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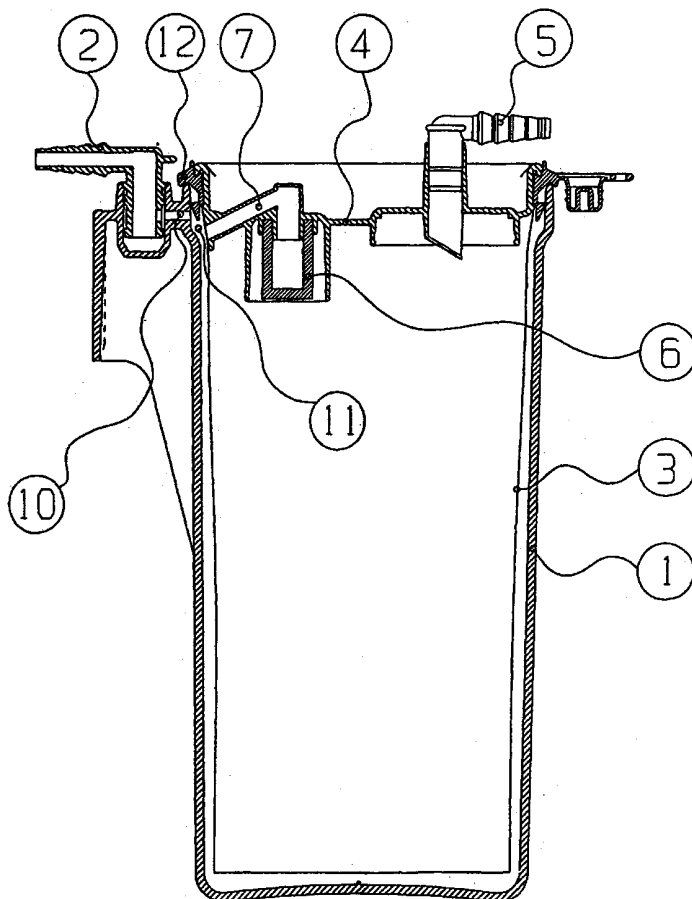
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- (71) Applicant (for all designated States except US): SERRES OY [FI/FI]; Kurikantie 287, FIN-61850 Kauhajoki (FI).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): RAJAMÄKI, Veikko [FI/FI]; Aisatie 8, FIN-61800 Kauhajoki (FI).
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[Continued on next page]

(54) Title: SUCTION BAG ASSEMBLY



(57) Abstract: The invention relates to a suction bag assembly for collection of liquid fluid, the assembly comprising a collection container (1) open at its one end, a cover (4) for closing the open end of the collection container (1), a flexible suction bag (3) which is adapted insertable into the collection container (1) so as to be attached to said cover (4), a connector (2) adapted to the collection container (1) and communicating via a flow channel with a vacuum source so as to provide a vacuum between the interior surface of the collection container (1) and the exterior surface of the suction bag (3), a patient tubing connector (5) serving to provide fluid communications from the source of fluids being sucked to the interior of the suction bag (3), a conduit (7) adapted to the cover (4) for transmitting the applied vacuum to the interior of the suction bag (3), and a filter (6) adapted to the end of the conduit (7) exiting into the interior of the suction bag (3), whereby the filter serves to prevent contaminants from entering the vacuum system.



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Suction bag assembly

The invention relates to a suction bag assembly according
5 to the preamble of claim 1 and a suction bag structure
according to the preamble of claim 9 adapted insertable
into a collection container of said suction bag assembly.

In the surgical, intensive-care and first-aid departments
10 of hospitals, for instance, the collection of different
fluids sucked from a patient has conventionally been
carried out using collection containers, wherein the
fluid is sucked by a vacuum. Generally, the vacuum source
is connected to the collection container via a tubing so
15 that the interior of the collection container can be
brought to a vacuum. Also another tubing, commonly known
as the patient tubing, is passed from the container to
the point selected for sucking fluid. When the vacuum
source is operative, the fluid being sucked moves along
20 the patient tubing under the vacuum into the collection
container. When full, the container is emptied, washed
and put in use again.

Due to hygienic reasons, washable collection containers
25 have been replaced by disposable suction bags, generally
made from a polymer material, that can be air-tightly
sealed with the help of a cover into the interior of a
collection container. The connector of the patient tubing
is adapted to the cover of the container, while the con-
30 nector of the tubing communicating with the vacuum source
may be adapted to either the cover or the side of the
container. Not only the interior of the suction bag, but

also the space remaining between the interior surface of the collection container and the exterior surface of the suction bag must be brought to a vacuum that expands the bag against the walls of the collection container and thus prevents the flexible suction bag from collapsing under the vacuum brought into its interior.

Suction bag systems commonly used today can be categorized by their construction into two major types. In the first type, the suction bag has thereto connected in a permanent manner a thick and solid cover portion that also serves as the cover of the collection container after the suction bag has been inserted into the container. The bag and the cover portion may be attached to each other by welding, for instance. When the bag is full, the bag with its integral cover is removed from the container so that a new bag with its integral cover can be inserted therein. This kind of collection bag structure is disclosed in US Pat. No. 4,516,973, for instance.

In the other major type, the basic structure of the system is formed by a separate cover cooperating with a collection container, while the suction bag is attached to the cover portion by quick-connects, for instance. When the suction bag is full, the bag is detached from the cover, whereupon a new bag can be attached thereto. This kind of suction bag structure is disclosed in application publication EP 861,668, for instance.

Generally in both of the above-described suction bag systems, there is located between the collection

container and the vacuum source a filter that serves to prevent microbes from entering the vacuum system. Additionally, the system is commonly provided with a suction bag overfill preventer that may be implemented integrally with the filter by way of inserting therein material which undergoes swelling when wetted. In this manner, the filter can be arranged to block the conduit to the suction system when the fluid level in the suction bag reaches the filter level, thus preventing the entry of fluid into the suction system. Conventionally, the filter is located to operate in a suction opening of the suction bag or in conjunction with a vacuum connector mounted on the cover portion.

In order to ensure correct and safe operation of a suction bag system, it is important to prevent inadvertent misconnection of the patient/vacuum tubings to wrong connectors. The risk of such a misconnection is high, particularly in systems wherein the suction bag and the cover portion are permanently connected to each other. If the connectors for both of the tubings are located in the cover portion, the tubings must be disconnected and reconnected each time the suction bag is replaced. Obviously, the risk of misconnection of tubings can be prevented by way of using connectors of different types or dimensions for the patient tubing and the vacuum system tubing. As the connector types of suction bag systems used in different countries may be unlike each other, a wide selection of incompatible connector systems can be found in commercial fluid collection equipment.

To ease the replacement of a suction bag, suction bag

collection systems have been developed based on suction bag structures comprising an integral combination of a cover portion with a suction bag, whereby the replacement of the full bag only needs the patient tubing to be disconnected and then reconnected to the cover portion of the new bag. Herein, the vacuum system tubing is attached to a connector adapted to the side of the collection container, thus dispensing with the need to disconnect the vacuum tubing at the replacement of the bag. In a known construction of this kind, the vacuum is brought into the suction bag via an opening provided at the side of the bag. A disadvantage of such a structure, however, is that the combination filter-overfill preventer protecting the vacuum system must be mounted to the flexible and thin bag portion, which is very awkward in series production. The structure of this kind of suction bag is described in US Pat. No. 4,516,973, for instance.

In publication WO 94/14045 is described a construction, wherein the opening of the collection container is sealed with a detachable cover portion. The suction bag is attached in a permanent manner to another cover portion. The cover portions of the collection container and the suction bag are connected to each other with the help of support spacers so that a gap remains therebetween. The cover portion of the suction bag has an opening that is covered by a filter from the side facing the cover portion of the collection container of the suction bag. The filter is held in place by means of a lattice that can be inserted between the two cover portions. The patient tubing is attached to a connector extending through the cover portions and the vacuum system tubing is attached

to the side of the collection container so that the vacuum is applied via the interior of the opposed cover portions into the interior of the suction bag. A disadvantage of this construction is that the cover construction is complicated and expensive to manufacture inasmuch it comprises three separate components, namely, the cover of the collection container, the cover of the suction bag and the lattice supporting the filter therebetween when the filter is inserted between the opposed cover portions. After the filter is properly fixed, the cover portions must be joined to each other, which adds to the worksteps and production costs encountered in manufacture.

In collection systems, wherein the suction bag is connected to the cover portion by means of, e.g., quick-connects, an advantage is that the tubings attached to the connectors of the cover portion need not necessarily be disconnected during the replacement of the suction bag inasmuch the same cover portion detached from a full suction bag can be directly reused with a new bag. However, as the seal in the cover of this type of construction wears with time, the sealed joint between the cover portion and the collection container begins to leak, whereby the vacuum system becomes ineffective.

It is an object of the invention to provide an entirely novel type of suction bag assembly capable of overcoming the disadvantages of the above-described techniques.

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In the suction bag assembly according to the invention, the connector for the vacuum system tubing is adapted to

the side of the collection container, while the connector for the patient tubing is adapted to the cover portion that also has the suction bag attached thereto. This arrangement needs only the patient tubing connected to the cover to be disconnected when the suction bag is being replaced. The vacuum is brought via the vacuum system connector to the space remaining between the exterior surface of the suction bag and the interior surface of the collection container wall and also to the interior of the suction bag via a conduit adapted to the cover portion. The filter protecting the vacuum system, also serving as an overfill protector, is adapted into a conduit made in the cover portion, particularly to that end of the conduit which exits into the interior of the suction bag.

More specifically, the suction bag assembly according to the invention is characterized by what is stated in the characterizing part of claim 1.

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Furthermore, the suction bag structure according to the invention is characterized by what is stated in the characterizing part of claim 9.

25 The invention offers significant benefits.

The suction bag assembly according to the invention is free from the risk of misconnection of the patient tubing and the vacuum system tubing to wrong connectors inasmuch only the connector of the patient tubing must be disconnected during the replacement of the suction bag. Moreover, the construction according to the invention

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dispenses with the need for differently dimensioned connectors to prevent inadvertent mistakes in the connection of tubings. Furthermore, the replacement of a full suction bag is a quick operation. In the suction bag assembly according to the invention, the filter
5 protecting the vacuum system is adapted to the underside interior surface of the cover portion which is a significantly superior location as compared to the conventional placement of the filter at the side of the
10 bag or between two joined cover parts.

In the following, the invention is examined in detail by making reference to the attached drawing wherein

15 FIG. 1 is a longitudinally sectional view of a suction bag assembly according to the invention; and

FIG. 2 is a top view of the suction bag assembly of FIG. 1.

20 Referring to FIG. 1, the suction bag assembly shown therein comprises a collection container 1, made from a durable polymer material, having adapted to its support handle a vacuum connector 2, whereto a tubing passed to a vacuum source can be connected. The vacuum connector 2
25 has a conduit 10 exiting on the interior surface of the collection container 1.

To the collection container 1 is placed a suction bag 3 made from a material that is impervious to fluid and air.
30 The suction bag 3 is advantageously attached permanently to a cover 4 by welding, for instance. The cover 4 is stiffer and thicker than the suction bag 3 and can be

made from a polymer material, for instance. The cover has a connector 5, whereto a tubing can be connected passed to a patient or other point, wherefrom fluid is to be sucked. Additionally, the cover 4 has attached thereto with a flexible tie a plug 8, by means of which the patient tubing connector 5 can be plugged when the suction bag 3 is full. Additionally, there is adapted to the cover 4 a sampling/drainage connector 9 for the sucked fluid so as to make the connector channel to extend through the cover 4. The connector 9 may also be used for feeding therethrough a disinfectant and/or a solidifying agent into the suction bag 3 or for a series connection of multiple suction bags. The cover 4 is shaped to have a rim 12 adapted to be tightly compressible against the rim of the collection container 1 so as to form a seal that maintains the vacuum applied between the interior surface of the collection container 1 and the exterior surface of the suction bag 3 and, respectively, in the space 11 between the interior surface of the cover 4 and the interior surface of the collection container 1. The seal in this joint may be implemented, e.g., using O-rings mountable about the rim of the cover 4.

The cover 4 has a conduit 7 whose first end exits on the exterior surface of the cover 4, into the space 11 remaining between the interior surface of the collection container 1 and the cover 4, while its second end exits into the interior of the suction bag 3 facing the cover 4. On the cover 4, at the second end of the conduit 7, there is adapted a filter 6 serving to prevent contaminants from entering the vacuum system. Additionally, the filter 6 is advantageously made self-sealing under a

contact with a fluid, thus preventing the entry of fluid into the conduit 7 when the fluid level in the suction bag 3 reaches the level of the filter 6.

5 In the use of the suction bag system, a vacuum is applied via a tubing communicating with a vacuum source via the conduit 10 of the vacuum connector 2 into the space between the interior surface of the collection container 1 and the exterior surface of the suction bag 3 and,
10 respectively, into the space 11 between the cover 4 and the interior surface of the collection container 1, whereby the vacuum is further applied via the conduit 7 of the cover 4 and the filter 6 thereof into the suction bag 3 and therefrom further to the patient tubing connector 5 and, finally, into the suction tubing connected
15 thereto, thus forcing the fluid to flow from the point subjected to sucking toward the suction bag 3. Accordingly, the flow of the vacuum in the conduit 7 takes place from the suction bag 3 toward the vacuum
20 connector 2. When the fluid level in the suction bag 3 reaches the level of the filter 6, the filter 6 cuts off the fluid flow, thus preventing the entry of fluid into the vacuum system. After the suction bag 3 is sucked full, both the suction bag 3 with the cover 4 is removed
25 from the collection container 1 so that a new suction bag 3 with its integral cover 4 can be inserted in the collection container 1.

30 As the conduit 7 and the filter 6 are dimensioned to cause some pressure loss in the vacuum flow, the vacuum prevailing in the space between the interior surface of the collection container 1 and the exterior surface of

the suction bag 3 exceeds the vacuum prevailing in the interior of the suction bag, thus preventing the suction bag 3 from collapsing, particularly when empty.

What is claimed is:

1. Suction bag assembly for collection of liquid fluid,
the assembly comprising

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- a collection container (1) open at its one end,
- a cover (4) for closing said one open end of said collection container (1),
- adapted insertable into said collection
10 container (1), a flexible suction bag (3) attached to said cover (4),
- a vacuum connector (2) adapted to said collection container (1) and communicating via a flow channel with a vacuum source so as to
15 provide a vacuum between the interior surface of said collection container (1) and the exterior surface of said suction bag (3),
- a patient tubing connector (5) adapted to said cover (4) and serving to provide fluid
20 communications from the source of fluids to the interior of said suction bag (3),
- a communications means (7) adapted to said cover (4) for transmitting the applied vacuum to the interior of said suction bag (3), and
- 25 - a filter (6) serving to prevent contaminants from entering the vacuum system,

c h a r a c t e r i z e d in that

30

- said communications means is a conduit (7), and
- said filter (6) is adapted to the end of said conduit (7) exiting into the interior of said

suction bag (3).

2. Assembly according to claim 1, c h a r a c t e r -
i z e d in that the first end of said conduit (7)
5 exits on the exterior surface of the cover (4), into
a space (11) remaining between the interior surface
of the collection container (1) and the cover (4),
while its second end exits into the interior of the
suction bag (3) facing the cover (4).
- 10 3. Assembly according to claim 1, c h a r a c t e r -
i z e d in that said suction bag (3) is permanently
attached to said cover (4).
- 15 4. Assembly according to claim 1, c h a r a c t e r -
i z e d in that said filter (6) is made of a mate-
rial capable of swelling when wetted.
- 20 5. Assembly according to claim 1, c h a r a c t e r -
i z e d in that said vacuum connector (2) is adapted
to the support handle of said collection container
(1).
- 25 6. Assembly according to claim 1, c h a r a c t e r -
i z e d by a plug (8) attached to said cover (4)
with a flexible tie so as to serve as a plug for said
patient tubing connector (5).
- 30 7. Assembly according to claim 1, c h a r a c t e r -
i z e d by a sampling/drainage connector (9) adapted
to said cover (4) for handling the sucked fluid.

8. Assembly according to claim 1, characterized in that said vacuum connector (2) incorporates a conduit (10) via which the vacuum can be brought into the interior of said collection
5 container (1).

9. Suction bag structure insertable into a collection container (1) of liquid fluids which is open at its one end and incorporates a vacuum connector (2) suited for
10 communicating with a vacuum source, the suction bag structure comprising

- a cover (4) for closing said one open end of said collection container (1),
- a flexible suction bag (3) attached to said
15 cover (4),
- a patient tubing connector (5) serving to provide fluid communications from the source of fluids to the interior of said suction bag (3),
- a communications means (7) adapted to said
20 cover (4) for transmitting the applied vacuum to the interior of said suction bag (3), and
- a filter serving to prevent contaminants from entering the vacuum system,

25 characterized in that

- said communications means is a conduit (7), and
- said filter (6) is adapted to the end of said conduit (7) exiting into the interior of said
30 suction bag (3).

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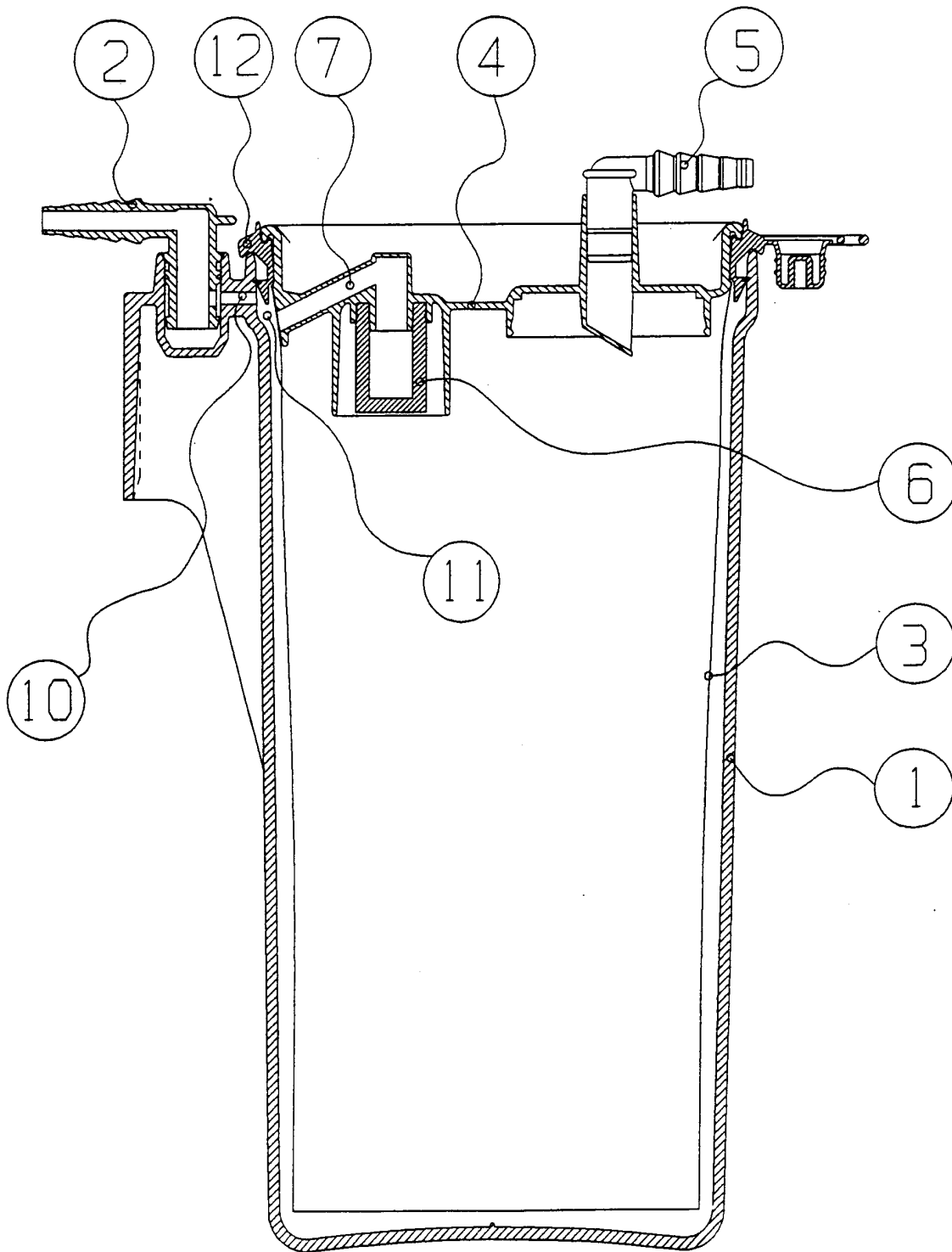


Fig. 1

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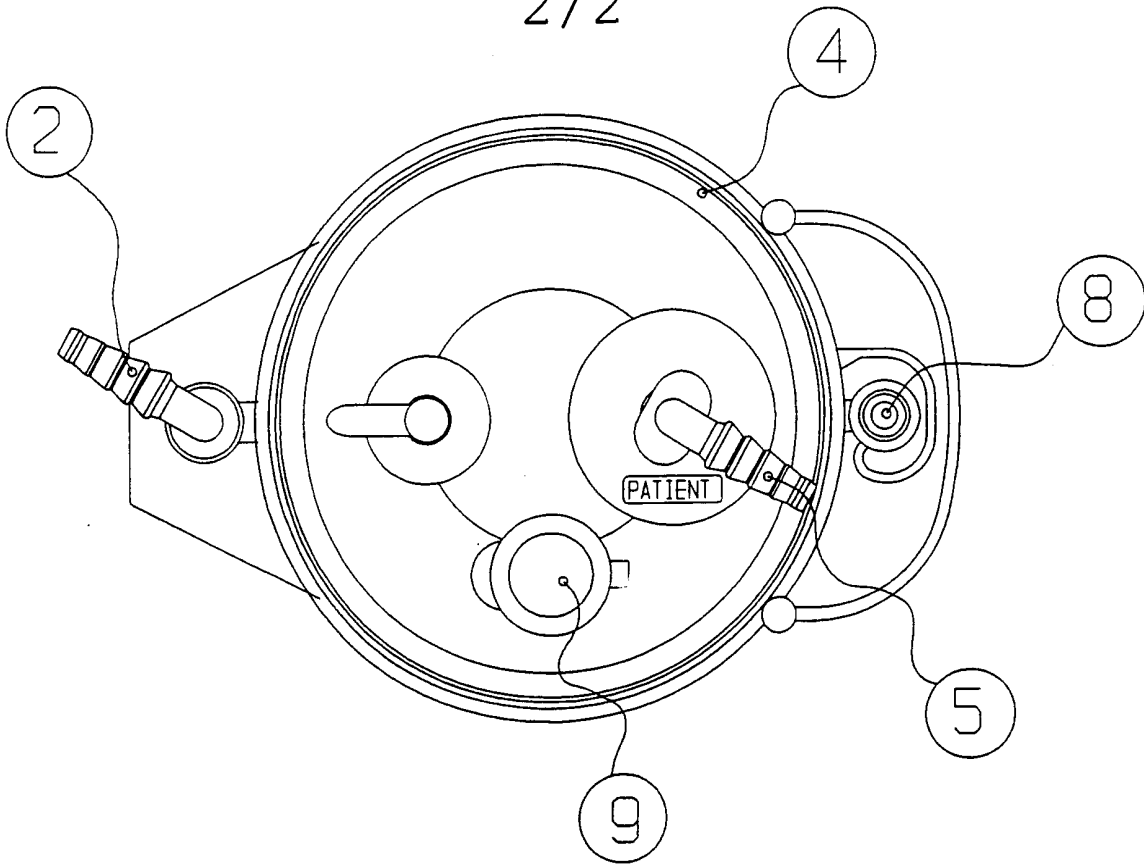


Fig. 2

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 00/00840

A. CLASSIFICATION OF SUBJECT MATTER		
IPC7: A61M 1/00 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
IPC7: A61M		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
SE,DK,FI,NO classes as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4460361 A (NICHOLS), 17 July 1984 (17.07.84), column 2, line 33 - line 47; column 3, line 36 - line 38 --	1-9
Y	WO 9414045 A1 (LANGDON MEDICAL, INC.), 23 June 1994 (23.06.94), page 3, line 6 - line 21; page 12, line 15 - line 26 --	1-9
A	US 4228798 A (DEATON), 21 October 1980 (21.10.80), abstract --	4
A	US 4681571 A (NEHRING), 21 July 1987 (21.07.87), column 2, line 3 - line 27, figure 6 --	1,9
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search		Date of mailing of the international search report
19 February 2001		22-02-2001
Name and mailing address of the ISA: Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86		Authorized officer Frida Plym Forsshell /OGU Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

Information on patent family members

05/02/01

International application No.

PCT/FI 00/00840

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4460361 A	17/07/84	NONE	
WO 9414045 A1	23/06/94	AU 5951294 A MX 9307826 A US 5386735 A	04/07/94 30/06/94 07/02/95
US 4228798 A	21/10/80	NONE	
US 4681571 A	21/07/87	NONE	