

CASSETTE FOR A FLOW CONTROL APPARATUS

FIELD

[0001] The present invention generally relates to a flow control system with a flow control apparatus and a feeding set, and more particularly to a cassette for use with the flow control apparatus.

BACKGROUND

[0002] Administering medicine or nutrition to a patient who cannot intake the medicine or nutrition orally can be effected by utilizing peristaltic flow control systems. Typically in such systems, fluid is delivered to the patient by a pump set including a flexible elastomeric tubing loaded on a flow control apparatus, such as a peristaltic pump, which delivers fluid to the patient at a controlled rate of delivery. The peristaltic pump usually has a housing that includes a rotor operatively engaged to a motor through a gearbox. The rotor drives fluid through the flexible tubing of the pump set by the peristaltic action effected by reversible compression created by impingement, e.g., pinching, by one or more roller on the rotor. Rotation of the rotor progressively compresses the elastomeric tubing that drives the fluid at a controlled rate. The pump set may have a valve mechanism for permitting or preventing fluid flow communication through the pump set. The flow control system may also have a controller that operatively regulates the one or more motors which effectively controls fluid flow.

[0003] Peristaltic pumps operate by delivering fluid in small charges called "aliquots". The rotor engages elastomeric tubing of the pump set, pinching off a portion of the elastomeric tubing and pushing fluid forward of the pinch point, e.g., closer to the patient than to the source of fluid toward the patient. Typically, the volume of fluid to be administered to the patient is controlled in the pump by counting the number of aliquots, each being of substantially the same volume, and stopping when the number reaches an amount corresponding to the total desired volume of fluid to be delivered. Peristaltic pumps are sanitary and generally accurate and therefore very useful in the administration of medication and therapeutic fluids to the patient.

[0004] In ~~one~~ a first aspect of the present invention, a cassette for use with a pumping apparatus having a pumping system for engaging a pump set generally comprises a cassette body configured for releasable attachment to the pumping apparatus to mount the cassette on the pumping apparatus, the pumping apparatus having a plurality of sensors, each sensor

configured to detect presence and orientation of at least one identification member when the cassette is engaged with pumping apparatus; a fitting assembly mounted on the cassette body, the fitting assembly comprising at least one mounting formation, an inlet port, an outlet port and tubing connecting the inlet port to the outlet port, the inlet port being configured to receive at least one of an external feeding source or an external flushing source; the at least one mounting formation comprising a plurality of pockets with each pocket configured to receive one identification member in any one of a plurality of predetermined orientations, each predetermined orientation indicating a different functional configuration of the pump set, with each pocket of the plurality of pockets positioned to be centered with a corresponding sensor when the cassette is engaged with the pumping apparatus; and at least one identification member positioned in at least one pocket of the plurality of pockets. A fitting is mounted on the cassette body and includes a mounting structure. At least one identification member is

~~mounted by the mounting structure on the fitting for indicating a functional configuration of the pump set. The mounting structure and identification member are configured to mount the identification member in different orientations on the fitting to indicate different functional configurations of the cassette and pump set.~~

[0005] In ~~another a second~~ aspect of the present invention, a fitting assembly for use in a cassette of a pump set generally comprises a body configured for attachment to the cassette, the body comprising: an inlet port configured to receive at least one of an external feeding source or an external flushing source; ~~and an outlet port, tubing connecting the inlet port to the outlet port;~~ at least one mounting formation comprising a plurality of pockets with each pocket configured to receive one identification member in any one of a plurality of predetermined orientations, each predetermined orientation indicating a different functional configuration of the pump set, with each pocket of the plurality of pockets positioned to be centered with a corresponding sensor when the cassette is engaged with the pumping apparatus; and ~~The body is configured for attachment to the cassette. At~~ at least one identification member positioned in at least one pocket of the plurality of pockets~~is mounted on the body for indicating a functional configuration of the pump set.~~

[0006] In ~~still another aspect~~ embodiments, a cassette for use with a pumping apparatus having a pumping system for engaging a pump set generally comprise a cassette body configured for releasable attachment to the pumping apparatus to mount the cassette on the pumping apparatus. The cassette body has at least one mounting formation. At least one identification member is mounted on the cassette body by the mounting formation of the cassette body. The identification member and mounting formation are formed to mount the identification member in any one of a plurality of predetermined orientations. Each predetermined orientation indicates a different functional configuration of the pump set.

[0007] In ~~yet another a third~~ aspect of the present invention, a method of assembling a cassette generally comprises providing a cassette for use with a pumping apparatus having a pumping system for engaging a pump set; ~~and~~ Mounting-inserting at least one identification member to at least one mounting formation of the cassette for indicating a functional configuration of the pump set, with the at least one mounting formation comprising a plurality of pockets with each pocket configured to receive one identification member in any one of a plurality of predetermined orientations, each predetermined orientation indicating a different functional configuration of the pump set, with each pocket of the plurality of pockets is positioned to be

centered with a corresponding sensor when the cassette is engaged with the pumping apparatus and the at least one identification member positioned in at least one pocket of the plurality of pockets.

[0008] In ~~still yet another~~ a fourth aspect of the present invention, a flow control system generally comprises a flow control apparatus including a pumping device and a plurality of sensors, each sensor configured to detect presence and orientation of at least one identification member when a cassette is engaged; ~~A~~ a pump set includes ~~a~~ the cassette and tubing mounted to the cassette. The cassette is configured for releasable attachment to the flow control apparatus to mount the cassette and tubing to the flow control apparatus. The cassette has at least one mounting formation and at least one identification member mounted on the cassette by the mounting formation. The at least one mounting formation comprising a plurality of pockets with each pocket configured to receive one identification member in any one of a plurality of predetermined orientations, each predetermined orientation indicating a different functional configuration of the pump set, with each pocket of the plurality of pockets is positioned to be centered with a corresponding sensor when the cassette is engaged with the pumping apparatus and at least one identification member positioned in at least one pocket of the plurality of pockets~~The identification member and mounting formation are formed to mount the identification member in any one of a plurality of predetermined orientations. Each predetermined orientation indicates a different functional configuration of the pump set. The sensor is configured to detect the presence and orientation of the at least one identification member for determining the functional configuration of the pump set.~~

Claims:

1. A cassette for use with a pumping apparatus having a pumping system for engaging a pump set, the cassette comprising:

a cassette body configured for releasable attachment to the pumping apparatus to mount the cassette on the pumping apparatus, the pumping apparatus having a plurality of sensors, each sensor configured to detect presence and orientation of at least one identification member when the cassette is engaged with pumping apparatus~~the cassette body having at least one mounting formation; and~~

a fitting assembly mounted on the cassette body, the fitting assembly comprising at least one mounting formation, an inlet port, an outlet port and tubing connecting the inlet port to the outlet port, the inlet port being configured to receive at least one of an external feeding source or an external flushing source;

~~at least one identification member mounted on the cassette body by the mounting formation of the cassette body, the identification member and mounting formation being formed to mount the identification member~~ the at least one mounting formation comprising a plurality of pockets with each pocket configured to receive one identification member in any one of a plurality of predetermined orientations, each predetermined orientation indicating a different functional configuration of the pump set, with each pocket of the plurality of pockets positioned to be centered with a corresponding sensor when the cassette is engaged with the pumping apparatus; and

at least one identification member positioned in at least one pocket of the plurality of pockets.

2. The cassette of claim 1, ~~further comprising a fitting mounted on the cassette body, the fitting including the at least one mounting formation~~ wherein each sensor is a Hall-effect sensor.

3. The cassette of claim 2, wherein the pumping apparatus further comprises a processor in communication with the at least one sensor, the processor configured to identify the functional configuration of the pump set based on the presence and orientation of the at least one identification member when the cassette is engaged with the pumping apparatus and the at least

~~one identification member is detected by the at least one sensor further comprising tubing, wherein the fitting includes an inlet port and an outlet port, the tubing connecting the inlet port to the outlet port.~~

4. The cassette of claim 1, wherein the at least one identification member is an axially magnetized magnet, and the plurality of predetermined orientations include one of a north and south pole of the magnet facing in a first direction, and said one of the north and south pole of the magnet facing in a second direction, opposite the first direction.

5. The cassette of claim 1, wherein the at least one identification member is a diametrically magnetized magnet, and the plurality of predetermined orientations include multiple angular positions of the magnet.

6. The cassette of claim 1, wherein the at least one identification member comprises a single identification member, the single identification member and mounting formation being configured to indicate up to eight different functional configurations.

7. The cassette of claim ~~16~~, wherein the functional configuration of the pump set if one of feed, feed/flush, feed wifi, feed/flush wifi, neonatal feed, neonatal feed/flush, neonatal feed wifi, and neonatal feed/flush wifi ~~at least one identification member comprises a magnet and the at least one mounting formation comprises a pocket in the cassette body.~~

8. The cassette of claim 1, ~~further comprising:~~ wherein the plurality of pockets comprises four pockets with each pocket configured to receive one identification member of the at least one identification member.

~~a plurality of identification members, the identification members being positioned and arranged on the cassette body to indicate the functional configuration of the pump set as being one of feed, feed/flush, feed wifi, feed/flush wifi, neonatal feed, neonatal feed/flush, neonatal feed wifi, and neonatal feed/flush wifi; or~~

~~a tubing, wherein the cassette body defines a housing having an interior that receives at least a portion of the tubing.~~

9. A fitting assembly for use in a cassette of a pump set, the fitting assembly comprising:

a body configured for attachment to the cassette, the body comprising:

an inlet port configured to receive at least one of an external feeding source or an external flushing source;~~and~~

an outlet port, ~~the body being configured for attachment to the cassette; and~~

tubing connecting the inlet port to the outlet port;

at least one mounting formation comprising a plurality of pockets with each pocket configured to receive one identification member in any one of a plurality of predetermined orientations, each predetermined orientation indicating a different functional configuration of the pump set, with each pocket of the plurality of pockets positioned to be centered with a corresponding sensor when the cassette is engaged with the pumping apparatus; and

at least one identification member positioned in at least one pocket of the plurality of pockets~~mounted on the body for indicating a functional configuration of the pump set.~~

10. The fitting assembly of claim 9, ~~further comprising a pocket formed in the body, the at least one identification member comprising a magnet received in the pocket; or~~

wherein the at least one identification member is one of an axially magnetized magnet and a diametrically magnetized magnet.

11. A method of assembling a cassette, the method comprising:

providing a cassette for use with a pumping apparatus having a pumping system for engaging a pump set; ~~and~~

~~mounting-inserting~~ at least one identification member to at least one mounting formation of the cassette for indicating a functional configuration of the pump set,

with the at least one mounting formation comprising a plurality of pockets with each pocket configured to receive one identification member in any one of a plurality of predetermined orientations, each predetermined orientation indicating a different functional configuration of the pump set, with each pocket of the plurality of pockets is positioned to be centered with a corresponding sensor when the cassette is engaged with the pumping apparatus and the at least one identification member positioned in at least one pocket of the plurality of pockets.

12. The method of claim 11, wherein:

the identification member is a magnet, mounting the at least one identification member to the cassette comprising selectively mounting the magnet to the cassette with one of a north pole and a south pole of the magnet facing away from the cassette for being identified by a sensor in the pumping apparatus to indicate the functional configuration of the pump set; or

the at least one identification member is a diametrically magnetized magnet for being identified by an angularity magnet sensor in the pumping apparatus to indicate the functional configuration of the pump set.

13. A flow control system comprising:

a flow control apparatus including a pumping device and a plurality of sensors, each sensor configured to detect presence and orientation of at least one identification member when a cassette is engaged; and

a pump set including a-the cassette and tubing mounted to the cassette, the cassette being configured for releasable attachment to the flow control apparatus to mount the cassette and tubing to the flow control apparatus, the cassette having at least one mounting formation and at least one identification member mounted on the cassette by the mounting formation, ~~the identification member and mounting formation being formed to mount the identification member in any one of a plurality of predetermined orientations, each predetermined orientation indicating a different functional configuration of the pump set, the sensor being configured to detect the presence and orientation of the at least one identification member for determining the functional configuration of the pump set~~

the at least one mounting formation comprising a plurality of pockets with each pocket configured to receive one identification member in any one of a plurality of predetermined orientations, each predetermined orientation indicating a different functional configuration of the pump set, with each pocket of the plurality of pockets is positioned to be centered with a corresponding sensor when the cassette is engaged with the pumping apparatus and at least one identification member positioned in at least one pocket of the plurality of pockets.

14. The system of claim 13, wherein:

the at least one identification member is an axially magnetized magnet, and wherein the plurality of predetermined orientations include one of a north and south pole of the magnet facing in a first direction, and said one of the north and south pole of the magnet facing in a second direction, opposite the first direction, and, wherein the sensor comprises a hall-effect sensor; ~~or~~

~~the flow control apparatus comprises a plurality of sensors, each sensor being configured to detect the presence and orientation of an identification member for determining the functional configuration of the pump set.~~

15. The system of claim 14, wherein the at least one identification member is a diametrically magnetized magnet, and wherein the plurality of predetermined orientations include multiple angular positions of the magnet, preferably wherein the sensor comprises an angularity magnet sensor.