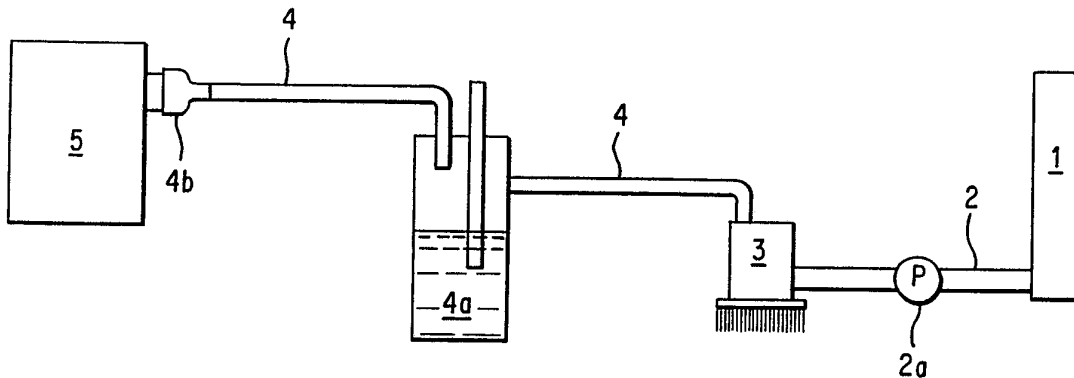




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>5</sup> : <b>A61M 1/00, 35/00</b>	<b>A1</b>	(11) International Publication Number: <b>WO 92/12741</b> (43) International Publication Date: <b>6 August 1992 (06.08.92)</b>
<p>(21) International Application Number: PCT/US92/00114</p> <p>(22) International Filing Date: 17 January 1992 (17.01.92)</p> <p>(30) Priority data: 642,966 18 January 1991 (18.01.91) US</p> <p>(71)(72) Applicant and Inventor: GIBBONS, DeLamar [US/US]; 204 Oregon Street, Kellogg, ID 83837 (US).</p> <p>(74) Agent: HENDRICKS, Glenna; 9669-A Main Street, P.O. Box 2509, Fairfax, VA 22031-2509 (US).</p> <p>(81) Designated States: AT (European patent), AU, BE (European patent), CA, CH (European patent), DE (European patent), DK (European patent), ES (European patent), FR (European patent), GB (European patent), GR (European patent), IT (European patent), JP, KR, LU (European patent), MC (European patent), NL (European patent), SE (European patent).</p>		<p><b>Published</b> <i>With international search report.</i></p>

## (54) Title: BODY VACUUM



## (57) Abstract

The invention requires a brush (3) having a passage through which water forced under pressure (2) is supplied to the brush area and having a passage (4) attached to a vacuum (40). The water supply passage (2a) and the passage under vacuum must be so aligned that the cleaning solution is removed from the area to be cleaned along with debris without allowing the contaminated solution to collect on the surface of the skin. In the preferred embodiment of the invention, no moving parts are required for the brush. The brush may be made of any soft material that is easily cleaned. However, a brush made of soft plastic bristles such as those used for surgical scrub brushes is preferred. The invention does not require formation of a foam as a cleansing agent.

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BODY VACUUMField of the Invention

5 This invention is related to means for cleaning  
surfaces. The cleaning of objects using controlled expo-  
sure to the cleaning fluid is particularly desirable in  
many instances where either there is need to avoid expo-  
sure of the surrounding area to moisture or there is need  
to protect the environment, including care givers, from  
10 the used cleaning medium. Such instances include the  
washing of patients that must be confined to bed and  
trauma patients in surgery or emergency care facilities.  
Furthermore, it is frequently difficult to provide ade-  
quate cleansing without moistening the bedding. The  
15 problem is particularly acute when exposure to the solu-  
tion used for cleansing may damage the patient or in-  
crease discomfort, as is the case with burn patients or  
patients in body casts.

20 Background of the Invention

Problems related to protection of the environment  
include care of patients with infectious diseases or  
practice of cleaning processes that use harmful cleaning  
solutions or remove environmentally harmful substances  
25 from the area being cleansed. Patient bathing devices  
have been known. A few of these devices use a suction  
means for removing cleansing fluid and debris.

The use of portable scrubbing devices has been  
known. United State Patent 3,574,239 to Sollerud dis-  
30 closes a portable bathing device for use in bathing pa-  
tients in hospital and nursing home settings. The device  
is, however, limited in its application since it is  
housed in a rather large unit that must be wheeled to the

bedside. Furthermore, the invention of Sollerud uses a sponge surrounded with a concentric passageway connected to a vacuum. The device requires a foaming cleaning solution under pressure to clean the wound, and would not be appropriate for removing bits of glass or other debris from wounds. Other scrubbing devices for use in cleaning of carpeting and hard surface floors have, of course, been known, but such devices are often unwieldy and are not adapted for meeting a wide range of cleaning applications. Most particularly, they are not adapted for use in cleaning skin or other surfaces requiring gentle, controlled cleaning.

United States Patent 4,900,316 to Yamamoto discloses a suction device for use in cleaning and suctioning the skin. The device uses a suction cap. The device requires access to modern plumbing and is useful only for removing small amounts of undesirable matter from the skin.

## 20 Disclosure of the Invention

The subject invention provides a means of cleaning body surfaces with a portable device that may be either connected to a vacuum or can be used as an adaptation to currently used cleaning machines. While the invention has been particularly adapted for use in cleaning the skin and its appendages, it is deemed useful for any application requiring gentle cleaning and removal of debris with maximum control of the cleansing solution and/or debris.

30

## Brief Description of the Drawings

**Figure 1:** Figure 1 is a schematic view of the invention having a solution supply (1), a conduit carrying solution under pressure (2), a brush having soft bristles (3), and a conduit to a negative pressure source (4).

35

**Figure 2:** Figure 2 is a schematic view of some preferred brushes used to clean patients wherein the bristles are of soft plastic.

**Figure 3:** Figure 3 is a schematic view of the invention adapted for the cleaning device disclosed in U.S. Patent 4,803,466, which is incorporated herein by reference, namely, the Ultimate cleaning device available from U.S. Products, Inc. of Hayden Lake, Idaho in the United States.

**Figure 4:** Figure 4 is a schematic view wherein the fluid supply is a bag filled with sterile solution and wherein the pressure is provided by gravity and the negative pressure source is a wall suction.

#### 15 Modes for Carrying Out the Invention

The subject invention provides a means for cleaning in instances where it is necessary to avoid exposure the area surrounding the area being cleaned to cleaning solution and debris. The invention is useful for purposes of protecting care deliverers from exposure to infectious organisms or toxic substances. The subject invention also provides a means of cleaning patients while protecting dressings from exposure to fluid used in cleaning.

Referring now to the drawings, Fig. 1 is a schematic view of the invention. The system requires a source of solution (1). The solution source is not important and can be, for example, a tank in a cleaning device such as that disclosed in U.S. patent 4,803,466, a bag or bottle of sterile fluid hung on a standard, or a water faucet. A conduit (2) from the water supply carries the solution under pressure to the brush. The source of the pressure is not important. The pressure may result from the force of gravity as would result if a container of fluid were held above the level of the brush on a standard such as that usually used to administer intravenous feedings.

Alternatively, the solution may be forced under pressure from a pump means (2a). The solution must enter the brush unit (3) near the bristles. The solution is then removed by lift provided from a negative pressure generator (5) through the conduit (4). The source of negative pressure generator may be a vacuum pump that is part of a cleaning machine, a wall suction in a care facility, or a household vacuum cleaner. If household vacuum cleaner is used, the conduit must be equipped with a trap (4a) for collecting the used solution and other debris. In the latter case, the part of the conduit leading from the trap must have, at its end, an adaptive connection for attachment to the vacuum cleaner as shown at 4b (insert). If the negative pressure generator is a wet/dry vacuum, a connector as shown in the 4b insert may be attached to the conduit from the brush portion without use of a trap.

Preferred embodiments of the brush unit adapted for attachment to the conduit from the solution supply source and a negative pressure generator are shown in Fig. 2. The brush portion (1) has conduits equipped with connectors (2) and (3) adapted for connection to the solution supply and suction units. Fig. 2(a) shows the brush having a large conduit to the suction unit. This arrangement was used successfully with the cleaning device disclosed in U.S. Patent 4,803,466 known as Ultimate PB-III (hereinafter referred to as "Ultimate". Fig. 2(b) shows a unit particularly useful with standard plastic tubing connected to the suction apparatus with traps commonly used in hospitals, or for use with wall suction. Fig. 2(c) shows an alternative arrangement for the brush wherein the bristles are surrounded by a concentric passage under negative pressure. Fig. 2(d) shows a connector that may be used with a wet/dry vacuum when no trap is required.

Fig. 3 depicts the brush arrangement of Fig. 2(a) as

used with the "Ultimate" cleaner, which comes equipped with a unit that warms the solution and holds it at the desired temperature. The device as illustrated would be useful in nursing homes and other care facilities where  
5 there was a desire to clean many patients suffering from incontinence or infectious disease.

One important feature of the unique devices and methods of the invention for use in protecting care-givers from exposure to infection or toxic substances is the  
10 capability for treating used solution before it is discharged into the environment. In a preferred embodiment, the spent/soiled fluid can be retained in a trap for treatment with disinfectants or detoxifying means (whether chemical or physical) before appropriate disposal.

15 The invention can, of course, be used to clean any person, whether well or ill. When used for patient care, it is possible to wash the patient without exposing areas covered with bandaging or casts to the fluid. It is also possible to wash patients suffering burns without exposing  
20 the nearby burned areas to the cleansing fluid. The invention is very useful for cleaning victims of trauma who have debris such as glass imbedded in bruised areas of flesh. The use of the brush having soft bristles that will not mat in conjunction with the lift provided by the vacuum would remove the imbedded debris without adding to  
25 the trauma affecting the underlying tissues. The brush must have bristles that will spring back after displacement from rubbing, in other words, that will not mat, in order to be useful for this purpose, since it is necessary that the water flow not be obstructed and that the  
30 individual bristle tips be available to the surface being cleansed if maximum benefit is to be obtained when cleansing such wounds.

Fig. 4 provides a schematic drawing of the invention  
35 using as a negative pressure source a wall suction (5)

such as that found in hospital and other care facilities. The source of solution (1) is a bag of fluid. The fluid can contain, for example, disinfectants and detergents. The brush unit (3) is attached through a tubular conduit (3a) to the conduit from the fluid bag (1a) through a connector (2). A preferred connector would comprise an integral extension which is a cylindrical screw having a graduated cylinder size with external threads that would be inserted into the conduit from the solution supply. It is appreciated that the screw arrangement will allow access of the connector to tubular conduits of varying sizes. The conduit from the brush to the vacuum is attached by a second connector (4) through a trap (5) to the wall suction (6). If controlled collection of the solution is not required, there is no need for a trap. In that instance the conduit from the brush may attach directly to the hollow cylindrical screw of the wall suction.

It is possible to avoid contact in the general environment with the spent fluid, body discharges and fluids containing disease inducing contaminants, since the suction may be attached to the vacuum source through a trap that will contain substances that will render the used cleansing fluid harmless. Even if the negative pressure providing device has a solution receiving device, it may be necessary to pass the spent/soiled fluid through a trap before discharge into the solution-receiving area so that the solution can be treated. As an example, addition of chlorine or other disinfectants can be added to fluid in the trap before discharge into the environment. In some instances, it might be quite acceptable to simply pour the disinfectant into the discharge receptacle either before use of the device or after the soiled solution has been collected but before discharge into the environment.



The invention can be used to provide cleansing when there is a limited supply of water available, since the solution can be used more efficiently. Because the invention can be used with a wide variety of suction devices, it is necessary to transport only the fluid with scrubbing units to the user.

The invention is also useful for cleaning pets. It is particularly useful for cleansing in conjunction with use of pesticides such as flea repellents, since exposure of the care-taker to the pesticides is reduced.

If desired, the suction can be applied through a concentric passageway that surrounds the brush as illustrated in Fig. 2c. This arrangement may be particularly advantageous when it is crucial that no solution reach the surrounding area. Such control is particularly crucial in cleaning burn patients or patients in a cast. The concentric passageway design may also be particularly useful when it is desirable to use less lift, since the solution, if not contained by such a passage, is then more likely to escape the area being cleaned.

The brush may be any shape, though the round or oval shape is preferred for purposes of cleansing the skin.

The method and devices of the invention make it possible to administer a sterile solution under pressure to a wound area in such a manner that the area is cleaned by the pressurized solution and the gentle agitation of the brush bristles. While it is often desirable to have a pump to force the cleaning solution against the surface being cleaned, in many instances, it is possible for gravity to provide sufficient pressure to the liquid. In such instances, the cleansing solution can easily be supplied in bags or bottles. This arrangement provides a ready means of cleansing wounds of patients in surgical or emergency care units with sterile solution wherein the brush is attached through the connector to the bag of

solution and the second connector is attached to a wall suction.

For purposes of daily cleaning of patients, a cleaning device such as The Ultimate cleaning device of U.S. Products, Inc. of Hayden Lake, Idaho is appropriate. The  
5 brush unit could be stored at the beside of each patient and could then be connected to the unit as needed. However, since the unit having the connectors and the brush would be relatively inexpensive, the brush unit could be  
10 disposed of after each use. It would not be necessary for such a device to have a heat exchanger as shown with the product of U.S. Products for purposes of washing patients. It would be necessary to use the brush as modified in the present invention to provide the necessary  
15 gentle cleansing needed in patient care. The container for the soiled solution will entrap any deleterious components such as asbestos or harmful infectious organisms for safe disposal and/or disinfecting.

The brush unit with connectors as exemplified in  
20 **Figure 2** may be sold as a unit for patient care. The connector means may be attached to the conduits or provided separately. Alternatively, kits containing the brush portion and a container of appropriate cleansing fluid may be provided. Solution may contain, for exam-  
25 ple, antiseptics or pharmaceutically active agents such as astringents or steroids.

For veterinary uses, kits containing the brush unit and pesticidal solutions may be provided. The pesticidal agents may be provided as concentrates or dissolved solu-  
30 tion ready for use.

All references cited in this document are incorporated herein by reference.

## CLAIMS:

1. A component adapted for cleaning comprising a brush portion having soft bristles that do not mat, said brush portion having two conduits attached thereto wherein the first conduit is equipped at the end distal to said brush with a connector adapted for connection to a solution supply source and at the end of said first conduit proximal to said brush portion an opening that opens into said brush portion near to said bristles, and wherein the second conduit leads from said brush, said second conduit leading, during operation, toward a negative pressure source, said second conduit having a first opening into said brush portion near the bristles of said brush portion, said second conduit having at the end distal from said brush portion a connector for attachment to a conduit from a negative pressure generator.
2. A component adapted for cleaning comprising a brush unit having soft bristles that do not mat, said brush unit having attached thereto a supply conduit, said supply conduit having at the end distal to said brush unit a connector adapted for connection to a solution supply source and at the end proximal to said brush unit an opening into said brush unit in such a position that no barrier intercepts flow of fluid from said supply conduit to the surface being cleaned, and a discharge conduit for attachment to a negative pressure source, said discharge conduit having at one end an opening into said brush unit wherein there is no barrier between said brush bristles and said discharge conduit opening, said discharge conduit having at the end distal from said brush unit a connector for attachment of said con-

duit to a negative pressure generator.

3. A device for cleaning comprising a brush portion having soft bristles that do not mat having two conduits, a first conduit attached to a solution supply and a second conduit attached to a negative pressure source.
4. A device of claim 3 wherein the negative pressure source is an "Ultimate" cleaner.
5. A device of claim 3 wherein the negative pressure source is a wall suction.
6. A device of claim 3 wherein the fluid in the second is discharged into a trap.
7. A component of claim 1 wherein the bristles are made of plastic.
8. A component of claim 1 wherein the brush is oval or circular in shape.
9. A component of claim 1 wherein the connector of the first conduit distal to the brush portion is an integral extension of said conduit wherein said connector is a cylindrical screw having a graduated size with external threads adapted for insertion into a conduit from the solution supply.
10. A component of claim 1 wherein the connector of the second conduit distal from the brush portion is an integral extension of said conduit and wherein said connector is a cylindrical screw having a graduated size with external threads, said connector being

adapted for insertion into a conduit from the negative pressure generator.

- 5 11. A kit for cleaning comprising the component of claim 1 in a wrapping.
12. A kit of claim 11 containing, additionally, a container of pesticide.
- 10 13. A device of claim 3 wherein the first conduit is attached to a sterile solution supply source.
14. A device of claim 3 wherein the first conduit carries a solution containing an antiseptic.
- 15 15. A device of claim 3 which employs a pumping means to provide pressure.
16. A method of cleaning a mammal comprising the steps of:
- 20 (1) forcing fluid through a conduit connected to a brush portion having soft bristles that do not mat against the tissue to be cleaned; and
- (2) removing the fluid under negative pressure from
- 25 the area being cleaned.
17. A method of claim 16 wherein the tissue being cleaned is dermal tissue.
- 30 18. A method of claim 16 wherein the fluid is forced against the tissue by a pump.
19. A component of claim 1 wherein the brush bristles are made of plastic.
- 35

20. A component of claim 1 wherein the negative pressure is applied through a concentric passageway that surrounds the brush.

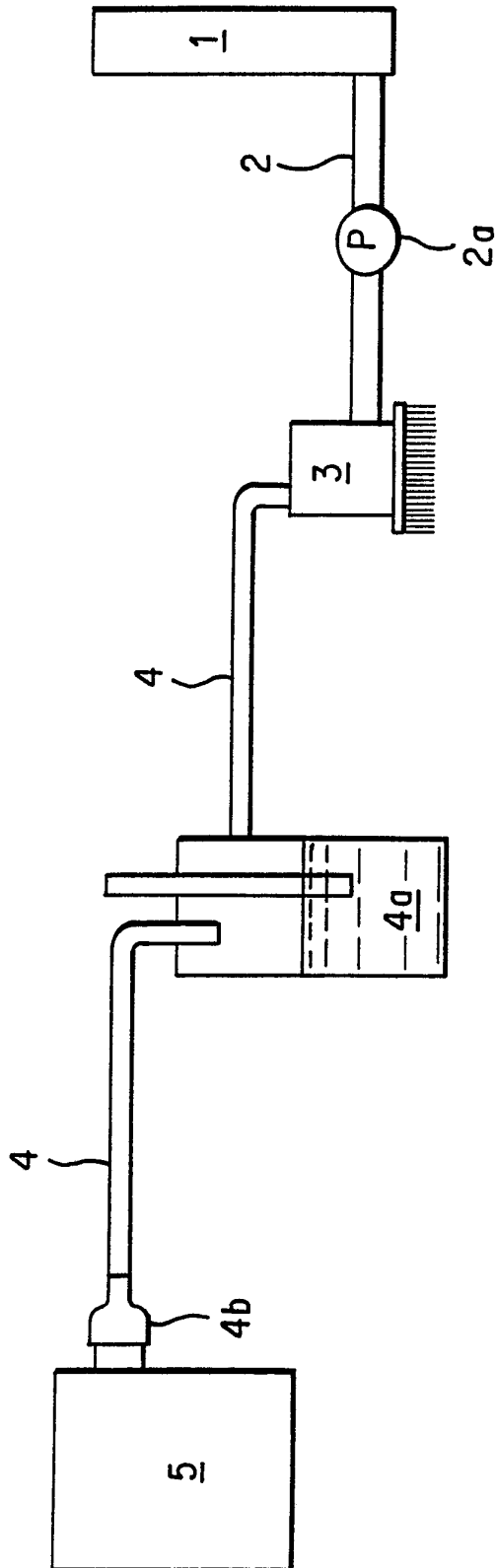


FIG. 1

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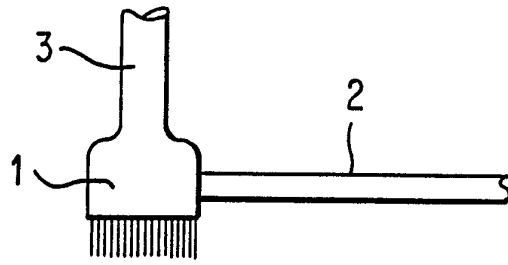


FIG. 2(a)

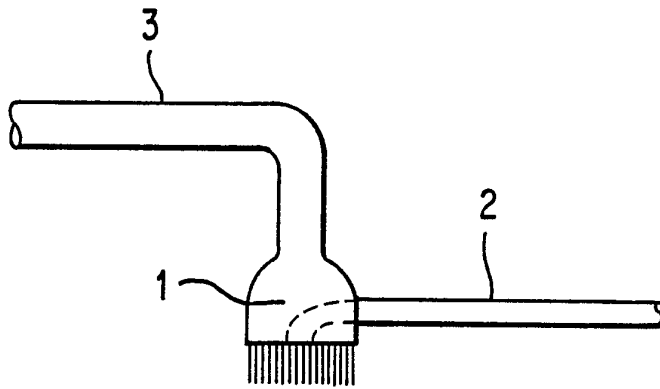


FIG. 2(b)

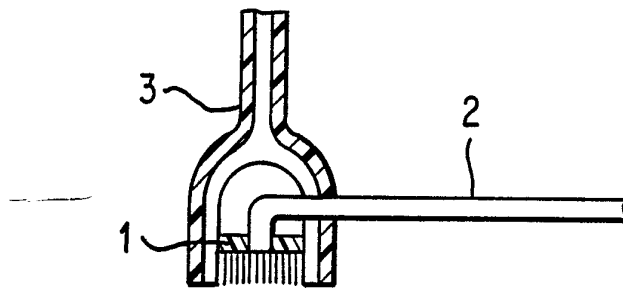


FIG. 2(c)

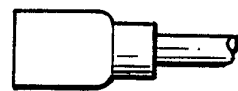


FIG. 2(d)



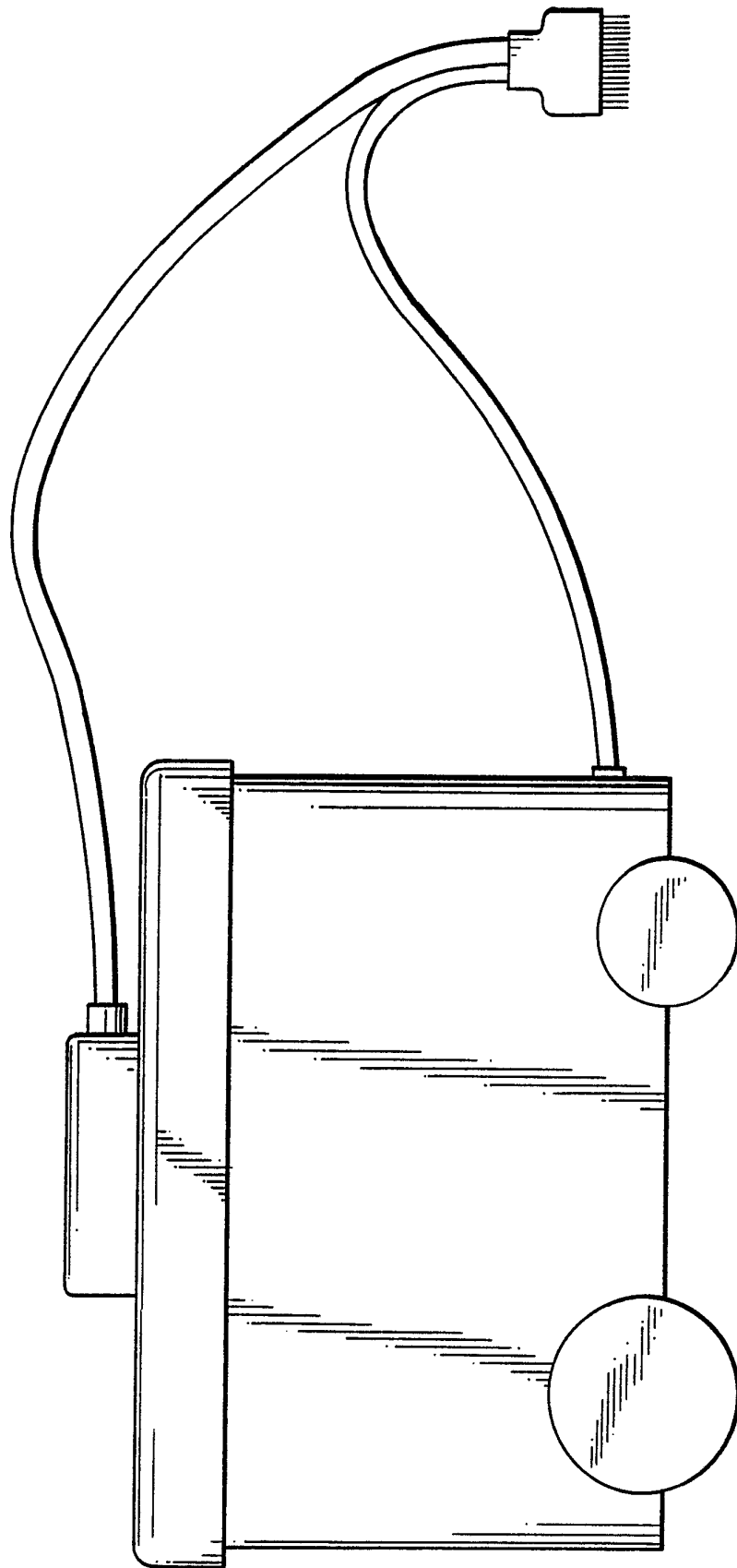


FIG. 3

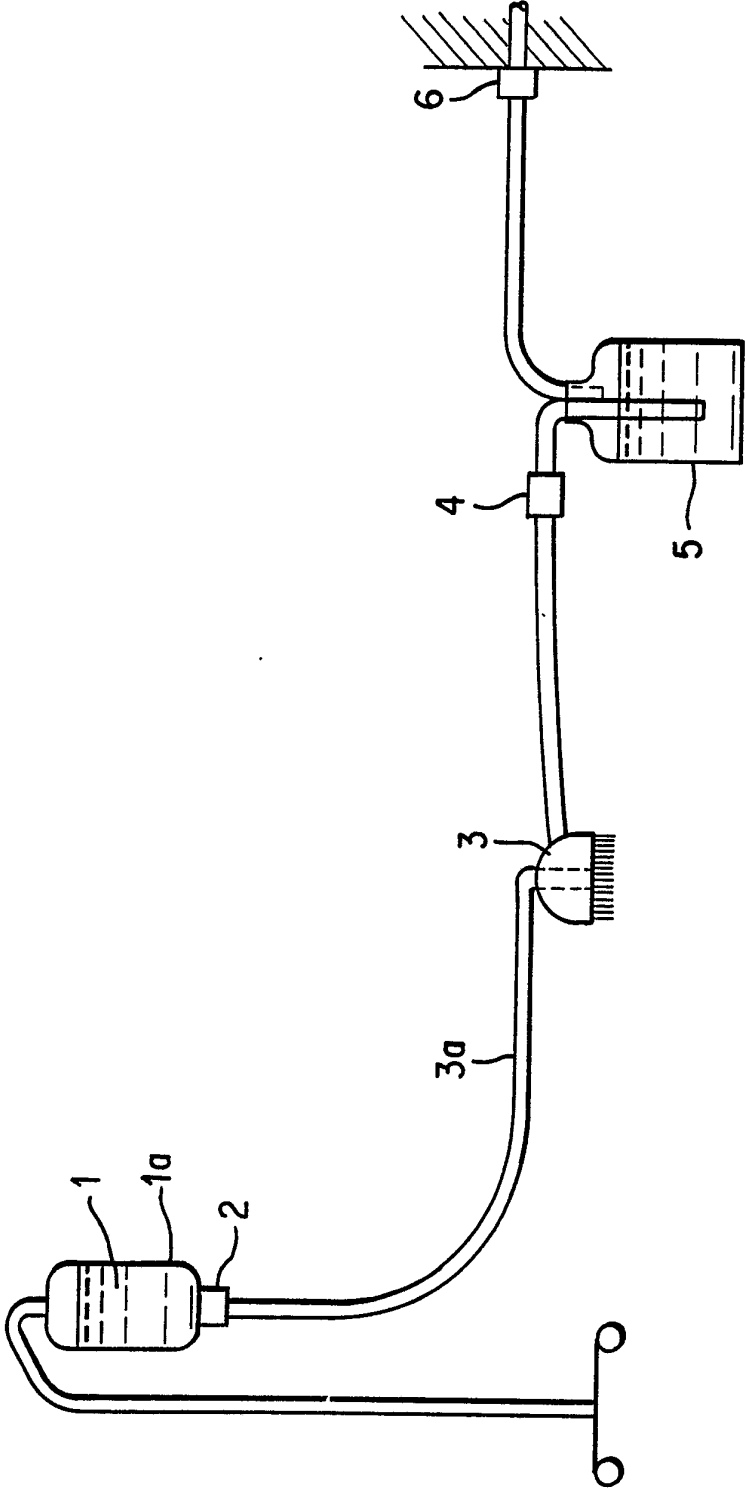


FIG. 4

# INTERNATIONAL SEARCH REPORT

International Application No. PCT/US92/00114

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC (5): A61M 1/00, A61M 35/00		
U.S.C.I.: 604/313,289		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
U.S.C.I.	604/313,289,290 15/321-322,346,398	128/66,67,44,756
Documentation Searched other than Minimum Documentation to the extent that such Documents are Included in the Fields Searched <sup>8</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT <sup>9</sup></b>		
Category <sup>*</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
X Y	US, A, 4,295,243, (KING) 20 October 1981 See column 2, line 53 - column 6, line 22.	1-6,8,13-14,16 20 7,12,15
X Y	US, A, 1,847,619 (MASCOLO) 01 March 1932 See column 1, line 43 - column 3, line 23.	1,9-10,16,20 7,11,17-19
A	US, A, 2,177,987 (KELLY) 31 October 1939 See entire reference.	1,7,11
A	US, A, 2,810,991 (MEAD ET AL.) 29 October 1957 See Figure 1.	1,2,7,8,11
A	US, A, 3,616,482 (BRYCKI) 02 November 1971 See entire reference.	1,2,3,4,7,8,11 13,15,16-20
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<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search		Date of Mailing of the International Search Report
09 March 1992		14 APR 1992
International Searching Authority		Signature of Authorized Officer
ISA/US		Gina M. Gualtieri