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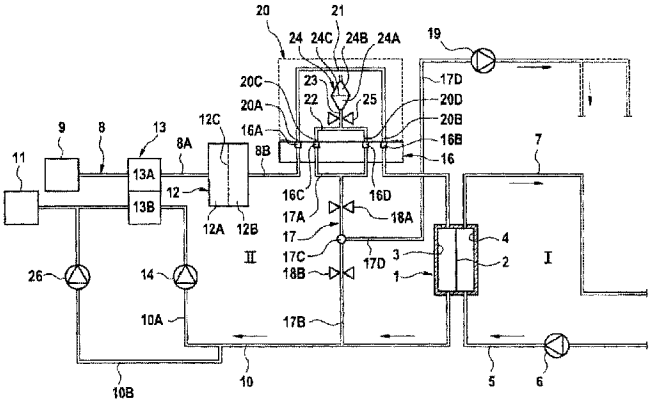
(72) Inventeur/Inventor:
WIESEN, GERHARD, DE

(73) Propriétaire/Owner:
FRESENIUS MEDICAL CARE DEUTSCHLAND GMBH, DE

(74) Agent: SMART & BIGGAR IP AGENCY CO.

(54) Titre : DISPOSITIF PERMETTANT DE METTRE EN OEUVRE UN PROCEDE DE CONSERVATION D'UN DISPOSITIF DE TRAITEMENT DU SANG ET PROCEDE DE CONSERVATION D'UN DISPOSITIF DE TRAITEMENT DU SANG

(54) Title: DEVICE FOR CARRYING OUT A METHOD FOR CONSERVING A BLOOD TREATMENT DEVICE, AND METHOD FOR CONSERVING A BLOOD TREATMENT DEVICE



(57) Abrégé/Abstract:
The invention relates to a device for carrying out a method for conserving an extracorporeal blood treatment device and to a method for conserving an extracorporeal blood treatment device. The invention further relates to an extracorporeal blood treatment device with a device for carrying out a method for conserving the blood treatment device. The device according to the invention and the method according to the invention are based on introducing an anti-freeze agent only into that part of the dialysis liquid system I of the blood treatment device that includes the volume lying upstream of the sterile filter 15 with which sterile substituate is recovered from the dialysis liquid. Accordingly, that part of the dialysis liquid system that includes the volume lying downstream of the sterile filter is not filled with an anti-freeze agent. The device 20 according to the invention for carrying out the method according to the invention makes it possible, after removal of the sterile filter 15, to easily and safely separate the substituate segment 17 from the rest of the dialysis liquid system II and drain off liquid located in the substituate segment.

Abstract:

The invention relates to a device for carrying out a method for conserving an extracorporeal blood treatment device and to a method for conserving an extracorporeal blood treatment device. The invention further relates to an extracorporeal blood treatment device with a device for carrying out a method for conserving the blood treatment device. The device according to the invention and the method according to the invention are based on introducing an anti-freeze agent only into that part of the dialysis liquid system I of the blood treatment device that includes the volume lying upstream of the sterile filter 15 with which sterile substituate is recovered from the dialysis liquid. Accordingly, that part of the dialysis liquid system that includes the volume lying downstream of the sterile filter is not filled with an anti-freeze agent. The device 20 according to the invention for carrying out the method according to the invention makes it possible, after removal of the sterile filter 15, to easily and safely separate the substituate segment 17 from the rest of the dialysis liquid system II and drain off liquid located in the substituate segment.

Device for carrying out a method for conserving a blood treatment device, and method for conserving a blood treatment device

The invention relates to a device for carrying out a method for conserving an extracorporeal blood treatment device, and to a method for conserving an extracorporeal blood treatment device. The invention further relates to an extracorporeal blood treatment device with a device for carrying out a method for conserving the blood treatment device.

The known dialysis devices have an extracorporeal blood circuit and a dialysis liquid system. The dialysis liquid system of the known dialysis devices comprises a dialysis liquid delivery line, which leads from a dialysis liquid source to the dialysis liquid chamber of a dialyser, and a dialysis liquid removal line, which leads from the dialysis liquid chamber of the dialyser to an outflow. While the dialysis liquid flows through the dialysis liquid chamber of the dialyser, substance transport takes place across the membrane of the dialyser into the blood chamber. In what is called haemo(dia)filtration, some of the liquid drawn off through the membrane of the dialyser is replaced by a sterile replacement liquid (substituate), which is delivered to the extracorporeal blood circuit either upstream or downstream of the dialyser. The delivery of the substituate takes place via a substituate line, which leads to the extracorporeal blood circuit.

It has been found in practice that the substituate can be recovered in a sterile state from the dialysis liquid online during the blood treatment.

Dialysis devices are known in which the substituate is recovered from the dialysis liquid during the dialysis treatment (online). In order to ensure that the substituate recovered online is sterile and free of pyrogens, the dialysis liquid is passed through a sterile filter, which is divided into two chambers by a membrane that holds back microorganisms. A dialysis device with a sterile filter for recovering substituate is known from US 6,187,207 B1, for example.

Various methods are known for cleaning and disinfecting blood treatment devices. Before it is put into operation, the blood treatment device is flushed with a liquid that contains a cleaning agent and/or disinfectant. In this way, it is also possible for stubborn contaminants, for example biofilm, algae, protein deposits and blood residues, to be removed safely and quickly.

An exception is when a blood treatment device is kept in storage over quite a long period, particularly before being put into operation for the first time. During this period, there is not only the problem of eliminating the possibility of contamination, but also that of protecting the blood treatment device against freezing. Therefore, for conservation, the liquid systems of the known blood treatment devices are generally filled with an anti-freeze agent.

The object of the invention is to make available a method permitting conservation of an extracorporeal blood treatment device without the danger of formation of contaminants that could not be removed safely and quickly using the known cleaning and disinfecting agents.

It is also an object of the invention to make available a device with which the method for conserving the blood treatment device can be carried out easily and safely.

A further object of the invention is to create a blood treatment device with a device for carrying out the conservation method.

Various investigations by the inventor into the causes of bacterial contamination in dialysis liquid systems have shown that the danger of contamination may increase if the dialysis liquid system were to be filled with an anti-freeze agent for conserving the blood treatment device.

The method according to the invention for conserving a blood treatment device reduces the danger of contamination if the dialysis liquid system of the extracorporeal blood treatment device were to be filled with an anti-freeze agent. It is based on introducing an anti-freeze agent only into that part of the dialysis liquid system that includes the volume lying upstream of the sterile filter with which sterile substituate is recovered from the dialysis liquid. Accordingly, that part of the dialysis liquid system that included the volume lying downstream of the sterile filter is not filled with an anti-freeze agent. This part of the dialysis liquid system is referred to hereinbelow as the substituate segment. The two volumes, which are filled with liquid or not filled with liquid, are separated by

the membrane which divides the sterile filter into two chambers.

Generally, a liquid that contains a cleaning and disinfecting agent is located in the substituate segment. The dialysis liquid system of the blood treatment devices is filled with such a liquid after being brought into operation for the first time. This liquid is drained off in the method according to the invention. Thus, only the rest of the dialysis liquid system remains filled.

The device according to the invention for carrying out the method according to the invention makes it possible, after removal of the sterile filter, to easily and safely separate the substituate segment from the rest of the dialysis liquid system and drain off liquid located in the substituate segment. The liquid in the substituate segment can be pumped off, for example. The dialysis liquid pump present in the dialysis liquid system of the known blood treatment device can be started up for this purpose.

The sterile filters used in practice generally have an inlet and an outlet for the first chamber and an inlet and an outlet for the second chamber, so as to be able to operate both chambers in through-flow. If the known sterile filters are used to recover a sterile substituate, dialysis liquid is passed through the first chamber, while the substituate is drawn off from the second chamber. In sterile filters in which the first chamber and second chamber each have an inlet and an outlet, the inlet and outlet of both chambers must be attached to the blood treatment device. Consequently, the blood treatment device has four appliance-side attachment pieces, and the sterile filter has four filter-side attachment pieces. However, it is also possible that the

second chamber of the sterile filter used to recover substituate has only an outlet. Then, the blood treatment device only needs to have three appliance-side attachment pieces, and the sterile filter only needs to have three filter-side attachment pieces. The invention thus provides two alternative embodiments.

In one alternative embodiment, the device according to the invention has four attachment pieces, wherein the first and second attachment pieces are connected to each other by a first connection line and the third and fourth attachment pieces are connected to each other by a second connection line. With the device according to the invention, a first flow connection can be established with the two attachment pieces to which the inlet and outlet of one chamber of the sterile filter are attached, and a flow connection can be established with the two attachment pieces to which the inlet and outlet of the second chamber of the sterile filter are attached. In this way, that part of the dialysis liquid system that includes the substituate segment is separated from the rest of the dialysis liquid system. Attachment pieces are understood as all means for establishing a connection or flow connection, and several attachment pieces can also form one unit.

In the other alternative embodiment, the first and second attachment pieces are connected to each other by a first connection line, while the third and fourth attachment pieces are closed in a sterile manner, such that that part of the dialysis liquid system that includes the substituate segment can be separated from the rest of the dialysis liquid system. The third attachment piece can be designed in the manner of a closure cap, which closes the appliance-side attachment piece in a sterile manner when

the device according to the invention is attached to the blood treatment device.

In order to be able to drain off liquid located in the substituate segment, the device according to the invention has a venting means. The venting means is preferably once again a sterile filter through which air can flow into the volume included by the substituate segment while the liquid is being drained off.

The device according to the invention can be designed in different ways. The only crucial point is that said flow connections can be established between the appliance-side attachment pieces of the blood treatment device. It is advantageous if the device according to the invention is designed in the manner of an adapter, which can be connected easily and safely to the appliance-side attachments when the sterile filter is detached from the blood treatment device. The connection lines between the attachment pieces can be fixed or flexible lines. They can be designed as channels in solid bodies or can be hose lines.

The known blood treatment devices have holders for securing the sterile filters. Preferably, the device according to the invention is designed in such a way that it can be inserted, in place of the sterile filters, with an exact fit into the holders of the blood treatment devices.

The appliance-side attachment pieces and the attachment pieces of the device according to the invention can be designed as plugs or sockets. Preferably, in each case two attachment pieces of the device according to the invention form a common plug, which can be inserted with an exact fit into an appliance-side socket of the blood

treatment device, to which otherwise the respective attachment pieces of the sterile filter are attached.

According to one aspect of the present invention, there is provided an apparatus for carrying out a method for conserving an extracorporeal blood treatment device which has a dialysis liquid system with a means for attachment of a first sterile filter, which has a first and a second appliance-side attachment piece for attachment of a first and a second filter-side attachment piece of the first sterile filter, and a third appliance-side attachment piece for attachment of a third filter-side attachment piece of the first sterile filter, wherein the apparatus has a first attachment piece for attachment to the first appliance-side attachment piece, and a second attachment piece for attachment to the second appliance-side attachment piece of the blood treatment device, and also a third attachment piece for attachment to the third appliance-side attachment piece of the blood treatment device wherein the first, second and third attachment pieces of the apparatus are arranged to connect to the first, second and third appliance-side attachment pieces of the means for attachment, wherein the first and second attachment pieces are connected to each other by a first connection line, and a venting means is connected to the third attachment piece so that the third attachment piece is closed in a sterile manner, the first connection line being separated from the third attachment piece and the venting means connected to the third attachment piece so that there is no fluid connection between the first connection line and the third attachment piece and the venting means.

Date Reçue/Date Received 2021-02-01

According to another aspect of the present invention, there is provided an apparatus for carrying out a method for conserving an extracorporeal blood treatment device which has a dialysis liquid system with a means for attachment of a first sterile filter, which has a first and a second appliance-side attachment piece for attachment of a first and a second filter-side attachment piece of the first sterile filter, and a third and a fourth appliance-side attachment piece for attachment of a third and a fourth filter-side attachment piece of the first sterile filter, wherein the apparatus has a first attachment piece for attachment to the first appliance-side attachment piece, and a second attachment piece for attachment to the second appliance-side attachment piece of the blood treatment device, and also a third attachment piece for attachment to the third appliance-side attachment piece, and a fourth attachment piece for attachment to the fourth appliance-side attachment piece of the blood treatment device, wherein the first, second, third and fourth attachment pieces of the apparatus are arranged to connect to the first, second, third and fourth appliance-side attachment pieces of the means for attachment, wherein the first and second attachment pieces are connected to each other by a first connection line, and the third and fourth attachment pieces are connected to each other by a second connection line, and a venting means being connected to the second connection line, the first and second attachment pieces being separated from the third and fourth attachment pieces so that there is no fluid connection between the first connection line and the second connection line.

According to still another aspect of the present invention, there is provided an extracorporeal blood treatment device with a dialysis liquid system (II) having a means for attachment of a first sterile filter, which has a first and a second appliance-

Date Reçue/Date Received 2021-02-01

side attachment piece for attachment of a first and a second filter-side attachment piece of the first sterile filter, and a third appliance-side attachment piece for attachment of a third filter-side attachment piece of the first sterile filter, and with an apparatus as described above or detailed below, wherein the first filter-side attachment piece is attached to the first appliance-side attachment piece, the second filter-side attachment piece is attached to the second appliance-side attachment piece, and the third filter-side attachment piece is attached to the third appliance-side attachment piece.

According to yet another aspect of the present invention, there is provided an extracorporeal blood treatment device with a dialysis liquid system (II) having a means for attachment of a first sterile filter, which has a first and second appliance-side attachment piece for attachment of a first and second filter-side attachment piece of the first sterile filter, and a third and fourth appliance-side attachment piece for attachment of a third and fourth filter-side attachment piece of the first sterile filter, and with a device as described above or detailed below for carrying out a method for conserving the extracorporeal blood treatment device, wherein the first filter-side attachment piece is attached to the first appliance-side attachment piece, the second filter-side attachment piece is attached to the second appliance-side attachment piece, the third filter-side attachment piece is attached to the third appliance-side attachment piece, and the fourth filter-side attachment piece is attached to the fourth appliance-side attachment piece.

According to a further aspect of the present invention, there is provided a method for conserving an extracorporeal blood treatment device with an extracorporeal blood circuit and a

Date Reçue/Date Received 2021-02-01

dialysis liquid system, wherein the dialysis liquid system has: a dialysis liquid delivery line which leads to a dialyser and has a first section, to which an inlet of a first chamber of a first sterile filter can be attached, and a second section, to which an outlet of said first chamber of the first sterile filter can be attached, such that said first chamber of the first sterile filter can be coupled into the dialysis liquid delivery line, a dialysis liquid removal line leading away from the dialyser, and a substituate segment, which leads to the extracorporeal blood circuit and which can be attached at one end to a second chamber of the first sterile filter, the method comprising: removing the first sterile filter attached to the first and second sections of the dialysis liquid delivery line and to the substituate segment, establishing a flow connection between the end of the first section of the dialysis liquid delivery line by means of an apparatus as described above or detailed below, formerly attached to the inlet of the first chamber of the first sterile filter, and the end of the second section of the dialysis liquid delivery line, formerly attached to the outlet of the first chamber of the first sterile filter, such that the liquid can flow through the dialysis liquid delivery line into the dialyser, bypassing the first sterile filter, sterile closing the end of the substituate segment that was formerly attached to the first sterile filter, by separating fluid connection between the dialysis liquid delivery line and the substituate segment by means of the apparatus as described above or detailed below, drainage of liquid located in the substituate segment.

An illustrative embodiment of the invention is explained in more detail below with reference to the drawings, in which:

Date Reçue/Date Received 2021-02-01

Fig. 1 shows the main components of an extracorporeal blood treatment device, wherein a sterile filter is attached to the blood treatment device for the purpose of recovering a sterile substituate from the dialysis liquid,

Fig. 2 shows the extracorporeal blood treatment device from Fig. 1, wherein the device according to the invention is attached to the blood treatment device for the purpose of carrying out a method for conserving the blood treatment device,

Fig. 3 shows a partial view of an alternative embodiment of the blood treatment device from Fig. 1, wherein an alternative embodiment of the sterile filter is attached to the blood treatment device for the purpose of recovering a sterile substituate from the dialysis liquid, and

Fig. 4 shows the blood treatment device from Fig. 3, wherein an alternative embodiment of the device according to the invention is attached to the blood treatment device for the purpose of recovering a sterile substituate from the dialysis liquid.

The blood treatment device, in particular a haemo(dia)filtration device, has a dialyser 1, which is separated by a membrane 2 into a dialysis liquid chamber

Date Reçue/Date Received 2021-02-01

3, through which dialysis liquid flows, and a blood chamber 4, through which blood flows.

A blood delivery line 5, into which a blood pump 6 is coupled, leads to the blood chamber 4, while a blood return line 7 issues from the blood chamber 4. The blood delivery line 5 and blood discharge line 7 form, together with the blood chamber 4, the extracorporeal blood circuit I of the blood treatment device.

The dialysis liquid system II of the blood treatment device is described below. The dialysis liquid system II has a dialysis liquid delivery line 8, which leads from a dialysis liquid source 9 to the dialysis liquid chamber 3, and a dialysis liquid return line 10, which issues from the dialysis liquid chamber 3 and leads to an outflow 11. The dialysis liquid delivery line 8 has a first section 8A, which leads from the dialysis liquid source 9 to the first chamber 12A of a first sterile filter 12. One chamber 13A of a balance device 13 is coupled into the first section 8A of the dialysis liquid delivery line 8. The second section 8B of the dialysis liquid delivery line 8 issues from the second chamber 12B of the first sterile filter 12 and leads to the dialysis liquid chamber 3.

The dialysis liquid return line 10 divides into two sections 10A and 10B, which leads to the outlet 11. A dialysis liquid pump 14 is coupled into the first section 10A, while an ultrafiltrate pump 26 is coupled into the second section 10B. The other chamber 13B of the balance device 13 is also coupled into the first section 10A.

In order to recover a substituate from the dialysis liquid, the haemo(dia)filtration device has a second sterile filter 15, which is divided by a semipermeable

membrane 15C into a first chamber 15A and a second chamber 15B. The second sterile filter 15 forms an exchangeable unit, which can be attached to the blood treatment device or removed from the treatment device.

To attach and secure the second sterile filter 15, the blood treatment device has a holder 16, which has a first attachment piece 16A, a second attachment piece 16B, a third attachment piece 16C and a fourth attachment piece 16D. The appliance-side attachment pieces 16A to 16D can be designed as sockets.

The second filter 15 has a first attachment piece 15D, a second attachment piece 15E, a third attachment piece 15F and a fourth attachment piece 15G. The filter-side attachment pieces 15D to 15G can be connected with an exact fit to the appliance-side attachment pieces 16A to 16D. The filter-side attachment pieces can be corresponding plugs.

The third and fourth appliance-side attachment pieces 16C, 16D are connected to each other by a connection line 17A, to which a bypass line 17B is attached. Two shut-off elements 18A and 18B are located on the bypass line 17B. Between the two shut-off elements 18A and 18B, a substituate line 17D, into which a substituate pump 19 is coupled, branches off from a substituate port 17C. The substituate line 17D leads to the extracorporeal blood circuit I upstream or downstream of the blood chamber 4, in order to be able to deliver substituate to the extracorporeal blood circuit I. While the substituate is being delivered, the shut-off element 18A is opened and the shut-off element 18B closed.

The blood treatment device also has further shut-off elements and bypass lines, and other components too, but these are not shown for sake of clarity.

The line sections of the dialysis liquid system II, through which sterile substituate is delivered from the second chamber 15B of the second sterile filter 15 to the extracorporeal blood circuit I, represent the substituate segment 17 that has to be kept free of contaminants, in particular from the formation of a biofilm. The substituate segment therefore comprises all the lines or line sections that include the volume lying downstream of the sterile filter, for example the connection line 17A and the line section of the bypass line 17B upstream of the substituate port 17C.

The blood treatment devices are tested after assembly. The dialysis liquid system II is then filled completely with a liquid that contains a cleaning and disinfecting agent. All the line sections of the dialysis liquid system are thus filled. At this time, the substituate line 17D is not generally attached to the substituate port 17C.

For the subsequent transport and storage of the blood treatment device, the method according to the invention is carried out using the device according to the invention.

The first and second sterile filters 12, 15 are removed. The first sterile filter 12 is replaced in a known manner by a known bypass piece. The second sterile filter 15 is replaced by the device according to the invention, which device is described below with reference to Fig. 2.

The device 20 according to the invention for carrying out the conservation method has, like the sterile filter 15, a first attachment piece 20A, a second attachment piece 20B, a third attachment piece 20C and a fourth attachment piece 20D, which can be connected to the appliance-side attachment pieces 16A to 16D. The attachment pieces can once again be designed as plugs that can be inserted with an exact fit into sockets.

In a preferred embodiment, the first and third attachment pieces 20A, 20C are designed as a common plug, while the second and fourth attachment pieces 20B, 20D are designed as a second plug. However, all of the attachment pieces can also be separate from one another.

The first and second attachment pieces 20A, 20B are connected to each other by a first connection line 21, and the third and fourth attachment pieces 20C, 20D are connected to each other by a second connection line 22. The first and second connection lines 21, 22 can be hose lines. A third line 23, which is closed by a sterile filter 24, branches off from the second connection line 22. The sterile filter 24 has a first chamber 24A and a second chamber 24B, which are separated by a semipermeable membrane 24C. The first chamber 24A of the sterile filter 24 is connected to the third line 22, in particular a hose line. A hose clamp 25 is provided for clamping off the hose line 23.

The device according to the invention preferably forms a unit that can be easily and safely secured to the holder 16 in place of the sterile filter 15.

When the device 20 according to the invention is attached to the blood treatment device, a flow connection is established between the dialysis liquid source 9 and the

dialysis liquid chamber 3, while the substituate segment 17 is separated from the rest of the dialysis liquid system. The liquid located in the substituate segment 17 decoupled from the rest of the dialysis liquid system is now drawn off, such that the substituate segment is free of liquid. For this purpose, the shut-off element 25 on the device according to the invention is opened, such that air can pass into the substituate segment in order to vent the volume enclosed by the substituate segment 17. The liquid can be conveyed, for example, to the outflow 11, for which purpose the pumps 14 and 26 can be operated. The shut-off element 25 is then closed again, and the rest of the dialysis liquid system is filled completely with a liquid that contains an anti-freeze agent. The blood treatment device remains in this state until installation at the dialysis centre.

When the dialysis device is started up, new sterile filters 12 and 15 are used. The compulsory cleaning and disinfecting cycle then follows. Any bacteria are either killed off or flushed out by the direct cleaning and disinfecting. Thus, the first use of a filter and all subsequent exchanges can be classed as aseptic procedures, which guarantee that the substituate segment is permanently sterile.

It has been found in tests that, in the substituate segment not filled with anti-freeze agent, and even after quite a long storage period, a biofilm cannot form that cannot be safely and quickly removed using conventional cleaning and disinfecting measures.

An alternative embodiment of the blood treatment device, and of the device according to the invention for attachment to the blood treatment device, is described below with reference to Figures 3 and 4, which embodiment

differs from the embodiment described with reference to Figures 1 and 2 only in that the blood treatment device and the device according to the invention have only three attachment pieces. The corresponding parts are provided in Figures 3 and 4 with the same reference signs as in Figures 1 and 2. Instead of the two filter-side attachment pieces 15F and 15G (Fig. 1), the second chamber 15B of the second sterile filter 15 has only one attachment piece 15F' (Fig. 3), and, instead of the two appliance-side attachment pieces 16C and 16D (Fig. 1), the blood treatment device has only one attachment piece 16C' (Fig. 3), wherein the third filter-side attachment piece 15F' is attached to the third appliance-side attachment piece 16C' (Fig. 3). A connection line for the connection of two appliance-side attachment pieces is not required here. The bypass line 17B of the substituate segment 17 is therefore connected directly to the third appliance-side attachment piece 16C'. The first chamber 24A of the sterile filter 24 is connected directly to the third attachment piece 20C' of the device 20 according to the invention via the connection line 23 (Fig. 4), such that the substituate segment 17 is closed in a sterile manner (Fig. 4) when the device according to the invention is attached to the blood treatment device.

CLAIMS:

1. An apparatus for carrying out a method for conserving an extracorporeal blood treatment device which has a dialysis liquid system with a means for attachment of a first sterile filter, which has a first and a second appliance-side attachment piece for attachment of a first and a second filter-side attachment piece of the first sterile filter, and a third appliance-side attachment piece for attachment of a third filter-side attachment piece of the first sterile filter, wherein

the apparatus has a first attachment piece for attachment to the first appliance-side attachment piece, and a second attachment piece for attachment to the second appliance-side attachment piece of the blood treatment device, and also a third attachment piece for attachment to the third appliance-side attachment piece of the blood treatment device wherein the first, second and third attachment pieces of the apparatus are arranged to connect to the first, second and third appliance-side attachment pieces of the means for attachment, wherein

the first and second attachment pieces are connected to each other by a first connection line, and

a venting means is connected to the third attachment piece so that the third attachment piece is closed in a sterile manner,

the first connection line being separated from the third attachment piece and the venting means connected to the third attachment piece so that there is no fluid

Date Reçue/Date Received 2021-02-01

connection between the first connection line and the third attachment piece and the venting means.

2. An apparatus for carrying out a method for conserving an extracorporeal blood treatment device which has a dialysis liquid system with a means for attachment of a first sterile filter, which has a first and a second appliance-side attachment piece for attachment of a first and a second filter-side attachment piece of the first sterile filter, and a third and a fourth appliance-side attachment piece for attachment of a third and a fourth filter-side attachment piece of the first sterile filter, wherein

the apparatus has a first attachment piece for attachment to the first appliance-side attachment piece, and a second attachment piece for attachment to the second appliance-side attachment piece of the blood treatment device, and also a third attachment piece for attachment to the third appliance-side attachment piece, and a fourth attachment piece for attachment to the fourth appliance-side attachment piece of the blood treatment device, wherein the first, second, third and fourth attachment pieces of the apparatus are arranged to connect to the first, second, third and fourth appliance-side attachment pieces of the means for attachment, wherein

the first and second attachment pieces are connected to each other by a first connection line, and the third and fourth attachment pieces are connected to each other by a second connection line, and

a venting means being connected to the second connection line,

Date Reçue/Date Received 2021-02-01

the first and second attachment pieces being separated from the third and fourth attachment pieces so that there is no fluid connection between the first connection line and the second connection line.

3. The apparatus according to Claim 1, wherein the venting means has a second sterile filter divided by a membrane into a first chamber and a second chamber, wherein the first chamber is connected to the third attachment piece.

4. The apparatus according to Claim 3, wherein the first chamber is connected to the third attachment piece by a connection line on which a shut-off element is provided.

5. The apparatus according to Claim 4, wherein the connection line is a hose line.

6. The apparatus according to Claim 2, wherein the venting means has a second sterile filter divided by a membrane into a first chamber and a second chamber, wherein the first chamber is connected to the connection line connecting the third and fourth attachment pieces.

7. The apparatus according to Claim 5, wherein the connection line is a hose line.

8. The apparatus according to Claim 6 or 7, wherein the first chamber is connected to the connection line, connecting the third and fourth attachment pieces, via a connection line on which a shut-off element is provided.

9. The apparatus according to Claim 8, wherein the connection line is a hose line.

Date Reçue/Date Received 2021-02-01

10. The apparatus according to any one of Claims 1 to 9, wherein any one or more of the first, second, third, and fourth attachment pieces are plugs.

11. The apparatus according to Claim 10, wherein the first and third attachment pieces are a common first plug, and the second and fourth attachment pieces are a common second plug.

12. An extracorporeal blood treatment device with a dialysis liquid system (II) having a means for attachment of a first sterile filter, which has a first and a second appliance-side attachment piece for attachment of a first and a second filter-side attachment piece of the first sterile filter, and a third appliance-side attachment piece for attachment of a third filter-side attachment piece of the first sterile filter, and with an apparatus according to Claim 1, wherein

the first filter-side attachment piece is attached to the first appliance-side attachment piece, the second filter-side attachment piece is attached to the second appliance-side attachment piece, and the third filter-side attachment piece is attached to the third appliance-side attachment piece.

13. The blood treatment device according to Claim 12, wherein the means for attachment of the first sterile filter is designed as a holding means for the first sterile filter, wherein the first, second and third appliance-side attachment pieces are part of the holding means.

14. A method for conserving an extracorporeal blood treatment device with an extracorporeal blood circuit and a dialysis liquid system,

Date Reçue/Date Received 2021-02-01

wherein the dialysis liquid system has:

a dialysis liquid delivery line which leads to a dialyser and has a first section, to which an inlet of a first chamber of a first sterile filter can be attached, and a second section, to which an outlet of said first chamber of the first sterile filter can be attached, such that said first chamber of the first sterile filter can be coupled into the dialysis liquid delivery line,

a dialysis liquid removal line leading away from the dialyser, and

a substituate segment, which leads to the extracorporeal blood circuit and which can be attached at one end to a second chamber of the first sterile filter,

the method comprising:

removing the first sterile filter attached to the first and second sections of the dialysis liquid delivery line and to the substituate segment,

establishing a flow connection between the end of the first section of the dialysis liquid delivery line by means of an apparatus according to any one of claims 1 to 11, formerly attached to the inlet of the first chamber of the first sterile filter, and the end of the second section of the dialysis liquid delivery line, formerly attached to the outlet of the first chamber of the first sterile filter, such that the liquid can flow through the dialysis liquid delivery line into the dialyser, bypassing the first sterile filter,

Date Reçue/Date Received 2021-02-01

sterile closing the end of the substituate segment that was formerly attached to the first sterile filter, by separating fluid connection between the dialysis liquid delivery line and the substituate segment by means of the apparatus according to any one of claims 1 to 11,

drainage of liquid located in the substituate segment.

15. The method according to Claim 14, wherein the dialysis liquid system, except for the substituate segment, is filled with a liquid that protects against freezing.

16. The method according to Claim 14 or 15, wherein the liquid located in the substituate segment is conveyed into an outflow.

17. The method according to any one of Claims 14 to 16, wherein, in order to put the blood treatment device into operation after the conservation, the method comprising

connecting the end of the first section of the dialysis liquid delivery line to the first chamber of the first sterile filter, and connecting the end of the second section of the dialysis liquid delivery line to the first chamber of the first sterile filter, such that a liquid can flow through the dialysis liquid delivery line and through the first sterile filter into the dialyser, and

connecting the end of the substituate segment to the second chamber of the first sterile filter, and

flushing the dialysis liquid system with a flushing solution.

Date Reçue/Date Received 2021-02-01

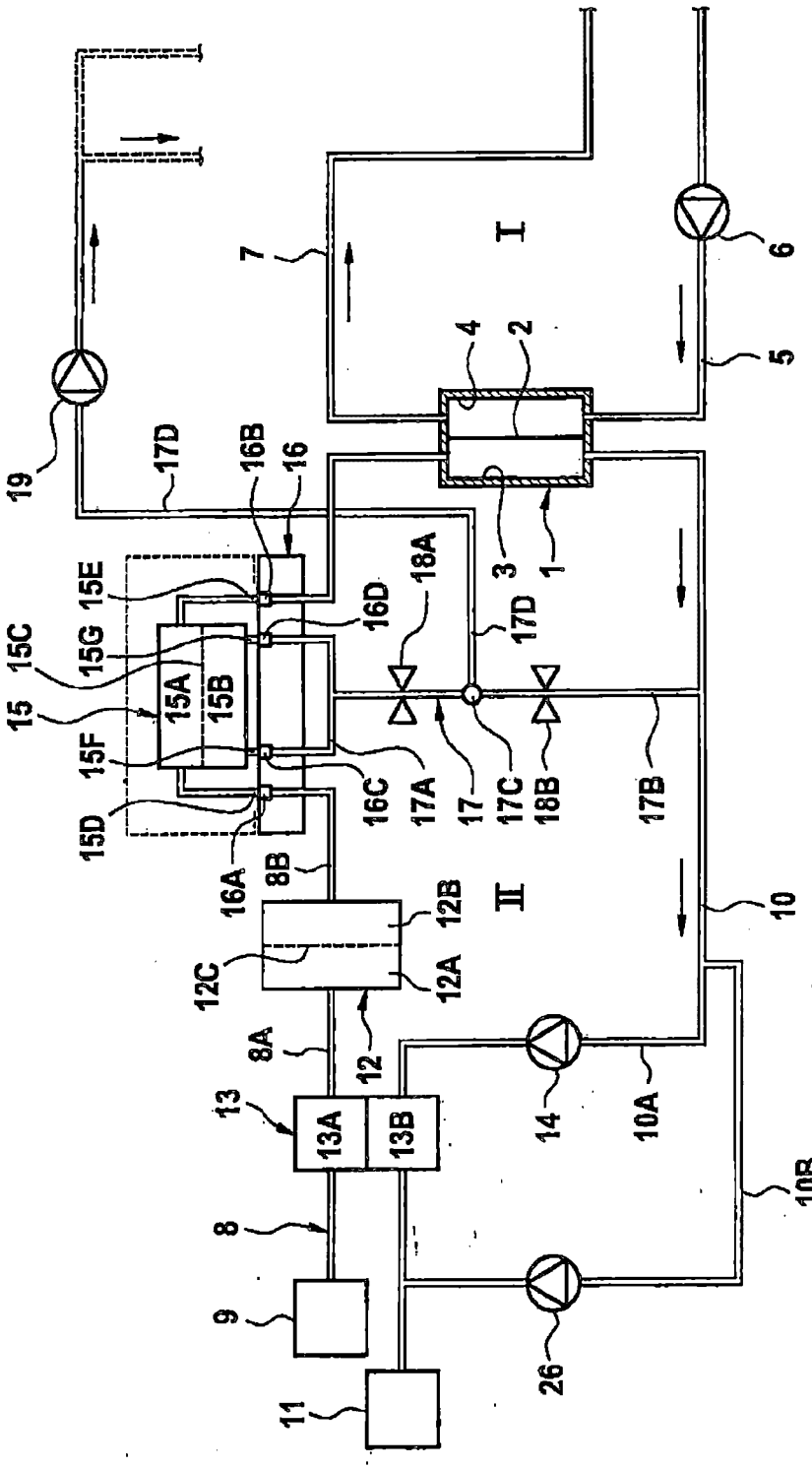


Fig. 1

CA 2869004 2020-04-07

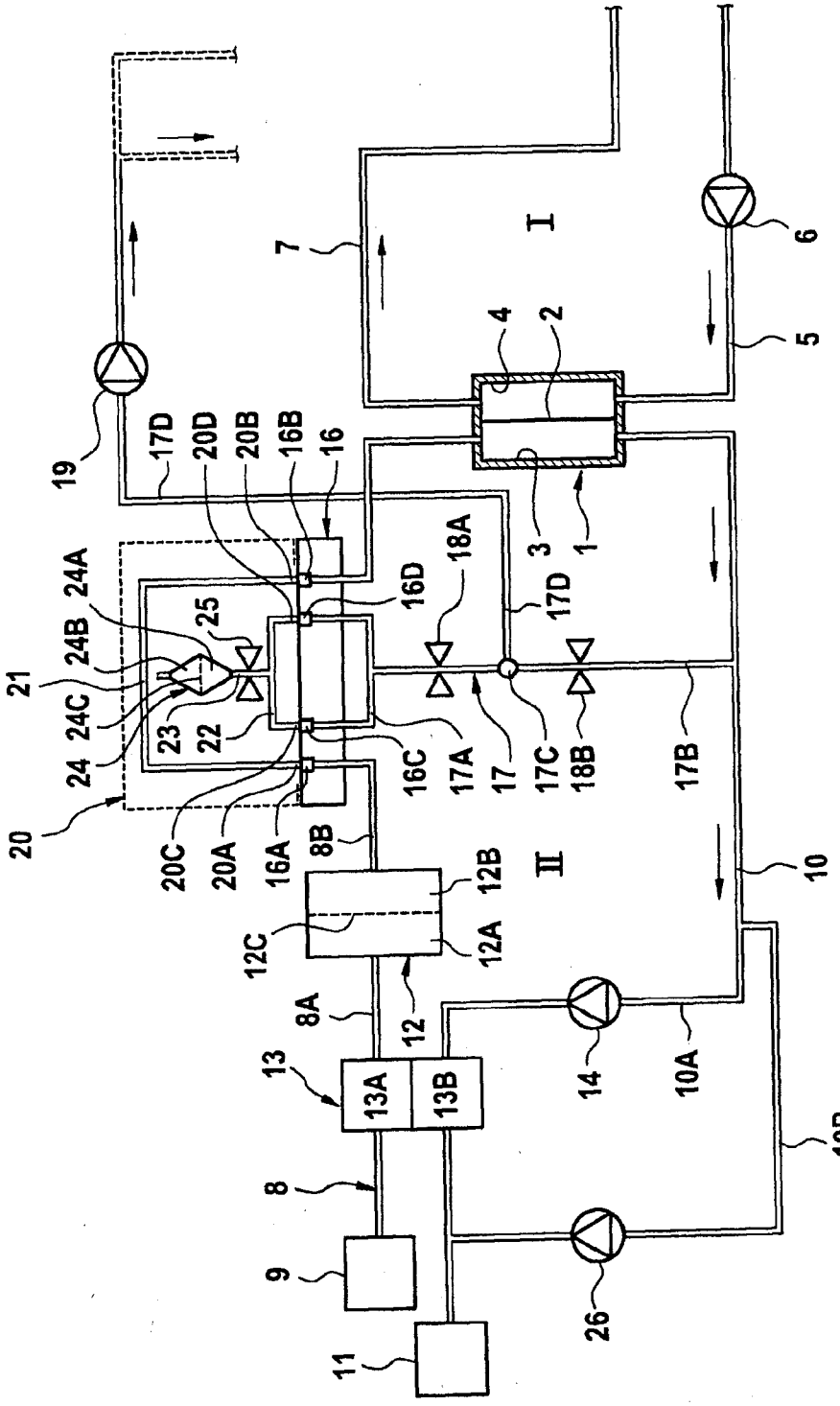

I
II
1
2
3
4
5
6
7
8
8A
8B
9
10
10A
10B
11
12
12A
12B
12C
13
13A
13B
14
16
16A
16B
16C
16D
17
17A
17B
17C
17D
18A
18B
19
20
20A
20B
20C
20D
21
22
23
24
24A
24B
24C
25
26

Fig. 2

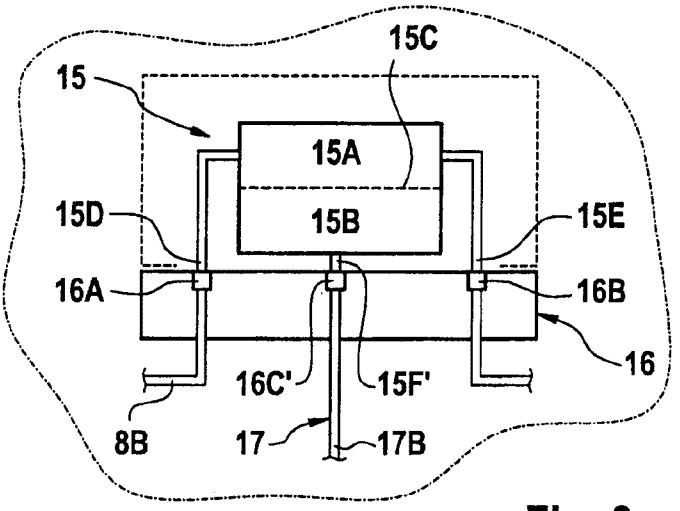

15C
15
15A
15B
15D
15E
16A
16B
16
16C'
15F'
8B
17
17B

Fig. 3

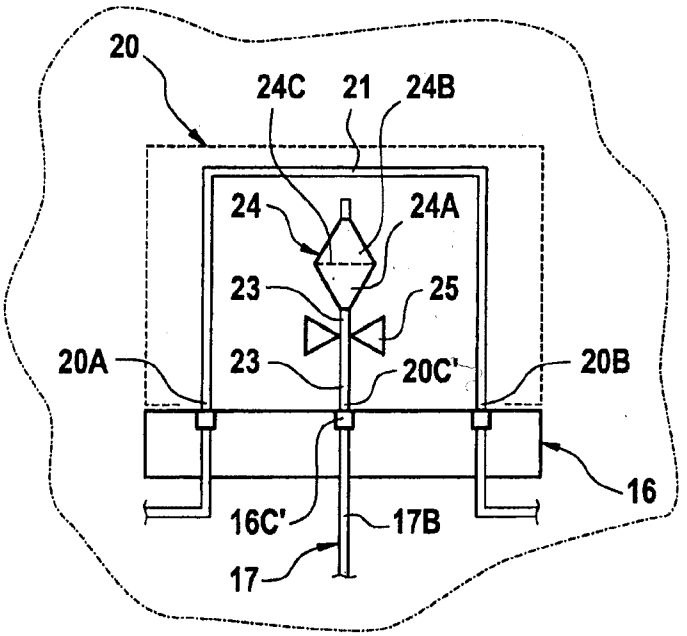
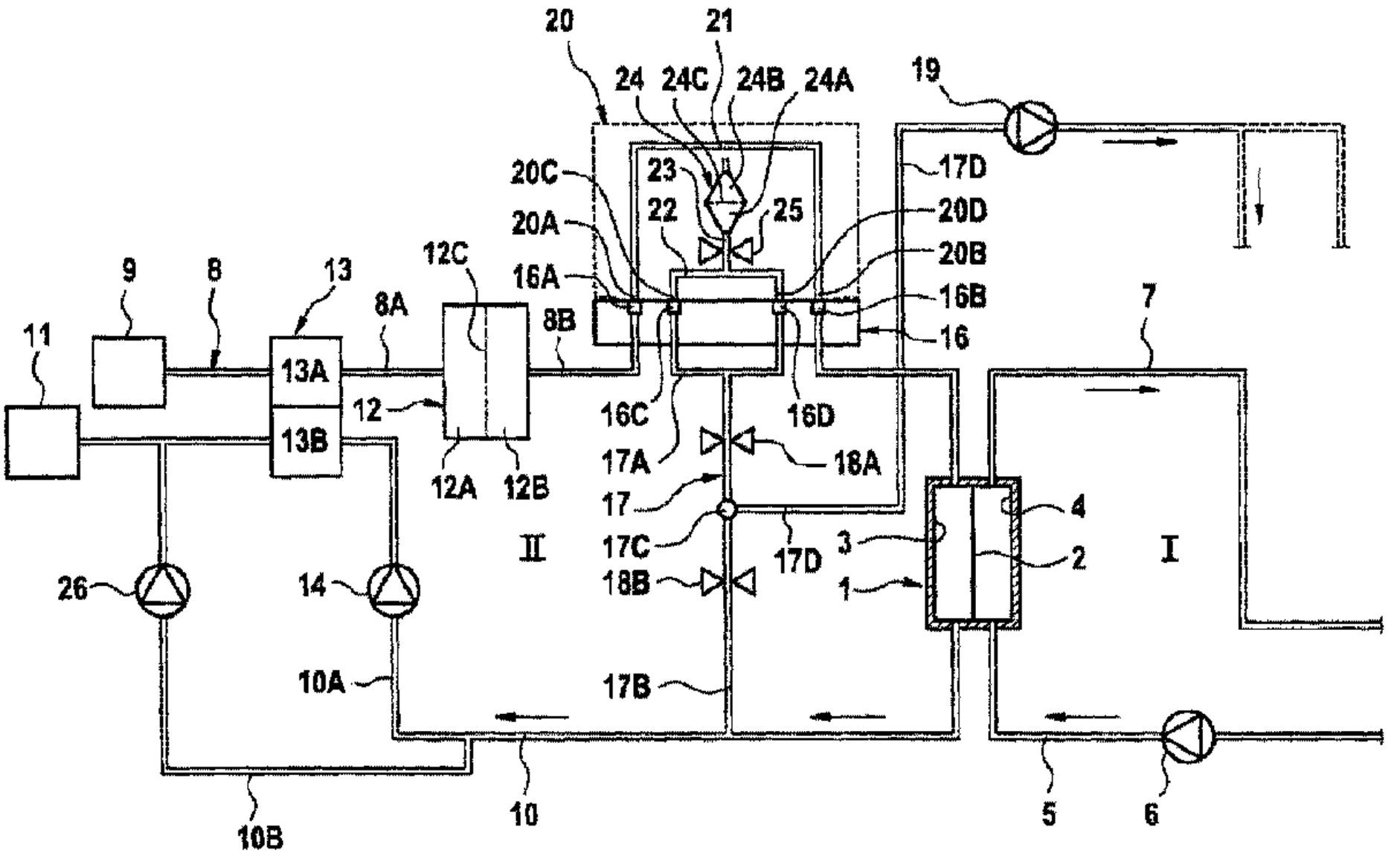

20
24C
21
24B
24
24A
23
25
20A
23
20C'
20B
16
16C'
17B
17

Fig. 4


20
21
24
24C
24B
24A
19
20C
23
17D
22
25
20D
20A
20B
12C
16A
16B
9
8
13
8A
8B
16
7
11
13A
13B
12
16C
16D
17A
18A
12A
12B
17
4
17C
3
2
I
II
17D
26
14
18B
1
10A
17B
10
5
6
10B