretation is consistent with the specification which states that “the fluid impingement point P is located such that *when* the cold plate 20 is coupled to the heat source, the point P is near a relatively hotter spot of the heat source.” (*Id.* at ¶ 23.) (Emphasis added.) The “when” condition is only satisfied when a heat source is attached to the cold plate. Claim 1 does not require the heat source.

In addition, our interpretation is supported by claim differentiation because claim 13 explicitly discloses a “system” which comprises a “cold plate” and an “electrical component” having a hot spot. Claim 1 is to the “cold plate” apparatus, alone.

#### PRIOR ART

Doll teaches a cold plate for cooling an electronic component (*e.g.*, a semiconductor chip) which comprises a fluid inlet, a fluid outlet, and a channel structure (“cooling fins”) comprising radial paths through which a cooling fluid flows (Answer 3). The channel structure defines a plurality of radial paths that radiate from an impingement point (*id.*).

Anderson teaches a cooling system for high density integrated circuit chips (col. 1, ll. 5-10) comprising a condenser structure through which a coolant flows (col. 2, ll. 33-50). The coolant fluid flows through a nozzle

and directly impinges on the chip surface where it vaporizes and dissipates the heat (col. 2, ll. 42-47; col. 3, ll. 55-66; Fig. 1).

## DISCUSSION

All the claims stand rejected under § 103 as obvious over Doll in view of Anderson (*supra* at p. 2). We address below the patentability of each grouping of the claims as separately argued by Appellants (*id.*).

### *Claims 1-3, 7-9, 13-15, 19 and 20*

We interpret claim 1 to be drawn to an apparatus comprising an enclosure with a connecting fluid inlet and outlet, radial flow channels between the fluid inlet and outlet, and an impingement point. Appellants have not challenged the Examiner's finding that this structure is described in the prior art. Rather, they argue that the prior art does not disclose that "an impingement point for cooling fluid in the enclosure is located at a position corresponding to an expected relatively hotter spot of a heat source." (Br. 3) The problem with this argument is that not all the claims in this grouping, particularly claim 1, require the presence of a heat source. The placement of the impingement point at a hot spot of a heat source is an intended use of the apparatus which does not confer a structural limitation on the apparatus, itself. For this reason, we do not find Appellants' argument persuasive.

Claim 13 contains the same elements of claim 1, but further comprises an electronic component. In this claim, placing the apparatus on a "relatively hotter spot of the electrical component" may constitute a limitation to the scope of the claim. However, Appellants did not take the opportunity, when they had it, to argue this claim separately. But, instead grouped claim 13 with claim 1, waiving any argument that the Board must

consider its patentability separately. *See* 37 C.F.R. § 41.37(c)(1)(vii). When claims are argued as a group, the Board has the discretion to choose a single claim on which to base its decision (*id.*).

Having chosen claim 1, our mandate is to give claims their broadest reasonable interpretation. The reason for this is to reduce “the possibility that claims, finally allowed, will be given broader scope than is justified.” *In re Yamamoto*, 740 F.2d 1569, 1571, 222 USPQ 934, 936 (Fed. Cir. 1984).

Construing claims broadly during prosecution is not unfair to the applicant . . . because the applicant has the opportunity to amend the claims to obtain more precise claim coverage. *See Yamamoto*, 740 F.2d at 1571-72 (“Applicants’ interests are not impaired since they are not foreclosed from obtaining appropriate coverage for their invention with express claim language. An applicant’s ability to amend his claims to avoid cited prior art distinguishes proceedings before the PTO from proceedings in federal district courts on issued patents. When an application is pending in the PTO, the applicant has the ability to correct errors in claim language and adjust the scope of claim protection as needed.”)

*In re American Academy of Science Tech Center*, 367 F.3d 1359, 1364, 70 USPQ2d 1827, 1830 (Fed. Cir. 2004). Claim 1, when read in the context of the specification as it would be understood by the person of skill in the art, is clearly drawn to an apparatus – a cold plate – not a system comprising the cold plate and a heat source. Such an apparatus is suggested by the combination of Doll in view of Anderson. Consequently, we affirm the rejection of claim 1. Because claims 2, 3, 7-9, 13-15, 19 and 20 were not separately argued, they fall with claim 1.

*Claims 4, 10, and 16*

Claim 4 further requires that “the impingement point is offset from a central region of the fins.” The Examiner contends that Figs. 3 and 5 of Doll show an offset impingement point (Answer 5). Appellants argue that “Doll teaches only that the impingement is directly centered.” (Reply Br. 5).

We agree with Appellants that Doll describes Fig. 5 as showing the impingement point “centered directly over the center of the fin plate.” (Col. 5, ll. 6-10). The Examiner does not explain what aspect of Figs. 3 and 5 disclose or suggest an impingement point offset from the center. Nonetheless, we affirm this rejection, but for different reasons.

A general problem confronting the semiconductor industry is how to dissipate heat from high density integrated circuits. According to Doll, thermal energy produced by a semiconductor chip” is a problem because heat “decreases [the chip’s] performance and reliability.” (Doll, col. 1, ll. 11-18.) Anderson also recognizes the concern with heat accumulation in integrated circuits (“Increased heat removal demands [from chip surfaces] have been an on-going problem.”). (Anderson, col. 1, ll. 20-21.)

One approach in the prior art to dissipating heat from a chip is “liquid impingement on the chip.” (Anderson, col. 1, ll. 24-30.) Both Doll and Anderson teach systems that use the impingement method of striking a fluid stream against the hot surface of a chip. In each system, the fluid is subsequently conducted along fin structures to further dissipate the heat. The preferred embodiments in which the impingement point is located centrally with respect to the cooling fins does not detract from the more general teaching that having an impingement point coupled to fin structures

is an effective solution to cool semiconductor chips. There is no indication from the teachings in either Doll or Anderson that placing the impingement point at the center of the fins is necessary to achieve the cooling function. For example, Anderson has more general disclosure which does not specify the position of the impingement point with respect to the fins (col. 2, ll. 41-43; col. 6, ll. 56-59). Anderson also states that “[i]n fact the fins shown may actually comprise any convenient heat transfer surface structure.” (Anderson, col. 4, ll. 38-40.) A reference must be “considered in its entirety for what it fairly suggests to one skilled in the art.” *In re Hedges*, 783 F.2d 1038, 1039, 228 USPQ 685, 687 (Fed. Cir. 1986). In this case, the person of skill in the art would recognize that the impingement point can be positioned with the fins in any configuration suitable to achieve the cooling function. The instant specification does not indicate that there is any unexpected advantage or benefit of offsetting the impingement point.

In sum, we affirm the rejection of claims 4, 10, 16, but because our reasoning differs from the Examiner’s, we designate this as a new grounds of rejection under 37 C.F.R. § 41.50(b) to provide Appellants with the opportunity to respond.

*Claims 5, 11, and 17*

Claim 5 states that “the channel walls provide[] a high fluid channel aspect ratio.” The Examiner asserts that “the specification does not provide the range in which the aspect ratio should be considered as high.” (Answer 5.) The Examiner finds that Doll’s ratio is sufficiently high to meet the claimed limitation (*id.*). Appellants argue that “[t]he Examiner has offered

no evidence of what one skilled in the art would consider to be a high ratio.”  
(Reply Br. 6.)

We find that the Examiner has the better argument. Claim 5 depends on claim 2 which characterizes the channel walls as “cooling fins.” Thus, the channel walls must be sufficiently “high” to perform the “cooling” function. Because Doll’s fins serve this same purpose (col. 1, ll. 59-62; col. 2, ll. 54-59; col. 4, ll. 27-33), it was reasonable for the Examiner to presume they have “a high fluid channel aspect ratio,” shifting the burden to Appellants to show otherwise.

When the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing patentability based on inherency under 35 U.S.C. § 102 or on prima facie obviousness under 35 U.S.C. § 103, “it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristic relied on.” *In re Swinehart*, 439 F.2d 210, 212-13, 169 USPQ 226, 229 (CCPA 1971); *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977). Because Appellants have not rebutted the Examiner’s reasonable presumption, we affirm the rejection of claims 5, 11, and 17.

*Claims 6, 12, and 18*

Claim 6 further limits claim 1 by requiring that “the fluid inlet and fluid outlet are co-located on the enclosure.” The Examiner interprets “co-located” to encompass positioning the inlet and outlet on the same plane (Answer 5). The Examiner finds that Doll shows the fluid inlet and outlet on the same plane, meeting the claimed limitation (*id.* at 3.). Appellants argue

that it would be clear from the specification at § 36 that “co-located means in the same position or located very near to each other on the enclosure.”

(Reply Br. 7.)

Co-located is not defined in the specification. We adopt its ordinary and customary meaning as set forth in a dictionary to mean “to set or place together.”<sup>2</sup> The Examiner’s interpretation of the term to encompass configurations where the inlet and out are placed together on the same plane is consistent with its dictionary meaning. We find no support in the specification at § 36 that the term “co-located” requires the fluid inlet and outlet to be “in the same position” as urged by Appellants (Reply Br. 7.), rather than in the same plane. Accordingly, we affirm the rejection of claims 6, 12, and 18.

#### TIME PERIOD

Regarding the affirmed rejection(s), 37 CFR § 41.52(a)(1) provides “[a]ppellant may file a single request for rehearing within two months from the date of the original decision of the Board.”

In addition to affirming the examiner's rejection(s) of one or more claims, this decision contains a new ground of rejection pursuant to 37 CFR § 41.50(b) (effective September 13, 2004, 69 Fed. Reg. 49960 (August 12, 2004), 1286 Off. Gaz. Pat. Office 21 (September 7, 2004)). 37 CFR § 41.50(b) provides “[a] new ground of rejection pursuant to this paragraph shall not be considered final for judicial review.”

37 CFR § 41.50(b) also provides that the appellant, *WITHIN TWO MONTHS FROM THE DATE OF THE DECISION*, must exercise one of the

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<sup>2</sup> *Id.* at 264.

following two options with respect to the new ground of rejection to avoid termination of the appeal as to the rejected claims:

(1) *Reopen prosecution.* Submit an appropriate amendment of the claims so rejected or new evidence relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the proceeding will be remanded to the examiner. . . .

(2) *Request rehearing.* Request that the proceeding be reheard under § 41.52 by the Board upon the same record. . . .

Should the appellant elect to prosecute further before the examiner pursuant to 37 CFR § 41.50(b)(1), in order to preserve the right to seek review under 35 U.S.C. §§ 141 or 145 with respect to the affirmed rejection, the effective date of the affirmance is deferred until conclusion of the prosecution before the examiner unless, as a mere incident to the limited prosecution, the affirmed rejection is overcome.

If the appellant elects prosecution before the examiner and this does not result in allowance of the application, abandonment or a second appeal, this case should be returned to the Board of Patent Appeals and Interferences for final action on the affirmed rejection, including any timely request for rehearing thereof.

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Application No. 10/822,054

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED/§ 41.50(b)

Demetra J. Mills )  
Administrative Patent Judge )  
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)  
) BOARD OF PATENT  
Lora M. Green )  
Administrative Patent Judge ) APPEALS AND  
)  
) INTERFERENCES  
)  
Richard M. Lebovitz )  
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/dm

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Application No. 10/822,054

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