

# United States Court of Appeals for the Federal Circuit

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**SCIENTIFIC PLASTIC PRODUCTS, INC.,**  
*Appellant,*

v.

**BIOTAGE AB,**  
*Appellee.*

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2013-1219, -1220, -1221

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Appeals from the United States Patent and Trademark Office, Patent Trial and Appeal Board in Reexamination Nos. 95/000,495, 95/000,496, and 95/000,497.

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Decided: September 10, 2014

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FREDERICK C. LANEY, Niro, Haller & Niro, of Chicago, Illinois, argued for appellant. With him on the brief was PAUL K. VICKREY. Of counsel on the brief was DAVID M. QUINLAN, David M. Quinlan, P.C., of Princeton, New Jersey.

GEORGE C. BECK, Foley & Lardner, LLP, of Washington, DC, argued for appellee. With him on the brief were MICHAEL R. HOUSTON, of Chicago, Illinois, and DEBRA D. NYE, of San Diego, California.

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Before NEWMAN, MOORE, and WALLACH, *Circuit Judges*.

Opinion for the court filed by *Circuit Judge* NEWMAN.

Dissenting opinion filed by *Circuit Judge* MOORE.

NEWMAN, *Circuit Judge*.

Scientific Plastics Products, Inc. (SPP) is the owner of the three United States Patents here at issue: No. 7,138,061 (the '061 patent), No. 7,381,327 (the '327 patent), and No. 7,410,571 (the '571 patent), which relate to a resealable cartridge for low pressure liquid chromatography (LPLC). The '061 patent claims a method of performing LPLC using the cartridge, the '571 patent claims the cartridge, and the '327 patent claims a modified cartridge. After SPP filed suit against Biotage AG for patent infringement, Biotage requested *inter partes* reexamination of the three patents. The district court then stayed the infringement litigation.

The patent examiner rejected all claims of the three patents on the ground of obviousness, and the Patent Trial and Appeal Board affirmed the rejections and cancelled all claims.<sup>1</sup> We affirm the Board's decisions.

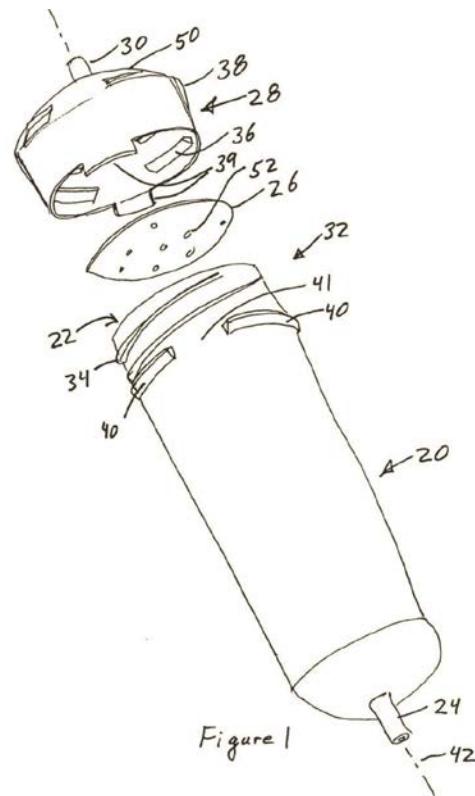
#### BACKGROUND

The SPP patents discuss the need for a low cost resealable cartridge for LPLC that provides a fluid tight seal under pressure. The claimed cartridge, illustrated at Figure 1 of the '327 patent, comprises a tubular container

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<sup>1</sup> *Biotage AB v. Scientific Plastic Prods., Inc.*, No. 2012-007321, 2012 WL 6043584 (P.T.A.B. Nov. 30, 2012) ('327 patent); No. 2012-007322, 2012 WL 6043585 (P.T.A.B. Nov. 30, 2012) ('061 patent); No. 2012-012468, 2012 WL 6043586 ('571 patent) (P.T.A.B. Nov. 30, 2012). The opinion for each appeal is effectively identical; Board Op. citations herein are to the '061 patent decision.

20 having a threaded polymer cap 28 and a sealing flange 40.



Claim 1 of the '327 patent is the broadest cartridge claim:

1. A low pressure liquid chromatographic cartridge having a longitudinal axis, comprising:  
a tubular polymer container adapted to receive a chromatographic packing material, the container having an outlet port located at a downstream end of the container and configured for connecting to chromatographic equipment during use of the cartridge, the container having container threads formed on an upstream end of the container and a lip defining an opening to the

container with an inward facing inclined sealing surface adjacent the lip and facing the longitudinal axis;

a polymer cap having an inlet port located on an upstream end of the container, the port being configured for connecting to chromatographic equipment during use of the cartridge, the cap having cap threads located on a skirt of the cap to threadingly engage the container threads;

an annular sealing flange depending from the cap and located radially closer to the longitudinal axis than the skirt, the flange having an outward facing inclined sealing surface facing away from the axis with an upstream end of the flange being further from the axis than a downstream distal end of the flange; the outward facing inclined surface on the flange generally aligned with and located to abut the inward facing inclined surface on the container to form a resilient fluid tight seal between the cap and container suitable for use in low pressure liquid chromatography when the cap is screwed onto the container.

The primary issue on reexamination concerned the obviousness of combining the LPLC cartridge shown in the Yamada reference with the King or Strassheimer pressure-resistant caps. These references are:

*U.S. Patent No. 5,693,223 (Yamada):*

Yamada shows an LPLC cartridge having a tubular polymer container with an open upstream end and an outflow at the downstream end. Yamada shows a threaded polymer cap for the cartridge that is "detachably" fitted to the corresponding threaded upstream end of the cartridge body. Yamada further shows an O-ring in the cap to ensure liquid tightness. The examiner found that Yamada discloses all of the features of the SPP cartridge

except for the complementary inclined sealing surfaces of the cap and the lip of the container.

*PCT publication WO 2002/42171A1 (King):*

King relates to “improved seals for container closure assemblies,” and is “especially applicable to the sealing of containers in substantially gas-tight and liquid-tight fashion, such as the sealing of . . . beverage containers.” King shows a “container closure assembly” with a threaded polymer cap that ensures a fluid tight seal. The examiner found that King shows sealing surfaces that have oppositely inclined surfaces with respect to the cap and lip of the container, as in the SPP closure.

*U.S. Patent No. 5,100,013 (Strassheimer):*

Strassheimer relates to plastic bottles and closures therefor that are “especially useful for carbonated beverages.” Strassheimer shows a plastic threaded cap that ensures a fluid tight seal “even after repeated use.” The examiner found that Strassheimer shows a taper on the lip of the plastic container that corresponds to a taper on the cap, as in the SPP closure.

The examiner concluded that it would have been obvious to combine the cartridge of Yamada with the cap of either King or Strassheimer. On appeal to the Board, SPP challenged (1) the examiner’s determination that King and Strassheimer were “analogous art” and (2) that it would have been obvious to combine the LPLC cartridge of Yamada with the pressure-resistant resealable cap of either King or Strassheimer.

To be deemed “analogous art,” a reference outside an inventor’s field of endeavor must be “reasonably pertinent” to the particular problem with which the inventor is involved, such that a person of ordinary skill would reasonably have sought a solution to the problem in that outside field. The Board stated that “[h]ere, Patent Owner identifies one of the purposes of the ’061 Patent as

forming an LPLC cartridge that ‘would allow a user to easily vary and access the cartridge’s contents without destroying its ability to be sealed and function under the LPLC pressures.’” Board Op. at \*6 (quoting Appellant Br. 11). The Board found that King and Strassheimer were relevant to SPP’s identified purpose, and therefore were analogous art:

Therefore, it was reasonable for the Examiner to find that one of ordinary skill in the art would have found the disclosures of King and Strassheimer relevant in constructing a plastic container that achieves a fluid tight seal at elevated pressure, while preserving access to the container in order to easily vary its contents.

Board Op. at \*7.

The Board also addressed SPP’s argument that the examiner failed to provide adequate reasoning for combining Yamada with King or Strassheimer. The Board found that the specification of the SPP patents identified a leakage problem associated with threaded connections between the polymer cap and polymer body in LPLC cartridges, and that Yamada’s use of an O-ring in the cartridge “implicitly acknowledges” potential leakage. *Id.* The Board concluded that this known problem “provides a reason for one of ordinary skill to have turned to King or Strassheimer to improve the sealing arrangement set forth in Yamada.” *Id.*

#### DISCUSSION

Criteria for determining whether prior art is analogous may be summarized as “(1) whether the art is from the same field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the inventor’s endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.” *In re Clay*, 966 F.2d 656, 658–

59 (Fed. Cir. 1992). The question here is whether King or Strassheimer meets the second criterion. Precedent provides guidance as to when a reference is reasonably pertinent to the problem:

“A reference is reasonably pertinent if . . . it is one which, because of the matter with which it deals, logically would have commended itself to an inventor’s attention in considering his problem. If a reference disclosure has the same purpose as the claimed invention, the reference relates to the same problem, and that fact supports use of that reference in an obviousness rejection.”

*Innovention Toys, LLC v. MGA Entm’t, Inc.*, 637 F.3d 1314, 1321 (Fed. Cir. 2011) (quoting *Clay*, 966 F.2d at 659); *see also In re Klein*, 647 F.3d 1343, 1348 (Fed. Cir. 2011) (same standard). The pertinence of the reference as a source of solution to the inventor’s problem must be recognizable with the foresight of a person of ordinary skill, not with the hindsight of the inventor’s successful achievement. *See In re Oetiker*, 977 F.2d 1443, 1447 (Fed. Cir. 1992) (“Patent examination is necessarily conducted by hindsight, with complete knowledge of the applicant’s invention . . . .”); *see also KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2006) (“A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning.”).

The Board found that the central purpose of the SPP inventors was to form “an LPLC cartridge that ‘would allow a user to easily vary and access the cartridge’s contents without destroying its ability to be sealed and function under LPLC pressures.’” Board Op. at \*6 (quoting Appellant Br. 11). The Board concluded that a person of ordinary skill seeking such a cartridge would reasonably look to sealing arrangements for other pressurized systems. Thus the Board held that replacement of the

sealing arrangement of Yamada with the sealing arrangement of King or Strassheimer was an obvious solution to the problem of providing a resealable cartridge that achieves a fluid tight seal at elevated pressures.

SPP disagrees with the Board's characterization, and states that the purpose of its invention is to "provide chemists with a low cost disposable chromatography cartridge that can function under LPLC pressures and simplify the chemist's ability to control the chromatographic packing material and the introduction of fluids into the cartridge under pressure." Appellant Br. 25–26. SPP argues that the needs identified in the specification are specific to flash chromatography, and that chemists in laboratories would not look to "soda-pop" bottle caps to solve problems with flash chromatography cartridges. However, the analogous art inquiry does not exclude references "not within the field of the inventor's endeavor," if a person of ordinary skill would reasonably look to that reference in order to solve the problem confronting the inventor. *In re Clay*, 966 F.2d at 659.

SPP states that the purposes of the invention and the prior art must be considered as a whole, in contrast to focusing on specific components. SPP argues that "[b]y focusing just on sealing issues, the Board improperly narrowed its focus to commonality for particular features instead of answering the central question of whether the reference's field itself is even one a skilled artisan would have reasonably looked to, which requires a focus on the claimed invention." Appellant Br. 33.

The Board observed that when the problem an invention is designed to solve is not unique to the specific field of the invention, it is not improper for the trier of fact to consider whether a person of ordinary skill would consult a different art in order to solve the problem. See *In re Paulsen*, 30 F.3d 1475, 1481–82 (Fed. Cir. 1994) (affirming rejection of a laptop computer hinge as obvious over

hinged cabinets, piano lids, etc., because the “problem is not unique to portable computers”); *Pentec, Inc. v. Graphic Controls Corp.*, 776 F.2d 309, 314 (Fed. Cir. 1985) (affirming invalidation of a patent for a hinged pen arm because a person skilled in pen art would have looked to hinge and fastener art for a way to attach a pen to a pen arm).

Other cases have found that a particular reference was not analogous art when the field was not an obvious area to be consulted. In *In re Oetiker*, the court held that a person of ordinary skill, seeking to solve the problem of fastening a hose clamp, would not reasonably be expected to look to the field of fasteners for women’s garments. See 977 F.2d at 1446–47 (“The Board apparently reasoned that all hooking problems are analogous.”). The analogous art inquiry is a factual one, requiring inquiry into the similarities of the problems and the closeness of the subject matter as viewed by a person of ordinary skill.

Here, the King and Strassheimer references address the problem of providing a fluid tight seal at elevated pressures, between a container and a resealable cap. This is sufficiently close to the problem addressed by the claimed invention; substantial evidence supports the Board’s finding that King and Strassheimer are available as prior art.

The question remains as to whether combining the cartridge of Yamada with the pressure-resistant cap of King or Strassheimer would have been obvious to a person of ordinary skill in the field of liquid chromatography devices. In *KSR*, the Court explained:

[A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. Although common sense directs one to look with care at a patent application that claims as innovation the combination of two known devices according to their established functions, it

can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.

550 U.S. at 418.

Applying these principles, the Board concluded that the “known problem of leakage in threaded connections of plastic LPLC cartridges under pressure identified in the [patents] provides a reason for one of ordinary skill in the art to have turned to King or Strassheimer to improve the sealing arrangement set forth in Yamada.” Board Op. at \*8. The Board cited a statement in the SPP patents that explained that because prior art LPLC cartridges “leak at the seams[,] [t]hreaded connections are thus not used to form the body of [LPLC cartridges] when the body is made out of polymers.” *Id.* at \*6. The Board noted SPP’s argument that Yamada, a polymer cartridge with threaded connections, does not explicitly disclose a leakage problem. However, the Board found that “by providing for the presence of an O-ring, Yamada implicitly acknowledges that there is a potential leakage issue between the cap and column body of the plastic cartridge.” *Id.* at \*7.

SPP argues that the Board improperly relied on the inventors’ description of the problem solved in order to find the solution obvious, an analytic procedure that relies on hindsight by using the inventors’ own reasoning against them. SPP points out that the statement in the patents that threaded connections are not used with plastic LPLC cartridges was actually incorrect, as evidenced by the Yamada reference, which shows a plastic LPLC cartridge with threaded connections. SPP argues that a person of ordinary skill would not have perceived any need to improve such cartridges, and that only through improper hindsight was the Board able to justify its finding of a known leakage problem.

SPP is correct that obviousness is not determined by hindsight. However, the issue here is not whether the Yamada cartridge leaked, but whether there was a concern with leakage in LPLC cartridges such that a person of ordinary skill would have provided a known pressure-resistant cap, as in King or Strassheimer, to the cartridge of Yamada. Substantial evidence supports the Board's finding that there was such a concern.

We conclude that the Board did not err in holding that it would have been obvious for a person of ordinary skill in the field of the invention to modify the chromatography cartridge of Yamada with the resealable threaded cap of King or Strassheimer. This applies to the three patents whose reexamination decisions are here appealed. The Board's decisions are

**AFFIRMED.**

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MOORE, *Circuit Judge*, dissenting.

I would find for the patentee. This is a two-reference obviousness rejection (Yamada and King or Yamada and Strassheimer), which I would reverse. The Board failed to provide substantial evidence that it would have been obvious to modify Yamada and it failed to determine the level of ordinary skill in the art.

The claims at issue are directed to a flash chromatography cartridge to be used in low pressure liquid chromatography (LPLC). The primary reference, Yamada, is directed to a column device for use in LPLC. The Board determined that Yamada disclosed all the elements of the

claims at issue except the inclined abutting surfaces of the cap and the lip of the container. The Board concluded that one of skill in the art would have been motivated to modify the Yamada structure by using the sealing structure disclosed in King or Strassheimer, both of which are directed to container closures for soda pop bottles. I dissent from the majority because this record does not contain substantial evidence that one of skill in the relevant art would have modified the chromatography cartridge in Yamada by replacing its sealing configuration with that of a soda pop bottle.

The Board concluded that “known problem of leakage in threaded connections of plastic LPLC cartridges . . . provides a reason for one of ordinary skill in the art to have turned to King or Strassheimer to improve the sealing arrangement [of] Yamada.” Board Op. at \*8. The majority cites two factual findings in support of this conclusion—that Yamada’s use of an O-ring “implicitly acknowledges” a “potential leakage issue,” and that the inventors’ statements in the patents allegedly identify a prior art leakage problem. Maj. Op. at 6; *see also* Board Op. at \*7. Neither factual finding is supported by substantial evidence. These were contested *inter partes* reexaminations with experts on both sides, yet there is no testimony or other evidence of a known leakage problem in prior art cartridges that would have motivated one of skill in the art to modify Yamada.

The Board’s finding regarding Yamada’s O-ring, Board Op. at \*7, ignores the reality of the situation, which is that Yamada did not have a leakage problem. Yamada does not disclose leakage problems. *Id.* Even Biotage’s expert admitted that Yamada’s configuration did not have leakage problems at the pressures identified by the patents-at-issue. J.A. 501 ¶ 9, 613 ¶ 9, 713 ¶ 9. In fact, the Board found that Yamada’s configuration “ensure[s] liquid tightness.” Board Op. at \*5. The time delay be-

tween the Yamada configuration and the inventions at issue also supports the fact that one of skill in the art would not have modified Yamada because it did not have a leakage problem. Yamada's earliest priority date is more than ten years before the earliest filing date of the patents-at-issue. There is absolutely no evidence even suggesting that one skilled in the art was aware of a leakage problem in Yamada's design during those ten years. The Board's conclusion that Yamada's O-ring "implicitly" acknowledges a "potential" leakage problem such that one of skill in the art would have been motivated to modify Yamada is pure conjecture. We cannot rely on the Board's speculation about a "potential" problem that, according to all of the evidence on record, never actually existed, to support a finding of obviousness. One of skill in the art would not have modified Yamada to fix a leakage problem that never existed in the first place. You wouldn't seek to "improve [a] sealing arrangement" that doesn't leak.

The patents at issue do say: "This operating pressure is sufficiently high that these cartridges, which have relatively large diameter bodies, leak at the seams. Threaded connections are thus not used to form the body when the body is made of polymer." '061 patent col. 1 ll. 16–19. As a preliminary matter, the statement, as the parties acknowledge, is inaccurate. Yamada, for example, uses threaded connections. This statement, in the patents, is not a recognition of a *known* prior art problem that would have motivated one of skill in the art to want to modify the Yamada design. It was a problem identified, not in the prior art, but by these inventors.

It is troubling that the majority and the Board rely on the inventors' disclosure of the problem *their inventions solve* as the primary basis for modifying the prior art. This is hindsight of the worst kind, "wherein that which only the invention taught is used against its teacher."

*W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553 (Fed. Cir. 1983). The patents do not indicate that leakage was a problem identified in the prior art or a problem known to those of skill in the art. Rather they indicate that the claimed design will avoid leakage. These inventors identified a design problem, articulated it, and solved it. There is absolutely no evidence of the existence of a known leakage problem that would have motivated skilled artisans to modify Yamada. The Board is taking the ingenuity of these inventors and, without any record basis, attributing that knowledge to all skilled artisans as the motivation to make the inventions at issue. Hindsight, hindsight, hindsight.

These were *inter partes* reexamination proceedings between sophisticated parties. Both parties put on expert testimony regarding obviousness. Yet there is no evidence that the chromatography cartridges in Yamada had a leakage problem that skilled artisans would have been motivated to address. There is simply no evidence that one of skill in the art would have modified the Yamada cartridge using the soda pop bottle sealing mechanisms of King or Strassheimer to prevent a leakage problem that the Yamada cartridge did not have.

I dissent for a second, independent reason. The Board found the claims obvious without resolving the level of skill in the art. Oral Argument at 24:59–25:31, available at <http://oralarguments.cafc.uscourts.gov/default.aspx?fl=2013-1219.mp3>. It is axiomatic that this is a “basic factual inquir[y]” required of any obviousness determination. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966). In most cases, there is no dispute over the level of the skilled artisan. But in this case, the parties contested this factual issue throughout the proceedings, and inexplicably the Board never resolved it. Oral Argument at 19:57–20:32, 23:21–23:56, 24:59–25:31. The parties still dispute this issue on appeal. Compare Appellant’s Br. 21 (“A chemist

analyzing organic compounds would not look to soda-pop bottles to solve problems with flash chromatography cartridges.”) (emphasis added), *with Appellee’s Br.* 28–29 (“SPP[] mischaracterizes the relevant person of ordinary skill to whom knowledge of analogous art would be attributable . . . . [T]he relevant person of ordinary skill in the art . . . would include a designer . . . skilled in *mechanical engineering*.”) (emphasis added).

The Board’s failure to make this determination is especially pernicious where the analogous art question is far from clear. Soda pop bottles and methods for using chromatography cartridges are clearly not in the same field of endeavor. Instead, the dispute on appeal is whether the soda pop bottle references are both reasonably pertinent to the inventors’ problem. Maj. Op. at 6–7; *see also In re Oetiker*, 977 F.2d 1443, 1447 (Fed. Cir. 1992). “Reasonably pertinent” means “which fields *a person of ordinary skill* would reasonably be expected to look for a solution to the problem facing the inventor.” *Oetiker*, 977 F.2d at 1447 (emphasis added). An ordinarily skilled chemist would have likely looked to a different body of prior art than an ordinarily skilled mechanical engineer with industrial design experience. Even Biotage recognizes that the determination of the person of ordinary skill is inextricably linked to what art would have been analogous. Oral Argument at 25:31–25:43. We cannot answer the analogous art question without knowing who the person of ordinary skill is.

I would reverse because I conclude that the Board’s cancellation of the claims at issue was based entirely on hindsight reconstruction—there is no record evidence that one of skill in the art would have been motivated to modify Yamada with soda pop bottle sealing closures. And the Board cannot transfer the inventors’ identification of the motivation for their patented design to the skilled artisan when there is no record evidence that the

skilled artisan possessed that knowledge. Finally, where the level of ordinary skill, as here, is hotly contested and would affect the scope of the analogous art, the Board must decide that factual issue. I respectfully *dissent*.