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571-272-7822

Paper 13
Date: June 11, 2025

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ABBOTT LABORATORIES,
Petitioner,

v.

MIRACOR MEDICAL SA,
Patent Owner.

IPR2025-00115
Patent 11,674,517 B2

Before ANNETTE R. REIMERS, JAMES A. TARTAL, and JOHN D. HAMANN, *Administrative Patent Judges*.

REIMERS, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314, 37 C.F.R. § 42.4

I. INTRODUCTION

Abbott Laboratories ("Petitioner")[1] filed a Petition pursuant to 35 U.S.C. §§ 311–319 requesting an *inter partes* review of claims 1–4, 10, 11, 14, 15, 17, 21, 22, 24, 26, 28–30, 32, 33, and 35 ("the Challenged Claims") of U.S. Patent No. 11,674,517 B2 (Ex. 1001, "the '517 patent"). Paper 1 ("Pet."). Miracor Medical SA ("Patent Owner")[2] filed a Preliminary Response. Paper 8 ("Prelim. Resp.").

We have authority to determine whether to institute an *inter partes* review. 35 U.S.C. § 314(b) (2018); 37 C.F.R. § 42.4(a) (2024). An *inter partes* review may not be instituted "unless . . . the information presented in the petition . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a). Upon consideration of the Petition, the Preliminary Response, and the evidence of record, we conclude that the information demonstrates a reasonable likelihood that Petitioner would prevail in showing the unpatentability of at least one of the Challenged Claims. Accordingly, we institute an *inter partes* review as to the Challenged Claims of the '517 patent.

II. BACKGROUND

A. The '517 Patent

The '517 patent discloses a device that "assist[s] the performance of a heart with at least one pump that is formed as a rotary pump and driven via a magneto coupling." Ex. 1001, code (57). The '517 patent explains that conventional external pumps that assist the performance of a heart do not

[1] Petitioner identifies Thoratec LLC as another real party-in-interest. Pet. 3.
[2] Patent Owner identifies no additional real parties-in-interest. Paper 4, 2.

provide the desired pressure at particular locations due to fluid flow of blood being affected by mechanical stress. *Id.* at 1:62–2:23. The '517 patent purports to resolve this problem by providing "[a] completely impervious separation of the rotor from the drive wheel" via "a magneto coupling" that "eliminates axial passages between the drive wheel and the rotor lying distally on the outside a rotary pump." *Id.* at 2:23–28.

The '517 patent discloses that "[t]he rotor itself can follow design principles such as described for example in WO 01/70300 Al." Ex. 1001, 3:29–30. According to the '517 patent, "[t]he rotary pump shown and described there for conveying blood and other highly sensitive fluids is formed as an external electromagnetically driven pump which is not directly suitable for incorporation into a catheter." *Id.* at 3:30–34. The '517 patent discloses that for the desired conveying capacity with the axial pump, the rotor needs to have "guide surfaces to produce centrifugal flow components." *Id.* at 3:34–38.

Figure 1 "shows a diagrammatic illustration of the arrangement of the pump and of the drive" of the '517 patent and is reproduced below. Ex. 1001, 3:1–3.

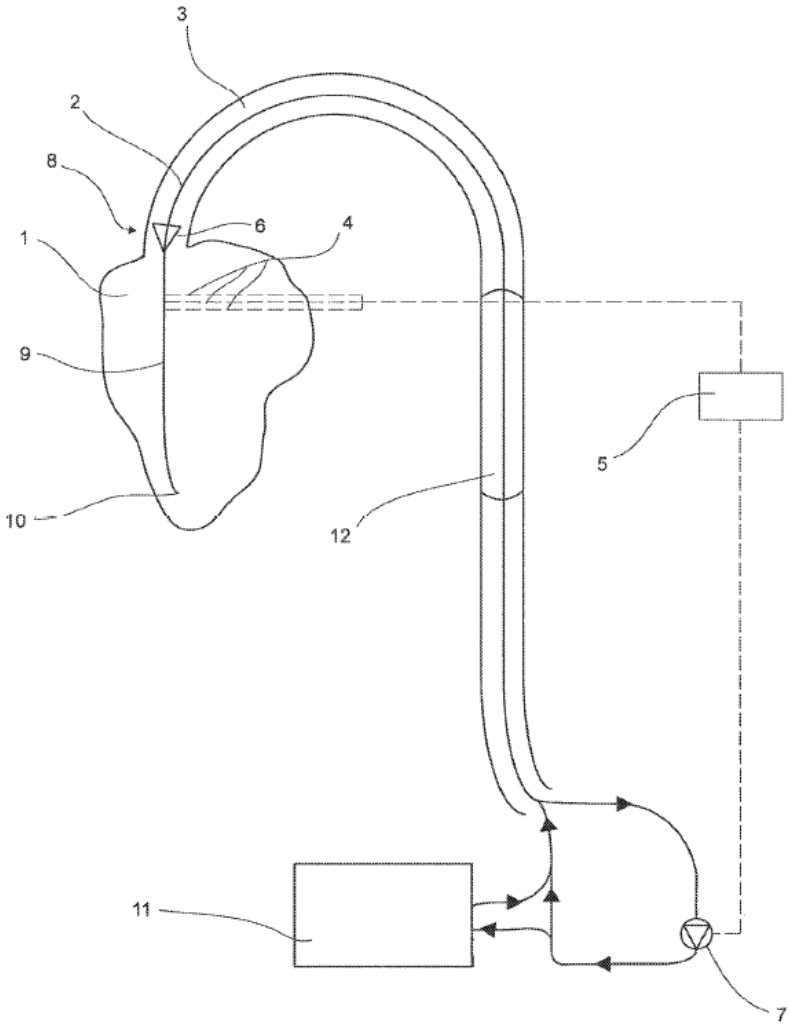


Fig.1

Figure 1 illustrates heart ventricle catheter 2 introduced into heart 1 via aortic arch 3. *Id.* at 3:10–13. Catheter 2 carries into heart 1 sensors 4 "via which the volume can be determined" such that measurement signals are passed to control arrangement 5. *Id.* at 3:11–15. Catheter 2 has several lumina that supply fluid to drive a rotor at its distal end, which forms pump 6 to assist the blood circulation at position 8. *Id.* at 3:15–23. "The driving medium for the rotor or the pump is guided in a circular flow by means of" fluid pump 7 which can be regulated in a synchronized manner as a function of the control signals generated in control arrangement 5. *Id.* at 3:23–26.

Catheter 2 has at its distal end tube 9 that leads to suction end 10. *Id.* at 3:26–29. Reservoir 11 for driving fluid provides additional driving medium for filling balloon 12 that serves for an occlusion of the artery, "and which receives again the volume of driving medium occurring on deflation of the balloon." *Id.* at 3:29–34. Control arrangement 5 provides corresponding fixed values, "such as for example a defined cardiac output, which is referred to on deviation of the measured cardiac output to control the pump." *Id.* at 3:39–43. The '517 patent discloses that "[a] retroperfusion can take place via a conventional balloon catheter which is occluded in a correspondingly synchronized manner, so that the directed return is in fact guaranteed during the diastole." *Id.* at 3:44–47.

Figure 2 "shows a diagrammatic illustration of the distal end of a catheter" as being used to assist the heart according to the '517 patent and is reproduced below. Ex. 1001, 3:3–4.

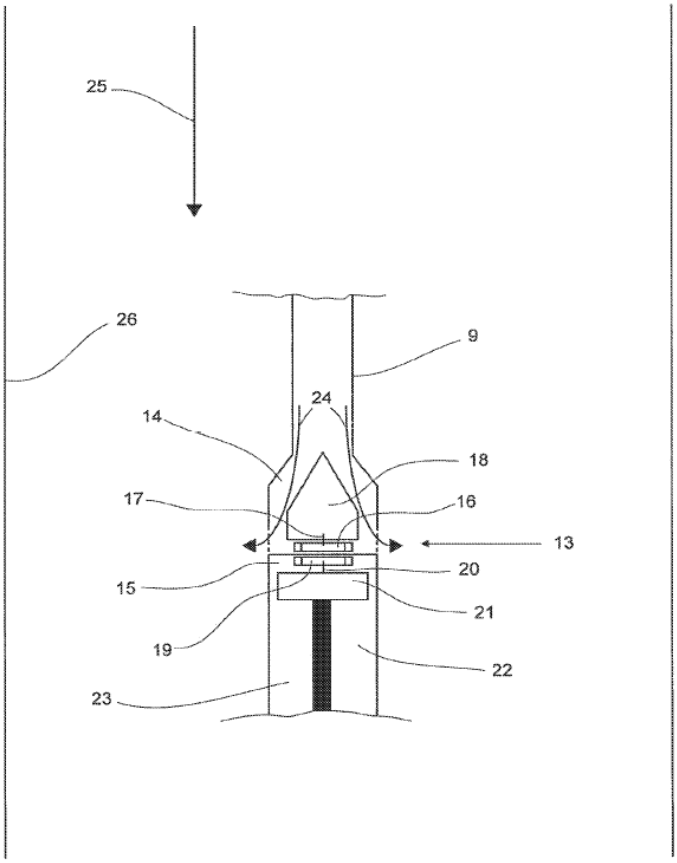


Fig. 2

Figure 2 shows the distal end of catheter 2 having end side 13 with two pocket-shaped chambers 14 and 15, "in which bar magnets [16 and 19] are respectively arranged." *Id.* at 3:50–53. Bar magnet 16 "is connected here at the distal end outwards" via shaft 17 with rotor 18, whereas bar magnet 19 "lying on the inside is connected" via shaft 20 with drive wheel 21. *Id.* at 3:53–56. Drive wheel 21 "is formed here as a paddle wheel and is acted upon with fluid" via lumen 22, in which this fluid flows off again via lumen 23 of the catheter. *Id.* at 3:56–59. The rotation of drive wheel 21 "is regulated here accordingly by corresponding control of the fluid pressure" in lumen 22 serving for the supply of fluid, in which magnet 19, "which is connected so as to be locked against relative rotation" with drive wheel 21,

"is set into corresponding rotation." *Id.* at 4:59–64. The '517 patent discloses that

> [a]t the outer side, which is completely sealed with respect to the lumina 22 and 23, the magnet 16 is subsequently entrained accordingly and drives the rotor 18 via the shaft 17, whereby a flow is formed in the region of the tube 9, as is indicated by the arrows 24, and which assists the natural blood flow in the vessel 26, illustrated by the arrow 25.

Id. at3:64–4:3.

B. Illustrative Claims

Petitioner challenges claims 1–4, 10, 11, 14, 15, 17, 21, 22, 24, 26, 28–30, 32, 33, and 35 of the '517 patent. Pet. 1, 6. Claims 1 and 21 are independent. Claims 1 and 21 are illustrative of the claimed subject matter and are reproduced below, with bracketed labels annotated by Petitioner:

1. [1PRE] A system for assisting blood circulation of a heart, the system comprising:

[1A] a heart assist pump device deliverable to the heart and comprising: an inflow tube defining a blood inflow path and

having a suction end insertable into a ventricle of the heart;

[1B] a magnetically driven rotor axially aligned with the inflow tube and being spaced apart from the suction end when the suction end of the inflow tube is inserted into the ventricle,

[1C] the magnetically driven rotor being rotatable within a surrounding rotor housing to act upon blood flowing from the inflow tube toward the rotor,

[1D] the magnetically driven rotor being rotatable about a central axis

[1E] and being rigidly coupled to

[1F] and axially adjacent to a first magnetic device

[1G] that is located within the surrounding rotor housing;

[1H] a second magnetic device axially aligned with the inflow tube

[1I] and positioned to magnetically drive rotation of the magnetically driven rotor via a magneto coupling with the first magnetic device

[1J] while being spaced apart and sealed from both the magnetically driven rotor and the first magnetic device by at least one sealing wall, the second magnetic device being positioned axially spaced apart from the magnetically driven rotor;

[1K] a blood outflow port positioned radially adjacent the magnetically driven rotor such that blood driven by the magnetically driven rotor is configured to exit the surrounding rotor housing in a direction transverse to the central axis of the magnetically driven rotor,

[1L] wherein when the magnetically driven rotor is rotated, the magnetically driven rotor remains adjacent to and spaced apart from the surrounding rotor housing by the blood flowing from the inflow tube and to the blood outflow port; and

[1M] an external control unit configured to regulate operation of the second magnetic device, wherein the external control unit is connectable to the heart assist pump device for controlling the second magnetic device to thereby magnetically drive the rotation of the magnetically driven rotor via the magneto coupling with the first magnetic device.

21. [21PRE] A system for assisting blood circulation of a heart, the system comprising:

[21A] a heart assist pump device deliverable to the heart and comprising: an inflow tube defining a blood inflow path along an inflow axis and being insertable into a left ventricle;

[21B] one or more walls at least partially defining a chamber to receive blood from the inflow tube;

[21C] a magnetically driven rotor axially aligned with the inflow axis and being rigidly coupled

[21D] and axially adjacent to a first magnetic device that is axially aligned with the inflow axis,

[21E] the magnetically driven rotor and first magnetic device being rotatable about an axis of rotation aligned with the inflow axis to drive the blood flowing from the inflow tube;

[21F] a magnetic drive system comprising a second magnetic device axially aligned with the inflow axis

[21G] and spaced apart from the magnetically driven rotor such that a wall of the one or more walls defining the chamber is positioned between the magnetically driven rotor and the second magnetic device, the second magnetic device positioned axially closer to the first magnetic device than to the magnetically driven rotor

[21H] so as to magnetically drive rotation of the magnetically driven rotor within the chamber via a magneto coupling with the first magnetic device; and

[21I] a blood outflow port positioned radially outward of the magnetically driven rotor such that the blood driven by the magnetically driven rotor exits the chamber in a direction transverse to the inflow axis,

[21J] wherein the magneto coupling orients the magnetically driven rotor so that both the magnetically driven rotor and the first magnetic device remain spaced apart from the one or more walls by the blood in response to rotation of the magnetically driven rotor; and

[21K] an external control unit configured to control operation of the second magnetic device based on a control value indicative of a defined cardiac output,

[21L] wherein the external control unit is connectable to the heart assist pump device for controlling the second magnetic device to thereby magnetically drive the rotation of the magnetically driven rotor via the magneto coupling with the first magnetic device.

Ex. 1001, 4:28–5:3, 5:60–6:36.

C. Related Proceedings

Petitioner and Patent Owner identify as a related proceeding *Miracor Medical SA v. Abbott Laboratories and Thoratec LLC*, No. 1:23-cv-16257 (N.D. Ill.) (the "Parallel Proceeding"). Pet. 3–4; Paper 4, 2–3. Petitioner also filed petitions in IPR2025-00096, IPR2025-00112, IPR2025-00113, IPR2025-00114, and IPR2025-00116 challenging claims of other related patents owned by Patent Owner.

D. Asserted Grounds of Unpatentability

Petitioner asserts that the Challenged Claims are unpatentable based on the following grounds:

Claims Challenged	35 U.S.C. §[3]	Reference(s)/Basis
1–4, 10, 11, 14, 15, 17, 21, 22, 24, 26, 28–30, 32, 33, 35	103(a)	Wampler[4]
1–4, 10, 11, 14, 15, 17, 21, 22, 24, 26, 28–30, 32, 33, 35	103(a)	Bourque,[5] Wampler
1–4, 10, 11, 14, 15, 17, 21, 22, 24, 26, 28–30, 32,	103(a)	Akamatsu[6]

[3] The Leahy-Smith America Invents Act ("AIA") included revisions to 35 U.S.C. § 103 that became effective on March 16, 2013. We apply the pre-AIA version of § 103 here because the '517 patent reflects a priority date earlier than the effective date of the AIA. *See* Ex. 1001, codes (22), (60).

[4] U.S. Patent Application Publication No. 2002/0102169 A1, published Aug. 1, 2002 (Ex. 1008, "Wampler").

[5] Bourque et al., HeartMate III: Pump Design for a Centrifugal LVAD with a Magnetically Levitated Rotor, ASAIO J. 401–405 (2001) (Ex. 1007, "Bourque").

[6] Akamatsu et al., Development of Terumo Implantable Left Ventricular Assist System (T-ILVAS) with a Magnetically Suspended Centrifugal Pump, J. Artif. Organs 2:3–7 (1999) (Ex. 1006, "Akamatsu").

Claims Challenged	35 U.S.C. §[3]	Reference(s)/Basis
33, 35		
1–4, 10, 11, 14, 15, 17, 21, 22, 24, 26, 28–30, 32, 33, 35	103(a)	Schima,[7] Akamatsu

Pet. 6. Petitioner relies on the Declaration of Peter Crosby, dated November 22, 2024, as support for its contentions. Ex. 1003.

III. ANALYSIS

A. Alleged Failure to Comply with Word Count Limits

Petitioner's Certificate of Compliance states that the Petition "complies with the type-volume limitations of 37 C.F.R. § 42.24, because it contains 13,958 words (as determined by the Microsoft Word word-processing system used to prepare the brief and including annotated figures), excluding the parts of the brief exempted by 37 C.F.R. § 42.24." Pet. 149. Patent Owner argues that we should deny the Petition because it uses improper formatting to circumvent the 14,000-word count limit set by 37 C.F.R. § 42.24. Prelim. Resp. 74–76. In particular, Patent Owner asserts that the "Petition regularly omits a space when citing to exhibits (e.g., "Ex.1001" vs. "Ex. 1001"), the expert's declaration (e.g., '¶¶54–55' vs. '¶¶ 54–55'), and statutes (e.g., '§102' vs. '§ 102')." *Id.* at 75 (citing *Axon Enterprise, Inc., v. Digital Ally, Inc.*, IPR2017-00375, Paper 9 at 2 n.2 (PTAB June 6, 2017)). According to Patent Owner, "these citations occur so frequently that at least 1,087 words have been improperly undercounted" (*id.* at 75), and "[t]he result is an advantage to Petitioner and undue prejudice to Patent Owner" (*id.* at 76).

[7] U.S. Patent Application Publication No. 2003/0124007 A1, issued July 3, 2003 (Ex. 1005, "Schima").

Patent Owner further asserts that "the Petition attempts an additional massive circumvention of the word count limit by omitting analysis for about half of the challenged claims." Prelim. Resp. 77. According to Patent Owner, "in each of Grounds 1–4, Petitioner addresses claims 11, 22, 24, 26, 30, 28, 29, 32, 33, and 35 by referencing non-identical elements of claims 1–4, 10, 14, 15, and 17,[] in most cases without any additional analysis" and "Petition also cite to summary paragraphs for Crosby's analyses of claims 21, 22, 24, 26, 28–30, 32, 33, and 35, which collectively span 256 pages of his 630-page declaration." *Id.* at 77–78 (emphasis omitted).

With respect to Patent Owner's assertions about word count limits, the Patent Trial and Appeal Board Consolidated Trial Practice Guide November 2019 ("Consolidated TPG") states that "deleting spacing between words, or using excessive acronyms or abbreviations for word phrases, in order to circumvent the rules on word count, may lead to a party's brief not being considered." Consolidated TPG, 40 (citing *Pi-Net Int'l, Inc. v. JPMorgan Chase & Co.*, 600 F. App'x 774 (Fed. Cir. 2015)). As the basis for denying the Petition, Patent Owner alleges "undue prejudice." Prelim. Resp. 76. Patent Owner, however, did not raise with the Board, prior to filing its Preliminary Response, any concern with the manner in which Petitioner formatted its Petition. As a result, Patent Owner did not avail itself of the opportunity to seek relief to address any alleged undue prejudice short of denying the Petition through, for example, an increase in the word count for its own brief. *See* 37 C.F.R. § 42.24(a)(2). Under the circumstances

presented, we do not find denial of the Petition warranted based on the alleged improper formatting.[8]

B. Summary of Asserted Prior Art References

1. Summary of Wampler

Wampler, titled "Sealless Rotary Blood Pump," relates "to continuous flow pumps of rotary design, suitable for permanent implantation in humans for use as chronic ventricular assist devices." Ex. 1008, code (54), ¶ 2. Wampler explains that left ventricular assist devices (LVADs) using rotary pumps to provide continuous flow are "smaller, simpler, and less expensive" than prior art designs using pumps that provide cyclic or pulsating blood flow. *Id.* ¶ 4. According to Wampler, the prior art did not disclose "a durable rotary blood pump" due to the "unique problems with the rotary pump's driveshaft seal." *Id.* ¶ 5. To address this issue, Wampler discloses an improved rotary blood pump that eliminates the need for a driveshaft seal. *Id.* ¶ 6.

Figure 3 of Wampler, reproduced below, is a partial cross-sectional view of a first embodiment of a sealless rotary blood pump. *Id.* ¶ 50.

[8] Patent Owner also broadly argues that the Petition should be denied as "incomplete" because Petitioner did not identify differences between the prior art and the Challenged Claims, did not propose modifications to the asserted art, and failed to assert rationales for obviousness. Prelim. Resp. 1, 8–16 (arguing, additionally, that the Petition lacks particularity and that Mr. Crosby's declaration "often" mirrors the Petition). We have considered all of Patent Owner's arguments and have determined Petitioner made a sufficient showing in the Petition to support institution, as explained below.

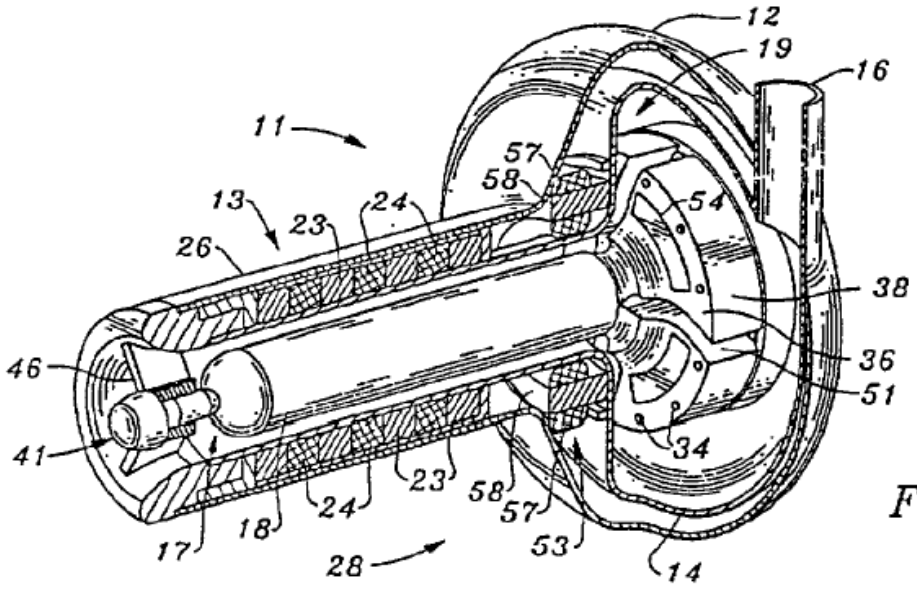


Fig. 3

Figure 3 depicts pump 11 including housing 12 with elongated inlet tube 13 and discharge tube 16. *Id.* ¶ 50. Casing 14 encloses rotor 17, which includes spindle 18 and attached impeller 19. *Id.* ¶ 51. Forward magnetic bearing 21 and rearward magnetic bearing 22 "levitate rotor 17 and maintain it in proper radial alignment with respect to its longitudinal axis." *Id.* ¶ 52; *see also id.* ¶ 54 (explaining that "magnetic polarizations and repulsive forces produced by the magnets and the pole pieces of forward magnetic bearing 21 are such that magnetic levitation of support shaft 18 results"). Motor 53 includes arcuate magnetic segments 54 embedded in upper face portion 36 of impeller 19. *Id.* ¶ 70. Magnetic segments 54 have alternating polarity orientations and are directed toward motor stator 56 mounted on the outer surface of impeller casing 14. *Id.* Motor stator 56 includes pole piece 58 and windings 57, which are energized to generate an electromagnetic field that drives magnets 54 to rotate impeller 19 of rotor 17. *Id.* ¶¶ 70, 72. According to Wampler, "[m]otor 53, with windings 57 and pole piece 58, together with magnets 54, function not only

to transmit torque but also provide a restoring radial magnetic force that acts as a radial bearing." *Id.* ¶ 73.

Figure 13 of Wampler, reproduced below, illustrates a second embodiment of a rotary blood pump. *Id.* ¶¶ 34, 37.

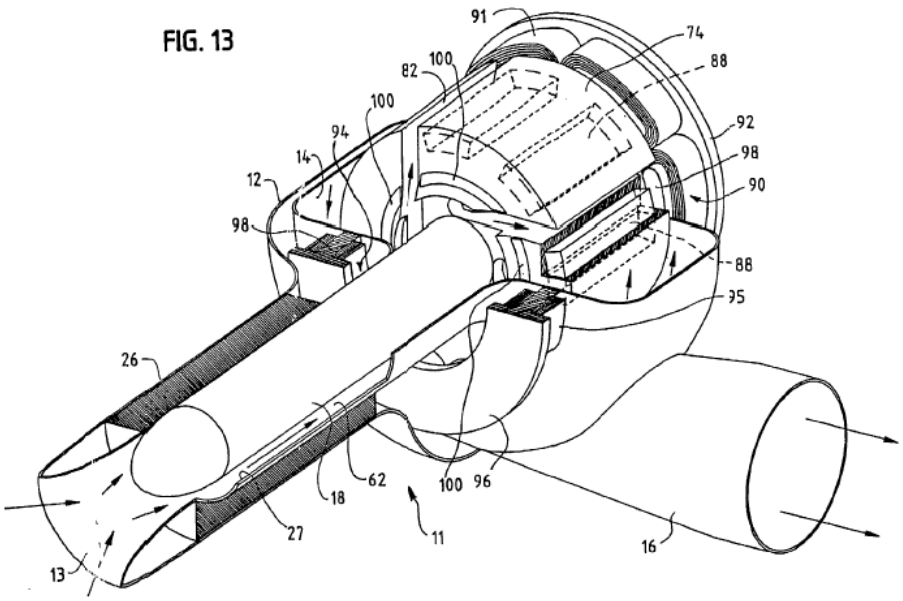


Figure 13 shows a second embodiment of pump 11 that includes first motor stator 90 comprising windings 91 and back iron 92 located at the rear side of impeller 74 between housing 12 and casing 14. *Id.* ¶ 83. Second motor stator 94 comprises windings 95 and back iron 96 fixed to casing 14 on the forward side of impeller 74. *Id.* ¶ 84. Motor stators 90 and 94 are positioned on opposite sides of casing 14 so that each is adjacent to the pole faces of rotor magnets 98. *Id.* ¶ 85.

Wampler explains that one of several advantages to the arrangement described in the second embodiment is that "hydrodynamic bearings can be located on the surface of the impeller to constrain axial motion and to provide radial support in the case of eccentric motion or shock on the device." *Id.* ¶ 89. The hydrodynamic bearings may take the form of raised pads 100 symmetrically located about impeller 74 that are spaced from a

contact surface by a gap. *Id.* ¶¶ 89, 92. According to Wampler, once impeller rotation begins, the relative movement between the raised pads and the contact surfaces produces increased pressure within the gaps that forces the raised pads and contact surfaces apart to aid in axial and/or radial support. *Id.* ¶¶ 92–93.

2. Summary of Bourque

Bourque is titled "HeartMate III: Pump Design for a Centrifugal LVAD with a Magnetically Levitated Rotor" and relates to a "long-term, compact left ventricular assist device (LVAD) . . . featuring a centrifugal pump with a magnetically levitated rotor." Ex. 1007, 1.[9] Bourque explains that second generation LVAD research has focused on continuous flow pumps over positive displacement pumps because the former which have inherently fewer mechanical parts, are smaller, and lower cost. *Id.* According to Bourque, the HeartMate III further improves upon second generation LVADs because the pump has no mechanical bearings. *Id.* Instead, "[t]he rotor is magnetically suspended, eliminating contact between moving parts and consequently extending wear life indefinitely." *Id.*

[9] We refer to the page numbers added by Petitioner at the lower right corner of Exhibit 1007.

Figure 1B of Bourque, reproduced below, is a cross-sectional view of a model representing a HeartMate III pump. *Id.* at 2.

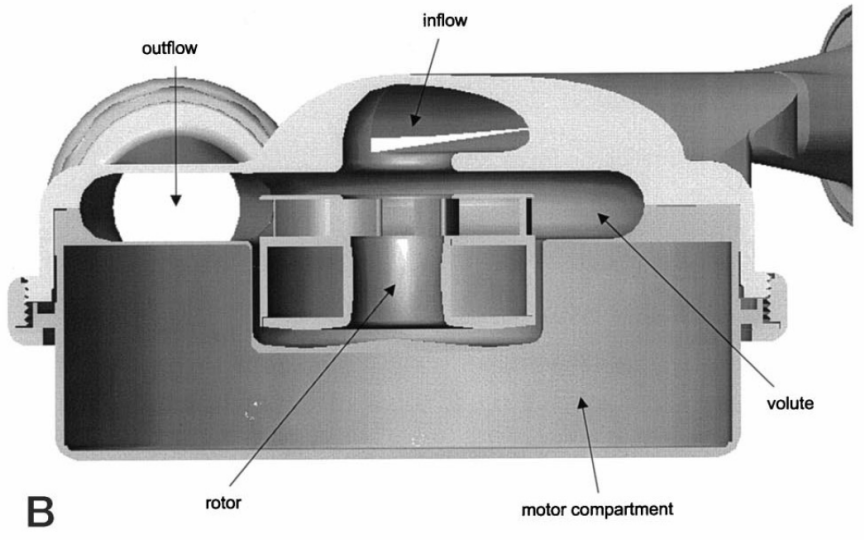


Figure 1B depicts a HeartMate III pump including an upper housing and a lower housing clamped together by a screw ring. *Id.* at 1–2. The upper housing includes an inflow channel, an outflow channel, and an upper half of a volute. *Id.* The lower housing includes a lower half of the volute and a cavity for a rotor, which encloses a motor. *Id.* The rotor includes an impeller and passive magnetic elements. *Id.*

Figure 4 of Bourque, reproduced below, is a cross-sectional diagram of the HeartMate III motor. *Id.* at 2.

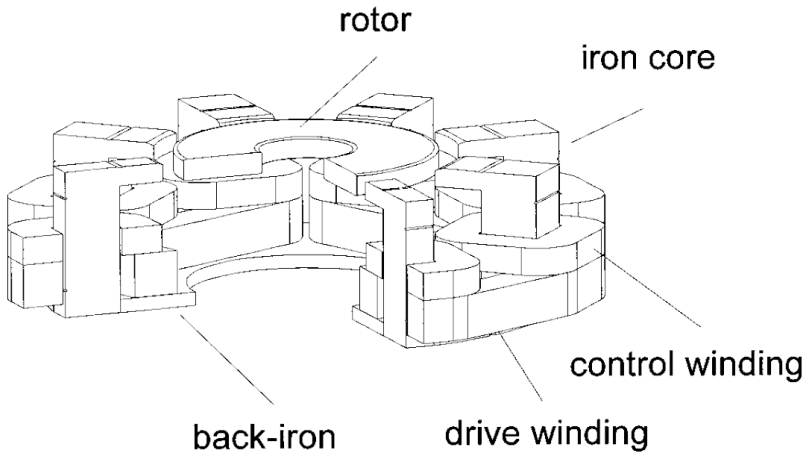


Figure 4 depicts a single magnetic structure including a back-iron, a drive winding, an iron core, and a control winding. *Id.* at 3. The magnetic structure drives the rotor and controls rotor levitation. *Id.* at 2. Bourque explains that "[t]he rotor is passively magnetically levitated in the axial-translational and transverse-rotational degrees of freedom . . . and actively magnetically levitated in the remaining degrees of freedom." *Id.* at 2–3; *see also id.* at 2 (explaining that "the magnetic suspension (passive in the axial direction, actively controlled in the radial direction) . . . describes the levitation system's capacity to counteract imposed deviations of rotor position").

3. Summary of Akamatsu

Akamatsu, titled "Development of Terumo Implantable Left Ventricular Assist System (T-ILVAS) with a Magnetically Suspended Centrifugal Pump [(MSCP)]," relates to a "study describ[ing] recent progress in the development of the T-ILVAS, focusing on ex vivo and in vivo evaluations of the prototype MSCP." Ex. 1006, 1.[10] Akamatsu explains that "the MSCP is a sealless rotor pump providing contact-free rotation of the impeller without any material wear, [and] it is expected to be one of the most durable blood pumps." *Id.*

[10] We refer to the page numbers added by Petitioner at the lower right corner of Exhibit 1006.

Figure 2 of Akamatsu, reproduced below, is a schematic cross-sectional view of a MSCP. *Id.* at 2.

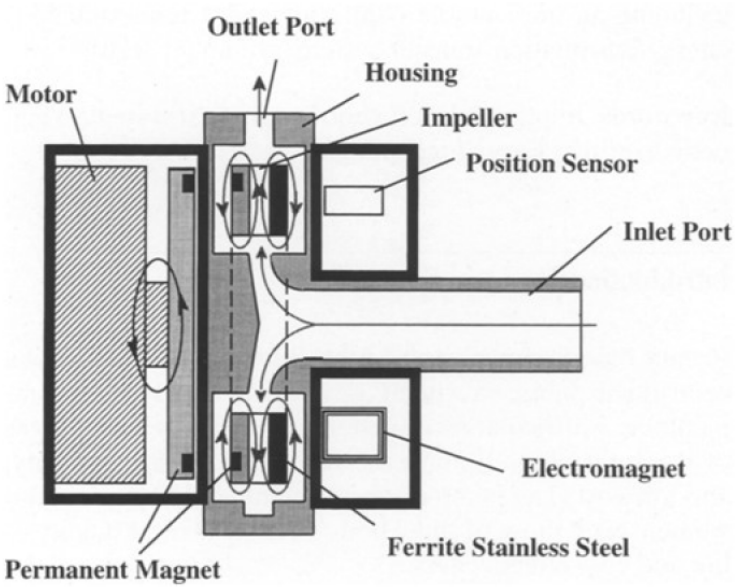


Figure 2 depicts a MCSP with its main components including a housing with an inlet port and an outlet port, an impeller suspended by a magnetic bearing, and a DC brushless motor. *Id.* The magnetic bearing comprises electromagnets and position sensors that are used to control the electric current in the electromagnets in order to suspend and "maintain the impeller free-floating at the center of the pump housing." *Id.* The motor rotates the impeller via a magnetic coupling. *Id.* The impeller is suspended in the housing by the magnetic bearing, which comprises three electromagnets. *Id.*

4. Summary of Schima

Schima is titled "Rotary Pump Comprising a Hydraulically Mounted Rotor" and "relates to a rotary pump for moving blood and other shear-sensitive liquids with a rotor journaled hydraulically and, if necessary, magnetically in a housing." Ex. 1005, code (54), ¶ 1. Schima explains that an object of the disclosed invention is to provide a pump with a small number of parts and a simple construction that avoids mechanical

depositions, dead-water zones, zones of reduced flow velocity, and small gaps. *Id.* ¶ 9.

Figure 1 of Schima, reproduced below, is a cross-sectional view of a pump according to one embodiment. *Id.* ¶ 11.

Fig.
~~Abb. 1~~

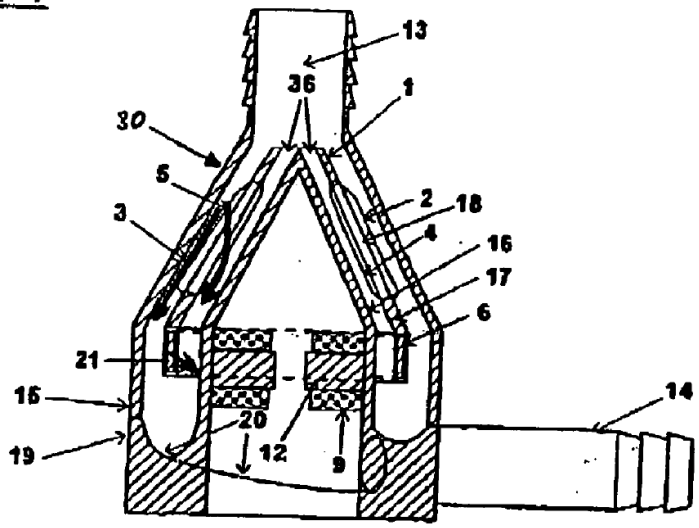


Figure 1 depicts hollow conical rotor 1 having vanes 2 and 4 that produce flow components 3 and 5, and rotor magnets 6. *Id.* ¶ 12. Rotor 1 rotates in housing 30, which comprises hollow conical upper part 15 with inlet 13, and lower part 19 with conical middle part 16 and outlet 14. *Id.* Rotor 1 also includes inlet opening 36 that distributes incoming liquid between the rotor and middle part 16. *Id.* Flow components 5 are directed axially against the conical surface of middle part 16 to effect centering of rotor 1. *Id.* Housing lower part 19 also includes stator 12 with coils 9 for generating a rotating magnetic field. *Id.* Rotor magnets 6 and stator 12 work together and are axially offset so that coupling force 21 is "effective at an angle and provide[s] an axial component for additional stabilizing of the rotor 1." *Id.*

Figure 2 of Schima, reproduced below, is a cross-sectional view of a second pump embodiment having an alternative drive arrangement. *Id.* ¶ 13.

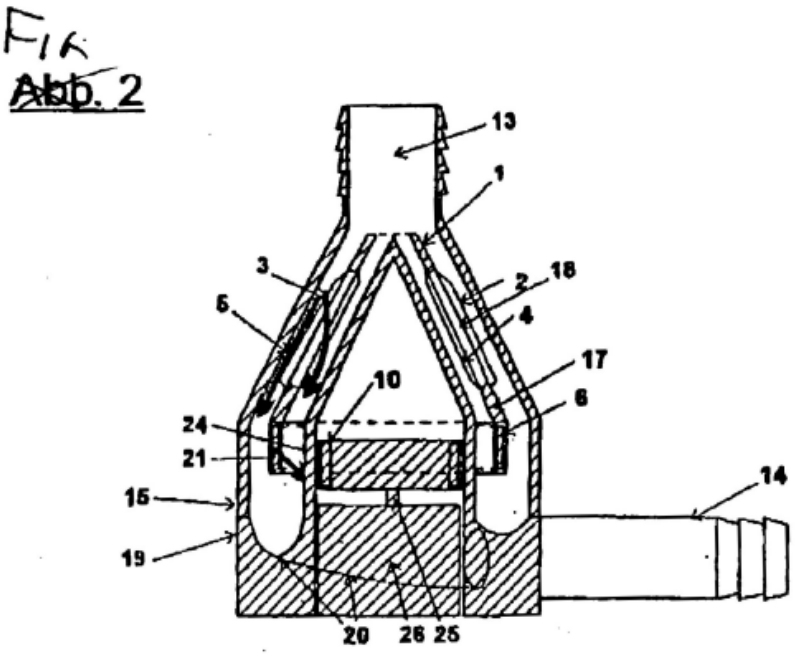


Figure 2 depicts electric motor 26 driving rotating disk 24 with magnets 10 via shaft 25. *Id.* According to Schima, "[t]his embodiment has the advantage that no electrical energy is used to journal the rotor and as a result the axial offset of the disk 24 ensures an axial component for the magnetic force 21." *Id.*

C. Legal Standards for Obviousness

A patent claim is unpatentable for obviousness if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). In *Graham v. John Deere Co. of Kan. City*, 383 U.S. 1 (1966), the Supreme Court set out a framework for assessing obviousness that requires

consideration of four factors: (1) the "level of ordinary skill in the pertinent art," (2) the "scope and content of the prior art," (3) the "differences between the prior art and the claims at issue," and (4) "secondary considerations" of nonobviousness such as "commercial success, long felt but unsolved needs, failure of others, etc." *Id.* at 17–18; *KSR*, 550 U.S. at 407.

"Whether an ordinarily skilled artisan would have been motivated to modify the teachings of a reference is a question of fact." *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1327 (Fed. Cir. 2016) (citations omitted). "[W]here a party argues a skilled artisan would have been motivated to combine references, it must show the artisan 'would have had a reasonable expectation of success from doing so.'" *Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1360–61 (Fed. Cir. 2017) (quoting *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1068–69 (Fed. Cir. 2012)).

D. Level of Ordinary Skill in the Art

In determining the level of ordinary skill in the art, various factors may be considered, including the "type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field." *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995).

Petitioner contends a person of ordinary skill in the art at the time of the invention "would have at least a bachelor's degree in engineering; knowledge and experience in human circulatory system anatomy and physiology; and at least five years' experience designing and developing implantable medical devices." Pet. 6 (citing Ex. 1003 ¶ 18). At this stage of the proceeding, Patent Owner does not contest Petitioner's proposed level of ordinary skill in the art. *See* Prelim. Resp. 1–2. We find, for purposes of

this Decision, that the '517 patent and the cited prior art references reflect the appropriate level of skill at the time of the claimed invention and that the level of skill reflected in these references and in the '517 patent is consistent with the definition of a person of ordinary skill in the art proposed by Petitioner. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

E. Claim Construction

In this proceeding, we construe claims using the same claim construction standard that would be used to construe the claims in a civil action under 35 U.S.C. § 282(b). *See* 37 C.F.R. § 42.100(b). The claim construction standard includes construing claims in accordance with the ordinary and customary meaning of such claims as understood by one of ordinary skill in the art at the time of the invention. *See id.*; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (en banc). In construing claims in accordance with their ordinary and customary meaning, we take into account the specification and prosecution history. *Phillips*, 415 F.3d at 1315–17.

Petitioner asserts that Patent Owner's "apparent" claim constructions offered in the Parallel Proceeding "differ from the plain and ordinary meanings" in the context of the '517 patent. Pet. 7. Petitioner further asserts that "the Board need not construe the claim terms," because a person of ordinary skill in the art "would find the Challenged Claims unpatentable under any interpretation." *Id*.

Patent Owner argues that Petitioner proposes constructions for the terms "magneto coupling" and "by the blood flowing" that are "narrowing positions" corresponding to Petitioner's "non-infringement positions" in the Parallel Proceeding, and that Petitioner "contradicts" the narrower proposed construction in Petitioner's alleged grounds of unpatentability, resulting in

"grounds being unclear." Prelim. Resp. 2. Patent Owner further argues that Petitioner and its expert engage in erroneous claim construction with analysis that repeatedly and improperly refers to pleadings in the Parallel Proceeding as statements of claim construction and ignores plain and ordinary meaning, resulting in Petitioner taking "inappropriate and contradictory" claim construction positions. *Id.* at 1–5.

As a preliminary matter, we find no ambiguity or improper contradiction in the claim construction arguments advanced by Petitioner. Petitioner is not limited to a "single" claim construction argument in its Petition, as Patent Owner implies, but may show how it contends a claim limitation is disclosed under alternative constructions, including a construction that Petitioner maintains is incorrect, but reflective of a position allegedly advanced by Patent Owner. We address whether Petitioner sufficiently shows how the asserted art teaches a particular limitation based on a particular construction in our analysis of each ground. Next, we turn to the Parties' claim construction positions for the terms "magneto coupling," "by the blood flowing," and "axially adjacent."

1. "magneto coupling"

Claim 1 recites, in relevant part, a second magnetic device "positioned to magnetically drive rotation of the magnetically driven rotor via a magneto coupling with the first magnetic device." Ex. 1001, 4:45–48. Claim 21 recites, in relevant part, "the second magnetic device positioned axially closer to the first magnetic device than to the magnetically driven rotor so as to magnetically drive rotation of the magnetically driven rotor within the chamber via a magneto coupling with the first magnetic device." *Id.* at 6:13–18. Petitioner asserts the "plain meaning" of "magneto coupling" would have been understood to be "a transfer of torque from one rotating

permanent magnetic component to another rotating permanent magnetic component via a magnetic field." Pet. 7 (citing Ex. 1003, § VII.A.1.a). According to Petitioner, this construction is consistent with the '517 patent, which describes "a coupling between two rotating 'bar magnets'—a drive wheel rotates one bar magnet which causes another bar magnet (connected to a rotor) to rotate." *Id.* (citing Ex. 1003 ¶¶ 68–73 (analyzing Ex. 1001, 2:60–62, 3:50–4:3, Fig. 2)). Petitioner further argues that contemporaneous art to the '517 patent distinguished "magneto coupling" drives from drives using stators. *Id.* (citing Ex. 1011, 1 (explaining that the rotating field is generated by rotating magnets in a magnetic coupling pump and by electric stator windings in a stator pump)).

Additionally, Petitioner argues that in the Parallel Proceeding Patent Owner "conflates 'magneto coupling' . . . with a stator drive using a stationary electromagnet, instead of a rotating magnet, to rotate the rotor magnet." *Id.* at 8 (emphasis omitted). According to Petitioner, in the Parallel Proceeding Patent Owner "alleges that a 'stator' (a stationary element) achieves magneto coupling with a rotor." *Id.* (citing Ex. 1019, 7–8; Ex. 1003, ¶¶ 84–87). Petitioner applies this alternative, broader construction to certain of its grounds of alleged unpatentability in the Petition. *See id.* at 9.

Patent Owner does not dispute Petitioner's characterization of Patent Owner's contentions in the Parallel Proceeding concerning the meaning of "magneto coupling." Further, Patent Owner states that Petitioner identifies in the Petition "two types of magnetic couplings," the first involving "one permanent magnet driving movement of another permanent magnet," and the second involving "an electromagnet (a stator) driving movement of a permanent magnet." Prelim. Resp. 2 (citing Pet. 7–8). According to Patent

Owner, "Petitioner provides no recognizable basis for limiting the plain meaning of magnetic coupling to one type of magnet and excluding another type of magnet." *Id.* at 3. In other words, Patent Owner agrees with Petitioner's alternative construction, which interprets "magnetic coupling" to encompass generating a rotating field either by rotating magnets or by an electromagnet / stator.

In sum, Petitioner maintains a narrower construction of "magneto coupling" is correct, and alleges grounds of unpatentability based on both its narrower proposed construction (a construction encompassed by the broader construction), as well as based on the broader construction that Patent Owner does not dispute. We, therefore, find no merit to Patent Owner's argument that Petitioner's contention "contradicts itself" or fails to present a "*prima facie* obviousness position." *See* Prelim. Resp. 3. Patent Owner does not dispute the broader construction applied by Petitioner, which encompasses the narrower construction Petitioner proposes. For purposes of this Decision, we apply the broader construction of "magneto coupling," which encompasses generating a rotating field either by rotating magnets or by an electromagnet / stator.

2. "by the blood flowing"

Claim 1 recites, in relevant part, "the magnetically driven rotor remains adjacent to and spaced apart from the surrounding rotor housing by the blood flowing from the inflow tube and to the blood outflow port." Ex. 1001, 4:60–63. Claim 21 recites, in relevant part, "the magneto coupling orients the magnetically driven rotor so that both the magnetically driven rotor and the first magnetic device remain spaced apart from the one or more walls by the blood in response to rotation of the magnetically driven rotor." *Id.* at 6:23–28. Petitioner does not offer an express construction of "by the

blood flowing," but instead contends "that type of suspension" produces a "fluid film" and was referred to in the art as a "hydrodynamic bearing," in contrast to a "magnetic bearing," which uses "magnetic polarizations and repulsive forces." Pet. 8. Thus, Petitioner suggests the claim term should be more narrowly interpreted to encompass only a hydrodynamic bearing. Further, according to Petitioner, in the Parallel Proceeding Patent Owner purportedly interprets the claim language as "encompassing a magnetic bearing." *Id.* at 9 (citing Ex. 1003 ¶ 95; Ex. 1019). Petitioner subsequently applies this alternative, broader construction to certain of its grounds of alleged unpatentability in the Petition. *See id.*

Patent Owner argues that "there is no reason in the plain meaning of the claim language that magnetic bearings should be excluded from the scope of the claim." Prelim. Resp. 4–5 (further arguing that Petitioner's "contradictory positions cannot make out *prima facie* obviousness"). In other words, Patent Owner agrees with Petitioner's alternative construction, which interprets the "by the blood flowing" claim language to encompass both a hydrodynamic bearing and a magnetic bearing.

In sum, Petitioner maintains a narrower construction of the "by the blood flowing" claim language is correct, and alleges grounds of unpatentability based on both its narrower proposed construction (a construction encompassed by the broader construction), as well as based on the broader construction that Patent Owner does not dispute. We, therefore, find no merit to Patent Owner's argument that Petitioner's contention "contradicts itself" or fails to present a "*prima facie* obviousness position." *See* Prelim. Resp. 4–5. Patent Owner does not dispute the broader construction proposed by Petitioner, which encompasses the narrower construction. For purposes of this Decision, we apply the broader

construction of the "by the blood flowing" claim language, which encompasses both a hydrodynamic bearing and a magnetic bearing.

3. "axially adjacent"

Claim 1 recites, in relevant part, a magnetically driven rotor "axially adjacent to a first magnetic device that is located within the surrounding rotor housing." Ex. 1001, 4:34–44. Claim 21 recites, in relevant part, a magnetically driven rotor "axially adjacent to a first magnetic device that is axially aligned with the inflow axis." *Id.* at 6:1–4. Petitioner does not address "axially adjacent" in the Claim Construction portion of the Petition. *See* Pet. 7–9.

In its analysis of alleged obviousness over Wampler, Petitioner states that it assumes the "interpretation" of "axially adjacent" that Patent Owner allegedly asserts in the Parallel Proceeding, specifically, "that a magnetic element sealed within a rotor is 'axially adjacent.'" Pet. 25 (citing Ex. 1019, 5–6). Petitioner does not argue that this is the plain and ordinary meaning of "axially adjacent" and does not identify any support for this construction either from the Specification of the '517 patent or from any extrinsic evidence. Moreover, in its analysis of alleged obviousness over other asserted art, Petitioner does not state that it is assuming Patent Owner's alleged position in the Parallel Proceeding, and instead refers to figures in the asserted prior art that Petitioner alleges show a "magnetically driven rotor" adjacent to a "first magnetic device" as measured along a central axis. *See*, *e.g.*, *id.* at 26, 47.

The only support cited by Petitioner for the assertion that "a magnetic element sealed within a rotor is 'axially adjacent'" is Exhibit 1019 (identified by Petitioner as Exhibit 12 to the Complaint filed in the Parallel Proceeding), which refers to "a first magnetic device that is located within

the surrounding rotor housing" at a position "axially adjacent" to the magnetically drive rotor. *See* Pet. 25 (citing Ex. 1019, 5–6).

Exhibit 1019, however, depicts a device with parts labeled "First Magnetic Device" and "Magnetically Driven Rotor" along a "Central Axis". Ex. 1019, 5–6. We find nothing in Exhibit 1019 that defines "axially adjacent" to mean "a magnetic element sealed within a rotor," as Petitioner alleges.

In this regard, Patent Owner argues as follows:

> Exhibit 1019 . . . contains no mention of "a magnetic element sealed within a rotor" or a contention that such a configuration would represent an "axially adjacent" orientation of such components. Instead, [in Exhibit 1019], Patent Owner illustrates a Petitioner product and labels components identified as the claimed magnetically driven rotor and first magnetic device that are adjacent to one another as measured along a central axis. [*See* Ex. 1019 at 6–7]. This is in accordance with the plain and ordinary meaning of the claim terms and does not suggest that any component "sealed within" another component would categorically be axially adjacent thereto.

Prelim. Resp. 20–21; *see also id.* at 22 (contrasting "axially adjacency" to "axially aligned").

We find no sufficient support for Petitioner's assertion that "a magnetic element sealed within a rotor is 'axially adjacent.'" Pet. 25. Moreover, we find Patent Owner's definition of the claim language reflects its plain and ordinary meaning and is consistent with the disclosure of the '517 patent (which illustrates only a "magnetically driven rotor" positioned adjacent to a "first magnetic device" as measured along a central axis). *See* Ex. 1001, Fig. 2. It is also consistent with the construction Petitioner appears to contend is the correct construction, as applied by Petitioner in, for example, its contentions based on the asserted combination

of Bourque and Wampler. *See* Pet. 62 (relying on Bourque's teaching of a rotor and magnetic device adjacent to one another as measured along a central axis with regard to the "axially adjacent" limitation and not on Wampler's magnets embedded in the impeller at the same location along a central axis). Accordingly, we find, for purposes of this Decision and based on the current record, that the plain and ordinary meaning of "axially adjacent," as shown by Patent Owner, is "adjacent to one another as measured along a central axis," and apply this definition to our analysis of Petitioner's contentions below. *See* Prelim. Resp. 21–23.

F. Alleged Obviousness over Wampler

Petitioner contends that the subject matter of claims 1–4, 10, 11, 14, 15, 17, 21, 22, 24, 26, 28–30, 32, 33, and 35 of the '517 patent would have been obvious over Wampler. Pet. 16–52. Petitioner relies on the testimony of Mr. Crosby in support of its contentions. Ex. 1003 ¶¶ 149–455. In opposition, Patent Owner argues, among other things, that Petitioner fails to show how Wampler teaches "a magnetically driven rotor . . . *axially adjacent* to a first magnetic device," as required by claim 1. Prelim. Resp. 20–23 (emphasis added).

As explained above (*supra* Section III.E.3), for purposes of this Decision we find "axially adjacent" to mean "adjacent to one another as measured along a central axis." Petitioner does not contend or show in the Petition that Wampler teaches a magnetically driven rotor adjacent to a first magnetic device as measured along a central axis. *See* Pet. 25–26, 47. In opposition, Patent Owner argues, and we agree on the current record, as follows:

> Wampler cannot teach or suggest a magnetically driven rotor . . . axially adjacent to a first magnetic device based on the

> positioning of its magnet segments 88 and impeller 74 because these components are not adjacent to one another as measured along the central or inflow axis of the device. Instead, the magnet segments 88 and impeller 74 are aligned with, and overlap, one another as measured along the central or inflow axis based on [in Wampler's] configuration where the magnet segments are housed within the impeller blades.

Prelim. Resp. 23 (citing Ex. 1008, ¶ 18, Figs. 3, 4, 7, 9, 11, 13, 15, 17, 19). We find Patent Owner's arguments refuting Petitioner's contention that the Challenged Claims would have been obvious over Wampler, alone, have substantial merit. We, therefore, turn to Petitioner's contentions based on Bourque, in combination with Wampler, which instead rely on Bourque as teaching the "axially adjacent" limitation.

G. Alleged Obviousness over Bourque and Wampler

Petitioner contends that the subject matter of claims 1–4, 10, 11, 14, 15, 17, 21, 22, 24, 26, 28–30, 32, 33, and 35 of the '517 patent would have been obvious over the combination of Bourque and Wampler. Pet. 53–82. More particularly, Petitioner contends that Bourque teaches each limitation recited in independent claims 1 and 21. *Id.* at 53–74, 78–80. Additionally, for each of limitations [1B], [1H], and [1K], Petitioner further contends that, "to the extent" it might be argued that Bourque fails to disclose the limitation, each of these limitations would have been obvious in view of Wampler. *Id.* at 56–58, 63–65, 69–71; *see also id.* at 78–80 (referencing claim 21). Petitioner relies on the testimony of Mr. Crosby in support of its contentions. Ex. 1003 ¶¶ 470, 472–474, 476, 477, 504, 508, 509, 526–528; *see also id.* at ¶¶ 594, 606, 632, 655 (referencing claim 21).

In opposition, Patent Owner primarily argues that Bourque fails to disclose limitations [1A], [1B], [21A], and [21C] and that Petitioner fails to "provide a coherent rationale for the contended combination" with Wampler.

Prelim. Resp. 10–11, 36–46. Patent Owner does not dispute that Bourque teaches limitation [1F] and [21D] (i.e., a rotor coupled and axially adjacent to a first magnetic device).

1. Independent Claim 1

We focus our discussion below on the disputed limitations of claim 1.

[1A] a heart assist pump device deliverable to the heart and comprising: an inflow tube defining a blood inflow path and having a suction end insertable into a ventricle of the heart;

[1B] a magnetically driven rotor axially aligned with the inflow tube and being spaced apart from the suction end when the suction end of the inflow tube is inserted into the ventricle.

Limitations [1A]–[1B] require, in relevant part, a device with an "inflow tube" that is "axially aligned" with a "magnetically driven rotor." Similarly, limitations [21A]–[21B] require, in relevant part, a device with an "inflow tube" having an "inflow axis" that is "axially aligned" with a "magnetically driven rotor." Petitioner first argues that Bourque, alone, teaches a rotor "axially aligned" with the inflow tube, and, second, that Bourque, in combination with Wampler, also teaches this limitation. Pet. 53–58. In opposition, Patent Owner argues that Bourque, alone, does not teach this limitation. Prelim. Resp. 40–45. Patent Owner does not dispute that the limitation is taught by Wampler, and instead argues Wampler cannot be combined with Bourque. Prelim. Resp. 46.

As to Petitioner's argument based on Bourque, alone, on the current record we agree with Patent Owner that Petitioner does not sufficiently show in the Petition that Bourque teaches a rotor "axially aligned" with an inflow tube or with the inflow axis of an inflow tube. Petitioner contends that Figure 3 of Bourque teaches a heart assist pump device ("HeartMate III LVAD") with an inflow tube ("an inflow subassembly . . . that includes a

left ventricular (LV) cannula") that is deliverable to the heart so that the inflow cannula is "implanted . . . via left ventricular apical cannulation." Pet. 53–55 (citing Ex. 1003 ¶ 464; Ex. 1007, 401, 403, Fig. 1A, Fig. 3).

Petitioner's annotated version of Figure 3 of Bourque is reproduced below.

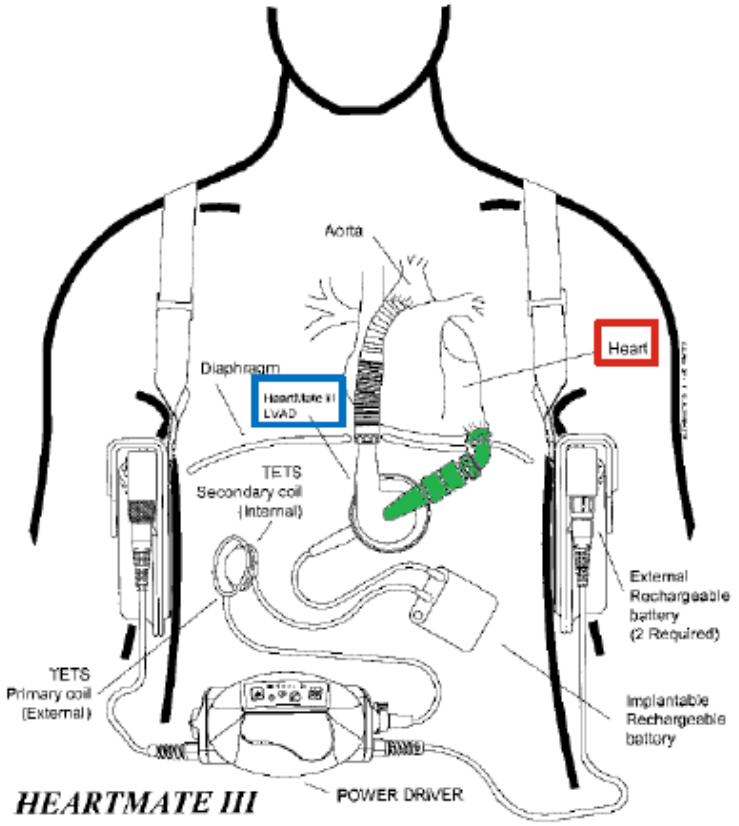
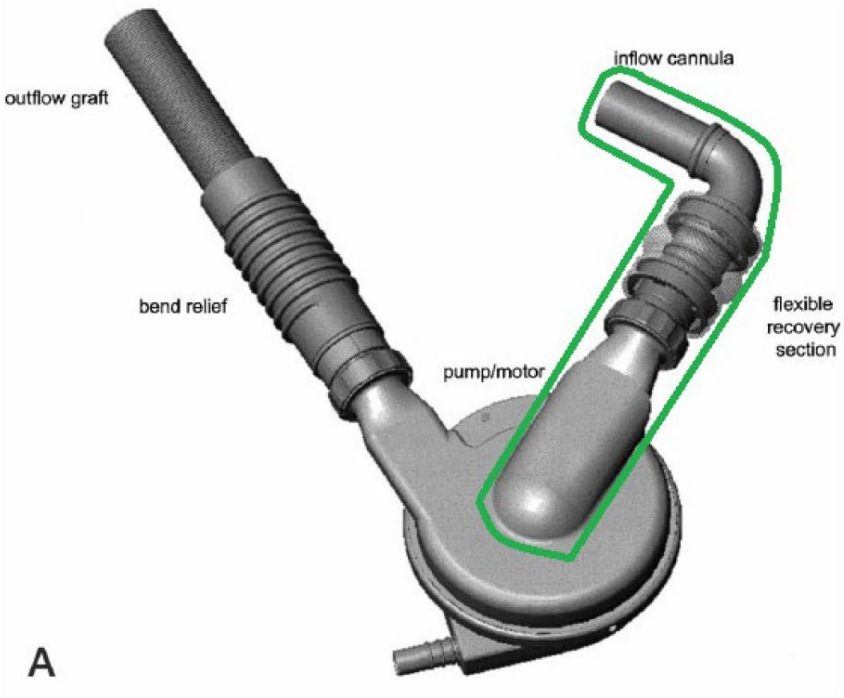


Figure 3. HeartMate III LVAD implanted configuration. TETS, transcutaneous energy transmission system.

Pet. 55; Ex. 1007, Fig. 3. The annotated version of Figure 3 of Bourque shows a human chest region with internal features identified as the "Heart" (labeled in a red outline) and an implanted heart assist pump device (labeled "HeartMateIII LVAD" in a blue outline). Petitioner identifies an element colored green in Figure 3 as "an inflow subassembly . . . that includes a left ventricular (LV) cannula," which Petitioner asserts corresponds to "an

inflow tube defining a blood inflow path," as required by claim 1 of the '517 patent. *Id*.

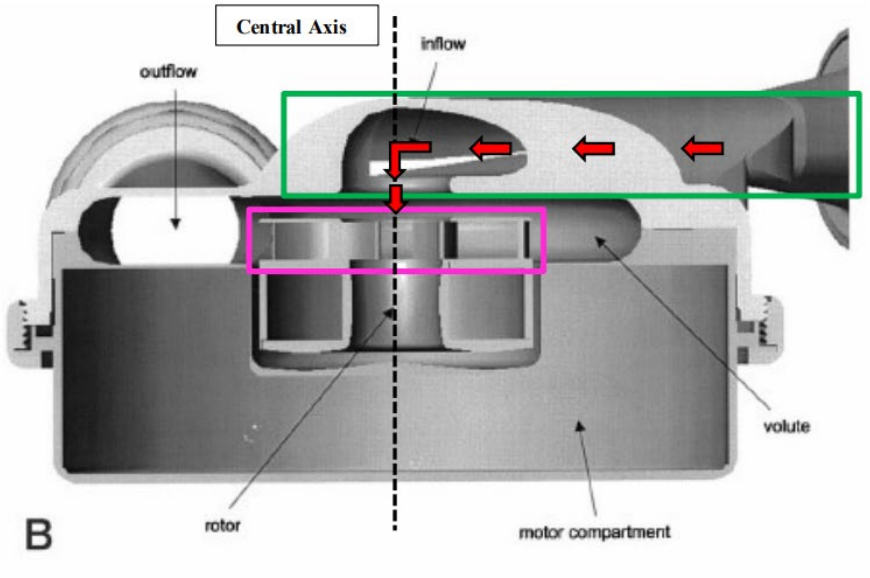
Petitioner also provides an annotated version of Figure 1A of Bourque, reproduced below.



Pet. 54. Figure 1A of Bourque shows, in relevant part, a "pump/motor" connected to an "inflow cannula" via a "flexible recovery section." Ex. 1007, Fig. 1A. Portions of the pump/motor, the flexible recovery section and the inflow cannula are surrounded by a green outline, as annotated by Petitioner, which presumably corresponds to green text in the Petition reading "inflow canula" or "inflow subassembly." Pet. 53–55. In Figure 1A, the "inflow cannula" and "flexible recovery section" form a right angle prior to the connection with the "pump/motor." *Id.* at 54.

Petitioner provides an annotated version of Figure 1B of Bourque, reproduced below, to purportedly show how Bourque's "impeller" (corresponding to the recited "rotor") is allegedly axially aligned with the

"inflow axis" of the "inflow subassembly" (corresponding to the recited "inflow tube").



Pet. 56–57. Petitioner's annotated version of Figure 1B, above, shows Bourque's inflow assembly (in a green outline) perpendicular to Bourque's impeller (in a pink outline). Petitioner annotated red arrows allegedly showing fluid flowing from right to left through the inflow assembly, where upon it makes an abrupt 90 degree turn into the impeller. Petitioner argues as follows:

> This inflow subassembly further comprises an "elbow" that "result[s] in a sharp bend in the flow before it enters the impeller." Ex. 1007, 402. Ex. 1003, ¶ 471. Nevertheless, by virtue of [Bourque's] device being "a centrifugal pump," its "impeller" is axially aligned with the "inflow subassembly" as flow "leav[es] the inflow conduit to enter the impeller." Ex. 1007, 402. Indeed, axial inflow is characteristic of centrifugal pumps. Ex.1003, ¶ 472.

Id. (emphasis omitted). Petitioner identifies the entire inflow subassembly of Bourque as corresponding to the recited "inflow tube," and it is plainly clear from Figures 1A and 1B of Bourque that the central/inflow axis of

Bourque's inflow subassembly is not axially aligned with the rotor. To show the required axial alignment, Petitioner appears to rely on an unidentified portion of Bourque's inflow subassembly, after the 90 degree bend, where Petitioner alleges "flow 'leav[es] the inflow conduit to enter the impeller.'" *Id.* We find on the current record Petitioner's arguments unconvincing.

As Patent Owner explains, "the rotor's axis in Bourque is perpendicular to the inflow tube," and "Bourque recognizes that this configuration, with the inflow tube perpendicular to the rotor, 'resulted in a sharp bend in the flow before it enters the impeller.'" Prelim. Resp. 42 (citing Ex. 1007, 402). We also agree with Patent Owner that the claim requires "that the inflow tube or inflow axis of the inflow tube is aligned with the rotor—not the flow." *Id.* at 43. We further agree with Patent Owner that Petitioner's annotation of fluid flow with red arrows showing a 90 degree turn in Figure 1B of Bourque does not appear likely to reflect reality. As Patent Owner explains, it is known that "the blood does not make a 90 degree turn as illustrated by Petitioner," because "Petitioner published a computational fluid dynamics analysis of the HeartMate III pump (including Mr. Bourque as an author), showing that the flow is not so simple." *Id.* at 44–45 (citing Ex. 2005, 874, 878, Fig. 6).

In sum, on the current record we agree with Patent Owner that Petitioner fails to sufficiently show that Bourque, alone, teaches a rotor "axially aligned" with the inflow tube or the "inflow axis" of the inflow tube, as required by claims 1 and 21. Petitioner, however, alternatively relies on Wampler as teaching a rotor "axially aligned" with an inflow tube and the "inflow axis" of the inflow tube, which we turn to next.

Petitioner provides an annotated version of Figure 5 of Wampler, reproduced below.

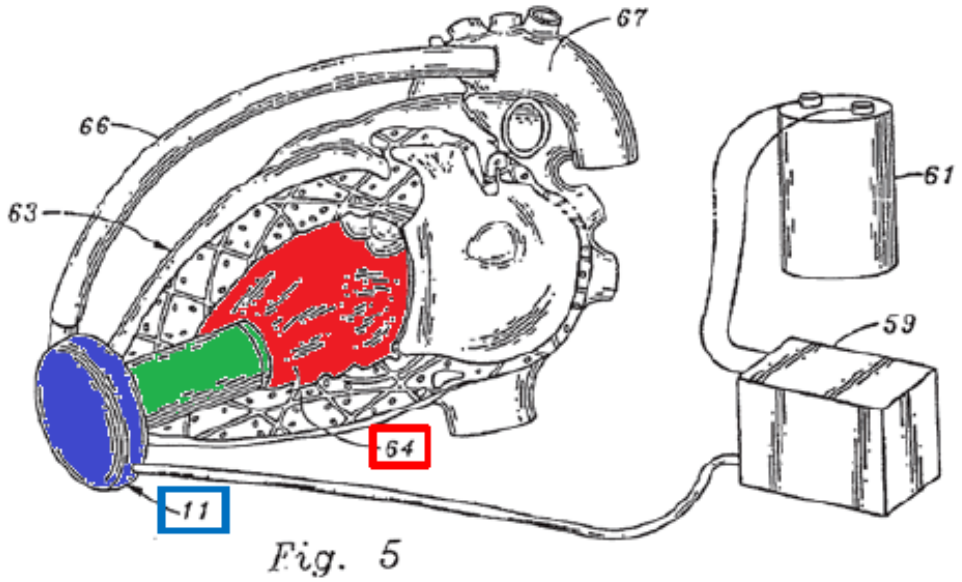


Fig. 5

Pet. 57. Petitioner's annotated Figure 5 of Wampler illustrates inlet tube 13 (colored green) extending from the apex of the left ventricle 64 of the heart (colored red) into pump 11 (colored blue), with the rotor of the pump along the same axis as the inlet tube. *See id.* Patent Owner does not dispute Petitioner's contention that the inflow tube and the "inflow axis" of the inflow tube are axially aligned with the rotor taught by Wampler. We find Petitioner sufficiently shows, on the current record, how Wampler teaches a rotor "axially aligned" with the inflow tube and the "inflow axis" of the inflow tube, as required by claims 1 and 21.

Patent Owner does not otherwise dispute that the asserted combination of Bourque and Wampler teaches or suggests each of the limitations of claims 1 and 21. *See generally* Prelim. Resp. Accordingly, based on the current record, we find Petitioner has sufficiently shown how the subject matter of claims 1 and 21 were taught or suggested by the asserted combination of Bourque and Wampler.

2. Dependent Claims 2–4, 10, 11, 14, 15, 17, 22, 24, 26, 28–30, 32, 33, and 35

Petitioner contends that Bourque teaches each additional limitation of dependent claims 2–4, 10, 11, 14, 15, 17, 22, 24, 26, 28–30, 32, 33, and 35. Pet. 74–82. At this stage of the proceeding, Patent Owner does not dispute Petitioner's contentions with respect to claims 2–4, 10, 11, 14, 15, 17, 22, 24, 26, 28–30, 32, 33, and 35, apart from relying on its arguments contesting the alleged obviousness of claims 1 and 21. *See generally* Prelim. Resp.; *see also id*. at 36 (asserting that, "[b]ecause claims 2–4, 10, 11, 14, 15, 17, 22, 24, 26, 28–30, 32, 33, and 35 depend from claim 1 or claim 21 and recite additional features, Petitioner also necessarily fails to show a reasonable likelihood that these dependent claims are unpatentable"). For the reasons explained above in our analysis of claims 1 and 21, and based on our review and consideration of Petitioner's arguments and evidence directed to claims 2–4, 10, 11, 14, 15, 17, 22, 24, 26, 28–30, 32, 33, and 35, on the current record before us, we find that Petitioner has shown sufficiently for purposes of institution how it contends Bourque, in combination with Wampler, teaches or suggests the subject matter of claims 2–4, 10, 11, 14, 15, 17, 22, 24, 26, 28–30, 32, 33, and 35.

3. Rationale in Support of Asserted Combination

Petitioner offers several reasons a person of ordinary skill in the art would have found it obvious to include Wampler's "techniques related to its *axially aligned inflow tube*" in the HeartMateIII device taught by Bourque. Pet. 82–90. Petitioner argues that Wampler teaches an arrangement for which "[g]ood anatomic compatibility is possible…fitting well between the apex of the heart and the adjacent diaphragm." Pet. 84 (quoting Ex. 1008

¶ 76). Petitioner reasons that applying Wampler's arrangement to Bourque combines old elements performing known functions yielding expected results. *Id.* at 85. According to Petitioner, a person of ordinary skill in the art would have known from Wampler that an axial inflow, as taught by Wampler, would have improved blood flow for the device of Bourque by eliminating the flow restrictive elbow in Bourque. *Id.* (citing Ex. 1003 ¶¶ 746–747; Ex. 1007, 402; Ex. 1008 ¶¶ 75–76). Petitioner contends that Bourque recognized certain components, including inflow components, were the cause of clinical troubles, and that Wampler "taught how to eliminate these components that caused clinical troubles–using the inlet to also 'serve[] as the inflow canula.'" *Id.* at 85–86 (citing Ex. 1003 ¶¶ 741–747; Ex. 1007, 401, 405; Ex. 1008 ¶¶ 75–76).

Petitioner also argues that a person of ordinary skill in the art would have understood Wampler's arrangement would have reduced "rates of infection" by avoiding placement of the pump in a preperitoneal pocket position, as taught by Bourque. *Id.* at 86–89. According to Petitioner, a person of ordinary skill in the art "would have adhered to the express teachings of [Wampler], which focused on '[g]ood anatomic compatibility' so that the device 'fit[s] well between the apex of the heart and the adjacent diaphragm,' eliminating the need for a peritoneal pocket dissection associated with increased rates of infection." *Id.* at 88–89 (citing Ex.1003 ¶¶ 749–752; Ex.1008 ¶ 76). Petitioner reasons that a person of ordinary skill in the art would have had a reasonable expectation of success because the asserted combination of Bourque and Wampler "would 'fit[] well between the apex of the heart and the adjacent diaphragm' due to the pump's 'development as a compact' device and the existence of several similar LVADs that fit well at that position." *Id.* at 89 (citing Ex. 1003 ¶¶ 750–753;

Ex. 1007, 405). Lastly, Petitioner argues the asserted combination would have been obvious to try, because "there were a finite number (i.e., two) options for LVAD implantation: the device would be implanted at a preperitoneal pocket, or at the cardiac apex." *Id.* at 89 (citing Ex.1003 ¶ 754).

Patent Owner argues that Petitioner's rationale for the asserted combination is insufficient because: (1) Petitioner ignores the "reasons, stated expressly in Bourque, for keeping the HeartMate III pump where it is, instead of moving it as required by the proposed combination," and (2) "the Bourque pump is too big to fit" in the position taught by Wampler that Petitioner relies upon. Prelim. Resp. 46–51. Patent Owner's arguments are unsupported by expert testimony.

As to the first argument, Patent Owner directs us to portions of Bourque that state the pump is placed in the "least obtrusive position," uses a "sharp bend" in the inflow to allow for placement in that location, and provides "freedom of movement" to reduce "potential tissue trauma." *Id.* at 46–48 (citing Ex. 1007, 402, 405; Ex. 2004, 387; Ex. 2006, 310, 311). At this stage of the proceeding, the evidence discussed by Patent Owner suggests that the named inventor of Bourque may have believed that the placement of the pump of Bourque provided certain benefits. It does not, however, address, for example, whether those benefits would have been lost in the asserted combination or whether a person of ordinary skill in the art would have understood the benefits of the asserted combination outweighed any detriments. Patent Owner's attorney arguments are not convincing on the current record.

For similar reasons, Patent Owner's bodily incorporation argument that Bourque's pump would not fit in the location of Wampler is not

convincing on the current record. Patent Owner argues that Wampler's pump fits between the apex of the heart and the adjacent diaphragm because "the pump casing is compact and disk-shaped." *Id.* at 49 (quoting Ex. 1008 ¶ 76). Patent Owner then makes the unsupported, conclusory assertion that "Bourque does not have such a compact disc," and that due to "the size of its 'motor compartment,'" Bourque's pump "will not fit well between the apex of the heart and the adjacent diaphragm." *Id.* at 49–50. Further, according to Patent Owner, "Petitioner has admitted that significant, patentable, engineering changes needed to be made in order to reduce the size of HeartMate III so that it would fit in the way that Wampler does." *Id.* at 49–51 (citing Ex. 2007, 5–6; Ex. 2008, 375; Ex. 2009; Ex. 2010, 5).

We have considered the evidence identified by Patent Owner and find Patent Owner's characterization of that evidence as an "admission" is not supported. For example, relying on a later patent to show that it included "inventive activity to redesign the pump to be small enough to work," is not an admission by Petitioner "that significant, patentable, engineering changes needed to be made in order to reduce the size of HeartMate III so that it would fit in the way that Wampler does." *See id.* In sum, the arguments raised by Patent Owner, based in part on attorney argument and mischaracterized evidence, does not convince us that Petitioner's rationale supporting the asserted combination is insufficient for purposes of institution.

4. Determination as to a Reasonable Likelihood of Prevailing

Upon consideration of the arguments and evidence of record, we conclude, for the reasons provided above, that the information presented in the Petition demonstrates a reasonable likelihood that Petitioner would prevail in showing the unpatentability of claims 1–4, 10, 11, 14, 15, 17, 21,

22, 24, 26, 28–30, 32, 33, and 35 of the '517 patent as obvious over Bourque and Wampler.

H. Alleged Obviousness over Akamatsu

Petitioner contends that the subject matter of claims 1–4, 10, 11, 14, 15, 17, 21, 22, 24, 26, 28–30, 32, 33, and 35 of the '517 patent would have been obvious over Akamatsu. Pet. 90–116. Petitioner relies on the testimony of Mr. Crosby in support of its contentions. Ex. 1003 ¶¶ 756–1041. In opposition, Patent Owner argues, among other things, that Petitioner fails to show how Akamatsu teaches "a magnetically driven rotor . . . *axially adjacent* to a first magnetic device," as required by claims 1 and 11. Prelim. Resp. 55–57 (emphasis added).

As explained above (*supra* Section III.E.3), for purposes of this Decision we find "axially adjacent" to mean "adjacent to one another as measured along a central axis." Petitioner does not contend or show that Akamatsu teaches a magnetically driven rotor adjacent to a first magnetic device as measured along a central axis. *See* Pet. 98.

Petitioner provides an annotated version of Figure 2 of Akamatsu, reproduced below.

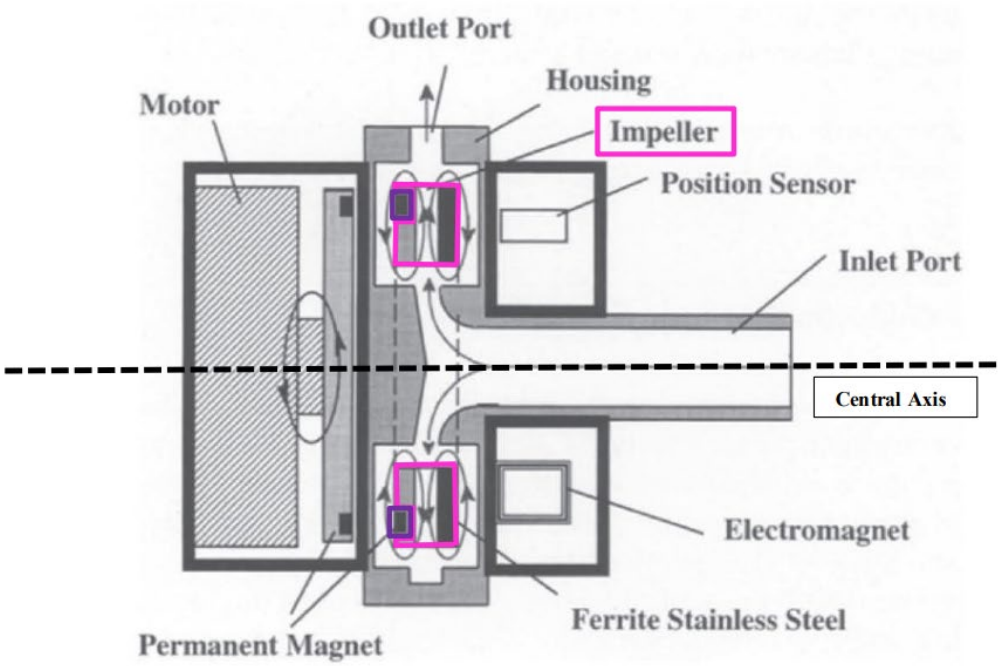


Fig. 2. Schematic cross section of the MSCP

Pet. 98. Petitioner's annotated version of Figure 2 of Akamatsu shows a schematic cross section of a MSCP, identifies the impeller (outlined in pink) and the impeller's "[p]ermanent [m]agnet" (outlined in purple). *Id.* Petitioner offers no explanation of its contention other than a conclusory assertion that "the 'impeller' is 'axially adjacent to' to the impeller's '[p]ermanent [m]agnet'" *Id.* (emphases omitted). We understand Petitioner to be arguing that "a magnetic element sealed within a rotor" is "axially adjacent" to the magnetically driven rotor, which we find unconvincing, as explained above. *See supra* Section III.E.3.

In opposition, Patent Owner argues, and we agree on the current record, that Akamatsu does not "teach or suggest a magnetically driven rotor . . . axially adjacent to a first magnetic device based on the positioning of its permanent magnets and impeller because these components are not

adjacent to one another as measured along the central axis of the device," and that "[i]nstead, the permanent magnets and impeller are aligned with, and overlap, one another as measured along the central or inflow axis [in Akamatsu's] configuration." Prelim. Resp. 57 (citing Ex. 1006, Fig. 2); *see also id.* at 56 (explaining that "Petitioner's marked up figure . . . highlights that the permanent magnet appears to be embedded within the impeller in an arrangement that axially aligns the two components rather than places them into an axially adjacent relation."). Because we find Patent Owner's arguments refuting Petitioner's contention that the Challenged Claims would have been obvious over Akamatsu, alone, have substantial merit, we turn to Petitioner's contentions based on Akamatsu in combination with Schima, which rely instead on Schima as teaching the "axially adjacent" limitation.

I. Alleged Obviousness over Schima and Akamatsu

Petitioner contends that the subject matter of claims 1–4, 10, 11, 14, 15, 17, 21, 22, 24, 26, 28–30, 32, 33, and 35 of the '517 patent would have been obvious over the combination of Schima and Akamatsu. Pet. 116–144. Petitioner relies on the testimony of Mr. Crosby in support of its contentions. Ex. 1003 ¶¶ 1042–1333.

1. Independent Claim 1[11]

Petitioner argues that Schima discloses "a rotary pump for moving blood" that is "deliver[ed] . . . to the heart." Pet. 116–118 (emphasis omitted). Petitioner relies on Schima as teaching or suggesting the features of the pump of claim 1, including, for example, that Schima's pump "has 'inlet 13' ['an inflow tube defining a blood inflow path along an inflow axis']," a "rotor 1" that "holds rotor magnets 6 that preferably transfer

[11] Petitioner provides similar arguments for claim 21. *See* Pet. 132–133.

rotation energy" ("magnetically driven rotor"), a first magnetic device "rotor magnets 6" and "the magnetically driven rotor ('rotor 1') 'being rigidly coupled and axially adjacent to a first magnetic device ('rotor magnets 6') that is axially aligned with the inflow axis.'" *Id.* at 116–128 (citing Ex. 1005 ¶ 12, Fig. 2) (emphasis omitted). Petitioner argues that inlet 13 of Schima's pump corresponds to an inflow tube with a suction end "insertable into a left ventricle [of the heart]." *Id.* at 118. According to Petitioner, a person of ordinary skill in the art would have had reason to "implant [Schima's] pump" in the configuration described by Akamatsu "because the teachings are complimentary," and "would have been motivated to use [Schima's] advantageous pump design while using [Akamatsu's] teachings as to pump control (regulating operation via external controller) and implantation (inserted into the left ventricle)." *Id.* at 146 (citing Ex. 1003 ¶¶ 1342, 1344, 1353).

Petitioner concedes Schima "does not expressly disclose" an "external control unit . . . to regulate operation," as required by claim 1. Pet. 136; *see also id.* at 137–138. Petitioner relies on Akamatsu as teaching the recited control unit. *Id.* (citing Ex. 1006, Fig. 1). According to Petitioner, a person of ordinary skill in that art "would have had a reasonable expectation of success that [Schima's] pump would be controlled and implanted according to [Akamatsu's] teachings" because "[e]xternal controllers were commonly employed to regulate operation of LVADs" and "LVADs were routinely delivered to the heart with a suction end inserted into the left ventricle." *Id.* at 146 (citing Ex. 1003 ¶¶ 1343, 1353–1354; Ex. 1008 ¶¶ 72, 75; Ex. 1007 401–403; Ex. 1006, 4).

In opposition, Patent Owner argues that Schima is deficient because it is "silent regarding placement of its disclosed pump and includes no

disclosure regarding delivery of its disclosed pump to a heart." Prelim. Resp. 68. However, neither claim 1 nor claim 21 require placement in a body or actual delivery of the device to the heart. In fact, claims 1 and 21 merely require "a system" that includes a device "deliverable to the heart" and an inflow tube "insertable" into a ventricle/left ventricle of the heart Similarly, Patent Owner's argument that "[t]here is simply no teaching or suggestions in Schima that it would have even been possible to implant its disclosed pump within the body" is misplaced. *Id.* at 69–70. Nor does Petitioner need to show that Schima's inlet tube was "designed to be . . . inserted into a ventricle of the heart," as Patent Owner suggests. *Id.* at 70. The relevant issue is whether a person of ordinary skill would have known that the apparatus disclosed by Schima would have been "deliverable to the heart" and that Schima's inflow tube would have been "insertable into a ventricle of the heart." Accordingly, Patent Owner's arguments appear on the current record to be outside the scope of claims 1 and 21.

Patent Owner also argues "it is simply not clear from Akamatsu that the reference discloses delivering its pump to a heart such that an inflow tube is inserted into a ventricle of the heart." Prelim. Resp. 71. Patent Owner, however, only provides attorney argument purporting to explain how a person of ordinary skill in the art would have understood what is shown, for example, in Figure 1 of Akamatsu. Moreover, Patent Owner's arguments, as explained above, appear on the current record to be outside the scope of claims 1 and 21.

Patent Owner also argues that neither reference teaches or suggests limitations [1M] and [21L], which relate to the recited external control unit. *Id.* at 72–74. For example, Patent Owner argues that Petitioner "should not be allowed" to rely on Figure 1 of Akamatsu because it is "a low-resolution

conceptual illustration of a potential 'future' system." *Id.* at 73. Patent Owner's argument lacks evidence of how a person of ordinary skill in the art would have understood the teachings of Akamatsu. By contrast, Mr. Crosby supports Petitioner's contention and offers an explanation for why a person of ordinary skill in the art would have understood Akamatsu to disclose an external controller. *See* Ex. 1003 ¶¶ 1131–1133.

Having already found for the reasons above that Petitioner has shown a reasonable likelihood of prevailing in showing the Challenged Claims would have been obvious over the combination of Bourque and Wampler, we find a detailed analysis of alleged obviousness over Schima and Akamatsu is not necessary at this stage of the proceeding. *PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (stating that the decision whether to institute *inter partes* review requires "a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition").

2. Dependent Claims 2–4, 10, 11, 14, 15, 17, 22, 24, 26, 28–30, 32, 33, and 35

Petitioner contends that the combination of Schima and Akamatsu teaches or suggests each limitation of claims 2–4, 10, 11, 14, 15, 17, 22, 24, 26, 28–30, 32, 33, and 35. Pet. 138–144. At this stage of the proceeding, Patent Owner does not dispute Petitioner's contentions with respect to claims 2–4, 10, 11, 14, 15, 17, 22, 24, 26, 28–30, 32, 33, and 35 apart from relying on the arguments contesting the assertions for claims 1 and 21. *See* Prelim. Resp. 63 (asserting that, "[b]ecause claims 2–4, 10, 11, 14, 15, 17, 22, 24, 26, 28–30, 32, 33, and 35 depend from either claim 1 or claim 21 and recite additional features, Petitioner also necessarily fails to show a reasonable likelihood that these claims are unpatentable").

IV. CONCLUSION

For the foregoing reasons, we determine that Petitioner demonstrates a reasonable likelihood of prevailing with respect to at least one of the claims challenged in the Petition. Accordingly, *inter partes* review of claims 1–4, 10, 11, 14, 15, 17, 21, 22, 24, 26, 28–30, 32, 33, and 35 of the '517 patent shall proceed in this case on all of the grounds raised in the Petition. *See SAS Inst, Inc. v. Iancu*, 584 U.S. 357, 371 (2018) (holding that a decision to institute under 35 U.S.C. § 314 may not institute on fewer than all claims challenged in the petition); *PGS Geophysical*, 891 F.3d at 1360 (stating that the decision whether to institute *inter partes* review requires "a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition").

Our determination in this Decision is not a final determination on either the patentability of any Challenged Claims or the construction of any claim term. The factual findings set forth in this Decision are preliminary and provided for the sole purpose of deciding whether to institute a review. Any final findings will be based on the full trial record, including any information presented by Patent Owner in a timely filed response to the Petition. *See TriVascular, Inc. v. Samuels*, 812 F.3d 1056, 1068 (Fed. Cir. 2016) (noting that "there is a significant difference between a petitioner's burden to establish a 'reasonable likelihood of success' at institution, and actually proving invalidity by a preponderance of the evidence at trial") (quoting 35 U.S.C. § 314(a) and comparing *id.* with § 316(e)).

V. ORDER

Upon consideration of the record before us, it is:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–4, 10, 11, 14, 15, 17, 21, 22, 24, 26, 28–30, 32, 33, and 35 of U.S. Patent No. 11,674,517 B2 is instituted with respect to all grounds set forth in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4(b), *inter partes* review of U.S. Patent No. 11,674,517 B2 shall commence on the entry date of this Order, and notice is hereby given of the institution of a trial.

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