

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CANON U.S.A., INC. and CANON INC.,
Petitioner,

v.

SLINGSHOT PRINTING LLC,
Patent Owner.

IPR2022-01416
Patent 7,938,523 B2

Before JO-ANNE M. KOKOSKI, GARTH D. BAER, and
JOHN D. HAMANN, *Administrative Patent Judges*.

BAER, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

A. *Background and Summary*

Canon U.S.A., Inc. and Canon Inc. (together, “Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting an *inter partes* review of claims 1–3, 5–7, 10–12, and 14–16 (“the challenged claims”) of U.S. Patent No. 7,938,523 B2 (Ex. 1001, “the ’523 patent”). Slingshot Printing LLC (“Patent Owner”) filed a Preliminary Response to the Petition. Paper 5. Pursuant to 35 U.S.C. § 314, we instituted this *inter partes* review as to all of the challenged claims and all grounds raised in the Petition. Paper 6. Following institution, Patent Owner filed a Response. Paper 9 (“PO Resp.”). Petitioner filed a Reply to Patent Owner’s Response (Paper 11, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 12, “PO Sur-reply”). On January 24, 2024 we held an oral hearing. A transcript of the hearing is included in the record. Paper 18.

We have jurisdiction under 35 U.S.C. § 6. This decision is a Final Written Decision issued pursuant to 35 U.S.C. § 318(a). For the reasons we discuss below, we determine that Petitioner has proven by a preponderance of the evidence that the challenged claims are unpatentable.

B. *Related Matters*

The parties indicate that the ’523 patent is the subject of the following district court cases: *Slingshot Printing LLC v. Canon U.S.A., Inc., et al.*, No. 2:22-cv-00123 (E.D.N.Y.) and *Slingshot Printing LLC v. HP Inc.*, No. 6:19-cv-00549, reassigned as No. 2:20-00187 (W.D. Tex.) (dismissed). Pet. 1; Paper 3, 1.

Patent Owner indicates that Petitioner filed the following concurrent petitions against patents that are asserted along with the ’523 patent in the

district court case: IPR2022-01414 (U.S. Patent 7,195,341) and IPR2022-01415 (U.S. Patent 7,559,629). Paper 3, 1.

C. The '523 patent

The '523 patent discloses “[a]n improved fluid supply tank for a micro-fluid ejection head and method for improving operation of a micro-fluid ejection device.” Ex. 1001, code (57). Specifically, the '523 patent purports to resolve, in devices such as ink jet printers, the problem of replaceable fluid supply tanks developing trapped air adjacent to a connection between the fluid supply tank and an ejection head structure. *Id.* at 1:21–24. Figure 6 is reproduced below.

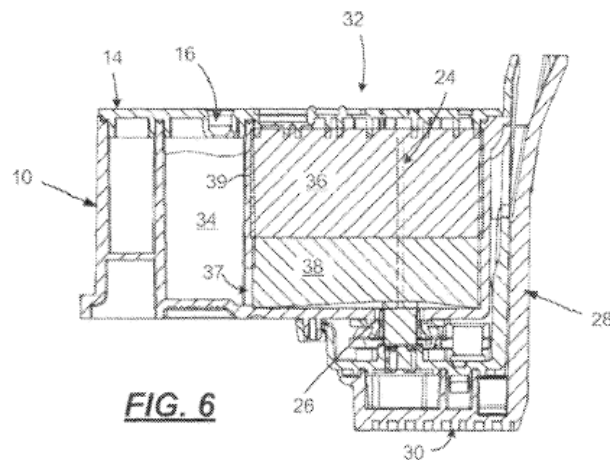


Figure 6 is a cross-sectional side view of a removable fluid supply tank and an ejection head structure. *Id.* at 2:65–66. Removable fluid supply tank 10 has body portion 12 (identified in Figure 1) and cover 14 in which cover 14 includes fluid fill port 16 and serpentine air removal vent path 18 (shown in Figure 1). *Id.* at 3:19–21. The wall of body portion 12 “may contain an internal vent conduit 24 disposed between the fluid outlet wall 22 [(shown in Figure 1)] and the cover 14.” *Id.* at 3:24–27. Vent conduit 24 “enables air adjacent the fluid outlet wall 22 or in an exit port 26 to flow to the cover 14

for exit through the serpentine vent path 18” and “may prevent entrapment of air or fluid in the tank’s exit port 26.” *Id.* at 3:28–31.

D. Illustrative Claim

Of the challenged claims, claims 1 and 10 are independent. Claim 1 is reproduced below.

1. A fluid supply tank for a micro-fluid ejection head, the fluid supply tank comprising:

a body portion for holding a fluid to be ejected, the body portion having a fluid exit port on an exit end thereof and a cover on an opposing end thereof of the body portion, the cover having an opening in fluid communication with atmosphere;

an internal vent conduit disposed between the exit end and the cover for removing air adjacent to the fluid exit port and releasing the air through the cover to said atmosphere; and

an air space in the fluid exit port wherein the internal vent conduit is in air flow communication with the air space and the cover.

Ex. 1001, 5:52–65. Independent claim 10 recites a method with parallel limitations to claim 1. *Id.* at 6:26–38.

E. Asserted Grounds

Petitioner asserts the challenged claims are unpatentable on the following grounds:

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
1, 3, 5, 10, 12, 14	102	Studer ’708 ¹
1, 3, 5–7, 10, 12, 14–16	103	Studer ’708
1–3, 5–7, 10–12, 14–16	103	Studer ’708, Studer ’471 ²

¹ US 6,739,708 B2, issued May 25, 2004 (Ex. 1003, “Studer ’708”).

² US 2006/0164471 A1, published July 27, 2006 (Ex. 1004, “Studer ’471”).

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
6, 7, 15, 16	103	Studer '708, Studer '471, Elliot ³
6, 7, 15, 16	103	Studer '708, Studer '878 ⁴

Pet. 3.

II. ANALYSIS

A. *Level of Ordinary Skill in the Art*

Petitioner argues that a person of ordinary skill in the art would have had “at least a Bachelor’s or Master’s level college degree in Mechanical Engineering, Materials Science, Physics, Electrical Engineering, or a related field, and at least two years of training or experience in the design of inkjet cartridges and printheads.” Pet. 17 (citing Ex. 1011 ¶¶ 19–20). Patent Owner does not propose a description of the level of ordinary skill in the art or dispute Petitioner’s description. PO Resp. 20. We agree with and adopt Petitioner’s description as it is consistent with the asserted prior art and the challenged patent’s specification. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (prior art itself may reflect an appropriate level of skill).

B. *Claim Construction*

Patent Owner proposes we construe the term “internal vent conduit” as a “physical structure other than the convoluted passageways inherently present in a capillary material such as felt, providing a more direct path for air to move from a space in the exit port of the fluid supply tank to the vent in the cover of the tank.” PO Resp. 20. Petitioner does not propose any express constructions for any claim terms. Pet. 17. We determine that no

³ US 5,671,001, issued Sept. 23, 1997 (Ex. 1006, “Elliot”).

⁴ US 2005/0212878 A1, published Sept. 29, 2005 (Ex. 1005, “Studer ’878”).

claim terms require express construction for us to determine unpatentability. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“we need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

C. Description of Primary Prior Art References

1. Studer ’708 (Ex. 1003)

Studer ’708 discloses “mechanisms and methods for venting the fluid interconnect port of fluid container that is at least partially filled with a capillary material.” Ex. 1003, code (57). Figure 5 of Studer ’708 is reproduced below.

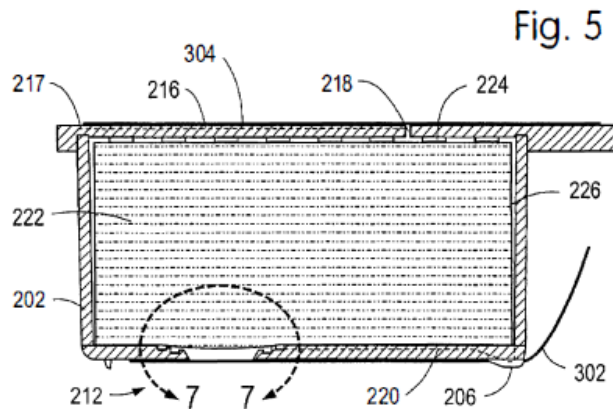


Figure 5 is a cross-sectional view of a replacement ink supply showing “fluid interconnect port venting features.” *Id.* at 2:31–33, 2:23–24. Studer ’708 discloses that

[the] vent system [is] formed in the container lid (217, 216, 218), as is known in the art; provisions for allowing air passage around the end of the capillary material; redundant vent paths (206, 220) formed in the floor of the container to provide air from the end of the container to the fluid interconnect port region; and features adjacent to the fluid interconnect port 212

to facilitate and regulate the absorption of ink into the capillary material.

Id. at 4:20–28.

2. Studer '471 (Ex. 1004)

Studer '471 teaches a replaceable ink supply including an ink container. Ex. 1004, code (57). Studer '471 teaches “vent notches or the like that allow the formed air bubble to escape from the cavities” so that “pressure within the ink chamber may be equalized as the air exits through one or more openings through the lid portion.” *Id.* ¶ 22. Figure 4 of Studer '471 is reproduced below.

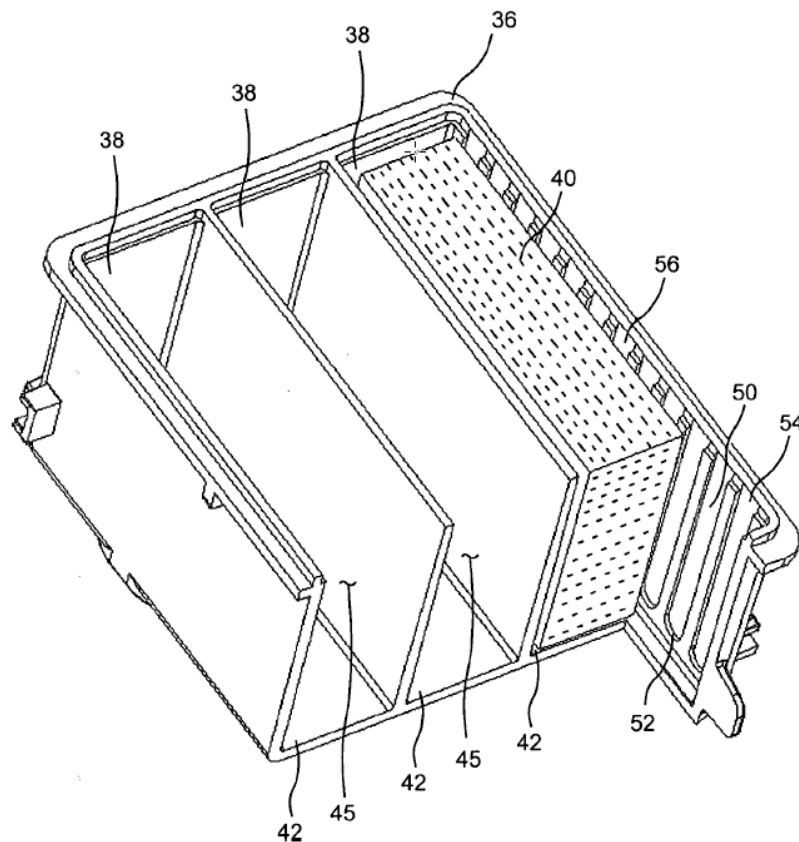


FIG. 4

Figure 4 is “a cut-away perspective view of an exemplary embodiment of

the ink container.” *Id.* ¶ 12. Figure 4 includes “channels 50 [that] may be formed in one or more walls of the internal chamber.” *Id.* ¶ 26. The “channels 50 are located vertically so that the ink and air may flow upward toward the lid portion . . . wherein air is then able to escape from chamber 45 (e.g., through an opening in the lid portion).” *Id.* ¶ 29.

D. Unpatentability Analysis

1. Anticipation Based on Studer ’708

Petitioner argues that Studer ’708 anticipates claims 1, 3, 5, 10, 12, and 14. Pet. 18–37. Based on Petitioner’s analysis and for the reasons explained below, we find Petitioner has shown by a preponderance of evidence that Studer ’708 anticipates claims 1, 3, 5, 10, 12, and 14.

a. Claims 1 and 10

Petitioner corresponds Studer ’708’s “**replaceable ink containers 12**” and “**printheads 16**” to the claimed fluid supply tank and micro-fluid ejection head. Pet. 18–19. For the claimed body portion, Petitioner explains that Studer ’708 teaches:

a body portion [e.g., body portion 202] for holding a fluid to be ejected [e.g., ink], the body portion having a fluid exit port [e.g., fluid interconnect port 212] on an exit end thereof [e.g., the side of the body portion 202 where the fluid interconnect port 212 is located] and a cover [e.g., lid portion 204] on an opposing end thereof [e.g., the side of the body portion 202 where the lid portion 204 is located] of the body portion, the cover having an opening in fluid communication with atmosphere [e.g., vent system 217, 216, 218].

Id. at 22 (quotation marks and emphasis omitted).

Studer ’708 includes the claimed internal vent conduit, Petitioner explains, because Studer ’708 teaches that its methods “include [1] [*externally*] venting a fluid container to ambient air with a vent located

on the upper portion of the container; [2] *internally* venting the container to channel air from the ambient air vent to an internal location adjacent to the fluid interconnect port; and [3] then restrictedly venting the fluid port.” *Id.* at 23 (quoting Ex. 1003, 7:38–43).

Last, Petitioner explains that Studer ’708 includes the claimed air space because Studer ’708 teaches

an air space in the fluid exit port [e.g., air between the fluid interconnect port and capillary material] wherein the internal vent conduit [e.g., (i) channels formed by spacing members 224, (ii) passageway between capillary material 222 and end wall 226, (iii) vent channels 220 and air chambers 206, and (iv) the fluid interconnect port venting features, including small vent 234, wall 232, and air path ring 230)] is in air flow communication with the air space [e.g., air between the fluid interconnect port and capillary material] and the cover [e.g., lid portion 204].

Id. at 31–32 (quotation marks and emphasis omitted).

(1) Studer ’708’s Internal Vent Conduit

Claim 1 requires “an internal vent conduit disposed between the exit end and the cover for removing air adjacent to the fluid exit port and releasing the air through the cover to said atmosphere.” Ex. 1001, 5:59–62. Independent claim 10 has a similar limitation reciting “trapped air . . . is urged to said atmosphere through the internal vent conduit.” *Id.* at 6:36–37. Petitioner provides annotated versions of Figures 3 and 5 of Studer ’708, reproduced below, to illustrate its contentions with respect to these limitations of claims 1 and 10.

Studer ’708’s Figures 3 and 5 are reproduced below, with Petitioner’s annotations in color.

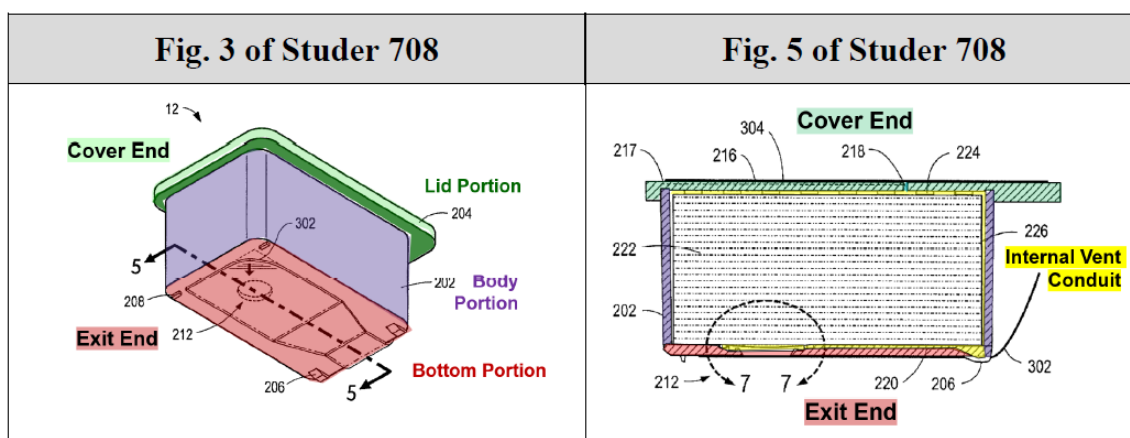


Figure 3 is “an exemplary replacement ink supply.” Ex. 1003, 2:23–24. Figure 5 is a cross-sectional view illustrating “the fluid interconnect port venting features” in Figure 3’s ink supply. *Id.* at 2:14–33. Petitioner asserts Studer ’708 teaches the claimed internal vent conduit because “vent system (yellow) allows for air to travel within the body portion 202 (purple) around the capillary material 222 between the cover end (green) of lid portion 204 and the exit end (red) of ink container 12.” Pet. 24 (emphasis omitted). According to Petitioner,

[w]hile Studer 708 primarily discusses . . . internally venting to ambient air from a vent in the cover along a pathway to an internal location adjacent to the fluid interconnect port—a PHOSITA would understand that air travels in both directions along the venting pathway as dictated by air pressure and thus would also vent air from the interconnect port to the vent cover in the upper portion of the container and out to ambient air.

Id. at 23.

Patent Owner argues that Petitioner’s anticipation challenge fails because Studer ’708’s venting mechanism is “designed to introduce air into the air path ring 230 of Studer’s ink retention system near the exit port of an ink container rather than remove air trapped adjacent the expert port as described and claimed in the ’523 patent.” PO Resp. 26. According to

Patent Owner, “Studer ’708 consistently discloses movement of air into the top of the container and then toward the exit port,” rather than in the opposite direction, as the challenged claims require. *Id.* In addition, Patent Owner asserts, Petitioner fails to show “that Studer ’708 actually discloses operating the ink container at pressure conditions that would produce air travel from the exit port to the opening in the cover.” *Id.* at 31.

We disagree with Patent Owner’s arguments. As Petitioner notes, Studer ’708 discloses airflow in the claimed direction because it teaches “methods of the present invention . . . include venting a fluid container *to* ambient air with a vent located on the upper portion of the container.” Pet. 11 (quoting Ex. 1003, 7:39–41) (emphasis added). Studer ’708’s overall emphasis on venting air towards, rather than away from, its fluid interconnect port does not undermine Petitioner’s assertion that the system vents in the opposite direction, as well. Petitioner’s expert, Dr. Pond, presents testimony explaining why that is so: “Studer 708’s air vents, air channels, and air spaces are open to the ambient atmosphere for the movement of air both to and from all such spaces.” Ex. 1011 ¶ 109. Further, “a PHOSITA would understand that the direction of this air flow is governed by air pressure inside and outside of the container and necessarily flows both internally and externally.” *Id.* ¶ 110. In addition, Dr. Pond explains conditions when “air from inside the container 12 must also be vented outside the container” including during “changes in temperature or pressure, jostling or dropping during shipping, or installation of the container into the printer.” *Id.* ¶ 89. With this explanation, Petitioner has shown sufficiently that Studer ’708 discloses the claimed internal vent conduit for removing and releasing air, as the challenged claims require.

(2) Claims 1 and 10 Summary

Other than the argument addressed above, Patent Owner does not additionally challenge Petitioner's anticipation challenge to claims 1 and 10. We have reviewed Petitioner's arguments and evidence (*see* Pet. 18–34) and, based on that analysis as outlined above, we find Petitioner has shown by a preponderance of the evidence that Studer '708 anticipates independent claims 1 and 10.

b. Dependent Claims 3, 5, 12, and 14

Petitioner explains that Studer '708 discloses the additional feature in dependent claims 3 and 12 (“the cover comprises a serpentine vent structure and the internal vent conduit is in air flow communication with the serpentine vent structure”) because Studer '708 includes “narrow serpentine depression 216, disposed in the cover that allows for air flow communication between the vent conduit and ambient air.” Pet. 35 (citing Ex. 1003, 4:49–52); *see* Ex. 1001, 6:4–7, 6:43–46. Petitioner further explains that Studer '708 discloses the additional feature in dependent claims 5 and 14 (“wherein the fluid supply tank is removably attached to an ejection head structure”) because Studer 708's ink containers 12 “are physically separate from the corresponding printheads 16 . . . and removably connected . . . together through the manifold 100.” Pet. 36 (citing Ex. 1003, 3:27–38, 2:45–49, 3:14–16); *see* Ex. 1001, 6:10–11, 6:50–52.

Patent Owner does not additionally challenge Petitioner's assertions regarding dependent claims 3, 5, 12, and 14. Based on Petitioner's analysis as outlined above, Petitioner has shown by a preponderance of the evidence that Studer '708 anticipates dependent claims 3, 5, 12, and 14.

2. *Obviousness Based on Studer '708 and Studer '471*

Petitioner argues that claims 1–3, 5–7, 10–12, and 14–16 would have been obvious over Studer '708 and Studer '471. Pet. 47–60. Petitioner relies on Studer '471 for teaching that “*air may flow upward toward the lid portion . . . and wherein air is then able to escape from chamber 45.*” *Id.* at 49 (quoting Ex. 1004 ¶ 29). In addition, Petitioner relies on Studer '471 for teaching several dependent-claim features including vertical side-wall channels (claims 2 and 11), non-fluid wettable vent channels (claims 6 and 15), and conduit width and depth ranging from about 0.5–2.0 millimeters (claims 7 and 16). *See id.* at 51–56. According to Petitioner, Studer '471 includes these additional dependent-claim features because it discloses “vent channels located vertically along the interior side wall and having ‘a depth of approximately 0.5 mm [and] a width of approximately 3.0 mm’ [that] provide a non-fluid wettable vent channel.” *Id.* at 48 (emphasis omitted); *see id.* at 51–55. According to Petitioner, a skilled artisan would have been motivated to add Studer '471’s side vent channels “to allow for sufficient air flow around the capillary material,” particularly when using polyurethane foam or melamine capillary material. *Id.* at 60; *see id.* at 59 (explaining that Studer '708 teaches additional vent channels may be necessary when using alternative capillary materials like polyurethane foam or melamine).

Although Patent Owner does not contest that Studer '471 teaches the additional elements in claims 2, 6, 7, 11, 15, and 16, Patent Owner raises two arguments in contesting whether it would have been obvious to combine the two references. *See* PO Resp. 47–50. First, Patent Owner argues Studer '708 and Studer '471 are not analogous art because “Studer '471 addresses the problem of air pockets being trapped within the capillary material, while

Studer '708 is directed to the entirely different issue of channeling air toward a fluid interconnect port to prevent leakage.” *Id.* at 48. We disagree with Patent Owner’s argument because Studer '708 and Studer '471 are both within the same field of endeavor and address the same problem as the '523 patent. Specifically, as Petitioner explains, “[j]ust like the '523 patent, Studer 708 and Studer 471 are generally directed to capillary-filled ink containers that are removably connected to a printhead, and more specifically, to managing the air pressure and air pockets within capillary-filled ink containers.” Pet. 57; *see In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004).

Second, Patent Owner argues Petitioner “makes no showing that it would have been obvious to connect Studer '471’s [side] ink channels to the vents at the bottom of Studer '708,” because “Studer '471 actually teaches away from extending the channels all the way to the floor of the container.” PO Resp. 49; *see id.* at 49–50 (citing Ex. 1004 ¶ 27). In support, Patent Owner notes a passage from Studer '471 that teaches “extending the channels only to ‘a predetermined distance above the bottom 42 of the internal chamber 45 . . . [which] helps to avoid the condition wherein ink left in the channel may flow along the bottom 42 and possibly leak out from the ports’” *Id.* at 50 (quoting Ex. 1004 ¶ 27).

We disagree with Patent Owner’s argument. As Petitioner explains, its proposed combination includes features from Studer '708 that would prevent ink from leaking out the ports. *See* Pet. Reply 24. Specifically, Dr. Pond explains that Studer '708’s exit port design “includes a capillary break and a capillary accumulator which prevents the migration of liquid from the floor out of the exit port.” *Id.* (quoting Ex. 2003, 80:11–81:9). Thus,

because Petitioner's combination includes features that alleviate Studer '471's ink-leakage concern, we agree with Petitioner that Studer '471 does not teach away from Petitioner's proposed combination.

Other than the arguments outlined above, Patent Owner does not additionally challenge Petitioner's showing. Based on Petitioner's analysis as outlined above, we agree with Petitioner that the combined Studer '708-Studer '471 system teaches the additional elements in dependent claims 2, 6, 7, 11, 15, and 16. In addition, given Petitioner's explanation that Studer '471's side channels and dimensions would help allow for sufficient air flow when using alternative capillary materials, *see* Pet. 57–60, Petitioner has articulated sufficient reasoning with rational underpinning to support the legal conclusion that its proffered combination would have been obvious. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). Thus, we find Petitioner has shown by a preponderance of the evidence that claims 2, 6, 7, 11, 15, and 16 would have been obvious over Studer '708 and Studer '471.

3. *Additional Grounds*

In three alternative grounds, Petitioner argues that claims 1, 3, 5–7, 10, 12, and 14–16 would have been obvious over Studer '708 (Pet. 37–47), claims 6, 7, 15, and 16 would have been obvious over Studer '708, Studer '471, and Elliot (*id.* at 61–67), and claims 6, 7, 15, and 16 would have been obvious over Studer '708 and Studer '878 (*id.* at 67–76). Because we have already determined these same claims are unpatentable based on Petitioner's other asserted grounds, we decline to reach Petitioner's alternative challenges.

III. CONCLUSION

For the foregoing reasons, we determine Petitioner has demonstrated by a preponderance of the evidence that claims 1–3, 5–7, 10–12, and 14–16 of the '523 patent are unpatentable.⁵ Our conclusions are summarized in the following table.

⁵ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
1, 3, 5, 10, 12, 14	102	Studer '708	1, 3, 5, 10, 12, 14	
1, 3, 5–7, 10, 12, 14–16	103	Studer '708 ⁶		
1–3, 5–7, 10–12, 14–16	103	Studer '708, Studer '471	1–3, 5–7, 10– 12, 14–16	
6, 7, 15, 16	103	Studer '708, Studer '471, Elliot ⁷		
6, 7, 15, 16	103	Studer '708, Studer '878 ⁸		
Overall Outcome			1–3, 5–7, 10– 12, 14–16	

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1–3, 5–7, 10–12, and 14–16 of the '523 patent are unpatentable; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

⁶ We do not reach this ground because it would not change the outcome of this case.

⁷ We do not reach this ground because it would not change the outcome of this case.

⁸ We do not reach this ground because it would not change the outcome of this case.

IPR2022-01416
Patent 7,938,523 B2

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