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APPELLANT'S BRIEF

2011-1120

IN THE

UNITED STATES COURT OF APPEALS

FOR THE FEDERAL CIRCUIT

SEIKO EPSON CORPORATION,

Plaintiff/Counterclaim Defendant-Appellant,

and

EPSON RESEARCH AND DEVELOPMENT, INC.
and EPSON AMERICA, INC.,

Counterclaim Defendants-Appellees,

v.

CORETRONIC CORPORATION,

Defendant/Counterclaimant-Appellee,

and

OPTOMA TECHNOLOGY, INC.,

Defendant-Appellee.

Appeal from the United States District Court for the
Northern District of California in 06-CV-6946,
Judge Marilyn Hall Patel.

APPELLANT'S BRIEF OF SEIKO EPSON CORPORATION

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February 11, 2011

CERTIFICATE OF INTEREST

Counsel for Plaintiff-Appellant Seiko Epson Corporation certifies the following:

1. The full name of every party or amicus represented by me is:

   Seiko Epson Corporation

2. The name of the real party in interest (if the party named in the caption is not the real party in interest) represented by me is:

   Not Applicable.

3. All parent corporations and any publicly held companies that own 10 percent or more of the stock of the parties represented by me are:

   Aoyama Kigyo Kabushiki Kaisha

4. The names of all law firms and the partners or associates that appeared for the party or amicus now represented by me before the trial court or agency, or are expected to appear in this court, are:

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STATEMENT OF RELATED CASES

There were two prior appeals to this Court from the district court action:

1. *Seiko Epson Corporation v. Optoma Technology, Inc.*, Appeal No. 2008-1523. By Order dated December 22, 2008, this Court (per Circuit Judges Lourie, Dyk and Moore) dismissed the appeal as not taken from a final judgment A91. The decision is reported at 323 Fed. Appx. 896, 2008 WL 5874319.

2. *Seiko Epson Corporation v. Coretronic Corporation*, Appeal Nos. 2009-1439, -1440. This Court affirmed in part, vacated in part and remanded on May 20, 2010 (per Chief Judge Michel and Circuit Judges Lourie and Bryson). A40-46. The decision is reported at 376 Fed. Appx. 23, 2010 WL 2008847.

No case known to counsel pending in this or any other court will directly affect or be directly affected by this Court's decision in the pending appeal.

JURISDICTIONAL STATEMENT

A. The United States District Court for the Northern District of California had jurisdiction over Seiko Epson Corporation's ("SEC's") patent infringement claims under 28 U.S.C. §§ 1331 and 1338(a).

B. The United States Court of Appeals for the Federal Circuit has jurisdiction of this appeal under 28 U.S.C. § 1295(a)(1).

C. SEC filed a timely notice of appeal on December 7, 2010 from the Judgment of the district court, entered on January 5, 2011. A1-2; A1750-51. The district

court had previously announced its decision on the merits in a Memorandum and Order of November 23, 2010. A3-14. *See* Fed. R. App. P. 4(a)(2) (a notice of appeal filed after a district court announces a decision, but before the entry of the judgment, is treated as filed on the date of and after the entry of judgment).

I. INTRODUCTION

The district court failed to apply the statutorily mandated obviousness test: it failed to consider, as required by § 103, whether "the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." While those of ordinary skill in the art certainly apply common sense to solving technical problems, they also take into account the practical context of the invention. Thus, ignoring real world factors weighing against design changes is not common sense. Moreover, things that may later seem obvious to a judge—viewed at a sufficiently high level of abstraction and with the benefit of hindsight gained from reading the asserted patent—may not have been obvious to one of ordinary skill in the art at the time of the invention. Unmindful of these fundamental principles, the district court here "simply retraced the path of the inventor with hindsight, discounted the number and complexity of the alternatives, and concluded that the invention ... was obvious," violating the basic precept that "at the time of the invention, the inventor's insights [and] willingness to confront and overcome obstacles ... cannot

be discounted." *Ortho-McNeil Pharm., Inc. v. Mylan Labs., Inc.*, 520 F.3d 1358, 1364 (Fed. Cir. 2008).

II. STATEMENT OF ISSUES

1. Whether the district court erred as a matter of law, including by resolving genuine issues of material fact on summary judgment, in finding the asserted 158 patent claims to have been obvious over a combination of the Nakamura and Gourdine references, where (1) it was not feasible to directly utilize Gourdine's conduit to directly conduct outside air to Nakamura's power supply and (2) a modified combination would have been (a) inconsistent with the purposes of both Nakamura and Gourdine and (b) unpredictable in its consequences.

2. Whether Nakamura and Gourdine lacked additional features of the asserted claims, aside from not directly conducting outside air to a projector power unit, or are subject to genuine disputes of material fact over the existence of such additional features.

III. STATEMENT OF THE CASE

SEC filed this patent infringement suit on November 6, 2006, in the Northern District of California, against Coretronic Corporation, a Taiwanese manufacturer of display projectors, and Optoma Technology, Inc., Coretronic's U.S. sales subsidiary (both of which will be referenced here as "Coretronic"). A55. SEC originally asserted five patents, but later withdrew three of them. In March

2007, Coretronic asserted two projector cooling patents. A57-58.

The district court issued its claim construction ruling on May 16, 2008 and indicated at the claim construction hearing that it would set an accelerated schedule for invalidity summary judgment motions. A118, A1830-37. The district court issued a summary judgment decision on May 15, 2009, ruling that SEC's two patents, as well as one of Coretronic's patents (Coretronic had stipulated to non-infringement of the other patent under the district court's claim construction), were invalid over the prior art. A15-39. The summary judgment ruling is reported at 633 F. Supp. 2d 931, 2009 WL 1371407.

On May 20, 2010, this Court affirmed the district court's rulings as to Coretronic's patents and one of SEC's patents. A40-46. As to SEC's U.S. Patent No. 6,203,158 (the "158 patent"), this Court held erroneous the district court's claim construction of "directly conducts cooling air," in the limitation "second cooling air intake port . . . that directly conducts cooling air from the outside of the outer case to the ventilating path/air inlet [of the power unit]," and instead adopted SEC's construction: "transmits cooling air without substantial contamination by internal sources of heat." A43-44. This Court further held that the prior art Nakamura patent publication, which the district court had found to be anticipatory of the asserted claims of the 158 patent, did not disclose cooling air being directly conducted (A45):

> The Nakamura reference, however, plainly fails to satisfy our construction of "directly conducts cooling air from the outside of the case." Although Nakamura teaches a second air intake port located in the vicinity of the power unit, it does not provide an uninterrupted path from that port to the power unit. Instead, the figures in the Nakamura reference indicate that the fresh air entering through the second air intake port mixes with ambient air from inside the case before reaching the power unit. Consequently, the fresh air entering through the second air intake port is not directly conducted to the power unit as required by the '158 patent.

This Court accordingly vacated the district court's grant of summary judgment of invalidity of the 158 patent, without addressing the other defects in that ruling that SEC had asserted on appeal. A45-46.

On remand, the district court entertained a second motion for summary judgment by Coretronic, also allowing Coretronic to amend its Final Invalidity Contentions of June 16, 2008, to assert a new prior art reference: U.S. Patent No. 5,297,005 (Gourdine). A1344, 1349-50. On November 23, 2010, the district court granted Coretronic's motion, holding asserted claims 1, 2 and 5 of the 158 patent obvious based on the combination of Nakamura and Gourdine. A3-14; cited as "Op." In doing so, the district court refused to revisit the factual underpinnings of its initial holding that Nakamura was anticipatory of those claims, except as explicitly overruled by this Court, asserting that its other initial findings had not been disturbed on appeal and apparently considering them to be law of the case. A8-9 (6:26-7:9).

IV. STATEMENT OF THE FACTS

A. The 158 Patent

Light projectors are subject to conflicting design constraints. Within a confined space, they contain multiple heat-generating components that must be cooled. They must also accommodate an optical path along which many components may be arranged and light must be able to travel freely. Because such projectors are intended to be portable, their size and weight must be kept to a minimum. Moreover, because they are generally used to provide visual displays to an audience that is also listening to an oral presentation, they must not generate substantial noise. *See* A110, 105-106 & 108 (158 pat., 1:24-2:25, 3:60-4:2, Figs. 3, 4 & 6); A1276, 1281 (Nakamura ¶ 5, Figs. 2 & 3); A1430-31 (Keller ¶ 26).[1]

Components that generate heat in a projector include the light source lamp, liquid crystal valves (typically three, one for each of three primary colors), a polarized light conversion device, polarization plates, a primary active filter, a power supply and a ballast, as well as a circuit board. *See* A110 (158 pat., 1:24-2:25). Of these, the hottest is the light source lamp. A1411 (Biber 22:1-7); A1440-41 (Keller ¶ 62). In addition, the "liquid crystal valves and their respective

[1] Appendix references herein to "Keller" refer to the declaration of SEC's expert, Kurtis Keller, and references to "Biber" refer to the deposition transcript of Coretronic's expert, Catharina Biber.

polarization plates are major heat sources because they absorb part of the transmitted light beams." A110 (158 pat., 1:64-67).

Prior art projectors cooled the power unit (including the primary active filter, power supply and ballast) with air that had circulated inside the projector casing and had therefore absorbed heat from other components. A110 (*id.*, 2:1-30). The 158 patent improves power unit cooling efficiency by directly cooling the power unit with fresh air from outside of the projector.

SEC asserted independent claims 1 and 5 and dependent claim 2 of the 158 patent. A4. Both independent claims recite a projector comprising an optical unit, a power unit, an outer case, and two cooling air intake ports. A117. The optical unit includes a light source lamp and projection lens and is able to form optical images, such as by use of liquid crystal valves. Most of the elements missing from the applied prior art have to do with the power unit, the second cooling air intake port, and their interaction, as reflected in the following emphasized claim language (A117):

Claim 1	Claim 5
A projector, comprising:	
an optical unit including a light source lamp and a projection lens, the optical unit forming an optical image in response to image information by optically treating light beams emitted from the light source lamp and expansively projecting the optical image through the projection lens;	
a power unit including a ventilating path provided inside the power unit for circulating cooling air;	*a power unit including an air inlet and an air outlet*;
an outer case that stores the optical unit and the power unit;	
a first cooling air intake port located on the outer case that provides cooling air from outside of the outer case to the optical unit; [and]	
a second cooling air intake port located on the outer case that *directly conducts cooling air from the outside of the outer case to the ventilating path*, said second cooling air intake port comprising: *an air inlet provided on the power unit*, and *a duct connecting said second cooling air intake port and the air inlet.*	a second cooling air intake port located on the outer case that *directly conducts cooling air from the outside of the outer case to the air inlet*; and
	an exhaust vent provided on the outer case that directly conducts air exhausted from the air outlet to the outside of the outer case.

As reflected above, independent claim 5 differs from claim 1 primarily in two ways: claim 5 (1) does not include the duct of claim 1, but (2) includes an exhaust vent not required by claim 1. Claim 2 depends from claim 1 and further recites "a ventilating fan that ventilates an interior portion of said outer case." A117.

B. The Prior Art

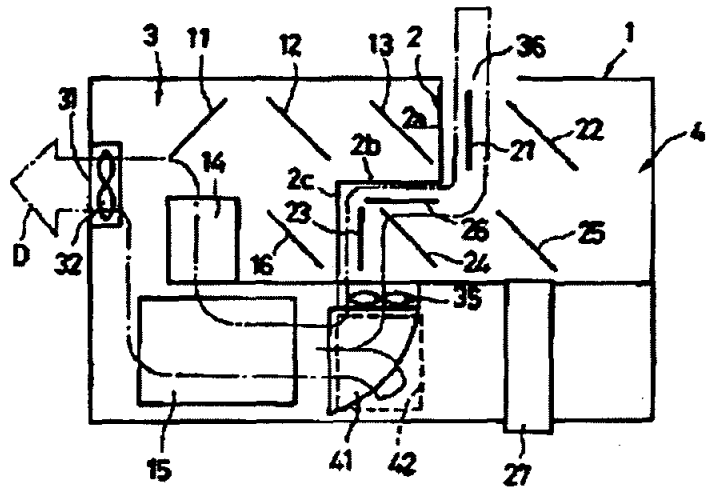
As noted above, the district court found the asserted claims to be obvious over a combination of Nakamura and Gourdine. Nakamura discloses a projector, but one that differs in multiple ways from the projector of the 158 patent claims. Gourdine discloses a conduit used to cool a microprocessor chip in a computer.

1. Nakamura

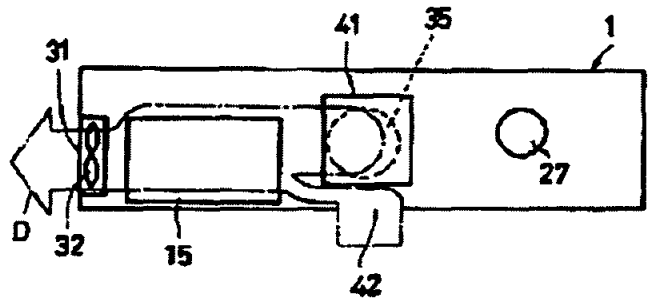
The Nakamura embodiment relied upon by the district court (that of Figures 2 and 3, A1281); hereafter referred to as Nakamura) improved upon a prior art projector that had multiple exhaust ports, and a fan for each exhaust port. Nakamura has a single exhaust port, thereby simplifying the design, avoiding interference with other equipment and reducing fan noise (A1276, ¶ 5; *see also* A1279 (¶ 14)):

> [T]here are two exhaust ports [in the prior art projector], which imposes restrictions on the design, and requires installation in locations in which obstructions, such as other equipment or walls, etc., are not present opposite each of the exhaust ports 31, 34, so that the installation location consequently also is subject to restrictions, and there is a further problem with the high noise level.

As shown below, Nakamura's projector is divided into a liquid crystal display panel chamber 4 and a light source chamber 3 by a partition 2, including partition segments 2a, 2b and 2c. Two air intake ports introduce cooling air into the projector along two air paths. One air path brings air into liquid crystal display panel chamber 4 through an air intake port 36, where it is first used to cool liquid



Nakamura, Figure 2

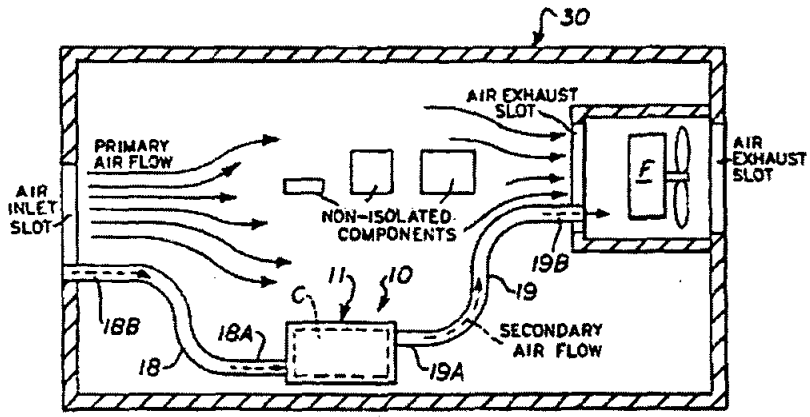


Nakamura, Figure 3

crystal display panels 21, 26 and 23. The air in that path is then discharged by a second cooling fan 35, through a duct 41, into light source chamber 3. That air next "passes through the vicinity of each of a power supply 15 and a light source 14," after which it is exhausted from an exhaust port 31 by a first cooling fan 32. A1278 (¶¶ 9-10). The second air path brings air in through an air intake port 42 (partially beneath the duct 41), which air then mixes with the air from the first path that has circulated through the light crystal display panel chamber 4, before passing "through the vicinity of each of the power supply 15 and the light source 14, cooling them." A1279 (*id.* ¶ 13).

2. Gourdine

Gourdine discloses electronic components in a computer cabinet being cooled by both a primary and secondary airflow. The primary airflow cools various non-isolated components in the cabinet and is then exhausted by an exhaust fan F. The secondary airflow passes through a flexible conduit 18 into a hollow housing 11, which is configured to enclose a heat generating electronic component C. The air that has cooled electronic component C is then exhausted through another flexible conduit 19 and the exhaust fan F. A1284 (Fig. 3), A1287-88 (4:44-5:3).



Gourdine, Figure 3

Gourdine describes the problem it addresses as originating with a "microprocessor chip in a computer," which "generates a relatively large amount of heat." A1286 (1:32-34). Heat sinks are typically mounted on such chips, which is "useful in cooling the microprocessor chip," but "the heat generated by the heat sink is mixed with the heat generated by the other components in the cabinet such

that the effective cooling of all the components including the ones having heat sinks is diminished." A1286 (1:53-58). Accordingly, Gourdine discloses directing "a small portion of outside air" to form a secondary air flow to cool such a chip, which flow is to be small enough not to jeopardize "the cooling effects of the outside air circulating across the other non-isolated components." A1288 (6:1-16). "As a result, cooling of the other non-isolated components by the circulating air outside of the enclosure is improved because the primary air flow through the cabinet is not mixed with the secondary hot air emerging from the isolated component or heat sink." A1288 (6:16-21). The cooling of the non-isolated components is thus "maximized" by separating them from the heat generated by the hottest component in the cabinet.

As evidence of the feasibility of this approach, Gourdine conducted a test "by removing a microprocessor chip generating only 0.4 W from a PC computer and replacing it with a simulated Intel 80486 microprocessor chip (Intel Corporation) and heat sink generating 4.5 W." A1289 (7:4-10). The temperature of the 4.5 W chip was reduced with the enclosure system. A1289 (Col. 7, table).

C. The Differences Between The Prior Art and the Claims

As explained in more detail in the Argument below, Nakamura lacks four elements of the 158 patent claims:

1. As this Court found, Nakamura does not directly conduct cooling air from the outside of the outer case to the power unit;

2. Nakamura does not disclose directly conducting power unit exhaust air to the outside of the outer case;

3. Nakamura does not disclose a duct between the second air intake port and the power unit; and

4. Nakamura does not disclose a power unit with an air inlet, air outlet or inside.

Gourdine discloses neither a projector nor the cooling of a power supply. While power supplies are found in computers, Gourdine does not mention them and never suggests providing them with separate cooling. *See* A1440 (Keller ¶¶ 60-61); A1410 (Biber 20:12-16). To the extent Gourdine discloses providing separate cooling for an electronic component, it teaches isolating the hottest component in the cabinet: the microprocessor chip. A1411 (Biber 22:1-5).

V. SUMMARY OF ARGUMENT

The district court's conclusion of obviousness was reached by discounting the practical factors that one of ordinary skill in the art must confront in projector design. The district court's conclusion would thus not have been "common sense" to such a designer.

The district court found the asserted claims to be obvious based on a hypothetical insertion of Gourdine's conduit, which cools a microprocessor chip, into Nakamura's projector to cool a power supply. Such a combination would have been inconsistent with the teaching of Gourdine to isolate the hottest component, which in a projector would have been the lamp. It would also have been inconsistent with Nakamura's cooling system, which cooled both the power supply and the lamp with a single airflow.

Redesigning Nakamura into a dual airflow system would have been inconsistent with its expressed purposes in that such an arrangement would have compromised the cooling of the lamp, increased the size and weight of the projector, and generated greater fan noise. Such a re-design would also have been unpredictable in its effects, given what Coretronic's own expert called the "mysterious" and unpredictable nature of airflow in a projector context. Accordingly, one of ordinary skill in the art would not have found such a combination to have been an easy, straightforward approach, and there are genuine issues of material fact precluding any finding of obviousness on this record.

The district court also disregarded further genuine issues of material fact as to whether Nakamura otherwise met all the limitations of the asserted 158 patent claims, including whether Nakamura inherently disclosed the claimed power unit.

VI. ARGUMENT

A. Standard of Review

A district court's grant of summary judgment is reviewed *de novo* by reapplying the standard applicable at the district court. *See Monarch Knitting Mach. Corp. v. Sulzer Morat GmbH,* 139 F.3d 877, 880-81 (Fed. Cir. 1998) (citing *Conroy v. Reebok Int'l, Ltd.,* 14 F.3d 1570, 1575 (Fed. Cir. 1994)). Summary judgment is appropriate only when "there is no genuine issue as to any material fact and ... the moving party is entitled to a judgment as a matter of law." Fed. R. Civ. P. 56(c). All reasonable inferences must be drawn in favor of the nonmovant. *United States v. Diebold, Inc.,* 369 U.S. 654, 655 (1962). Moreover, in rendering a decision on a motion for summary judgment, a court must "view the evidence presented through the prism of the substantive evidentiary burden" that would inhere at trial. *Anderson v. Liberty Lobby, Inc.,* 477 U.S. 242, 254 (1986). An issued patent is presumed valid by law, 35 U.S.C. § 282, and its invalidity must be proven by clear and convincing evidence. *Monarch Knitting Mach. Corp. v. Sulzer Morat GmbH,* 139 F.3d 877, 881 (Fed. Cir. 1998).

Obviousness is a question of law based on underlying findings of fact. An analysis of obviousness must be based on several factual inquiries: (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; (3) the level of ordinary skill in the art at the time the invention was made;

and (4) objective evidence of nonobviousness, if any. *See Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). Thus, what a reference teaches, as well as the background knowledge of one of ordinary skill in the art, is "reserved for the finder of fact." *Trimed, Inc. v. Stryker Corp.*, 608 F.3d 1333, 1341 (Fed. Cir. 2010) (citing cases). The motivation to combine or modify prior art references is likewise a question of fact. *See Wyers v. Master Lock Co.*, 616 F.3d 1231, 1238-39 (Fed. Cir. 2010) (citing cases).

To review a summary judgment of obviousness, this Court "first determines anew whether the record raises any genuine issues about these critical facts. In doing so, this court remains cognizant of the statutory presumption of validity, ..., and of the movant's burden to show invalidity of an issued patent by clear and convincing evidence." *Monarch Knitting*, 139 F.3d at 881. If there are no genuine issues of material fact, the conclusion of obviousness is reviewed *de novo*. *See, e.g., Takeda Chemical Indus., Ltd. v. Alphapharm Pty. Ltd.*, 492 F.3d 1350, 1355 (Fed. Cir. 2007).

B. The 158 Patent Claims Would Not Have Been Obvious Over Nakamura and Gourdine

1. The District Court Did Not View The 158 Patent Invention From The Perspective Of One Of Ordinary Skill In The Art Without Benefit Of The 158 Patent Disclosure

The district court acknowledged that modifying Nakamura by incorporating Gourdine's conduit to cool the power supply might have changed Nakamura's cooling system in ways inconsistent with Nakamura's objectives. A12 (Op. 10:12-15). The court, however, discounted any such problems as reflecting "too narrow" a focus. Instead, the court framed the issue as simply whether a projector designer can envision a hypothetical advantage from making such a modification. In the court's view, unless the prior art taught away, making an advantageous modification would have been obvious. The court dismissed the real world effects of the change and whether the projector so modified would have been practicable, because the court presumed—without record support—that one of ordinary skill would be able to fit the two references together "like pieces of a puzzle." A12 (Op. 10:11-23). Neither *KSR* nor this Court's decisions treat the invocation of "common sense" as a basis to ignore the actual context that would have faced one of ordinary skill in the art.

The district court's approach was wrong because the cooling of projectors is not a predictable art, as both parties' experts agreed, and modifying Nakamura's cooling system to incorporate a conduit would not have been "easy, obvious,

routine, or within the grasp of a common sense application of the prior art to the apparent problem." *Source Search Technologies, LLC v. LendingTree, LLC*, 588 F.3d 1063, 1073 (Fed. Cir. 2009). In other words, the only evidence before the district court established that the design of projectors is a difficult and complicated puzzle, and the pieces of the puzzle cannot be readily or predictably rearranged. *KSR* nowhere suggests that its puzzle piece fitting paradigm applies to all puzzles or endorses lopping off the parts of the puzzle pieces that do not fit to purportedly arrive at claimed inventions.

Ignoring the practical difficulties faced by those of ordinary skill fails to evaluate obviousness from the perspective of one of ordinary skill, as required. One of ordinary skill in the art does not have the luxury of ignoring practical problems and constraints that may frustrate the supposed advantages of a hypothetical approach. By considering whether a conduit might have a benefit only from a narrow and abstract perspective, the district court oversimplified and trivialized the technical design issues that faced one of ordinary skill in the art at the time the 158 patent invention was made. The district court's approach would treat all projector cooling inventions as obvious on the theory that "there are a limited number of components requiring cooling inside a projector casing, and such a casing can contain only so many prior art passageways." A5 (Op. 3:25-26,

quoting A30).[2] A projector contains many components that need cooling, however, including the claimed lamp and image modifying portions of the optical unit, and space and optical pathway restrictions do not permit using a separate conduit for each such component. That is why the invention of the 158 patent cannot be found in the projector prior art.

The conventional approach in projectors is exemplified by Nakamura: the power supply was cooled by air that had already been used to cool other components, and all of the available air in the projector was used to cool the lamp, by far the hottest component. While a person of ordinary skill in the art possesses "ordinary creativity," *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007), such a person is also "one who thinks along the line of conventional wisdom in the art." *Standard Oil Co. v. American Cyanamid Co.*, 774 F.2d 448, 454 (Fed. Cir. 1985). Importation of Gourdine's conduit from a desktop computer context—which does not have a projector's need to tightly pack components into a minimum space while providing optical pathways—would have been contrary to both those conventional aspects of projector design. As detailed below, attempting to introduce Gourdine's conduit into Nakamura's projector, disrupting Nakamura's

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[2] At the April 23, 2008 claim construction hearing (shortly after assignment of Judge Patel to this case on February 15, 2008), the district court indicated that design of projectors was not "rocket science," and that it contemplated an accelerated schedule to file motions for summary judgment on grounds of invalidity. A1833-34.

approach of cooling both the power supply and lamp with a single airflow, would have been inconsistent with the purposes of both references and unpredictable in its result.[3]

This Court has refused to treat a high level concept as providing sufficient reason for a modification of the prior art, particularly where such an approach was fraught with known difficulties. For example, *Source Search* involved an e-commerce system that matched buyers with sellers through a filtering process that limited the number of quotes a buyer would receive. Prior art systems had matched buyers and sellers, but did not filter the quotes. The district court nonetheless granted summary judgment of obviousness based on a computer article that taught the need for "information filtering to act as a mediator between information sources and their users." 588 F.3d at 1070. This Court held that such a high level teaching, which did "not apply those general filtering methods to the '328 patent's context of matching buyers with vendors," created a genuine issue of material fact as to whether one of ordinary skill in the art would have found the claim obvious viewed as a whole. *Id.* at 1071-73.

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[3] While cooling of computers and projectors may be sufficiently similar to make their cooling techniques eligible for consideration by those of ordinary skill in the other art, that does not mean that there are no differences between computers and projectors or that solutions applied to a particular computer component will necessarily be suitable or practical for a different projector component in view of the other design considerations that must be accommodated in the projector environment.

Another example is *Takeda Chemical Indus., Ltd. v. Alphapharm Pty., Ltd.*, 492 F.3d 1350, 1358-59 (Fed. Cir. 2007), where potential side effects would have discouraged use of a prior art compound that fell within "the objective reach of the claim." *See also Hearing Components, Inc. v. Shure Inc.*, 600 F.3d 1357, 1373-74 (Fed. Cir. 2010) (affirming nonobviousness where an expert gave "particular reasons why one skilled in the art would not have been motivated to combine the references").

By discounting the practical problems in making a drastic change to Nakamura's cooling system, the district court substituted its own perspective for that of one of ordinary skill in the art. The district court thereby lost the objectivity that the requisite ordinary skill framework is intended to bring to analysis of obviousness:

> [T]he level of skill in the art is a prism or lens through which a judge, jury, or the Board views the prior art and the claimed invention. This reference point prevents those factfinders from using their own insight or, worse yet, hindsight, to gauge obviousness. . . . Skill in the art does not act as a bridge over gaps in substantive presentation of an obviousness case, but instead supplies an important guarantee of objectivity in the process.

Okajima v. Boudreau, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (citing *Al-Site Corp. v. VSI Int'l, Inc.*, 174 F.3d 1308, 1324 (Fed. Cir. 1999)).

Only by impermissibly relying upon the disclosure of the 158 patent, and ignoring the perspective of one of ordinary skill in the art, was the district court able to contrive a basis to provide isolated cooling to the power supply, even

though it is not the hottest element in the projector, or to ignore the disruption of lamp cooling that would have been caused by discarding Nakamura's disclosed cooling system.

2. Applying Gourdine's Conduit To Nakamura Would Not Have Yielded The Claimed Invention, Would Have Been Inconsistent With Nakamura's And Gourdine's Purposes, And Would Have Been Unpredictable

The district court viewed the issue before it narrowly, asserting that the "sole issue at this juncture is whether it would have been obvious to modify Nakamura by adding a dedicated cooling path between the outside of the projector case and the power supply housing." A9 (Op. 7:10-12). The district court found that limitation obvious from Gourdine. In taking that approach, the district court refused to revisit its factual finding on Coretronic's initial summary judgment motion that there were no other relevant differences between the 158 patent claims and Nakamura. *See* A8-9 (Op. 6:26-7:9). We address those additional differences in subsection 3 below.

This section addresses the district court's combination of Nakamura with Gourdine. We assume arguendo for purposes of this section that the district court's premise that Nakamura lacks only direct cooling of the power supply by outside air is correct. Even on that incorrect assumption, one of ordinary skill in the art would not have had a sufficient reason or motivation to apply Gourdine's conduit to Nakamura because Gourdine does not cool a power supply, or teach that a

component like a power supply in a projector should be isolated. Indeed, such a combination of Nakamura with Gourdine would have been inconsistent with the purposes of both Nakamura and Gourdine and would have produced unpredictable results, both of which are hallmarks of a non-obvious combination.

a) Gourdine suggests cooling a projector's chip, or arguendo its lamp (hottest component), not the projector's power supply

A combination of Gourdine with Nakamura would not have provided a separate cooling path for the power supply of Nakamura. Rather, such a combination would have provided a separate cooling path for the microprocessor chip of the projector.

Moreover, if one of ordinary skill would have looked to Gourdine for more general guidance in designing the projector of Nakamura, Gourdine would still not have suggested isolated cooling of the power supply. Gourdine is concerned with isolating the microprocessor chip primarily because it generates the most heat, thereby compromising the cooling of other components. A1411 (Biber 22:1-5). However, the component in projectors that generates the most heat is the lamp, not the power supply. A1411 (Biber 22:6-7); A1440-41 (Keller ¶ 62). Accordingly, one of ordinary skill in the art broadly applying the teachings of Gourdine to Nakamura would have, at most, provided separate cooling for the lamp.

The chip is also sensitive to high temperatures. A1286 (Gourdine 1:32-34). To the extent Gourdine can be read as teaching isolation of the most temperature sensitive component, the LCD projector components that are most temperature sensitive are the liquid crystal display panels, not the power supply. A1440-41 (Keller ¶ 62).

b) Adding Gourdine's conduit to Nakamura would have been inconsistent with the purposes of both Nakamura and Gourdine

Using Gourdine's housing and conduits to isolate Nakamura's power supply would have been inconsistent with the design of Nakamura and with Nakamura's and Gourdine's intended purposes.

As discussed above, Nakamura uses all of the available cooling air (i.e., both airflows originating with air intake ports 36 and 42) to cool the lamp and seeks to reduce the number of projector exhaust ports in order to avoid design constraints and reduce fan noise. A1276, 1279 (¶¶ 5 & 14). *See* A1441 (Keller ¶ 63.1).

Had an ordinary projector designer considered using Gourdine's housing and conduits to isolate the Nakamura power supply by taking fresh air from air intake port 42, that would have diverted a substantial portion of the coolest air being used to cool the lamp (the greatest heat generator), thus reducing the effectiveness of lamp cooling. A1441 (Keller ¶ 63.1). Coretronic's expert testified that one of ordinary skill accordingly might not have used Gourdine's conduit in Nakamura

and, in any event, would not have known how much air to divert. A1413 (Biber 32:4-6, 30:7-17). Had cooling air been diverted away from the lamp, that would have required other significant changes to the projector to compensate for the loss of cooling air, such as running the exhaust fan at a higher speed to pull more air past the lamp, which would have conflicted with Nakamura's purposes by generating greater fan noise. A1441 (Keller ¶ 63.1).

Gourdine's two-airflow approach also would have created substantial space problems in the projector, contrary to Nakamura's purpose of avoiding such constraints. In order to provide sufficient airflow to the conduit, Gourdine creates a plenum space around the exhaust fan by partially enclosing that fan in a housing, thereby narrowing the opening available to the primary airflow at the exhaust side and creating sufficient vacuum within the plenum to pull air through the secondary air path. A1441-42 (Keller ¶ 63.3); A1412 (Biber 25:8-13). Because Nakamura has only a single airflow to exhaust, it does not need an exhaust housing. Its fan is simply placed at the exhaust port and air approaching it is not constrained. In order to have used the airflow isolation conduit of Gourdine in Nakamura, it would have been necessary to add such a bulky exhaust fan housing to Nakamura. A1441-42 (Keller ¶ 63.3). This would have used valuable space inside the projector and substantially constrained the design (i.e., required a bigger and heavier projector), contrary to the purpose of Nakamura. *Id.*

In addition, having to maintain the vacuum pressure in the plenum area would have required more suction than in Nakamura's design—requiring multiple exhaust fans or running the exhaust fan at a higher speed—both of which would have increased the ambient noise. *Id.*

Even if one of ordinary skill in the art attempting to apply Gourdine's conduit to cool a power supply in Nakamura had considered reducing the need for suction by enlarging the conduit, there is no proof that the conduit necessarily could have been enlarged sufficiently to dispense with the fan housing and plenum. *See id.* And, even if that had been possible, any such configuration would still have had to balance the pressures of the two airflows, which balancing would have required substantially constraining the airflow volume passing the lamp, thereby further reducing cooling of the lamp (in addition to the reduction caused by diverting cooling air to the power supply). A1442 (Keller ¶ 63.4).

Accordingly, applying Gourdine's conduit to Nakamura would have reduced lamp cooling, increased the projector size, weight and design complexity, and potentially increased noise, all of which would have been inconsistent with Nakamura's purposes.

Using Gourdine's conduit to cool Nakamura's power supply would also have been inconsistent with Gourdine's purposes, as that would have failed to isolate the hottest component in Nakamura's projector (the lamp). A1440-41 (Keller ¶ 62).

Unlike *KSR*, this is not a case where a feature from one prior art reference is simply being substituted for an element of another reference. Moreover, as this Court has held, modifications that would have rendered a prior art reference unsatisfactory for its intended purpose would not have been obvious to one of ordinary skill. *See In re Fritch*, 972 F.2d 1260, 1265-66 & n.12 (Fed. Cir. 1992); *In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984). Such longstanding principles continue to be applied post-*KSR*: "the 'predictable result' discussed in *KSR* refers not only to the expectation that prior art elements are capable of being physically combined, but also that the combination would have worked for its intended purpose." *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1326 (Fed. Cir. 2009). "[A] conclusion [of nonobviousness] would follow, ... if the prior art indicated that the invention would not have worked for its intended purpose." *Id.*; *see also* MPEP ¶ 2143.01 (instructing patent examiners to consider whether a combination will work for its intended purpose).

The district court dismissed such considerations on the ground that the prior art did not "teach away" from a combination of Nakamura and Gourdine, quoting the formulation of "teaching away" that requires the prior art to explicitly "'criticize, discredit, or otherwise discourage' investigation into the invention claimed." A11 (Op. 9:3-23). However, this mischaracterized SEC's argument, which was not a "teaching away" argument. The district court failed to address

SEC's actual argument that the combination was inconsistent with the intended purposes of the prior art. Teaching away, moreover, is not a prerequisite for nonobviousness, contrary to the district court's assumption.

In addition to claiming that Nakamura does not "teach away," the district court contended that Nakamura's purposes may be disregarded because Nakamura is "simply directed at a different problem . . . than the problem addressed by the '158 patent," citing *KSR*. A11 (Op. 9:16-20). This confuses the issue addressed in *KSR*, which did *not* hold that the purposes of a prior art reference are irrelevant to obviousness. The "different problem" argument rejected in *KSR* was that prior art aimed at solving a different problem than that confronted by the inventors should be disregarded in evaluating obviousness. *KSR*, 550 U.S. at 414, 419-20. SEC is not arguing that Nakamura may not be considered, but that one applying ordinary skill in the art would not have *modified it* in ways inconsistent with its purposes.

c) Adding Gourdine's conduit to Nakamura would have had unpredictable results

The declaration of Dr. Biber, Coretronic's expert, claims, in reliance on the test data in Gourdine, that one of ordinary skill in the art would "be reasonably certain that retrofitting the projector of Nakamura" with "the isolated secondary air flow of Gourdine" would have improved power supply cooling. A1233 (Biber Dec. ¶ 32). However, that test data related to 4.5 watt microprocessor chips, not a substantially hotter projector power supply, and Dr. Biber was unable to describe

at her deposition how Gourdine could have been applied to Nakamura or what modifications would have been necessary to both Gourdine and Nakamura to produce a combination that would work for Nakamura's intended purposes. A1411-14 (Biber 24:2-32:6; 33:7-34:18).

In fact, Dr. Biber expressed doubt that the structure of Gourdine would work in Nakamura to cool the power supply. She instead testified that she "might put some other duct" in Nakamura because of the small diameter of the duct in Gourdine. A1411-12 (Biber 24:10-25:6, 27:8-28:13). Dr. Biber was unable to state, however, how much airflow one of ordinary skill in the art would have had to divert from air intake port 42 to cool power supply 15. A1412-13 (26:14-20, 30:7-17). When asked what would have been the effect of such a diversion on the cooling of Nakamura's lamp, Dr. Biber testified that she could not necessarily predict the effects of such a change in airflow (A1414 (33:21-34:14)):

> Q. Isn't [the structure shown in Gourdine] different than the structure shown in Nakamura in that there's less cool air available to cool the lamp?
>
> A. I'm not certain that it would be less.
>
> Q. Why would it not be less?
>
> A. Airflow is a mysterious thing.
>
> Q. So you can't predict what the airflow would be?
>
> A. Not necessarily.

Q. So you think that the air from air intake port 42 could be removed from cooling the lamp and the lamp would still be cooled equally as what's shown in Figures 2 and 3 of Nakamura; is that your testimony?

A. It's possible that it could be. I don't know for sure.

Q. How would it be possible?

A. Again, back pressures in fans, it's kind of -- it's a hydrodynamic thing and what -- if I needed to find the answer for that question, I would want to use airflow modeling to figure it out.

Accordingly, by the admission of Coretronic's own expert, one of ordinary skill in the art would not have known whether incorporating a system like that of Gourdine into Nakamura would have worked, either to cool Nakamura's power supply adequately or to continue to cool Nakamura's lamp adequately, at least without substantial additional work. Absent predictability, such a combination would not have been obvious. *DePuy Spine,* 567 F.3d at 1326. Moreover, where the complexity of the art causes the effects of a combination of references to be uncertain to an expert, they are certainly beyond the comprehension of a layperson and motivation to combine becomes an issue that can only be resolved by expert testimony. *See Wyers v. Master Lock Co.*, 616 F.3d 1231, 1240 n.5 (Fed. Cir. 2010). And, to the extent the parties' experts differ on a genuine issue of material fact, summary judgment may not be granted. *Hodosh v. Block Drug Company*, 786 F.2d 1136, 1142-43 (Fed. Cir. 1986).

The district court did not address the testimony of either expert about the predictability of Coretronic's prior art combination, instead incorrectly asserting that "the Gourdine specification envisions application of the invention to chips generating heat in the range of 15-30 watts." A12 (Op. 10:7-9). In fact, Gourdine tests its invention on a computer upgraded from a 0.4 W chip to a simulated 4.5 W chip. A1289 (7:4-10). In the background section of the patent, Gourdine states, in the future tense, that "newer chips will generate 15-30 watts," A1286 (1:38). Gourdine does not say, however, let alone present evidence, that its system can be applied to chips of that substantially larger wattage. Power supplies of projectors generate far more heat than a microprocessor chip. Lamps of projectors at the time of the 158 invention often operated on about 250 to 300 watts of power. A1441 (Keller ¶ 63.2). Power supplies for such lamps thus generated in the range of 25 to 60 watts of waste heat (i.e., 10-20% of the lamp wattage, based on typical power supply efficiency ratings of 80-90%, A1411 (Biber 22:21-22)). *See* A1441 (Keller ¶ 63.2).

Moreover, by treating SEC's unpredictability argument as if it related only to the difference in wattage between a computer microprocessor chip and a projector power supply, A10-11 (Op. at 8:24-9:2), the district court failed to acknowledge the degree of unpredictability in the projector cooling art. As noted above, Coretronic's own expert testified that the effects of changing Nakamura's airflow

characteristics were unpredictable. Accordingly, as SEC's expert, Mr. Keller, testified, it was far from predictable whether modifying Nakamura by diverting fresh air away from the lamp and constraining the volume of air passing the lamp would have left the lamp with adequate cooling.

The lack of predictability of the art is also one of the reasons demonstrating the incorrectness of the district court's contention that it would have been obvious to try "arranging a prior art design with air ducts such that an air duct goes directly through the power supply." *See* A12-13 (Op. 10:23-11:2); A30 (16:19-23) & 38-39 n.10. For a new technical solution to have been "obvious to try," there first must have been "a design need or market pressure to solve a problem and . . . a finite number of identified, predictable solutions," as well as a "record up to the time of the invention [that gave] some reasons ... to make particular modifications." *See KSR*, 550 U.S. at 421; *Eisai Co. v. Dr. Reddy's Labs., Ltd.*, 533 F.3d 1353, 1359 (Fed. Cir. 2008).

Nothing in Nakamura suggests that exhausting power unit air directly out of the projector would be likely to be useful. Rather, Nakamura suggests the contrary by consistently using power unit air for further cooling. The testimony of both experts also indicates that addition of a duct to Nakamura would not have been a predictable solution to the problem of better cooling the projector, as it would

likely have led to problems in cooling the lamp, as well as made the projector larger, heavier and noisier.

Thus, one of ordinary skill in the art, at the time of the 158 patent invention, would not have been motivated, or had any reasonable rationale, for combining Nakamura with Gourdine.

3. Nakamura Differs From The 158 Patent Claims In Additional Ways Not Recognized By The District Court, And Not Remedied By Gourdine

Aside from not directly conducting cooling air from the outside of the outer case to the power unit, Nakamura lacks at least the following additional features of the asserted claims:

1. directly conducting power unit exhaust air to the outside of the outer case;

2. a duct between the second air intake port and the power unit; and

3. a power unit with an air inlet, air outlet or inside.

The district court gave short shrift to all these issues in considering Coretronic's second summary judgment motion, instead relying, under a flawed law of the case theory, on its reversed earlier finding that Nakamura was anticipatory of claim 1 of the 158 patent. As to the first feature, the district court admitted that there is a genuine issue of material fact as to whether the feature is present in Nakamura, but nonetheless found the claim to be obvious based on

conclusory reasoning and inappropriately borrowed features from Gourdine. The other features are also plainly not disclosed in Nakamura, but the district court again treated them as present both by ignoring its claim construction of "duct" and by finding features to be inherent contrary to the undisputed record. The district court's approach to these issues further demonstrates that the court's reasoning was outcome driven, founded in the court's misguided notion that the claimed inventions must be obvious given that projector cooling technology seemed to it to be simple and understandable, notwithstanding the contrary caution expressed in *Panduit Corp. v. Dennison Mfg. Co.,* 810 F.2d 1561, 1572 (Fed. Cir. 1987):

> Nowhere in the statute or the Constitution is the patent system opened only to those who make complex inventions difficult for judges to understand and foreclosed to those who make less mysterious inventions a judge can understand after hearing, as here, the inventor's explanation of his invention and the engineering principles he employed.

The absence of the above three features from Nakamura is significant even under the district court's current obviousness ruling. Nakamura remains the only prior art projector reference applied against the 158 patent claims. Gourdine does not disclose a projector power unit (or even a computer power unit), the cooling of which is the primary object of the 158 patent, and Nakamura does not disclose such a power unit with the claimed structure or claimed cooling arrangement. The district court's misapprehension of the scope and content of the Nakamura reference skewed the district court's reasoning, including by permitting it to gloss

over failures of proof as to several of the claim limitations. Gourdine does not supply any of those deficiencies, as it is directed to a desktop computer that, unlike a projector, has ample room to provide dedicated cooling to components, and is otherwise not concerned with the design needs unique to projectors.

a) The law of the case doctrine is inapplicable

Coretronic contended, in its reply brief on summary judgment, that the district court was precluded by the law of the case doctrine from considering SEC's contentions that Nakamura lacked multiple elements of the 158 patent claims, because those issues had been addressed by the district court in its initial summary judgment ruling. A1540-42. The district court appeared to give weight to that contention, asserting that this Court "did not disturb [the district court's prior] findings" on such issues and citing a Ninth Circuit law of the case decision. A8-9 (Op. 6:26-7:9). *See also* A6, 13 (Op. 4:12, 11:15).

Both the district court and Coretronic are wrong. This Court did disturb the district court's findings: it vacated them when it vacated the first summary judgment on the 158 patent. A45. Vacation of a judgment is not a silent endorsement of the judgment's underpinnings. *Smith Int'l, Inc. v. Hughes Tool Co.*, 759 F.2d 1572, 1577 (Fed. Cir. 1985) (citing *Mutual Life Ins. Co. v. Hill*, 193 U.S. 551, 553-54 (1904)). Instead, it eliminates that judgment, requiring the parties to re-litigate the issues afresh, to the extent the appellate court does not address them.

See, e.g., Cardinal Chemical Co. v. Morton Int'l, Inc., 508 U.S. 83, 101-102 (1993). The law of the case doctrine thus does not apply to a vacated judgment. *See Rumsfeld v. Freedom NY, Inc.*, 329 F.3d 1320, 1332 (Fed. Cir. 2003); *U.S. Philips Corp. v. Sears Roebuck & Co.*, 55 F.3d 592, 598 (Fed. Cir. 1995).

b) Nakamura does not disclose power unit air conducted directly outside

The district court found there to be a genuine issue of material fact as to whether Nakamura discloses "an exhaust vent provided on the outer case that directly conducts air exhausted from the air outlet [of the power unit] to the outside of the outer case," as recited in claim 5 of the 158 patent. A27 (13:5-6). *See also* A1439 (Keller ¶¶ 56-58). The district court nonetheless found such direct venting of power unit air to have been obvious, and in its second ruling cited Gourdine as evidence of such obviousness. A13 (Op. 11:5-21).

However, in the projector art, the conventional approach was that disclosed in Nakamura: air that has first been used to cool other elements, including the power supply, is then used to cool the lamp, the hottest item in the projector. *See* A1441 (Keller ¶ 63.1). Gourdine does not supply a rationale for diverting air exhausted from a projector power supply away from the projector lamp. To the contrary, Gourdine places the hottest item in its cabinet, the microprocessor chip, inside the conduit system. In other words, Gourdine seeks to increase the cooling of the hottest component, not reduce the cooling of the hottest component.

c) Nakamura does not disclose a duct connecting the second cooling air intake port to a power unit

Claim 1 of the 158 patent recites a second air intake port assembly that directly conducts cooling air from outside of the outer case to the ventilating path of the power unit, including a duct connecting the intake port on the outer case to the air inlet of the power unit. The district court, in finding Nakamura to be anticipatory of claim 1, found that Nakamura disclosed both a second cooling air intake port that directly conducts cooling air from the outside of the outer case to the ventilating path and "a duct connecting said second cooling intake port and the air inlet." A25-26 (11:22-12:18).

This Court's holding that Nakamura discloses no such second cooling air intake port because "cooling air from the outside of the outer case" is not furnished to the power unit (A45) applies equally to the lack of a duct connecting the second cooling air intake port and the power unit. This Court understood the claimed duct as *only* introducing fresh air to the power unit (A44):

> The patent also notes that the duct recited in claim 1, which connects the second air intake port and the air inlet of the power unit, "only introduces fresh air from the cooling air intake port to the ventilating path . . . [and] prevents the air from the outer case, which is hotter than the fresh air, from entering into the ventilating path." *Id.*, col. 3, ll. 18-21.

Nakamura does not have such a duct: the air from air intake port 42 mixes with hot air coming from liquid crystal display panel chamber 4 before the mixed air reaches power supply 15. Moreover, the district court's construction of "a duct

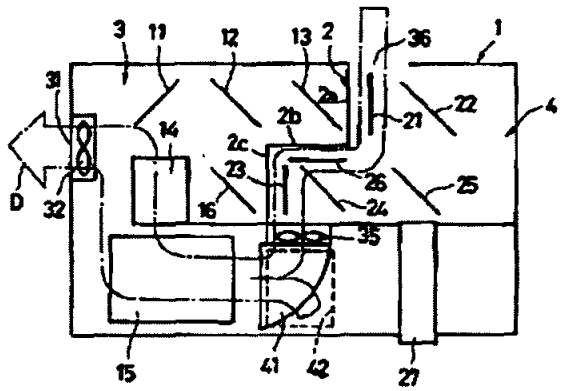
connecting said second cooling intake port and the air inlet" requires "structure that limits the direction of airflow between the intake port on the outer case and an opening leading to a ventilating path of the power unit *so as to form an airflow passage.*" There is no structure between intake port 42 and power supply 15 of Nakamura that forms an airflow passage. A1436-38 (Keller ¶¶ 45-54). Nor, as explained above, would it have been obvious to have inserted Gourdine's duct into Nakamura, as that would have substantially altered Nakamura's cooling system in unpredictable ways inconsistent with Nakamura's purposes.

d) Nakamura does not disclose a power unit with an air inlet, air outlet or inside

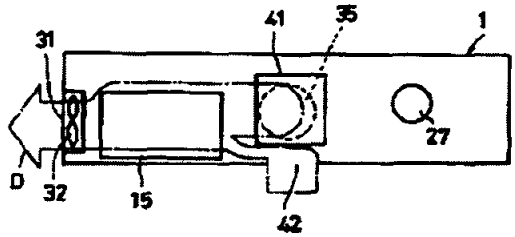
Claim 1 of the 158 patent requires a "power unit including a ventilating path provided inside the power unit for circulating cooling air" and an "air inlet provided on the power unit." Claim 5 similarly requires a "power unit including an air inlet and an air outlet." The district court, in ruling on Coretronic's first summary judgment motion, found the power supply inherently to have an air inlet and outlet (and implicitly also an "inside"): "Furthermore, an air inlet is inherently disclosed in Nakamura. . . . The passage of air through an ordinary physical object necessitates that some inlet and outlet be present. Because the air passes through the power unit, there is necessarily 'an air inlet provided on the power unit.'" A26 (12:7-11).

The district court's conclusion misread Nakamura, which does not disclose the specific structure of its power supply, and inappropriately resolved a genuine issue of material fact on summary judgment. It is apparent from Nakamura that neither an inlet nor an outlet is shown on power supply 15. Rather, power supply 15 is a featureless rectangular box (a parallelepiped). Moreover, one of ordinary skill in the art would not have understood Nakamura as disclosing a specific structure, because Nakamura makes clear that Figures 2 and 3 are only schematic in nature: "Figures 2 and 3 show the schematic structure of a liquid crystal projector in another embodiment of this device." A1279 (¶ 12). As both parties' experts agree, a schematic drawing is one that shows the functional features of a system, as opposed to the physical structure of the system. A1434 (Keller ¶¶ 38-39); 1458-64; A1409 (Biber 13:17-14:2, 14:23-15:11).

The schematic nature of Figures 2 and 3 of Nakamura is further shown by their unrealistic depiction of airflows. For example, airflow through duct 41 is inconsistently shown between Figure 2, which shows the airflow only flowing through half of fan 35, and Figure 3, which shows the airflow as flowing through nearly the entire fan. A1434-35 (Keller ¶ 40); A1410 (Biber 18:6-16). Likewise, airflow through liquid crystal display panel chamber 4 is shown as passing through a solid object (mirror 24) and making right angle turns without any structure that could produce such turns. A1434-35 (Keller ¶ 40); A1409 (Biber 15:12-16:1). As



Nakamura, Figure 2



Nakamura, Figure 3

Coretronic's expert, Dr. Biber, testified, one cannot tell what aspects of Nakamura's airflows are realistic merely from reviewing Nakamura's drawings. A1410 (Biber 18:17-22). Thus, determining what is "inherent" in Nakamura's schematic disclosure is not an issue that can be resolved without expert testimony. *See* A1410 (Biber 18:17-19 ("I think it takes experience.")); *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1240 n.5 (Fed. Cir. 2010). Summary judgment was thus improperly granted here, where SEC's expert, Mr. Keller, testified as to why the claimed features of the power unit are not inherent in Nakamura. A1432-36 (Keller ¶¶ 30-44); *Hodosh*, *supra.*

It is also significant that Nakamura does not describe the airflow as passing through power supply 15, but through its "vicinity": "[T]his is constituted, *as*

shown in Figures 2 and 3, so that air from the air intake port 42 is drawn, together with air drawn from the second cooling fan 35 into the duct 41, into the light source chamber 3 by operation of the first cooling fan 32, *said drawn air passes through the vicinity of each of the power supply 15 and the light source 14, cooling them*, after which, it is exhausted from the exhaust port 31 to the outside." A1279 (¶ 13 (emphasis added)). "Vicinity" means a "nearby, surrounding, or adjoining region; a neighborhood." A1456. Thus, Nakamura's description of the airflow as passing "through the vicinity of . . . the power supply 15" further demonstrates that Nakamura does not expressly or inherently disclose airflow passing through power supply 15, as Coretronic's expert confirmed. A1410 (Biber 19:20-25).[4]

Furthermore, even if one accepted the district court's premise that a comparison of Figures 2 and 3 shows air passing through power supply 15, that does not mean that the power supply inherently has an air inlet, an air outlet or an inside. An "inlet" is "an opening providing a means of entrance." A1455. For a power supply to have either an inlet or an outlet, it must have structure creating an opening near the perimeter of the power supply. Prior to Nakamura and the 158

[4]The district court misunderstood Nakamura's text as not relating to the Figures 2 and 3 embodiment, stating: "While some of the language in the patent discloses a more general concept of 'traveling in the vicinity of' the power supply, Figures 2 and 3 clearly disclose a specific embodiment in which the air travels through the power unit." A25 (11:17-19). However, the above quoted language from Nakamura referring to airflow *passing through the vicinity of the power supply 15* clearly refers to Figures 2 and 3 and not some other embodiment.

patent priority date, "open-frame" power supplies were available that had no cover or enclosure and no structure forming an "inlet" or "outlet," examples of which are shown in Mr. Keller's declaration. A1433 (Keller ¶¶ 35-36). Accordingly, the schematic disclosure of a power supply in the "vicinity" of a schematic airflow cannot be treated as inherently disclosing any specific structure for that power supply.

Thus, one of ordinary skill in the art would not have understood Nakamura as disclosing a power supply air inlet, a power supply air outlet, or a ventilating path inside a power supply, within the meaning of the 158 patent. The district court's ruling that those features were inherent was a means to its end of patent invalidation, rather than a determination based on the evidence.

VII. CONCLUSION

For the foregoing reasons, this Court should reverse the district court's summary judgment of invalidity of the 158 patent, and remand the case to the district court.

Dated: February 11, 2011

Respectfully submitted,

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ADDENDUM

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SEIKO EPSON CORPORATION,

Plaintiff,

v.

CORETRONIC CORPORATION and OPTOMA TECHNOLOGY INC.,

Defendants.
_____/

No. C 06-6946 MHP

JUDGMENT
(Fed.R.Civ.P. 58)

This action having come before this court, the Honorable Marilyn Hall Patel, United States District Judge presiding, and the issues having been duly presented and an order having been duly filed May 15, 2009, declaring United States Patent Numbers 6,527,392 ("the '392 patent") and 6,742,899 ("the '899 patent") invalid on grounds of obviousness and an order having been duly filed November 23, 2010, declaring United States Patent Number 6,203,158 ("the '158 patent") invalid on the grounds of obviousness, and a request for entry of judgment under Federal Civil Rule 58(d) having been filed stating that the above orders resolve all claims and issues pending in this case and the court so finding; and, there being no just reason for delay,

IT IS ORDERED AND ADJUDGED that defendant/counter-claimant CORETRONIC CORPORATION and OPTOMA TECHNOLOGY, INC.s' motions for summary judgment to invalidate claims 1, 3, 4, 7, 9 and 10 of the '392 patent and to invalidate claims 1, 2 and 5 of the '158

patent are GRANTED and the action of plaintiff/counter-defendant SEIKO EPSON CORPORATION is DISMISSED in its entirety.

IT IS FURTHER ORDERED AND ADJUDGED that plaintiff/counter-defendant SEIKO EPSON CORPORATION's motion for summary judgment to invalidate claims 1, 2, 3, 7, 9 and 11 of the '899 patent is GRANTED and the counterclaim of CORETRONIC CORPORATION and OPTOMA TECHNOLOGY, INC. for infringement of the '899 patent is DISMISSED in its entirety..

DATED: January 5, 2011

MARILYN HALL PATEL
Judge
United States District Court
Northern District of California

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA

SEIKO EPSON CORPORATION

Plaintiff,

v.

CORETRONIC CORPORATION and OPTOMA TECHNOLOGY, INC.

Defendants,

/

No. C 06-6946 MHP

MEMORANDUM & ORDER

Re: Defendants' Renewed Motion for Summary Judgment of Invalidity & Plaintiff's Motion to Strike

Plaintiff Seiko Epson Corporation brought this action against defendants Coretronic Corporation and Optoma Technology, Inc., alleging infringement of several United States patents. On May 15, 2009, the court granted defendants' motion for summary judgment, invalidating several claims of U.S. Patent No. 6,203,158 ("the '158 patent") and U.S. Patent No. 6,527,392 ("the '392 patent"), both owned by plaintiff. The United States Court of Appeals for the Federal Circuit vacated the court's judgment of invalidity as to the '158 patent and remanded for further proceedings. *Seiko Epson Corp. v. Coretronic Corp.*, 376 Fed. Appx. 23 (Fed. Cir. 2010). Now before the court is (1) defendants' renewed motion for summary judgment of invalidity as to claims 1, 2 and 5 of the '158 patent on the grounds of obviousness and (2) plaintiff's motion to strike defendants' revised final invalidity contentions and corresponding portions of defendants' summary judgment brief. Having considered the parties' arguments and submissions, and for the reasons set forth below, the court enters the following order.

BACKGROUND

The patent at issue concerns projectors. Projectors may use a high-brightness light source inside a casing to generate light. The light is modulated to create images. High-brightness light sources generate significant amounts of heat. Plaintiff's '158 patent claims improvements to projector designs that increase the effectiveness of projector cooling. The '158 patent was filed on July 29, 1999, as a continuation of U.S. Patent Application 08/943,730, filed on October 3, 1997. *See* Docket No. 402 (Biber Dec.), Exh. B. The '158 patent issued on March 20, 2001. *See id.* It "describes a projector that conducts air from outside the projector directly through the power unit in order to cool it more effectively." *Seiko Epson*, 376 Fed. Appx. at 24.

The asserted claims are claims 1, 2 and 5. Coretronic moves for summary judgment of invalidity on each of these claims. Claims 1 and 5 are independent claims. Claim 1 reads as follows:

> 1. A projector, comprising:
>
> an optical unit including a light source lamp and a projection lens, the optical unit forming an optical image in response to image information by optically treating light beams emitted from the light source lamp and expansively projecting the optical image through the projection lens;
>
> a power unit including a ventilating path provided inside the power unit for circulating air;
>
> an outer case that stores the optical unit and the power unit;
>
> a first cooling air intake port located on the outer case that provides cooling air from outside of the outer case to the optical unit; and
>
> a second cooling air intake port located on the outer case that directly conducts cooling air from the outside of the outer case to the ventilating path, said second cooling air intake port comprising:
>
> an inlet provided on the power unit, and
>
> a duct connecting said second cooling air intake port and the air inlet.

'158 patent at 15:25-47. Independent claim 5 reads as follows:

> 5. A projector, comprising:
>
> an optical unit including a light source lamp and a projection lens, the optical unit forming an optical image in response to image information by optically treating light

> beams emitted from the light source lamp and expansively projecting the optical image through the projection lens;
>
> a power unit including an air inlet and an air outlet;
>
> an outer case that stores the optical unit and the power unit;
>
> a first cooling air intake port located on the outer case that provides cooling air from outside of the outer case to the optical unit;
>
> a second cooling air intake port located on the outer case that directly conducts cooling air from the outside of the outer case to the air inlet; and
>
> an exhaust vent provided on the outer case that directly conducts air exhausted from the air outlet to the outside of the outer case.

Id. at 16:10-31. In its May 16, 2008 claim construction order, the court construed the phrase "directly conducts cooling air" to mean "transmits cooling air without [increasing] its temperature to that of the air inside the outer casing of the projector." *See* Docket No. 183 at 24. The court modified plaintiff's proposal that the phrase mean "transmits cooling air without substantial contamination by internal sources of heat," because the patent's advance over the prior art was to cool the power supply with fresh air that is cooler than the air in the outer case of the projector, and plaintiff's construction was not limited to the air's temperature. *Id.* at 19.

On May 15, 2009, the court granted Coretronic's motion for summary judgment of invalidity regarding the '158 patent. Docket No. 373. It found that a prior art Japanese patent application, "Nakamura," disclosed each and every limitation of claims 1 and 2 of the '158 patent. Nakamura teaches a projector design with an embodiment containing two separate air inlets and one exhaust vent. Air from the first inlet passes through several projector components before combining with fresh air pulled in through the second inlet and cooling the power supply. *Id.* at 10. The court also held that claim 5 was obvious as a matter of law in light of Nakamura. Although Nakamura arguably lacked an "exhaust vent provided on the outside case that directly conducts air exhausted from the air outlet [of the power supply] to the outside of the outer case," the court determined that "there are a limited number of components requiring cooling inside a projector casing, and such a casing can contain only so many prior art passageways." *Id.* at 16.

On appeal, the Federal Circuit disagreed with the court's construction of the phrase "directly conducts cooling air" and agreed with plaintiff that "air from outside of the case must be conducted directly to the power unit without substantial contamination by the air inside the case." 376 Fed. Appx. at 24-25. "Cooling air" does not refer to any form of air that is cooler than the air in the outer case but more specifically to "fresh air" brought in from the exterior of the projector case. *Id.* at 25. The Federal Circuit further held that Nakamura failed to satisfy this narrow construction:

> Although Nakamura teaches a second air intake port located in the vicinity of the power unit, it does not provide an uninterrupted path from that port to the power unit. Instead, the figures in the Nakamura reference indicate that the fresh air entering through the second air intake port mixes with ambient air from inside the case before reaching the power unit. Consequently, the fresh air entering through the second air intake port is not directly conducted to the power unit as required by the '158 patent.

Id. at 25. The court did not address any other aspects of the court's '158 ruling. The Federal Circuit vacated this court's judgment as to the '158 patent, but it did not "rule out the possibility that other prior art, standing alone or in combination with the Nakamura reference, might sustain the district court's finding of invalidity." *Id.*

On October 4, 2010, defendants filed a renewed motion for summary judgment of invalidity based upon the Federal Circuit's superseding claim construction. Defendants argue that claims 1, 2 and 5 are invalid as obvious over Nakamura, in combination with U.S. Patent No. 5,297,005 ("Gourdine"), or alternatively over U.S. Patent No. 4,243,307 ("Rizzuto"). Plaintiff filed a motion to strike defendants' revised final invalidity contentions and portions of defendants' summary judgment briefs referencing Rizzuto.

LEGAL STANDARD

I. Summary Judgment

Summary judgment may be granted only when, drawing all inferences and resolving all doubts in favor of the non-moving party, there are no genuine issues of material fact and the moving party is entitled to judgment as a matter of law. Fed. R. Civ. P. 56(c); *see generally Anderson v.*

Liberty Lobby, Inc., 477 U.S. 242, 247-255 (1986). A material fact is "genuine" if the evidence is such that a reasonable jury could return a verdict for the non-moving party. *Anderson*, 477 U.S. at 248. The moving party bears the burden of identifying those portions of the pleadings, discovery and affidavits that demonstrate the absence of a genuine issue of material fact. *Celotex Corp. v. Catrett*, 477 U.S. 317, 323 (1986). Once the moving party meets its initial burden, the non-moving party must go beyond the pleadings and, by its own affidavits or discovery, set forth specific facts showing that there is a genuine issue for trial. Fed R. Civ. P. 56(e); *see Anderson*, 477 U.S. at 250.

II. Non-Obviousness

35 U.S.C. section 103(a) requires that a patent be non-obvious:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Once the patent issues, each claim in an issued patent is presumed valid. 35 U.S.C. § 282. To prevail in invalidating a patent on the basis of obviousness, the moving party must prove obviousness by clear and convincing evidence. *Oakley, Inc. v. Sunglass Hut Int'l*, 316 F.3d 1331, 1339 (Fed. Cir. 2003).

The question of obviousness "is a question of law premised on underlying findings of fact." *Eolas Techs. Inc. v. Microsoft Corp.*, 399 F.3d 1325, 1332 (Fed. Cir. 2005) (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966)). These fact questions are: (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; (3) the level of ordinary skill in the art; and (4) secondary evidence of non-obviousness. *Graham*, 383 U.S. at 17-18; *see also KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The relevant question "is not whether the combination was obvious to the patentee but whether the combination was obvious to a person with ordinary skill in the art." *KSR*, 550 U.S. at 420.

The "combination of familiar elements according to known methods" is likely to be obvious when it "does no more than yield predictable results." *KSR*, 550 U.S. at 416. If an ordinarily skilled artisan can implement a predictable variation of a work available in the same field of endeavor or a

different one, section 103 likely bars patentability of the variation. *Id.* at 417. If, however, the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be non-obvious. *Id.* at 416. In assessing non-obviousness, hindsight bias and *ex post* reasoning are to be avoided. *Id.* at 421.

To determine the issue of non-obviousness, it will often be necessary for a court "to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art," in order to determine "whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue." *KSR*, 550 U.S. at 418. To facilitate review, the trial court's analysis should be made explicit. *Id.* However, the analysis "need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1262 (Fed. Cir. 2007) (quoting *KSR*, 550 U.S. at 418). "[T]he common sense of those skilled in the art demonstrates why some combinations would have been obvious where others would not." *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1161 (Fed. Cir. 2007).

"[I]n appropriate cases, the ultimate inference as to the existence of a motivation to combine references may boil down to a question of 'common sense,' appropriate for resolution on summary judgment." *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1240 (Fed. Cir. 2010). Summary judgment is appropriate where the content of the prior art, the scope of the patent claim and the level of ordinary skill in the art are not in material dispute. *KSR*, 550 U.S. at 427.

DISCUSSION

I. Nakamura in Combination with Gourdine

A. Claims 1 and 2

With the exception of the "directly conducts cooling air" element, the court has already found that Nakamura discloses every limitation of claim 1 of the '158 patent. The Federal Circuit

did not disturb these findings. Nevertheless, plaintiff again argues that Nakamura did not inherently disclose a ventilating path inside a power supply unit. Although plaintiff expands upon the argument it previously made before the court, *compare* Opp. at 10-13 *with* Docket No. 279 at 13-14, it has provided no compelling reason for the court to reconsider its earlier decision rejecting this argument. *See* Docket No. 373 at 10-11; *see also United States v. Alexander*, 106 F.3d 874, 876 (9th Cir. 1997) (stating that a court abuses its discretion in failing to apply law of the case doctrine unless "1) the first decision was clearly erroneous; 2) an intervening change in the law has occurred; 3) the evidence on remand is substantially different; 4) other changed circumstances exist; or 5) a manifest injustice would otherwise result").

The sole issue at this juncture is whether it would have been obvious to modify Nakamura by adding a dedicated cooling path between the outside of the projector case and the power supply housing. Defendants argue that Gourdine discloses this modification. Gourdine was filed on September 28, 1992 and issued on March 22, 1994 and is therefore prior art to the '158 patent. *See* Biber Decl. at Exh. E. Gourdine relates to an apparatus and method for cooling electronic heat generating components in a cabinet, specifically by isolating predetermined components and cooling those components through an independent secondary air flow. The primary airflow cools various non-isolated components in the cabinet and is then exhausted by an exhaust fan. The secondary airflow passes from the exterior of the cabinet, through a flexible conduit, and into a hollow housing for a heat-generating electrical component. The secondary airflow is then exhausted from the housing through another flexible conduit and the exhaust fan. Gourdine is directed to solving heat problems within personal computers, and the preferred embodiment describes isolating and cooling an Intel 80486 microprocessor chip. Unlike Nakamura, Gourdine describes that "the heat generated by the isolated components and non-isolated components is not mixed within the cabinet to maximize cooling of all components within the cabinet." *Id.* at 1:19-22.

Although Gourdine is directed to personal computers and the '158 patent is directed to projectors, there is no genuine dispute that Gourdine is analogous art to the '158 patent. Plaintiff's expert stated in his 2008 declaration that, "[t]here are similarities in the cooling issues in computers

and projectors, and the ways of addressing those issues," Docket No. 242 at ¶ 9, and at his 2010 deposition stated that "I still believe it is correct." Docket No. 410 (Huang Decl.), Exh. 6 (Keller Tr.) at 32:10. Plaintiff does argue, however, that a person of ordinary skill would not be motivated to combine Gourdine with Nakamura, because doing so would be inconsistent with the respective purposes of each invention and would yield unpredictable results. These arguments are meritless.

Plaintiff points out that the goal of Nakamura is to produce a projector that uses fewer intake and exhaust ports than the number of cooling fans used. *See* Biber Decl, Exh. D. The prior art projector addressed by Nakamura contained two exhaust ports, which imposed design restrictions, required installation in a location without obstructions next to each port, and created high fan noise levels. *Id.* Nakamura addressed each of these problems by providing a single exhaust port and using the same airflow to cool the power supply and the lamp. Plaintiff argues that isolating the power supply as taught by Gourdine would potentially undermine Nakamura's intended purpose in at least two ways: (1) the isolation of the secondary cooling path would result in the loss of some cooling air for the fan, requiring the use of a stronger, noisier exhaust fan or "other changes to the projector to compensate for the loss of cooling air," Docket No. 405 (Opp.) at 7; and (2) Gourdine discloses the use of an exhaust fan housing so as to provide sufficient vacuum for the secondary air path, thereby constraining design (i.e. a bulky housing requires a bigger projector) or requiring a noisier fan to maintain sufficient vacuum pressure. *Id.* at 7-8.

With regard to Gourdine, plaintiff points out that Gourdine is concerned particularly with the cooling of a microprocessor chip within a computer case, because that component is most sensitive to temperature issues and also generates the most heat. The power unit in the '158 patent, by contrast, is not the greatest heat producer in the projector (the liquid crystal display is) and plaintiff argues that a person of ordinary skill would apply Gourdine by isolating the liquid crystal display and/or the lamp, not the power supply. Additionally, plaintiff argues that isolating the power unit via the concepts taught by Gourdine would yield unpredictable results, because the disclosed Intel 80486 chip only generate 4.5 watts, far less than the 25 to 60 watts of waste heat estimated by plaintiff's expert. Opp. at 9; Keller Decl. ¶ 63.2. Plaintiff points out that defendants' expert

specifically testified that she might need to make the duct larger than in Gourdine to arrive at the optimal airflow.

Although plaintiff has provided examples of how a literal combination of Gourdine and Nakamura might not further the particular goals stated by each reference, neither reference "teaches away" from the combination. "A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant . . . A reference does not teach away, however, if it merely expresses a general preference for an alternative invention but does not 'criticize, discredit, or otherwise discourage' investigation into the invention claimed." *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009) (citations omitted). For example, in *DePuy Spine*, defendant argued that a patent was obvious over a combination of two prior art references, one of which disclosed the use of a rigid screw in a spinal surgical device. *Id.* at 1324-26. The other prior art reference, however, expressly warned that such a rigid screw would likely fall off within a human body, thereby discouraging the proffered prior art combination. *Id.* By contrast, there is nothing in Nakamura that discourages the use of a dedicated secondary cooling path for the power supply. Nakamura is simply directed at a different problem presented by the prior art projectors than the problem addressed by the '158 patent. *See KSR*, 550 U.S. at 420; *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1259 (Fed. Cir. 2007) ("In the context of *KSR*, the Asano teachings and its obvious variants were relevant prior art, even if that patent did address a different problem."). The '158 patent is aimed at more efficiently cooling a power supply in the midst of other heat-generating projector components, and Nakamura does not "criticize, discredit or otherwise discourage" looking to the teachings Gourdine to solve this problem.

Moreover, the fact that Gourdine describes isolating the hottest component with a dedicated cooling air path does not render it nonobvious to apply this cooling technique to another heat-generating component like a power supply. The problem addressed by the '158 patent is that the power supply in the prior art projectors was inefficiently cooled because the air had *already* passed

through and been warmed by other heat-generating components. Biber Decl., Exh. B. at 2:26-31. In other words, the problem articulated by the '158 patent was not that the hottest components were insufficiently cooled, but rather that the air was too warm after cooling those units to efficiently cool the power supply. Gourdine teaches a manner of increasing the flow of cool, fresh air to a predetermined component, and this need was presented by prior art projectors. Regarding the unpredictability of applying Gourdine to a component that generates more than the 4.5 watts of heat, the Gourdine specification envisions application of the invention to chips generating heat in the range of 15-30 watts, overlapping with plaintiff's heat-generating estimate for the projector power supply. Biber Exh. E at 1:38. Moreover, Gourdine does not limit its teachings to this range of heat generation.

Plaintiff's nonobviousness arguments too narrowly focus on what would result from a literal fusion of the preferred embodiments disclosed in Nakamura and Gourdine. It may be the case that isolating the secondary cooling path could potentially divert cooling air from the lamp described in Nakamura, or that the installation of an exhaust fan housing would add bulk to the projector, or that the increased heat from the power supply would require a duct larger than shown in Gourdine. The obviousness inquiry, however, looks more broadly at whether a projector designer of ordinary skill "facing the wide range of needs created by developments in the field of endeavor, would have seen a benefit" to installing a dedicated air path to better cool the power supply. *KSR*, 550 U.S. at 424. Gourdine's teaching that isolating a predetermined heat-generating component improves cooling of that component has obvious benefit for a projector designer looking to more efficiently cool the projector power supply. Some alterations might be necessitated in applying Gourdine's teachings to the projector disclosed by Nakamura, but "a person of ordinary skill often will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420. This court previously observed that "[s]eeking to increase the efficiency of cooling a power unit by arranging a prior art design with air ducts such that an air duct goes directly through the power unit is obvious under the 'obvious to try' rationale approved by the Supreme Court and the Federal Circuit." Docket No. 373 at 16 (citing *In re Kubin*, 561 F.3d 1351, 1359 (Fed. Cir. 2009)). Gourdine buttresses this

conclusion by demonstrating that directing a cooling air passageway through a dedicated housing unit is not merely "obvious to try," but also expressly disclosed in the prior art.

The court concludes, as a matter of law, that claim 1 and its dependent claim 2 are obvious in light of Nakamura and Gourdine.

B. Claim 5

Claim 5 differs from claim 1 in that claim 5's power unit includes "an air inlet and an air outlet" rather than a "ventilating path," and that claim 5's "second cooling air intake port" element recites only an air inlet and no ventilating path or duct. In its May 15, 2009 memorandum and order, the court concluded that these elements of claim 5 were present in Nakamura. Docket No. 373 at 13. The court did find that there was a genuine issue of material fact as to whether Nakamura disclosed the third element present only in claim 5, namely "an exhaust vent provided on the outer case that directly conducts air exhausted from the air outlet to the outside of the outer case." *Id.* Nonetheless, the court found claim 5 to be obvious in light of Nakamura, even though the prior art advanced by defendants did not disclose this final limitation. *Id.*

Although the Federal Circuit did not disturb this aspect of the court's earlier ruling, the court notes that its finding of obviousness with regard to claim 5 is further strengthened by the combination of Nakamura and Gourdine. Gourdine describes using a conduit to directly exhaust the secondary air flow to the exterior of the cabinet. As discussed above, it would be obvious to a person of ordinary skill to combine the teachings of Gourdine with the projector disclosed by Nakamura. Plaintiff proffers no argument why claim 5 should be treated differently than claim 1 in this regard, and the court similarly concludes that claim 5 is obvious as a matter of law.

III. Rizzuto/Motion to Strike

Because the court determines that claims 1, 2 and 5 are obvious in light of Nakamura and Gourdine, it need not address defendants' arguments regarding Rizzuto. Accordingly, it also need not address plaintiff's motion to strike defendants' revised invalidity contentions or the portions of their summary judgment briefs addressing Rizzuto.

CONCLUSION

For the reasons stated above, defendants' motion to invalidate claims 1, 2 and 5 of the '158 patent is GRANTED on the basis of obviousness.

IT IS SO ORDERED.

Dated: November 22, 2010

MARILYN HALL PATEL
United States District Court Judge
Northern District of California

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SEIKO EPSON CORPORATION,

Plaintiff/Counter-Defendant,

v.

CORETRONIC CORPORATION and OPTOMA TECHNOLOGY, INC.,

Defendants/Counter-Claimants.

No. C 06-06946 MHP

OPINION

Re: Cross-Motions for Summary Judgment of Invalidity

Plaintiff/counter-defendant Seiko Epson Corporation ("Seiko Epson") brought this action against defendant/counter-claimant Coretronic Corporation and Optoma Technology, Inc. (collectively "Coretronic"), alleging infringement of several United States patents, including U.S. Patent No. 6,203,158 ("the '158 patent") and U.S. Patent No. 6,527,392 ("the '392 patent"). Coretronic counterclaimed, alleging infringement of two United States patents, including U.S. Patent No. 6,742,899 ("the '899 patent"). Now before the court are the parties' cross-motions for summary judgment of invalidity of the '158, '392 and '899 patents. Having considered the parties' arguments and submissions, and for the reasons set forth below, the court enters the following order.

BACKGROUND

The patents-in-suit concern projectors. Projectors may use a high-brightness light source inside a casing to generate light. The light is modulated to create images. High-brightness light sources generate significant amounts of heat. Seiko Epson's '158 patent and Coretronic's '899

patent claim improvements to projector designs that increase the effectiveness of projector cooling. Seiko Epson's '392 patent addresses a different problem. It claims a design to ensure the proper alignment of a lamp with the surrounding projector structure so that the images are fully and uniformly illuminated.

I. Seiko Epson's '158 Patent

The '158 patent was filed on July 29, 1999, as a continuation of U.S. Patent Application 08/943,730, filed on October 3, 1997. See Docket No. 252 (Biber Dec.), Exh. B ("'158 Patent"). The '158 patent issued on March 20, 2001. See id. It describes a design for cooling a projector by using multiple fans and ventilating paths. The specification teaches a design in which external air moves straight into and through the projector's power unit. The other heat-producing components of the projector are cooled via a separate air intake and ventilation path. The power unit is, therefore, cooled by air drawn immediately from the ambient air, rather than air that has already passed near other heat-producing components and thereby retained heat. The design purports to enhance the efficiency of cooling of the power unit.

The asserted claims are claims 1, 2 and 5. Coretronic moves for summary judgment of invalidity on each of these claims. Claims 1 and 5 are independent claims. Claim 1 reads as follows:

> 1. A projector, comprising:
>
> an optical unit including a light source lamp and a projection lens, the optical unit forming an optical image in response to image information by optically treating light beams emitted from the light source lamp and expansively projecting the optical image through the projection lens;
>
> a power unit including a ventilating path provided inside the power unit for circulating air;
>
> an outer case that stores the optical unit and the power unit;
>
> a first cooling air intake port located on the outer case that provides cooling air from outside of the outer case to the optical unit; and
>
> a second cooling air intake port located on the outer case that directly conducts cooling air from the outside of the outer case to the ventilating path, said second

cooling air intake port comprising:

an inlet provided on the power unit, and

a duct connecting said second cooling air intake port and the air inlet.

Id. at 15:25-47. Independent claim 5 reads as follows:

5. A projector, comprising:

an optical unit including a light source lamp and a projection lens, the optical unit forming an optical image in response to image information by optically treating light beams emitted from the light source lamp and expansively projecting the optical image through the projection lens;

a power unit including an air inlet and an air outlet;

an outer case that stores the optical unit and the power unit;

a first cooling air intake port located on the outer case that provides cooling air from outside of the outer case to the optical unit;

a second cooling air intake port located on the outer case that directly conducts cooling air from the outside of the outer case to the air inlet; and

an exhaust vent provided on the outer case that directly conducts air exhausted from the air outlet to the outside of the outer case.

Id. at 16:10-31.

Coretronic asserts that the '158 patent is anticipated by both the D-400 projector manufactured by nVIEW ("the D-400") and Japanese Patent Application No. 4-271334 ("Nakamura"). See Baily Dec. (discussing the D-400); Biber Dec., Exh. D ("Nakamura").[1] The D-400 is a projector, and Nakamura is a patent on a design for cooling a liquid crystal projector that includes multiple fans and air ducts for cooling the projector's power unit and other components. Nakamura was published on September 28, 1992, before the critical date of the '158 patent. See id.

II. Seiko Epson's '392 Patent

The '392 patent was filed on February 25, 1999, and it issued on March 4, 2003. See Docket No. 251 (Payne Dec.), Exh. B ("'392 Patent"). It describes a design for the mounting of a lamp within a lamp housing in such a way as to properly align the lamp. The lamp itself comprises a "light source lamp" such as a lightbulb and the larger conical reflector in which the light source

lamp is mounted. The patent specification describes the manufacturing of the lamp's exterior such that the bottom and the side of the lamp are flat and fit flush against the bottom and side of the lamp housing which surrounds the lamp. In a preferred embodiment, a firm wireform-type spring presses the lamp down and sideways, as well as forward, against the lamp housing. In short, the spring holds the lamp in place by pressing it against the surfaces on the lamp housing.

The asserted claims are claims 1, 3, 4, 7, 9 and 10. Coretronic moves for summary judgment of invalidity on each of these claims. Claim 1 is the only independent claim asserted, and it reads as follows:

> 1. A light source lamp unit, comprising:
>
> a light source lamp;
>
> a reflector that reflects light emitted from the light source lamp, the light source lamp being attached to the reflector, the reflector having a main body that reflects light, the main body having and opening on a light-emitting side through which reflected light is transmitted, an outer surface of the light-emitting side of the reflector including a first alignment reference surface that extends in a first direction and a second alignment reference surface that extends in a second direction perpendicular to the first direction;
>
> a lamp housing to which the reflector is mounted, the lamp housing including a first surface extending in the first direction and a second surface extending in the second direction; and
>
> a spring that presses the reflector against the lamp housing so that the first alignment reference surface engages the first surface and the second alignment reference surface engages the second surface.

Id. at 10:15-35.

Coretronic asserts that two pieces of prior art, Seiko Epson's ELP-5000XB projector and U.S. Patent No. 4,660,128 ("Bergin"), each anticipate the '392 patent or render the '392 patent obvious. The ELP-5000X is a projection device containing a lamp, lamp housing and wireform spring. It was on sale in the United States before February 25, 1998, the critical date for the '392 patent. See Huang Dec., Exh. A (Responses to Requests for Admission (RFAs) Nos. 15-17). Bergin describes a motor vehicle lighting assembly. Bergin issued on April 21, 1987, before the '392 critical date. See Payne Dec., Exh. G.

III. Coretronic's '899 Patent

The '899 patent was filed on April 14, 2003, and it issued on June 1, 2004. See Docket No. 242 (Keller Dec.), Exh. 2 ("'899 Patent"). It describes a design for the cooling of a lamp holder located inside a lamp casing. The specification describes a cooling system in which air is moved through ducts located above and below the lamp holder. By moving air through the ducts, the design allows air which has been heated by contact with the lamp holder to exit the projector, rather than to convect heat from the lamp holder to the outer casing.

The asserted claims are claims 1, 2, 3, 7, 9 and 11. Seiko Epson moves for summary judgment of invalidity on each of these claims. The only independent claim is claim 1, which reads as follows:

> 1. A cooling apparatus for projector casing, comprising:
>
> a casing having an interior;
>
> a lamp holder fixed in the interior of the casing, and having at least one guiding surface on the side near the lower edge of the lamp holder;
>
> a ventilation outlet disposed on the casing and proximate the side of the lamp holder;
>
> an upper sheet disposed at the top of the lamp holder and keeping a distance from the casing to define an upper air duct;
>
> a lower sheet disposed at the bottom of the lamp holder and keeping a distance from the casing to define a lower air duct; and
>
> a fan disposed adjacent to the lamp holder.

Id. at 4:12-26.

Seiko Epson asserts that three separate pieces of prior art each anticipate the '899 patent: the Optoma EzPro 730 projector; the Epson ELP-3000 projector;[2] and Japanese Patent Publication No. 2000-36215 ("Koba"). Additionally, Seiko Epson asserts that the combination of Japanese Patent Publication Nos. 2000-330206 ("Miyashita") and 2002-49098 ("Kobayashi") renders the '899 claims at issue obvious.

Miyashita describes a system that cools a projector in part by moving air through the spaces between an inner and outer casing. See Utermohlen Dec., Exh. 2. Miyashita was published on

November 30, 2000, before the '899 patent critical date of April 14, 2002. See id., Exh. 4 (RFA No. 174). Kobayashi describes a lamp holder for a projector that includes a guiding surface for guiding air beneath the lamp holder. See id., Exh. 3. Kobayashi was published on February 15, 2002, before the '899 patent's critical date. See id.

IV. Relevant Procedural History

On November 6, 2006, Seiko Epson brought this action against Coretronic. Coretronic answered and counterclaimed on November 27, 2006. On March 21, 2007, Coretronic amended its answer and counterclaims, alleging, *inter alia*, infringement of the '899 patent. On May 16, 2008, the court entered a claim construction memorandum and order. The parties filed the instant cross-motions for summary judgment on September 28, 2008. Oral argument was heard on January 22, 2009.

LEGAL STANDARD

I. Summary Judgment

Summary judgment may be granted only when, drawing all inferences and resolving all doubts in favor of the non-moving party, there are no genuine issues of material fact and the moving party is entitled to judgment as a matter of law. Fed. R. Civ. P. 56(c); see generally Anderson v. Liberty Lobby, Inc., 477 U.S. 242, 247-255 (1986). A material fact is "genuine" if the evidence is such that a reasonable jury could return a verdict for the non-moving party. Anderson at 248. The moving party bears the burden of identifying those portions of the pleadings, discovery and affidavits that demonstrate the absence of a genuine issue of material fact. Celotex Corp. v. Catrett, 477 U.S. 317, 323 (1986). Once the moving party meets its initial burden, the non-moving party must go beyond the pleadings and, by its own affidavits or discovery, set forth specific facts showing that there is a genuine issue for trial. Fed R. Civ. P. 56(e); see Anderson at 250.

II. Novelty

Novelty of a claimed invention is an explicit condition for patentability. 35 U.S.C. § 102; Aristocrat Tech. Australia Pty., Ltd. v. Int'l Game Tech., 543 F.3d 657, 660-61 (Fed. Cir. 2008). Section 102(b) provides that a patent claim is invalid if the patented invention is "described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States." 35 U.S.C. § 102(b); see Schering Corp. v. Geneva Pharm., Inc., 339 F.3d 1373, 1377 (Fed. Cir. 2003). A patent claim is invalid based on anticipation if "the four corners of a single, prior art document describe every element of the claimed invention." Advanced Display Sys., Inc. v. Kent State Univ., 212 F.3d 1272, 1282 (Fed. Cir. 2000). Furthermore, such disclosure must be "enabling" in that it must be sufficient to permit a person having ordinary skill in the art to practice the invention. SmithKline Beecham Corp. v. Apotex Corp., 403 F.3d 1331, 1342 (Fed. Cir. 2005). A patent is presumed valid, and the party asserting the affirmative defense of anticipation must prove the facts to establish invalidity of each claim by clear and convincing evidence. 35 U.S.C. § 282; Praxair, Inc. v. ATMI, Inc., 543 F.3d 1306, 1327 (Fed. Cir. 2008). "While anticipation is a question of fact, it may be decided on summary judgment if the record reveals no genuine dispute of material fact." Leggett & Platt, Inc. v. VUTEk, Inc., 537 F.3d 1349, 1352 (Fed. Cir. 2008) (citation and internal quotations omitted).

III. Non-Obviousness

35 U.S.C. section 103(a) requires that a patent be non-obvious:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Once the patent issues, each claim in an issued patent is presumed valid. 35 U.S.C. § 282. As with anticipation, to prevail in invalidating a patent on the basis of obviousness, the moving party must

prove obviousness by clear and convincing evidence. Oakley, Inc. v. Sunglass Hut Int'l, 316 F.3d 1331, 1339 (Fed. Cir. 2003).

The question of obviousness "is a question of law premised on underlying findings of fact." Eolas Techs. Inc. v. Microsoft Corp., 399 F.3d 1325, 1332 (Fed. Cir. 2005), citing Graham v. John Deere Co., 383 U.S. 1, 17-18 (1966). These fact questions are: (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; (3) the level of ordinary skill in the art; and (4) secondary evidence of non-obviousness. Graham, 383 U.S. at 17-18; see also KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 406 (2007). The relevant question "is not whether the combination was obvious to the patentee but whether the combination was obvious to a person with ordinary skill in the art." KSR, 550 U.S. at 420.

The "combination of familiar elements according to known methods" is likely to be obvious when it "does no more than yield predictable results." KSR, 550 U.S. at 416. If an ordinarily skilled artisan can implement a predictable variation of a work available in the same field of endeavor or a different one, section 103 likely bars patentability of the variation. Id. at 417. If, however, the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be non-obvious. Id. at 416. In assessing non-obviousness, hindsight bias and *ex post* reasoning are to be avoided. Id. at 421; see also Sanofi-Synthelabo v. Apotex, Inc., 550 F.3d 1075, 1088 (Fed. Cir. 2008) (holding selection and undertaking of the arduous separation of a particular racemate could be judged obvious only with hindsight knowledge that a dextrorotatory enantiomer has certain desirable properties) .

To determine the issue of non-obviousness, it will often be necessary for a court "to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art," in order to determine "whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue." KSR at 418. To facilitate review, the trial court's analysis should be made explicit. Id. However, the analysis "need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account

of the inferences and creative steps that a person of ordinary skill in the art would employ." In re Translogic Tech., Inc., 504 F.3d 1249, 1262 (Fed. Cir. 2007), quoting KSR at 418. "[T]he common sense of those skilled in the art demonstrates why some combinations would have been obvious where others would not." Leapfrog Enters., Inc. v. Fisher-Price, Inc., 485 F.3d 1157, 1161 (Fed. Cir. 2007).

Summary judgment is appropriate where the content of the prior art, the scope of the patent claim and the level of ordinary skill in the art are not in material dispute. KSR at 427.

DISCUSSION

I. Seiko Epson's '158 Patent

Coretronic contends that the asserted claims of the '158 patent are anticipated by, or obvious in light of, the D-400 and Nakamura. Seiko Epson has asserted two independent claims, claims 1 and 5, and a dependent claim, claim 2.

A. Prior Art Status of the D-400

Seiko Epson challenges the prior art status of the D-400. Coretronic's expert has examined and opined upon a D-400 projector manufactured after the critical date of the '158 patent, but Coretronic has been unable to produce a D-400 that was on sale before the critical date. Coretronic therefore seeks to establish that the D-400 examined by its expert is identical to those marketed in the mid-1990s—before the critical date. To establish such identity, Coretronic relies upon the testimony of one individual, N. Wayne Bailey, a former sales officer for nVIEW, the company that marketed the D-400. The parties expend not inconsiderable effort in arguing over the appropriate standard for invalidating a patent on the basis of oral testimony. Hearkening back to the Barbed Wire Patent Case, 143 U.S. 275 (1892), Seiko Epson asserts that corroboration is required of any witness whose testimony alone is asserted to invalidate a patent. See also Finnigan Corp. v. Int'l Trade Comm'n, 180 F.3d 1354, 1369 (Fed. Cir. 1999). For its part, Coretronic accuses Seiko Epson of misstating the corroboration standard, arguing that the question is whether Bailey's testimony is

"clear and satisfactory" in light of a multi-factor "rule of reason" test. See Eibel Process Co. v. Minnesota & Ontario Paper Co., 261 U.S. 45, 60 (1923); Price v. Symsek, 988 F.2d 1187, 1195 (Fed. Cir. 1993).

It is unlikely that Bailey's declaration would suffice under either standard. In any event, deciding the status of the D-400 for the purposes of this motion does not call for reliance upon a special corroboration standard. On summary judgment, Coretronic's burden is at least to show by clear and convincing evidence that there is no genuine issue of material fact regarding the D-400's status as prior art. Bailey is not held out to be an engineer or to have been involved in the design of the D-400.[3] He provides no technical documents supporting his assertions. He is but one witness. The fact that he looked at the interiors of D-400s does not necessarily mean that he understood the technical details of the D-400 or that his memory is sufficiently reliable after more than a decade. Bailey's testimony, standing alone, is insufficient to prove the equivalence of the D-400 produced in 2008 to the D-400 models observed in the mid-1990s for the purposes of summary judgment. Accordingly, the D-400 is disregarded.

B. Nakamura and Anticipation of Claims 1 and 2

The Nakamura patent application was published in 1992, and there is no dispute as to its status as prior art. Nakamura, which is not listed as a reference on the face of the '158 patent, teaches a projector design with an embodiment containing two separate air inlets and one exhaust vent. Air drawn into the projector through the first air inlet passes through several projector components before traveling "through the vicinity" of the power supply. Before this air reaches the power supply, however, it is joined by air pulled into the projector from outside the projector through a second air inlet. The power supply is then cooled by the combined air from both inlets. Upon passing out of the vicinity of the power supply, at least some of the air passes over or near a light source before exiting the projector through the exhaust vent. The air is moved via the use of two fans.

Claim 1 of the '158 patent requires an optical unit, which Nakamura undisputedly possesses. Claim 1 also has the limitation of a power unit with a "ventilating path provided inside the power unit for circulating cooling air." '158 Patent at 15:33-34. The court ruled in its claim construction order that this limitation is to be construed as "a route in the power unit along which at least some fresh air moves while cooling the power unit, the power unit being a portion of the projector that comprises components that convert and regulate electrical power for use in the projector." Docket No. 183 ("Claim Const. Order") at 24. Nakamura unambiguously discloses a path circulating cooling air through the power unit. See Nakamura at 2 & 10, Figures 2 & 3. Seiko Epson is incorrect in its assertion that the airflow shown in Figures 2 and 3 of Nakamura could just as easily be flowing around the power unit as through it. The patent describes Figures 2 and 3 as different views of the same embodiment. See id. at 8 (¶ 12). Figure 2, a view from above, shows the air path going through the power unit, not around it. Figure 3, a view from the side, shows the air path going both above and through the power unit, not only above or below it. Viewed together, these two schematics of one embodiment show that some or most of the air path is traveling through the power unit, not simply around it. Nothing in the claim language or claim construction suggests that a ventilating path cannot be "inside" a power unit merely because some air passes over or around the unit as well. While some of the language in the patent discloses a more general concept of "traveling in the vicinity of" the power supply, Figures 2 and 3 clearly disclose a specific embodiment in which the air travels through the power unit.

There is no dispute that Nakamura has "an outer case that stores the optical unit and power unit." '158 Patent at 15:35-36. It also plainly has "a first cooling intake port on the outer case that provides cooling air from outside the outer case to the optical unit." Id. at 15:37-39. Furthermore, Nakamura has a second intake port. This intake port "directly conducts cooling air from the outside of the outer case to the ventilation path." Figures 2 and 3 make it plain that the air brought in through the second intake port travels immediately into the power unit. Seiko Epson's suggestion that the air entering from the lower duct, after mixing with the warmer air, might be no cooler than the ambient air, is misplaced. The issue is not whether the air mixture is cooler than the ambient air

(the air outside the outer casing); rather, the question is whether it is cooler than the air *inside* the outer casing of the projector. See Claim Const. Order at 24.[4] Since the air already inside the projector is ambient air that has been heated by the process of cooling projector components, any air being brought in from the outside via a second intake port will lower the temperature of the air mixture. Accordingly, it is "cooling air." See '158 Patent at 15:4-7 ("Direct introduction of fresh air into the ventilating path permits cooling of the interior of the power unit by fresh air, which is cooler than the air in the outer case . . . ."). Furthermore, an air inlet is inherently disclosed in Nakamura. See Finnigan, 180 F.3d at 1365 (holding that an inherent characteristic must necessarily be present, and so recognized by persons of ordinary skill, in the thing described in the reference). The passage of air through an ordinary physical object necessitates that some inlet and outlet be present. Because the air passes through the power unit, there is necessarily "an air inlet provided on the power unit." See '158 Patent at 15:44.[5] Finally, there is a "duct connecting said second cooling air intake port and the air outlet." Id. at 15:46-47. That phrase has been construed to mean a "structure that limits the direction of airflow between the intake port on the outer case and an opening leading to a ventilating path of the power unit so as to form an airflow passage." Claim Const. Order at 24. In Nakamura, the airflow is limited by the outer case's structure and duct 41. Nakamura at 8 & 10. These structures limit the direction of the airflow, directing it toward the power unit. As such, there is a duct.

In sum, Nakamura reads onto each and every limitation of claim 1. Accordingly, claim 1 and its dependent claim 2, which merely recites a ventilating fan, are invalid.

C. Nakamura and Obviousness of Claim 5

Claim 5's limitations are identical to those of claim 1, with three exceptions. Firstly, claim 5's power unit includes "an air inlet and an air outlet" rather than a "ventilating path." As noted above, Nakamura discloses air moving through a power unit; therefore, an inlet and outlet for air are inherently disclosed. Secondly, claim 5 also differs from claim 1 in that the "second cooling air intake port" element recites only an air inlet and no ventilating path or duct. As discussed,

Nakamura discloses an air inlet on a power unit. Finally, claim 5 claims a final element not recited in claim 1: "an exhaust vent provided on the outer case that directly conducts air exhausted from the air outlet to the outside of the outer case." There is no material dispute that Nakamura discloses an exhaust vent on the outer case or that the vent exhausts air from the power unit (and its inherent air outlet). There is a genuine issue of material fact, however, whether Nakamura's exhaust vent "directly" conducts air out of the projector.[6] Thus Nakamura—the only reference advanced by Coretronic which is clearly prior art—does not disclose as a matter of law the final limitation of claim 5 and does not anticipate the claim.

Must Coretronic's motion for summary judgment of obviousness of claim 5 therefore necessarily also fail? Perhaps conflating novelty and non-obviousness analysis, it is sometimes stated that, for a claim to be held obvious, each and every claim limitation must be identified in the prior art. A recent post-KSR case took up this issue. The district court in Abbot Labs. v. Sandoz, Inc., 500 F. Supp. 2d 846 (N.D. Ill. 2007), wrote:

> Prior to the issuance of the KSR opinion, Federal Circuit precedent taught that all the claim limitations of the invention at issue must be found to exist in the prior art references before it could be determined whether there was a teaching, motivation, or suggestion to combine those limitations. The KSR opinion only focused on the Federal Circuit's strict use of the TSM test in performing the obviousness analysis; it did not mention or affect the requirement that each and every claim limitation be found present in the combination of the prior art references before the analysis proceeds.

Id. at 851-852 (internal citations omitted). That court denied an accused infringer of a pharmaceutical patent a stay of injunction pending appeal, finding, *inter alia*, no substantial question of obviousness. Id. at 853.

The district court in Abbot Labs. relied on three pre-KSR cases to support its contention that some version of an "each and every limitation" requirement for obviousness was established in Federal Circuit precedent prior to KSR. The first such case, Velander v. Garner, 348 F.3d 1359 (Fed. Cir. 2003), affirmed a Board of Patent Appeals and Interferences decision that a patent application in the field of bioengineering was obvious. The court noted in dicta, "If all the elements of an invention are found in a combination of prior art references, a proper analysis under § 103

requires, *inter alia*, consideration of two factors . . . ." Id. at 1363. In that case, all of the claim limitations had been identified in the prior art, and the question of whether each and every element must exist in prior art references was neither presented nor decided. The second case relied upon by the district court in Abbot Labs. is U.S. Surgical Corp. v. Ethicon, Inc., 103 F.3d 1554 (Fed. Cir. 1997). In that case, the court affirmed entry of judgment in favor of the accused infringer on the basis of patent invalidity due to obviousness. The court simply noted that the jury instruction used by the trial court included an instruction that "the prior art must show not only all of the elements of the claimed combination, but must contain some [teaching, etc.] to combine . . . ." Id. at 1564. The Court of Appeals found no error with the jury's finding of obviousness under such an instruction. The question of whether the instruction stated too rigid a standard was not at issue. Finally, the district court in Abbot Labs. relied upon Dystar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co., 464 F.3d 1356 (Fed. Cir. 2006). Like Velander and U.S. Surgical Corp., the Dystar case affirmed a finding of obviousness. Focusing on the teaching-suggestion-motivation test, that opinion stated "Where, as here, all claim limitations are found in a number of prior art references, the factfinder must determine what the prior art teaches, whether it teaches away from the claimed invention, and whether it motivates a combination of teachings from different references." Id. at 1360 (citation and internal quotations omitted). Like the other cases, the rule as stated allows a finding of obviousness to be made through a combination of all prior art references and some teaching, suggestion, or motivation to combine; however, neither the holding nor the dicta supports the conclusion that a rigid "each and every limitation" rule stands as a requirement for any finding of obviousness.[7]

The Abbot Labs. case was appealed, and the Court of Appeals was presented with this issue. See Abbot Labs. v. Sandoz, 544 F.3d 1341 (2008) (affirming entry, and denying stay, of preliminary injunction). In that case, one circuit judge appeared to agree, albeit obliquely, with the district court's assertions regarding the requirement that each and every element be present in the prior art. See id. at 1351 (Newman, C.J., concurring).[8] Another circuit judge strongly disagreed, writing that "a given claim limitation may be obvious over the prior art even if no single reference had

specifically disclosed that limitation." See id. at 1377 (Gajarsa, C.J., dissenting). Judge Gajarsa cited cases in support of this conclusion, although the relevant language in these opinions is also dicta. See Takeda Chem. Indus. v. Alphapharm Pty., Ltd., 492 F.3d 1350, 1356 (Fed. Cir. 2007) ("[S]tructural similarity between claimed and prior art subject matter [structurally similar compounds], proved by combining references *or otherwise*, where the prior art gives a reason or motivation to make the claimed compositions, creates a prima facie case of obviousness.") (citation omitted) (emphasis added); Tegal Corp. v. Tokyo Electron Am., Inc., 257 F.3d 1331, 1349 (Fed. Cir. 2001) (stating that district court's finding that the single prior art reference does not disclose "metal wall" claim term does not preclude finding of obviousness of asserted claims). See also Al-Site Corp. v. VSI Int'l, Inc., 174 F.3d 1308, 1323 (Fed. Cir. 1999) (noting a party asserting invalidity must identify prior art references "which *alone or* combined with other references would have rendered the invention obvious to one of ordinary skill in the art at the time of invention") (citations omitted) (emphasis added); Model Patent Jury Instructions for the Northern District of California (Oct. 9, 2007) § B.4.3b ("This means that . . . a person of ordinary skill in the field . . . who knew about all this prior art would have come up with the claimed invention.").

It cannot be said that Federal Circuit precedent establishes that every single claim limitation must be identified in the prior art for a court to invalidate a patent claim on the basis of obviousness. Nor is it apparent that, even if there had been such a rule, KSR left it untouched. That unanimous Supreme Court decision dealt specifically with the teaching-suggestion-motivation test, but its reach was not explicitly limited to that issue; rather, the opinion set out principles implicating the non-obviousness analysis more generally. See, e.g., KSR, 550 U.S. at 401 ("Graham provided an expansive and flexible approach to the obviousness question that is inconsistent with the way the Federal Circuit applied its TSM test here."). This court can discern no rigid "each and every limitation" rule in either the statutory language of section 103 or the flexible test set forth by the Supreme Court in Graham and reaffirmed in KSR. Accordingly, the fact that the final limitation of the '158 patent's claim 5 is not disclosed in any piece of prior art here in evidence does not mean that the claim necessarily meets the requirement of non-obviousness.

Although the specific limitation of "an exhaust vent provided on the outer case that directly conducts air exhausted from the air outlet to the outside of the outer case" has not been identified in the prior art, the scope and content of the prior art and differences between the prior art and the claims at issue, in light of the level of ordinary skill in the art, support a finding of obviousness. Graham, 383 U.S. at 17-18. Nakamura draws ambient air into projectors and circulates and expels such air in order to cool hot projector components. Nakamura 's cooling system uses the same physical components used in the invention claimed by claim 5: two air intake ports, one or more exhaust vents, an outer case, an air outlet and the like. Moreover, the conducting of air from one part of the apparatus to another part, both directly and indirectly, is taught in Nakamura. Like the invention of claim 5, Nakamura teaches the use of multiple ventilating paths with their accompanying ducts and vents to cool a single projector. Claim 5 does not claim the specific spatial arrangement within the casing, i.e., specifically that given elements are nestled next to each other or are a certain shape or distance apart. The invention claimed by claim 5 is the arrangement of the cooling airways such that one airway goes directly through the power unit, with the purpose of more efficiently cooling it. See '158 Patent at 15:1-7.

There are a limited number of components requiring cooling inside a projector casing, and such a casing can contain only so many prior art air passageways. Where, as here, there is a finite number of identified, predictable solutions, success is likely the product not of innovation but ordinary skill and common sense. KSR, 550 U.S. at 421.[9] Seeking to increase the efficiency of cooling a power unit by arranging a prior art design with air ducts such that an air duct goes directly through the power unit is obvious under the "obvious to try" rationale approved by the Supreme Court and the Federal Circuit. See In re Kubin, 561 F.3d 1351, 1359 (Fed. Cir. 2009) (explaining permissible and impermissible applications of the "obvious to try" rationale).[10] Dedicating an airway to the power unit would have been obvious, and Seiko Epson has not offered evidence that the prior art teaches away from such an arrangement.[11] Nor has Seiko Epson presented any evidence of secondary considerations that would support non-obviousness, e.g., commercial success, long felt but unsolved needs, or the failure of others. KSR, 550 U.S. at 406; Graham, 383 U.S. at 17-18; see

also Muniauction, Inc. v. Thomson Corp., 532 F.3d 1318, 1327 (Fed. Cir. 2008). In sum, there is no genuine issue of material fact contradicting the conclusion that a person ordinarily skilled in the art, when confronted with the problem of more efficiently cooling the power unit, would at the time of invention have considered arranging a duct like those taught by Nakamura to directly cool the power unit and to directly exhaust the air from the power unit out of the casing. The differences between claim 5 and Nakamura are, as a matter of law, "such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." See 35 U.S.C. § 103. In light of Nakamura, claim 5 is obvious as a matter of law.

II. Seiko Epson's '392 Patent

Coretronic argues that the asserted claims of the '392 patent are anticipated by both the Bergin patent and Seiko Epson's ELP-5000XB projector or, alternatively, are obvious. Seiko Epson does not dispute Coretronic's contention that both of these are prior art. Instead, Seiko Epson argues that neither piece of prior art practices the invention, because (1) Bergin does not disclose a spring or alignment reference surfaces; and (2) the ELP-5000XB's reflector is not pressed and does not engage the accompanying lamp housing laterally. Seiko Epson also argues that Coretronic has not proven obviousness, because Coretronic's expert does not indicate how the two references would be combined or what would motivate a person of ordinary skill in the art to combine the references.

A. Anticipation

Bergin discloses a headlight assembly for use in an automobile. Like the ELP-5000XB, Bergin discloses wireform springs (two separate ones in the preferred embodiment) to press a lamp reflector against a lamp housing. See Payne Dec., Exh. G at 9:52-10:34. Bergin's wireform springs also press the reflector forward, toward the center of the aperture, rather than to one side. See id. The relevant difference between Bergin and the ELP-5000XB is that Bergin discloses an external, projecting flange member having a plurality of protuberances around the front of the reflector. See

id. at 6:59-68. These protuberances line up with corresponding bosses located around the sides of the front of the lamp holder. See id. at 6:68-7:2. Coretronic asserts that each protuberance has a first and a second alignment surface that align with the corresponding boss. By engaging each protuberance with its respective boss, the wireform spring or springs align the alignment surfaces as required by claim 1, according to Coretronic. In this interpretation, there is not just one first reference surface and one second reference surface; rather, there are as many first and second reference surfaces as there are protuberances. Similarly, each boss possesses a first surface going in one direction and a second surface going in another.

Coretronic's theory for finding that Bergin meets the claim limitation requiring a first and second reference surface hinges upon, among other things, the notion that the reflector's protuberances are somehow inserted into the bosses on the lamp holder. This could be the case if Bergin's "bosses" were in fact depressions of some sort, such that the reflector's protuberances fit within the depressions. Yet even Coretronic's own expert appears to recognize that a "boss" is "something that juts out," rather than a depression. See Docket No. 340, Exh. B (Payne Depo.) at 150; see also Random House College Dictionary (1982) (defining "boss" as a "protuberance" or a "stud"). Coretronic's theory appears to be, however, that the bosses, while themselves protuberances, each contain a cavity within them into which the reflector's protuberances fit. This theory is without merit, because the patent teaches no such cavities. While it might make apparent sense to align protuberances with cavities, the fact remains that Bergin does not disclose such a system. Indeed, it appears that the purpose of the protuberances and bosses may not have been to themselves physically align the lamp but rather to provide "aiming pads" allowing a manufacturer to determine the alignment and connect the reflector and the lamp housing in some other fashion. See Bergin at 7:31-37. Bergin does not anticipate the claims.

The ELP-5000XB is a projector practicing almost all of the limitations of claim 1 of the '392 patent. For instance, the ELP-5000XB has a lamp assembly consisting of a light source lamp and a reflector. The reflector is held in place within a lamp housing by a wireform spring. Seiko Epson argues that the ELP-5000XB cannot anticipate claim 1 because it does not practice the limitation of

"a spring that presses the reflector against the lamp housing so that the first alignment reference surface engages the first surface and the second alignment reference surface engages the second surface." Specifically, Seiko Epson contends that the reflector does not exert a lateral force against the side of the lamp housing. According to Seiko Epson, the wireform spring supplies only downward pressure to the ELP-5000XB's reflector, pressing said reflector in one direction, rather than along two reference surfaces extending in two different directions.

Indeed, Coretronic has provided no evidence that the ELP-5000XB's wireform spring exerts pressure in a direction other than the downward direction.[12] Coretronic instead argues that claim 1 does not contain a specific "lateral force" limitation.[13] While this observation is, strictly speaking, correct, the claim does specify that the reflector is engaged in two different directions. As demonstrated by Coretronic's own evidence, the ELP-5000XB's spring aligns the reflector in the center of the aperture, rather than against a side of the lamp housing. See Payne Dec., Exh. C.[14] However, there is no material dispute that the ELP-5000XB practices the other limitations of the claim.

B. Non-Obviousness

Coretronic urges that the '329 patent claims are, if not anticipated, obvious. "The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." KSR, 550 U.S. at 416. Indeed, the prior art ELP-5000XB contains every element of the '392 patent, except for the "presses the reflector against the lamp housing so that the first alignment reference surface engages the first surface and the second alignment reference surface engages the second surface" limitation. Engaging an object against two parallel surfaces to hold it in place is neither novel nor non-obvious. The bricks of the Great Pyramid at Giza were aligned by engaging multiple perpendicular surfaces of each brick against the surfaces of surrounding bricks. A floor tile inset into a floor is aligned along two surfaces with neighboring tiles to press it into the correct position. Common experience is replete with examples of the pressing of surfaces of one object against the surfaces of another to hold the object in place.

A claim is less likely to be obvious if the prior art teaches away from combining the claimed elements. KSR, 550 U.S. at 416. If, for instance, the prior art had taught that pressing the reflector against the housing should be avoided due to some obstacle that technique posed—perhaps such a design might make reflectors more vulnerable to damage caused by impacts, for instance—then a technique for overcoming the obstacle and thereby allowing improved alignment would be non-obvious. But that is not this patent. The '329 patent does not teach how to overcome any existing obstacle to pressing the reflector against the housing. Instead, it claims a design the simply presses a reflector against a housing. Seiko has presented no evidence that the prior art teaches away from a design in which the reflector is pressed against the sides of its housing.

Moreover, there are only so many ways to secure a reflector within a lamp housing. See KSR, 550 U.S. at 421. An ordinarily skilled artisan in this field is "one with a Bachelor's degree in physics, engineering, optics or other related field who also is familiar with the design of projectors." Claim Const. Order at 5. It is clear as a matter of law that an ordinarily skilled artisan using common sense would consider adjusting her prior art wireform spring to press the reflector against the surfaces of the housing.[15] There was also an apparent reason to combine the known elements in the fashion claimed by the '392 patent. See KSR, 550 U.S. at 418. The patent itself states that prior art projectors required accurate positioning in relation to the optical axis to efficiently use their luminous flux. '392 Patent at 1:30-36. The court's non-obviousness analysis "need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." Id. An ordinarily skilled artisan in this field would have been motivated to optimize the alignment of reflector and lamp housing and would have taken the step of modifying the reflector to press it up against the sides of the housing for stability. Finally, it must be noted that Seiko Epson has not offered any evidence regarding secondary considerations. See KSR, 550 U.S. at 406; Graham, 383 U.S. at 17-18. Claim 1 of the '392 patent is obvious as a matter of law. Dependent claims 3, 4, 7, 9 and 10 each recite some non-novel variant of claim 1 and are likewise invalid.

III. Coretronic's '899 Patent

Seiko Epson has pointed to five pieces of prior art that, it argues, either anticipate the asserted claims of the '899 patent or render them obvious. None of these references were considered by the U.S. Patent and Trademark Office (USPTO) during the initial examination of the patent. Seiko Epson has also moved for a declaration that the '899 patent is unenforceable due to Coretronic's failure to disclose its Optoma EzPro 730 projector to the USPTO during examination. In light of the following discussion, it is unnecessary to reach the merits of the anticipation or inequitable conduct arguments.

Seiko Epson contends that the combination of Miyashita and Kobayashi renders the '899 claims at issue obvious to a person having ordinary skill in the art. Miyashita describes a system in which an image display device casing is provided with both an inner and outer structure. One way in which the device is cooled is through the transmission of heat from the inner casing into coupling members that transfer heat to specific locations on the outer casing. A second way in which the device is cooled is through the movement of air by a fan through the "space between the first casing . . . and the second casing." Utermohlen Dec., Exh. 2 ("Miyashita") at 1. The lamp is cooled by outside air flowing between the inner casing and the outer casing. Air is clearly shown flowing through the spaces bounded by the upper and lower surfaces of the inner lamp casing and the respective parts of the outer casing to which they are coupled. See id. at Figure 1.

Every element of the '899 patent's claim 1, save one, can be found in Miyashita. The casing disclosed in Miyashita has an interior. There is a ventilation outlet on the casing and proximate to the side of the lamp assembly. The top and bottom of the inner casing define an upper air duct using an upper sheet and a lower air duct using a lower sheet. There is a fan located adjacent to the lamp holder. The missing element is "a lamp holder fixed in the interior of the casing, and having at least one guiding surface on one side near the lower edge of the lamp holder." '899 Patent at 4:14-16. While something must hold the lamp in position, Miyashita does not describe in detail any sort of lamp holder.

Kobayashi teaches this other element. It discloses a removable lamp holder. The lamp is cooled by air blown through a passage created between the cover of the aperture and a diagonal surface, a guide rib present in the bottom of the lamp holder. "[A]n air passage . . . is formed between the cover and the lamp holder so as to guide cooling air . . . ." Utermohlen Dec., Exh. 3 ("Kobayashi") at 6. In short, Kobayashi discloses a lamp holder with a guiding surface near the lower edge of the lamp holder.

Accordingly, each of claim 1's elements is identifiable in the prior art. Moreover, an ordinarily skilled artisan would be expected to consider the step of augmenting Miyashita with Kobayashi's guiding surface or surfaces. Guiding surfaces have often been used in cooling ducts to smooth out airflow (making it more laminar versus turbulent), reduce backpressure and provide for more controlled and efficient cooling. See Keller Dec. ¶ 16.[16] Anyone faced with designing an air duct must, by the very nature of the activity, consider how to position surfaces so as to direct air toward the desired target.[17] Both parties have alluded in their papers to market incentives to create projectors that dissipate heat more efficiently and effectively. Indeed, the broad range of prior art in evidence shows that many inventors have sought to do just that. Furthermore, Coretronic has presented no evidence that the prior art taught away from the modification of the Miyashita design with a lamp holder having leading surfaces. A skilled artisan, when faced with the demand for more efficient cooling, would without a doubt have considered such a modification.

Seiko Epson has clearly and convincingly established a prima facie case that claim 1 is obvious as a matter of law. Coretronic has not attempted to rebut this showing with evidence of secondary considerations. Instead, Coretronic argues that the combination of Miyashita and Kobayashi cannot render the '899 patent obvious because neither of these patents was directed toward the problem of cooling an outer casing. Precisely this sort of argument was addressed and rejected by the Court in KSR: "The second error of the Court of Appeals lay in its assumption that person of ordinary skill attempting to solve a problem will be led only to those elements of prior art designed to solve the same problem." KSR at 420. As the Court noted, common sense teaches that "familiar items may have obvious uses beyond their primary purposes." Id. Whether or not the

prior art in question was expressly directed toward cooling the outer casing cannot control the result here.[18]

Claim 1 is invalid as a matter of law, and the '899 patent's dependent claims do not fare any better. Claims 2, 3 and 9 merely address the position of the lower sheet and represent no engineering innovation. Claims 7 and 11 are likewise minor variations of claim 1. This patent's purported innovation hinges on claim 1. Each of the challenged claims is invalid under section 103(a) as a matter of law.

CONCLUSION

For the reasons stated above, the court rules as follows. Defendants/counter-claimants' motion to invalidate claims 1 and 2 of the '158 patent is GRANTED on the basis of anticipation. Defendants/counter-claimants' motion to invalidate claim 5 of the '158 patent is GRANTED on the basis of obviousness. Defendants/counter-claimants' motion to invalidate claims 1, 3, 4, 7, 9 and 10 of the '392 patent is GRANTED on the basis of obviousness. Plaintiff/counter-defendant's motion to invalidate claims 1, 2, 3, 7, 9 and 11 of the '899 patent is GRANTED on the basis of obviousness.

IT IS SO ORDERED.

Dated: May 15, 2009

MARILYN HALL PATEL
United States District Court Judge
Northern District of California

ENDNOTES

1. Neither party has questioned the accuracy of any of the certified translations filed in connection with these motions.

2. Coretronic's Rule 56(f) motion to continue the hearing on Seiko Epson's motion for summary judgment, Docket No. 287, is DENIED as moot. The hearing on the cross-motions for summary judgment has already occurred, and this decision does not rely upon assertions of the ELP-3000 projector's status as prior art.

3. There has been no showing that determining specifications or finalizing marketing requirements, see Bailey Dec. ¶ 5, is the same as active participation in the design of the technology itself.

4. The parties jointly requested clarification of the court's construction of "directly conducts cooling air" as "transmits cooling air without *reducing* its temperature to that of the air inside the outer casing of the projector." See Docket No. 198 (Joint Request for Clarification); Docket No. 183 (Claim Const. Order). The parties are correct that use of the word "reducing" was in error and that the correct word is "increasing."

5. The location and nature of the inlet required by claim 1 of the '158 patent is described in only general terms in the specification. See '158 Patent at 14:57-67; 5:32-38.

6. On the one hand, as Seiko Epson's expert points out, text references in Nakamura describe air passing "through the vicinity" of the power supply and then the light source, cooling both of them before being exhausted. See Nakamura at 7-8 (¶¶ 10 & 13). This suggests that the air does not "directly" exit the projector casing after cooling the power supply. On the other hand, the drawings illustrating embodiments of the invention show an air path with some air passing from the power unit over or near the light source and some air passing in a direct line from the power unit to the exhaust vent. See id., Figures 2 & 3. The figures, at least, suggest that some air may pass directly out of the projector without cooling the light source.

7. Indeed, the tenor of these (pre-KSR) opinions suggests that where all elements had been identified in various prior art references, there was an *additional* requirement: a teaching, suggestion or motivation to combine. Where, on the other hand, obviousness was based on one piece of prior art, there was no need to identify a specific motivation to combine, since nothing was being combined.

Regarding claim 5, obviousness is apparent because the claim is an obvious extension of, or variant upon, Nakamura. The motivation to make such a variant is inherent to the nature of the goal expressly sought by the '158 patent and by the prior art: to achieve efficient cooling of projectors and their components.

8. Judge Newman wrote for a majority comprising herself and Judge Archer; however, Judge Archer did not join in Part I of the opinion, in which Judge Newman took up this issue. Judge Gajarsa dissented.

9. Designing configurations of familiar mechanical projector components does not involve the same level of unpredictability as, for example, the chemical arts. Cf. Eisai Co. Ltd. v. Dr. Reddy's Labs., Ltd., 533 F.3d 1353, 1359 (Fed. Cir. 2008).

10. It is impermissible to invalidate a claim under an "obvious to try" rationale where what was "obvious to try" was either (1) "to vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result, where the prior art gave either no indication of which parameters were critical or no direction as to which of many possible choices is likely to be successful" or (2) "to explore a new technology or general approach that seemed to be a promising field of

experimentation, where the prior art gave only general guidance as to the particular form of the claimed invention or how to achieve it." Kubin, 561 F.3d at 1359.

11. It should also be noted that the final claim limitation of claim 5 "solves no stated problem and would be an obvious matter of design choice within the skill of the art." Application of Kuhle, 526 F.2d 553, 555 (C.C.P.A. 1975). The specification makes a number of references to the benefits of cooling air being conducted directly from an intake port to cool the hot projector components. See, e.g., '158 Patent at 3:3-6; 13:19-22; 15:1-7. However, the patent contains no reference to any advantage to directly conducting air exhausted from the air outlet to outside the outer case, as opposed to using it to cool other components.

12. Coretronic did point to its expert's opinion that a component of the lamp assembly which the expert calls a "sheet metal spring" exerts lateral pressure on the lamp. In its opposition, Seiko Epson responded by explaining, quite plausibly, that the item identified by Coretronic's expert as a "sheet metal spring" did not exert lateral force, as it was actually one of four metal strips used to secure a glass cover over the lamp's aperture. See Iechika Dec. ¶¶ 3-6 & Exhs. A-D. Coretronic did not dispute this explanation in its reply, thus conceding the point.

13. It may be noted that Coretronic opines, in its reply, that the springs in the ELP-5000XB lamp assembly are "*almost* identical" to those in the ELP-7300, a device that Coretronic asserts to have been admitted by Seiko Epson to be a commercial embodiment of the '392 patent. This being the case, the ELP-5000XB must *ipso facto* practice the invention, according to Coretronic. Apparently, counsel for Coretronic is unfamiliar with the old adage (doubtlessly coined by a judge): "'Almost' only counts in horseshoes and hand grenades."

14. The wireform spring appears to push the reflector both downward and foreword toward the aperture. Coretronic has not argued that the lamp housing against which the front of the reflector is being pressed (in the direction of the aperture) should be considered one of the two alignment reference surfaces, perhaps because it does not "align" the reflector in any real sense.

15. It would also be well within the capability of the ordinarily skilled artisan to alter the surfaces of the reflector as needed to press them firmly against the sides of the housing.

Claim 1 quite clearly represents something that is "obvious to try" in the sense of the term approved by the Supreme Court and the Federal Circuit. See Kubin, 561 F.3d at 1359.

16. Coretronic did not rebut this testimony of Seiko Epson's expert.

17. To state it another way, Coretronic has not shown that the combination of these elements yields anything "more than one would expect from such an arrangement." See Sundance, Inc. v. Merlot Tarpaulin & Sidekit Mfg. Co., Inc., 550 F.3d 1356, 2008 U.S. App. LEXIS 26082 (Fed. Cir. Dec. 24, 2008), at *30, quoting Sakraida v. AG Pro, Inc., 425 U.S. 273, 282 (1976). The benefit of using a guiding surface to guide air within a projector would have been inescapably obvious to an ordinarily skilled artisan.

18. Coretronic also points out that Seiko Epson's expert used a definition of a person of ordinary skill in the art that differs slightly from that adopted by the court in claim construction, in developing his opinion. The difference is insubstantial and does not affect the result here.

NOTE: This disposition is nonprecedential.

United States Court of Appeals for the Federal Circuit

SEIKO EPSON CORPORATION,
Plaintiff/Counterclaim Defendant-Appellant,

and

EPSON RESEARCH AND DEVELOPMENT, INC. and EPSON AMERICA, INC.,
Counterclaim Defendants-Appellees,

v.

CORETRONIC CORPORATION,
Defendant/Counterclaimant-Cross Appellant,

and

OPTOMA TECHNOLOGY, INC.,
Defendant-Appellee.

2009-1439, -1440

Appeals from the United States District Court for the Northern District of California in 06-CV-6946, Judge Marilyn H. Patel.

Decided: May 20, 2010

WILLIAM J. UTERMOHLEN, Oliff & Berridge, PLC, of Alexandria, Virginia, argued for plaintiff/counterclaim defendant-appellant and counterclaim defendants-appellees. With him on the brief were JAMES A. OLIFF and JOHN W. O'MEARA.

STEVEN D. HEMMINGER, Alston and Bird LLP, of Palo Alto, California, argued for defendant/counterclaimant-cross appellant and defendant-appellee. On the brief were YITAI HU, MADISON C. JELLINS and ELIZABETH H. RADER.

Before MICHEL, *Chief Judge*, LOURIE, and BRYSON, *Circuit Judges*.

PER CURIAM.

Four patents are at issue in this case: U.S. Patent Nos. 6,527,392 and 6,203,158, asserted by Seiko Epson Corporation, and U.S. Patent Nos. 6,739,831 and 6,742,899, asserted on counterclaims by Coretronic Corporation. As to three of the patents, we find that the arguments raised by the parties on appeal have no merit. We therefore affirm the district court's judgments with respect to the '392, '831, and '899 patents for the reasons given by the district court.

The '158 patent presents a more difficult issue. The '158 patent describes a projector that conducts air from outside the projector directly through the power unit in order to cool it more effectively. Seiko Epson asserted

infringement of two independent claims. Claim 1 recites a projector comprising:

> a power unit including a ventilating path provided inside the power unit for circulating cooling air;
>
> an outer case that stores the optical unit and the power unit;
>
> a first cooling air intake port located on the outer case that provides cooling air from outside of the outer case to the optical unit; and
>
> a second cooling air intake port located on the outer case that directly conducts cooling air from the outside of the outer case to the ventilating path, said second cooling air intake port comprising:
> an air inlet provided on the power unit, and
> a duct connecting said second cooling air intake port and the air inlet.

Similarly, claim 5 recites a projector comprising:

> a power unit including an air inlet and an air outlet;
>
> an outer case that stores the optical unit and the power unit;

> a first cooling air intake port located on the outer case that provides cooling air from outside of the outer case to the optical unit;
>
> a second cooling air intake port located on the outer case that directly conducts cooling air from the outside of the outer case to the air inlet; and
>
> an exhaust vent provided on the outer case that directly conducts air exhausted from the air outlet to the outside of the outer case.

At the claim construction hearing, Seiko Epson proposed that the phrase "directly conducts cooling air" be construed to mean "transmits cooling air without substantial contamination by internal sources of heat." The district court agreed in essence with Seiko Epson's proposed construction, but modified it to "transmits cooling air without [increasing] its temperature to that of the air inside the outer casing of the projector." The court explained that the change was necessary because Seiko Epson's proposed construction was "not limited to the air's temperature." The court also noted that the modified construction was consistent with how the patent distinguished the prior art, which was described as being less efficient because the air used to cool the power unit "had already been heated by many other elements located in the outer case."

We hold that the district court erred in its construction of "directly conducts cooling air," and we adopt Seiko Epson's narrower construction. Claims 1 and 5 recite that the second air intake port directly conducts not just "cooling air," but "cooling air from the outside of the outer case." The inclusion of that additional phrase indicates that air from outside of the case must be conducted di-

rectly to the power unit without substantial contamination by the air inside the case. Moreover, it reveals that the modifying term "cooling" is merely descriptive rather than definitional, since all air from outside of the case is presumed to be cooler than the air inside the case.

That interpretation is further supported by the specification, which clarifies that the term "cooling" is used in the patent solely in reference to "fresh" air from outside of the case. For instance, the abstract of the patent states that the second air intake port "directly conduct[s] fresh air into the ventilating path. Because the interior of the power unit is cooled by fresh air which is cooler than the air inside the outer case, cooling efficiency is enhanced." The Summary of the Invention section of the specification reiterates that the invention

> directly conduct[s] fresh air from outside the outer case from the cooling air intake port to the inlet of the ventilating path. Because the cooling air conducting means directly conducts fresh air to the ventilating path, and because fresh air is cooler than the air in the outer case, the interior of the power unit can be cooled with high efficiency."

'158 patent, col. 2, line 67 to col. 3, line 6. The patent also notes that the duct recited in claim 1, which connects the second air intake port and the air inlet of the power unit, "only introduces fresh air from the cooling air intake port to the ventilating path . . . [and] prevents the air from the outer case, which is hotter than the fresh air, from entering into the ventilating path." *Id.*, col. 3, ll. 18-21. Those statements demonstrate that the thrust of the invention is not simply to pass any form of cooler air through the power unit, but rather to inject "fresh" air from outside the case directly into the ventilating path.

Because we are satisfied that "cooling air from the outside of the outer case" has a more limited meaning than "cooling air," and that directly conducting such air to the power unit requires a narrower construction than the one provided by the district court, we vacate the district court's grant of summary judgment as to the '158 patent. On motion for summary judgment, the district court held that the asserted claims of the '158 patent were invalid in light of Japanese Patent Application No. 4-271334 ("Nakamura"). The Nakamura reference, however, plainly fails to satisfy our construction of "directly conducts cooling air from the outside of the case." Although Nakamura teaches a second air intake port located in the vicinity of the power unit, it does not provide an uninterrupted path from that port to the power unit. Instead, the figures in the Nakamura reference indicate that the fresh air entering through the second air intake port mixes with ambient air from inside the case before reaching the power unit. Consequently, the fresh air entering through the second air intake port is not directly conducted to the power unit as required by the '158 patent.

While we vacate the district court's judgment as to the '158 patent and remand for further proceedings, we do not rule out the possibility that other prior art, standing alone or in combination with the Nakamura reference, might sustain the district court's finding of invalidity. Our decision is limited to holding that the district court erred in its construction of "directly conducts cooling air" and that, under a narrower construction, the Nakamura reference fails to disclose the required structure.[1]

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[1] Seiko Epson moved this court to take judicial notice of the definitions of several terms in generally available references. We grant the motion to take judicial notice of the fact that those references define the terms as they do, although we do not take judicial notice of the correctness of those definitions.

AFFIRMED IN PART, VACATED IN PART, and REMANDED.

US006203158B1

(12) **United States Patent**
Furuhata et al.

(10) **Patent No.: US 6,203,158 B1**
(45) **Date of Patent: Mar. 20, 2001**

(54) **PROJECTOR**

(75) Inventors: **Mutsuya Furuhata; Takeshi Takizawa; Motoyuki Fujimori; Akitoshi Kuroda; Shinji Haba; Kiyoshi Miyashita**, all of Suwa (JP)

(73) Assignee: **Seiko Epson Corporation**, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/362,660**

(22) Filed: **Jul. 29, 1999**

Related U.S. Application Data

(63) Continuation of application No. 08/943,730, filed on Oct. 3, 1997, now Pat. No. 5,951,136.

(30) **Foreign Application Priority Data**

Oct. 4, 1996 (JP) P8-264951
Oct. 28, 1996 (JP) P8-285690
Aug. 26, 1997 (JP) P9-229541

(51) **Int. Cl.**[7] **G03B 21/00**; G03B 21/26
(52) **U.S. Cl.** **353/31**; 353/34
(58) **Field of Search** 353/31, 33, 34, 353/52, 57, 61, 122

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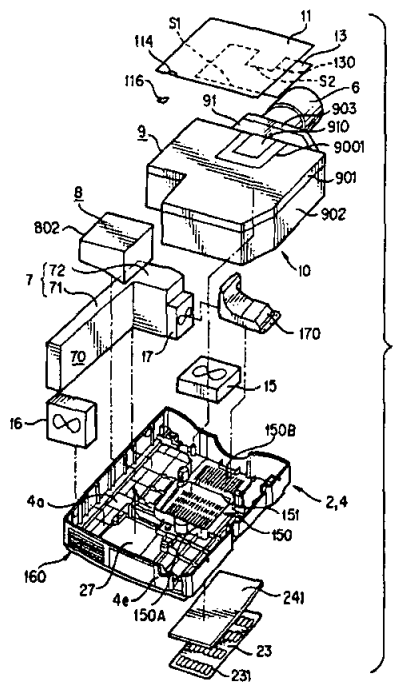
WO96/20424 7/1996 (WO) .

Primary Examiner—Russell Adams
Assistant Examiner—Hung Henry Nguyen
(74) *Attorney, Agent, or Firm*—Oliff & Berridge, PLC

(57) **ABSTRACT**

A projection display device capable of improving cooling efficiency of the power unit includes a light source lamp unit, a projection lens unit, an exhaust fan provided near the light source lamp unit for ventilating an outer case, and a ventilating path provided inside the power unit. A suction fan is provided at the inlet of the ventilating path which is connected to the cooling air intake port through a duct cover to directly conduct fresh air into the ventilating path. Because the interior of the power unit is cooled by fresh air which is cooler than the air inside the outer case, cooling efficiency is enhanced.

9 Claims, 7 Drawing Sheets



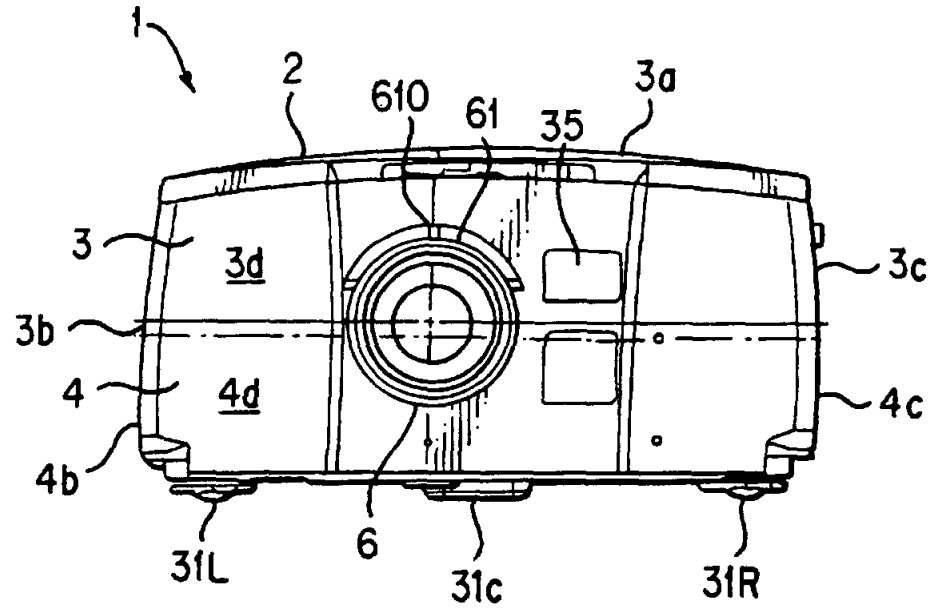

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FIG. 1 (A)

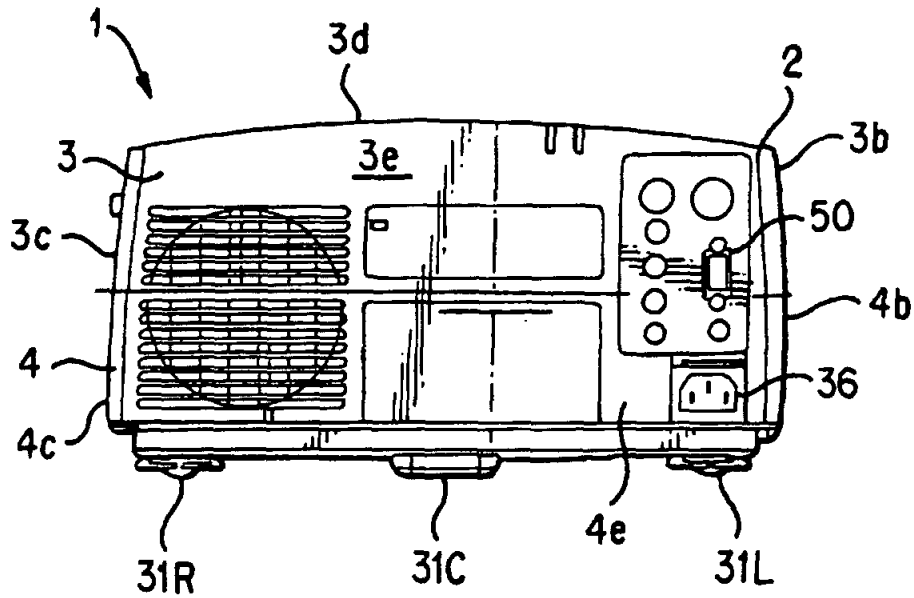
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FIG. 1 (B)

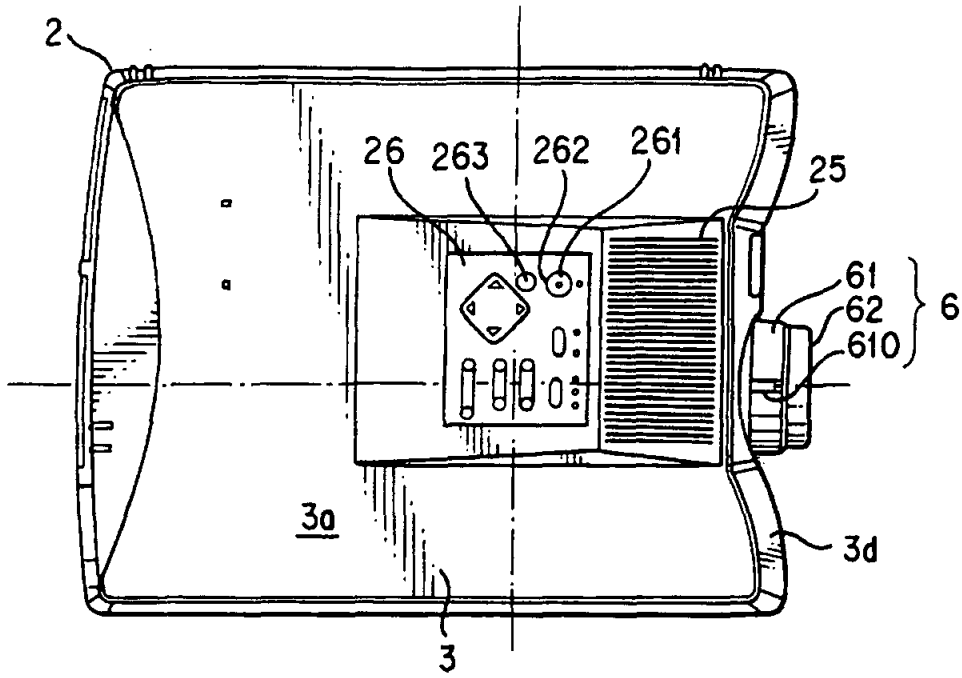
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FIG. 2(A)

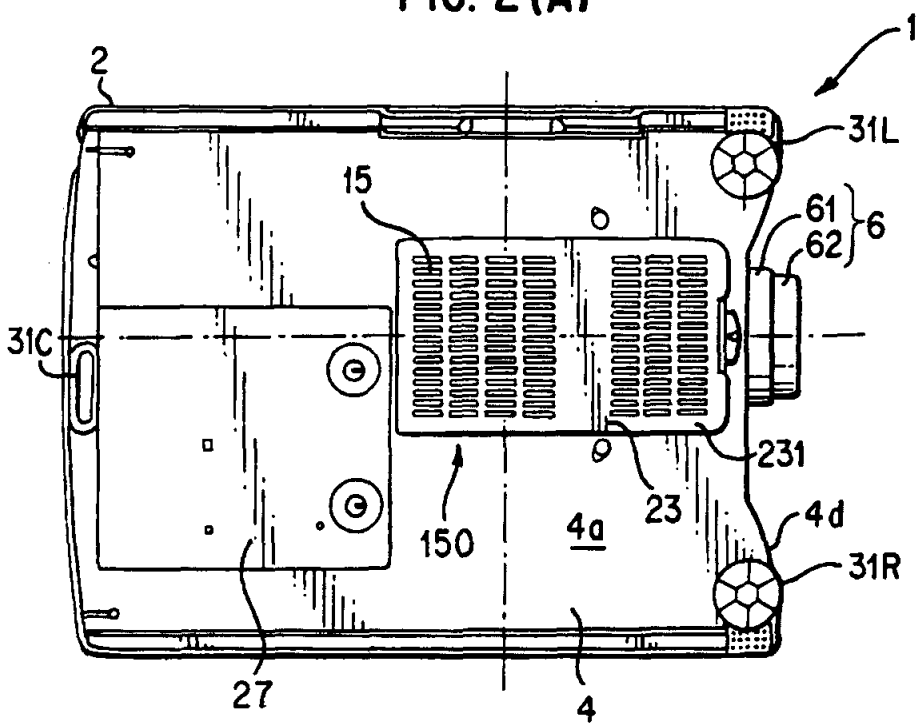
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FIG. 2(B)

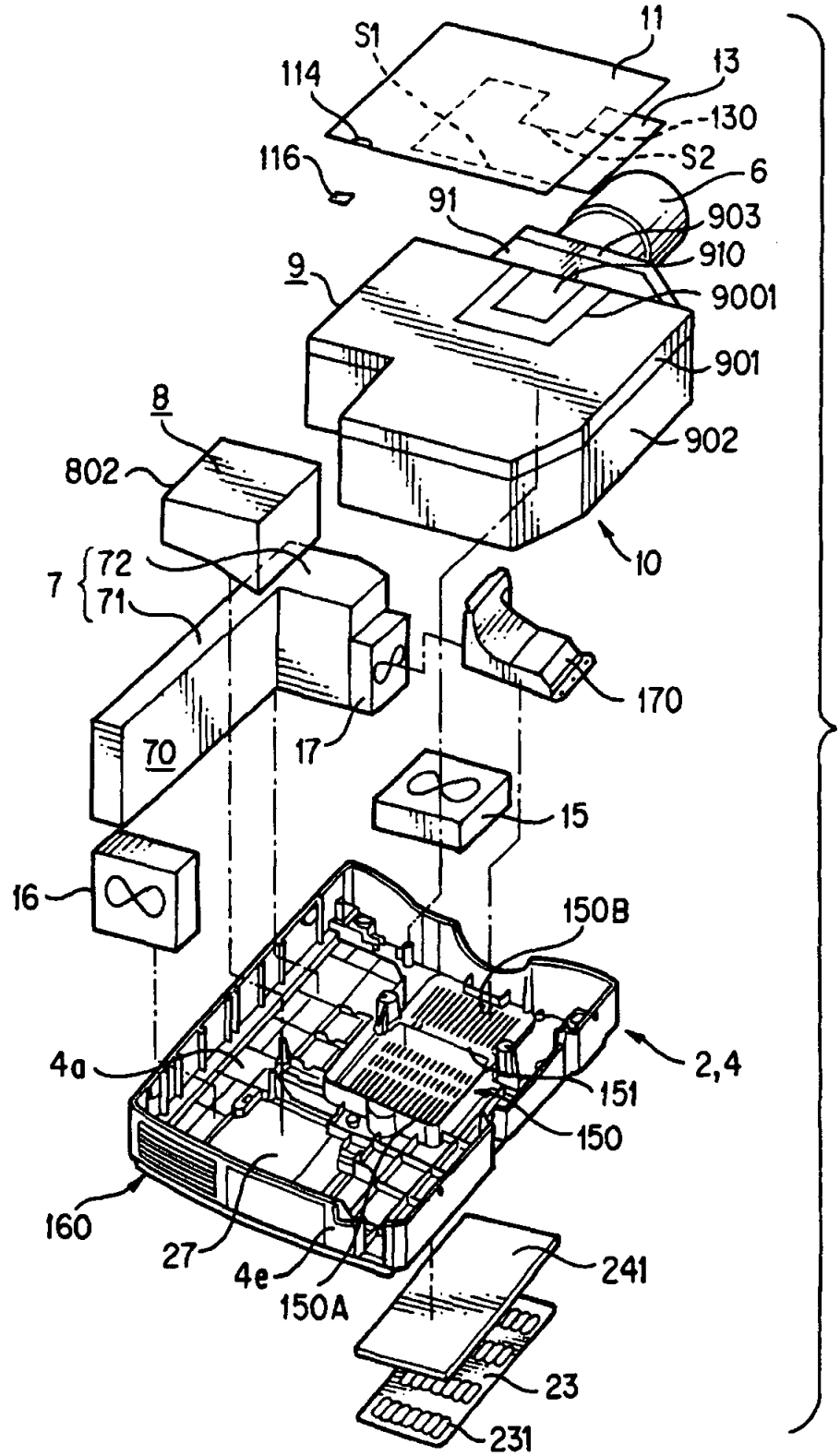
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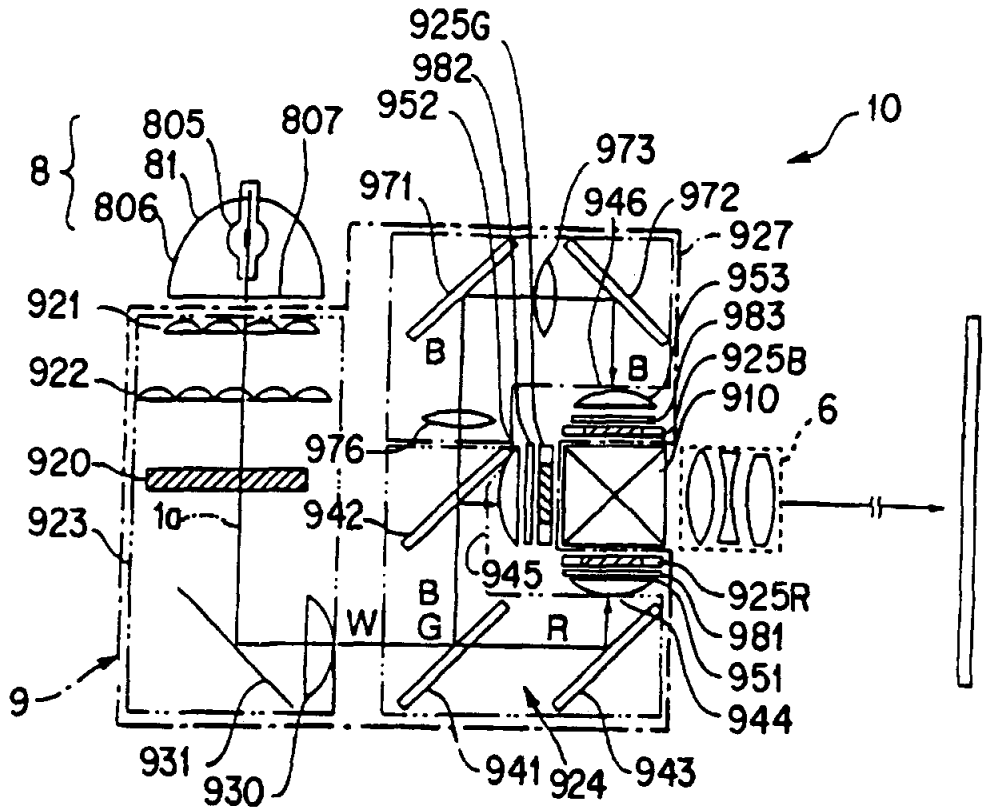
FIG. 3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942
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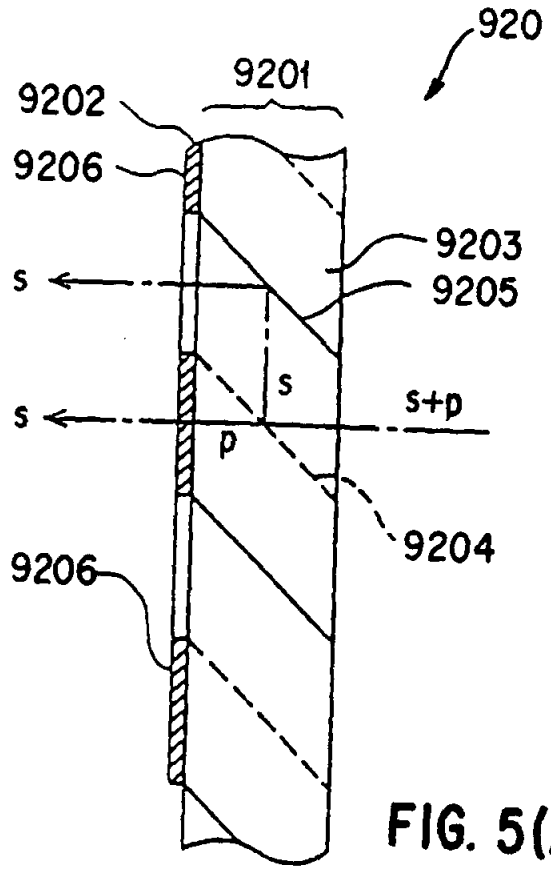
FIG. 4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9206

FIG. 5(A)

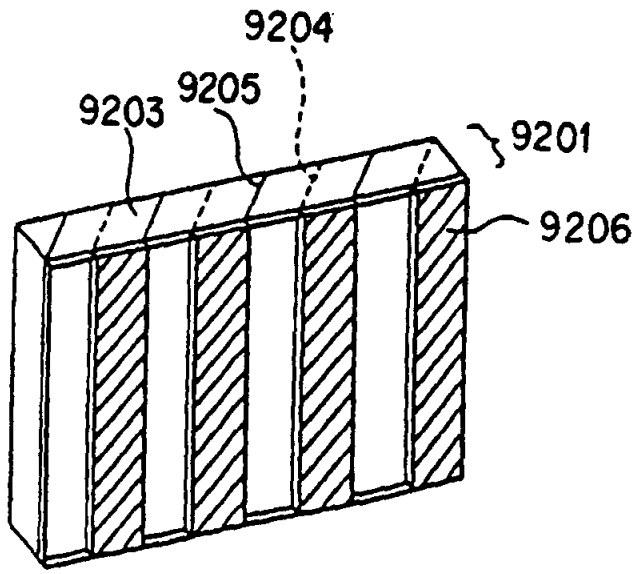
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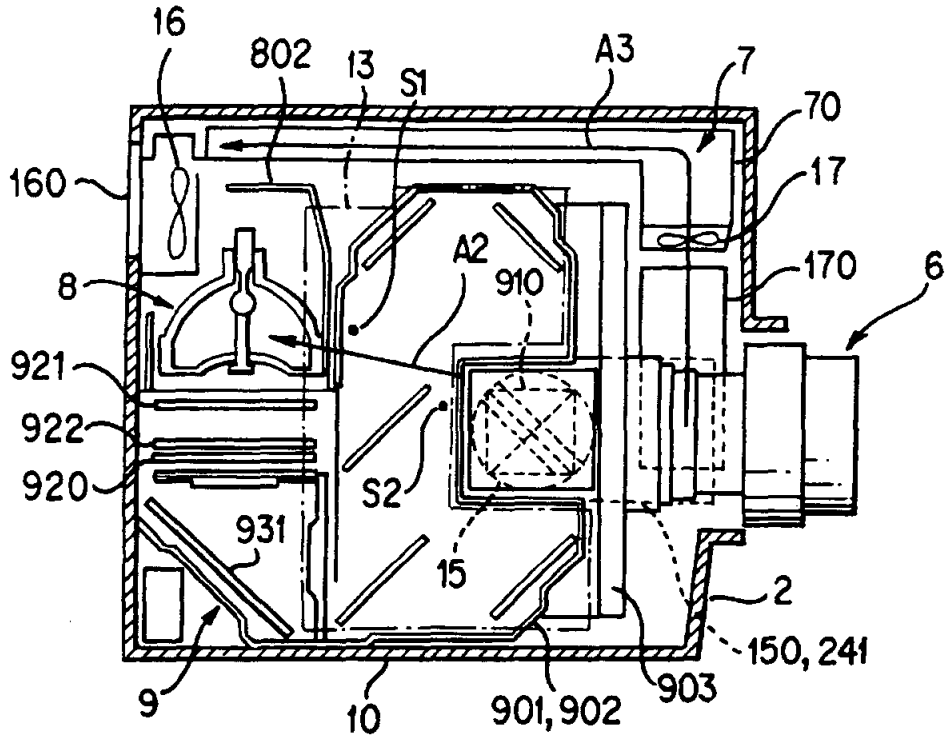
FIG. 5(B)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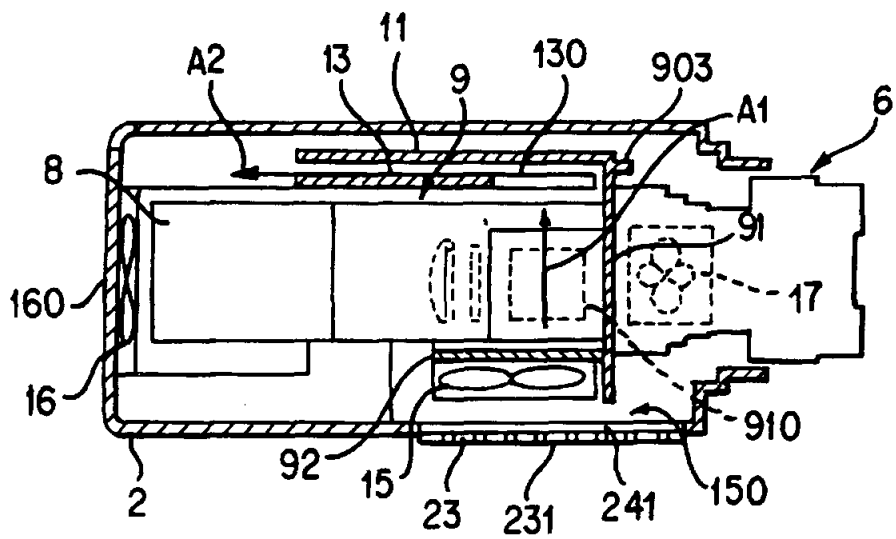
901, 902
903

FIG. 6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A2
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A1
6
8
91
160
17
16
910
92
15
23
231
241
150
2

FIG. 7

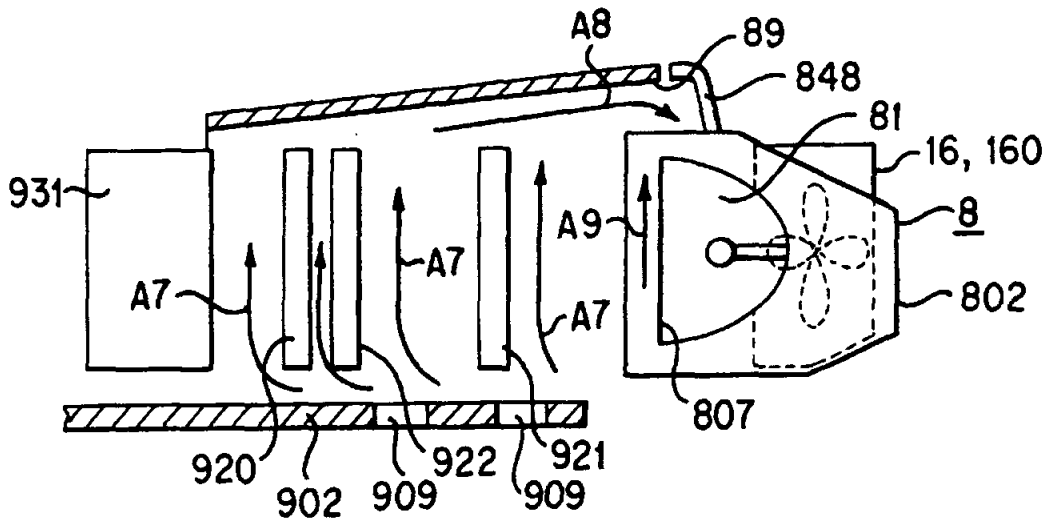
A8
89
848
81
16, 160
8
802
931
A7
A7
A7
A9
807
920
902
909
922
909
921

FIG. 8

PROJECTOR

This is a Continuation of application Ser. No. 08/943,730 filed Oct. 3, 1997 now U.S. Pat. No. 5,951,136. The entire disclosure of the prior applications is hereby incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

1. Field of Invention

The invention relates to a projection display apparatus which separates light beams from a light source into red, blue and green light beams. The display apparatus modulates the red, blue and green light beams through light valves provided in a liquid crystal panel in response to image information. The modulated red, blue and green light beams are combined and expansively projected through a projection lens on a projection screen. In particular, the invention relates to a cooling system for efficiently and cleanly cooling the components of a projection display device that separates, modulates combines and projects light beams.

2. Description of Related Art

Conventional projection display devices include an optical unit which optically treats light beams emitted from a light source lamp unit to synthesize a color image in response to image information. The synthesized light beams are projected on a screen through the use of a projection lens unit, a power unit, and a circuit board unit including control circuits and similar devices.

The optical unit separates light beams emitted from the light source lamp unit into red, blue and green color light beams. The optical unit modulates these color light beams with light valves provided in a liquid crystal panel in response to image information. The modulated color light beams are recombined with a cross dichroic prism or similar devices, and are projected on a screen.

Japanese Patent Publication No. 7-225379 discloses a projection display apparatus provided with a polarized light conversion device for aligning the polarization direction of light beams emitted from a light source lamp unit. The polarized light conversion device has a polarized beam splitter array provided with a plurality of sets of polarized light separating films and reflection films which are parallel to each other. The polarized beam splitter array separates incident light beams into two types of straight polarized light components, and aligns the polarization direction of these two types of straight polarized light components.

Some elements of the projection display apparatus, e.g. the polarized light conversion device and the optical unit, are stored in an outer case. A projection side of the projection lens unit is disposed in the outer case such that it protrudes from the front face of the outer case. The outer case is provided with an operating section including a power switch, a light-receiving window for remote control, and an input/output terminal group for sending and receiving signals to and from external devices.

Conventional projection display devices include optical devices in the light source lamp unit, a power unit and an optical unit, all of which are sources of heat. The liquid crystal light valves and their respective polarization plates are major heat sources because they absorb part of the transmitted light beams.

In order to cool the heat sources, the projection display apparatus is provided with a cooling system.

The cooling system introduces fresh air into the outer case through an intake port by a suction fan. The introduced air is circulated through the outer case and exhausted through an air outlet provided on the outer case by an exhaust fan.

In such a cooling system, the power unit, which often become very hot, is provided with a suction fan to introduce the air in the outer case to the interior of the power unit for cooling.

The power unit includes a primary active filter, a power supply, and a ballast. A transmitter FET may be mounted on the circuit board of the primary active filter. A rectifier diode bridge, an oscillating transistor for a D/D converter and a triode regulator for a D/D converter may be mounted on the circuit board of the power supply. Also, devices such as a driving FET for a chopper circuit and a reverse-current preventing diode for a chopper circuit may be mounted on the circuit board of the ballast. Because these devices are heat sources, heat sinks are fixed to them to enhance cooling efficiency. Air introduced with the suction fan cools the heat sinks.

By the time that air is introduced to the power unit in the outer case, it has already been heated by many other elements located in the outer case. Thus, the air introduced to the power unit is hotter than the fresh air introduced into the outer case, and is less efficient in cooling the power unit.

Also, when the air in the outer case is drawn with the suction fan, fresh air containing dust may be introduced through openings of the outer case, e.g., the gap between the projection lens unit and the outer case. As a result, dust may adhere to the optical system and deteriorate the display quality, which reduces the reliability of the apparatus.

The polarized light conversion device is heated because the polarized light separating film and the reflection film absorb some of the incident light. The device has no separate cooling means even though it must be cooled. The polarized light conversion device is therefore cooled by the air circulating from the suction fan to the outlet. Thus, the device may not be efficiently cooled due to insufficient circulation of the cooling air in some apparatus configurations.

SUMMARY OF THE INVENTION

It is therefore an object of the invention to provide a projection display apparatus that includes a cooling system that efficiently cools the power unit and polarized light conversion device while preventing airborne debris from contaminating the apparatus.

In accordance with a first embodiment of the invention, a projection display apparatus includes an optical unit for forming an optical image in response to image information by optically treating light beams emitted from a light source lamp unit and for expansively projecting the optical image on a projection area through a projection lens. The projection display device includes a power unit with a ventilating path provided inside the power unit for circulating cooling air. An outer case stores the optical unit and the power unit. The projection display apparatus further includes a cooling air intake port formed on the outer case and a cooling air conducting means for directly conducting fresh air from

outside the outer case from the cooling air intake port to the inlet of the ventilating path.

Because the cooling air conducting means directly conducts fresh air to the ventilating path, and because fresh air is cooler than the air in the outer case, the interior of the power unit can be cooled with high efficiency.

A ventilating fan for ventilating the interior of the outer case is preferably provided near the light source lamp unit. The air in the outer case, including the air exhausted from the ventilating path, is collected near the light source lamp unit before being exhausted to the exterior. Thus, the heated light source lamp unit can be securely cooled.

It is preferred that the cooling air conducting means include a duct section connecting the cooling air intake port and the inlet of the ventilating path. Accordingly, the duct section only introduces fresh air from the cooling air intake port to the ventilating path. The duct section also prevents the air from the outer case, which is hotter than the fresh air, from entering into the ventilating path. The interior of the power unit can therefore be more efficiently cooled.

The cooling air conducting means may also include a suction fan provided at the inlet of the ventilating path for drawing fresh air into the ventilating path. A large volume of fresh air can therefore be stably supplied to the ventilating path, and the power unit can be securely cooled with high efficiency.

The duct section securely prevents the suction fan from drawing dust into the outer case through openings in the outer case such as the gap between the projection lens unit and the outer case. Dust can therefore be prevented from adhering onto the optical system, which provides high image display quality and satisfactory reliability.

Although the power unit provided with the suction fan does not have to be located inside the outer case, the optical path from the light source lamp unit to the projection lens unit must be provided within the narrow space in the outer case of the projection display apparatus. The power unit is preferably arranged so that the suction fan is located in the free space in the outer case in order to effectively use the space in the outer case.

The projection lens may be provided so as to have an edge protrude from the outer case. The suction fan may be located on the base end of the projection lens unit, and the cooling air intake port may be formed in a region of the bottom wall of the outer case which includes the lower side of the projection lens unit.

In the optical unit, the projection lens unit may protrude from the light source lamp unit and the optical devices so that the combined light from the optical device is incident on the base end of the projection lens. When the projection lens unit is arranged so as to have a front end protrude from the outer case, a dead space is formed at the side of the base end of the projection lens.

Because the power unit has a suction fan located on the base end of the projection lens unit, the apparatus can be miniaturized as a result of the effective use of space in the outer case.

Further, because the cooling air intake port is formed in a region of the lower side of the projection lens unit, the duct section can be provided in the dead space running from the lower side of the projection lens unit to the side of its base end. Accordingly, space in the outer case is effectively used.

In accordance with another aspect of the invention, a projection display apparatus includes an optical unit including a light source lamp unit and a projection lens unit for forming an optical image in response to image information. The apparatus optically treats light beams emitted from the light source lamp unit and expansively projects the optical image on a projection screen through the projection lens unit. An outer case for storing the optical unit and a power unit includes a ventilating fan for ventilating the interior of the outer case near the light source lamp unit. The projection display apparatus further includes a polarized light conversion device facing an emitting surface of the light source lamp unit for separating the light beams emitted from the light source lamp unit into two types of straight polarized light components and for aligning the polarizing direction of the straight polarized light components. A ventilating path is provided inside the outer case for circulating cooling air along at least one face among a light incident face and a light emerging face of the polarized light conversion device.

Because the ventilating path circulates the cooling air along at least one face among the light incident face and the light emerging face of the polarized light conversion device, the cooling air can securely circulate near the polarized light conversion device to achieve satisfactory cooling effects regardless of the configuration of the apparatus.

A guide is preferably provided for introducing the cooling air circulated along at least one face among the light incident face and light emerging face of the polarized light conversion device to the light source lamp unit.

In such an apparatus, the guide introduces the cooling air after cooling the polarized light conversion device to the light source lamp unit to effectively cool the light source lamp unit. The lamp life is therefore prolonged, and replacement of the lamp is required less frequently.

The outer case may be provided with an operating section having a plurality of switches including a main on/off switch for main power. A protruding section may protrude from the main switch between the main switch and the switch adjacent to the main switch. Such a structure prevents erroneous operation of the main switch.

The protruding section is preferably provided along the periphery of the main switch. This structure also prevents careless contact with the main switch and thus securely prevents erroneous operation of the switch.

A circuit board may be provided on the optical unit. A temperature-sensing element may be connected to the circuit board and located near the light source lamp unit to monitor the temperature of the lamp.

Such a structure effectively monitors the temperature of the light source lamp unit while obviating wiring between the temperature-sensing element and the circuit board because the temperature-sensing element is directly mounted on the circuit board.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other aspects and advantages of the invention will become apparent from the following detailed description of preferred embodiments when taken in conjunction with the accompanying drawings, in which:

FIG. 1(A) is a front view and FIG. 1(B) is a rear elevational view of a projection display apparatus in accordance with a preferred embodiment of the invention;

FIG. 2(A) is a top view and FIG. 2(B) is a bottom view of the projection display apparatus in accordance with the preferred embodiment of the invention;

FIG. 3 is an exploded perspective view showing the optical system and the power unit in accordance with the preferred embodiment of the invention;

FIG. 4 is a schematic representation of the optical system in accordance with the preferred embodiment of the invention;

FIG. 5(A) is a cross-sectional view and FIG. 5(B) is an isometric view of the polarized light conversion device in accordance with the preferred embodiment of the invention;

FIG. 6 is a planar cross-sectional view showing the stream of cooling air in the projection display apparatus in accordance with the preferred embodiment of the invention;

FIG. 7 is a cross-sectional view showing the stream of cooling air in the projection display apparatus in accordance with the preferred embodiment of the invention; and

FIG. 8 is a cross-sectional view showing the stream of cooling air in the projection display apparatus in accordance with the preferred embodiment of the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

While the invention will hereinafter be described in connection with preferred embodiments thereof, it will be understood that it is not intended to limit the invention to those embodiments. On the contrary, it is intended to cover all alternatives, modifications and equivalents that may be included within the spirit and scope of the invention as defined by the appended claims.

For a general understanding of the features of the invention, reference is made to the drawings. In the drawings, like reference numerals have been used throughout to designate identical elements.

FIGS. 1(A) and 1(B) are a front view and a rear elevation view, respectively, of a projection display apparatus in accordance with a preferred embodiment of the invention. FIGS. 2(A) and 2(B) are a plan view and a bottom view, respectively, of the projection display apparatus in accordance with the preferred embodiment of the invention.

As shown in FIGS. 1(A)–2(B), the projection display apparatus **1** in accordance with the preferred embodiment has a rectangular parallelepiped outer case **2**. The outer case **2** may include an upper case **3** and a lower case **4**. The rear wall of the outer case **2** is provided with an AC inlet **36** for supplying external power to the apparatus and an input/output terminal group **50**. The apparatus is user-friendly because no signal cables or similar devices are placed on the side at which users generally stand.

The upper case **3** of the outer case **2** includes a rectangular top wall **3***a*, left and right side walls **3***b* and **3***c*, a front wall **3***d* and a rear wall **3***e*. The front wall **3***d* and rear wall **3***e* extend vertically from the four sides of the upper wall toward the lower side. The lower case **4** includes a rectangular bottom wall **4***a*, left and right side walls **4***b* and **4***c*, a front wall **4***d* and a rear wall **4***e*. The front wall **4***d* and rear wall **4***e* vertically extend from the four sides of the bottom wall.

The front wall **3***d* and the front wall **4***d* are dented on slightly left portion of the center as shown in FIG. **2**. The front end of a projection lens unit **6** extends toward the front side of the apparatus from a circular opening formed thereon, and the top of the projection lens unit protrudes from the front face of the outer case **2**.

A zoom ring **61** holding a zoom lens in the protruding section of the outer case **2** has a protuberance **610**, such as a linear knob, extending to the axis line direction. The zoom ring **61** and a focus ring **62** can therefore be tactily distinguished from each other and easily rotated. The protuberance **610** may be provided on the focus ring **62** as long as it does not prevent motion of the focus ring **62**.

As shown in FIG. **1**(A), a light-receiving window **35** is provided on the front wall **3***d* of the upper case **3** on the right of the projection lens unit **6**. The receiving window **35** is provided for receiving control light beams passing through a remote controller not shown in the drawings.

As shown in FIG. **2**(A), a number of holes **25** are formed in the center of the front side of the top wall **3***a* of the upper case **3**. A self-contained speaker (not shown in the drawings) may be located behind the top wall **3***a*.

The center of the front side of the top wall **3***a* is also provided with an operating switch section **26**. A main switch **261** for turning on/off the main power includes a protuberance section **262** provided between the main switch **261** and the adjacent switch **263** among switches formed on the operating switch section **26**. The protuberance section **262** protrudes from the main switch **261** and has an arc shape along the periphery of the circular main switch **261**. The protuberance is preferably located along the periphery of the main switch **261** along a 90 degree arc. Because the arc protuberance **262** protrudes from the top of the main switch **261**, other switches can be operated without erroneously touching the main switch **261**. Erroneous operation of the main switch can therefore be securely prevented.

A foot **31**C is provided in the center of the rear end of the bottom wall **4***a* of the lower case **4**, and feet **31**R and **31**L are provided on the left and right sides of the front end. The height of the left and right feet **31**R and **31**L, as measured from the bottom wall **4***a*, is adjustable by turning the feet.

FIG. **3** shows an arrangement of individual components inside the outer case **2** of the projection display apparatus **1**. The outer case **2** is provided with an optical unit **10** including the above-mentioned projection lens unit **6** and a power unit **7** adjacent to each other therein. A control board **13** for controlling the apparatus and a video board **11** are stacked on the optical unit **10**.

The optical unit **10** includes a light source lamp unit **8** that includes a light source lamp **81** (shown in FIG. **4**) stored in a housing **802**. An optical lens unit **9** optically treats the light beams emitted from the light source lamp unit **8** and forms an optical image in response to image information. A projection lens unit **6** expansively projects the optical image onto a projection screen. The optical unit **10** occupies at least the right half of the internal space of the outer case **2**.

The optical lens unit **9** includes a prism unit **910** and upper and lower light guides **901** and **902** containing various

optical devices as described below. The upper and lower light guides **901** and **902** are fixed to the upper case **3** and the lower case **4** shown in FIGS. **1**(A) and **2**(B), respectively, with fixing screws.

A rectangular cutout **9001** in the plan view shown in FIG. **3** is formed in the center on the front side of the light guides **901** and **902** to facilitate assembly of the prism unit **910**.

The prism unit **910** is attached to a thick diecast head plate **903** formed of magnesium or aluminum, and is fixed to the light guides **901** and **902** via the head plate **903**.

The head plate **903** is L-shaped which includes a vertical wall **91** along the width direction of the apparatus and a bottom wall **92** (shown in FIG. **7**) horizontally extending from the bottom of the vertical wall **91**. The prism unit **910** is fixed on the bottom wall **92**. In the center of the vertical wall **91**, a rectangular opening (not shown) is provided as a passageway for the light emerging from the prism unit **910**. The base end of the projection lens unit **9** is fixed to the rectangular opening. The prism unit **910** and the projection lens unit **6** are fixed to the optical lens unit **9** so as to sandwich the stiff vertical wall **91** therebetween after the optical system is aligned. These units are therefore formed integrally, and misalignment of the optical system due to strong impact will rarely occur.

The base end of the projection lens unit **6** is located in the center of the front side of the optical lens unit **9**, and a gap in response to the protruded length of the projection lens unit **6** from the outer case **2** is formed on the side of the base end, i.e., between the head plate **903** and the front walls **3***d* and **4***d* of the outer case **2**.

The corner portion of the rear section of optical lens unit **9** at the side of the power unit **7** includes an indent, and the light source lamp unit **8** is assembled in the indent. That is, the light source lamp unit **8** is provided at a rectangular area formed by the rear end of the power unit **7** and the indent in the optical lens unit **9**.

A lamp-replacement cover **27** is fixed with a screw to the bottom of wall **4***a* of the lower case **4**. A lamp can be replaced by loosening the screw and removing the cover **27** to expose the light source lamp unit.

A control board **13** for controlling the apparatus is fixed with screws on the upper face of the optical lens unit **9**. A video board **11** including a video signal treating circuit is provided on the control board **13**.

Because the control board **13** is fixed to the upper face of the optical unit **10** with screws, the control board **13** and the optical unit **10** can be tested using external power even when the whole assembly is not completed, such as in OEM production in which the control board **13** and the optical unit **10** are fixed. The control board **13** has a cutout section **130** at a location corresponding to, and overlapping with, the prism unit **910**. The boards **11** and **13** are electrically connected to each other through connectors **114** and **116**.

The power unit **7** is disposed on the left side of the optical unit **10** in the left side of the outer case **2** in the rear view of the display apparatus **1** as shown in FIG. **3**.

The power unit **7** has an L shape to match the shape of the space between the outer case **2** and the optical unit **10**. The power unit includes a main body **71** located from the rear to the front of the apparatus and includes an extension **72** bending from the front end of the main body **71**. The extension **72** is located at the side of the base end of the projection lens unit **6**.

The gap at the side of the base end of the projection lens unit **6**, which increases as the protruded length of the projection lens unit **6** from the front end of the outer case **2** decreases, is filled with the extension **72** of the power unit **7**. The interior of the outer case **2** is therefore effectively used to miniaturize the projection display apparatus **1**.

The power unit **7** contains various electronic parts in an L-shaped metallic shield case **70**. The shield case **70** acts as a ventilating path for circulating cooling air in the power unit **7**. Also, the shield case **70** prevents leakage of electrical and magnetic noises generated in the power unit **7**, and shields AC input and output lines accompanied with the power unit **7** to shut out noises generated from them.

The shield case **70** stores a primary active filter, a power supply, and a ballast or similar device not shown in the drawings. These devices may include circuit boards including various electronic components. For example, the circuit board of the primary active filter includes components such as a transmission FET. The circuit board of the power supply includes a rectifier diode bridge, an oscillating transistor for a D/D converter and a triode regulator for a D/D converter. The circuit board of the ballast includes a driving FET for a chopper circuit and a reverse-current preventing diode for a chopper circuit. Because these devices are heat sources, they are fixed to heat sinks to enhance cooling efficiency.

Various optical parts are densely packed in the outer case **2** so as not to form a dead space. It is therefore difficult to provide a conventional metallic chassis over the entire outer case **2**. A flexible shielding sheet (not shown) can cover the entire case without forming a dead space.

The optical system assembled in the optical unit **10** is described with reference to FIG. **4**. The optical system in accordance with this embodiment includes an illuminating optical system **923** that includes a light source lamp unit **8**, integrator lenses **921** and **922** and a polarized light conversion device **920**. The optical system includes a color-separating optical system **924** for separating the light beams W emerging from the illuminating optical system **923** into red (R), green (G) and blue (B) light beams. Three liquid crystal light valves **925**R, **925**G and **925**B modulate the color light beams. A prism unit **910** recombines the modulated light beams and a projection lens unit **6** expansively projects the recombined light beams on a screen.

The light source lamp **81** of the light source lamp unit **8** is provided with a lamp **805** such as a halogen lamp, a reflector **806** and a glass face **807** adhered to the front surface of the reflector **806**. The light source lamp **81** is stored in a housing **802** so as to expose the glass face **807** (see FIGS. **3** and **8**). The light from the lamp **805** emerges toward the integrator lens **921** of the optical lens unit **9** through the glass face **807** in the direction perpendicular to the direction of the apparatus **1**.

The light source lamp **81** may be a halogen lamp, a metal halide lamp, a xenon lamp or the like.

The illuminating optical system **923** includes two integrator lenses **921** and **922**, each of which includes a matrix of fine lenses. A polarized light conversion device **920** is

disposed parallel to the integrator lenses **921** and **922** and a collective lens **930** is disposed perpendicular to the polarized light conversion device **920**. A reflection mirror **931** is provided in front of the collective lens **930**, i.e., between the polarized light conversion device **920** and the collective lens **930**. The reflection mirror **931** perpendicularly reflects the central optical axis **1***a* from the light source lamp **81** toward the front section of the apparatus.

The integrator lens **921** divides the light beams from the light source lamp unit **8** into a plurality of partial light beams which are collected near the integrator lens **922**.

The integrator lens **922** arranges central optical paths of partial light beams from the integrator lens **921** so as to be parallel to the optical axis **1***a*. When light beams from the light source lamp unit **8** are perfectly parallel to the optical axis **1***a*, the central optical path of each partial light beam from the integrator lens **921** is also parallel to the optical axis **1***a*. Therefore, the integrator lens **922** may be omitted when the light beams from the light source lamp unit **8** are highly parallel to the optical axis **1***a*.

The collective lens **930** collects partial light beams onto the light valves **925**R, **925**G and **925**B.

As described above, in the projection display apparatus **1** in accordance with this embodiment, the light beams from the light source lamp unit **8** are divided into a plurality of partial light beams with the integrator lens **921**. The partial light beams are collected onto the liquid crystal light valves **925**R, **925**G and **925**B by the collective lens **930**. Therefore, the liquid crystal light valves **925**R, **925**G and **925**B can be illuminated with substantially uniform light, resulting in an image having less irregular illumination.

The polarized light conversion device **920** includes an integration of a polarized light separation film and a λ/2 phase plate in which the incident light is separated into P-polarized light and S-polarized light and then unified into S-polarized light. As shown in FIG. **5**, the polarized light conversion device **920** is provided with a polarized beam splitter array **9201** and a selective phase plate **9202**. The polarized beam splitter array **9201** includes a plurality of pillar transparent plates **9203** each bonded to each other and having a cross-section in the form of a parallelogram. Polarized light separation films **9204** and reflection films **9205** are alternately disposed between the transparent plates. The polarized beam splitter array **9201** is made by bonding a plurality of glass plates having these films so as to alternately arrange the polarized light separation films **9204** and reflection films **9205**. The glass plates are obliquely cut at a given angle.

The unpolarized light from the integrator lenses **921** and **922** (shown in FIG. **4**) is separated into S-polarized light and P-polarized light with the polarized light separation film **9204**. The S-polarized light is substantially vertically reflected by the polarized light separation film **9204** and vertically reflected by the reflection film **9205**. The P-polarized light passes through the polarized light separation film **9204**. The selective phase plate **9202** comprises a λ/2 phase layer **9206** formed on the surface of the transparent plate **9203** which transmits the light passing through the polarized light separation film **9204**. The λ/2 phase layer is not formed on the surface of the transparent plate **9203** which transmits the light reflected from the reflection film **9205**. The P-polarized light passing through the polarized light separation film **9204** therefore emerges after being converted to S-polarized light by the λ/2 phase layer **9206**. As a result, substantially S-polarized light beams emerge from the polarized light conversion device **920**.

The use of only the S-polarized light improves color separation characteristics of dichroic mirrors **941** and **942** (shown in FIG. **4**) of the color separating optical system **924** described below in relation to use of unpolarized light. Further, the S-polarized light has a higher reflectance than that of the P-polarized light to the mirror, and thus light loss by reflection can be suppressed.

Referring to FIG. **4**, the color separating optical system **924** includes a blue and green light reflecting dichroic mirror **941**, a green light reflecting dichroic mirror **942** and a reflection mirror **943**.

In the color separating optical system **924**, light beams (W) are radiated to the blue and green light reflecting dichroic mirror **941**, and the red light beam passing through the mirror **941** is perpendicularly reflected by a rear reflection mirror **943** and emerges from a red light emerging section **944** toward a prism unit **910**.

Blue light beams (B) and green light beams (G) in the light beams (W) are perpendicularly reflected by the blue and green light reflecting dichroic mirror **941** toward the green light reflecting dichroic mirror **942**. Only green light beams are perpendicularly reflected by the green light reflecting dichroic mirror **942** and emerge from a green light emerging section **945** toward the prism unit **910**. The blue light beams (B) passing through the green light reflecting dichroic mirror **942** emerge from a blue light emerging section **946** through a light-guiding system **927** toward the prism unit **910**.

The light-guiding system **927** leads the blue light beams (B) to the corresponding liquid crystal light valve **925**B and includes an incident side reflection mirror **971**, an emerging side reflection mirror **972**, an intermediate lens **973** provided therebetween and a collective lens **976** provided ahead of the incident side reflection mirror **971**. The distance to the blue (B) light emerging section **946** is the longest among distances from the illuminating optical system **923** to red (R), green (G) and blue (B) light emerging sections **944**, **945** and **946**. Provision of the light-guiding system **927** prevents light loss.

Red (R) and blue (B) light emerging sections **944** and **945** of the color separating optical system **924** are provided with collective lenses **951** and **952**, respectively. Red light beams (R) and green light beams (G) emerging from their respective emerging sections **944** and **945** are paralleled by their respective collective lenses **951** and **952**.

Parallel red light beams (R) and green light beams (G) are incident on liquid crystal light valves **925**R and **925**G through polarizing plates **981** and **982** and are modulated into image information. A driving means (not shown) switches the light valves **925**R and **925**G in response to the image information to modulate color light beams passing through.

As with the red and green light beams (R) and (G), the blue light beams (B) passing through the light-guiding

system **927** are paralleled by the collective lens **953** provided at the blue (B) light emerging section **946**. The blue light beams are incident on the liquid crystal valve **925**B through a polarizing plate **983**, and are modulated in response to the image information.

The liquid crystal valves **925**R, **925**G and **925**B may use a polysilicon TFT as a switching device.

The modulated color light beams from the liquid crystal panels **925**R, **925**G and **925**B are incident on the prism unit **910**, which includes a dichroic prism, and are recombined. The recombined color image is expansively projected through the projection lens unit **6** onto a projection screen provided at a given position.

In the optical unit **10** in accordance with this embodiment, the illuminating optical system **923**, the color separating optical system **924**, the liquid crystal light valves **925**R, **925**G and **925**B, the polarizing plates **981** to **983**, and the light-guiding system **927** are arranged in the above-mentioned light guides **901** and **902** (shown in FIG. **3**) after the optical axis is aligned.

In this embodiment, light beams emitted from the light source lamp unit **8** are reflected by the reflection mirror **931**, travel a long L-shaped optical path and reach the prism unit **910** through the color separating optical system **924**. The optical path is therefore preferred to be as long as possible, since individual optical parts are arranged in the narrow region. Thus, the light beams from the light source lamp unit **8** are paralleled and transmitted to the liquid crystal valves **925**R, **925**G, and **925**B while lenses having low F values are used and positioning space of the integrator lenses **921** and **922** and the polarized light conversion device **920** are sufficiently secured. Since a wide space is secured for the integrator lenses **921** and **922**, the number of division of the lenses can be increased. The integrator lenses **921** and **922**, therefore, can be arranged close to each other, resulting in miniaturization of the apparatus.

The structure for cooling the projection display apparatus in accordance with the embodiment is described with reference to FIGS. **3**, **6** and **7**. In the apparatus **1**, fresh air (cooling air) drawn from a cooling air intake port **150** formed in the outer case **2** is circulated in the outer case **2** to cool heat sources in the case **2**. The air is exhausted from an air outlet **160** on the rear end of the outer case **2**.

The cooling air intake port **150** includes a plurality of vent holes **151** formed on the bottom wall **4***a* of the lower case **4** shown in FIG. **3**. These vent holes **151** are formed over the region **150**A under the prism unit **910** and the region **150**B under the base end of the projection lens unit **6**.

A spongy air filter **241** covers the entire regions **150**A and **150**B having the vent holes **151**. An air filter cover **23** is fixed with screws to the exterior of the bottom wall **4***a* of the lower case **4** to enclose the spongy filter **241**. The air filter cover **23** also has a number of vent holes **231**. The air filter is provided so as to cover both regions **150**A of the optical lens unit **9** and **150**B of the projection lens unit **6**. A single cover structure saves labor for exchanging the air filter **241** and improves dust control.

The second half of the cooling air intake port **150**, i.e., the region **150**A under the prism unit **910**, is provided with a suction fan **15** as shown in FIG. **7**. The suction fan **15** is fixed to the lower face of the bottom wall **92** of the head plate **903** mounting the prism unit **910**. The bottom wall **92** of the head plate **903** is provided with a vent hole (not shown) for circulating the cooling air.

The first half of the cooling air intake port **150**, i.e., the region **150**B under the projection lens unit **6**, is formed near the extension **72** of the power unit **7** which is located on the base end of the projection lens unit **6**. As shown FIG. **6**, the end of the extension **72**, i.e., the end of the shield case **70** at the side of the projection lens unit **6**, is used as an inlet for a ventilating path formed in the case **70**. The rear end of the main body **71** or the end of the shield case **70** is used as an outlet of the ventilating path.

The inlet of the ventilating path is provided with an auxiliary cooling fan **17** which acts as a cooling air conducting means, i.e., a suction fan for introducing cooling air into the power unit **7**. The auxiliary cooling fan **17** introduces air into the ventilating path through the inlet at the front section of the shield case **70**. The air in the ventilating path is exhausted from the outlet at the rear section of the case **70**.

The auxiliary cooling fan **17** and the region **150**B under the projection lens unit **6** are connected to each other by a duct cover **170**. The duct cover **170** forms a duct section defining an air path as shown in FIG. **3** to directly introduce fresh air from the cooling air intake port **150** to the power unit **7**.

An air outlet **160** with an exhaust fan **16** are provided at the rear end of the apparatus, i.e., behind the power unit **7** and the light source lamp unit **8**. The air outlet is provided at the rear end of the apparatus so that air is not exhausted onto users. The exhaust fan **16** is attached to the housing **802** so as to cover the opening formed on the side face of the housing **802** of the light source lamp unit **8** and exhausts the air in the outer case **2** through the housing **802**.

In the above-mentioned projection apparatus **1**, the cooling air intake port **150** may include a suction fan **15** provided under the prism unit **910**. The prism unit **910** may be surrounded on three sides with liquid crystal light valves **925**R, **925**G and **925**B at given distances. The front side of the prism unit **910** faces the projection lens unit **6**. The control board **13** covers the upper face of the optical unit **10** and has a cutout section **130** at the position corresponding to the prism unit **910**. A video board **11** may be overlaid upon the control board **13**.

Air introduced from the cooling air intake port **150** is drawn to the exhaust fan **16** and rises along the side faces of the prism unit **910** as shown by arrow A1 of FIG. **7** to cool the prism unit **910**, the liquid crystal valves **925**R, **925**G and **925**B, and the polarizing plates **981**–**983**. The cooling air that reaches the upper portion of the prism unit **910** is drawn by the exhaust fan **16** toward the light source lamp unit **8** through the space between the video board **11** and the control board **13**, as shown by arrow A2 in FIG. **7**. The air cools the light lamp unit **8** and is exhausted from the air outlet **160**. The circuits on the boards **11** and **13** can therefore be cooled by the cooling air introduced from the bottom wall of the outer case **2** to the air path. Because the cooling air cools the hot light source lamp unit **8** after cooling the boards **11** and **13**, a high cooling efficiency can be achieved.

The cooling air from the cooling air intake port **150** provided at the bottom wall of the outer case **2** cools at least the prism unit **910**, the liquid crystal light valves **925R**, **925G** and **925B**, the polarizing plates **981–983** and the light source lamp unit **8**. Because these parts are densely arranged in the narrow region, they can be effectively cooled, resulting in improved reliability of the optical elements.

The cooling air (fresh air) is also drawn from the cooling air intake port **150** by means of the auxiliary cooling fan **17** provided on the power unit **7**. The air is introduced into the power unit **7** through the duct cover **170**, i.e., the ventilating path in the shield case **70** as shown by arrow A3 of FIG. **6**. The cooling air is drawn by the exhaust fan **16** through the interior of the power unit **7** from the extension **72** to the main body **71** in order to cool the power unit **7**, and is exhausted from the air outlet **160**.

The heat sinks provided on the electronic components in the power unit **7** must also be cooled. Because the cooling air (fresh air) from the cooling air intake port **150** is directly introduced to the ventilating path in the shield case **70**, the heat sinks can be effectively and securely cooled. Direct supply of the low-temperature fresh cooling air to the power unit **7** efficiently dissipates heat from the heat sinks as compared with the introduction of air that has already cooled other parts.

Because the auxiliary cooling fan **17** and the first half of the cooling air intake port **150** are connected to each other through the duct cover **170**, only fresh air can be introduced from the exterior of the outer case **2** to the ventilating path in the shield case **70**. Thus, the power unit **7** is efficiently cooled.

The use of the auxiliary cooling fan **17** enables a stable supply of a large volume of fresh air to the ventilating path, ensuring efficient cooling of the power unit **7**.

Further, the auxiliary cooling fan **17** is connected to the cooling air intake port **150** through the duct cover **170**. Such a configuration securely prevents dust from being sucked through the space between the projection lens unit **6** and the outer case **2** when the fan **17** is operated. Dust is prevented from adhering onto the optical system and a high quality display image is obtained with high reliability.

As shown in FIGS. **3** and **6**, temperature-sensing elements **S1** and **S2** are directly mounted on the control board **13** near heating sources, i.e., the prism unit **910**, the liquid crystal light valves **925R**, **925G** and **925B**, and the light source lamp unit **8**. The temperature sensing elements **S1** and **S2** monitor extraordinary temperature fluctuations of the air heated by the heat sources. Direct mount of the temperature-sensing elements **S1** and **S2** on the control board **13** eliminates the need for additional wiring.

In the optical unit **10** in this embodiment as shown. in FIG. **8**, ventilating paths that include vertical gaps are provided between the two integrator lenses **921** and **922** and between the integrator lens **922** and the polarized light conversion device **920**. A plurality of intake ports **909** are provided at regions below the integrated lenses **921** and **922** and the polarized light conversion device **920**. These gaps and intake ports **909** form optical paths which also circulate cooling air along at least one face of the light incident face and the light emerging face of each of the integrator lenses **921** and **922** and the polarized light conversion device **920**.

A guide plate **89** is provided above the integrator lenses **921** and **922** and the polarized light conversion device **920** to introduce cooling air. The cooling air is circulated along at least one face of the light incident face and the light emerging face of each optical element to a hood **848** which is provided on a housing **802** of the light source lamp unit **8**.

The integrator lenses **921** and **922** and the polarized light conversion device **920** are cooled with the cooling air drawn from the cooling air intake port **150** by the suction fan **15**.

The cooling air introduced from the cooling air intake port **150** into the outer case **2** is drawn by the exhaust fan **16** provided behind the light source lamp unit **8** and introduced into the optical lens unit **9** through the intake ports **909** of the lower light guide **902**. The cooling air rises in the ventilating paths along the light incident face and emerging face of the integrator lenses **921** and **922** and the polarized light conversion device **920** as shown by arrows A7 of FIG. **8**.

Because the polarized light conversion device **920** partially absorbs incident S-polarized light through the polarized light separation film **9204** and the reflection film **9205** (see FIG. **5**), it becomes heated. Accordingly, ventilating paths are provided along the polarized light conversion device **920** to securely cool it with circulating cooling air.

The cooling air which rises between the polarized light conversion device **920** and the integrator lenses **921** and **922** is introduced to the hood **848** of the housing **802** along the guide plate **89**, as shown by arrow A8 of FIG. **8**. The air that has risen then enters into the housing **802** to cool the light source lamp **81** and is exhausted via the air outlet **160**.

Because the cooling air which cools the polarized light conversion device **920** and the integrator lenses **921** and **922** is conducted to the light source lamp unit **8** by the guide plate **89**, it can securely and effectively cool the light source lamp unit **8**.

A portion of the cooling air that is introduced into the optical lens unit **9** is drawn toward the light source lamp unit **8** by the exhaust fan **16** and rises along the glass face **807** of the light source lamp unit **81** to cool the glass face **807**, as shown by arrow A9 of FIG. **8**. The air which cools the glass face **807** is drawn into the housing **802** through the hood **848** of the housing **802** and is also drawn into the gaps between the light source lamp **81** and the housing **802** to cool the light source lamp **81**. The air is then exhausted through the air outlet **160**.

Accordingly, the light source lamp **81** and the optical elements are efficiently maintained at a cool temperature, resulting in more reliability for the lamp **81** and the optical elements and requiring less frequent changing of the light source lamp **81**.

Although the above-mentioned embodiment describes an apparatus in which the inlet of the ventilating path of the power unit **7** is formed on the end face of the shield case **70** at the side of the projection lens unit **6**, the inlet may be provided on many alternative surfaces, for example, on the front side face of the shield case at the projection face. In this case, the cooling air intake port may be provided on the side face of the outer case **2** at the projection face side to directly connect the cooling air intake port with the inlet of the ventilating path.

The power unit **7** is cooled with great efficiency because a cooling air conducting means is provided for directly introducing fresh air into a ventilating path provided inside the power unit. Direct introduction of fresh air into the ventilating path permits cooling of the interior of the power unit by fresh air, which is cooler than the air in the outer case **2**, and accordingly results in greater cooling efficiency.

Also, a ventilating path is provided to direct the cooling air along the polarized light conversion device in the outer case **2**. The ventilating path securely circulates the cooling air near the polarized light conversion device regardless of the structure of the projection display apparatus, resulting in a satisfactory cooling effect.

While the invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications and variations may be apparent to those skilled in the art. Accordingly, the preferred embodiments of the invention as set forth herein are intended to be illustrative, not limiting. Various changes may be made without departing from the spirit and scope of the invention as defined in the following claims.

What is claimed is:

1. A projector, comprising:

an optical unit including a light source lamp and a projection lens, the optical unit forming an optical image in response to image information by optically treating light beams emitted from the light source lamp and expansively projecting the optical image through the projection lens;

a power unit including a ventilating path provided inside the power unit for circulating cooling air;

an outer case that stores the optical unit and the power unit;

a first cooling air intake port located on the outer case that provides cooling air from outside of the outer case to the optical unit; and

a second cooling air intake port located on the outer case that directly conducts cooling air from the outside of the outer case to the ventilating path, said second cooling air intake port comprising:

an air inlet provided on the power unit, and

a duct connecting said second cooling air intake port and the air inlet.

2. The projector according to claim **1**, further including a ventilating fan that ventilates an interior portion of said outer case.

3. The projector according to claim **1**, said second cooling air intake port further comprising:

a suction fan provided at the air inlet that draws in the air.

4. The projector according to claim **3**, the projection lens having an edge that protrudes from the outer case,

the suction fan being located on a base end of the projection lens in the power unit, and

the second cooling air intake port being formed in a region of a bottom wall of said outer case that includes a lower side of the projection lens.

5. A projector, comprising:

an optical unit including a light source lamp and a projection lens, the optical unit forming an optical image in response to image information by optically treating light beams emitted from the light source lamp and expansively projecting the optical image through the projection lens;

a power unit including an air inlet and an air outlet;

an outer case that stores the optical unit and the power unit;

a first cooling air intake port located on the outer case that provides cooling air from outside of the outer case to the optical unit;

a second cooling air intake port located on the outer case that directly conducts cooling air from the outside of the outer case to the air inlet; and

an exhaust vent provided on the outer case that directly conducts air exhausted from the air outlet to the outside of the outer case.

6. The projector according to claim **5**, further including a ventilating fan provided between the air outlet and the exhaust vent.

7. The projector according to claim **5**, said second cooling air intake port further comprising:

a duct connecting said second cooling air intake port and the air inlet.

8. The projector according to claim **5**, said second cooling air intake port further comprising:

a suction fan provided at the air inlet that draws in the air.

9. The projector according to claim **8**, the projection lens having an edge that protrudes from the outer case,

the suction fan being located on a base end of the projection lens in the power unit, and

the second cooling air intake port being formed in a region of a bottom wall of said outer case that includes a lower side of the projection lens.

* * * * *

CERTIFICATE OF SERVICE

I hereby certify that two copies of the foregoing **APPELLANT'S BRIEF OF SEIKO EPSON CORPORATION** were served this 11th day of February 2011, as follows:

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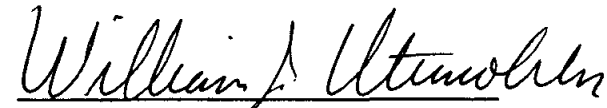

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February 11, 2011
(Date)