

[54] **CONNECTOR FOR OPEN HEART SURGERY**

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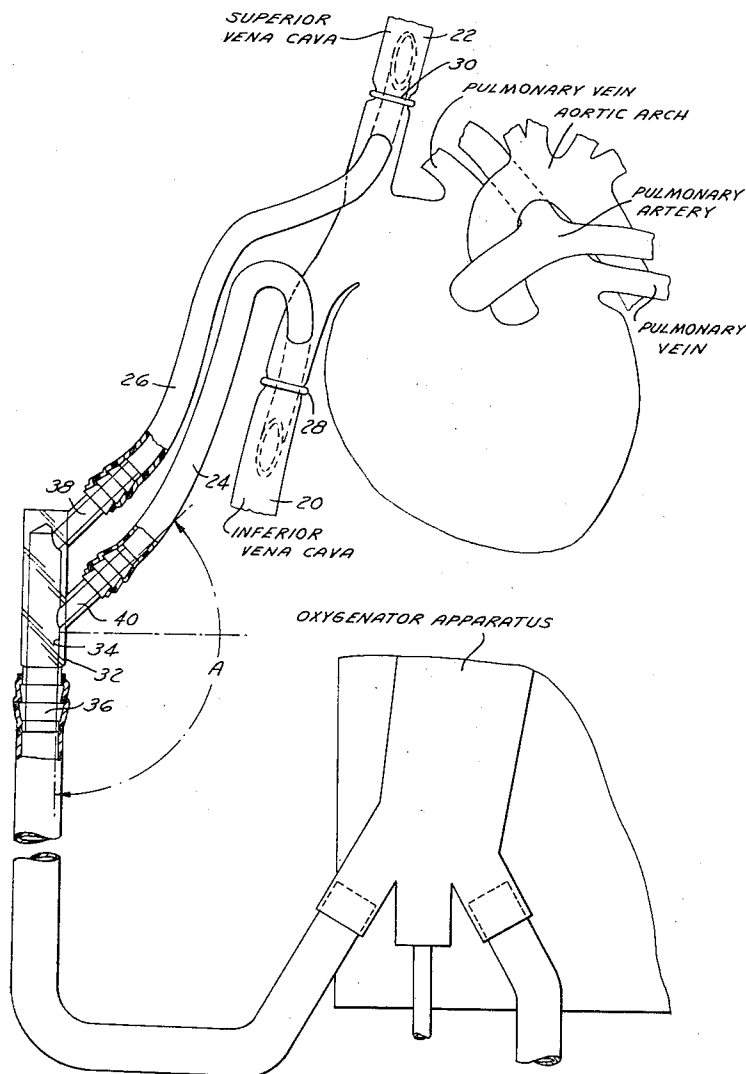
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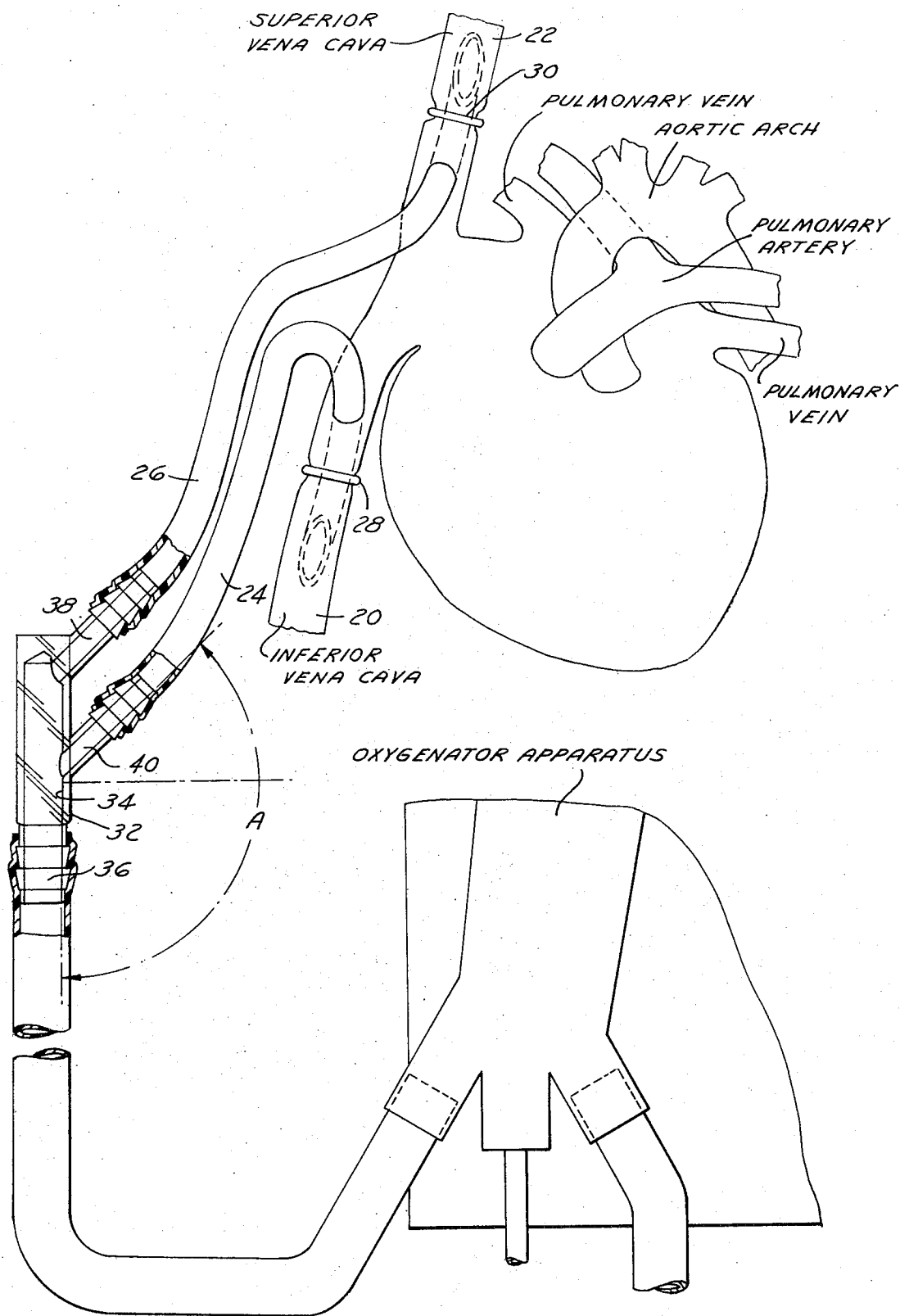
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[57] **ABSTRACT**

A connector for open heart surgery to allow blood from the superior vena cava and the inferior vena cava to pass to the pump oxygenator in a smooth and coordinated flow including a plastic connector body having a straight flow passage and parallel branch passages entering the body and joining the flow passage at spaced points but lying in the same plane and having about the same obtuse angle with the axis of the flow passage.

1 Claim, 1 Drawing Figure





CONNECTOR FOR OPEN HEART SURGERY

BACKGROUND OF THE INVENTION

In open heart surgery, there are certain extracorporeal connections that must be made to cause the venous blood to divert from the heart and flow to a pump oxygenator which temporarily serves to perform the functions of the heart and lungs of the patient. In the past a standard Y-connector has been used to connect the inferior and superior vena cava to the oxygenator. Problems have developed with this type of connector in that venous blood has sometimes bypassed the oxygenator by back flow in the Y-connector, thus destroying the efficiency of the support system for the patient.

THE DISCLOSED INVENTION

It is an object of the present invention to provide a venous connector which assures smooth and integrated flow from the heart connecting tubes and avoids any bypass or shunting of venous blood from the pump oxygenator.

Other objects of the invention will be apparent in the following description and claims taken with the accompanying drawing in which there are disclosed the principles of operation of the invention and the best mode presently contemplated for the practice thereof.

A drawing accompanies the disclosure and the single view illustrates the new connector and the relationship to the heart passages and the oxygenator.

In the drawing, a diagrammatic view of the heart illustrates aortic arch, pulmonary artery and pulmonary veins as well as the superior vena cava and inferior vena cava as the left side of the heart. When heart surgery is to take place, access is provided to the heart, and cannulae (hollow needles) are inserted into the inferior and the superior venae cavae. The surgeon punctures the wall of these passages and the cannulae in the form of plastic tubes are inserted into the respective passages and the walls of the passage are then tied or clamped around the tube to cause a diversion of the blood. The cannulae are then connected to the pump oxygenator.

In the drawing the inferior and superior venae cavae are shown at 20 and 22 respectively and the cannulae are shown at 24 and 26. The closing ties are shown at 28 and 30.

The connector constructed in accordance with the present invention is shown having a body portion 32 in the form of an elongate plastic block having a blind hole or passage 34 which opens to a ribbed outer connector nipple 36. Two hollow side branches 38 and 40 are formed integrally with the body extending in the

same plane from one side of the body. These side branches are disposed at an obtuse angle A to the axis of the passage in body 32, this angle being preferably in the range of 130° to 140°.

Each end of the side branches 38 and 40 is provided with a ribbed connector surface to which the flexible cannulae tubes 24, 26 are fitted. The upper branch 38 enters passage 34 at approximately the blind end while the other branch 40 is spaced downwardly about 1 inch. The passage 34 is preferably about equal in area to the combined areas of the entering branch passages. The inside diameter of the cannula tube may vary with the patient but for an adult, it will be about 3/8 inch. The combined flow through the passage 34 may be as high as 5 liters per minute during an operation.

In a heart operation, it is easier, because of the limited space, to attach the cannulae to the same side of a connector, but it has also been discovered that the flow characteristics at the very low venous pressure (as distinguished from arterial pressure) are such that the best fluid dynamic conditions must prevail and experience has shown that there is a minimum of back pressure from either branch line against the flow of the other and a minimum of upstream pressure in comparison with the previously used Y-connectors. In addition, in clamping off either the upper or lower branch, fluid flowing freely through the open line develops less pressure on the line that is clamped.

I claim:

1. In apparatus for open heart surgery wherein cannulae are adapted to lead from the inferior vena cava and the superior vena cava, respectively, for transmitting low pressure venous blood to a tube leading to a pump oxygenator, the improvement which comprises:

- a. a connector including an elongate body having an axial passage blind at one end of the body and open at the other end,
- b. means at said other end for connection to the tube leading to the pump oxygenator,
- c. a pair of spaced branch arms integrally connected with said body lying on one side of said body in a plane common to the axis of said axial passage and extending at an angle to said body and having passages to flow into said axial passage, one at about the blind end of said passage and the other spaced approximately an inch from said blind end, said arms having an obtuse angle of about 130° to 140° to the axis of said axial passage, and
- d. means on the ends of said branch arms for connection of the respective cannulae from said inferior and superior venae cavae.

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