

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

RECYCLED PLASTICS INDUSTRIES, LLC
Petitioner

v.

TANGENT TECHNOLOGIES LLC
Patent Owner

Inter Partes Review No.: 2024-00898
U.S. Patent No. 10,981,350

**PATENT OWNER'S AUTHORIZED SUR-REPLY TO PETITIONER'S
CORRECTED REPLY**

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List of Exhibits

No.	Description
<i>Exhibits Listed in Petition</i>	
RPI1001	U.S. Patent No. 10,981,350
RPI1010	“SMB Extrusion Melt Blender,” StaMixCo (2007) (“StaMixCo”)
RPI1011	Korean Patent No KR 10-1338611 with certified translation (“Nam”)
RPI1012	Zumbrunnen, D.A., “Chaotic Advection and Its Application to Extruding Micro- and Nanostructured Plastic Materials,” <i>Applied Plastics Engineering Handbook</i> (2011), 401-415 (“Zumbrunnen”)
RPI1013	U.S. Patent No. 9,527,341 (“Rassi”)
RPI1038	“Principles of Operation,” StaMixCo (“Previously Presented StaMixCo”)
<i>Patent Owner's Additional Exhibits</i>	
T2001	U.S. Patent No. 11,173,643
T2002	U.S. Patent Application No. 18/630,723
T2003	U.S. Patent Application No. 17/505,091
T2004	Non-Final Office Action (Dec. 15, 2017)
T2005	Supplemental Amendment and Response to Office Action (May 21, 2018)
T2006	Non-Final Office Action (July 13, 2018)
T2007	U.S. Patent No. 7, 204, 944 (“Piedboeuf”)

T2008	U.S. Patent Application Publication 2011/0177291 (“Sudano”)
T2009	Final Office Action (Jan. 2, 2019)
T2010	Appeal Brief (Aug. 23, 2019)
T2011	Decision on Appeal (Dec. 11, 2020)
T2012	Notice of Allowability (Mar. 22, 2021)
T2013	Response to Office Action (Sept. 13, 2018)
T2014	Examiner's Answer to Appeal Brief
T2015	Information Disclosure Statement (Feb. 27, 2018)
T2016	<i>Tangent Techs. LLC v. Recycled Plastics Indus., LLC</i> , No. 1:23-cv-00261-WCG, D.I. 65, Decision and Order on Counterclaims (July 24, 2024)
T2017	Examiner's Search Strategy and Results (July 7, 2018)
T2018	<i>Tangent Techs. LLC v. Recycled Plastics Indus., LLC</i> , No. 1:23-cv-00261-WCG, D.I. 66, Claim Construction Order (July 24, 2024)

I. Introduction

The Board should exercise its discretion to deny institution under 35 U.S.C. § 325(d) because the same or substantially the same art and arguments were previously presented. There is no merit to the arguments Petitioner raises in its Reply.

First, Petitioner incorrectly argues that Nam is materially different than the prior art references applied during prosecution. Nam does not teach the claim limitations that the Applicant argued were missing from the prior art applied by the Examiner and Nam is cumulative of Piedboeuf, a reference cited by the Patent Owner during the prosecution of the '350 patent. As such discretionary denial is appropriate.

Second, Petitioner incorrectly argues that StaMixCo provides additional non-cumulative disclosures deemed missing from previously considered prior art because there are no relevant differences between StaMixCo and Previously Presented StaMixCo, a reference cited by the Patent Owner during the prosecution of the '350 patent. As such, StaMixCo is cumulative and discretionary denial is appropriate.

Third, Petitioner incorrectly argues that Zumbrunnen is materially different than the prior art references applied during prosecution. Zumbrunnen does not teach the claim limitations that the Applicant argued were missing from the prior art applied by the Examiner and Zumbrunnen is cumulative of Piedboeuf, a reference

cited by the Patent Owner during the prosecution of the '350 patent. As such discretionary denial is appropriate.

Fourth, Petitioner incorrectly argues that Rassi is non-cumulative secondary prior art because Rassi was considered during prosecution. Petitioner fails to establish that Rassi or its related arguments are not cumulative, and therefore, discretionary denial is appropriate.

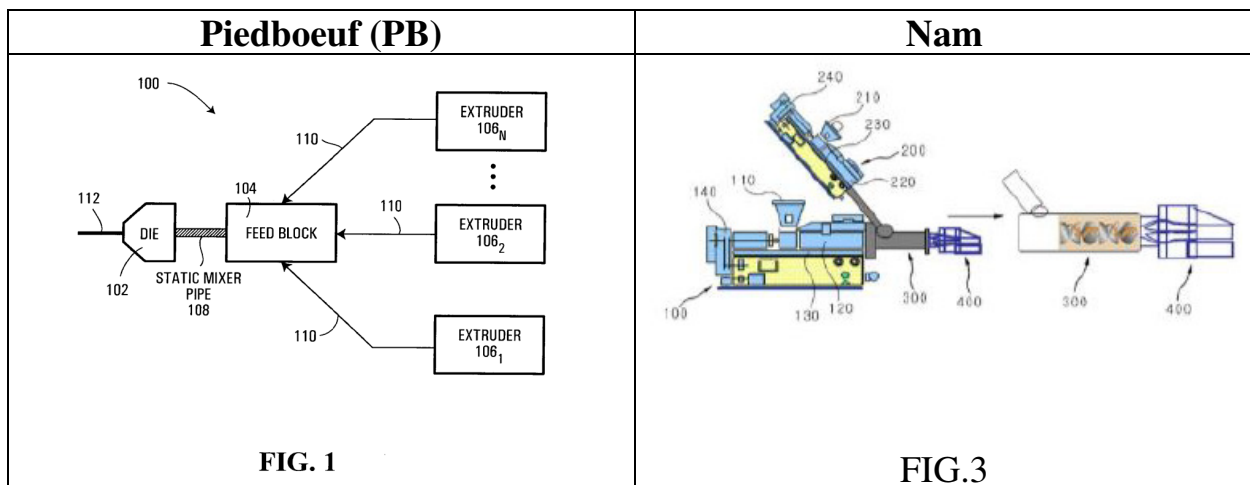
II. Discretionary Denial Is Appropriate Under 35 U.S.C. § 325(d)

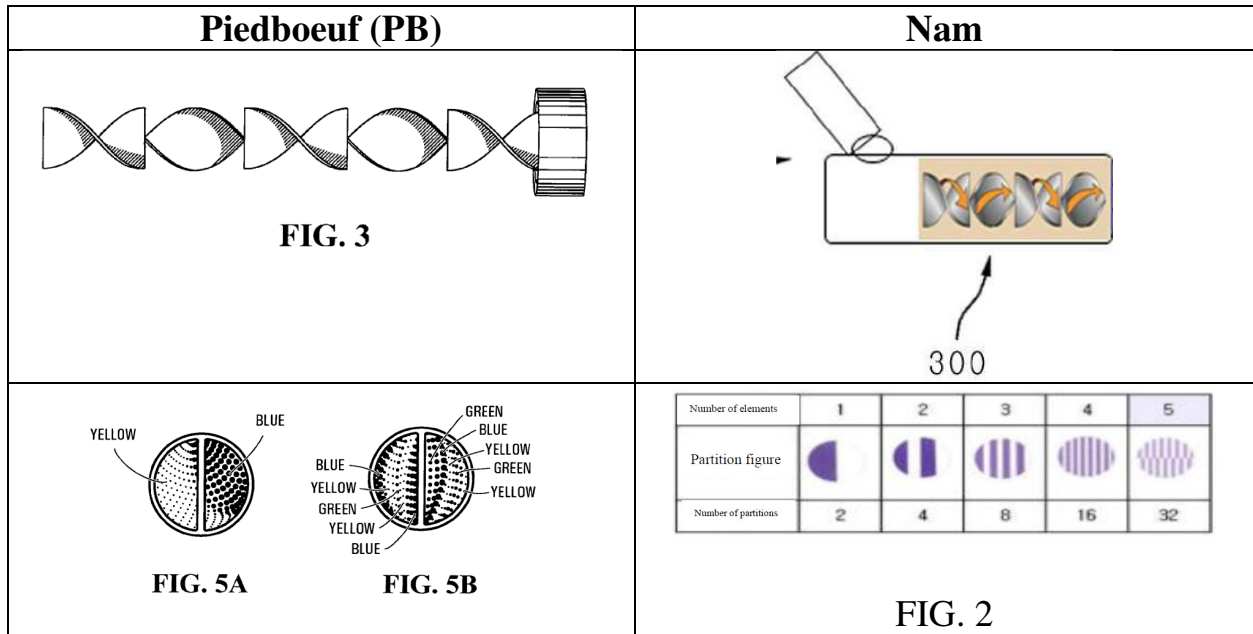
A. Nam Is Substantially Identical And/Or Similar To Previously Considered Prior Art And Does Not Disclose Elements Deemed Missing from Previously Considered Prior Art

Nam discloses a “manufacturing apparatus and method of synthetic wood having striped grain and synthetic wood manufactured from the same.” *See* Ex. RPI1011, Nam, at Abstract and [0001]. Nam, however, does not disclose a pattern having a substantially curvilinear path. To address this deficiency, Petitioner argued that “[a] POSITA would have expected a helical static mixer to create curved, not straight patterns” and “would have therefore understood the polymer layers of Nam to ‘extend along a substantially *curvilinear* path.’” *See* Petition at 42 (emphasis in original). In the underlying prosecution, the Board determined this conclusory assertion was insufficient to establish Piedboeuf’s system teaches the recited claim limitation. *See* POPR at 22-23.

Specifically, during prosecution of the '350 patent, the Examiner cited Piedboeuf in connection with the limitation “wherein a plurality of individual layers of the first and second sets of polymer layers alternate within the board and extend along a substantially uninterrupted curvilinear path originating proximate the first side of the board and terminating proximate to the second side of the board” as recited in Claim 1. *See* Ex. T2006, Non-Final Office Action dated July 13, 2018 at 6. Like Petitioner, the Examiner asserted this limitation was met because it was obvious that the system taught by Piedboeuf would result in the claimed structure. *Id.* at 6.

As illustrated below, Piedboeuf and Nam are substantially similar and Petitioner's arguments with respect to Nam are substantially similar to the Examiner's arguments about Piedboeuf during prosecution of the '350 patent.





The systems disclosed in Piedboeuf and Nam are substantially the same. Piedboeuf's system (FIG. 1) features multiple extruders (106_N) with multiple-colored polymers, connected to a feedblock (104)/static mixer (108) for mixing, that output a layered polymer product through the die (102). Nam's system (FIG. 3) similarly includes multiple extruders (100 and 200) with colored polymer, connected to a feedblock/static mixer (300) for mixing, and that output a layered polymer product through the die (400). Both the systems use a static mixer (108 in Piedboeuf and 300 in Nam) with mixing elements. *See* FIGS. 5A and 5B of Piedboeuf; FIG. 2 of Nam.

Petitioner is incorrect that Nam's system produces products "materially different" from Piedboeuf's system. Both systems produce "grain patterns [that] are depicted using seemingly straight lines." *See* Petition at 41. *Compare* FIGs. 5A, 5B

of Piedboeuf and FIG. 2 of Nam. Neither of these references disclose polymer layers that “alternate within the board and extend along a substantially uninterrupted curvilinear path originating proximate the first side of the board and terminating proximate to the second side of the board” as required by the challenged claims. *See* Petition, at 41. Petitioner argues, like the Examiner did, that “[a] POSITA would have expected a helical static mixer to create curved, not straight patterns” and “would have therefore understood the polymer layers of Nam to ‘extend along a substantially *curvilinear* path.’” *See id.* at 41–44. This same argument was already considered and rejected by the Board during the underlying prosecution. The Board stated: “The Examiner does not establish that even if kayaks and canoes can have a simulated wood grain appearance, Piedboeuf would have suggested forming the streams of viscous material such that the product has that appearance [similar to the Petitioner’s assertion, with reference to Nam, that a ‘POSITA would have expected a helical static mixer to create curved, not straight patterns’]. Nor does the Examiner explain how one of ordinary skill in the art would have carried out Piedboeuf’s process in a way that produces a product having a simulated wood grain appearance.” *See* Ex. T2011, Decision on Appeal dated December 11, 2020, at 4.

Petitioner’s reliance on an expert declaration does not make Nam any less cumulative. Petitioner cites to its expert for the proposition that a person of skill in the art would allegedly expect polymers extruded through a helical mixer, such as

the one shown in Nam, to show a curved pattern in the width direction. *See* Corrected Reply at 3-4. However, Nam's helical mixer (element 300) does not teach this. Nam actually depicts straight grain patterns. Nam at [126]. The petitioner even admits this, stating "Nam's grain patterns are depicted using seemingly straight lines." *See* Petition at 41. Petitioner's arguments are no different than those rejected by the Board in reversing the Examiner's rejection, finding that "the Examiner's rejections are based upon impermissible hindsight in view of the Appellant's disclosure." *See* Ex. T2011, Decision on Appeal at 6. Similarly, the claim that Nam's system allegedly produces a curved patten is also impermissibly based on hindsight.

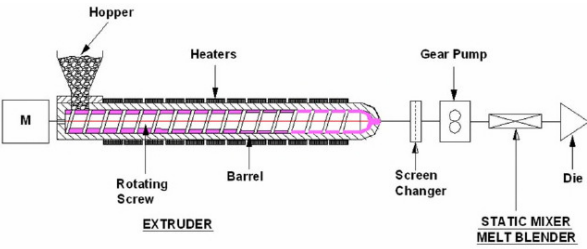
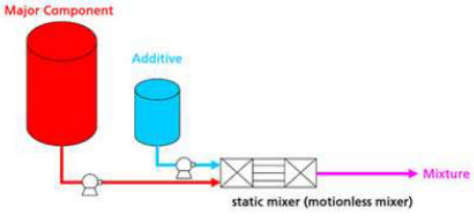
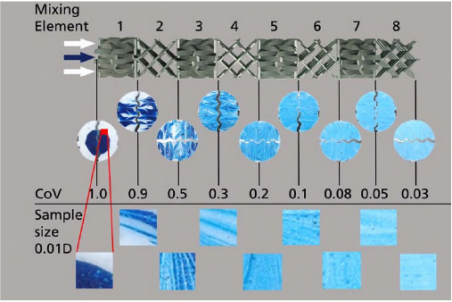
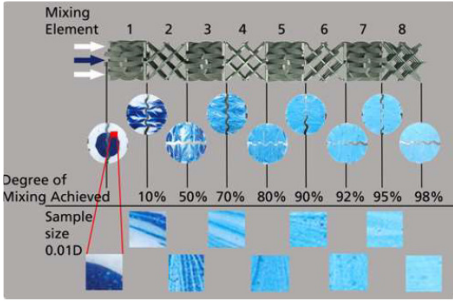
Given that Nam is cumulative of Piedboeuf, discretionary denial is appropriate under 35 U.S.C. § 325(d).

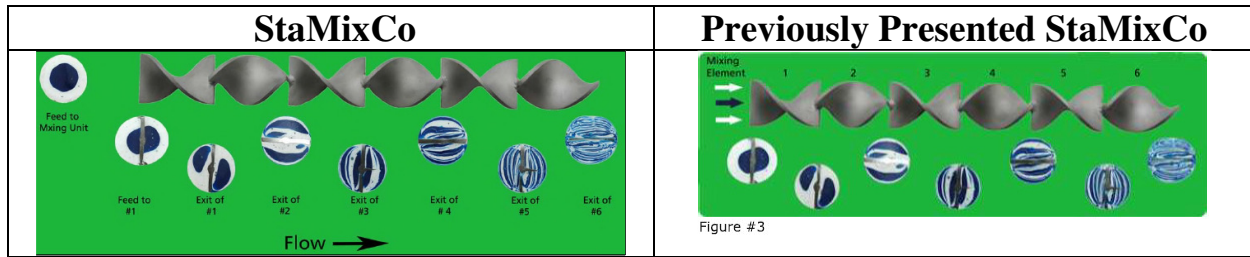
B. StaMixCo Is Substantially Identical And/Or Similar To Previously Considered Prior Art And Does Not Provide Additional Non-Cumulative Disclosures Deemed Missing from Previously Considered Prior Art

Petitioner's StaMixCo reference is identical to (and certainly cumulative of) the teaching of StaMixCo, "Principled of Operation of Static Mixers," Static Mixer Products & Technology ("Previously Presented StaMixCo") (Ex. T2015). The Previously Presented StaMixCo was cited by the Patent Owner during the prosecution of the '350 patent in an Information Disclosure Statement dated Feb. 27, 2018), and considered by the Examiner. As noted in the POPR, prior art cited in an

IDS is deemed previously presented to, and considered by, the Patent Office. *See Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 at 7–8 (stating that previously presented art includes art cited in an IDS). *See* POPR at 25.

Previously Presented StaMixCo and StaxMixCo are identical in aspects relevant to Petitioner's arguments. The figures in the second and third row of the comparison table below are nearly identical, demonstrating that both references show the same static mixer that can combine multiple polymers (of different colors) to produce a layered mixture.

StaMixCo	Previously Presented StaMixCo
	
	



Petitioner argues that “RPI1038 [Previously Presented StaMixCo] does not disclose the extrusion machine shown in StaMixCo (that is similar to the one shown in Nam), or that the mixer can be ‘installed just in front of the extruder die’ in such a machine.” Corrected Reply at 6. This argument is irrelevant because Petitioner does not rely on StaMixCo’s extrusion machine. Instead, Petitioner combines Nam’s extrusion machine with StaMixCo’s static mixer, and not with StaMixCo’s extrusion machine. *See* Petition at 42. Both StaMixCo and Previously Presented StaMixCo present identical static mixers.¹

¹ In any event, the “extrusion machine” in StaMixCo is cumulative of extrusion machines in other prior art the Examiner considered such as Piedboeuf described in the paragraphs above. “The first and second *extruder* provide a first flow of Viscous material of a first color and a second flow of Viscous material of a second color that is different from the first color.” (emphasis added) *See* Ex. T2007, “Piedboeuf” at 2:56-59.

Petitioner also incorrectly alleges that Previously Presented StaMixCo omits StaMixCo's disclosures about using a static mixer to extrude multi-colored viscous polymers. Corrected Reply at 7. Figure 1 of Previously Presented StaMixCo illustrates the static mixer receiving input from more than one source (i.e., major component and additive) and outputs a mixture that contains both the major component and the additive. Further, Figures 2 and 3 of Previously Presented StaMixCo show multi-colored polymers. Like StaMixCo, the static mixer of Previously Presented StaMixCo will have a product with layers of the "multi-colored viscous polymers." *See* RPI1038, "Previously Presented StaMixCo" at Figure #2 and Figure #3. Additionally, Petitioner's argument that "[StaMixCo's] static mixer could be used in such a machine to extrude multi-colored viscous polymers" is no different than the Examiner's rejected assertion about Piedboeuf. This further demonstrates that StaMixCo is cumulative of art already considered by the Examiner.

Additionally, during the parties' co-pending district court litigation, the district court denied Petitioner's motion for leave to add an inequitable conduct counterclaim against Patent Owner based on the alleged failure to disclose StaMixCo during prosecution of the '350 patent. The Court found that "Defendant [Petitioner] has failed to adequately allege that the StaMixCo marketing materials [StaMixCo, Ex. RPI1010] are non-cumulative of other information already disclosed

to the USPTO [Previously Presented StaMixCo, Ex. RPI1038].” See Ex. T2016, *Tangent Techs. LLC v. Recycled Plastics Indus., LLC*, No. 1:23-cv-00261-WCG, D.I. 65 (July 24, 2024), at 12. This further demonstrates that the StaMixCo reference cited by the Petitioner is entirely cumulative of the Previously Presented StaMixCo reference, which was already considered by the Examiner during prosecution of the ‘350 patent.

There are no *relevant* differences between StaMixCo and Previously Presented StaMixCo. As such, StaMixCo is cumulative and discretionary denial is appropriate.

C. Zumbrunnen Is Substantially Identical And/Or Similar To Previously Considered Prior Art And Does Not Disclose Elements Deemed Missing from Previously Considered Prior Art

Zumbrunnen discloses “chaotic advection-based processing of plastics” which can be “used with existing polymer resins and is well suited to melt processing of shear-sensitive materials.” See Ex. RPI1012, Zumbrunnen, at 1. Zumbrunnen also mentions that “[p]lastics have also been produced with the appearance of realistic wood grains both inside and on surfaces of extrusions” *Id.* This teaching is identical to (and certainly cumulative of) the teaching of Piedboeuf (T2007), which was extensively considered by the Examiner and Board during the underlying prosecution.

Specifically, as explained in POPR on pages 35-38, during prosecution of the '350 patent, the Examiner cited Piedboeuf in connection with the limitation “wherein a plurality of individual layers of the first and second sets of polymer layers alternate within the board and extend along a substantially uninterrupted curvilinear path originating proximate the first side of the board and terminating proximate to the second side of the board” as recited in Claim 1. *See* Ex. T2006, Non-Final Office Action dated July 13, 2018 at 6. Like Petitioner, the Examiner asserted this limitation was met because it was obvious that the system taught by Piedboeuf would result in the claimed structure. *Id.* at 6.

Petitioner incorrectly asserts that “[u]nlike Piedboeuf, Zumbrunnen also expressly shows its polymer layers alternating throughout its simulated wood grain product, and extending ‘substantially interrupted’ along their entire length, in a ‘curvilinear’ pattern, allowing an ‘infinite variety of simulated wood patterns’ to be formed throughout.” Corrected Reply at 10-11.

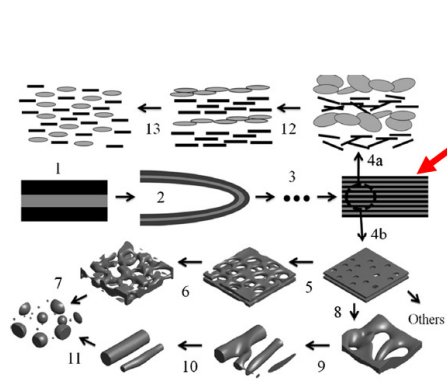


FIG 22.1 (Zumbrunnen)

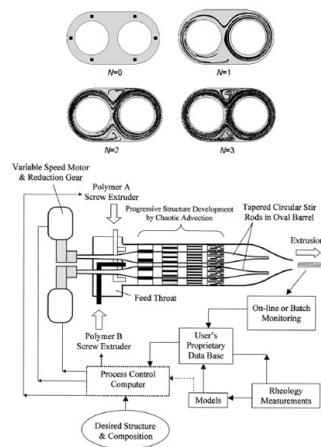


FIG 22.2 (Zumbrunnen)

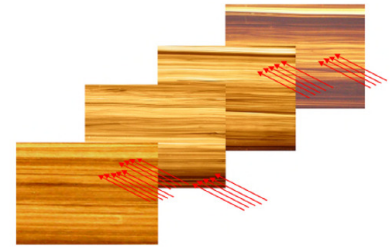


FIG 22.12 (Zumbrunnen)

As shown in FIG. 22.2 of Zumbrunnen, Zumbrennen's system uses cylindrical stir where polymers are stretched and folded recursively by chaotic advection, creating a layered arrangement. RPI1012 at 403. Petitioner claims these cylindrical rotating stir rods, produce "curvilinear layering in its products." Corrected Reply at 10.

Not so. FIG. 22.2 of Zumbrunnen and element 4b in FIG. 22.1 show that Zumbrunnen's system produces layered products with straight layers, not "curvilinear layering" as Petitioner claims. Indeed, Zumbrunnen indicates that continued "stretching and folding of polymer melt layers in a smart blender" would lead to "individual layer rupture" (i.e., not uninterrupted) as shown in steps 12-13, 5-7, and/or 8-11 of FIG. 22.1. RPI1012 at 402. Thus, Zumbrunnen acknowledges that folding and blending of the layers to allegedly create curves would lead to interruptions in the layers, which is contrary to the challenged claims. Zumbrunnen

therefore does not disclose producing layered products with “curvilinear” layering that is “substantially uninterrupted.”

Petitioner also cites FIG. 22.12 of Zumbrunnen above as alleged proof that Zumbrunnen shows polymer layers alternating throughout its simulated wood grain product, extending “substantially uninterrupted” along their entire length, in a “curvilinear” pattern, allowing an “infinite variety of simulated wood patterns” to be formed throughout.” Corrected Reply at 10-11. However, while Zumbrunnen presents plastic wood having “various wood grain patterns” where the simulated grain “appears both on the surface and interior” (*see* Petition at 26-28, 60-61, 66-71), Zumbrunnen does not show that the “grains of the substrate take an “uninterrupted” and “curvilinear path” in the length direction. Nor does the Petitioner identify any disclosure that the grains can take an “uninterrupted” and “curvilinear path” in the width direction.”

Petitioner's assertion regarding Zumbrunnen is no different than the Examiner's assertion regarding Piedboeuf. The Board previously found this type of conclusory assertion insufficient to establish that Piedboeuf's system teaches the recited claim limitation. There is no reason the Board should reach a different conclusion here. Thus, discretionary denial is appropriate.

D. Rassi Was Considered During Prosecution

As detailed in the POPR, the Examiner considered Rassi during prosecution of the '350 patent. The Examiner's prior art search included a specific search for Rassi. There can be no credible dispute that the Examiner was aware of Rassi when examining the claims of the '350 patent. As explained in *Molins PLC v. Textron, Inc.*, 48 F.3d 1172, 1185 (Fed. Cir. 1995), "[w]hen a reference was before the examiner, whether *through the examiner's search* or the applicant's disclosure, *it cannot be deemed to have been withheld from the examiner.*" (emphasis added); *see also* POPR at 29. Petitioner has not established that Rassi or its related arguments are not cumulative, and therefore, discretionary denial is appropriate.

III. Conclusion

To prevent any further waste of Board and Patent Owner's resources, the Board should exercise its discretion to deny institution of *inter partes* review. Patent Owner respectfully reserves all of its arguments regarding why Petitioners' invalidity proofs fail on the merits (including but not limited to: (i) the level of ordinary skill in the art, (ii) the state of the art, (iii) claim construction, and (iv) validity issues), and will present them if a Patent Owner Response becomes necessary.

Dated: September 30, 2024

Respectfully submitted,

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Certificate of Service

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