

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* KAZUNAO ONIKI  
and HITOSHI TAMADA<sup>1</sup>

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Appeal 2007-3659  
Application 10/998,750  
Technology Center 2600

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Decided: May 20, 2008

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Before JAMESON LEE, RICHARD TORCZON, and SALLY C.  
MEDLEY, *Administrative Patent Judges*.

LEE, *Administrative Patent Judge*.

DECISION ON APPEAL

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<sup>1</sup> The real party in interest is Sony Corporation.

A. Statement of the Case

This is a decision on appeal by Appellants under 35 U.S.C. § 134(a) from a final rejection of claims 1-24. We have jurisdiction under 35 U.S.C. § 6(b).

References Relied on by the Examiner

DeAndrea	US 5,708,743	Jan. 13, 1998
Brophy	US 6,592,269	Jul. 15, 2003
Simon	US 6,807,345	Oct. 19, 2004
Hirata	US 2003/0142928	Jul. 31, 2003
Kirkpatrick	US 2004/0022476	Feb. 5, 2004

Prior art cited by the Appellants in the specification (Figures 8-10B)

The Rejections on Appeal

The Examiner rejected claims 1-5, 8-12, 15-19, and 22-24 under 35 U.S.C. § 103(a) as unpatentable over Kirkpatrick et al. (“Kirkpatrick”) in view of Simon.

The Examiner rejected claims 6-7, 13-14, and 20-21 under 35 U.S.C. § 103(a) as unpatentable over Kirkpatrick in view of Simon and prior art cited by the Appellants in the specification (Figures 8-10B).

B. Issue

Have the Appellants shown error in the rejection of claims 1-24?

C. Summary of the Decision

The Appellants have not shown error in the rejection of claims 1-24.

D. Findings of Fact (Referenced as FF. ¶ No.)

1. The invention relates to an optical apparatus and an image production apparatus. (Spec. 1:3-4.)

2. Claims 1, 8, 15, 22, 23, and 24 are independent claims. Claims 1, 8, and 15 are representative and are reproduced below:

1. An optical apparatus, comprising:

an optical element;

a mounting substrate;

a support member; and

a cooling/ heat radiating member;

said support member being attached to a first face of said mounting substrate;

said optical element being attached to a second face of said mounting substrate;

said cooling/heat radiating member being attached to said support member;

said optical element and said support member being thermally connected to each other by a heat transmission element provided in the inside of said mounting substrate;

said support member being made of a material having a thermal conductivity of 230 W/m·K or more.

8. An optical apparatus, comprising:

an optical element;

a mounting substrate; and

a support member;

said mounting substrate having an opening formed therein;

said support member being attached to one face of said mounting substrate;

said optical element being attached to a portion of said support member which is exposed to said opening formed in said mounting substrate;

said support member being made of a material having a thermal conductivity of  $230 \text{ W/m}\cdot\text{K}$  or more.

15. An optical apparatus, comprising:

an optical element;

a mounting substrate; and

a support member;

said support member being attached to one face of said mounting substrate in such a manner as to extend from an edge portion of said mounting substrate to the outer side of said mounting substrate;

said optical member being attached to the portion of said support member which extends to the outer side of said mounting substrate;

said support member being made of a material having a thermal conductivity of  $230 \text{ W/m}\cdot\text{K}$  or more.

3. Kirkpatrick discloses an optoelectronic component package that includes a multilayer substrate which provides a platform to integrate

various components such as optoelectronic or optical components.

(Kirkpatrick 1:¶ 22.)

4. Kirkpatrick discloses that a first bottom layer 320 of the multilayer substrate is fabricated to form a metalized layer 310 and RF signal path layer 330. (Kirkpatrick 2:¶ 35 and Fig. 5.)

5. The Examiner found that in Kirkpatrick, the layer 330 corresponds to the Appellants' claimed support member. (Ans. 3:17-18.)

6. The Examiner pointed to paragraph 22 of Kirkpatrick to support the finding that the layer 330 may be made of an aluminum based material. (Ans. 13:15-17.)

7. The Examiner also pointed to each of Brophy, DeAndrea, and Hirata to support the finding that support members may be made of copper that has a thermal conductivity of 230 W/m·K or more. (Ans. 13:19-21.)

8. Kirkpatrick discloses that layer 310 forms a bottom surface of the first layer of the multilayer substrate and is made of metalized ceramic to enable RF shielding as well as contact to a heat sink. (Kirkpatrick 2:¶ 32.)

9. Simon discloses systems and methods for removing heat from opto-electronic components. (Simon 1:8-10.)

10. In Simon, heat generated by an opto-electronic component 402 is dissipated through a heat sink 408. (Simon 3:56-61 and 4:6-10.)

11. In combining Kirkpatrick and Simon, the Examiner reasoned (Ans. 4:14-19):

Given Kirkpatrick's suggestion to use a heat sink device and Simon's disclosure that such devices are well known in the art, one skilled in the art would have been motivated to employ a heat sink such as that taught by Simon in the device of Kirkpatrick. Therefore, it would have been obvious to one

skilled in the art at the time the invention was made to couple a heat sink to the support member of Kirkpatrick.

E. Principles of Law

Obviousness is a legal determination made on the basis of underlying factual inquiries including (1) the scope and content of the prior art; (2) the differences between the claimed invention and the prior art; (3) the level of ordinary skill in the art; and (4) any objective evidence of unobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966). One with ordinary skill in the art is presumed to have skills apart from what the prior art references explicitly say. *See In re Sovish*, 769 F.2d 738, 743 (Fed. Cir. 1985). A person of ordinary skill in the art is also a person of ordinary creativity, not an automaton. *KSR International Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1742 (2007).

In an obviousness analysis, it is not necessary to find teachings in the prior art precisely directed to the specific subject matter claimed because the inferences and creativity that a person of ordinary skill in the art would possess can be relied on to reach a conclusion of obviousness. *See KSR International Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007).

A basis to combine teachings need not be expressly stated in any prior art reference. *In re Kahn*, 441 F.3d 977, 989 (Fed. Cir. 2006). There need only be an articulated reasoning with rational underpinnings to support a motivation to combine teachings. *Id.* at 988.

F. Analysis

The Appellants must show error in the decision of the Examiner rejecting claims 1-24. The Appellants have argued the claims in nine separate claim groupings. We address each in turn.

Claims 1, 4-7, and 22

We focus our analysis on the contested limitations. *Aero Prods. Int'l, Inc. v. Intex Rec. Corp.*, 466 F.3d 1000, 1012 n.6 (Fed. Cir. 2006). The Appellants first dispute that Kirkpatrick and Simon suggest a cooling/heat radiating member being attached to the support member. (Br. 7:8 to 8:21.)

The Examiner found that in Kirkpatrick, the layer 330 corresponds to the Appellants' claimed support member. (Ans. 3:17-18.) The layer 330 along with metalized layer 310 are disclosed as being formed by layer 320 (Kirkpatrick 2:¶ 35). That layer 320 is shown in Figure 5 as being a first layer at the bottom of a multilayer substrate. The layer 310 is disclosed as forming a bottom surface of the first layer and is made of metalized ceramic to enable RF shielding as well as contact to a heat sink. (Kirkpatrick 2:¶ 32.) The Examiner found that cooling/heat radiating members are commonly referred to in the art as heat sinks. (Ans. 4:10-11.) The Examiner turned to Simon for the showing of a particular heat sink 408 attached to a support member. (Ans. 4:12-14.) The Examiner reasoned (Ans. 4:14-19):

Given Kirkpatrick's suggestion to use a heat sink device and Simon's disclosure that such devices are well known in the art, one skilled in the art would have been motivated to employ a heat sink such as that taught by Simon in the device of Kirkpatrick. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to couple a heat sink to the support member of Kirkpatrick.

The Appellants initially disputed the Examiner's treatment of Kirkpatrick's layer 330 as a support member. (Response 10:7-12, December 6, 2005.) In response, the Examiner explained how the layer 330 is regarded as a support member. (Final Office Action 4:21 to 5:7, February 23, 2006.) The Appellants have made no further argument in that regard in the Appeal Brief.

Instead, the Appellants argue there is insufficient motivation to combine Kirkpatrick and Simon. While the Appellants acknowledge the Examiner's reliance on the heat sink 408 of Simon (Br. 8:7-10), they argue there is inadequate showing of motivation to combine a different component of Simon, the heat spreader 104, 306, or 404, with the Kirkpatrick layer 330. (Br. 7:12 to 8:21.) The Appellants argue that the Examiner has "failed to show the operability of the heat spreader of Simon in the presence of an intervening layer between the opto-electronic component of Simon and the heat spreader of Simon." (Br. 8:1-3.) The Appellants also argue that the combination is improper as "Simon fails to disclose, teach or suggest the heat spreader 404 as including any RF shielding." (Br. 8:5-6; 18-19.)

Those arguments concerning the heat spreader of Simon are misplaced. The Examiner does not rely on the heat spreader of Simon for any limitation of the Appellants' claims. Rather, as articulated by the Examiner in the above-quoted reasoning, it is heat sink 408 of Simon that is identified as the type of heat sink suggested by Kirkpatrick to be attached to the bottom surface of the first layer of the multilayer substrate. The Examiner relied on that suggestion in Kirkpatrick as the motivation to attach heat sink 408 of Simon to the metalized bottom of the support member formed by layer 330 in Kirkpatrick.

In an obviousness analysis, it is not necessary to find teachings in the prior art precisely directed to the specific subject matter claimed because the inferences and creativity that a person of ordinary skill in the art would possess can be relied on to reach a conclusion of obviousness. *See KSR International Co.*, 127 S.Ct. at 1741. Also, a basis to combine teachings need not be expressly stated in any prior art reference. *In re Kahn*, 441 F.3d at 989. There need only be an articulated reasoning with rational underpinnings to support a motivation to combine teachings. *Id.* at 988.

The Examiner's reasoning that Kirkpatrick provides motivation to one of ordinary skill in the art to attach the heat sink 408 of Simon to the support member 330 of Kirkpatrick is sensible and rational. None of the Appellants' arguments pertaining to Simon's heat spreader, including the attack on its operability and RF shielding capability, undermines that reasoning. The Appellants have not shown any error in the Examiner's proposed combination.

The Appellants also dispute that Kirkpatrick teaches the claimed heat transmission element which thermally connects the optical element and support member. The Examiner pointed to the vias 308 of Kirkpatrick to satisfy that limitation. (Ans. 4:1-2.) The Appellants argue there is no teaching in Kirkpatrick that the vias 308 are suitable for heat transmission or that those vias thermally connect the optoelectronic component 510 and layer 330. (Br. 9:2-6.)

Responding to the Appellants' arguments, the Examiner reasoned (Ans. 12:3-11):

However, the examiner notes that in the next dependent claim, e.g. claim 2, the Appellant recites that the heat transmission element is formed from a via hole for heat transmission formed in the inside of

the mounting substrate. As such, one must ask how the Appellant's via holes are different from the via holes taught by Kirkpatrick. The examiner sees no difference since they are both essentially holes in the mounting substrate. The examiner contends that if Appellant's via holes are capable of dissipating heat, then so are Kirkpatrick's.

The Appellants' specification discloses a via hole as a heat transmission element. (Spec. 19:21-23; 20:15-18.) The Appellants do not dispute the Examiner's finding that any of vias 308 of Kirkpatrick is properly regarded as a via hole or allege that those vias 308 are in any way structurally different from the Appellants' via hole. As described in the above-quoted text, the Examiner took the position that if the Appellants' via hole serves as a heat transmission element then any of the via holes of Kirkpatrick would also qualify as a heat transmission element. The Examiner further reasoned (Ans. 12:21 to 13:2):

Kirkpatrick discloses a ceramic mounting substrate that includes via holes which is then sandwiched between two metal layers, to top layer of which is used to mount the optoelectronic component 510. As such, the examiner contends that the optoelectronic component 510 and the support member are thermally connected by the via holes. This is particularly true when one considers that the Appellant claims that via holes are capable of dissipating heat, and further since each of these Kirkpatrick's layers are made of materials which are known to dissipate, conduct, radiate, and absorb heat. In other words materials that are thermally active.

The Examiner's reasoning is credible and is not addressed by the Appellants. The Appellants have not demonstrated any error in the Examiner's position.

The Appellants further argue that the limitation of the support member being made of a material having a thermal conductivity of 230 W/m·K or more has not been satisfied in the Examiner's rejection. The Appellants

contend that the Examiner has relied on taking official notice to account for the thermal conductivity limitation but has not provided any evidence to support the assertion. (Br. 9:9-11.)

The Examiner initially took official notice to satisfy the thermal conductivity limitation in a Non-final Office Action (Office Action 3:1-2, September 9, 2005). The taking of official notice was subsequently challenged by the Appellants (Response 10:16-21, December 6, 2005). Responding to that challenge, the Examiner provided the following explanation in the Final Office Action (Final Office Action 5:12-21, February 23, 2006):

The applicant also argues that Kirkpatrick in no way discloses that the support member is made of a material having a thermal conductivity of 230 W/m K or more, and asks for evidence supporting the examiner's allegation that the RF signal path layer 330 of Kirkpatrick could have the thermal conductivity claimed. In response, the examiner notes that Kirkpatrick discloses that the RF signal path layer 330 is made of metal and further suggest that the metal can be aluminum based (paragraph [0022]). Furthermore, the applicant's own specification discloses that aluminum is known to have a thermal conductivity of 236 W/m K ([Table 11]). **Moreover, the examiner provides patents or pre-grant publications to Brophy, DeAndrea, and Hirata that each teach a metal support member made of copper with a thermal conductivity of 230 W/m K or more.** (Emphasis added).

Thus, the Examiner supported the taking of official notice by pointing to Kirkpatrick's teaching that the material of layer 330 is "aluminum based." The Examiner found that material to have the required thermal conductivity. The Examiner also alternatively pointed to each of Brophy, DeAndrea, and Hirata as evidence of the use of copper as a support member material. Copper is identified in the Appellants' specification as a material having a

thermal conductivity of 403 W/m·K (Spec. 23:Table 1) and satisfies the claim limitation of 230 W/m·K or more. The evidence and corresponding reasoning were reiterated in the Examiner's Answer (Ans. 13:12-21).

The Appellants do not address any of the above-identified evidence presented by the Examiner in either the Appeal Brief or in any reply to the Examiner's Answer. Accordingly, no error has been shown in the Examiner's finding that the claimed support member being made of material having the specified thermal conductivity is satisfied by the evidence of record.

### Claim 2

Claim 2 depends on claim 1 and includes the additional limitation: said heat transmission element is formed from a via hole for heat transmission formed in the inside of said mounting substrate.

As noted above, the Examiner relied on any of the vias 308 in Kirkpatrick to form the claimed via hole and reasoned that the vias 308 would perform a heat transmission function.

We again note that the Appellants do not dispute the Examiner's finding that any of Kirkpatrick's vias 308 is properly regarded as a via hole. Instead, the Appellants' arguments as to claim 2 are the same as those presented for claims 1, 4-7, and 22 in alleging that the vias 308 of Kirkpatrick are not disclosed as being suitable for heat transmission or thermally connecting optoelectronic component 510 and layer 330.

For the same reasons as discussed above with regard to claims 1, 4-7, and 22, no error has been shown in the Examiner's determination that the vias 308 are via holes that provide heat transmission from the bottom surface

of layer 330 to an optoelectronic component 510 mounted on the top layer of the substrate 300.

We sustain the rejection of claim 2 under 35 U.S.C. § 103(a) as unpatentable over Kirkpatrick in view of Simon.

Claim 3

Claim 3 depends upon claim 1 and includes the additional limitation: said support member is made of aluminum, copper, a beryllium copper alloy, silver or gold.

The Appellants argue that the Examiner has taken official notice to satisfy those claimed materials of the support member without providing any evidence to support the assertion. (Br. 12:8-10).

The Examiner initially took official notice of the use of the materials recited in claim 3 and reasoned that it would have been obvious to use any of those materials for the support member formed by layer 330 in Kirkpatrick. (Office Action 3:20 to 4:2, September 9, 2005). The Appellants generally challenged the taking of official notice to meet the claimed materials and requested supporting evidence (Response 10:16-21, December 6, 2005). In response to that challenge, the Examiner cited to paragraph 22 of Kirkpatrick to suggest the use of aluminum for the layer 330 and alternatively cited to each of Brophy, DeAndrea, and Hirata as evidence of the use of copper for support members (Final Rejection 5:12-21, February 23, 2006; Ans. 14:4 to 15:2).

We note that both aluminum and copper are included in the list of materials recited in claim 3. The Appellants have not addressed the evidence cited by the Examiner showing the use of those materials in

support members. Therefore, no error has been shown in the Examiner's finding that claim 3 is satisfied by the evidence of record.

We sustain the rejection of claim 3 under 35 U.S.C. § 103(a) as unpatentable over Kirkpatrick in view of Simon.

Claims 8, 11-14, and 23

Claims 8, 11-14, and 23 are argued as a separate claim group. However, the Appellants' argument is the same as that relating to the thermal conductivity limitation presented for claims 1, 4-7, and 22. The Appellants again argue that the Examiner has relied solely on taking official notice to meet the claim limitation of the support member being made of a material having a thermal conductivity of 230 W/m·K or more, without any supporting evidence.

As discussed above with regard to claims 1, 4-7, and 22, the Appellants have not addressed the evidence that was provided by the Examiner in response to the Appellants' challenge to the taking of official notice. Accordingly, no error has been shown in the Examiner's finding that the claimed support member being made of material having the specified thermal conductivity is satisfied by the evidence of record.

We sustain the rejections of claims 8, 11-14, and 23 under 35 U.S.C. § 103(a) as unpatentable over the applied prior art.

Claim 9

Claim 9 depends upon claim 8 and includes the additional limitation: a cooling/heat radiating member attached to said support member.

The Appellants' argument for claim 9 is the same as that made for the corresponding limitation in claim 1. As before, the Appellants do not argue the Examiner's combination of Simon's heat sink 408 with the support

member formed by Kirkpatrick's layer 330, but have instead attacked the combination based on alleged deficiencies of the heat spreader component 104, 306, or 404 of Simon.

As discussed in connection with claim 1, the Appellants' arguments do not undermine the Examiner's rationale for combining Simon's heat sink 408 with Kirkpatrick's layer 330. Accordingly, the Appellants have not shown error in that proposed combination.

We sustain the rejection of claim 9 under 35 U.S.C. § 103(a) as unpatentable over Kirkpatrick in view of Simon.

#### Claim 10

Claim 10 depends upon claim 8 and includes the additional limitation: said support member is made of aluminum, copper, a beryllium copper alloy, silver or gold.

The limitation is the same as that added by claim 3. The Appellants argue that the Examiner has taken official notice to satisfy the materials of claim 10 without providing supporting evidence.

As is the case with claim 3, the Appellants have not addressed the evidence provided by the Examiner in response to the challenge to the taking of official notice. Therefore, no error has been shown in the Examiner's rejection of claim 10.

We sustain the rejection of claim 10 under 35 U.S.C. § 103(a) as unpatentable over Kirkpatrick in view of Simon.

Claims 15, 18-21, and 24

The Appellants dispute the rejections of the claims in this grouping on two issues. The Appellants first argue that the Examiner has not shown, in either Kirkpatrick or Simon, the following limitation of Claim 15:

said support member being attached to one face of said mounting substrate in such a manner as to extend from an edge portion of said mounting substrate to the outer side of said mounting substrate.

In addressing that limitation, the Examiner explained (Ans. 15:3-11):

Finally, to rebut Appellant's argument that Kirkpatrick fails to show said support member being attached to one face of said mounting substrate in such a manner as to extend from an edge portion of said mounting substrate to the outer side of said mounting substrate, the examiner notes that Figures 3, 6(A), 6(B), and 6(C) each show that the support member (reference numeral 330 in Figure 6(B)) is attached to one face of said mounting substrate (e.g. bottom face in Figure 3) in such a manner as to extend from an edge portion (e.g. an area close to the edge of the mounting substrate as shown in Figure 3, 6(A), 6(B), and 6(C)) of said mounting substrate to the outer side of said mounting substrate (e.g. the support member practically covers the entire bottom surface).

Thus, the Examiner found that the support member formed by layer 330 in Kirkpatrick, shown for instance in Figure 6B, is attached to the mounting substrate 300 shown in Figure 3 and extends from an edge portion to the outer side of that mounting substrate. The Appellants have not explained why there is error in that finding.

The Appellants also dispute the Examiner's taking of official notice for the limitation that the support member is made of a material having a thermal conductivity of 230 W/m·K or more. As discussed above with regard to claims 1, 4-7, and 22, while the Examiner initially took official notice to address the thermal conductivity limitation, the Examiner

subsequently pointed to supporting evidence found in paragraph 22 of Kirkpatrick and each of Brophy, DeAndrea, and Hirata. The Appellants do not address that evidence. Therefore, no error has been shown in the Examiner's finding that the thermal conductivity limitation has been met.

We sustain the rejections of claims 15, 18-21, and 24 under 35 U.S.C. § 103(a) as unpatentable over the applied prior art.

Claim 16

Claim 16 depends upon claim 15 and includes the additional limitation:

a cooling/heat radiating member attached to said support member.

The limitation is the same as that added by each of claims 1 and 9. The Appellants again argue that limitation is not shown in Kirkpatrick and Simon. However, for the same reasons noted for claims 1 and 9, the Appellants arguments relating to the heat spreader 104, 306, or 404 of Simon do not undermine the Examiner's reliance on heat sink 408 of Simon. The Appellant's have not shown error in the Examiner's finding that claim 16 is satisfied by the combination of the heat sink 408 of Simon with the support member formed by layer 330 of Kirkpatrick.

We sustain the rejection of claim 16 under 35 U.S.C. § 103(a) as unpatentable over Kirkpatrick and Simon.

Claim 17

Claim 17 depends upon claim 15 and includes the additional limitation:

said support member is made of aluminum, copper, a beryllium copper alloy, silver or gold.

The limitation is the same as that added by each of claims 3 and 10. The Appellants again argue that the Examiner has based the rejection of the claim on official notice without providing supporting evidence. As discussed above with regard to each of claims 3 and 10, the Appellants have not addressed the evidence provided by the Examiner in response to the Appellants' challenge of the taking of official notice. Therefore, no error has been shown in the Examiner's rejection of claim 17.

We sustain the rejection of claim 17 under 35 U.S.C. § 103(a) as unpatentable over Kirkpatrick in view of Simon.

G. Conclusion

The rejection of claims 1-5, 8-12, 15-19, and 22-24 under 35 U.S.C. § 103(a) as unpatentable over Kirkpatrick in view of Simon is **affirmed**.

The rejection of claims 6-7, 13-14, and 20-21 under 35 U.S.C. § 103(a) as unpatentable over Kirkpatrick in view of Simon and prior art cited the Appellants in the specification (Figures 8-10B) is **affirmed**.

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**

Appeal 2007-3659  
Application 10/998,750

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