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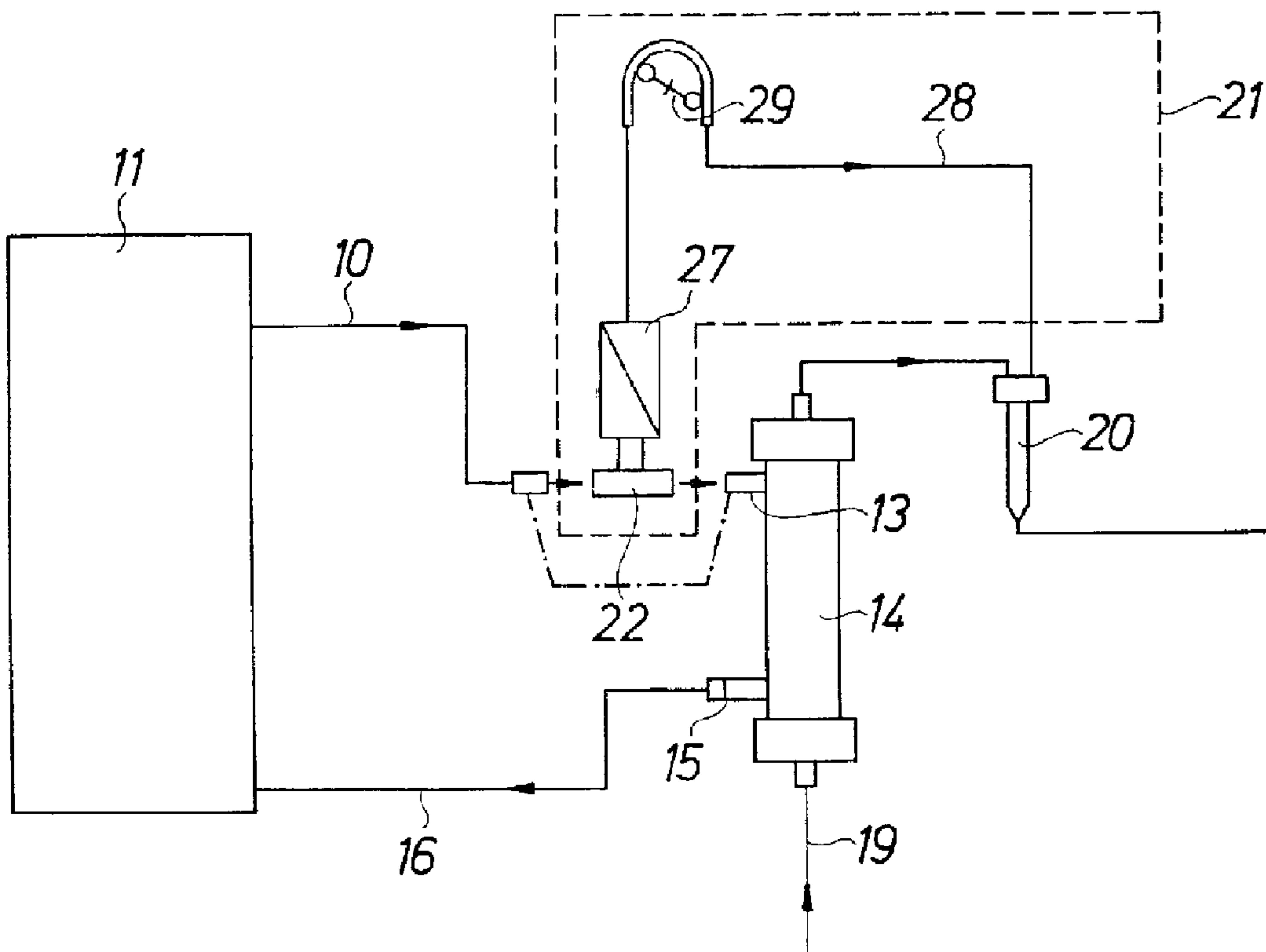
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(54) Title: DISPOSABLE HEMODIAFILTRATION SET



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A sterile disposable hemodiafiltration set to be connected to a dialysis machine comprising a dialyzer (14) with an extracorporeal blood path (19) and a supplying dialysis liquid supply line (10) which can be connected to the dialyzer. The hemodiafiltration set comprises a sterilized unit consisting of a hose connection (28) with a sterile filter (27) therein, said hose connection being arranged for connection at one end thereof to the extracorporeal path (19) via a separate pump (29; 30) and being provided with a three-way joint (22) at the other end thereof for connection of said latter end between the dialysis liquid supply line (10) and the dialyzer (14).



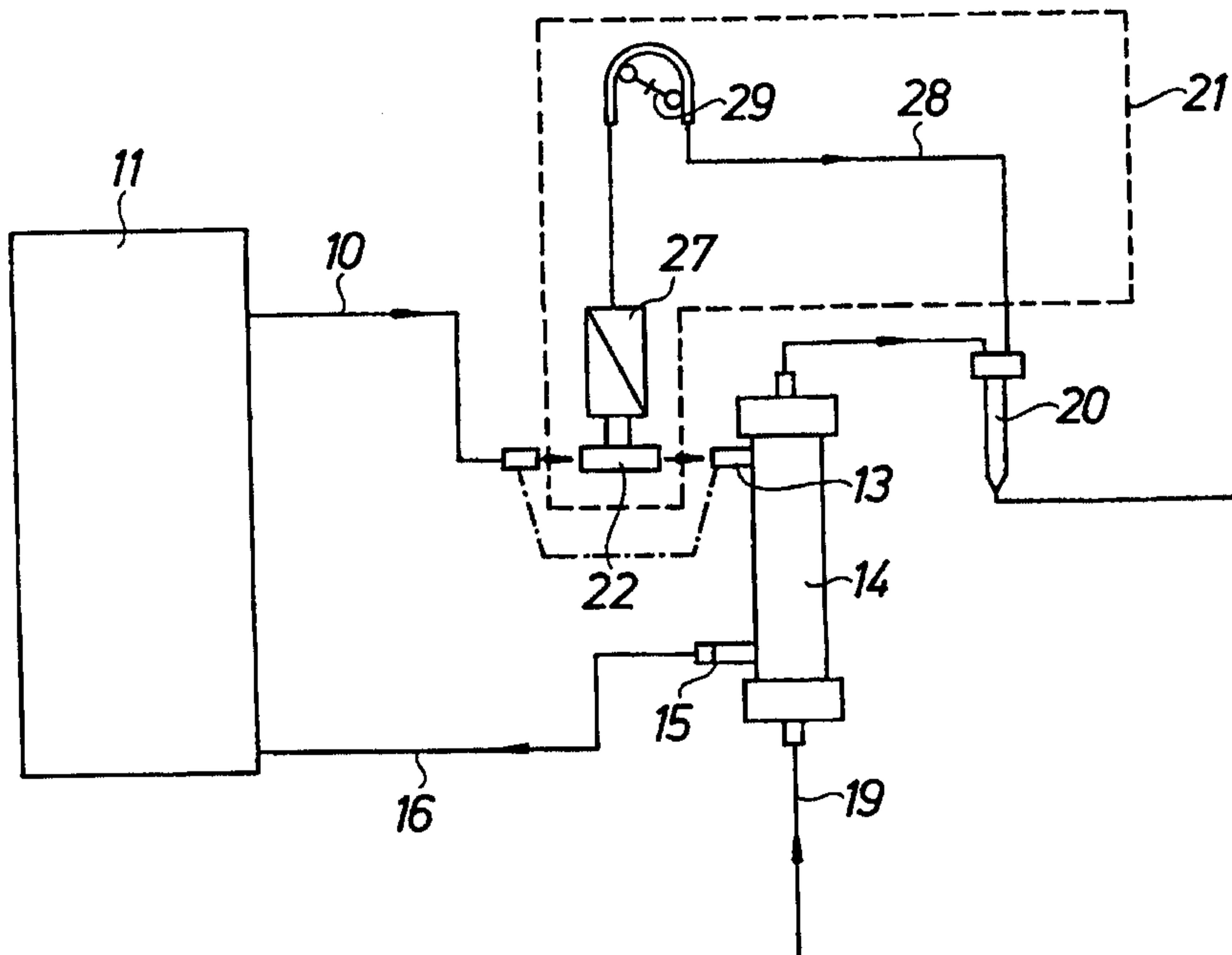
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(54) Title: DISPOSABLE HEMODIAFILTRATION SET



(57) Abstract

A sterile disposable hemodiafiltration set to be connected to a dialysis machine comprising a dialyzer (14) with an extracorporeal blood path (19) and a supplying dialysis liquid supply line (10) which can be connected to the dialyzer. The hemodiafiltration set comprises a sterilized unit consisting of a hose connection (28) with a sterile filter (27) therein, said hose connection being arranged for connection at one end thereof to the extracorporeal path (19) via a separate pump (29; 30) and being provided with a three-way joint (22) at the other end thereof for connection of said latter end between the dialysis liquid supply line (10) and the dialyzer (14).

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Disposable hemodiafiltration set

The invention relates to a sterile disposable hemo-
5 diafiltration set to be connected to a dialysis machine comprising a dialyzer with an extracorporeal blood path and a dialysis liquid supply line, which can be connected to the dialyzer.

In the conventional hemodialysis treatment impurities 10 are separated from the blood in the dialyzer by diffusion while the separation of impurities in hemodiafiltration treatment is effected both by diffusion and by convection dialysis liquid being supplied as a substitute liquid to the blood in the extracorporeal path. Hemodiafiltration 15 treatment is preferred because also greater molecules are separated from the blood; greater molecules cannot be separated to the same extent when the dialysis treatment includes diffusion only. The dialysis liquid to be supplied to the blood as the substitute liquid is of course subject 20 to higher demands as to sterility than dialysis liquid passing through the dialyzer and, therefore, it undergoes supplementary filtering before being supplied to the blood path.

US-A-4 702 829 describes a machine for hemodiafiltration 25 wherein the dialysis liquid to be used as substitute liquid is passed through two sterile filters provided in the machine which are not used for filtering the dialysis liquid to be supplied to the dialyzer. Having passed the sterile filters the substitute liquid is passed through a 30 disposable line section including a microfilter and being connected to the blood path either on the outlet side of the dialyzer (post-dilution) or on the inlet side of the dialyzer (pre-dilution).

In the dialysis machine intended for hemodiafiltration 35 according to US-A-4 702 829 as in other dialysis machines on the market, intended for hemodiafiltration

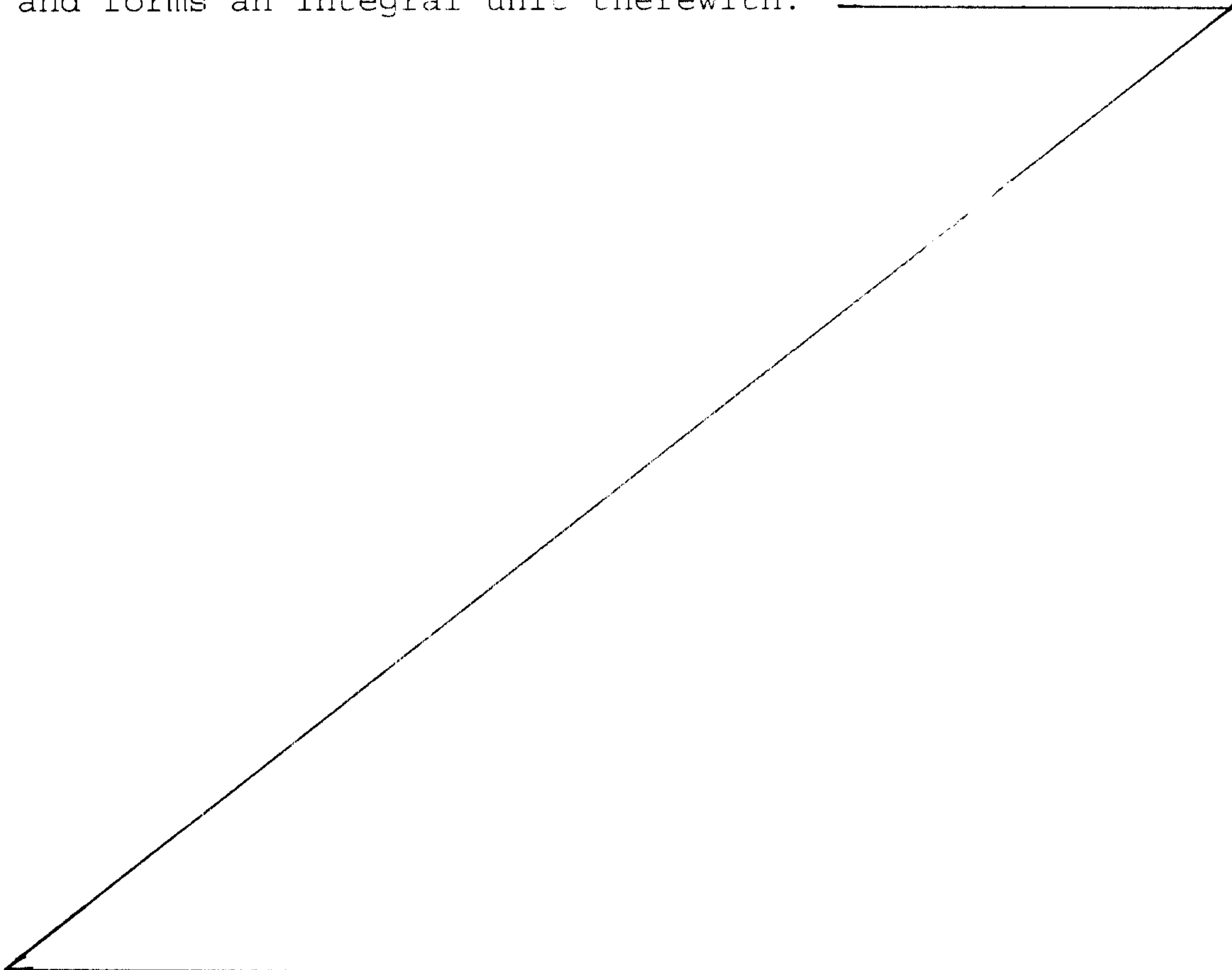
there is provided on the machine a separate outlet for substitute liquid to which a disposable set forming part of the hemodiafiltration circuit is connected in order to set up the dialysis machine for hemodiafiltration
5 treatment, said circuit being partly permanent and exposed to disinfection between the treatments in the dialysis machine especially constructed for hemodiafiltration.

Taking into account that the dialyzer always is connected to the dialysis machine via hoses by quick connectors (Hansen connectors) the object of the invention is to provide a disposable set which can be easily connected to any dialysis machine constructed for hemodialysis and having ultrafiltration control but in no
15 way constructed or prepared for hemodiafiltration treatment, in order to allow that the dialysis liquid to be supplied to the dialyzer is partly drained off and after filtration in a sterile micro-filter included in the disposable set, is supplied to the blood path.

20 According to one aspect of the invention, there is provided a sterile disposable hemodiafiltration set to be connected to a dialysis machine comprising a dialyzer with an extracorporeal blood path and a dialysis liquid supply line which can be connected to the dialyzer
25 wherein the hemodiafiltration set comprises a sterilized unit consisting of a hose connection with a sterile filter provided therein the hose connection being arranged for connection at one end thereof to the extracorporeal path via a separate pump and being provided with a three-way joint at the other end thereof for connection of the latter end between the supply line for dialysis liquid and the dialyzer.
30

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In order to achieve said object the disposable set of the kind referred to above has obtained according to the invention the characterizing features of claim 1. By this arrangement it is possible to make dialysis liquid 5 available on any dialysis machine constructed for hemodialysis and having ultrafiltration control simply by disconnecting the dialyzer from the dialysis liquid and supply line and interconnecting the three-way joint between the supply line and the dialyzer the dialysis 10 liquid after filtration in the sterile filter being supplied via the hose connection to the blood path at one side or the other of the dialyzer (pre-dilution or post-dilution, respectively)

According to a preferred embodiment of the invention 15 the sterile filter is combined with the three-way joint and forms an integral unit therewith. 

In order to explain the invention in more detail reference is made to the accompanying drawings disclosing an illustrative embodiment and wherein

5 FIG. 1 is a diagram of a dialysis machine constructed for hemodialysis and having ultrafiltration control with the disposable set according to the invention in one embodiment thereof,

10 FIG. 2 is a corresponding diagram of a dialysis machine with a disposable set of a second embodiment,

FIG. 3 is a perspective view of a three-way joint forming part of the disposable set, and

15 FIG. 4 is a perspective view of a three-way joint made integral with a sterile filter.

20 In FIG. 1 a dialysis machine constructed only for hemodialysis and having ultrafiltration control indicated by a block 11. The machine supplies dialysis liquid of high quality in a line 10 which is connected to the dialysis liquid inlet 13 of a dialyzer. The dialysis liquid outlet 15 thereof is connected to an outlet line 16. An extracorporeal blood path 19 extends through the dialyzer 14 and includes a drip chamber 20.

25 In order to allow hemodiafiltration treatment by using the dialysis machine with the system described the invention provides a sterile disposable hose set located within the dash line frame 21. This disposable hose set comprises a three-way joint 22 of the kind disclosed in FIG. 3. The three-way joint comprises a socket 23 with quick connectors at both ends thereof, so called Hansen connectors, one connector 24 thereof being a male connector to be connected with supply line 10, and the other connector 25 being a female connector to be connected with inlet 13 for dialysis liquid of the dialyzer 14. The inlet is provided with a male connector and the supply line with a female connector, and in conventional hemodialysis treatment these two connectors are interconnected as indicated

by a dot-and-dash line, but when a hemodiafiltration treatment shall take place the connectors are disconnected and socket 23 of the three-way joint is interconnected therebetween. The three-way joint also has a branch socket 26 and 5 is connected at this socket with a sterile filter 27 which is connected to one end of a hose 28. The hose set is delivered in a sterile package. After the three-way joint has been connected as explained above the other end of hose 28 is connected to drip chamber 20 and the hose is placed 10 around the rotor of a peristaltic pump 29.

From the flow of dialysis liquid supplied to the dialyzer a flow determined by the peristaltic pump thus is drained off, and after filtration in the microfilter this flow is supplied to the drip chamber to be supplied to the 15 blood in the extracorporeal blood path during a hemodiafiltration treatment. The supply can take place at another site either for post-dilution, as shown, or for pre-dilution.

In a preferred development of the invention the sterile filter 27 is integrated with the three-way joint 22 as 20 shown in FIG. 4. The filter can instead be integrated with another element in the circuit for substitute flow for example with the drip chamber 20.

In the embodiment according to FIG. 2 the peristaltic pump is replaced by a pump - indicated by a symbol 30 - 25 which is combined with the unit formed by the three-way joint 22 and the sterile filter 27. The pump is connected with a turbine which is driven by the dialysis liquid flow to the dialyzer 14, to pump substitute liquid to the extracorporeal path via the sterile filter. 30

Summarizing, the invention provides the possibility of effecting by means of an ultrafiltration controlled dialysis machine, constructed for hemodialysis only and not constructed or prepared for hemodiafiltration treatment, a 35 hemodiafiltration treatment without performing any modifi-

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cation in the machine or the program thereof. In other words, no machine of special construction is necessary for hemodiafiltration.

CLAIMS

1. A sterile disposable hemodiafiltration set to be connected to a dialysis machine comprising a dialyzer with an extracorporeal blood path and a dialysis liquid supply line which can be connected to the dialyzer wherein the hemodiafiltration set comprises a sterilized unit consisting of a hose connection with a sterile filter provided therein said hose connection being arranged for connection at one end thereof to the extracorporeal path via a separate pump and being provided with a three-way joint at the other end thereof for connection of said latter end between the supply line for dialysis liquid and the dialyzer.
- 15 2. Hemodiafiltration set according to claim 1, wherein the three-way joint is provided with quick connectors for connection to matching quick connectors on the dialysis liquid supply line and the dialyzer, respectively.
- 20 3. Hemodiafiltration set according to claim 1 or 2, wherein the three-way joint and the sterile filter are integrated to form a unit.
- 25 4. Hemodiafiltration set according to any of claims 1 to 3, wherein the hose connection forms a liquid conducting element in a peristaltic pump.
- 30 5. Hemodiafiltration set according to any of claims 1 to 3, wherein the pump is integrated with the three-way joint to form a unit therewith.

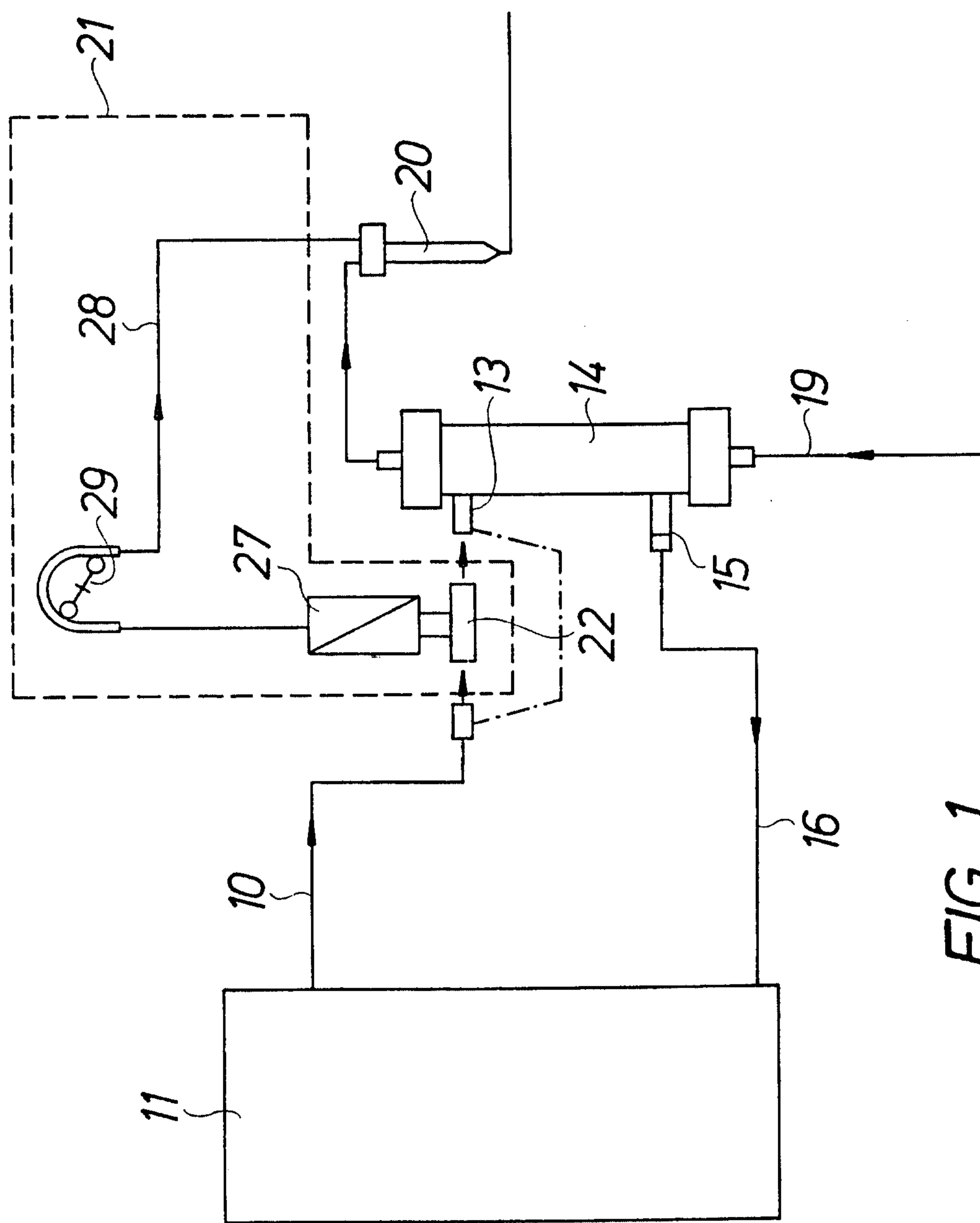
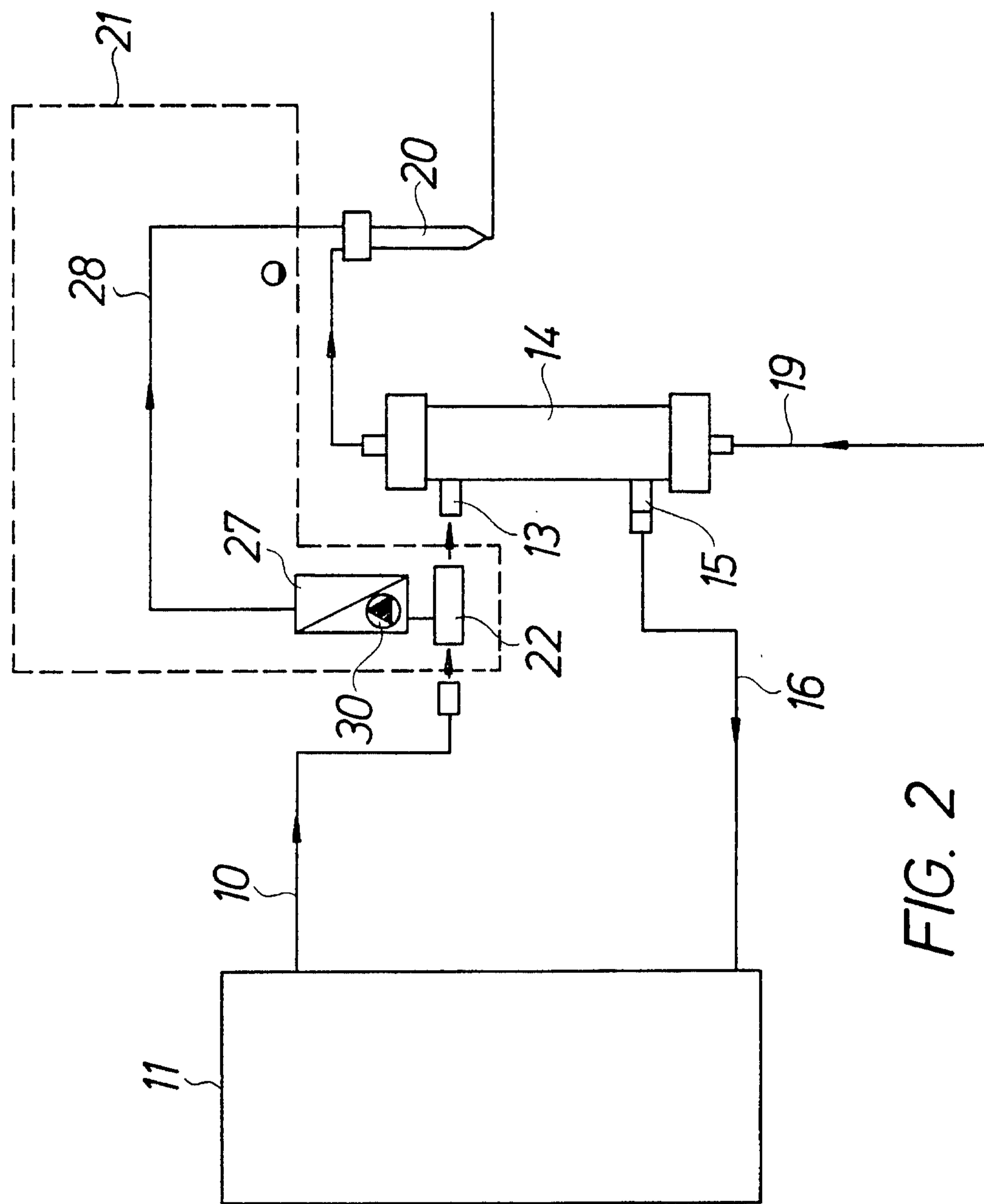


FIG. 1



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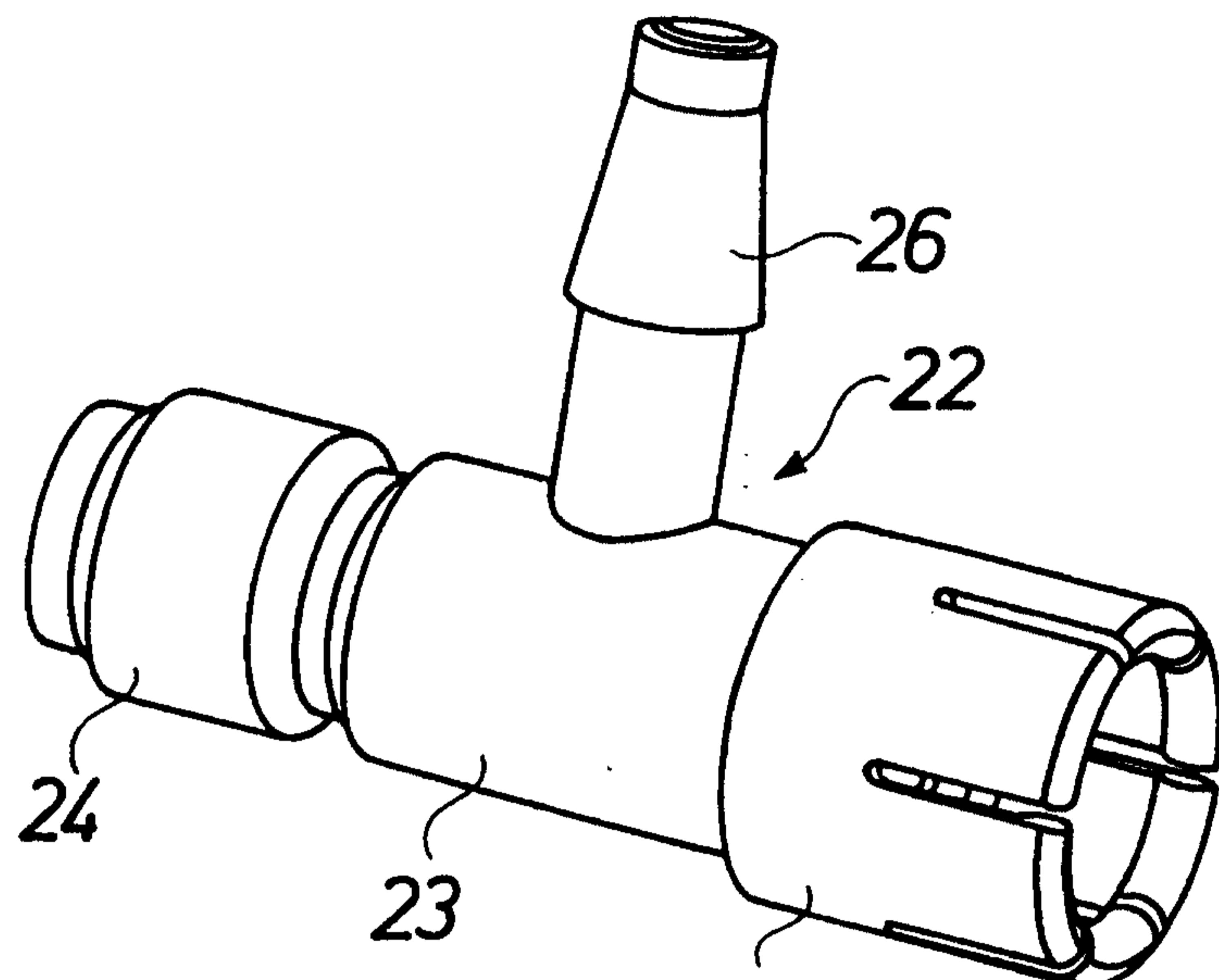


FIG. 3

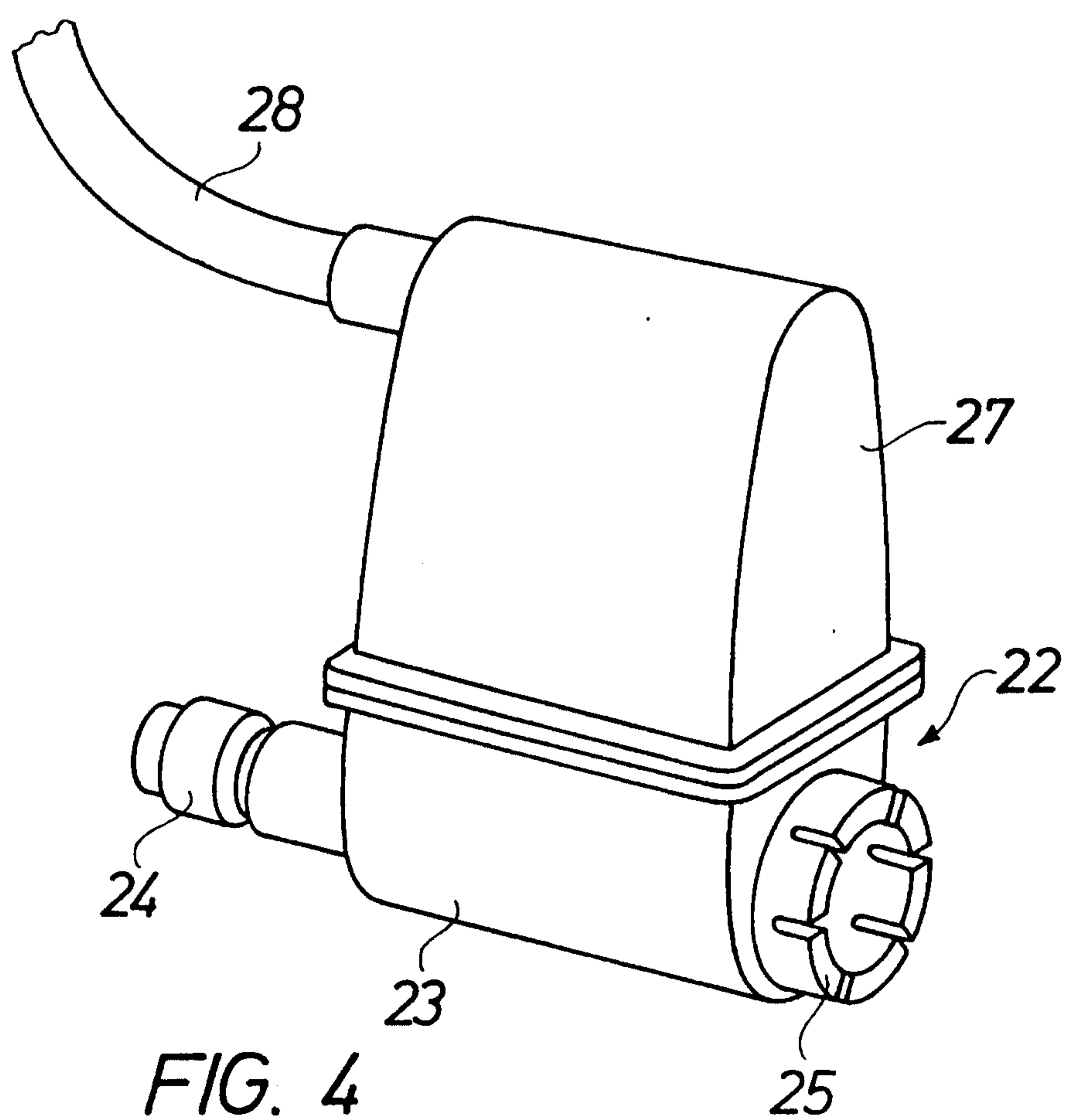


FIG. 4

