

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

IMPERATIVE CARE, INC.,
Petitioner,

v.

INARI MEDICAL, INC.,
Patent Owner.

Case No. IPR2025-01021
U.S. Patent No. 11,969,333

PATENT OWNER'S RESPONSE

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STATUTES

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EXHIBIT LIST

Petitioner's Exhibits	
Exhibit	Description
EX1001	U.S. Patent No. 11,974,333 (“the ’333 Patent”)
EX1002	’333 Patent Prosecution History
EX1003	Expert Declaration of Troy Thornton
EX1004	Resume of Troy Thornton
EX1005	U.S. Patent No. 8,734,374 B2 to Aklog et al. (“Aklog”)
EX1006	U.S. Patent Publication No. 2015/0173782 A1 to Garrison et al. (“Garrison”)
EX1007	WIPO Publication No. WO 2006/124307 A2 to Goff et al. (“Goff”)
EX1008	U.S. Patent Publication No. 2003/0116731 A1 to Hartley (“Hartley”)
EX1009	U.S. Patent No. 6,776,770 B2 to Trerotola (“Trerotola”)
EX1010	U.S. Patent Publication No. 2010/0042118 A1 to Garrison et al.
EX1011	U.S. Patent No. 8,535,283 B2 to Heaton et al. (“Heaton”)
EX1012	U.S. Patent Publication No. 2017/0043066 A1 to Laub (“Laub”)
EX1013	U.S. Patent Publication US 2003/0225379 A1 to Schaffer et al. (“Schaffer”)
EX1014	U.S. Patent No. 5,938,645 to Gordon (“Gordon”)
EX1015	U.S. Patent Publication No. 2014/0296868 A1 to Garrison et al.
EX1016	U.S. Patent No. 7,998,104 B2 to Chang (“Chang”)
EX1017	U.S. Patent No. 8,157,760 B2 to Criado et al. (“Criado”)
EX1018	U.S. Patent No. 6,481,439 B1 to Lewis et al.
EX1019	U.S. Patent No. 8,075,510 B2 to Aklog et al.

Petitioner's Exhibits	
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EX1020	WIPO Publication No. WO 2018/019829 A1 to Brady et al. ("Brady")
EX1021	U.S. Patent Application No. 16/117,519 (the "519 application")
EX1022	Expert Declaration of Dr. Aquilla S. Turk, III, DO
EX1023	Resume of Dr. Aquilla Turk, III, D.O.
EX1024	Shani, Jacob M.D., et al., Mechanical Manipulation of Thrombus: Coronary Thrombectomy, Intracoronary Clot Displacement, and Transcatheter Aspiration, 72 Am. J. Cardiol. 116G-118G (1993)
EX1025	Bose, A et al., The Penumbra System: A Mechanical Device for the Treatment of Acute Stroke due to Thromboembolism, 29 Am. J. Neuroradiol. 1409-1413 (Aug. 2008)
EX1026	Turk, Aquilla S. et al., Initial clinical experience with the ADAPT technique: A direct aspiration first pass technique for stroke thrombectomy, 6 J. NeuroIntervent. Surg. 231-237 (2014)
EX1027	Turk, Aquilla S. et al., ADAPT FAST study: a direct aspiration first pass technique for acute stroke thrombectomy, 6 J. NeuroIntervent. Surg. 260-264 (2014)
EX1028	April 24, 2024 Letter from Inari to Imperative Care
EX1029	Turk, Aquilla S. et al., Aspiration thrombectomy versus stent retriever thrombectomy as first-line approach for large vessel occlusion (COMPASS): a multicentre, randomized, open label, blinded outcome, non-inferiority trial, 393 Lancet 998-1008 (March 2019)
EX1030	Save, Jeffrey L., Time is Brain – Quantified, American Heart Association Journals, available at http://www.stokeaha.org (2005).
EX1031	U.S. Patent No. 9,980,813 B1 to Eller ("Eller")
EX1032	US 2018/0064453 A1 ("Garrison II")
EX1033	US 2005/0054995 A1 ("Barzell")

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EX1034	Decision Granting Institution of <i>Inter Partes</i> Review for U.S. Patent No. 11,697,011 (Paper 7) in <i>Imperative Care, Inc. v. Inari Medical, Inc.</i> , IPR2024-01157 (P.T.A.B. Jan. 23, 2025)
EX1035	Decision Granting Institution of <i>Inter Partes</i> Review for U.S. Patent No. 11,697,012 (Paper 6) in <i>Imperative Care, Inc. v. Inari Medical, Inc.</i> , IPR2025-00156 (P.T.A.B. Apr. 22, 2025)
EX1036	U.S. Patent No. 12,109,384 B2 to Merritt et al.
EX1037	Patent Owner’s Exhibit 2002 filed in <i>Imperative Care, Inc. v. Inari Medical, Inc.</i> , IPR2025-00289 (P.T.A.B.)
EX1038	Indigo Aspiration System-Penumbra Engine Pump and Canister, 510(k) No. K180105 (Mar. 8, 2018) (“Indigo Aspiration System”)
EX1039	AXS Universal Aspiration Set Brochure (2017)
EX1040	VacLok Negative Pressure Syringe Brochure
EX1041	O. Nikoubashman et al., Under Pressure: Comparison of Aspiration Techniques for Endovascular Mechanical Thrombectomy, 39 Am. J. Neuroradiol. 905-909 (May 2018) (“Nikoubashman”)
EX1042	Inari’s Supplemental Infringement Contentions (without claim charts) from <i>Inari Medical, Inc. v. Imperative Care, Inc.</i> , No. 24- cv-3117 (N.D. Cal.) (served February 7, 2025)
EX1043	Inari’s Notice of Motion and Motion for Leave to File Third Amended Complaint (Dkt. #88) in <i>Inari Medical, Inc. v. Imperative Care, Inc.</i> , 24-cv-03117-EKL (N.D. Cal.) (filed March 5, 2025)
EX1044	Case Management & Scheduling Order (Dkt. #54) in <i>Inari Medical, Inc. v. Imperative Care, Inc.</i> , 24-cv-03117-EKL (N.D. Cal.) (issued December 19, 2024)
EX1045	Decision Denying Institution of <i>Inter Partes</i> Review for U.S. Patent No. 11,744,691 (Paper 10) in <i>Imperative Care, Inc. v. Inari Medical, Inc.</i> , IPR2024-01257 (P.T.A.B. Feb. 7, 2025)

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EX1046	U.S. Patent No. 7,984,730 B2 to Ziv et al.
EX1047	Imperative Care's Opposition to Inari's Motion for Leave to File Third Amended Complaint (Dkt. #98) in <i>Inari Medical, Inc. v. Imperative Care, Inc.</i> , 24-cv-03117-EKL (N.D. Cal.) (filed March 26, 2025)
EX1048	Imperative Care's Notice of Motion and Motion to Stay Pending <i>Inter Partes</i> Review (Dkt. #100) in <i>Inari Medical, Inc. v. Imperative Care, Inc.</i> , 24-cv-03117-EKL (N.D. Cal.) (filed April 2, 2025)
EX1049	Ahmed Pasha et al., Successful Management of Acute Massive Pulmonary Embolism Using Angiovac Suction Catheter Technique in a Hemodynamically Unstable Patient, 15 Cardiovasc. Revasc. Med. 240-243 (2014)
EX1050	Certified File History of U.S. Patent Application 10/371,190 (Schaffer File History)
EX1051	Maureen Kohi, Catheter Directed Interventions for Acute Deep Vein Thrombosis, 6 Cardiovasc. Diagn. Ther. 599-611 (2016)
EX1052	Decision Denying Patent Owner's Request for Discretionary Denial (Paper 9) in <i>Imperative Care, Inc. v. Inari Medical, Inc.</i> , IPR202-500289 (P.T.A.B. June 12, 2025)
EX1053	Decision Referring the Petition to the Board (Paper 9) in <i>Imperative Care, Inc. v. Inari Medical, Inc.</i> , IPR2025-00728 (P.T.A.B. July 31, 2025)
EX1054	Decision Granting Institution of <i>Inter Partes</i> Review for U.S. Patent No. 11,554,005 (Paper 10) in <i>Imperative Care, Inc. v. Inari Medical, Inc.</i> , IPR2025-00289 (P.T.A.B. June 18, 2025)
EX1055	Order Denying Motion for Preliminary Injunction (Dkt. #136) in <i>Inari Medical, Inc. v. Imperative Care, Inc.</i> , 24-cv-03117-EKL (N.D. Cal.) (issued September 29, 2025)
EX1056	Joint Stipulation to Continue to Stay of Litigation Pending IPR Decisions and Vacate Upcoming Case Management Conference (Dkt.

Petitioner's Exhibits	
Exhibit	Description
	#139) in <i>Inari Medical, Inc. v. Imperative Care, Inc.</i> , 24-cv-03117-EKL (N.D. Cal.) (dated January 21, 2026)
EX1057	Order Granting Joint Stipulation to Continue the Stay of Litigation Pending IPR Decisions and Vacate Upcoming Case Management Conference (Dkt. #140) in <i>Inari Medical, Inc. v. Imperative Care, Inc.</i> , 24-cv-03117-EKL (N.D. Cal.) (issued January 21, 2026)

Patent Owner's Exhibits	
Exhibit	Description
EX2001	U.S. Patent Application Publication No. 2017/0274180 to Garrison et al.
EX2002	U.S. Patent Application Publication No. 2013/0035628 to Garrison et al.
EX2003	U.S. Patent Application Publication No. 2018/0042623 to Batiste ("Batiste")
EX2004	U.S. Patent No. 6,059,745 to Gelbfish ("Gelbfish")
EX2005	Declaration of Brian Brown
EX2006	Order Granting in Part Motion to Stay, <i>Inari Medical, Inc. v. Imperative Care, Inc.</i> , No. 5:24-cv-03117-EKL (N.D. Cal. Sept. 29, 2025), ECF No. 137
EX2007	Hearing Transcript, dated February 6, 2026
EX2008	Supplemental Declaration of Brian Brown
EX2009	Instructions for Use for Medtronic Bio-Bump™ BP-50, CBBP-50

Patent Owner's Exhibits	
Exhibit	Description
EX2010	Instructions for Use for Maquet Getinge Group ROTAFLOW Centrifugal Pump
EX2011	40 Year Bio Pump Timeline
EX2012	OPERATING INSTRUCTIONS for the Pump Drive BVP-BP for centrifugal blood pump heads BP-50/BP-80 and SP-45
EX2013	Deposition Transcript of Troy L. Thornton (February 18, 2026)
EX2014	Deposition Transcript of Troy L. Thornton (February 19, 2026)
EX2015	Deposition Transcript of Aquilla S. Turk (February 25, 2026)
EX2016	Declaration of Dr. Christopher S. Morris
EX2017	Redacted version of Declaration of Brian Brown, <i>Inari Medical, Inc. v. Imperative Care, Inc.</i> , No. 5:24-cv-03117-EKL (N.D. Cal. July 24, 2024), ECF No. 24-2

I. INTRODUCTION

Petitioner has failed to demonstrate that any of Claims 1-38 (“the Claims”) of the ’333 Patent are unpatentable.¹ Rather, as explained herein, the Claims are directed to innovations pioneered by Patent Owner that are not disclosed or obvious in view of the prior art, as the Patent Office agreed during Prosecution—expressly finding the Claims patentable over Garrison, the only reference Petitioner uses for all grounds, in the Notice of Allowance. EX1002, pp.46-47.

The ’333 Patent is directed to improved clot treatment systems and methods for removing clot material, specifically pulmonary embolisms (“PEs”) and deep vein thromboses (“DVTs”), from the vasculature of a human patient. EX1001, 4:17-19; EX2008, ¶37. DVT/PE are particularly dangerous types of venous thromboembolism caused by blood clot formation in the veins of the body. EX2008, ¶31. DVT is a type of blood clot (thrombus) that typically forms in the deep veins of a limb, such as the leg. EX1001, 1:46-51; EX2008, ¶32. PE is a life-threatening condition that occurs when such a clot travels and becomes lodged in the pulmonary arteries (e.g., in the lungs), blocking the oxygenation of blood necessary to sustain

¹ The Petition does not challenge Claims 13 and 32 (Petition, p.1), but lists those claims in its table of challenged claims (*id.* at p.16) without substantively addressing them.

the entire body. EX1001, 1:57-67; EX2008, ¶32.

The methods for treating PE/DVT in the '333 Patent use innovative techniques to generate and build up (e.g., pre-charge and store) vacuum pressure *in a clot canister having a filter* before applying the built-up vacuum to an aspiration catheter to generate large suction forces (and corresponding fluid flow velocities) to effectively aspirate and remove (suck out) the PE/DVT from a patient. EX1001, 4:34-50, 10:14-27; EX2008, ¶37. That buildup and subsequent application of stored vacuum pressure specifically in a clot canister is a key feature to the Claims of the '333 Patent, which includes two independent claims that recite mirrored steps for treating “pulmonary embolism” (Claim 1) and “deep vein thrombosis” (Claim 20). EX1001, cls.1, 20. The methods specifically recite “generating vacuum pressure *within the clot canister* [that includes a filter] via the aspiration source while a valve positioned along the fluid path between the aspiration catheter and the clot canister is in a first position that inhibits fluid flow along the fluid path from the lumen of the aspiration catheter to the clot canister” and “moving the valve from the first position to a second position” to apply and the vacuum pressure and aspirate the PE/DVT. *Id.*

Here, Petitioner asserts four different grounds for independent Claims 1 and 20: (1A) Laub combined with Garrison, (2A) Aklog combined with Garrison, (3A) Garrison combined with Laub, and (4A) Garrison combined with Aklog. Petition,

p.16. For each ground, Petitioner relies on Garrison alone for disclosing the “valve” used to control the buildup of and subsequent application of vacuum pressure in the clot canister recited in the Claims. Petition, pp.36-41. But Garrison does not disclose or render obvious those features, so all grounds fail.

Each of grounds 1A-4A fail at least because none of Petitioner's references disclose or render obvious a method having steps of “generating vacuum pressure within” a “clot canister” having a “filter” and then moving a valve “thereby applying the vacuum pressure” to aspirate at least a portion of the PE (Claim 1) or DVT (Claim 20) “into the clot canister.” EX1001, cls.1, 20.

For example, Petitioner cites only Garrison to try to show Patent Owner's “generating vacuum pressure within the clot canister via the aspiration source while a valve ... is in a first position that inhibits fluid flow.” *Id.*; Petition, pp.36-41. But in doing so, Petitioner improperly conflates Garrison's multiple disparate embodiments. The Board preliminarily found “no flaw in Petitioner's alleged mixing of disclosures or features for different embodiments.” Institution Decision, pp.31-32. Here, Patent Owner provides additional evidence that it would not have been obvious to have mixed and matched Garrison's various embodiments as Petitioner suggests.

Specifically, Figure 34 of Garrison does not disclose the buildup of vacuum pressure in either filter 3418 (i.e., Petitioner's alleged “clot canister”) with the valve

3325 (i.e., Petitioner's alleged "valve") in a closed position. Petition, p.37; EX2008, ¶82. And a POSA would have understood that is for good reason—to prevent the peristaltic or like pumps shown there from operating without fluid flow to their inlet ("running dry") which *would damage the pumps and blood in the system* further making the blood unsuitable for return. EX2008, ¶¶86-104, 128-132. Conventional blood pumps at the time of the invention (like those described in Garrison, Laub, and Aklog) even specifically warned and cautioned against operating those pumps without inlet flow to prevent such pump and blood damage. EX2009, pp.7-8; EX2010, pp.4-5; EX2012, pp, 3, 5, 11. And, Garrison's disclosure of the syringe embodiment in [0134] would not have motivated a POSA to generate vacuum pressure in a clot canister having a filter as recited in the Claims. Instead, that embodiment "enable[s] the maximum level of aspiration" by being connected directly to a flow controller (valve)—rather than indirectly via any intermediate clot canister—to eliminate dead space in the system that cannot be directly evacuated. EX1006, ¶[0134]; EX2008, ¶¶131-132; EX2016, ¶¶63-69. Indeed, Garrison's disclosure of the syringe embodiment in paragraph [0134] does not describe any other type of aspiration source (e.g., a pump) to generate a vacuum pressure in such a "maximum" way, and it does not describe creating a vacuum in a clot canister or filter. EX2008, ¶131.

Therefore, Garrison does not disclose or suggest any embodiment in which

vacuum pressure is built up in a clot canister having a filter. A POSA would have understood Garrison's lack of disclosure of that feature in Figure 34 to be for preventing pump and blood damage, and Garrison's lack of disclosure of that feature in paragraph [0134] to be for enabling the maximum level of aspiration. Ground 1A–4A all fail for that reason.

Grounds 1A-2A also fail first because for the same reason a POSA would understand Garrison not to disclose building up pressure using the valve 3325 with a peristaltic pump in Figure 34, a POSA would not have been motivated to add any valve to Laub or Aklog and operate those systems with the valve closed to avoid pump and blood damage. EX2008, ¶¶86-104; EX2016, ¶¶57-60. Second, Petitioner's motivation to add Garrison's valve to Laub/Aklog—purportedly to “enable the maximum level of aspiration”—is irrelevant in systems with pumps where the pump speed controls the maximum aspiration level. Petition, pp.38-41; EX2008, ¶¶105-110. Third, Laub's and Aklog's systems do not have a valve so they can continuously aspirate and reinfuse blood to reduce blood loss and effectively aspirate clot, and adding Petitioner's alleged valve would hinder that intended continuous aspiration/reinfusion. EX1012, ¶[0045]; EX1005, 5:19-23; EX2008, ¶¶111-113; EX2016, ¶¶57-60. Finally, a surgeon using Laub's or Aklog's system controls the pump itself, which is sufficient to control aspiration such that adding Petitioner's alleged valve would require more surgeon interaction and unnecessarily

complicate those systems. EX1012, ¶[0046]; EX1005, 11:62-12:14; EX2008, ¶¶119-120.

Grounds 3A and 4A also fail because, as the Patent Office already expressly found, a POSA would not have used Garrison to treat large clots like PE/DVT even if the catheter were “upsized.” EX1002, pp.46-47. Namely, the embodiments Petitioner cites in Garrison are expressly unsuitable for returning blood to the patient, as is the embodiment Petitioner invents in which a valve is closed with the pump in Figure 34, and Petitioner's references Laub and Aklog disclose that blood return is critical to patient safety when treating large clots PE/DVT. EX1006, ¶[0135]; EX2008, ¶¶133-146; EX2016, ¶¶58, 60, 63-76.

Moreover, Patent Owner presents cross-examination testimony from Petitioner's purported experts demonstrating that Patent Owner's expert testimony supporting patentability should be credited over Petitioner's proffered testimony otherwise. First, Petitioner's primary expert, Mr. Thornton, has no experience in the field of the invention and thus would not qualify as a POSA, let alone as an expert here. And second, Petitioner's other purported expert, Dr. Turk, who is Petitioner's Chief Medical Officer and who holds “a lot” of Petitioner's stock, testified that he did not even read the '333 Patent, the claims at issue, or the asserted references Garrison, Aklog, and Laub. Dr. Turk also has no clinical experience treating PE. Petitioner's unsupported attorney argument fails to demonstrate unpatentability by a

preponderance of the evidence.

Further still, the methods of the Claims provide unexpected results compared to the closest prior art (e.g., Garrison, Laub, and Aklog). Patent Owner's expert, Dr. Christopher D. Morris, who has treated PE and DVT for many years (with Inari's system and with other systems) was surprised by the efficacy of Patent Owner's methods including building up vacuum pressure to treat PE/DVT. EX2016, ¶¶77-85.

Accordingly, for those reasons and the reasons set forth below, grounds 1A-4A fail because independent Claims 1 and 20 are not rendered obvious by any combination of Laub or Aklog and Garrison or Garrison and Laub or Aklog. Grounds 1B-1D, 2B-2D, 3B-3D, and 4B-4D pertain only to additional limitations of the dependent claims, and fail for the same reasons as grounds 1A-4A. Petitioner has therefore failed to demonstrate that any of the Claims are unpatentable under any of grounds 1A-4D.

II. BACKGROUND

A. Overview of the '333 Patent

Patent Owner is the world's leading developer of aspiration-based mechanical thrombectomy devices that treat PE. For example, Patent Owner's FlowTrievers line of products that have been and are currently offered by Patent Owner to treat at-risk patients were the first FDA-approved aspiration-based mechanical thrombectomy

systems for treating PE.²

The '333 Patent is directed to improved clot methods for treating pulmonary embolism ("PE") and deep vein thrombosis ("DVT") from the vasculature of a patient. EX1001, 4:17-19; EX2008, ¶37. PE and DVT are types of venous thromboembolism ("VTE"), a disease caused by blood clot formation in the veins of the body that is, unfortunately, a leading cause of both death and disease worldwide. EX1001, 1:45-67; EX2008, ¶31. PE/DVT are common and particularly dangerous types of VTE. EX2008, ¶31. DVT is a type of blood clot that typically forms in the deep veins of a limb, such as the leg, and can develop into PE if portions of the clot break off and migrate to the pulmonary system. *Id.* at ¶32. PE is a life-threatening condition that occurs when a clot, often a DVT or a portion of a DVT, breaks free and becomes lodged in the arteries of the lungs, blocking the oxygenation of blood necessary to sustain the entire body. *Id.*

VTE has traditionally been treated with drugs (thrombolytic agents) or invasive surgeries. EX10015, 2:1-33; EX2008, ¶33. However, these approaches have their drawbacks. For example, thrombolytic agents do not always work, take hours or even days to be successful, can cause hemorrhage of the blood vessel, and in many patients thrombolytic agents cannot be used at all. EX1001, 2:28-33;

²See <https://www.inarimedical.com/flowtriever-system>.

EX2008, ¶34. Invasive surgical procedures involve exposing a patient to surgery and may be traumatic to the patient. EX1001, 2:10-12; EX2008, ¶36.

The '333 Patent discloses aspiration systems that build up (e.g., pre-charge) and store vacuum pressure before applying that built-up vacuum pressure to an aspiration catheter positioned near clot material (e.g., PE or DVT) in a blood vessel to rapidly generate large suction forces (and corresponding fluid flow velocities) needed to effectively aspirate and remove the clot material from the patient. EX1001, 4:34-50, 10:14-27; EX2008, ¶37. That buildup and subsequent application of vacuum pressure is integral to the Claims of the '333 Patent, specifically to the two independent claims that recite identical steps for treating “a pulmonary embolism” (Claim 1) and “a deep vein thrombosis” (Claim 20). EX1001, cls.1, 20. Each of those Claims recites “generating vacuum pressure *within the clot canister* [having a filter] via the aspiration source while a valve positioned along the fluid path between the aspiration catheter and the clot canister is in a first position that inhibits fluid flow along the fluid path from the lumen of the aspiration catheter to the clot canister” and “moving the valve from the first position to a second position thereby applying the vacuum pressure to the lumen of the aspiration catheter such that at least a portion of the pulmonary embolism [or deep vein thrombosis] and blood are aspirated into the clot canister” *Id.*

Figure 1 of the '333 Patent illustrates an aspiration assembly 10 comprising

an aspiration catheter 102 fluidly coupled to a pressure source 140 via a valve 126 (e.g., a stopcock or other fluid control valve):

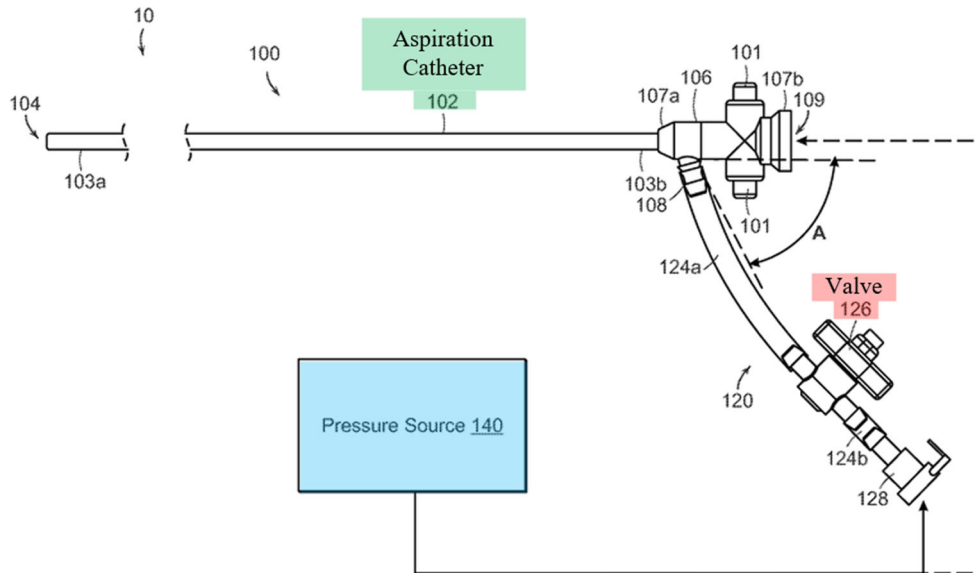


FIG. 1

EX1001, 5:25-7:23; EX2008, ¶41. The '333 Patent is not limited to a single pressure source, but describes various embodiments of the pressure source 140, explaining, for example, that it may have a filter in a chamber in which vacuum pressure is generated when the valve 126 shown in Figure 1 is closed. EX2008, ¶41; EX1001, FIGS.19–20E, 31:9-50, 31:51-33:6.

The '333 Patent explains that the aspiration source can either be a pump, or alternatively a different pressure source such as a syringe. EX1001, 7:36-41. Therefore, in different embodiments, the aspiration source is either a pump or a syringe. EX2008, ¶42.

Figure 8 of the '333 Patent is a flow chart demonstrating various steps of the

methods for treating PE/DVT recited in the claims and, some of those steps are illustrated with respect to the system of Figure 1 in Figures 9A-10B. EX1001, 16:33-56. For example, Figure 10A shows a distal portion of the aspiration catheter after being advanced through the vasculature such that a distal portion of the catheter is positioned proximate to a PE/DVT:

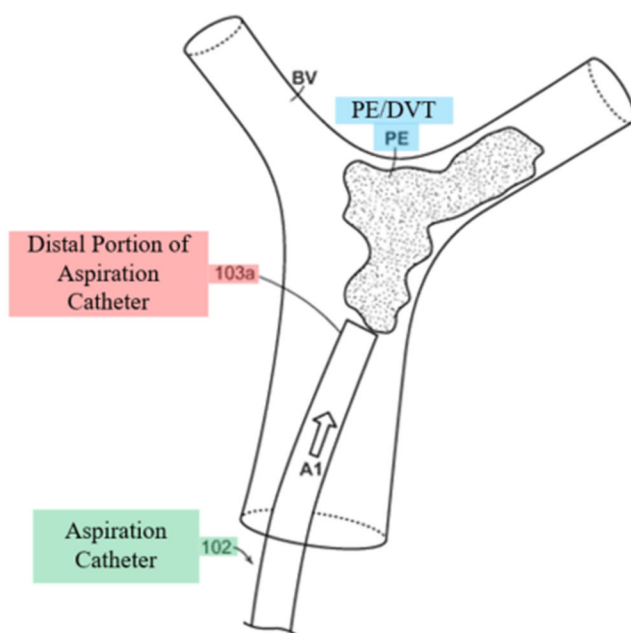
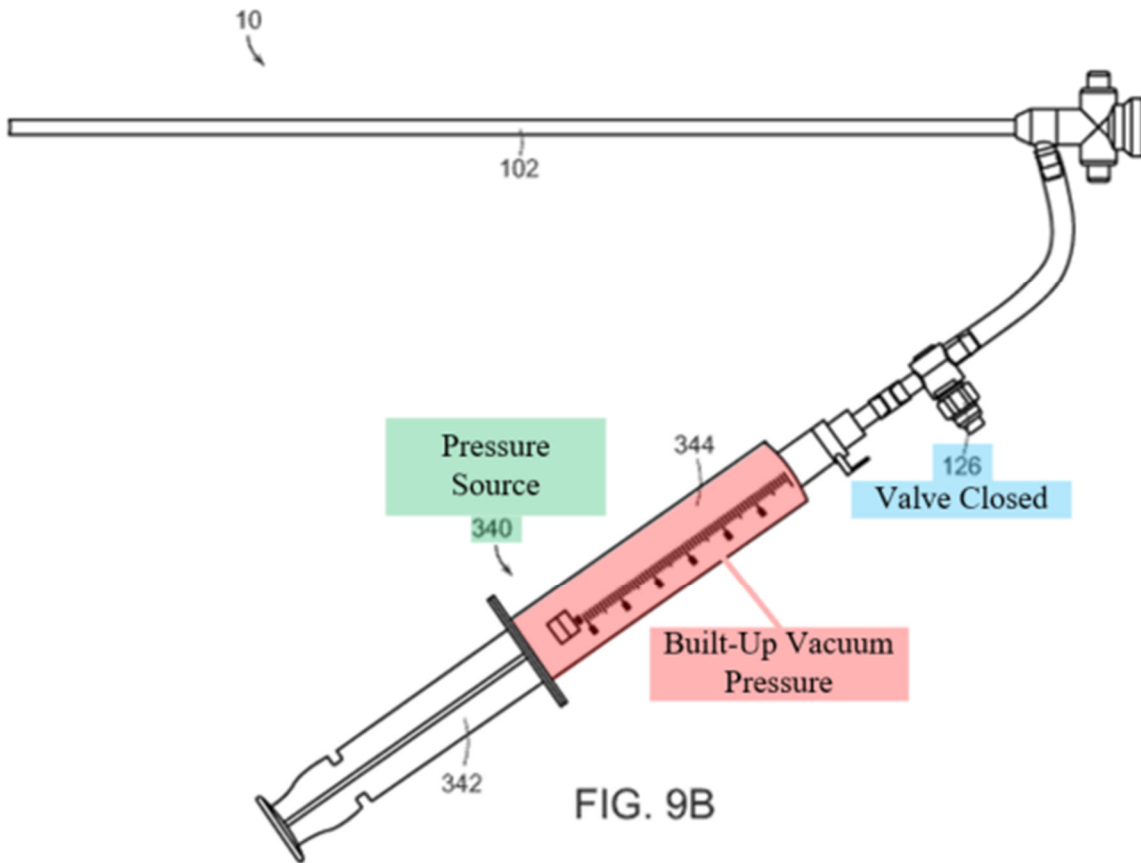


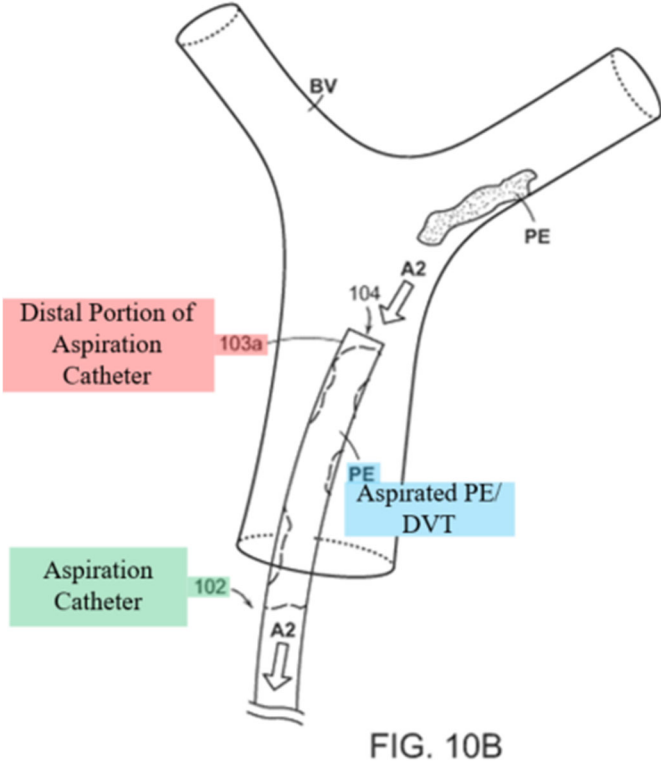
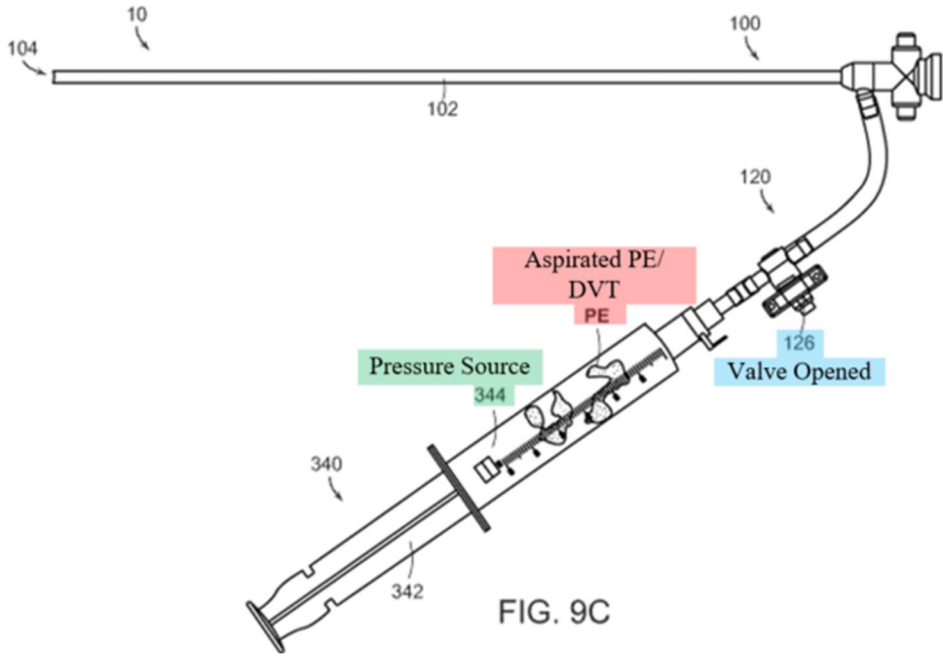
FIG. 10A

EX1001, 16:57-17:9; EX2008, ¶43. Next, as shown in Figure 9B, the aspiration source is used to generate and build up (e.g., pre-charge) vacuum pressure while the valve is closed:



EX1001, 18:11-41; EX2008, ¶43. While Figure 9B illustrates a syringe without a filter, a POSA would understand that the filtering embodiments of Figures 19-20E, or other filtering embodiments described in the '333 Patent, could be substituted for or used with the pressure source 340. EX2008, ¶43.

After building up the vacuum pressure, that pressure is then applied to the catheter to aspirate the PE/DVT by opening the valve as shown in Figures 9C and 10B:



EX1001, 18:43-19:9; EX2008, ¶44.

B. Prosecution History

Petitioner's reference for all grounds—Garrison—was substantively considered by the Patent Office and overcome. In the sole non-final Office action, the Examiner rejected the then-pending claims under 35 U.S.C. § 103 over a combination of references including Garrison II (EX1032). EX1002, pp.154-176. Garrison II is different than Garrison applied by Petitioner here, but shares common inventors and assignee (EX1006, p.1; EX1032, p.1), and is directed to the same subject matter of catheter systems for treating neurovascular clots (EX1006, ¶[0002]; EX1032, ¶[0003]; EX2008, ¶45).

In response to that Office action, Patent Owner canceled the then-pending claims and added new claims that matured into Claims 1-38 of the '333 Patent. EX1002, pp.109-119. Before filing the response, Patent Owner conducted a videoconference interview with the Examiner and an inventor of the '333 Patent, Dr. Thomas Tu, on January 25, 2024. During that interview, Patent Owner discussed the proposed new claims and also specifically called attention to the disclosure of Garrison relied on by Petitioner here. *Id.* at pp.101-104; EX2001, p.1 (listing discussion points including discussion of the *identical disclosure* of Garrison (a direct continuation thereof)). Accordingly, Patent Owner specifically brought the relevant disclosure of Garrison to the Examiner's attention despite Garrison not being cited in the sole Office action.

Following Patent Owner's amendment, the Examiner allowed the claims and further explained why the claims are patentable over the various Garrison references in including that *a POSA would not have modified Garrison to treat PE/DVT*. EX1002, pp.46-47. Accordingly, in allowing the Claims, the Examiner considered the disclosure of Garrison and found that a POSA would not have modified Garrison to treat PE/DVT, and also found that there is no prior art that reads on the Claims including in view of Batiste (EX2003) which the Examiner described as teaching an aspiration catheter used to treat DVT/PE (just like Petitioner relies on Laub and Aklog for here). *Id.*

Therefore, Garrison was considered in detail during prosecution. Garrison's disclosure was specifically brought to the Examiner's attention by Patent Owner, and the Examiner considered Garrison and expressly explained that the Claims were patentable over Garrison in the Notice of Allowance. And, although Aklog itself was not cited in an information disclosure statement, Aklog's parent (EX1019) was considered and includes disclosure that is identical to the only portions of Aklog relied upon in the Petition. EX1002, pp.186, 366 (identifying Aklog's parent, EX1019). While Laub was not cited during prosecution, Laub's system is substantively the same as Aklog and Aklog's parent (which was cited).

C. Person of Ordinary Skill in the Art

A POSA as of August 13, 2018 (the earliest priority date of the '333 Patent)

would have been (1) a person with a Bachelor of Science degree in engineering or an equivalent field, with two to four years of academic or industry experience in the mechanical thrombectomy industry or comparable industry experience who would, where necessary or desired, work or consult with others including a physician to develop thrombectomy devices; or (2) an interventional radiologist or pulmonologist with at least three years of experience developing and/or using medical devices in thrombectomy procedures, and who would, where necessary, work or consult with others including an engineer to develop such a medical device. EX2008, ¶52.

Petitioner's proposed definition of a POSA disregards the field of the invention of the '333 Patent and should be rejected. Specifically, Petitioner proposes that a POSA would have "an undergraduate degree in mechanical engineering or a related engineering discipline and 2-4 years of catheter design experience and, where necessary, would have consulted with a physician regarding the methods of treatment" without regard to the technology that is claimed. Petition, p.13.

First, there is no meaningful dispute regarding the field of the invention of the '333 Patent, namely, "systems, methods, and devices for the intravascular treatment of emboli and/or thrombi within a blood vessel of a human patient." EX1001, 1:23-26. Petitioner's purported expert, Mr. Thornton, agrees. Mr. Thornton testified that the field of the invention of the related U.S. Patent 11,974,910 (the "'910 Patent) is "devices for aspirating unwanted material from a patient." EX2013, 21:25-22:12. He

then confirmed that the recitation of “the present technology relates generally to systems, methods, and devices for the intravascular treatment of emboli and/or thrombi within a blood vessel of a human patient[,]” which is also recited verbatim in the '333 Patent (EX1001, 1:23-26), is a reasonable description of the technical field of the related '910 Patent and is the same in substance to his assertion that the field is “devices for aspirating unwanted material from a patient” set forth in his declaration (EX1003, ¶26). *See* EX2013, 22:23-23:20. Mr. Thornton further confirmed that this is the same field of the invention for the '333 Patent at issue here. *Id.* at 26:10-13.

So, while Petitioner's proposed definition of a POSA includes a similar level of education, Petitioner's proposed POSA omits any experience in the field of the invention (or any field of invention). Instead, Petitioner asserts that only “catheter design experience” is necessary, proposing that a POSA has “2-4 years of catheter design experience.” Petition, p.13. Petitioner's omission of experience in the field of the invention of the '333 Patent cannot be correct.

Moreover, Petitioner's purported expert, Mr. Thornton, has no experience in the field of the invention, either, in his own words “devices for aspirating unwanted material form a patient” (EX1003, ¶26) or “systems, methods, and devices for the intravascular treatment of emboli and/or thrombi within a blood vessel of a human patient” as expressly recited in the '333 Patent. EX1001, 1:23-26. Specifically, Mr.

Thornton testified:

[Q.] Have you ever designed a catheter to aspirate emboli, blood clot, or a thrombus from a patient?

[A.] No. The catheters that I developed, though, I would argue are more complex and have probably more design requirements than the single lumen aspiration catheters that are disclosed in these patents.

[Q.] Have you ever designed any device intended to be used to aspirate a blood clot, thrombus, or emboli?

[A.] No.

[Q.] Have you ever designed any catheter intended to be used to aspirate a blood clot, thrombus, or emboli?

[A.] I'll answer no again.

EX2013, 49:24-50:10.

And, while Petitioner proposes in its definition that a POSA, "where necessary, would have consulted with a physician" with appropriate experience in the field of the invention, Mr. Thornton testified that he did not do so in preparing his opinions, as follows:

[Q.] And did you consult with any physician in preparing your declaration with respect to the '910 patent?

[A.] No.

[Q.] Did you rely on any statement from any physician in preparing your declaration with respect to the '910 patent?

[MR. BARNES:] Object to the form.

[THE WITNESS:] I don't believe so.

EX2013, 43:9-17.

Because Mr. Thornton himself has no experience in the field of the '333 Patent, he is not qualified as an expert here and his testimony should be afforded no weight.³

D. The testimony of Petitioner's purported Experts should be afforded little or no weight.

Petitioner's purported expert testimony should be afforded little weight and should not be credited over the testimony of Patent Owner's experts, Brian Brown and Dr. Christopher S. Morris.

First as explained above, Petitioner's purported expert, Mr. Thornton, fails to qualify as a POSA, let alone as an expert, because he has no experience in the field of the invention of the '333 Patent. EX2013, 49:24-50:10. As such his testimony should be afforded no weight and should not be credited over the testimony of Patent Owner's experts.

Similarly, Petitioner's other purported expert Dr. Aquilla Turk's testimony

³ Mr. Thornton's testimony should also be excluded from the record because he does not have the minimum experience required for a POSA in the field of the '333 Patent. *Kyocera Senco Indus. Tools Inc. v. Int'l Trade Comm'n*, 22 F.4th 1369, 1377 (Fed. Cir. 2022).

should be afforded little weight and should not be credited over Patent Owner's experts. At deposition, Dr. Turk admitted that he did not review the '333 patent at all, let alone the claims at issue here. EX2015, 33:12-19 ("I'm sure I did not"). He also stated that his declaration did not render an opinion regarding the patentability of the claims at issue here. *Id.* at 34:7-35:7. He further testified that in preparing his declaration, he did not read any of the primary references Garrison, Aklog, or Laub. *Id.* at 69:7-11. And, while Claim 1 and 20 are directed to methods of treating PE or DVT, respectively, Dr. Turk testified at deposition that he has no experience treating either PE/DVT. *Id.* at 23:14-16. ("Do you have experience in treating deep vein thrombosis or pulmonary embolisms? A. No."). He further testified that he is not an expert in treating PE/DVT. *Id.* at 95:2-4. Instead, at best for Petitioner, for PE/DVT, Dr. Turk has been "in the room" and watched "eight or nine at least" such procedures. *Id.* at 69:14-70:4. Dr. Turk's testimony is not relevant to the Claims of the '333 Patent, the asserted references, or Petitioner's grounds here.

Dr. Turk is also biased. At deposition Dr. Turk testified that he is the Chief Medical Officer (CMO) of Petitioner, receiving a compensation of \$250,000 per year and that he has "a lot" of equity in Petitioner. *Id.* at 13:18-15:9. Patent Owner has sued Petitioner for patent infringement of the '333 Patent. Paper 3, p.2. As such, Dr. Turk has a strong financial incentive in the success of Petitioner in general, and in particular, in the outcome of this IPR.

In direct contrast to Petitioner's purported experts, Patent Owner's experts are highly qualified to render testimony in this IPR, and that testimony should be credited over Petitioner's purported expert testimony. First, Brian Brown is qualified as an expert in the field of the '333 Patent and has extensive experience in designing devices in the actual field of the '333 patent. EX2008, ¶¶7-16, 52. Similarly, Dr. Morris has decades of experience as a physician both treating and teaching others to treat the conditions at issue in the claims, namely PE/DVT.

E. Claim Construction

Petitioner proposes a claim construction for a single term, "filament," recited in dependent Claims 11-12 and 30-31. Petition, pp.13-15. This claim construction issue is not germane to Patent Owner's arguments here that focus on other aspects of the claims, and it is therefore not necessary to analyze that claim term for this proceeding. Patent Owner has proposed an express definition in other pending IPR proceedings.

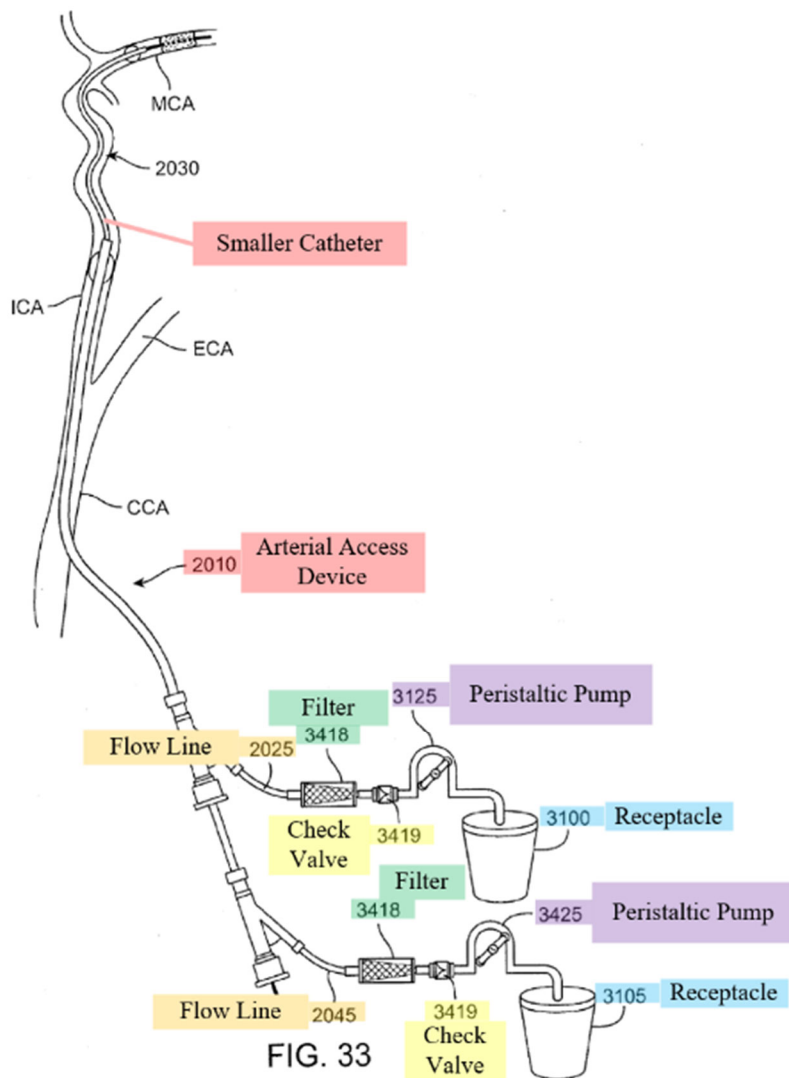
III. Petitioner's References

A. Garrison

Garrison is directed to systems for treating acute ischemic stroke caused by small cerebral clots in the cerebral arterial vasculature rather than, for example, treating large clots in the venous vasculature (e.g., PE or DVT) like the '333 Patent. EX1006, ¶[0002]; EX2008, ¶54. For example, Figure 33 (annotated below) of

Garrison shows an arterial access device 2010 that provides access to the common carotid artery (CCA), and a smaller catheter 2030 inserted through the arterial access device 2010 such that a distal tip of the catheter 2030 is positioned in the middle cerebral artery (MCA) to treat clot therein. EX1006, ¶[0131]; EX2008, ¶54. The catheters 2010/2030 are each connected to a flow line 2025/2045, which can be connected in series via tubing to a filter 3418, a check valve 3419, a source of aspiration 3125/3425 (a peristaltic pump), and a receptacle 3100/3105, respectively.

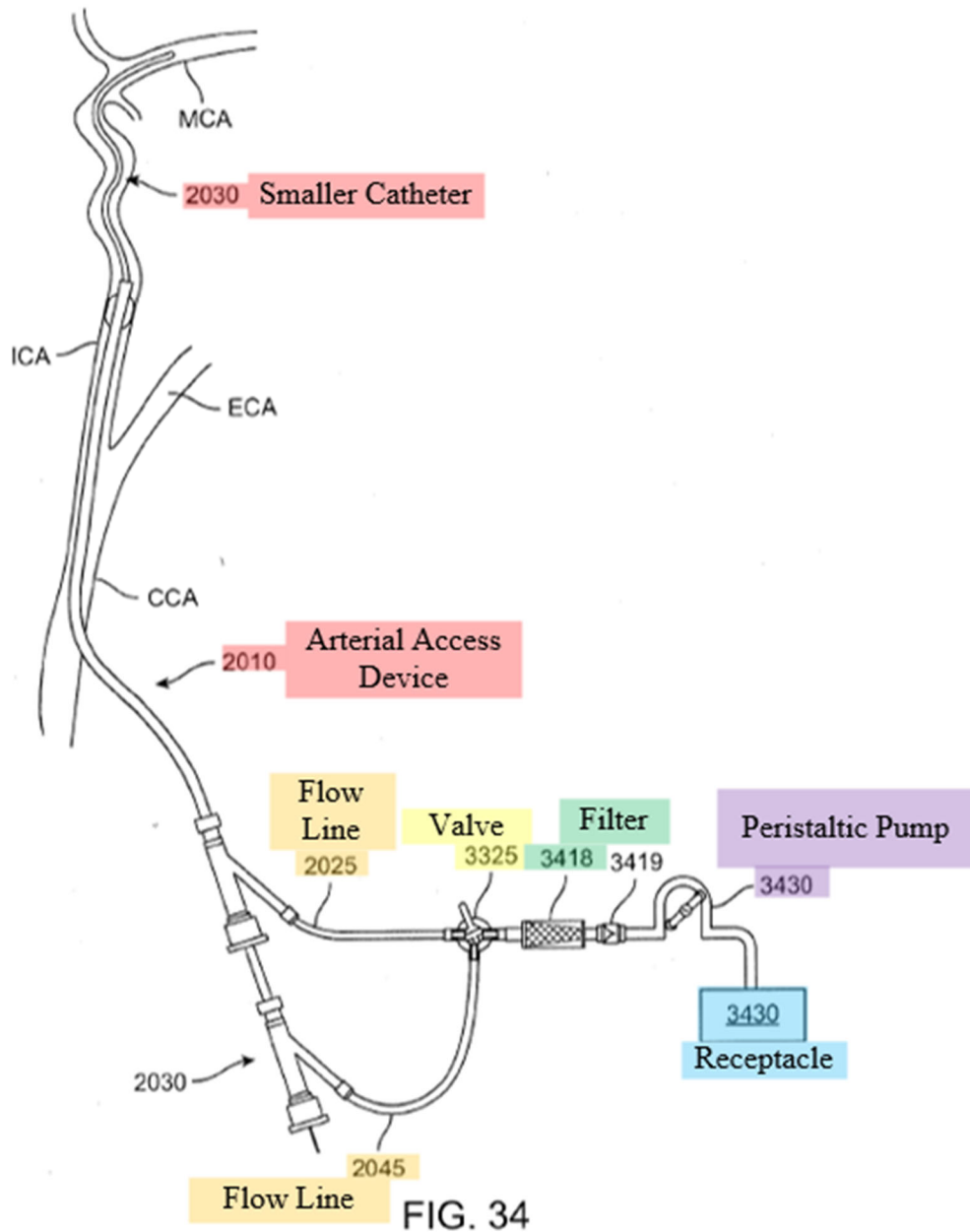
Id.



EX2008, ¶54. As can be seen above, Figure 33 does not include any valve in either flow path between the peristaltic pumps and connected catheter that could allow for building up and then releasing vacuum pressure. *Id.*

Figure 34 of Garrison (annotated below) shows a similar system in which both catheters 2010/2030 are connected to the same aspiration source 3430 and receptacle EX1006, ¶[0132]; EX2008, ¶55. Because they are connected to the same aspiration source, a “valve 3325 controls which device is connected to the aspiration source

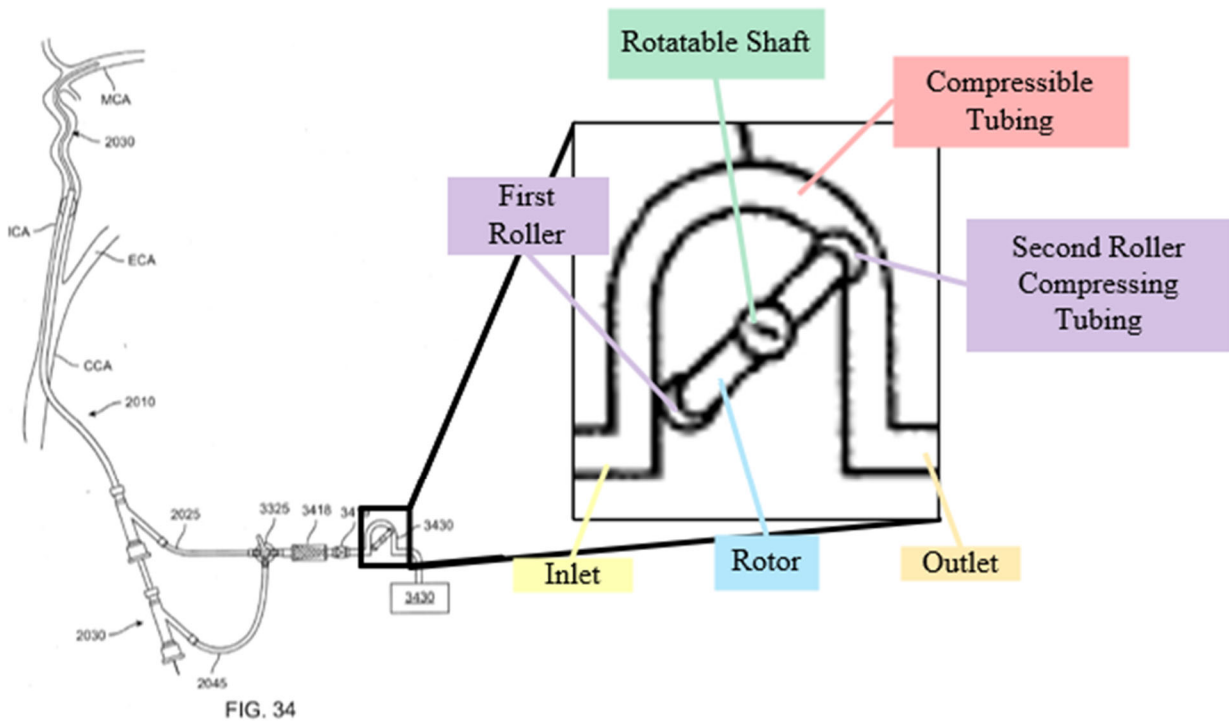
3430." *Id.*



Id.

The aspiration sources in Figures 33-34 are peristaltic pumps based on their depiction including compressible tubing and a rotatable shaft connected to a rotor

having rollers for compressing the tubing and moving fluid therethrough:



EX2008, ¶56. A POSA would understand that such peristaltic pumps are a type of positive displacement pump. *Id.*

Garrison discloses a different embodiment of a syringe-based system in which “a locking syringe (for example a VacLok Syringe) is attached to the flow controller and the plunger is pulled back into a locked position by the user while the connection to the flow line is closed prior to the thrombectomy step of the procedure.” EX1006, ¶[0134]; EX2008, ¶57. In that one embodiment, the syringe is attached directly to the flow controller (e.g., valve) rather than, for example, indirectly via a check valve and filter like shown in Figure 34 to “enable the maximum level of aspiration” by reducing any dead volume between the syringe and the valve. *Id.* Then, “[d]uring

the procedure ... the user may open the connection to the aspiration syringe ... [t]his would enable the maximum level of aspiration in a rapid fashion with one user.” EX1006, ¶[0134]. In that embodiment, the locking syringe is actuated with the connection to the flow line closed such that vacuum is generated in the syringe. EX2008, ¶57.

Garrison also discloses the drawbacks of the systems illustrated in Figures 33-34 and the different locking syringe embodiment disclosed (but not illustrated) in paragraph [0134], including that these embodiments are unsuitable for use with blood return because, for example, the blood is “exposed to air or has been static for a period of time” such that “there is a risk of thrombus formation or damage to the blood cells.” EX1006, ¶[0135]; EX2008, ¶58. To address that disadvantage, Garrison discloses a separate, but incompatible, system in Figure 36 “which is configured not to harm blood cells and which may be configured to return blood to the central venous system in real time during the procedure, so there is no reservoir in which the blood remains static.” EX1006, ¶¶[0136]-[0137]; EX2008, ¶¶59-60. The pump in Figure 36 is another type of positive displacement pump like a peristaltic pump, but that operates without rollers that compress tubing. EX2008, ¶60.

B. Laub

Laub discloses a “system for removing thrombi and other unwanted material

from the body of a patient, particularly from the patient's vasculature." EX1012, ¶[0005]. The embodiment of Laub relied on by Petitioner is shown in Figure 1A below and includes an aspiration catheter 200 in fluid communication with a filter 300, a pump 400, and a return catheter 500:

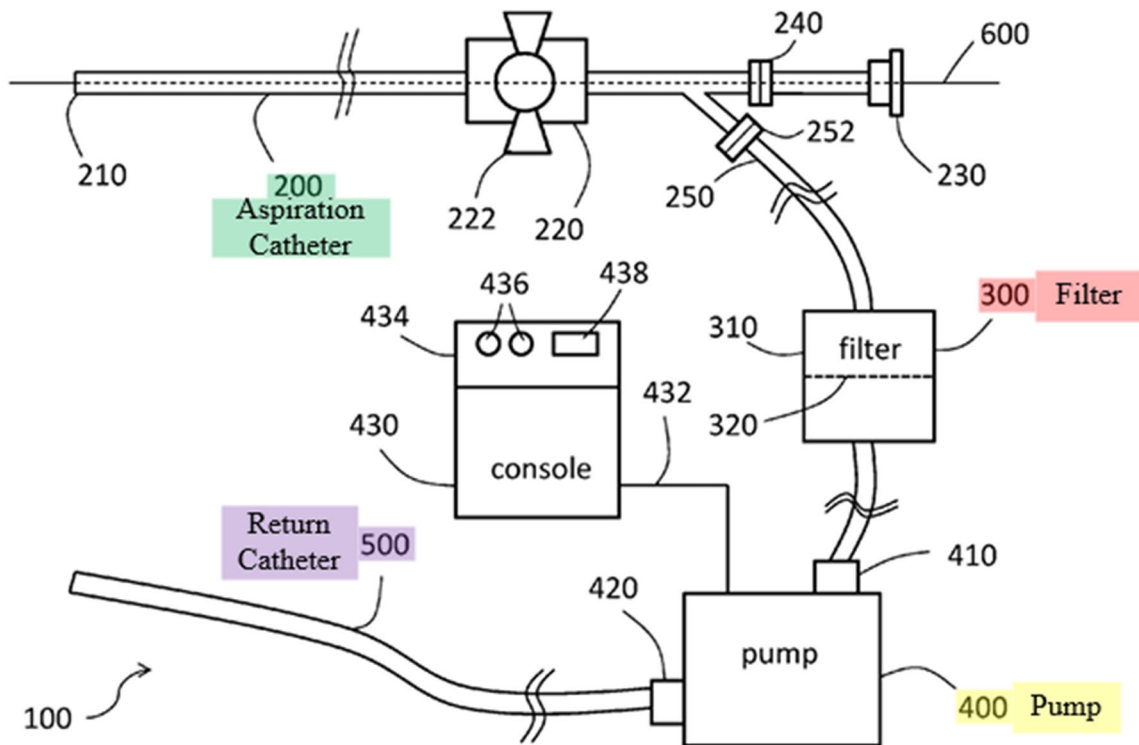


FIG. 1A

EX1012, ¶[0024]; EX2008, ¶61. The system includes no valve or fluid control device in the flow path and the pump 400 operates to continuously suction blood and thrombi through the aspiration catheter 200 and the filter 300 and then drive the filtered blood through the return catheter 500 back into the patient. *Id.* In other words, it does not generate a stored vacuum pressure. EX2008, ¶61. Accordingly, Laub discloses that “[i]n preferred embodiments, pump 400 is a centrifugal pump”

while “[i]n other embodiments, pump 400 may be a rotary pump, peristaltic pump, roller pump, or other form of pump known in the art.” EX1012, ¶[0041]; EX2008, ¶61.

Laub discloses that the aspiration catheter 200 can have a wide range of sizes, but that “[i]n certain preferred embodiments, aspiration catheter has a French size of equal to or greater than 10 Fr to allow for aspiration of large thrombi and/or other solid materials from the patient.” EX1012, ¶[0028]. A POSA would understand that PE and DVT are large clots. EX2008, ¶62; EX2016, ¶¶62, 70-73. Laub also discloses a wide range of flow rates including flow rates up to 6 liters per minute. EX1012, ¶¶[0043]-[0044].

Because of those large flow rates using large catheters, Laub correctly recognizes the necessity of blood reinfusion: “[w]ithout returning the blood back to the patient, such high flow rates could quickly result in exsanguination of the patient.” EX1012, ¶[0045]. That is, Laub assumes that when treating large clots like PE and DVT as claimed in the '333 Patent, the patient will bleed out and die if the blood is not returned. EX2008, ¶63; EX2016, ¶58. Laub addresses that critical concern “[b]y returning the aspirated blood back to the patient, embodiments of the present system 100 allows for aspiration while minimizing the blood loss of the patient.” EX1012, ¶[0045]. Laub also discloses that “reinfusing the patient’s blood continuously during aspiration allows for greater suction pressure and/or flow rates

(e.g., 2-4 L/min) which can assist in dislodging and removing larger clots and/or tumors than would otherwise be possible.” *Id.* Accordingly, a POSA would understand that Laub’s system is intended to be operated to continuously aspirate (rather than build up and store vacuum pressure) and return blood at a high flow rate so that large clots, such as PE/DVT, can be removed. EX2008, ¶63. Laub’s system would endanger the patient if blood were not returned. *Id.*

C. Aklog

A POSA would understand Aklog’s system to be substantially the same as Laub’s, as Petitioner recognizes. EX2008, ¶64; Petition, p.4 (after describing the disclosure of Laub, stating “**Aklog** ... also discloses an aspiration system for removing PEs and DVTs from blood vessels” and “Aklog also discloses ways to optimize aspiration systems to treat PE and DVT, including returning the aspirated blood to the patient to reduce blood loss.”). Indeed, like Laub, the embodiments of Aklog relied on in the Petition shown in Figures 1, 6, and 7 of Aklog (Figure 1 annotated below) include an aspiration catheter (cannula) 10 in fluid communication with a filter device 14, a pump 15, and a reinfusion catheter (cannula) 16:

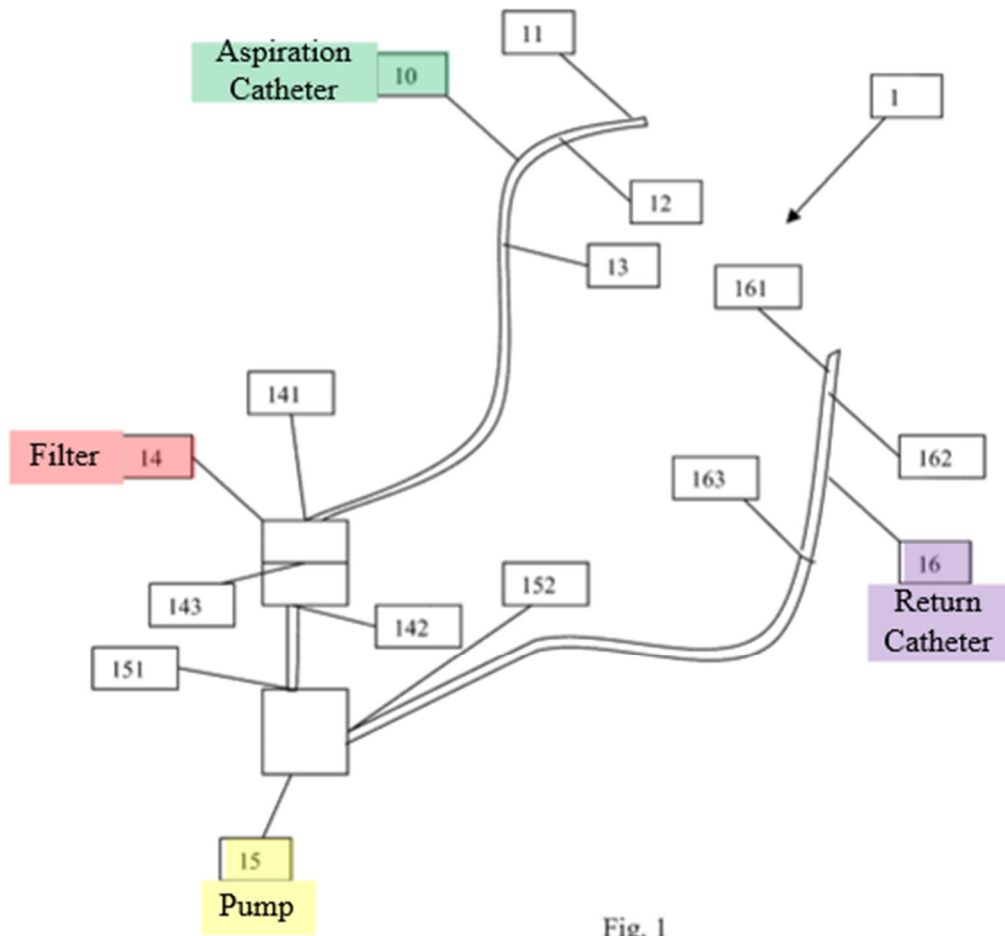


Fig. 1

EX1005, 11:24-12:34; EX2008, ¶64. Just like Laub, Aklog's system includes no valve or fluid control device in the flow path such that the pump 15 operates to suction blood and thrombi through the aspiration catheter 10 and the filter device 14 and then drive the filtered blood through the reinfusion catheter 16 into the patient. *Id.* Aklog also does not disclose any other mechanism for building up a stored vacuum pressure either, employing a continuous pump. EX2008, ¶65.

Aklog discloses that the aspiration catheter 10 "may be of any sufficient size,

so long as it can be accommodated within a predetermined vessel, such as a medium to large size blood vessel.” EX1005, 11:12-15. For example, “the suction cannula 10 may be designed to remove at least 10 cm³ of undesirable material substantially en bloc.” *Id.* at 11:18-20. A POSA would understand that a clot of 10 cm³ is much larger than neurovascular clots and likely the size of a PE or DVT. EX2008, ¶65. And, “[b]ecause the normal rate of blood flow through the heart and large blood vessels can be significant, suction cannula 11 and reinfusion cannula 16, when used around the heart and other large vessels, may displace a relatively large volume of fluid into and out of the patient's circulatory system.” EX1005, 19:57-62.

Given the large clots positioned in large vessels that Aklog is designed to treat, Aklog correctly recognizes that “[i]f the catheter is enlarged to accommodate the larger structure and material, such a catheter may aspirate an unacceptable volume of blood, resulting in excessive fluid loss and/or shock in the patient.” EX1005, 7:23-26; EX2008, ¶66. That is, the patient will be harmed due to excessive blood loss if the blood removed from the patient is not returned to the patient. EX2008, ¶66; EX2016, ¶60. To address this, Aklog's system “simultaneously reinfuse[s] aspirated (i.e., removed) and filtered fluid, such as blood, back into the patient on a substantially continuous basis to minimize any occurrences of fluid loss and/or shock.” EX1005, 5:19-23; EX2008, ¶66. Aklog further teaches that the “suction and reinfusion of blood can occur, in an embodiment, continuously for a desired duration

to minimize fluid loss in the patient.” EX1005, 6:9-11. Accordingly, like Laub, a POSA would understand that Aklog's system is intended to be operated to continuously aspirate (rather than build up vacuum pressure and apply that vacuum pressure) and then return blood so that large clots, such as PE or DVT, can be removed. EX2008, ¶66. Aklog's system would endanger the patient if blood were not returned, and a POSA would understand the necessity of blood return based on Aklog's disclosure. *Id.*

IV. CLAIMS 1-10, 13-29, AND 32-38 ARE NOT RENDERED OBVIOUS BY ANY OF THE COMBINATIONS OF LAUB OR AKLOG AND GARRISON (GROUNDS 1A, 2A, 3A, 4A)

Petitioner fails to demonstrate by a preponderance of the evidence that independent Claims 1 and 20 (and corresponding dependent Claims 2-9, 13-19, 21-29, and 32-38) would have been obvious over any of Petitioner's combinations of Garrison with Laub or Aklog: (1A) Laub with Garrison; (2A) Aklog with Garrison; (3A) Garrison with Laub; and (4A) Garrison with Aklog.

A claim is not obvious if any limitation is missing from the cited reference(s). *See Aug. Tech. Corp. v. Camtek, Ltd.*, 655 F.3d 1278, 1290 (Fed. Cir. 2011) (asserted claims are not rendered obvious in view of the cited prior art because they do not supply the missing element for purposes of obviousness analysis). Moreover, to demonstrate obviousness, Petitioner must demonstrate that a POSA would have been motivated to modify/combine the prior art to achieve the claimed invention.

Innogenetics, N.V. v. Abbott Labs., 512 F.3d 1363, 1374 (Fed. Cir. 2008); see also *Axonics, Inc. v. Medtronic, Inc.*, 73 F.4th 950, 957 (Fed. Cir. 2023). There is no motivation to modify a reference or combine prior art references where the modification/comboination would alter the principle of operation or render the prior art inoperable for its intended purpose. See *Adidas AG v. Nike, Inc.*, 963 F.3d 1355, 1358-59 (Fed. Cir. 2020); *Plas-Pak Indus. V. Sulzer MixPak AG*, 600 Fed.App'x. 755, 758 (Fed. Cir. 2015).

Here, each of grounds 1A-4A fail at least because none of Petitioner's references disclose or render obvious a method having steps of "generating vacuum pressure within" a "clot canister" having a "filter" and then moving a valve "thereby applying the vacuum pressure" to aspirate at least a portion of the PE (Claim 1) or DVT (Claim 20) "into the clot canister." EX1001, cls.1, 20. For those and the other reasons discussed below, the Claims are patentable.

A. Grounds 1A, 2A, 3A, & 4A: Neither Garrison, Laub, nor Aklog Disclose the Methods of Claims 1 or 20 Including the Buildup/Storage and Release of Vacuum Pressure in a Clot Canister Having a Filter

Independent Claims 1 and 20 of the '333 Patent recite methods including the steps of "***generating vacuum pressure within the clot canister*** via the aspiration source while ***a valve positioned along the fluid path between the aspiration catheter and the clot canister is in a first position that inhibits fluid flow*** along the fluid path

from the lumen of the aspiration catheter to the clot canister” and “*moving the valve from the first position to a second position thereby applying the vacuum pressure to the lumen of the aspiration catheter ... wherein the clot canister includes a filter configured to filter the blood from the portion*” of the “pulmonary embolism” or “deep vein thrombosis.” EX1001, cls.1, 20 (emphasis added).

Petitioner does not allege that either Laub or Aklog disclose or render obvious these steps of building up vacuum pressure in a clot canister having a filter and then applying that vacuum pressure to aspirate using a valve. Instead, Petitioner relies solely on Garrison for those features for each and every of its grounds. Petition, pp.36-42, 63.

But, Garrison does not disclose any embodiment that builds up and subsequently releases vacuum pressure *in a clot canister having a filter* as recited in the Claims of the '333 Patent. In the Institution Decision, the Board implicitly agreed but nevertheless saw “no flaw in Petitioner’s alleged mixing of disclosures or features for different embodiments of Garrison.” Institution Decision, pp.31-32. As discussed in this Response (§§IV.B-C) and the supporting evidence filed concurrently, no POSA would have mixed disclosures/features of Garrison to build up pressure in a “clot canister” as Petitioner alleges because doing so would damage the continuous pumps used in Laub, Aklog, and Garrison and also damage blood to be returned to the patient.” Further, discussed in this Section none of the various

embodiments of Garrison relied on by Petitioner disclose (or render obvious) the claimed buildup and release of vacuum pressure in a clot canister having a filter, and a POSA would not arrive at the claimed limitations by combining the syringe and pump embodiments Petitioner relies on.

In Figure 34 relied on by Petitioner, “both the arterial access device 2010 and the catheter 2030 are connected to the same aspiration source 3430” and the “valve 3325 controls which device is connected to the aspiration source 3430 ... at any given time.” EX1006, ¶[0132]; Petition, p.37. That is, because both of the “catheters” 2010/2030 are connected to the same pressure source 3430 (a peristaltic pump), the valve 3325 is used to switch the connection of those catheters to the pump. EX2008, ¶82. Indeed, a POSA would understand that Garrison does not disclose the use of a valve to build up negative pressure in that system by stopping flow to the pump 3430 (an electric pump) because, as set forth in §§IV.B.1-2. below, stopping inlet fluid flow to those pumps is warned and discouraged against as it could damage the pump and blood in Garrison's system. EX2008, ¶82.

Because of that deficiency in Figure 34, Petitioner attempts to combine Figure 34 with a different and incompatible disclosure of Garrison described in paragraph [0134] as allegedly disclosing the buildup and release of pressure (but using a syringe rather than a pump):

In one embodiment, a locking syringe (for example a VacLok Syringe) is attached to the flow controller and the plunger is pulled back into a locked position by the user while the connection to the flow line is closed prior to the thrombectomy step of the procedure. During the procedure when the tip of the aspiration device (either the arterial access device or the catheter) is near or at the face of the occlusion, the user may open the connection to the aspiration syringe. This would enable the maximum level of aspiration in a rapid fashion with one user.

EX1006, ¶[0134]; Petition, pp.36-38. Garrison also discloses that the syringe is “attached” to the flow controller rather than to a valve indirectly via a filter 3418 and a check valve 3419 like the peristaltic pump in Figure 34. EX2008, ¶83. And, a POSA would understand that arrangement to generate the maximum level of aspiration for the reasons described below in §IV.C.1. *Id.* at ¶¶105-110. Thus, the syringe embodiment does not include the filter 3418 (i.e., Petitioner’s alleged “clot canister”) specifically to enable the maximum level of vacuum. Petition, p.37; EX2008, ¶83.

Petitioner conflates the embodiments in Figure 34 and paragraph [0134] of Garrison stating, after describing the different syringe embodiment, that “[b]ecause the valve (e.g., stopcock 3325) is distal to the filter, the vacuum pressure builds up in the filter canister via the pressure source” in Figure 34. Petition, p.38. But Garrison does not disclose building up pressure in the filter 3418 in Figure 34 using

the peristaltic pump shown there. EX2008, ¶84. And a POSA would not have done so because doing so would cause pump damage and damage blood Garrison's system due to pump starvation described below in §§IV.B.1-2 & §IV.C.1. In the arrangement with the syringe Garrison discloses in paragraph [0134] in which pressure is built up therein, the syringe is "attached" to the flow controller without a filter 3418 and a check valve 3419 therebetween like shown in Figure 34. A POSA would not have used the system of Figure 34 of Garrison to build up pressure in the filter 3418 using a pump, and they would not have used a syringe either (even if construed as a suitable alternative for the peristaltic pump 3430 shown in that Figure) because that arrangement would lessen aspiration rather than maximize aspiration for the reasons described below in §IV.C.1.

In sum, Garrison discloses that the valve 3325 in Figure 34 is used to switch between different catheter connections and not to build up vacuum pressure in any clot canister, which could damage the pump. EX2008, ¶85. So, that embodiment does not disclose the methods of Claims 1 and 20 including "generating vacuum pressure within the clot canister ... while a valve positioned along the fluid path between the aspiration catheter and the clot canister is in a first position." *Id.* And the embodiment in paragraph [0134] is a completely different arrangement than that in Figure 34—including a syringe instead of a peristaltic pump and that does not include any clot canister in the flow path because the syringe is attached directly to

a flow controller to maximize the level of aspiration, such that vacuum cannot be generated in any clot canister as recited in Claims 1 and 20. *Id.*

Because Garrison does not disclose those features of Claims 1 and 20 relied all of Petitioner's grounds fail.

B. Grounds 1A & 2A: A POSA Would Not Have Been Motivated to Include Garrison's Valve in Laub or Aklog and Operate Those Modified Systems to Build Up Pressure in a Clot Canister to Treat PE/DVT

1. Petitioner's modifications to Laub and Aklog adding a valve (not found in either reference) to build up pressure would likely damage those systems.

Even if a POSA would combine Garrison's incompatible disclosures to create a new (undisclosed) method of closing a valve and generating a stored pressure in a clot canister with a filter, then releasing that pressure by opening the valve, a POSA still would not have been motivated to "incorporate Garrison's valve 3325 and method of generating pressure while the valve is closed into Laub's or Aklog's aspiration systems" because such a modification would be incompatible with the centrifugal/positive displacement pumps of Laub and Aklog by for example, potentially damaging those pumps and systems. Petition, pp.38-41; EX2008, ¶¶86-91.

Laub and Aklog both utilize a centrifugal or positive displacement pump that operates to mechanically (e.g., via a vane, rollers, or the like) pull fluid through an inlet and discharge that fluid through an outlet. EX2008; ¶87, *supra* §§III.B-D. For

example, Laub discloses that “[i]n preferred embodiments, pump 400 is a centrifugal pump” while “[i]n other embodiments, pump 400 may be a rotary pump, peristaltic pump, roller pump, or other form of pump known in the art.” EX1012, ¶[0041]. Likewise, the pump 15 of Aklog “may be any commercially available pump, including those for medical applications and those capable of pumping fluids, such as blood. Examples of such a pump includes a kinetic pump, such as a centrifugal pump, and an active displacement pump, such as a rollerhead pump.” EX1005, 12:9-14.

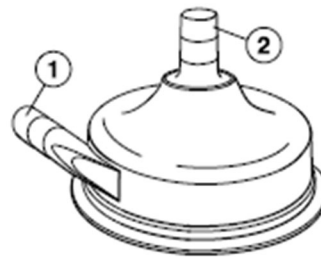
A POSA would have understood that there is no valve along the flow path in either Laub or Aklog, and would not have modified either to include such a valve to be closed while the pump operates as Petitioner alleges, because such centrifugal/positive displacement pumps are not intended to operate without fluid flow to their inlet. EX2008; ¶88. In Petitioner's proposed combinations, the pumps of Laub or Aklog would run to “generat[e] pressure while [Garrison's inserted] valve is closed” in “Laub's or Aklog's aspiration systems.” Petition, p.38. But, a POSA would understand that running a centrifugal, peristaltic, rotary, or like pump as disclosed by Laub and Aklog with the inlet (suction inlet) closed as in Petitioner's proposed combination would starve the pump of fluid, causing the pump to run dry and potentially damaging the pump. EX2008; ¶88. In particular, without fluid flowing through the pump, the pump would run dry, experience significantly

increased friction and cavitation, and overheating, potentially leading to mechanical failure. *Id.* More specifically, with Garrison's valve closed in Petitioner's purported combinations, Laub's pump or Aklog's pump would be unable to move fluid therethrough, thereby risking creating a vacuum that causes remaining fluid to boil and vaporize, destroying seals and bearings of the pump, while also cavitating and generating cavitation bubbles that could flow downstream. *Id.* Likewise, without fluid flowing through to remove heat, the internal casing temperature of Laub's pump or Aklog's pump would rise rapidly due to friction caused by the components moving, leading to eventual failure. *Id.* And, without fluid lubricating the pump flow paths, the internal surfaces of Laub's or Aklog's pumps could mechanically seize and fail as well. *Id.*

A POSA would have readily understood for all the foregoing reasons that the continuous pumps disclosed by Laub and Aklog would not be operated with a valve to the pump inlet closed shutting off fluid flow as Petitioner alleges. *Id.* at ¶89. As one example, Aklog discloses that its pump "may be any commercially available pump, including those for medical applications and those capable of pumping fluids, such as blood." EX1005, 12:9-12. One such commercially available blood pump at the time of the invention of the '333 Patent was the Bio-Pump™ BP-50. *See, e.g.,* <https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmn.cfm?id=K852807> (showing 510(k) clearance from the U.S. Food and Drug Administration for the BP-

50 pump September 30, 1985); EX2011, p.9 (showing Bio-Pump BP-50 innovations in 1985). Instructions for use for the BP-50 pump⁴ published around the time of the invention (September 12, 2018) describe the pump as a “centrifugal blood pump” having an inlet and outlet:

Figure 1. • Figura 1. • Figure 1.



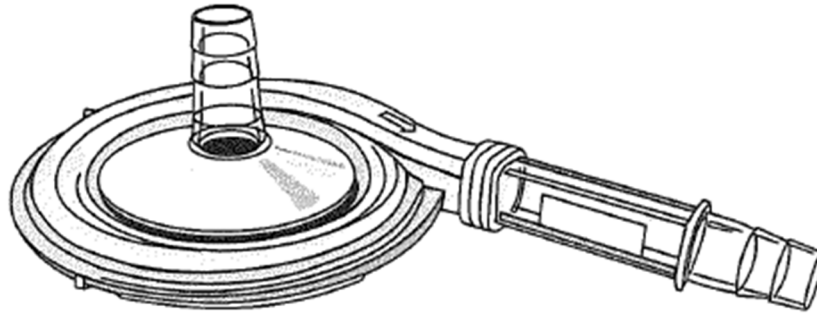
EN 1 Outlet
 2 Inlet

EX2009, pp.5-6. And, just like a POSA would understand based on the operation of such pumps, the instructions for use for the BP-50 pump specifically warned and instructed users: (1) “[d]o not operate the centrifugal blood pump for more than 30 s in the absence of flow ... [t]he temperature within the pump could rise,” (2) “[a]ttach tubing in a manner that prevents kinks or restrictions that may alter flow,” and (3) “[d]o not operate the centrifugal blood pump unprimed; damage to the

⁴ While these instructions are dated September 12, 2018—after the priority date of the '333 Patent—they reflect what a POSA would have understood of how the BP-50 pump, which was commercially available as early as 1985, should and should not be operated. EX2008, ¶89.

internal components will occur.” *Id.* at pp.7-8. Similar instructions for using the BP-50 pump (or like pumps such as the larger BP-80 version) likewise warn and emphasize that “**IMPORTANT: Pump heads must never be run dry! Danger of bearing damage!**” EX2012, p.3; *see also id.* at p.5 (“**⚠ The pump head must not be running dry.**”), p.11 (“Operating the pump head dry may damage the rotor bearing”; “the internal seal ... of the rotor bearing is endangered if ... the pump head is operated dry”). That is, the instructions for use for conventional blood pumps what a POSA would have understood that operating Laub’s or Aklog’s continuous centrifugal/positive displacement pumps without fluid flow therethrough (i.e., in the absence of flow, running dry, with kinks or restrictions, and/or unprimed) as in Petitioner’s proposed combinations could damage the pump. EX2008, ¶89.

Similarly, another commercially available blood pump at the time of the invention was the ROTAFLOW Centrifugal Pump from Maquet, and instructions for use for that pump dated June 2010 disclose that the “ROTAFLOW Centrifugal Pump (RF-32) has a spinning rotor with flow channels which imparts rotary motion to the incoming blood, directing it through a spiral housing to the outflow port”:



EX2010, pp.1 & 4. Similar to the instructions for the BP-50 pump, the instructions for use for the ROTAFLOW Centrifugal Pump warned and instructed users: (1) “to prevent kinks or any restrictions that may alter flow” and (2) “[r]educ[e] the pump speed to the minimum speed before clamping the tube, then turn the flow regulator to zero.” *Id.* at pp.4-5. That is, the instructions for use for the ROTAFLOW Centrifugal Pump likewise confirm what a POSA would have understood that operating Laub’s or Aklog’s continuous centrifugal/positive displacement pumps without fluid flow therethrough (i.e., with kinks or restrictions, or with clamped tubing) as in Petitioner’s proposed combinations is not advised. EX2008, ¶90.

Accordingly, a POSA would not have modified Laub or Aklog to include a valve as in Petitioner’s proposed combination because operating those systems with the valve closed would likely damage their pumps. *Id.* at ¶91. Indeed, rather than “making Laub’s and Aklog’s systems safer and more effective” and improving their aspiration systems as alleged by Petitioner, Petitioner’s combination would likely make those systems less safe and less effective. *Id.*; Petition, pp.38-41. Even if

aspiration power were momentarily increased by including a valve, a POSA still would not have included such a valve because any subsequent aspiration would be hindered by degradation of the pump. EX2008, ¶91. Leaving the pump on with the valve closed for any significant amount of time would damage the pump, and Petitioner provides no reason or consideration for how that might be considered or mitigated by a POSA.

2. Petitioner's modifications to Laub and Aklog adding a valve (not found in either reference) to build up pressure would endanger the patient by compromising blood return.

As set forth in §§III.B-C and §IV.C. above, both Laub and Aklog emphasize the critical nature of blood return to patient health and safety when treating large clots, which PE and DVT are. For example, omitting substantially continuous blood return “could quickly result in exsanguination of the patient” (EX1012, ¶[0045]) and/or lead to “occurrences of fluid loss and/or shock” (EX1005, 5:19-23).

But, a POSA would understand that utilizing the pumps of Laub or Aklog to generate vacuum pressure with a valve closed as in Petitioner's proposed combinations of Laub/Aklog and Garrison would be dangerous to the patient by harming blood meant for return. EX2008, ¶¶92-104. As set forth in §IV.B.1. above, closing a valve between Laub's aspiration catheter and pump 400 and/or closing a valve between Aklog's aspiration catheter and pump 15 while operating those pumps would likely damage those pumps due to pump starvation—i.e., no fluid flow

through the fluid inlet of the pump. Even if those pumps could somehow be operated without damage in such a state, a POSA would understand that such an operating state would damage the blood in Laub's and Aklog's systems such that it was unsuitable and unsafe for blood return. *Id.*

Specifically, the same mechanisms such as increased friction, overheating, etc., that act to damage the pump in a starvation (i.e., no-inflow) state as in Petitioner's purported combinations would also act to damage blood already in the system (e.g., blood in the system downstream of Petitioner's added valve). *Id.* at ¶94. For example, the instructions for use for the BP-50 pump specifically warned that "in the absence of flow ... [t]he temperature within the pump could rise and **increased cellular damage** may result." EX2009, p.7 (emphasis added). Likewise, the instructions for use for the ROTAFLOW Centrifugal Pump instructed the user to reduce flow to zero to prevent hemolysis of blood (i.e., the destruction of red blood cells) when a tube to the pump is clamped: "when clamping the tube: ... turn the flow regulator to zero **to prevent hemolysis.**" EX2010, p.5 (emphasis added). Accordingly, a POSA would have understood that operating Laub or Aklog with valve used to generate a stored pressure, as proposed by Petitioner, would damage blood in those systems. EX2008, ¶94.

In addition to damaging blood, Petitioner's proposed inclusion of Garrison's valve in Laub's and Aklog's systems to generate vacuum with the valve closed

would also endanger the patient by generating bubbles that could be reinfused into the patient and potentially cause embolism. *Id.* at ¶95. Specifically, a POSITA would have understood that when a centrifugal/positive displacement pump inlet like those of Laub/Aklog is closed and the pump continues to run (i.e., the pump is “starved” of fluid), the suction pressure will drop below the vapor pressure of the fluid (e.g., blood) in the system causing the liquid to flash to vapor bubbles. *Id.* Those bubbles may violently collapse in a manner that damages the pump, or if they do not collapse, the bubbles would be reinfused to the patient through Laub’s return catheter 500 or Aklog’s reinfusion cannula 16. *Id.* Such bubbles are a serious danger to the patient because they could form an embolism. *Id.* Again, conventional pumps such as the BP-50 pump recognized that danger and warned: “[d]o not operate the blood pump with its inlet clamped. This will generate negative pressure in the blood pump and could cause air bubbles to form in the blood.” EX2009, pp.8 & 10; *see also* EX2010, p.5 (“[r]emove any air bubbles detected”).

Because Laub and Aklog both disclose the criticality of blood return to patient health and safety when treating large clots like PE/DVT, a POSA would not have included the valve 3325 of Garrison in either Laub and Aklog, let alone operate those systems as proposed by Petitioner, because doing so would endanger the patient. EX2008, ¶96. That is, rather than “making Laub’s and Aklog’s systems safer and more effective”—Petitioner’s proposed combination would make those systems less

safe and effective by damaging blood in those systems and potentially introducing bubbles that could lead to downstream embolism. *Id.*; Petition, p.39. Even if aspiration power were momentarily increased by including a valve, a POSA still would not have included such a valve and operated Laub's or Aklog's systems in the manner recited in the Claims because of those dangers. EX2008, ¶96; EX2016, ¶¶63, 69-76.

Moreover, Garrison itself discloses that the very (incompatible) embodiments relied on by Petitioner in Figure 34 and paragraph [0134] (the syringe embodiment) are not suitable for returning blood, adding another layer of incompatibility that would stop a POSA from combining the references:

One disadvantage of current sources of aspiration is that the aspirated blood is received into an external reservoir or syringe. This blood is generally discarded at the end of the procedure, and as such represents blood loss from the patient. In addition, pumps such as centrifugal or peristaltic pumps are known to cause damage to blood cells.

EX1006, ¶[0135]. In Figure 34 of Garrison relied on by Petitioner for disclosing a "fluid control device," blood is pumped to the receptacle 3430 (an "external reservoir") where it remains "static" and is "exposed to air" such that it is not suitable for blood return. Petition, pp.36-41; EX2008, ¶97. In the syringe embodiment disclosed in paragraph [0134] of Garrison and relied on by Petitioner for disclosing the buildup and subsequent release of vacuum pressure, blood is aspirated into the

syringe where it remains “static” and is “exposed to air” such that it is not suitable for blood return. EX2008, ¶97.

Accordingly, a POSA would also not have modified Laub or Aklog based on those embodiments of Garrison because a POSA would have understood them to be unsuitable for and incompatible with blood return which is critical to both the system of Laub and the system of Aklog. EX2008, ¶98. For example, adding the valve 3325 shown in Figure 34 of Garrison into Laub or Aklog as Petitioner proposes would cause blood to remain static in those systems when the valve is closed:

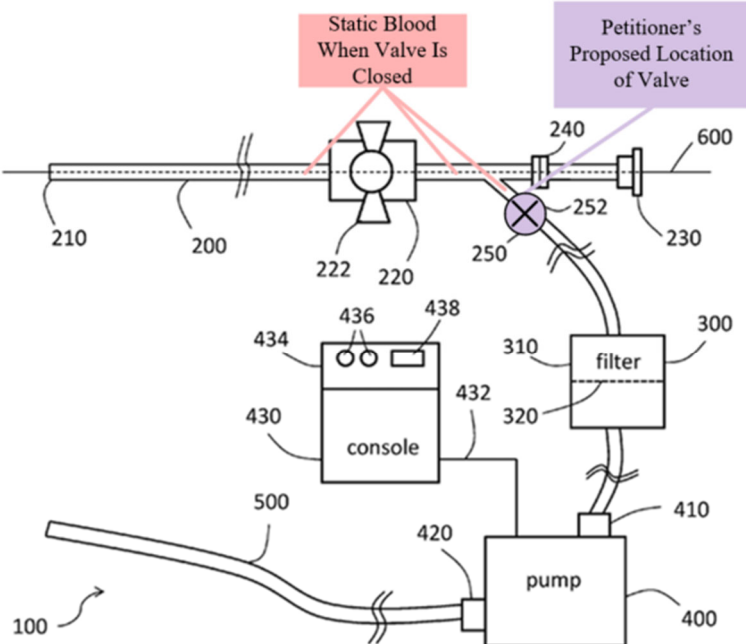


FIG. 1A

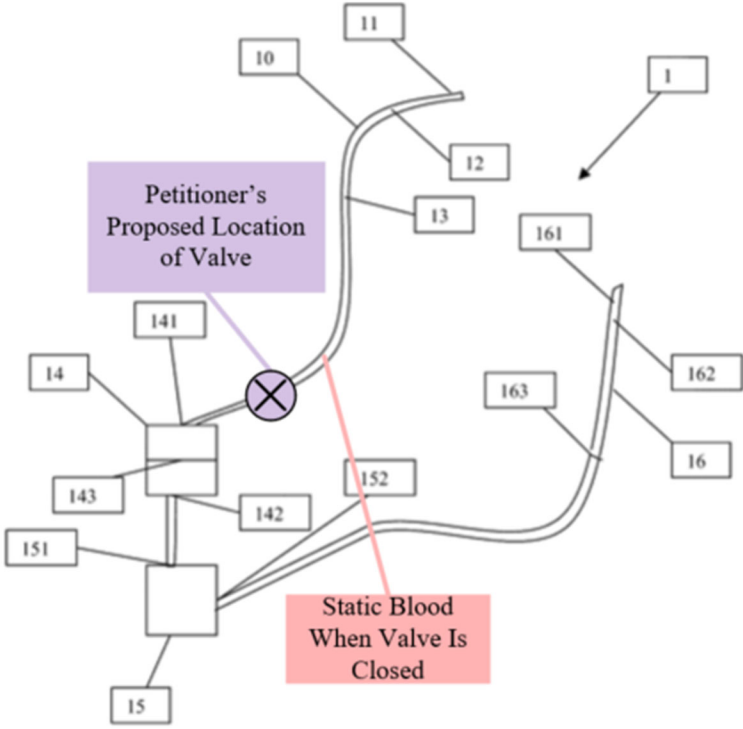


Fig. 1

Id.; Petition, pp.38-41. A POSA would understand the risk, as Garrison discloses that when “the blood ... has been static for a period of time, and there is risk of thrombus formation or damage to the blood cells” such that the blood is “[u]sually ... not returned to the patient to avoid risk of thromboembolism.” EX1006, ¶[0135]; EX2008, ¶99. Because Laub and Aklog both disclose that blood return is critical to patient health and safety when treating PE/DVT, a POSA would not have included the valve 3325 of Garrison in those systems to “avoid the risk of thromboembolism” from static blood that may make the blood unsuitable for return to the patient. EX2008, ¶99.

In the Institution Decision, the Board preliminarily found that Patent Owner's arguments in its Preliminary Response regarding blood return did “not undermine Petitioner's challenge at this stage” based on a number of preliminary observations (1)-(5). Institution Decision, pp.35-36. Patent Owner, however, respectfully submits that as described above a POSA would not have found it obvious—and in fact would have found it disadvantageous and dangerous—to include a valve in the aspiration systems of Laub or Aklog and close that valve to build up vacuum pressure as alleged by Petitioner.

More specifically, the Board's preliminary observation (1) that Garrison teaches an embodiment in Figure 36 that is compatible with blood return does not negate that a POSA would not have included a valve in either Laub or Aklog as

proposed by Petitioner (or in Figure 36). Institution Decision, pp.35-36. In fact, Garrison expressly contrasts the embodiments relied on by Petitioner (Figure 34 and paragraph [0134]) that are unsuitable for blood return with the embodiment in Figure 36 “which is configured not to harm blood cells and which may be configured to return blood to the central venous system *in real time* during the procedure, so there is no reservoir in which the blood remains static.” EX1006, ¶[0136] (emphasis added). So just, like Laub and Aklog, Garrison's embodiment in Figure 36 that is suitable for blood return operates to continuously return blood *without any intervening valve* that is closed to generate vacuum. EX2008, ¶101. A POSA would not have operated the pump in Figure 36 of Garrison—a positive displacement pump—with the inlet clamped to starve the pump of fluid flow for the same reasons discussed above. *Id.*

Regarding the Board's preliminary observation (2) that Laub and Aklog “teach that aspirated blood (including blood aspirated with conventional pumps, like centrifugal or peristaltic pumps) can safely be returned to the patient,” even so neither those references nor Garrison disclose that blood can safely be returned in a system like Petitioner's proposed combinations including a valve between the aspiration catheter and the centrifugal/positive displacement pump—and a POSA would understand it would not be for all the reasons described above. EX2008, ¶102. Institution Decision, p.36; EX2008, ¶102. Similarly, regarding the Board's

preliminary observation (3), even if Laub/Aklog can run “intermittently,” a POSA would understand that intermittent operation does not mean using a valve to shut off fluid flow and buildup vacuum pressure. Institution Decision, p.36; EX2008, ¶103. Instead, intermittent operation simply means turning the pump on at different times with the pump inlet and outlet *unobstructed* to prevent pump starvation. EX2008, ¶103.

Likewise, regarding the Board's preliminary observation (4), a POSA would not have added a valve to Laub or Aklog and operated those systems to build up pressure as alleged by Petitioner to provide any “rapid burst of vacuum” based on the potential for pump and blood damage, as well as the generation of cavitation bubbles that may be reintroduced to the patient by using stored pressure and operating a continuous pump without fluid flow. Institution Decision, p.36; EX2008, ¶104. Finally, regarding the Board's preliminary observation (5) that “the valve closure and vacuum generation would seem to be a temporary step to enable a rapid burst of suction—*without blood being withdrawn from the patient* during this brief window,” a POSA would understand that it is precisely because blood or other fluid is not being withdrawn while the pump operates in Petitioner's proposed combination that pump damage/blood damage would occur. Institution Decision, p.36 (emphasis added); EX2008, ¶104.

3. Petitioner's modifications would not "enable the maximum level of aspiration."

Petitioner's assertions that a "POSITA would have been motivated to incorporate Garrison's valve 3325 (e.g., multi-way stopcock) and method of generating pressure while the valve is closed into Laub's or Aklog's aspiration systems" to "enable the maximum level of aspiration in a rapid fashion with one user" ignores the fundamental difference between a syringe and a peristaltic pump. Petition, pp.38-41; EX1006, ¶[0134].

As set forth in §IV.A. above, Garrison's only disclosure of building up pressure with a valve closed is the "one embodiment" in paragraph [0134] including a syringe. EX1006, ¶[0134]. A POSA would understand that vacuum pressure is generated in the syringe barrel when a plunger is withdrawn. EX1006, ¶[0134]; EX2008, ¶106. That barrel has a fixed volume, and that volume sets and thus limits the "maximum level of aspiration." EX2008, ¶106. Therefore, when the syringe plunger is withdrawn with the flow controller closed as described in paragraph [0134] of Garrison, the maximum level of vacuum in the syringe is achieved because the full barrel is evacuated. *Id.*

In contrast, the peristaltic pump in Figure 34 of Garrison does not have a fixed volume that limits the "maximum level of aspiration" but instead includes a rotor rotated having rollers that compress and seal tubing to push fluid through the pump.

EX2008, ¶107. Accordingly, a POSA would understand that there is no fixed volume of the peristaltic pump that can be evacuated like the fixed barrel volume of a syringe to store vacuum pressure if a valve were closed to generate a “maximum level of aspiration.” *Id.* The “maximum level of aspiration” is dictated by the speed of the pump—i.e., how quickly the rotor rotates to drive material through the pump—and there is not a fixed volume in the peristaltic pump like a syringe that would be evacuated to generate vacuum if a valve were included and closed. *Id.*

Like Figure 34 of Garrison, Laub and Aklog both utilize a centrifugal or positive displacement pump (rather than syringe) that mechanically pulls fluid through an inlet and discharges it through an outlet to generate vacuum. *Id.* at ¶108, *supra* §§III.B-C; EX1012, ¶[0041]; EX1005, 12:9-14. Laub confirms that when using pumps rather than syringes, the pump is controlled to generate different negative pressures and flow rates. EX1012, ¶¶[0042]-[0044]; EX2008, ¶109. In fact, Laub discloses that in the context of treating large clots (like PE/DVT), “**reinfusing the patient’s blood continuously during aspiration allows for greater suction pressure and/or flow rates (e.g., 2-4 L/min) which can assist in dislodging and removing larger clots and/or tumors than would otherwise be possible.**” EX1012, ¶[0045] (emphasis added). That is, Laub discloses that to achieve the “maximum level of aspiration” the system is operated “continuously”—which is the opposite of Petitioner’s proposed combinations of Laub/Aklog and Garrison that add a valve

that is closed to build up vacuum before subsequently being opened, necessarily stopping the continuous aspiration/reinfusion. EX2008, ¶109.

For those reasons, a POSA would not have added Garrison's valve 3325 into Laub or Aklog as Petitioner proposes to "enable the maximum level of aspiration" using their pump. *Id.* at ¶110. Instead, a POSA would have simply increased the operational speed of the pumps or operated the system continuously (like Laub discloses) and not with valves closing/opening to increase or maximize the level of aspiration, if desired. *Id.*

4. Petitioner's modifications would be incompatible with continuous aspiration and reinfusion of Laub and Aklog.

Neither Laub or Aklog disclose a "valve" to connect and disconnect vacuum pressure as recited in the Claims. EX2008, ¶111. That is because their systems operate to simultaneously/continuously aspirate blood and clot material from a patient through an aspiration catheter and then reinfuse that blood into the patient. *Id.*; *supra* §§III.B-C. Those references both disclose the importance of that continuous aspiration/reinfusion for patient health and safety and clot aspiration efficiency when aspirating large clot like PE/DVT. EX2008, ¶¶111-113.

For example, Laub discloses that "reinfusing the patient's blood *continuously* during aspiration allows for greater suction pressure and/or flow rates ... which can assist in dislodging and removing larger clots" and that "[w]ithout returning the

blood back to the patient, such high flow rates could quickly result in exsanguination of the patient.” EX1012, ¶[0045]. Likewise, Aklog discloses that “[i]f the catheter is enlarged to accommodate the larger structure and material, such a catheter may aspirate an unacceptable volume of blood, resulting in excessive fluid loss and/or shock in the patient” and therefore “**simultaneously** reinfuse[s] aspirated (i.e., removed) and filtered fluid, such as blood, back into the patient on a substantially **continuous** basis to minimize any occurrences of fluid loss and/or shock.” EX1005, 5:19-23 (emphasis added), 7:23-26; EX2008, ¶112.

Based on those disclosures, a POSA would understand that both Laub and Aklog operate to continuously/simultaneously aspirate and return blood so that large clots (like PE/DVT) can be removed without endangering the patient by excessive blood loss. EX2008, ¶¶111-112; EX2016, ¶¶58, 60. But, adding Garrison's valve 3325 in Figure 34 to Laub or Aklog, and then further operating those modified systems to close the valve to build up vacuum pressure and open the valve to release that vacuum pressure as Petitioner asserts, would prevent the continuous/simultaneous reinfusion that Laub and Aklog disclose to be (i) more effective for treating large clots and (ii) critical to patient safety. EX2008 at ¶113. Specifically, when the valve is closed in either modified system, reinfusion could occur but not aspiration—rendering the operations discontinuous. *Id.* And, aspirated blood distal to the valve would not be reinfused until the valve is subsequently

opened. *Id.* Accordingly, a POSA would not have modified Laub's or Aklog's system and further operated them to perform a method that made those systems more dangerous to the patient by rendering aspiration and reinfusion discontinuous. *Id.*

5. Petitioner's modifications would needlessly complicate Laub's and Aklog's systems.

A POSA would understand that in both of Laub's and Aklog's systems, the surgeon controls the system only and simply by interacting with the pump to control aspiration. EX2008, ¶119; EX1012, ¶[0041] (“console 430 may be operated by the user (e.g., surgeon) to adjust the speed, pressure, or other attributes of pump 400”); EX1005, 11:62-12:14. In Petitioner's purported combinations of Laub/Aklog with Garrison, Garrison's valve 3325 is “user-actuated.” Petition, pp.37, 41. Accordingly, in Petitioner's combinations, the surgeon must not only control the pump as disclosed in Laub and Aklog but *also manually control* the closing and opening of the added valve from Garrison to effectuate aspiration. EX2008, ¶120. A POSA would not have included that valve 3325 in Laub/Aklog because it would complicate the aspiration methods of Laub/Aklog by requiring that additional manual surgeon interaction when those references disclose that controlling the pump is all that is needed to effectuate aspiration and reinfusion. *Id.* And, if the surgeon were to purposely (or not) close Petitioner's added valve while the pumps of Laub and Aklog ran, that inhibited flow condition would lead to system and blood damage as

described above. EX2008, ¶120.

C. Grounds 3A & 4A: A POSA Would Not Have Modified Garrison's System to Build Up Pressure in a Clot Canister Having a Filter or to Treat PE or DVT

1. A POSA would not have mixed and matched Garrison's various embodiments to build up vacuum pressure in Garrison's filter.

As set forth in §IV.A. above, Garrison does not disclose any embodiment that builds up and subsequently releases vacuum pressure in a clot canister having a filter as recited in the Claims of the '333 Patent. In the Institution Decision, the Board implicitly agreed but nevertheless saw “no flaw in Petitioner's alleged mixing of disclosures or features for different embodiments of Garrison.” Institution Decision, pp.31-32. There is a flaw, however—a POSA would not have operated Garrison's peristaltic, centrifugal, or like pumps against a closed valve, and a POSA would not have used a syringe in a system including Garrison's filter 3418 because that would not “enable the maximum level of aspiration.” Petition, p.38.

Indeed, Garrison's disclosure of the syringe embodiment in paragraph [0134] does not describe any other type of aspiration source (e.g., a pump) to generate a vacuum pressure in such a “maximum” way, and it does not describe creating a vacuum in a clot canister or filter.

As set forth above, Garrison discloses various embodiments that utilize different aspiration sources. In Figure 34 primarily relied on by Petitioner and

including a peristaltic pump, both catheters 2010/2030 are connected to the same pump 3430 so the valve 3325 simply controls which catheter is connected to the pump 3430. EX1006, ¶[0132]; Petition, p.37; EX2008, ¶129. For all the reasons set forth in §§IV.B.1-2. above, a POSA would have understood that the aspiration source 3430 (i.e., peristaltic pump) should not be run while the connections to both catheters are closed thereby shutting off fluid flow to the pump. Doing so would damage the pump, and, if blood return were to be implemented (like Laub and Aklog disclose as critical for treating PE/DVT), blood would be damaged and unsuitable for blood return. *Id.* Indeed, for that reason, Garrison does not disclose any such methodology at all related to Figure 34; the valve is simply used to switch flow paths between the catheters. *Id.*

Because of that deficiency, Petitioner points to the different embodiment of Garrison described in paragraph [0134] including the locking syringe for allegedly disclosing the purported buildup and release of vacuum pressure. EX1006, ¶[0134]; Petition, p.38. But, there is no disclosure of a “filter” in that embodiment as recited in the Claims of the '333 Patent—let alone disclosure of generating vacuum pressure in a filter or clot canister. EX2008, ¶¶130-131. Accordingly, Petitioner incorporates that embodiment into Figure 34 by stating that “the user may open the connection to the aspiration syringe’ to ‘enable the maximum level of aspiration in a rapid fashion’ ... [b]ecause the valve (e.g., stopcock 3325) is distal to the filter, the

vacuum pressure builds up in the filter canister via the pressure source.” Petition, p.38. That is, Petitioner alleges that substituting the syringe embodiment of paragraph [0134] into Figure 34 instead of the peristaltic pump would enable the maximum level of aspiration. That is incorrect. EX2008, ¶¶130-132.

In the syringe embodiment of paragraph [0134], Garrison discloses that the syringe is “attached” directly to a flow controller rather than indirectly via a filter, check valve, and tubing like the peristaltic pump in Figure 34. *Id.* at ¶131. That arrangement maximizes the level of aspiration because there is a minimal volume—i.e., no dead space—between the syringe and valve. *Id.* In contrast, in Petitioner’s proposed combination using a syringe, the filter 3418, check valve 3419, and associated tubing is between the syringe and Garrison’s valve 3325 such that the total volume between the syringe and valve is greater than directly connecting the syringe to valve. *Id.* That increased volume decreases the maximum vacuum pressure because removing the same volume of fluid (Garrison’s syringe volume) from a larger volume (Garrison’s syringe plus the filter 3418, check valve 3419, tubing, etc.) rather than a smaller volume (the direct connection to the flow controller as Garrison discloses), results in less vacuum pressure. *Id.* Thus, Petitioner’s purported arrangement with a syringe instead of the peristaltic pump in Figure 34 would generate less vacuum pressure and a correspondingly smaller “level of aspiration” than Garrison’s express disclosure of attaching the syringe to the flow

controller. *Id.*

Taken altogether, a POSA would not have operated the system shown in Figure 34 of Garrison to build up vacuum pressure in the filter 3418 using a peristaltic or like pump because that would damage the pump and blood in the system. *Id.* at ¶132. And, a POSA would not have simply replaced the peristaltic pump of Garrison's Figure 34 with a syringe because in that combination the volume of the filter 3418 and associated tubing would decrease—not “maximize”—the level of vacuum that could be generated. *Id.*

2. Treat PE or DVT Because Petitioner's References Teach that Such a System Would Endanger the Patient

Claim 1 requires a “method of treating a *pulmonary embolism*” including steps of within a vasculature of a patient” including “advancing an aspiration catheter ... to the *pulmonary embolism*” and “moving the valve ... such that at least a portion of the *pulmonary embolism* and blood are aspirated into the clot canister.” Claim 20 recites those same steps for treating “*deep vein thrombosis*.”

Petitioner does not contend that Garrison discloses methods for treating PE or DVT, correctly acknowledging that “Garrison focuses [only] on the ‘treatment of cerebral occlusions.’” Petition, p.21. Indeed, Garrison discloses “methods and systems for ... treatment of cerebral occlusions.” EX1006, ¶[0002]. Petitioner then asserts that a “POSITA would have found it obvious to use, or optimize, Garrison's

clot treatment system to treat PE based on Laub or Aklog” and that a “POSITA would have found it obvious to use or optimize Garrison’s aspiration system to treat DVT based on Laub or Aklog.” Petition, pp.21-30, 64.

But a POSA would not have modified Garrison, Aklog, and Laub as Petitioner asserts to treat PE/DVT because a POSA would have expected that the proposed combination would introduce significant risk and complications to a patient without sufficiently improving the ability to remove clots associated with treating the PE/DVT. EX2016, ¶¶62-76.

For example, because Petitioner’s references recognize the criticality of blood reintroduction to patient health and safety when treating large clots like PE/DVT in large vessels with high blood flow volumes. EX1012, ¶[0045], EX1005, 5:19-23; EX2008, ¶¶137-140; EX2016, ¶76. And Garrison expressly discloses that the embodiments relied on by Petitioner are not suitable for blood reintroduction. EX2008, ¶¶135, 141. What’s more, Petitioner’s proposed combination in which a pump runs against a closed valve to generate a stored vacuum would further harm the blood and introduce dangerous bubbles beyond what the other reasons Garrison expressly discloses those embodiments are unsuitable for blood return as set forth in §IV.B.2. above. *Id.* at ¶135.

After Garrison discloses the blood return deficiencies of the embodiments relied on by Petitioner, Garrison discloses the different and incompatible

embodiment in Figure 36 “which is configured not to harm blood cells and which may be configured to return blood to the central venous system *in real time* during the procedure, so there is no reservoir in which the blood remains static.” EX1006, ¶[0136] (emphasis added). Petitioner simply asserts that “Garrison already accounts for one challenge POSITAs encountered when moving from smaller to larger aspiration catheters – a larger catheter ‘may aspirate an unacceptable volume of blood, resulting in excessive fluid loss and/or shock in the patient’” based on the embodiment in Figure 36 of Garrison. Petition, pp.29-30.

But again, Petitioner inappropriately and disparately mixes and matches Garrison's different embodiments. Figure 36 would not suggest to a POSA that Petitioner's modified system would account for blood return issues. EX2008, ¶145. A POSA would understand the positive displacement pump disclosed in Garrison's Figure 36 is intended to operate continuously to aspirate/reinfuse—just like the continuous pumps of Aklog and Laub—and not intended operate with any valve closed while the pump operates to build up vacuum pressure as Petitioner suggests. EX2008, ¶¶143-145. Pump starvation and blood damage would result when the pump in Figure 36 is operated with a valve closing off fluid flow to its inlet. *Id.* at ¶145.

Indeed, the Patent Office has already found that a POSA would not have modified Garrison to treat PE/DVT, even in view of other references identified by

the Office that did teach aspiration of those types of clots. EX1002, pp.46-47 (“modified Garrison does not teach an aspiration catheter configured to aspirate pulmonary embolism or deep vein thrombosis”). That is, in allowing the Claims challenged here, the Examiner considered the disclosure of Garrison and found that a POSA would not have modified Garrison to treat PE/DVT, even in view of other art (e.g., Batiste) which the Examiner described as teaching an aspiration catheter used to treat DVT and PE (just like Petitioner relies on Laub and Aklog for here). EX2008, ¶146.

V. UNEXPECTED RESULTS

When unexpected results are used as evidence of nonobviousness, the results must be shown to be unexpected compared to the closest prior art. *Millennium Pharmaceuticals, Inc. v. Sandoz, Inc.*, 862 F.3d 1356, 1368 (Fed. Cir. 2017). “Unexpected results are useful to show the improved properties provided by the claimed invention are much greater than would have been predicted.” *Leo Pharma*, 726 F.3d at 1358. When a combination of known elements according to their established functions yields more than predictable results it is nonobvious. *Crocs, Inc. v. Int’l Trade Comm’n*, 598 F.3d 1294, 1309 (Fed. Cir. 2010).

Here, the closest prior art is the Garrison, Aklog, and Laub references and the closest comparable prior art device is the AngioVac device, which is similar to the Aklog reference. EX2016, ¶76. A POSA would not have expected that a quick burst

of pre-charged vacuum as provided in the methods of Claims 1 and 20 “could so effectively remove the clot material, particularly in view of the difficulty in mechanically removing clot material using other methods and systems....” *Id.* at ¶¶84-85. But, “the ability to remove a clot when treating PE or DVT (particularly with catheters of 16 French or greater) greatly exceeded any expectation of POSA at the time and thus was surprising and unexpected.” *Id.* at ¶85. As Dr. Morris explains, Inari’s Flowtriever systems practice the steps of claims 1 and 11 that generate pre-charged vacuum and release to treat PE and DVT and that provide unexpected results when treating PE or DVT. EX2016, ¶78-80. Specifically, Dr. Morris testified that when he first used the Flowtriever in the claimed manner, he “was personally surprised that the generation of a quick burst of vacuum and rapid pressure equalization could so effectively remove a clot when treating a PE or DVT, oftentimes removing the clot intact.” EX2016, ¶84. Dr. Morris further testified that “a POSA would not have expected a quick burst of pre-charged vacuum as provided by the current claims could so effectively remove the clot material, particularly in view of the difficulty in mechanically removing clot material using other methods and systems, including the AngioVac system.” *Id.*, ¶¶84-85.

Accordingly, regardless of whether a POSA would have been motivated to combine Garrison, Aklog, and/or Laub as claimed, the surprising and unexpected ability of the claimed methods to remove a clot when treating PE or DVT that

“greatly exceeded” any predicted result demonstrates that the claims are not obvious over the prior art.

VI. CLAIMS 6-8, 11-12, 17, 25-27, 30-31, AND 36 ARE NOT RENDERED OBVIOUS BY ANY OF THE COMBINATIONS OF LAUB OR AKLOG AND GARRISON FURTHER IN VIEW OF GOFF, SCHAFFER, AND/OR HARTLEY (GROUNDS 1B-1D, 2B-2D, 3B-3D, 4B-4D)

As set forth in §IV. above, independent Claims 1 and 20 are not rendered obvious by Laub or Aklog in combination with Garrison or Garrison in combination with Laub or Aklog. Dependent Claims 6-8, 11-12, and 17 depend from independent Claim 1, and dependent Claims 25-27, 30-31, and 36 depend from independent Claim 20. Petitioner does not allege that Goff (grounds 1B, 2B, 3B, and 4B; Claims 6-8, 17, 25-27, and 36), Schaffer (grounds 1C, 2C, 3C, and 4C; Claims 11-12 and 30-31), or Schaffer and Hartley (grounds 1D, 2D, 3D, and 4D; Claims 11-12 and 30-31) disclose any of the features of independent Claims 1 or 20. Therefore, those dependent Claims are also not rendered obvious by Petitioner's combinations because they incorporate all the features of their respective independent Claims 1 or 20.

VII. CONCLUSION

Petitioner failed to establish by a preponderance of evidence that the Claims of the '333 Patent are unpatentable. Accordingly, for each of the above reasons, Patent Owner respectfully requests that the Board find all the Claims patentable.

Respectfully submitted,

Dated: March 12, 2026

By: / Joseph P. Hamilton / _____
Joseph P. Hamilton
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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), I, Joseph P. Hamilton, certify that **PATENT OWNER'S RESPONSE** contains 13,529 words, excluding those portions identified in 37 C.F.R. § 42.24(a), as measured by the word-processing system used to prepare this paper.

Dated: March 12, 2026

By: / Joseph P. Hamilton / _____
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