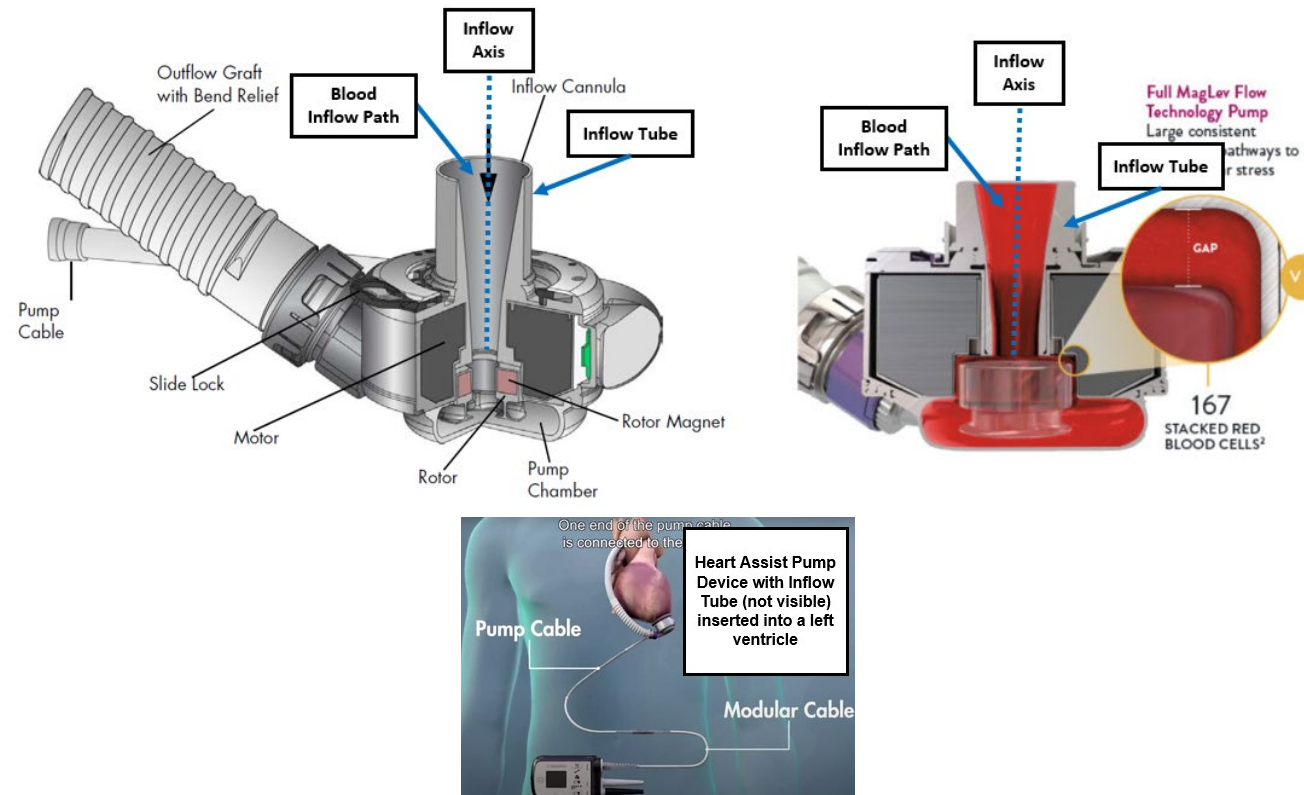


U.S. Patent No. 11,572,879 Claim	Abbott's Accused Products
<p>11. A system for assisting blood circulation of a heart, the system comprising:</p>	<p>HeartMate 3 is a system for assisting the blood circulation of a heart, as recited by claim 11.</p> <p>As shown in the images below from Abbott's documentation for the HeartMate 3 products, the HeartMate 3 is configured such that when implanted and assembled, it "assumes some or all of the workload of the left ventricle" to assist the heart in circulating blood.</p> <div data-bbox="994 435 1807 737" data-label="Complex-Block"> <p>Overview</p> <p>The HeartMate 3™ Left Ventricular Assist System (LVAS) is a set of equipment and materials that together comprise a medical device designed to provide therapeutic benefit to those affected with advanced heart failure. In service, the LVAS assumes some or all of the workload of the left ventricle, thereby restoring the patient's systemic perfusion while palliating the underlying pathology. The LVAS features a Left Ventricular Assist Device (LVAD), a blood pump intended for long-term implantation in such patients, an extracorporeal Controller, plus all of the features, controls, attachments, interfaces, power sources, supporting equipment, labeling, and tools required to achieve the desired therapeutic benefit. The HeartMate 3 Left Ventricular Assist System is intended for use inside or outside the hospital, or for transportation of LVAD patients via ground ambulance, airplane, or helicopter.</p> </div> <div data-bbox="1258 762 1541 1158" data-label="Image"> </div> <p>Exemplary Source: Abbott, Heartmate 3™ Left Ventricular Assist System Instructions for Use (Document ARTEN600200959 A, 2022-5 produced at, e.g., ABT-MIR-00007556-8187) at ABT-MIR-00007567.</p> <p><i>See also</i> the evidence and analysis for claim 1 above and the claim elements discussed below.</p>

U.S. Patent No. 11,572,879 Claim	Abbott's Accused Products
<p>a heart assist pump device deliverable to the heart and comprising:</p>	<p>The HeartMate 3 include a heart assist pump device deliverable to the heart.</p> <p>For example, the HeartMate 3 products include a Left Ventricular Assist Device (LVAD), a heart assist pump device configured to be delivered to a patient's heart, as shown in the image below:</p> <div data-bbox="1137 403 1659 711" data-label="Image"> </div> <p>Exemplary Source: Video titled “HeartMate 3 LVAD Patient Education Program – (2) System Overview,” available at https://www.youtube.com/watch?v=hmmpIKzmKe0.</p> <p><i>See also</i> the evidence and analysis for the Preamble above and the other claim elements discussed herein.</p>
<p>an inflow tube defining a blood inflow path along an inflow axis and being insertable into a left ventricle;</p>	<p>The HeartMate 3 includes a heart assist pump device deliverable to the heart that comprises an inflow tube, which Abbott calls the “Inflow Cannula,” defining a blood inflow path along an inflow axis and being insertable into a left ventricle, as shown in the images below.</p>

U.S. Patent No. 11,572,879 Claim

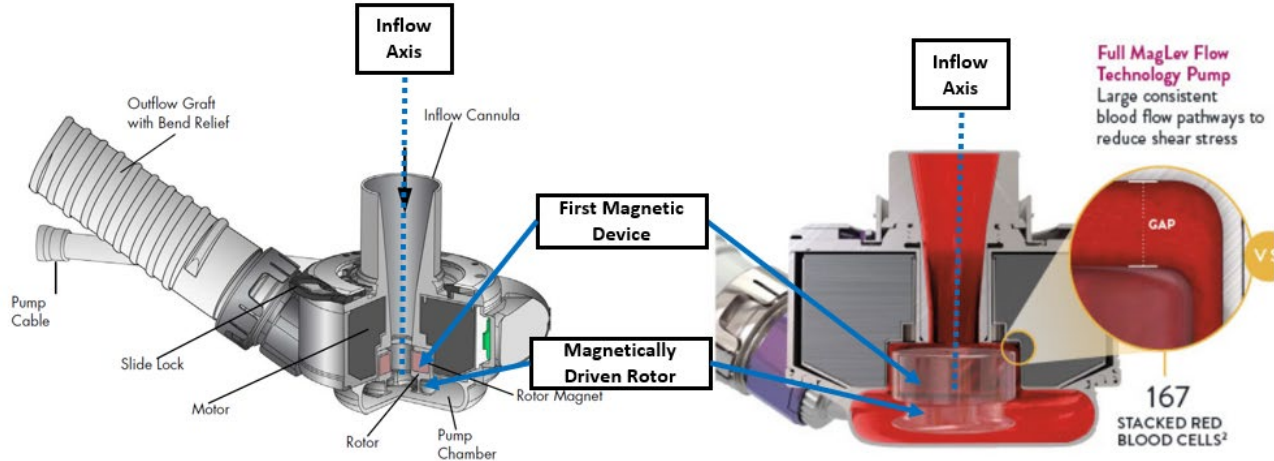
Abbott's Accused Products



Exemplary Sources: Video titled “HeartMate 3 LVAD Patient Education Program – (2) System Overview,” available at <https://www.youtube.com/watch?v=hmmmpIKzmKe0>; HeartMate 3 Website at <https://www.cardiovascular.abbott/us/en/hcp/products/heart-failure/left-ventricular-assist-devices/heartmate-3/about.html>; Abbott, Heartmate 3™ Left Ventricular Assist System Instructions for Use (Document ARTEN600200959 A, 2022-5 produced at, e.g., ABT-MIR-00007556-8187) at ABT-MIR-00007568.

See also the evidence and analysis for the Preamble above and the other claim elements discussed herein.

U.S. Patent No. 11,572,879 Claim	Abbott's Accused Products
<p>one or more walls at least partially defining a chamber to receive blood from the inflow tube;</p>	<p>The HeartMate 3 includes a heart assist pump device deliverable to the heart that comprises one or more walls at least partially defining a chamber to receive blood from the inflow tube.</p> <p>For example, Abbott's HeartMate 3 pump includes walls around the magnetically driven rotor that at least partially define a chamber that receives blood from the inflow tube, which Abbott calls the Inflow Cannula, as shown in the image below.</p> <div data-bbox="1068 505 1727 1015" data-label="Image"> <p>The diagram illustrates the internal structure of the HeartMate 3 pump. A red inflow tube is shown entering the pump from the top, with a label 'Inflow Tube' and an arrow pointing to it. A vertical dashed line indicates the 'Inflow Axis'. The pump housing is shown in cross-section, revealing a central rotor and a chamber defined by one or more walls. A label 'One or More Walls at least partially defining a Chamber' points to this chamber. A circular inset provides a magnified view of the chamber, showing a 'GAP' and '167 STACKED RED BLOOD CELLS'. A text box next to the inset reads 'Full MagLev Flow Technology Pump Large consistent blood flow pathways to reduce shear stress'.</p> </div> <p>Exemplary Source: HeartMate 3 Website at https://www.cardiovascular.abbott/us/en/hcp/products/heart-failure/left-ventricular-assist-devices/heartmate-3/about.html.</p> <p><i>See also</i> the evidence and analysis for the Preamble above and the other claim elements discussed herein.</p>

U.S. Patent No. 11,572,879 Claim	Abbott's Accused Products
<p>a magnetically driven rotor axially aligned with the inflow axis and being rigidly coupled and axially adjacent to a first magnetic device that is axially aligned with the inflow axis,</p>	<p>The HeartMate 3 includes a heart assist pump device deliverable to the heart that comprises a magnetically driven rotor axially aligned with the inflow axis and being rigidly coupled and axially adjacent to a first magnetic device that is axially aligned with the inflow axis.</p> <p>For example, as shown in the exemplary annotated images below, the HeartMate 3 pump comprises a magnetically driven rotor having a central axis that is aligned with the inflow axis. Further, the HeartMate 3 comprises a first magnetic device, axially aligned with the inflow axis, and rigidly coupled to and axially adjacent to the rotor.</p>  <p>Exemplary Sources: HeartMate 3 Website at https://www.cardiovascular.abbott/us/en/hcp/products/heart-failure/left-ventricular-assist-devices/heartmate-3/about.html; Abbott, Heartmate 3™ Left Ventricular Assist System Instructions for Use (Document ARTEN600200959 A, 2022-5 produced at, e.g., ABT-MIR-00007556-8187) at ABT-MIR-00007568.</p> <p><i>See also</i> the evidence and analysis for the Preamble above and the other claim elements discussed herein.</p>

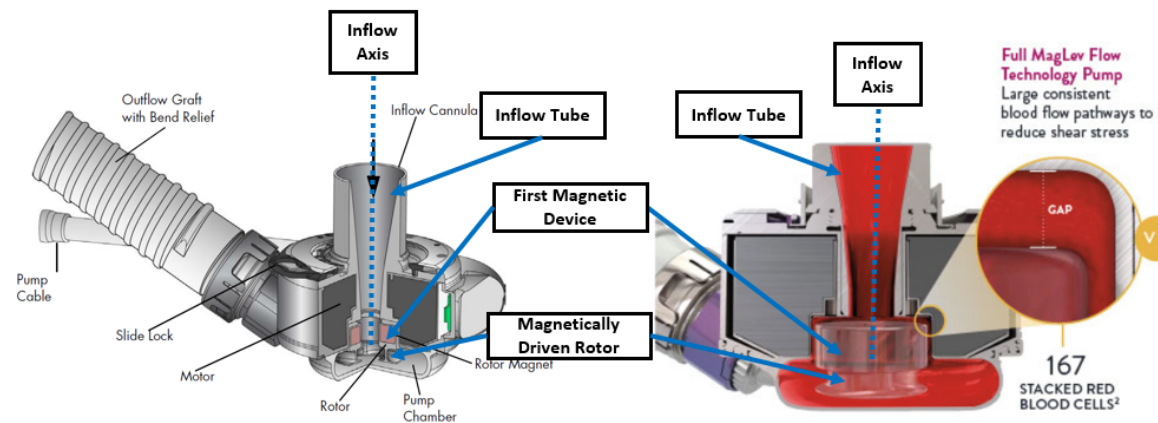
U.S. Patent No. 11,572,879 Claim

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;

Abbott's Accused Products

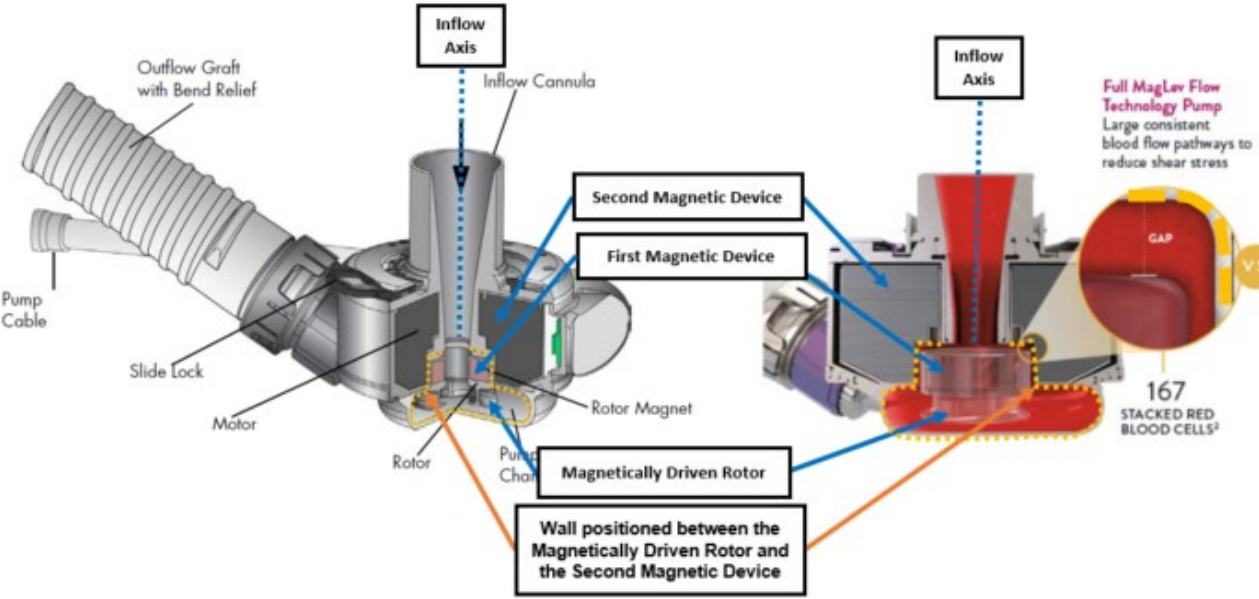
In the HeartMate 3, both the magnetically driven rotor and the first magnetic device are rotatable about an axis of rotation aligned with the inflow axis to drive the blood flowing from the inflow tube;

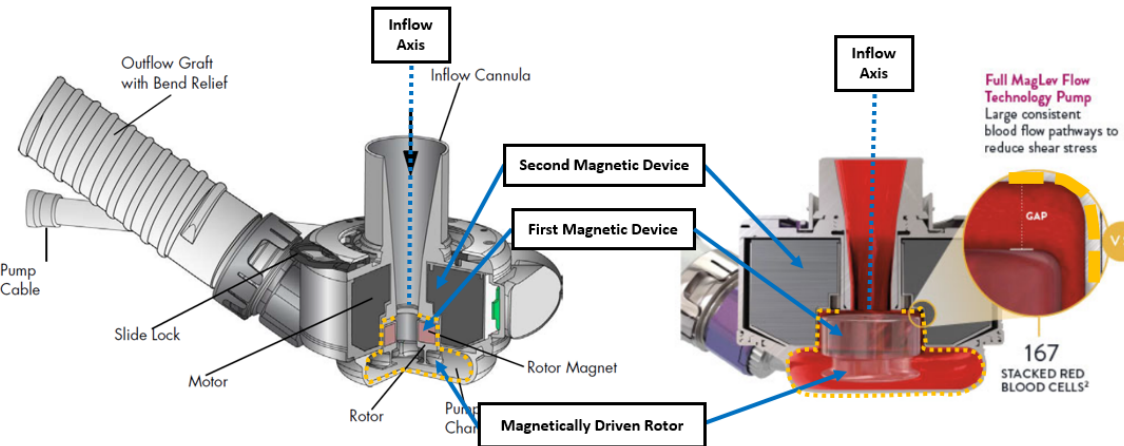
For example, the rotor and the first magnetic device are rotatable within the HeartMate 3 to act upon blood flowing from the inflow tube, which Abbott calls the Inflow Cannula, toward the rotor. The magnetically driven rotor, first magnetic device, inflow tube, inflow axis (aligned with the axis of rotation of the rotor and first magnetic device), and chamber are shown in the annotated images below.



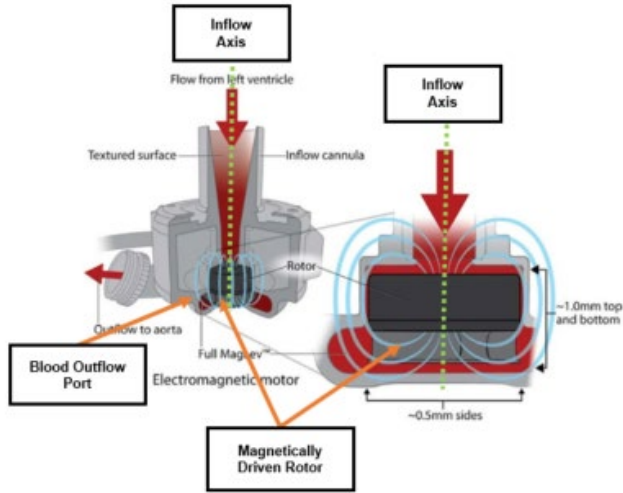
Exemplary Sources: HeartMate 3 Website at <https://www.cardiovascular.abbott/us/en/hcp/products/heart-failure/left-ventricular-assist-devices/heartmate-3/about.html>; Abbott, Heartmate 3™ Left Ventricular Assist System Instructions for Use (Document ARTEN600200959 A, 2022-5 produced at, e.g., ABT-MIR-00007556-8187) at ABT-MIR-00007568.

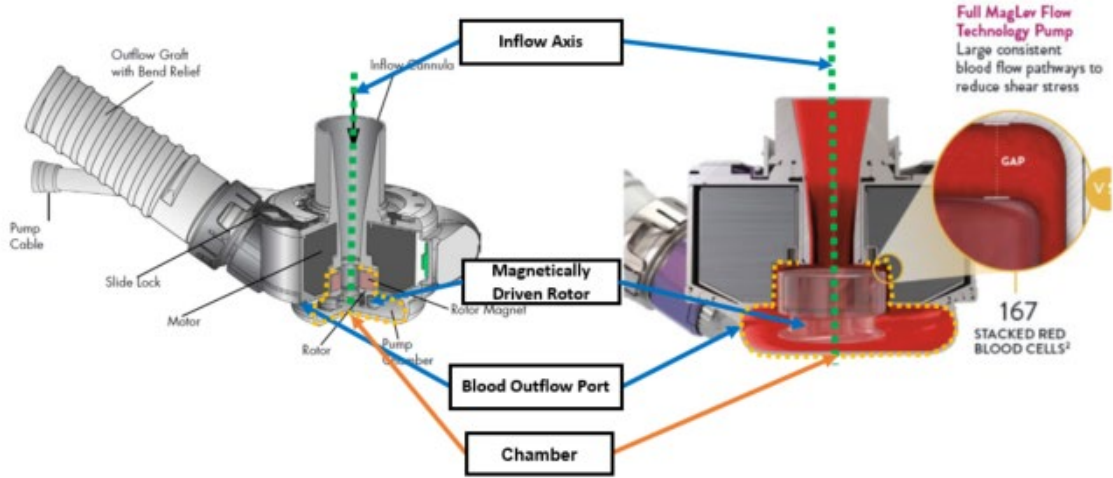
See also the evidence and analysis for the Preamble above and the other claim elements discussed herein.

U.S. Patent No. 11,572,879 Claim	Abbott's Accused Products
<p>a magnetic drive system comprising a second magnetic device axially aligned with the inflow axis 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,</p>	<p>The HeartMate 3 includes a heart assist pump device deliverable to the heart that comprises a magnetic drive system comprising a second magnetic device axially aligned with the inflow axis 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.</p> <p>For example, the HeartMate 3 pump includes a magnetic drive system that magnetically drives the magnetically driven rotor to rotate via a magneto coupling with the first magnetic device, and which includes a second magnetic device that Abbot calls a Motor, Stator, and/or MagLev Flow technology. This second magnetic device is axially aligned with the inflow axis. Further, the second magnetic device is spaced apart from the magnetically driven rotor by one or more walls of the chamber, the one or more walls being positioned between the magnetically driven rotor and second magnetic device as shown in the annotated images below.</p>  <p>The diagrams illustrate the internal structure of the HeartMate 3 pump. The left diagram shows the external components: Outflow Graft with Bend Relief, Pump Cable, Slide Lock, Motor, Rotor, and Pump Chamber. The right diagram shows the internal components: Inflow Axis, Inflow Cannula, Second Magnetic Device, First Magnetic Device, Rotor Magnet, Magnetically Driven Rotor, and a Wall positioned between the Magnetically Driven Rotor and the Second Magnetic Device. A callout for the 'Full MagLev Flow Technology Pump' highlights 'Large consistent blood flow pathways to reduce shear stress' and shows '167 STACKED RED BLOOD CELLS' passing through a 'GAP'.</p> <p>Exemplary Sources: HeartMate 3 Website at https://www.cardiovascular.abbott/us/en/hcp/products/heart-failure/left-ventricular-assist-devices/heartmate-3/about.html; Abbott, Heartmate 3™ Left Ventricular Assist</p>

U.S. Patent No. 11,572,879 Claim	Abbott's Accused Products
	<p>System Instructions for Use (Document ARTEN600200959 A, 2022-5 produced at, e.g., ABT-MIR-00007556-8187) at ABT-MIR-00007568; Video titled "Abbott's HeartMate 3™ LVAD" at https://youtu.be/1hcw9114DrY?si=GjOWVzmOQlhmTcGq; video titled “Abbott’s HeartMate 3 LVAD” at https://youtu.be/IbHN8e_OGJw?si=zNGPCWWTqjc9q7Xn.</p> <p><i>See also</i> the evidence and analysis for the Preamble above and the other claim elements discussed herein.</p>
<p>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 relative to the one or more walls via a magneto coupling with the first magnetic device; and</p>	<p>In the HeartMate 3, the second magnetic device is 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 relative to the one or more walls via a magneto coupling with the first magnetic device.</p> <p>For example, the HeartMate 3 includes a second magnetic device which Abbot calls a Motor, Stator, and/or MagLev Flow technology. This second magnetic device is positioned to magnetically drive the magnetically driven rotor to rotate relative to the one or more walls via a magneto coupling with the first magnetic device. Further, the second magnetic device is positioned axially closer to the first magnetic device than to the rotor, as shown in the images below.</p> 

U.S. Patent No. 11,572,879 Claim	Abbott's Accused Products
	<div data-bbox="1048 256 1760 644" data-label="Image"> </div> <div data-bbox="806 703 1991 999" data-label="Text"> <p>The Rotor is fully supported by magnetic levitation, obviating mechanical or fluid bearings and essentially eliminating Rotor mechanical wear as a reliability factor. Both drive (i.e. rotation) and levitation of the Rotor is accomplished using a single Stator comprising iron pole pieces, a back-iron, copper coils, and position sensors. By measuring the position of a permanent magnet in the Rotor and appropriately controlling the current in the drive and levitation coils, the radial position and rotational speed of the Rotor is actively controlled. Because of the permanent magnet's attraction to the iron pole pieces, the rotor passively resists excursion in the axial direction, whether such excursion is translation or tilting.</p> </div> <p data-bbox="674 1015 2114 1270">Exemplary Sources: HeartMate 3 Website at https://www.cardiovascular.abbott/us/en/hcp/products/heart-failure/left-ventricular-assist-devices/heartmate-3/about.html; <i>see also</i> video titled “Abbott’s HeartMate 3 LVAD,” available at https://www.youtube.com/watch?app=desktop&v=IbHN8e_OGJw; Video titled "Abbott's HeartMate 3™ LVAD" at https://youtu.be/1hcw9114DrY?si=GjOWVzmOQlhmTcGq; video titled “Abbott’s HeartMate 3 LVAD” at https://youtu.be/IbHN8e_OGJw?si=zNGPCWWTqjc9q7Xn; Abbott, Heartmate 3™ Left Ventricular Assist System Instructions for Use (Document ARTEN600200959 A, 2022-5 produced at, e.g., ABT-MIR-00007556-8187) at ABT-MIR-00007568.</p> <p data-bbox="674 1302 2018 1337"><i>See also</i> the evidence and analysis for the Preamble above and the other claim elements discussed herein.</p>

U.S. Patent No. 11,572,879 Claim	Abbott's Accused Products
<p>a blood outflow port positioned such that the blood driven by the magnetically driven rotor exits the chamber in a direction substantially perpendicular to the inflow axis,</p>	<p>The Heartmate 3 includes a heart assist pump device deliverable to the heart comprising a blood outflow port positioned such that the blood driven by the magnetically driven rotor exits the chamber in a direction substantially perpendicular to the inflow axis,</p> <p>For example, the HeartMate 3 heart assist pump device includes a port for blood outflow to the aorta, as shown in the images below. This port is adjacent to the magnetically driven rotor, such that blood driven by the rotor exits the chamber housing through the port in a direction substantially perpendicular to the inflow axis of the inflow tube, which Abbott calls the Inflow Cannula.</p> 

U.S. Patent No. 11,572,879 Claim	Abbott's Accused Products
	 <p>Exemplary Source: Figure 1 from “HeartMate 3 in Lowest INTERMACS Profile Cohort: The Swiss Experience,” available at https://www.researchgate.net/publication/317276467_HeartMate_3_in_Lowest_INTERMACS_Profile_Cohort_The_Swiss_Experience; Abbott, Heartmate 3™ Left Ventricular Assist System Instructions for Use (Document ARTEN600200959 A, 2022-5 produced at, e.g., ABT-MIR-00007556-8187) at ABT-MIR-00007568; https://www.cardiovascular.abbott/us/en/hcp/products/heart-failure/left-ventricular-assist-devices/heartmate-3/about.html</p> <p><i>See also</i> the evidence and analysis for the Preamble above and the other claim elements discussed herein.</p>
<p>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</p>	<p>The Heartmate 3 includes a heart assist pump device deliverable to the heart 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;</p> <p>For example, the second magnetic device of the HeartMate 3 (which Abbott calls a Motor, Stator, and/or MagLev Flow Technology) is configured to orient the magnetically driven rotor in its housing via the magneto coupling between the second magnetic device and the first magnetic device. And in response to rotation of the</p>

U.S. Patent No. 11,572,879 Claim	Abbott's Accused Products
	<p>magnetically driven rotor, the second magnetic device orients the rotor via the magneto coupling so that it remains spaced apart from the one or more walls by the blood, as shown in the image below.</p> <div data-bbox="1093 379 1715 852"> </div> <p>Exemplary Sources: HeartMate 3 Website at https://www.cardiovascular.abbott/us/en/hcp/products/heart-failure/left-ventricular-assist-devices/heartmate-3/about.html; <i>see also</i> video titled “Abbott’s HeartMate 3 LVAD,” available at https://www.youtube.com/watch?app=desktop&v=IbHN8e_OGJw; vVideo titled "Abbott's HeartMate 3™ LVAD" at https://youtu.be/1hcw9114DrY?si=GjOWVzmOQlhmTcGq; video titled “Abbott’s HeartMate 3 LVAD” at https://youtu.be/IbHN8e_OGJw?si=zNGPCWWTqjc9q7Xn.</p> <p><i>See also</i> the evidence and analysis for the Preamble above and the other claim elements discussed herein.</p>

U.S. Patent No. 11,572,879 Claim	Abbott's Accused Products						
<p>an external control unit configured to control operation of the second magnetic device based on a fixed value to thereby magnetically drive the rotation of the magnetically driven rotor via the magneto coupling with the first magnetic device.</p>	<p>The HeartMate 3 comprises an external control unit configured to control operation of the second magnetic device based on a fixed value to thereby magnetically drive the rotation of the magnetically driven rotor via the magneto coupling with the first magnetic device.</p> <p>For example, Abbott's HeartMate 3 includes an external control unit, which Abbott calls the System Controller. This external control unit is configured to be connected to the heart assist pump device. The external control unit is also configured to control the operation of the second magnetic device, which Abbott calls the Motor, Stator, or MagLev Flow technology, to magnetically drive the rotation of the magnetically driven rotor via the magneto coupling with the first magnetic device, as explained above.</p> <div data-bbox="1151 600 1650 965" data-label="Image"> <p>The diagram illustrates the HeartMate 3 system. A heart is shown with a pump cable connected to it. The pump cable is connected to a heart assist pump device. The heart assist pump device is connected via a modular cable to an external control unit. The external control unit is shown as a small device with a screen and buttons.</p> </div> <div data-bbox="714 994 1426 1176" data-label="Table"> <table> <tr> <th data-bbox="719 997 1227 1021">ITEM</th><th data-bbox="1227 997 1422 1021">CATALOG NUMBER</th></tr> <tr> <td data-bbox="719 1021 1227 1173"> <p>HeartMate 3™ System Controller Supplied sterile. A small computer that controls and monitors system operation. Uses lights, sounds, and on-screen messages to communicate with users about operating status and alarm conditions. Includes 11 Volt Lithium-Ion System Controller Backup Battery. Includes Patient Handbook.</p> </td><td data-bbox="1227 1021 1422 1173"> <p>106531US</p> </td></tr> </table> </div> <div data-bbox="1451 994 2085 1176" data-label="Table"> <table> <tr> <td data-bbox="1456 997 1680 1173"> <p>System Controller</p>  </td><td data-bbox="1680 997 2080 1173"> <p>The System Controller is a small computer that controls and monitors system operation. The System Controller uses lights, sounds, and on-screen messages to communicate with users about operating status and alarm conditions. A Driveline, which passes through the patient's abdomen, connects the implanted pump to the System Controller.</p> <p>For more information, see page 2-8.</p> </td></tr> </table> </div>	ITEM	CATALOG NUMBER	<p>HeartMate 3™ System Controller Supplied sterile. A small computer that controls and monitors system operation. Uses lights, sounds, and on-screen messages to communicate with users about operating status and alarm conditions. Includes 11 Volt Lithium-Ion System Controller Backup Battery. Includes Patient Handbook.</p>	<p>106531US</p>	<p>System Controller</p> 	<p>The System Controller is a small computer that controls and monitors system operation. The System Controller uses lights, sounds, and on-screen messages to communicate with users about operating status and alarm conditions. A Driveline, which passes through the patient's abdomen, connects the implanted pump to the System Controller.</p> <p>For more information, see page 2-8.</p>
ITEM	CATALOG NUMBER						
<p>HeartMate 3™ System Controller Supplied sterile. A small computer that controls and monitors system operation. Uses lights, sounds, and on-screen messages to communicate with users about operating status and alarm conditions. Includes 11 Volt Lithium-Ion System Controller Backup Battery. Includes Patient Handbook.</p>	<p>106531US</p>						
<p>System Controller</p> 	<p>The System Controller is a small computer that controls and monitors system operation. The System Controller uses lights, sounds, and on-screen messages to communicate with users about operating status and alarm conditions. A Driveline, which passes through the patient's abdomen, connects the implanted pump to the System Controller.</p> <p>For more information, see page 2-8.</p>						

U.S. Patent No. 11,572,879 Claim

Abbott's Accused Products

In Run Mode, the Pump Running symbol is illuminated green (P) and the System Controller is:

- Connected to a power source (the Power Module, the Mobile Power Unit, or two HeartMate™ 14 Volt Lithium-Ion batteries).
- Connected to the Left Ventricular Assist Device via the Driveline.
- Sending power to the pump via the Driveline.
- Controlling and monitoring physiological and operating conditions.
- Displaying data about physiological and operating conditions.
- Using user interface indicators to reflect System Controller and pump conditions.
- Responding to user interface button pushes.
- Charging the 11 Volt Lithium-Ion backup battery inside the System Controller.
- Communicating with the HeartMate Touch™ Communication System, if connected.
- Able to perform a System Controller self test.

For instructions on switching from Run Mode to Sleep Mode, see *Switching Operating Modes* on page 2-36.

Pump Flow

The System Controller provides an estimate of blood flow out of the pump. This estimate is based on pump speed and the amount of power being provided to the pump motor. The relationship between power and flow at any particular speed is mostly linear.

FLOW
4.9 LPM

Figure 4.51 Pump Flow Display

System Controller Overview

The HeartMate 3™ System Controller acts as the central power and communication hub for the HeartMate 3 LVAS. It passes power from the Power Module, the Mobile Power Unit, Lithium-Ion Batteries, or its own integrated emergency backup supply, down to the LVAD via the Driveline. The HeartMate 3 System Controller constantly monitors system performance through communication with the implanted LVAD and Controller internal measurements and alerts the user to any alarm conditions by activating membrane panel LEDs and integrated audio annunciators. Further information on alarm

Power

Device power is a direct measurement of pump motor voltage and current. Changes in pump speed, flow, or physiological demand can affect pump power. Gradual power increases (over hours or days) may signal thrombus deposits inside the pump, aortic or insufficiency. Gradual power decreases may indicate an obstruction of flow and should be evaluated. Depending on the speed of the pump, power values greater than 10 to 12 watts (W) also can indicate the presence of a thrombus. Abrupt changes in power should be evaluated for cause.

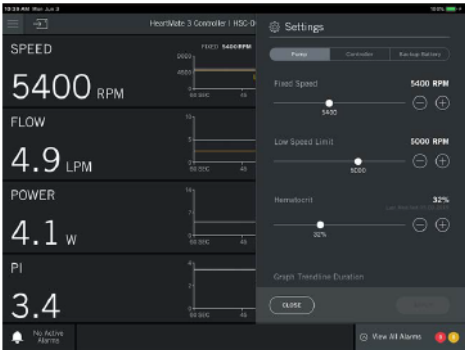
Flow

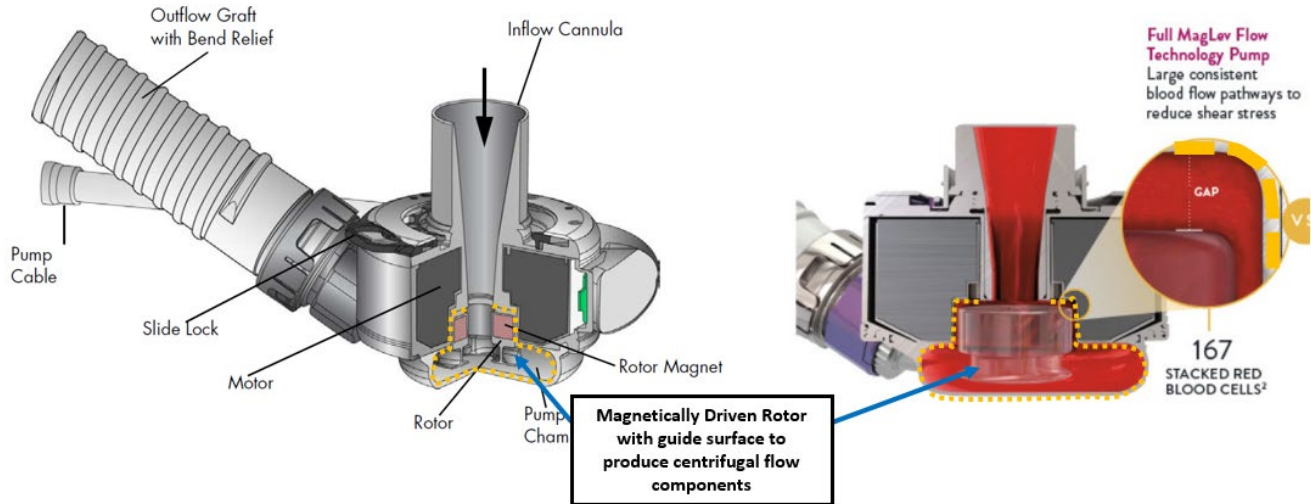
Device flow and power generally retain a linear relationship at a given speed. However, while power is directly measured by the System Controller, the reported flow is estimated, based on power. Since the flow displayed on the System Controller is a calculated value, it somewhat underestimates actual flow at high flows.

Any increase in power not related to increased flow (such as thrombus) causes erroneously high flow readings. Conversely, an occlusion of the flow path decreases flow and causes a corresponding decrease in power. In either situation, pump output should be assessed.

The Rotor is fully supported by magnetic levitation, obviating mechanical or fluid bearings and essentially eliminating Rotor mechanical wear as a reliability factor. Both drive (i.e. rotation) and levitation of the Rotor is accomplished using a single Stator comprising iron pole pieces, a back-iron, copper coils, and position sensors. By measuring the position of a permanent magnet in the Rotor and appropriately controlling the current in the drive and levitation coils, the radial position and rotational speed of the Rotor is actively controlled. Because of the permanent magnet's attraction to the iron pole pieces, the rotor passively resists excursion in the axial direction, whether such excursion is translation or tilting.

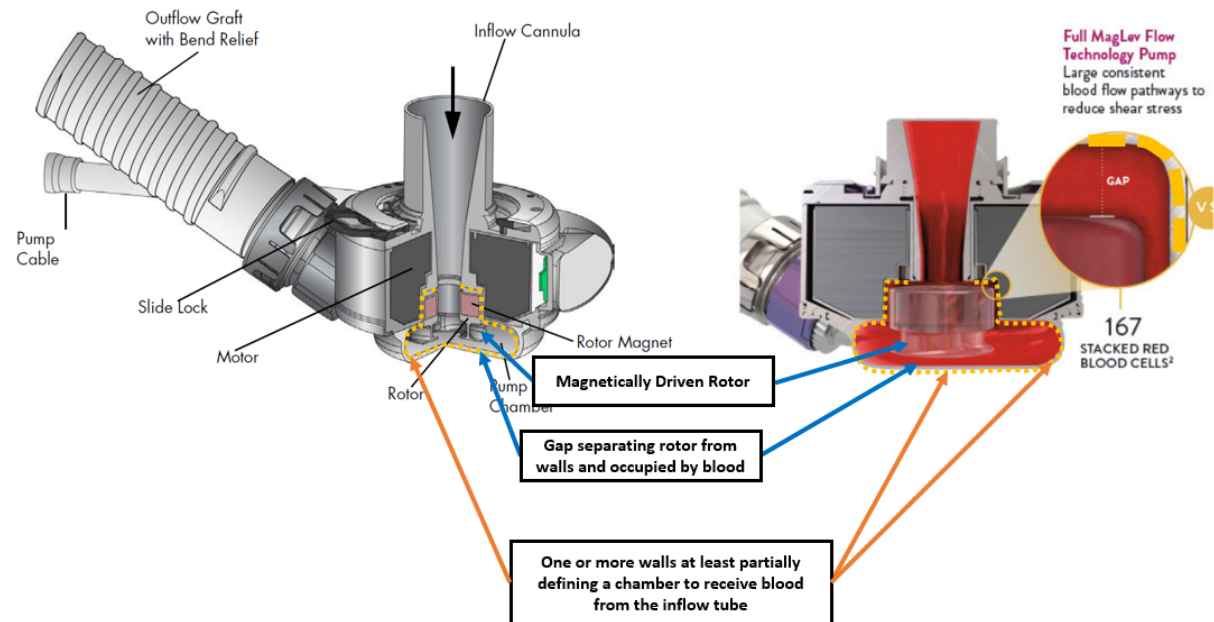
Further, Abbott's HeartMate 3 products are configured to control the operation of the second magnetic device based on a fixed value, such as what Abbott calls a "fixed speed."

U.S. Patent No. 11,572,879 Claim	Abbott's Accused Products
	<div data-bbox="1037 236 1771 868"> <p>Fixed Speed</p> <p>The fixed speed is adjustable in increments of 100 rpm, with a range of 3,000 to 9,000 rpm. A low speed advisory alarm appears if either the fixed speed has been set 200 rpm or more below the low speed limit, or the System Controller is unable to maintain the speed at or above the low speed limit. This low speed advisory alarm notification is always provided on the HeartMate Touch™ App (Figure 4.26).</p> <p>Set the Fixed Speed</p> <ol style="list-style-type: none"> 1. Tap — or + or move the slider to decrease or increase the fixed speed. 2. Tap APPLY to confirm changes.  <p>Figure 4.26 Settings Panel with Pump Parameters</p> </div> <p>Exemplary Sources: Video titled “HeartMate 3 LVAD Patient Education Program – (2) System Overview,” available at https://www.youtube.com/watch?v=hmmpIKzmKe0; Abbott, Heartmate 3™ Left Ventricular Assist System Instructions for Use (Document ARTEN600200959 A, 2022-5 produced at, e.g., ABT-MIR-00007556-8187) at ABT-MIR-00007567-7568, -7574, -7583, -7592, -7618, -7764, -7767, -7791, -8143.</p> <p><i>See also</i> the evidence and analysis for the Preamble above and the other claim elements discussed herein.</p>
<p>12. The system of claim 11, wherein the magnetically driven rotor includes a guide surface to produce centrifugal flow components.</p>	<p>The HeartMate 3 comprises the system of claim 11.</p> <p><i>See</i> the evidence and analysis for claim 11 above.</p> <p>Further, in the HeartMate 3, the magnetically driven rotor includes a guide surface to produce centrifugal flow components.</p>

U.S. Patent No. 11,572,879 Claim	Abbott's Accused Products
	<p>For example, the magnetically driven rotor of the HeartMate 3 heart assist pump device includes a guide surface, configured to produce centrifugal flow components, as shown in the images below.</p>  <p>Exemplary Sources: HeartMate 3 Website at https://www.cardiovascular.abbott/us/en/hcp/products/heart-failure/left-ventricular-assist-devices/heartmate-3/about.html; Abbott, Heartmate 3™ Left Ventricular Assist System Instructions for Use (Document ARTEN600200959 A, 2022-5 produced at, e.g., ABT-MIR-00007556-8187) at ABT-MIR-00007568.</p> <p><i>See also</i> the evidence and analysis for claim 11 above and the other claim elements discussed herein.</p>
<p>14. The system of claim 11, wherein the one or more walls and the magnetically driven rotor define a gap separating the magnetically driven rotor from the one or more walls, the gap configured to be occupied by the blood when the second magnetic device drives the rotation of the magnetically driven rotor.</p>	<p>The HeartMate 3 comprises the system of claim 11.</p> <p><i>See</i> the evidence and analysis for claim 11 above.</p> <p>In the HeartMate 3, the one or more walls and the magnetically driven rotor define a gap separating the magnetically driven rotor from the one or more walls, the gap configured to be occupied by the blood when the second magnetic device drives the rotation of the magnetically driven rotor.</p>

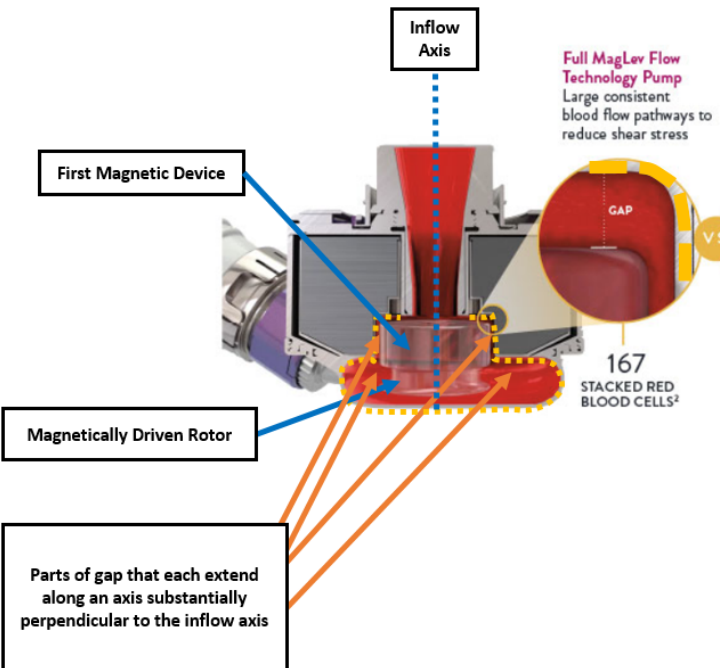
U.S. Patent No. 11,572,879 Claim**Abbott's Accused Products**

For example, the HeartMate 3 includes a gap defined by – and separating – (i) the one or more walls (which at least partially define a chamber to receive blood from the inflow tube) and (ii) the magnetically driven rotor. The HeartMate 3's heart assist pump device is configured such that blood occupies the gap when the second magnetic device (which Abbot calls a Motor, Stator, and/or MagLev Flow technology) drives the rotation of the magnetically driven rotor, as shown in the images below.

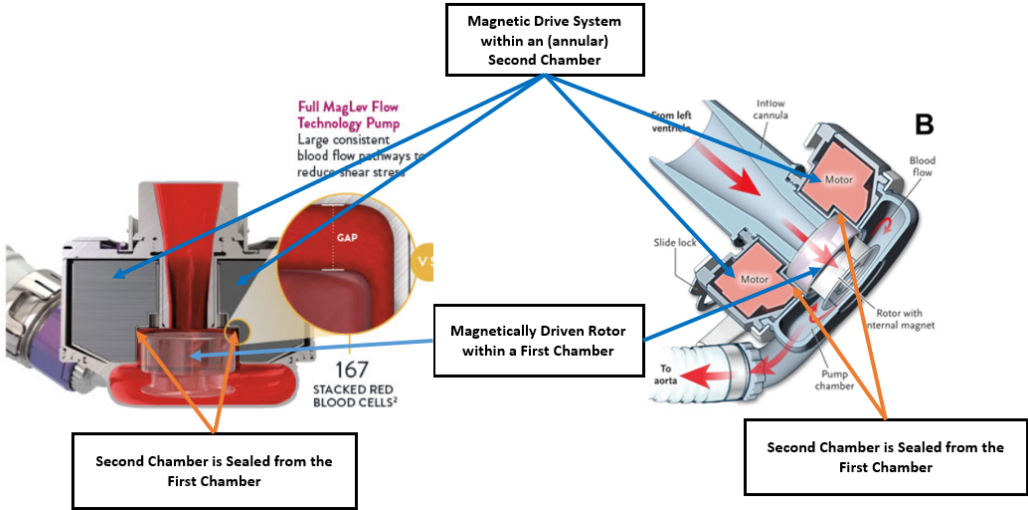


Exemplary Sources: Video titled “HeartMate 3 LVAD Patient Education Program – (2) System Overview,” available at <https://www.youtube.com/watch?v=hmmmpIKzmKe0>; Abbott, Heartmate 3™ Left Ventricular Assist System Instructions for Use (Document ARTEN600200959 A, 2022-5 produced at, e.g., ABT-MIR-00007556-8187) at ABT-MIR-00007568.

See also the evidence and analysis for claim 11 above and the other claim elements discussed herein.

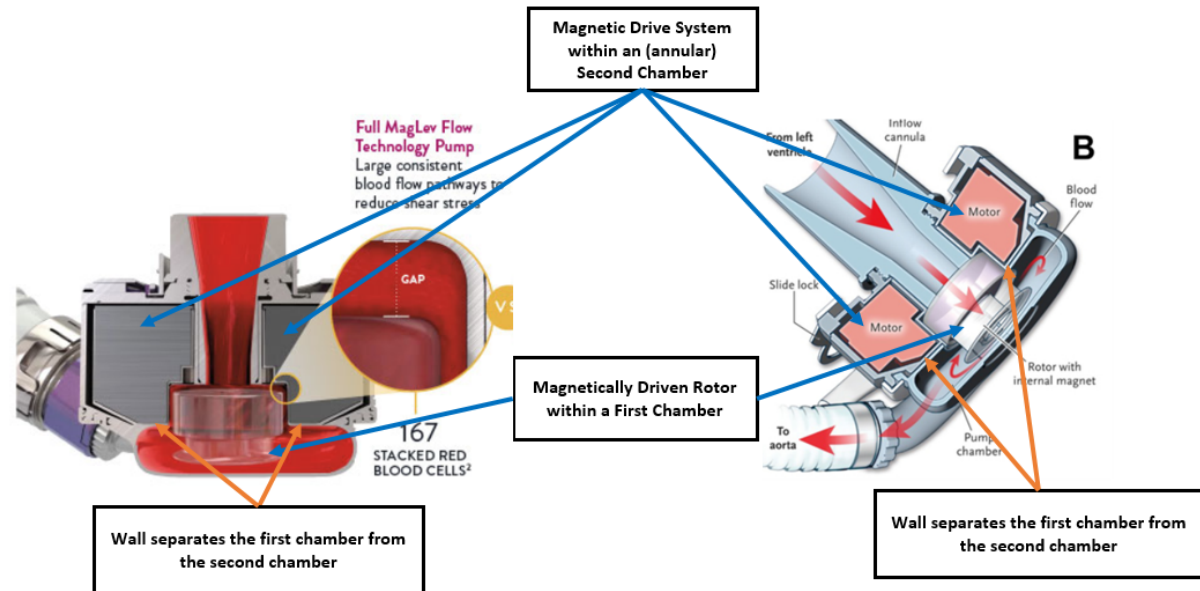
U.S. Patent No. 11,572,879 Claim	Abbott's Accused Products
<p>16. The system of claim 14, wherein at least part of the gap extends along a first axis substantially perpendicular to the inflow axis.</p>	<p>The HeartMate 3 comprises the system of claim 14.</p> <p><i>See the evidence and analysis for claims 11 and 14 above.</i></p> <p>In the HeartMate 3, at least part of the gap extends along a first axis substantially perpendicular to the inflow axis.</p> <p>For example, in the HeartMate 3, parts of the gap extend along an axis substantially perpendicular to the inflow axis, as shown in the annotated image below.</p>  <p>The diagram illustrates the internal components of the HeartMate 3 pump. A vertical dashed blue line at the top is labeled 'Inflow Axis'. A blue arrow points from a box labeled 'First Magnetic Device' to a component on the left. Another blue arrow points from a box labeled 'Magnetically Driven Rotor' to a central rotating part. Orange arrows point from a box labeled 'Parts of gap that each extend along an axis substantially perpendicular to the inflow axis' to several segments of the gap. A circular inset on the right shows a cross-section of the gap, with a label 'Full MagLev Flow Technology Pump' and text 'Large consistent blood flow pathways to reduce shear stress'. Below this inset, a label '167 STACKED RED BLOOD CELLS²' points to the gap. The gap itself is labeled 'GAP' and is shown as a red, curved structure.</p>

U.S. Patent No. 11,572,879 Claim	Abbott's Accused Products
	<p>Exemplary Sources: Video titled “HeartMate 3 LVAD Patient Education Program – (2) System Overview,” available at https://www.youtube.com/watch?v=hmmpIKzmKe0; Abbott, Heartmate 3™ Left Ventricular Assist System Instructions for Use (Document ARTEN600200959 A, 2022-5 produced at, e.g., ABT-MIR-00007556-8187) at ABT-MIR-00007568.</p> <p><i>See also</i> the evidence and analysis for claims 11 and 14 above and the other claim elements discussed herein.</p>
<p><i>18. The system of claim 11, wherein the chamber is a first chamber within which the magnetically driven rotor is positioned, and the magnetic drive system is positioned within a second chamber sealed from the first chamber.</i></p>	<p>The HeartMate 3 comprises the system of claim 11.</p> <p><i>See</i> the evidence and analysis for claim 11 above.</p> <p>Further, in the HeartMate 3, the chamber is a first chamber within which the magnetically driven rotor is positioned, and the magnetic drive system is positioned within a second chamber sealed from the first chamber.</p> <p>For example, in the heart assist pump device of the HeartMate 3, the chamber is a first chamber within which the magnetically driven rotor is positioned. And the magnetic drive system, which includes what Abbott calls a Motor, Stator, and/or MagLev Flow technology, is positioned within a second chamber. The second chamber (in which blood does not flow) is sealed from the first chamber (in which blood flows).</p>

U.S. Patent No. 11,572,879 Claim	Abbott's Accused Products
	 <p>The diagram illustrates the HeartMate 3 LVAD system. It shows a cross-section of the device with two main chambers: a first chamber and a second chamber. The first chamber contains a magnetically driven rotor. The second chamber is sealed from the first chamber and contains a magnetic drive system within an annular structure. Blood flow is shown entering from the left ventricle through an inflow cannula, passing through a pump chamber, and exiting to the aorta. The diagram also shows a gap between the chambers and a slide lock mechanism. Labels include: 'Magnetic Drive System within an (annular) Second Chamber', 'Full MagLev Flow Technology Pump Large consistent blood flow pathways to reduce shear stress', 'Magnetically Driven Rotor within a First Chamber', 'Second Chamber is Sealed from the First Chamber', '167 STACKED RED BLOOD CELLS', 'Inflow cannula', 'Slide lock', 'Rotor with internal magnet', 'Pump chamber', 'To aorta', and 'Blood flow'.</p> <p>Exemplary Sources: Video titled “HeartMate 3 LVAD Patient Education Program – (2) System Overview,” available at https://www.youtube.com/watch?v=hmmplKzmKe0; Heartmate 3 Review By Pablo Motta, MD, FAAP at https://www2.ccasociety.org/newsletters/2020summer/HM3.html.</p> <p><i>See also</i> the evidence and analysis for claim 11 above and the other claim elements discussed herein.</p>
<p>19. The system of claim 18, wherein the wall of the one or more walls separates the first chamber from the second chamber.</p>	<p>The HeartMate 3 comprises the system of claim 18.</p> <p><i>See</i> the evidence and analysis for claims 11 and 18 above.</p> <p>In the HeartMate 3, the wall of the one or more walls separates the first chamber from the second chamber.</p> <p>For example, in the HeartMate 3, the wall of the one or more walls (at least partially defining a chamber to receive blood from the inflow tube) separates the first chamber (in which blood flows, and within which is positioned the magnetically driven rotor) from the second chamber (in which blood does not flow, and within which is positioned the magnetic drive system, which includes what Abbott calls a Motor, Stator, and/or MagLev Flow technology), as shown in the annotated images below.</p>

U.S. Patent No. 11,572,879 Claim

Abbott's Accused Products



Exemplary Sources: Video titled “HeartMate 3 LVAD Patient Education Program – (2) System Overview,” available at <https://www.youtube.com/watch?v=hmmpIKzmKe0>; Heartmate 3 Review By Pablo Motta, MD, FAAP at <https://www2.ccasociety.org/newsletters/2020summer/HM3.html>.

See also the evidence and analysis for claims 11 and 18 above and the other claim elements discussed herein.