Description

This invention relates to fluid delivery systems for providing perenteral nutrition, enteral nutrition or other fluids to patients who require infusion of fluids. The invention is particularly related to improvements in such systems which use a disposable fluid delivery set in conjunction with a fluid flow control unit, such as a pump motor set, for supplying such fluids to a patient at a controlled delivery rate.

Applicants presently market in the United States an enteral delivery system under the trade name "Kangaroo". The system includes a fluid delivery motor set and a disposable fluid delivery set, which includes a fluid tube, a drip chamber which is arranged to be mounted to recess on the motor set, a mounting member. also arranged to be mounted to a recess on the motor set, an outlet tube connected to the mounting member and a pump tube which connects the drip chamber to the mounting member and engages a motor driven rotor on the motor set to form a peristaltic pump.

In the Kangaroo enteral delivery system the engagement of the pump tube to the rotor controls the flow of fluid to the patient according to the speed of the rotor. In the event the delivery set is not properly mounted to the motor set and the pump tube is not firmly engaged with the rotor, an excess flow of fluid through the set can occur under force of gravity. Improper mounting of the drip chamber is unlikely because of the mechanical configuration of that component and its corresponding recess. Improper placement of the mounting member, eg below, above or outside of the receiving recess, is possible if the delivery set is installed on the motor set by an operator who has not received proper instruction in the operation of the system. Instances of such improper installation have been reported.

The present invention relates to an interlock system which prevents operation of a fluid delivery system unless the delivery set is properly placed and installed on the flow control unit. Other types of safety devices are disclosed in, for example, EP-A-0107440 and GB-A-2069063.

The present invention is applicable in a medical fluid delivery system which includes a fluid delivery set arranged to be mounted on a corresponding fluid delivery flow control apparatus. Improper system operation may be prevented by a switching component on the flow control apparatus which has a first electrical state when the delivery set is properly mounted to the flow control apparatus and a second electrical state when the delivery set is not properly mounted to the flow control apparatus. Operation of the flow control apparatus is enabled in response to the first electrical state and disabled in response to the second electrical state. The second electrical state may also cause an alarm to be activated when operation is attempted.

According to a first aspect of the invention there is provided a medical fluid delivery system comprising a fluid flow control apparatus and a fluid delivery set arranged to be mounted thereon characterised in that the fluid control apparatus includes a switch means and a flow control means associated therewith to control the flow of fluid through the delivery set,

and the fluid delivery set includes a switch activating means associated therewith,

the switch means being arranged on the control apparatus to respond to the detection of the switch activating means when the switch activating means is mounted on the apparatus thereby to permit operation of the flow control means only when the switch means detects proper mounting of the delivery set about the flow control means of the control apparatus.

According to a second aspect of the invention there is provided a fluid flow control apparatus for a medical fluid delivery system arranged to receive a corresponding fluid delivery set and including flow control means, characterised in that the flow control apparatus is provided with a switch means responsive to proper mounting of the fluid delivery set on the flow control apparatus and wherein the flow control means is responsive to the switch means for permitting operation of the flow control apparatus only when the switch means detects proper mounting of the fluid delivery set about the flow control means. The switch means is preferably a magnetic field sensitive switching component.

According to a third aspect of the invention there is provided a medical fluid delivery set for a peristaltic pump delivery system which includes a fluid flow control apparatus, the delivery set including a flexible tube section having first and second ends connected to components arranged to be mounted to the flow control apparatus with the pump tube engaging a flow control means on the flow control apparatus, the components including at least one mounting member arranged to be received in a corresponding recess on the flow control apparatus characterised in that the delivery set also comprises a switch activating means for activating a switch means on the flow control apparatus such that operation of the flow control means is permitted only when the flexible tube section is properly mounted about the flow control means and the mounting member is received in the corresponding recess on the flow control apparatus.

For a better understanding of the present invention, together with other and further objects, reference is made to the following description, tak-

en in conjunction with the accompanying drawings, and its scope will be pointed out in the appended claims.

Figure 1 is a perspective view of a medical fluid delivery system incorporating the present invention.

Figure 2 is a perspective view of the interior of the medical fluid delivery system of Figure 1.

Figures 3A, 3B, 3C and 3D are detailed illustrations of a portion of the Figure 1 system illustrating correct and incorrect positioning of a fluid delivery set.

Figure 4 is a schematic diagram illustrating the electrical connection of a switching component in the fluid delivery system of figure 1.

Figure 5 is a top view of a mounting member in accordance with the present invention.

Figure 6 is a cross-sectional view of a mounting member taken along the lines illustrated in figure 5.

Figure 7 is a cross-sectional view of the Figure 1 fluid delivery system showing details of the components of the present invention.

Figure 8 is a plan view of magnetic field source used in the fluid delivery system of Figure 1.

Figure 9 is a cross sectional view of a magnetic field source taken along the lines illustrated in Figure 8.

Figure 1 is a perspective view of an enteral fluid delivery system incorporating the present invention. The system includes a motor set 10 upon which is mounted a disposable delivery set which includes inlet tube 18 which is connected to a source of fluid, drip chamber 19 which is connected to receive fluid from tube 18 and is mounted in recesses 20 and 22 on motor set 10. The delivery set also includes a pump tube 16 which is connected to the bottom of drip chamber 19 and which surrounds a pump rotor 14 on motor set 10 to form a peristaltic pump. The delivery set also includes a circular mounting member 24 which is received in mounting recess 26 and which connects pump tube 16 to outlet tube 28. Rotor 14 on motor set 10 is driven by motor 12 and rotates at various speeds to control the rate of delivery of fluid, such as enteral nutrition fluid, to a patient.

Those familiar with the art will recognize that similar delivery sets and motor sets are used in connection with delivery of other medical fluids, such as intravenous ie. parenteral fluids, or blood. In some systems rather than provide a motor driven pump, as the motor set 10 of Figure 1, there is provided a flow control apparatus which controls the flow of fluid by gravity, for example by exerting a valve-like force on a portion of the fluid delivery set.

The present invention is concerned with assuring proper placement of the fluid delivery set onto the motor set or other flow control apparatus, and in particular with the proper placement of the pump tube 16 around the rotor 14 to form a peristaltic pump which provides accurate and controlled delivery rates.

Pump tube 16 is mounted to drip chamber 19 at its inlet end and mounted to mounting member 24 at its outlet end. As illustrated in Figure 1, drip chamber 19 is received in recesses 20 and 22 on motor set 10 and mounting member 24 is received in recess 26. When properly mounted pump tube 16, which is typically silicone tubing is tightly stretched around rotor 14 so that the points of rotor contact on tube 16 close the passage of fluid. Referring to the Figure 3 there is shown in Figure 3A the correct arrangement of the drip chamber and mounting member in the recesses on motor set 10. As shown in Figure 3A mounting member 24 should be fully received into recess 26. It has come to the inventors' attention that in some cases the mounting member 24 may be improperly installed by inexperienced personnel so that mounting member 24 is seated below recess 26 as shown in Figure 3B. This arrangement can be hazardous to a patient because of excess and uncontrolled flow of fluid through the delivery set under force of gravity, whereby fluid is delivered at a higher rate than properly specified. Another improper mounting of the delivery set is illustrated in Figure 3C, wherein mounting member 24 is caught on the lip of recess 26 and not properly seated in the recess itself. Another improper mounting is shown in Figure 3D wherein mounting member 24 is not placed completely back into recess 26, but seats on the outer edge thereof.

In accordance with the present invention an arrangement is provided for detecting the proper placement of mounting member 24 in recess 26. Improper placement of drip chamber 19 is unlikely since it must engage both recess 20 and recess 22.

In order to detect the proper placement of mounting member 24 in recess 26 there is provided a magnetic field source 30 which is a toroidal shaped piece added to mounting member 24 and surrounding the fluid passage thereof. A magnetic field detector 32 is provided within the motor set 10 and arranged to detect the magnetic field from magnetic field source 30 when mounting member 24 is properly received into recess 26. Figures 1 and 2 show generally the internal arrangement of motor set 10 indicating the placement of magnetic field detector 32 against the inside wall of the motor set adjacent recess 26.

Magnetic field detector 32 is preferably a magneto resistive switching element, such as part No. SS21PE, available from Microswitch of Freeport, Illinois, USA. When connected as shown in Figure

4 this part provides an output of plus 5 volts when not in the presence of a magnetic field and zero volts when in the presence of either polarity of magnetic field. The zero or plus 5 volt output signal of switching element 32 is connected to microprocessor 34 as digital input signal to cause the motor set 10 to provide an error signal if an operator attempts to operate the motor set with an improperly placed delivery set. The error signal prevents operation of the motor set and preferably causes an alarm signal to be provided.

Figure 5 is a top view of mounting member 24 which is circular in cross section and includes a central passage for fluids. A magnetic source 30 which is toroidal in shape is attached directly to the shoulder of mounting member 24 as shown in the cross-sectional view of Figure 6. Magnetic source 30 surrounds an upwardly projecting tube receiving member 23 which connects to outlet tube 28. Mounting member 24 also includes a downwardly extending tube engaging member 25 which receives perstaltic pump tube 16. As an alternate to providing a separate magnetic field source 30, mounting member 24 can be formed entirely from magnetic material.

Figure 7 show the details of one arrangement for detecting the presence of the magnetic element 30 surrounding mounting member 24. The magnetic sensitive switching component 32 is arranged on the inside wall of the motor set 10 with its magneto sensitive end pointing at an angle of 42.5° toward the magnetic field source 30 mounted on mounting member 24. The end of magnetic sensitive switching element 32 is vertically spaced .210 inches (approx 5.334×10^{-3}m) from the top of magnetic field source 30 and is horizontally spaced .075 inches (approx 1.905×10^{-3}m) from the outside diameter of magnetic field source 30. Details of magnetic field source 30 showing mechanical dimensions are illustrated in Figures 8 and 9.

While it is believed that a wide variety of magnetic are suitable for the magnetic field source, the inventors have found that a material composed of 88% stronium ferrite and 12% #6 nylon to be a suitable material. This material is available from Tengan of Ostsego, Mich. The material is magnetized in the axial direction to a magnetic strength of 400 to 500 gauss at the surface edge.

Those skilled in the art will recognize that while the invention has been described with reference to application on an enteral delivery system, the present invention is likewise useable in connection with detecting the proper placement of a disposable delivery set on other medical fluid delivery systems, such as intravenous pumps or blood infusion pumps.

While the present invention has been described with respect to an embodiment which uses a magnetic field source on the disposable delivery set and a magnetic field sensitive switching element on the motor set, those skilled in the art will recognize that other arrangements for detecting the presence of and proper placement of a mounting member on the motor set are possible, including arrangements of mechanical micro-switches on a pump motor set and switch activating devices on the disposable delivery set.

Claims

1. A medical fluid delivery system comprising a fluid flow control apparatus (10) and a fluid delivery set (18,19,16,28) arranged to be mounted thereon characterised in that the fluid control apparatus (10) includes a switch means (32) and a flow control means associated therewith to control the flow of fluid through the delivery set,

   and the fluid delivery set (18,19,16,28) includes a switch activating means (30) associated therewith,

   the switch means (32) being arranged on the control apparatus to respond to the detection of the switch activating means (30) when the switch activating means is mounted on the apparatus thereby to permit operation of the flow control means only when the switch means (32) detects proper mounting of the delivery set about the flow control means of the control apparatus.

2. A medical fluid delivery system as claimed in claim 1 characterised in that the switch means (32) is arranged to have a first electrical state when the delivery set (18,19,16,28) is properly mounted to the flow control apparatus (10) and a second electrical state when the delivery set is not properly mounted to the flow control apparatus thereby enabling operation of the flow control means in response to the first electrical state and disabling operation of the flow control means in response to the second electrical state.

3. A medical fluid delivery system as claimed in claim 1 characterised in that the fluid delivery set includes at least one mounting member (24) arranged to be received on a corresponding receiving member (26) of the flow control apparatus (10), the switch activating moans (30) is a magnetic field source which is provided on the fluid delivery set (18,19,16,28) in the region of a selected one of the mounting members, and the switch means (32) is provided adjacent to the receiving member corresponding to the selected mounting member

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4 this part provides an output of plus 5 volts when not in the presence of a magnetic field and zero volts when in the presence of either polarity of magnetic field. The zero or plus 5 volt output signal of switching element 32 is connected to microprocessor 34 as digital input signal to cause the motor set 10 to provide an error signal if an operator attempts to operate the motor set with an improperly placed delivery set. The error signal prevents operation of the motor set and preferably causes an alarm signal to be provided.

Figure 5 is a top view of mounting member 24 which is circular in cross section and includes a central passage for fluids. A magnetic source 30 which is toroidal in shape is attached directly to the shoulder of mounting member 24 as shown in the cross-sectional view of Figure 6. Magnetic source 30 surrounds an upwardly projecting tube receiving member 23 which connects to outlet tube 28. Mounting member 24 also includes a downwardly extending tube engaging member 25 which receives perstaltic pump tube 16. As an alternate to providing a separate magnetic field source 30, mounting member 24 can be formed entirely from magnetic material.

Figure 7 show the details of one arrangement for detecting the presence of the magnetic element 30 surrounding mounting member 24. The magnetic sensitive switching component 32 is arranged on the inside wall of the motor set 10 with its magneto sensitive end pointing at an angle of 42.5° toward the magnetic field source 30 mounted on mounting member 24. The end of magnetic sensitive switching element 32 is vertically spaced .210 inches (approx 5.334 x 10^{-3}m) from the top of magnetic field source 30 and is horizontally spaced .075 inches (approx 1.905 x 10^{-3}m) from the outside diameter of magnetic field source 30. Details of magnetic field source 30 showing mechanical dimensions are illustrated in Figures 8 and 9.

While it is believed that a wide variety of magnetic are suitable for the magnetic field source, the inventors have found that a material composed of 88% stronium ferrite and 12% #6 nylon to be a suitable material. This material is available from Tengan of Ostsego, Mich. The material is magnetized in the axial direction to a magnetic strength of 400 to 500 gauss at the surface edge.

Those skilled in the art will recognize that while the invention has been described with reference to application on an enteral delivery system, the present invention is likewise useable in connection with detecting the proper placement of a disposable delivery set on other medical fluid delivery systems, such as intravenous pumps or blood infusion pumps.

While the present invention has been described with respect to an embodiment which uses a magnetic field source on the disposable delivery set and a magnetic field sensitive switching element on the motor set, those skilled in the art will recognize that other arrangements for detecting the presence of and proper placement of a mounting member on the motor set are possible, including arrangements of mechanical micro-switches on a pump motor set and switch activating devices on the disposable delivery set.

Claims

1. A medical fluid delivery system comprising a fluid flow control apparatus (10) and a fluid delivery set (18,19,16,28) arranged to be mounted thereon characterised in that the fluid control apparatus (10) includes a switch means (32) and a flow control means associated therewith to control the flow of fluid through the delivery set,

   and the fluid delivery set (18,19,16,28) includes a switch activating means (30) associated therewith,

   the switch means (32) being arranged on the control apparatus to respond to the detection of the switch activating means (30) when the switch activating means is mounted on the apparatus thereby to permit operation of the flow control means only when the switch means (32) detects proper mounting of the delivery set about the flow control means of the control apparatus.

2. A medical fluid delivery system as claimed in claim 1 characterised in that the switch means (32) is arranged to have a first electrical state when the delivery set (18,19,16,28) is properly mounted to the flow control apparatus (10) and a second electrical state when the delivery set is not properly mounted to the flow control apparatus thereby enabling operation of the flow control means in response to the first electrical state and disabling operation of the flow control means in response to the second electrical state.

3. A medical fluid delivery system as claimed in claim 1 characterised in that the fluid delivery set includes at least one mounting member (24) arranged to be received on a corresponding receiving member (26) of the flow control apparatus (10), the switch activating moans (30) is a magnetic field source which is provided on the fluid delivery set (18,19,16,28) in the region of a selected one of the mounting members, and the switch means (32) is provided adjacent to the receiving member corresponding to the selected mounting member

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so that an electrical signal is developed using the switch means when the mounting member is positioned in the corresponding recess to permit operation of the flow control means.

4. A medical fluid delivery system as claimed in claim 1 characterised in that the fluid flow control apparatus (10) includes a rotor (14) and the switch means (32) includes a microprocessor (34) therein which is responsive to proper mounting of the fluid delivery set about the flow control means to deliver medical fluid through the fluid delivery set at a controlled rate and the rotor (14) is responsive to the microprocessor (34) for permitting operation of the flow control apparatus only when the switch means (32) detects the switch activating means (30).

5. A medical fluid delivery system as claimed in claim 4 wherein the switch means (32) comprises a magnetic field sensitive switching component.

6. A medical fluid delivery system as claimed in claim 4 or 5 wherein the switch means (32) comprises a micro-switch which enables rotation of the rotor (14) in response to the detection of the switch activating means on the fluid delivery set.

7. A medical fluid delivery system as claimed in claim 1 wherein the fluid flow apparatus (10) comprises

a peristaltic pump having first and second receivers and the flow control means is a rotor (14) for controlling the rate of fluid delivery to a patient through the fluid delivery set, and in which the fluid delivery set comprises a fluid reservoir section (19), a fluid delivery section (28) adapted to deliver fluid to a patient and a flexible tube section (16) adapted to be placed in operative connection with the rotor (14) on the pump and first and second mounting members wherein the second mounting member (24) includes the switch activating means (30) which comprises a magnetic field source thereon and the first and second mounting members are arranged in a predetermined configuration on the delivery set such that when the flexible tube section is aligned about the rotor, the first and second mounting members are insertable into the first and second receivers, and in which the pump further comprises

a switch means on the pump for detecting the insertion of the magnetic field source on the second mounting member into the second receiver (26) and wherein the switch means enables the pump to rotate the rotor to deliver fluid to a patient when the second mounting member (24) is detected in the second receiver (26).

8. A medical fluid delivery system as claimed in claim 1 characterised in that the medical fluid delivery set (18,19,16,28) is adapted to be positioned adjacent to the switch means (32) which is a magnetic field sensitive component, the fluid delivery set (18,19,16,28) includes at least one mounting member (24) arranged to be received in a recess (26) on the fluid control apparatus and the switch activating means is a magnetic field source (30) adapted to be positioned on the mounting member (24) in proximity to the magnetic field sensitive component of the fluid control apparatus when the delivery set is the fluid control apparatus.

9. A fluid flow control apparatus (10) for a medical fluid delivery system arranged to receive a corresponding fluid delivery set and including flow control means, characterised in that the flow control apparatus is provided with a switch means (32) responsive to proper mounting of the fluid delivery set (18,19,16,28) on the flow control apparatus and wherein the flow control means is responsive to the switch means (32) for permitting operation of the flow control apparatus only when the switch means (32) detects proper mounting of the fluid delivery set about the flow control means.

10. An apparatus as claimed in claim 9 wherein the switch means (32) comprises a magnetic field sensitive switching component.

11. An apparatus as claimed in claim 9 wherein the switch means (32) is a magneto resistive switching element.

12. An apparatus as claimed in any one of claim 9 to 11 wherein there is further provided means in the flow control apparatus responsive to the switching means for activating an alarm indicating the absence of proper placement of the delivery set.

13. An apparatus as claimed in claim 9 characterised in that there is provided the switch means (32) on the flow control apparatus which is arranged to have a first state when the delivery set (18,19,16,28) is properly mounted to the flow control apparatus (10) and a second state when the delivery set is not properly mounted to the flow control apparatus thereby

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enabling operation of the flow control apparatus in response to the first state and disabling operation of the flow control apparatus in response to the second state.

14. An apparatus as claimed in any one of claims 9 to 11 wherein the apparatus comprises a peristaltic pump including a pump rotor adapted to be operatively connected to a flexible tube section of a medical fluid delivery set for the delivery of the medical fluid to a patient and there is provided-switch means responsive to improper operative connection of the flexible tube section (16) about the pump rotor (14) for interrupting rotation of the rotor.

15. A medical fluid delivery set for a peristaltic pump delivery system which includes a fluid flow control apparatus, the delivery set including a flexible tube section (16) having first and second ends connected to components arranged to be mounted to the flow control apparatus with the pump tube engaging a flow control means on the flow control apparatus, the components including at least one mounting member (24) arranged to be received in a corresponding recess on the flow control apparatus characterised in that the delivery set also comprises a switch activating means (30) for activating a switch means on the flow control apparatus such that operation of the flow control means is permitted only when the flexible tube section (16) is properly mounted about the flow control means and the mounting member (24) is received in the corresponding recess on the flow control apparatus.

16. A medical fluid delivery set as claimed in claim 15 wherein the switch activating means (30) comprises a magnetic field source for activating a magnetic field sensitive component on the flow control apparatus.

17. A medical fluid delivery set as claimed in claim 15 or 16 wherein the mounting member (24) includes a central passage in fluid connection with the flexible tube section (16) and wherein the switch activating means (30) is a permanent magnet surrounding the central passage.

18. A medical fluid delivery set as claimed in any one of claims 15 to 17 wherein the switch activating means (30) comprises a magnetized ferrite.

19. A medical fluid delivery set as claimed in any one of claims 15 to 18 wherein the mounting member (24) is formed of magnetic material thereby forming the switch activating means.

20. A medical fluid delivery set as claimed in any one of claims 15 to 19 wherein the components of the medical fluid delivery set further include a second mounting member (19) arranged to be received in a corresponding recess on the flow control apparatus and the flexible tube section (16) is arranged to be mounted about a rotor on the flow control apparatus.

Patentansprüche

1. Medizinisches Fluidabgabesystem mit einer Fluiddurchflußregelvorrichtung (10) und einer zur Anbringung an ihr eingerichteten Fluidabgabegarnitur (18, 19, 16, 28), dadurch gekennzeichnet, daß die Durchflußregelvorrichtung (10) eine Schalteinrichtung (32) und eine ihr zugeordnete Durchflußregeleinrichtung zur Regelung des Fluiddurchflusses durch die Abgabegarnitur aufweist,

   und die Fluidabgabegarnitur (18, 19, 16, 28) eine ihr zugeordnete Schalteraktiviereinrichtung (30) aufweist,

   wobei die Schalteinrichtung (32) an der Regelvorrichtung angeordnet ist, um auf die Erkennung der Schalteraktiviereinrichtung (30) bei deren Anbringung an der Vorrichtung anzusprechen, um dadurch einen Betrieb der Durchflußregeleinrichtung nur dann zu gestatten, wenn die Schalteinrichtung (32) eine richtige Anbringung der Abgabegarnitur um die Durchflußregeleinrichtung der Regelvorrichtung herum erkennt.

2. Medizinisches Fluidabgabesystem nach Anspruch 1, dadurch gekennzeichnet, daß die Schalteinrichtung (32) eingerichtet ist, einen ersten elektrischen Zustand einzunehmen, wenn die Abgabegarnitur (18, 19, 16, 28) an der Durchflußregelvorrichtung (10) richtig angebracht ist, und einen zweiten elektrischen Zustand einzunehmen, wenn die Abgabegarnitur nicht richtig an der Durchflußregelvorrichtung angebracht ist, wodurch ein Betrieb der Durchflußregeleinrichtung in Ansprechen auf den ersten elektrischen Zustand freigegeben und der Betrieb der Durchflußregeleinrichtung in Ansprechen auf den zweiten elektrischen Zustand gesperrt wird.

3. Medizinisches Fluidabgabesystem nach Anspruch 1, dadurch gekennzeichnet, daß die Fluidabgabegarnitur zumindest ein Montageglied (24) aufweist, das zur Aufnahme an einem entsprechenden Aufnahmeglied (26) der

Durchflußregelvorrichtung (10) eingerichtet ist, die Schalteraktiviereinrichtung (30) eine Magnetfeldquelle ist, die an der Fluidabgabegarnitur (18, 19, 16, 28) im Bereich eines ausgewählten Montageglieds vorgesehen ist, und die Schalteinrichtung (32) benachbart dem Aufnahmeglied entsprechend dem ausgewählten Montageglied vorgesehen ist, so daß ein elektrisches Signal unter Benützung der Schalteinrichtung herbeigeführt wird, wenn das Montageglied in der entsprechenden Ausnehmung positioniert ist, um den Betrieb der Durchflußregeleinrichtung zu gestatten.

4. Medizinisches Fluidabgabesystem nach Anspruch 1, dadurch gekennzeichnet, daß die Fluiddurchflußregelvorrichtung (10) einen Rotor (14) und die Schalteinrichtung (32) einen Mikroprozessor (34) darin aufweist, der auf die richtige Anbringung der Fluidabgabegarnitur um die Durchflußregeleinrichtung herum anspricht, um medizinisches Fluid durch die Fluidabgabegarnitur mit einer geregelten Durchflußmenge abzugeben, und wobei der Rotor (14) auf den Mikroprozessor (34) anspricht, um einen Betrieb der Durchflußregelvorrichtung nur dann zu gestatten, wenn die Schalteinrichtung (32) die Schalteraktiviereinrichtung (30) detektiert.

5. Medizinisches Fluidabgabesystem nach Anspruch 4, bei dem die Schalteinrichtung (32) eine Magnetfeld-empfindliche Schaltkomponente aufweist.

6. Medizinisches Fluidabgabesystem nach Anspruch 4 oder 5, bei dem die Schalteinrichtung (32) einen Mikroschalter aufweist, der eine Drehung des Rotors (14) in Ansprechen auf die Erkennung der Schalteraktiviereinrichtung an der Fluidabgabegarnitur freigibt.

7. Medizinisches Fluidabgabesystem nach Anspruch 1, bei dem die Fluiddurchflußvorrichtung (10)

eine peristaltische Pumpe mit einem ersten und zweiten Aufnehmer aufweist und die Durchflußregeleinrichtung ein Rotor (14) für die Regelung der Fluidabgabe an einen Patienten durch die Fluidabgabegarnitur ist, und in dem die Fluidabgabegarnitur einen Fluidbehälterabschnitt (19), einen Fluidabgabeabschnitt (28) zur Abgabe von Fluid an einen Patienten und einen flexiblen Schlauchabschnitt (16) zur Anbringung in betriebsmäßiger Verbindung mit dem Rotor (14) an der Pumpe sowie ein erstes und ein zweites Montageglied aufweist, wobei das zweite Montageglied (24) die Schalteraktiviereinrichtung (30) aufweist, die eine Magnetfeldquelle daran aufweist, und das erste und zweite Montageglied in einer vorherbestimmten Konfiguration an der Abgabegarnitur derart angeordnet sind, daß bei Ausrichtung des flexiblen Schlauchabschnitts um den Rotor das erste und zweite Montageglied in den ersten und zweiten Aufnehmer einführbar sind, und bei dem die Pumpe ferner

eine Schalteinrichtung an der Pumpe zum Erkennen des Einführens der Magnetfeldquelle am zweiten Montageglied in den zweiten Aufnehmer (26) aufweist, und wobei die Schalteinrichtung die Pumpe zur Drehung des Rotors freigibt, um Fluid an einen Patienten abzugeben, wenn das zweite Montageglied (24) im zweiten Aufnehmer detektiert wird.

8. Medizinisches Fluidabgabesystem nach Anspruch 1, dadurch gekennzeichnet, daß die medizinische Fluidabgabegarnitur (18, 29, 16, 28) benachbart der Schalteinrichtung (32) positionierbar ist, die eine Magnetfeld-empfindliche Komponente ist, die Fluidabgabegarnitur (18, 19, 16, 28) zumindest ein Montageglied (24) enthält, das in einer Ausnehmung (26) an der Durchflußregelvorrichtung aufnehmbar ist, und die Schalteraktiviereinrichtung eine Magnetfeldquelle (30) ist, die am Montageglied (24) nahe der Magnetfeld-empfindlichen Komponente der Durchflußregelvorrichtung positionierbar ist, wenn sich die Abgabegarnitur in der Durchflußregelvorrichtung befindet.

9. Fluiddurchflußregelvorrichtung (10) für ein medizinisches Fluidabgabesystem, eingerichtet zur Aufnahme einer entsprechenden Fluidabgabegarnitur und enthaltend eine Durchflußregeleinrichtung, dadurch gekennzeichnet, daß die Durchflußregelvorrichtung mit einer auf die richtige Anbringung der Fluidabgabegarnitur (18, 19, 16, 28) an der Durchflußregelvorrichtung ansprechenden Schalteinrichtung (32) versehen ist, und bei der die Durchflußregeleinrichtung auf die Schalteinrichtung (32) anspricht, um einen Betrieb der Durchflußregelvorrichtung nur dann zu gestatten, wenn die Schalteinrichtung (32) eine richtige Anbringung der Fluidabgabegarnitur um die Durchflußregeleinrichtung herum erkennt.

10. Vorrichtung nach Anspruch 9, bei der die Schalteinrichtung (32) eine Magnetfeld-empfindliche Komponente aufweist.

11. Vorrichtung nach Anspruch 9, bei der die Schalteinrichtung (32) ein Magnetwiderstandsschaltelement ist.

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12. Vorrichtung nach einem der Ansprüche 9 bis 11, bei der weiters eine auf die Schalteinrichtung ansprechende Einrichtung in der Durchflußregelvorrichtung vorgesehen ist, um einen das Fehlen einer richtigen Placierung der Abgabegarnitur anzeigenden Alarm zu aktivieren.

13. Vorrichtung nach Anspruch 9, dadurch gekennzeichnet, daß die Schalteinrichtung (32) an der Durchflußregelvorrichtung vorgesehen ist, die einen ersten Zustand haben kann, wenn die Abgabegarnitur (18, 19, 16, 28) richtig an der Durchflußregelvorrichtung (10) angebracht ist, und einen zweiten Zustand haben kann, wenn die Abgabegarnitur nicht richtig an der Durchflußregelvorrichtung angebracht ist, wodurch ein Betrieb der Durchflußregelvorrichtung in Ansprechen auf den ersten Zustand freigegeben und der Betrieb der Durchflußregelvorrichtung in Ansprechen auf den zweiten Zustand geperrt wird.

14. Vorrichtung nach einem der Ansprüche 9 bis 11, wobei gekennzeichnet, daß die Vorrichtung eine peristaltische Pumpe mit einem Pumpenrotor aufweist, der betriebsmäßig mit einem flexiblen Schlauchabschnitt einer medizinischen Fluidabgabegarnitur für die Abgabe des medizinischen Fluids an einen Patienten verbindbar ist, und eine auf eine mangelhafte betriebsmäßige Verbindung des flexiblen Schlauchabschnitts (16) um den Pumpenrotor (14) herum zur Unterbrechung der Drehung des Rotors ansprechende Schalteinrichtung vorgesehen ist.

15. Medizinische Fluidabgabegarnitur für ein Abgabesystem mit peristaltischer Pumpe, das eine Fluiddurchflußregelvorrichtung aufweist, wobei die Abgabegarnitur einen flexiblen Schlauchabschnitt (16) mit einem ersten und zweiten Ende aufweist, die mit Komponenten verbunden sind, die an der Durchflußregelvorrichtung anbringbar sind, wobei der Pumpenschlauch mit einer Durchflußregeleinrichtung an der Durchflußregelvorrichtung in Eingriff steht, und die Komponenten zumindest ein Montageglied (24) aufweisen, das in einer entsprechenden Ausnehmung an der Durchflußregelvorrichtung aufnehmbar ist, dadurch gekennzeichnet, daß die Abgabegarnitur auch eine Schalteraktiviereinrichtung (30) zur Aktivierung einer Schalteinrichtung an der Durchflußregelvorrichtung aufweist, so daß der Betrieb der Durchflußregeleinrichtung nur gestattet wird, wenn der flexible Schlauchabschnitt (16) richtig um die Durchflußregeleinrichtung herum angeordnet und das Montageglied (24) in der entsprechenden Ausnehmung an der Durchflußregelvorrichtung aufgenommen ist.

16. Medizinische Fluidabgabegarnitur nach Anspruch 15, bei der die Schalteraktiviereinrichtung (30) eine Magnetfeldquelle zur Aktivierung einer Magnetfeld-empfindlichen Komponente an der Durchflußregelvorrichtung aufweist.

17. Medizinische Fluidabgabegarnitur nach Anspruch 15 oder 16, bei der das Montageglied (24) einen zentralen Durchlaß in Fluidverbindung mit dem flexiblen Schlauchabschnitt (16) enthält, und bei der die Schalteraktiviereinrichtung (30) ein den zentralen Durchlaß umgebender Permanentmagnet ist.

18. Medizinische Fluidabgabegarnitur nach einem der Ansprüche 15 bis 17, bei der die Schalteraktiviereinrichtung (30) einen magnetisierten Ferrit aufweist.

19. Medizinische Fluidabgabegarnitur nach einem der Ansprüche 15 bis 18, bei der das Montageglied (24) aus magnetischem Material gebildet ist, und dadurch die Schalteraktiviereinrichtung bildet.

20. Medizinische Fluidabgabegarnitur nach einem der Ansprüche 15 bis 19, bei der die Komponenten der medizinischen Fluidabgabegarnitur weiters ein zweites Montageglied (19) enthalten, das in einer entsprechenden Ausnehmung an der Durchflußregelvorrichtung aufnehmbar ist, und der flexible Schlauchabschnitt (16) um einen Rotor an der Durchflußregelvorrichtung herum anbringbar ist.

Revendications

1. Système de distribution de fluide médical, comprenant un appareil de commande d'écoulement de fluide (10) et un dispositif distributeur de fluide (18, 19, 16, 28) propre à être monté sur l'appareil, caractérisé en ce que l'appareil de commande d'écoulement de fluide (10) comprend un commutateur (32) et un moyen de commande d'écoulement associé à ce commutateur pour commander l'écoulement du fluide à travers le dispositif distributeur,

et le dispositif distributeur de fluide (18, 19, 16, 28) comprend un moyen d'activation de commutateur (30) qui y est associé,

le commutateur (32) étant installé sur l'appareil de commande pour réagir à la détection du moyen d'activation de commutateur (30) lorsque ce moyen d'activation de commutateur

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est monté sur l'appareil de manière à ne permettre le fonctionnement du moyen de commande d'écoulement que lorsque le commutateur (32) détecte un montage adéquat du dispositif distributeur autour du moyen de commande d'écoulement de l'appareil de commande.

2. Système de distribution de fluide médical suivant la revendication 1, caractérisé en ce que le commutateur (32) présente un premier état électrique lorsque le dispositif distributeur (18, 19, 16, 28) est convenablement monté sur l'appareil de commande d'écoulement (10) et un second état électrique lorsque le dispositif distributeur n'est pas convenablement monté sur l'appareil de commande d'écoulement, autorisant ainsi le fonctionnement du moyen de commande d'écoulement en réponse au premier état électrique et interdisant le fonctionnement du moyen de commande d'écoulement en réponse au second état électrique.

3. Système de distribution de fluide médical suivant la revendication 1, caractérisé en ce que le dispositif distributeur de fluide comprend au moins un élément de montage (24) propre à être reçu sur un élément récepteur correspondant (26) de l'appareil de commande d'écoulement (10), le moyen d'activation de commutateur (30) est une source de champ magnétique qui est prévue sur le dispositif distributeur de fluide (18, 19, 16, 28) dans la région d'un élément de montage sélectionné, et le commutateur (32) est prévu à proximité de l'élément récepteur correspondant à l'élément de montage sélectionné, de sorte qu'un signal électrique est produit à l'aide du commutateur lorsque l'élément de montage est installé dans le logement correspondant pour permettre le fonctionnement du moyen de commande d'écoulement.

4. Système de distribution de fluide médical suivant la revendication 1, caractérisé en ce que l'appareil de commande d'écoulement de fluide (10) comprend un rotor (14) et le commutateur (32) contient un microprocesseur (34) qui réagit à un montage approprié du dispositif distributeur de fluide autour du moyen de commande d'écoulement afin de distribuer un fluide médical à travers le dispositif distributeur de fluide à un débit réglé et le rotor (14) est sensible au microprocesseur (34) pour ne permettre à l'appareil de commande d'écoulement de fonctionner que lorsque le commutateur (32) détecte le moyen d'activation de commutateur (30).

5. Système de distribution de fluide médical suivant la revendication 4, dans lequel le commutateur (32) est un élément de commutation sensible au champ magnétique.

6. Système de distribution de fluide médical suivant la revendication 4 ou 5, dans lequel le commutateur (32) comprend un microcommutateur qui permet la rotation du rotor (14) en réaction à la détection du moyen d'activation de commutateur sur le dispositif distributeur de fluide.

7. Système de distribution de fluide médical suivant la revendication 1, dans lequel l'appareil de commande d'écoulement de fluide (10) comprend :

une pompe péristaltique comportant un premier et un second récepteur et le moyen de commande d'écoulement est un rotor (14) pour commander le débit de distribution de fluide à un patient à travers le dispositif distributeur de fluide, et dans lequel le dispositif distributeur de fluide comprend une section de réservoir de fluide (19), une section de distribution de fluide (28) propre à distribuer du fluide à un patient et une section de tube flexible (16) propre à être placée en liaison active avec le rotor (14) sur la pompe ainsi qu'un premier et second élément de montage, le second élément de montage (24) comprenant le moyen d'activation de commutateur (30) qui comprend une source de champ magnétique et le premier et le second élément de montage étant disposés selon une configuration prédéterminée sur le dispositif distributeur, de telle sorte que, lorsque la section de tube flexible est alignée autour du rotor, le premier et le second élément de montage peuvent être insérés dans le premier et le second récepteur, et dans lequel la pompe comprend, en outre,

un moyen de commutation sur la pompe pour détecter l'introduction de la source de champ magnétique sur le second élément de montage dans le second récepteur (26), le moyen de commutation permettant à la pompe de faire tourner le rotor pour fournir du fluide à un patient lorsque le second élément de montage (24) est détecté dans le second récepteur (26).

8. Système de distribution de fluide médical suivant la revendication 1, caractérisé en ce que le dispositif distributeur de fluide médical (18, 19, 16, 28) peut être positionné à proximité du commutateur (32) qui est un élément sensible au champ magnétique, le dispositif distributeur

de fluide (18, 19, 16, 28) comprend au moins un élément de montage (24) propre à être reçu dans un logement (26) sur l'appareil de commande de fluide et le moyen d'activation de commutateur est une source de champ magnétique (30) propre à être positionnée sur l'élément de montage (24) à proximité de l'élément sensible au champ magnétique de l'appareil de commande de fluide lorsque le dispositif distributeur est l'appareil de commande de fluide.

9. Appareil de commande d'écoulement de fluide (10) pour un système de distribution de fluide médical propre à recevoir un dispositif distributeur de fluide correspondant et comprenant un moyen de commande d'écoulement, caractérisé en ce que l'appareil de commande d'écoulement est pourvu d'un commutateur (32) réagissant au montage approprié du dispositif distributeur de fluide (18, 19, 16, 28) sur l'appareil de commande d'écoulement et dans lequel le moyen de commande d'écoulement réagit au commutateur (32) pour ne permettre le fonctionnement de l'appareil de commande d'écoulement que lorsque le commutateur (32) détecte le montage approprié du dispositif distributeur de fluide autour du moyen de commande d'écoulement.

10. Appareil suivant la revendication 9, dans lequel le commutateur (32) comprend un élément de commutation sensible au champ magnétique.

11. Appareil suivant la revendication 9, dans lequel le commutateur (32) est un élément de commutation magnétorésistif.

12. Appareil suivant l'une quelconque des revendications 9 à 11, dans lequel est en outre prévu, dans l'appareil de commande d'écoulement, un moyen réagissant au moyen de commutation pour activer une alarme indiquant l'absence d'un placement approprié du dispositif distributeur.

13. Appareil suivant la revendication 9, caractérisé en ce que, sur l'appareil de commande d'écoulement, est prévu le commutateur (32) qui présente un premier état lorsque le dispositif distributeur (18, 19, 16, 28) est convenablement monté sur l'appareil de commande d'écoulement (10) et un second état lorsque le dispositif distributeur n'est pas convenablement monté sur l'appareil de commande d'écoulement, autorisant ainsi le fonctionnement de l'appareil de commande d'écoulement en réponse au premier état et interdisant le fonctionnement de l'appareil de commande d'écoulement en réponse au second état.

14. Appareil suivant l'une quelconque des revendications 9 à 11, dans lequel est prévu une pompe péristaltique comprenant un rotor de pompe propre à être relié activement à une section de tube flexible d'un dispositif distributeur de fluide médical pour la distribution du fluide médical à un patient et un commutateur est prévu, réagissant à une liaison active inadéquate de la section de tube flexible (16) autour du rotor de pompe (14) pour interrompre la rotation du rotor.

15. Dispositif distributeur de fluide médical pour un système de distribution à pompe péristaltique qui comprend un appareil de commande d'écoulement de fluide, le dispositif distributeur comprenant une section de tube flexible (16) comportant une première et une seconde extrémité raccordées à des éléments propres à être montés sur l'appareil de commande d'écoulement, le tube de pompage étant engagé avec un moyen de commande d'écoulement sur l'appareil de commande d'écoulement, les éléments comprenant au moins un élément de montage (24) propre à être reçu dans un logement correspondant sur l'appareil de commande d'écoulement, caractérisé en ce que le dispositif distributeur comprend également un moyen d'activation de commutateur (30) pour activer un commutateur sur l'appareil de commande d'écoulement, de telle sorte que le fonctionnement du moyen de commande d'écoulement ne soit permis que lorsque la section de tube flexible (16) est convenablement montée autour du moyen de commande d'écoulement et que l'élément de montage (24) est reçu dans le logement correspondant sur l'appareil de commande d'écoulement.

16. Dispositif distributeur de fluide médical suivant la revendication 15, dans lequel le moyen d'activation de commutateur (30) comprend une source de champ magnétique pour activer un élément sensible au champ magnétique sur l'appareil de commande d'écoulement.

17. Dispositif distributeur de fluide médical suivant la revendication 15 ou 16, dans lequel l'élément de montage (24) comprend un passage central en communication de fluide avec la section de tube flexible (16) et dans lequel le moyen d'activation de commutateur (30) est un aimant permanent entourant le passage central.

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18. Dispositif distributeur de fluide médical suivant l'une quelconque des revendications 15 à 17, dans lequel le moyen d'activation de commutateur (30) comprend une ferrite magnétisée.

19. Dispositif distributeur de fluide médical suivant l'une quelconque des revendications 15 à 18, dans lequel l'élément de montage (24) est fait d'une matière magnétique, formant ainsi le moyen d'activation de commutateur.

20. Dispositif distributeur de fluide médical suivant l'une quelconque des revendications 15 à 19, dans lequel les éléments du dispositif distributeur de fluide médical comprennent, en outre, un second élément de montage (19) propre à être reçu dans un logement correspondant de l'appareil de commande d'écoulement et la section de tube flexible (16) est destinée à être montée autour d'un rotor sur l'appareil de commande d'écoulement.