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(54) **FLUID COMMUNICATION DEVICE**

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(56) References cited:
DE-A- 2 920 975
DE-U- 7 736 090
GB-A- 695 403
US-A- 2 814 404
US-A- 3 565 286
US-A- 3 566 930
US-A- 3 749 285
US-A- 4 006 847
US-A- 4 143 853
US-A- 4 184 815
US-A- 4 191 183
US-A- 4 197 848
US-A- 4 347 874

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EP 0 112 356 B2

Description

Background of the invention

The present invention pertains to a fluid communication device for mixing and transferring solutions. More particularly, it pertains to a device especially useful in high speed compounding of hyperalimentation solutions.

Hyperalimentation therapy is the intravenous feeding of, for example, a protein-carbohydrate mixture to a patient. It is used primarily to meet the patient's protein and caloric requirements which are unable to be satisfied by oral feeding. The protein may be in the form of free amino acids or protein hydrolysate and the carbohydrate commonly is dextrose. In addition to the protein and carbohydrate, vitamins (water-soluble and fat-soluble) and electrolytes also can be supplied in this therapy.

Each of these parenteral ingredients and the combination thereof are particularly susceptible to the growth of deleterious organisms and it is desirable that they be administered to the patient in a sterile condition. Thus, because these protein and carbohydrate solutions cannot be pre-compounded by the manufacturer, but must be combined at the time of their use, their compounding must be performed under sterile conditions to avoid organism growth.

A known apparatus and process for compounding hyperalimentation solutions utilizes a solution transfer system including a receiving container and a Y-transfer set. The Y-transfer set includes two separate tubes, each having an end attached to a common juncture by which solutions delivered through the tubes will pass through the juncture into the receiving container. The other end of one tube of the set is attached to the protein holding container and of the other tube of the set to the carbohydrate holding container. The desired volume of each solution being tranferred to the container is controlled by a clamp placed on each tube. The solutions may be allowed to flow into the receiving container by gravity flow. However, it has been found to be useful to transfer the solutions under the influence of a vacuum applied to the receiving container. When the receiving container is a flexible plastic container, the vacuum is created in a vacuum chamber into which the container is placed.

It has been known in the past that to ensure sterility during the compounding of hyperalimentation solutions, compounding should be performed under a laminar flow hood. Laminar flow hoods are used for reducing the risk of airborne contamination of such solutions. These units operate by taking room air and passing it through a pre-filter to remove gross contaminates, such as dust and lint. The air is then compressed and channeled through a bacterial retentive filter in the hood in a laminar flow fashion. The purified air flows out over the entire work surface of the hood in parallel lines at a uniform velocity. The bacterial retentive type of filter is designed to remove all bacteria from the air being filtered.

Compounding under a laminar flow hood aids in preventing airborne contamination, but it is relatively cumbersome and expensive and would not be useful for eliminating any other source of contamination, such as contamination caused by handling. When using a hood the operator may inadvertently perform the work at the end or outside of the hood and not within the recommended space, at least six (6) inches (0,15 m) within the hood, which insures the benefits of the air being purified. Time must be taken and care must be exercised to maintain a direct open path between the filter and the compounding area. Solution bottles and other nonsterile objects cannot be placed at the back of the hood work area next to the filter because these objects could contaminate everything downstream and disrupt the laminar flow pattern of the purified air. Also, in using a laminar flow hood, it is necessary routinely to clean the work surface of the hood before any compounding is performed.

Thus, the prior art apparatus and process discussed above are disadvantageous due to the extensive number of hand operations which are time consuming and can be error prone.

An apparatus and process utilizing a filter system in the compounding operation poses new problems. The viscosities of some of these parenteral solutions could cause filter clogging and, consequently, retard transfer through the filter and apparatus. Also, the viscosites of the solutions may be and are generally different, which could lead to an unequal or otherwise undesired mixture of them. Therefore, additional time and care must be exercised to ensure that the desired mixture of the solutions being combined is achieved.

The device of the present invention overcomes the above-discussed disadvantages and provides a unitized, sterile, quick and economical fluid path. Also, the device is arranged to provide proper orientation with respect to the compounding apparatus.

U.S. Patent No. 3 749 285 discloses a fluid communication device having a plurality of fluid lines in fluid communication, via respective pumps, with a common fluid passageway, but this prior device does not appear to afford such ease of use as devices in accordance with the present invention.

DE-A-2920975 discloses a device for infusion of dialysis solution having a fluid line including a pump tubing segment for placement under tension on a peristaltic pump.

DE-U-7736090 discloses an infusion device having a plurality of fluid lines connected between respective supply containers and a junction block and a single outlet line from the junction block.

US-A-2814404 discloses a bottle cap including a retaining ring for securing the cap to a bottle neck and a closure member connected to the retaining ring by a flexible arm, which maintains the ring and closure member in substantially the same plane in the uncovering position. The internal side faces upwardly in the uncovering position and covers the bottle opening in its closure position.

The features of the present invention are as set out in Claim 1.

In accordance with an embodiment of the present invention, a device for fluid communication is provided to be used with an apparatus for compounding a plurality of solutions, preferably under sterile conditions. The device of the present invention includes a plurality of fluid container connectors to be inserted into respective solution containers, each container containing a solution to be compounded. Fluid lines sealingly connect each container connector to a respective inlet pump fitting for providing fluid flow from the solution containers to a respecitve pump tube.

The pump tubes are elastomeric bodies fluidly connecting respective inlet pump fittings to exit pump fittings. The pump fittings include grips about their periphery to facilitate putting the pump tubes in tension about pump rollers of peristaltic pumps of the compounder. Tension of the pump tubes is maintained by placing the pump fittings in respective nets and exits provided in the housing of the compounder.

The exit pump fittings are sealingly connected to further fluid lines to provide a fluid path to a common junction block. The junction block separately receives each of the plurality of further fluid lines in a substantially parallel, vertically spaced manner so as not to inhibit fluid flow by crimping of the lines.

The common junction block provides an exit port for sealingly and sterilely receiving a further fluid connector to provide a path to a receiving container. The exit port is preferably at right angles to the entrance of the plurality of further fluid lines.

The common junction block also has a closure member associated therewith to cover the exit port and protect it from contamination when not in use. The closure member includes a retaining ring, securing the member to the block, connected to a closure by a flexible member. In the block use or uncovered position, the ring, flexible member and closure lie in a substantially common plane with the internal side of the closure facing downward to prevent collection of particulate contamination on the interior thereof. In the block non-use or covered position, the flexible member is rotated to allow the interior of the closure to cover the exit port.

One of each set of inlet and exit pump fittings are color or numerically coded to correspond to a respective pump of the compounder to provide proper orientation of the present invention with respect to the compounder. Further, the fluid lines are sized to provide the exact requirements of length for the compounder. Preferably the device is constructed to accommodate three solutions to be compounded. The device of the present invention provides a sterile, unitized, economical fluid path between solution containers containing solutions to be compounded and a receiving container.

Brief description of the drawings

Fig. 1 is a perspective view of the present invention in accordance with its use as providing a fluid path;

Fig. 2 is a perspective view configured in accordance with the present invention;

Fig. 3 is a sectional view of a portion of the present invention; and

Fig. 4 is a sectional view of another portion of the present invention.

Detailed description

Referring now to Figs. 1 and 2, a fluid communication device 10 of the present invention is best illustrated. Fig. 1 shows the device 10 in position for use with the high speed bulk compounder, while Fig. 2 shows the device 10 as it is removed from its sterile package. Supply containers 12, 14 and 16, shown in phantom in Fig. 1, are fluidly connected with a receiving container 18 (also shown in phantom) by device 10. The supply and receiving containers which are shown in phantom may be flexible plastic bags of the type marketed by Travenol Laboratories, Inc. of Deerfield, Illinois under the registered trademark Viaflex.

The device 10 provides a sterile fluid path from each supply container to a common junction block 20, where a receiving container can be placed in fluid communication therewith. The solutions to be compounded are transferred from the supply containers to the receiving container by peristaltic pumps 22, 24 and 26 shown in phantom). The peristaltic pumps 22, 24 and 26 effect fluid flow from the supply containers 12, 14, and 16 through the device 10 to the receiving container 18 by movement of rotatable rollers 28 of each pump which compress respective tensioned wall portions

30, 30' or 30'' of the fluid path in contact therewith, forcing the fluid therein forward.

The portion 30, 30' and 30'' of the fluid paths of device 10 in contact with each respective pump is an elastomeric body or pump tubing from about 100 mm (four inches) to about 150 mm (six inches) long, preferably 125 mm (five inches) long, capable of being put in tension. The ends of each pump tubing 30, 30' and 30'' are connected to respective inlet and exit pump fittings 32, 32' and 32'' and 34, 34' and 34'' repectively, which are operatively fixed position to maintain the pump tubing in tension, such as placed within inlet and exit slots of a pump housing (not shown).

The fluid paths of device 10 start with fluid connectors 36, 36' and 36''. The tips of the fluid connectors 36, 36' and 36'' are adapted to be inserted into the supply containers 12, 14 and 16 respectively and prior to their use are covered with a protective sheath 38, 38' and 38'' (Fig. 2) to prevent contamination of the connectors and the fluid paths. Each fluid connector is sealingly connected to a respective fluid line 40, 40' and 40'', such as vinyl tubing or the like which are sealingly connected to a respective inlet pump fitting 32, 32' and 32''. Further fluid lines 42, 42' and 42'' are each sealingly connected to a respective exit pump fitting 34, 34' and 34'' to connect it with the common junction block 20.

The inlet and exit pump fittings 32 and 34 as seen in Fig. 4 are representative of like fittings and tubings of device 10. The inlet and exit pump fittings have a ribbed portion 43 around their periphery. This ribbed portion 43 facilitates their gripping to place pump tuning 30 in tension around rollers 28. The inlet and exit pump fittings 32 and 34 are identical and have a dish shaped portion 44 at one end connected to a cylindrical portion 46 at the other end providing a shoulder portion 47. The shoulder portion 47 bears against the inlet or exit slots of the pump housing to maintain tension in the pump tubing 30 connected thereto. The pump tubing 30 is stretched over the cylindrical portion 46 of the fittings 32 and 34 to provide an interference fit therebetween. The cylindrical portion 46 includes a cylindrical fluid line receiver 48 tapered along its length therein having a shoulder portion 50. The fluid line is inserted into the cylindrical portion 46 through the dish shaped portion 44 until it contacts the shoulder 50. The line is then sealed therein. The cylindrical portion 46 then provides fluid communciation through a hollow cylindrical portion 52.

The fluid lines 40, 40' and 40'' coupling respective fluid connectors 36, 36' and 36'' to respective inlet pump fittings 32, 32' and 32'' are preferably of the same length. The fluid lines 42, 42' and 42'' coupling the exit pump fitting 34, 34' and 34'' to the common junction block 20 are preferably of differing lengths to accommodate differences in the spatial relation of each pump 22, 24 and 26 to the block 20. Further, at least one of each set of inlet and exit pump fittings are either numerically, colour or otherwise coded to correspond to a respective coded operative position to provide proper orientation of the device 10.

The common junction block 20 is best seen in Fig. 3. The block 20 includes a junction body 54, a top cap 56 and a membrane 58 therebetween. The body 54 provides substantially parallel, vertically spaced tapered channels 60, 60' and 60'' which are each adapted to receive a respective fluid line 42, 42' and 42'' so as not inhibit fluid flow therethrough by crimping of the lines. The channels 60, 60' and 60'' are tapered to provide a snug fit for fluid lines 42, 42' and 42'' which are sealingly connected therein. Ports 62, 62' and 62'' provided fluid communication between a respective channel and a small volume chamber 64. The chamber 64 is at substantially right angles to the channels and ports and is of an inverted truncated cone shape 66 leading into another more pronounced inverted truncated cone shape 68 leading into a cylindrical portion 70.

The top cap 56 is sealed, such as by welding to the upper portion of the body 54 and secures the membrane 58 therebetween. The top cap 56 provides a dish shaped opening 72 leading in a channel 74 which provides communication with the membrane 58. The membrane 58 has a normally closed, resiliently deformable slit 76 which extends therethrough. The slit 76 provides a sealed sterile fluid path for the entrance of a fluid connector or the like to provide a fluid path to the receiving container. This is accomplished by the membrane 58 deforming and closing about the connector. Upon withdrawal of the connector the membrane 58 will close upon itself immediately, thereby continuing to protect the fluid path of the device 10. The top cap, membrance and slit are of the type disclosed in United States Patent No. 4,197,848 which issued in the names of Scott T. Garrett, Robert R. Fasana and William L. Rudzena.

A closure or dust cover 78 is provided to protect the fluid path of device 10 when not in use. The cover 78 includes a closure member 80, a connecting member 82 and a flexible arm 84 therebetween. The connecting member 82 is ring-like and fits around the periphery of the upper end portion of the junction body 54. The top cap 56 is provided with a lip 86 at its upper end portion to prevent the member 82 from becoming dislodged from the junction body 54 and to provide a sealed connection with member 80.

The flexible arm 84 connects the connecting member 82 and the closure member 80. The arm

84 maintains the members 80 and 82 in the substantially same plane and out of the way of the functional area when not used to protect device 10, but allows easy access when needed.

The closure member 80 includes lip 88 and undercut 90 which are complemental with lip 86 of the top cap 56 to provide a sealed enclosure about the top cap 56 thereby protecting the fluid path of device 10. The member 80 is orientated with its internal side 92 facing downward, when not used to protect device 10, to prevent any particulate matter from accumulating thereon. The member 80 when sealingly covering top cap 56 requires the flexible arm 84 to be rotated or twisted about its axis to provide the proper orientation of the closure 80 with respect to the top cap 56. The member 80 also includes a pull tab 94 with a raised gripping area 96 for easy grasping of the tab 94 to facilitate the uncovering of the top cap 56.

The device 10 of the present invention hereinabove described provides a unitized, sterile, economical fluid path between a plurality of solution containers containing solutions to be transferred to a receiving container. The device is especially adapted for use with the High Speed Bulk Compounder to provide a fast, efficient, precise, sterile way of compounding solutions. Further, the device 10 provides the proper orientation of the device with respect to the compounder to prevent errors.

It is to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

Claims

1. A fluid communication device comprising a plurality of fluid lines (40,40',40'';30,30'30'',42,42'42'') from respective solution containers and connected in fluid communication, via respective peristaltic pumps (28), with a common junction block (20) providing fluid communication between the fluid lines and an exit port (74), leading to a receiving container, the device being characterised in that:-

it provides a sterile and unitized fluid path and comprises:-

a plurality of first fluid lines (40,40'40''), each said first fluid line connecting a respective solution container connector (36,36'36'') to a respective first pump fitting (32.32'32'') providing a fluid path therebetween;

a plurality of pump tubing segments (30,30',30'') connecting each of said first pump fittings to a respective second pump fitting (34,34'34'') furnishing a fluid path therebetween;

a plurality of second fluid lines (42,42'42''), each second fluid line connecting a respective second pump fitting to said common junction block (20);

the first and second pump fittings being placed in respective inlets and exits of the pump housings with the segments (30,30',30'') engaged about pump rollers (28) to maintain the segments in tension.

the block including a fluid passageway (66) in fluid communication with each of the second fluid lines (42,42'42'') and the exit port (74) communicating with said fluid passageway (66) to provide a path for further fluid communication externally of the junction block;

a cover (78) being provided to cover said exit port (74) to prevent particulate matter from accumulating thereon;

the cover (78) including a retaining ring (82) securing the cover to the junction block (20), and a closure member (80) connected to the retaining ring by a flexible arm (84), the flexible arm maintaining the retaining ring (82) and closure member (80) in substantially the same plane in the uncovering position, the closure member (80) having an internal side (92) facing downwardly when the exit port (74) faces upwardly, the flexible arm (84) being twistable to allow the interior side (92) to cover the exit port (74) in the covering position.

2. The device as claimed in Claim 1 wherein the first pump fittings (32, 32', 32'') and the second pump fittings (34, 34', 34'') include gripping members about their periphery adapted to aid in placing the pump tubing segments (30, 30', 30'') in tension, and at least one of the first and second pump fittings is coded to provide proper orientation to a respective coded operative position for correct use.

3. The device as claimed in any preceding claim wherein the pump tubing segments (30, 30', 30'') are sealingly connected to the pump fittings (32, 32', 32'', 34, 34', 34'') by an interference fit therebetween.

4. The device as claimed in any preceding claim wherein each of said pump tubing segments (30, 30', 30'') is an elastomeric body capable of being placed in tension around associated rollers of a respective peristaltic pump to achieve fluid flow therethrough.

5. The device as claimed in any preceding claim wherein the length of each of said pump tubing segments (30, 30', 30'') is from four inches (10 cm) to six inches (15 cm) and preferably about

five inches (12.5 cm).

6. The device as claimed in any preceding claim wherein said fluid passageway (66) includes substantially parallel spaced ports (60, 60', 60'') for receiving said second fluid lines and maintaining said second fluid lines (42, 42', 42'') in a substantially parallel spaced relation to prevent crimping.

7. The device as claimed in any preceding claim, where said exit port (74) is adapted to sealingly receive a further fluid communication proximate the exterior of said common junction block to provide a path for fluid communucation.

Patentansprüche

1. Fluid-Verbindungsvorrichtung, die aufweist: eine Mehrzahl von Fluidleitungen (40,40',40'';30,30',30'';42,42',42'') von entsprechenden Lösungsbehältern, die über jeweilige peristaltische Pumpen (28) in Fluidkommunikation mit einem gemeinsamen Verbindungsblock (20) verbunden sind, der die Fluidkommunikation zwischen den Fluidleitungen herstellt, und eine Auslaßöffnung (74), die zu einem Aufnahmebehälter führt, wobei die Vorrichtung dadurch gekennzeichnet ist, daß:-

sie einen sterilen und vereinheitlichten Fluidweg bildet und folgendes aufweist:-

eine Mehrzahl von ersten Fluidleitungen (40,40',40''), wobei jede erste Fluidleitung einen jeweiligen Lösungsbehälter-Verbinder (36,36',36'') mit einem jeweiligen ersten Pumpenanschlußstück (32,32',32'') unter Herstellung eines Fluidwegs zwischen ihnen verbindet;

eine Mehrzahl von Pumpenschlauchsegmenten (30,30',30''), die jedes erste Pumpenanschlußstück mit einem jeweiligen zweiten Pumpenanschlußstück (34,34',34'') verbinden, um dazwischen einen Fluidweg herzustellen;

eine Mehrzahl von zweiten Fluidleitungen (42,42',42''), wobei jede zweite Fluidleitung ein entsprechendes zweites Pumpenanschlußstück mit dem gemeinsamen Verbindungsblock (20) verbindet;

wobei die ersten und zweiten Pumpenanschlußstücke in jeweiligen Einlässen und Auslässen der Pumpengehäuse angeordnet und die Segmente (30,30',30'') um Pumpenrollen (28) herum in Eingriff sind, um die Segmente unter mechanischer Spannung zu halten;

wobei der Block einen Fluidkanal (66) in Fluidkommunikation mit jeder der zweiten Fluidleitungen (42,42',42'') aufweist und die Auslaßöffnung (74) mit dem Fluidkanal (66) kommuniziert, um einen Weg zur weiteren Fluidkommunikation außerhalb des Verbindungsblocks zu bilden;

ein Verschlußstück (78), das vorgesehen ist, um die Auslaßöffnung (74) abzudecken und das Ansammeln von teilchenförmigen Stoffen daran zu verhindern;

wobei das Verschlußstück (78) einen Haltering (82), der das Verschlußstück an dem Verbindungsblock (20) festlegt, und ein Verschlußteil (80) aufweist, das mit dem Haltering über einen flexiblen Arm (84) verbunden ist, wobei der flexible Arm den Haltering (82) und das Verschlußteil (80) in der nichtabdeckenden Position im wesentlichen in derselben Ebene hält, wobei das Verschlußteil (80) eine innere Seite (92) hat, die nach unten weist, wenn die Auslaßöffnung (74) nach oben weist, und wobei der flexible Arm (84) verdrehbar ist, um zuzulassen, daß die innere Seite (92) die Auslaßöffnung (74) in der abdeckenden Position abdeckt.

2. Vorrichtung nach Anspruch 1, wobei die ersten Pumpenanschlußstücke (32,32',32'') und die zweiten Pumpenanschlußstücke (34,34',34'') um ihren Umfang herum Greifer aufweisen, die ausgebildet sind, um dazu beizutragen, die Pumpenschlauchsegmente (30,30',30'') unter mechanische Spannung zu bringen, und wobei wenigstens eines von den ersten und zweiten Pumpenanschlußstücken codiert ist, um eine ordnungsgemäße Orientierung in eine jeweilige codierte Betriebsposition zum richtigen Gebrauch vorzusehen.

3. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei die Pumpenschlauchsegmente (30,30',30'') mit den Pumpenanschlußstücken (32,32',32'',34,34',34'') durch einen Preßsitz zwischen ihnen abdichtend verbunden sind.

4. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei jedes der Pumpenschlauchsegmente (30,30',30'') ein elastomerer Körper ist, der um zugehörige Rollen einer jeweiligen peristaltischen Pumpe herum unter mechanische Spannung bringbar ist, um einen Fluiddurchfluß zu erzielen.

5. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei die Länge jedes der Pumpenschlauchsegmente (30,30',30'') zwischen 10 cm (4 inches) und 15 cm (6 inches) und bevorzugt ca. 12,5 cm (5 inches) beträgt.

6. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei der Fluidkanal (66) im wesentlichen parallele, beabstandete Öffnungen (60,60',60'') aufweist, um die zweiten Fluidleitungen aufzunehmen und die zweiten Fluidleitungen (42,42',42'') in einer im wesentlichen parallelen, beabstandeten Beziehung zu halten, um Einquetschen zu verhindern.

7. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei die Auslaßöffnung (74) ausgebildet ist, um eine weitere Fluidverbindung nahe der Außenseite des gemeinsamen Verbindungsblocks abdichtend aufzunehmen, um einen Weg zur Fluidkommunikation zu schaffen.

Revendications

1. Dispositif de communication de fluide comprenant une pluralité de conduites de fluide (40, 40', 40'' ; 30, 30', 30'' ; 42, 42', 42'') provenant de récipients respectifs de solution et reliées en communication de fluide, par l'intermédiaire de pompes péristaltiques respectives (28), avec un bloc de jonction commun (20) établissant la communication de fluide entre les lignes de fluide et un orifice de sortie (74), conduisant à un récipient collecteur, le dispositif étant caractérisé en ce que :

   il établit un chemin de fluide stérile et unifié et comprend :

   une pluralité de premières conduites de fluide (40, 40', 40''), chaque dite première conduite de fluide reliant un connecteur de récipient de solution respectif (36, 36', 36'') à un premier raccord de pompe respectif (32, 32', 32'') pour constituer entre eux un chemin de fluide,

   une pluralité de segments de tube de pompe (30, 30', 30'') reliant chacun desdits premiers raccords de pompe à un deuxième raccord de pompe respectif (34, 34', 34'') pour constituer entre eux un chemin de fluide ;

   une pluralité de deuxièmes conduites de fluide (42, 42', 42''), chaque deuxième conduite de fluide reliant un deuxième raccord de pompe respectif audit bloc de jonction commun (20) ; les premier et second raccords de pompe étant placés dans les entrées et sorties respectives des carters de pompe tandis que les segments (30, 30', 30'') sont engagés autour des rouleaux de pompe (28) de façon à maintenir les segments sous tension ;

   le bloc comportant un passage de fluide (66), en communication de fluide avec chacune des deuxièmes conduites de fluide (42, 42', 42''), et l'orifice de sortie (74) en communication avec ledit passage de fluide (66) de manière à fournir un chemin pour une nouvelle communication de fluide à l'extérieur du bloc de jonction ;

   un organe obturateur (78) étant prévu pour couvrir ledit orifice de sortie (74) de manière à empêcher l'accumulation de matière en particules sur celui-ci ;

   ledit organe obturateur (78) comprenant un anneau de retenue (82) qui fixe l'organe obturateur au bloc de jonction (20), et un élément de fermeture (80) relié à l'anneau de retenue par un bras flexible (84) le bras flexible maintenant l'élément de fermeture (80) et l'anneau de retenue (82) sensiblement dans le même plan dans la position découverte, l'élément de fermeture (80) ayant une face interne (92) tournée vers le bas quand l'orifice de sortie (74) regarde vers le haut, le bras flexible (84) pouvant tourner pour permettre à la face interne (92) de couvrir l'orifice de sortie (74) dans la position recouverte.

2. Dispositif suivant la revendication 1, dans lequel les premiers raccords de pompe (32, 32', 32'') et les deuxièmes raccords de pompe (34, 34', 34'') comportent des éléments de préhension, autour de leur périphérie, prévus pour faciliter la mise en tension des segments de tube de pompe (30, 30', 30''), et au moins l'un des premiers et deuxièmes raccords de pompe est codé pour indiquer l'orientation correcte par rapport à une position de fonctionnement codée respective pour une utilisation correcte.

3. Dispositif suivant l'une quelconque des revendications précédentes, dans lequel les segments de tube de pompe (30, 30', 30'') sont raccordés de façon étanche aux raccords de pompe (32, 32', 32'', 34, 34', 34'') par un joint à ajustement serré entre les tubes et les raccords.

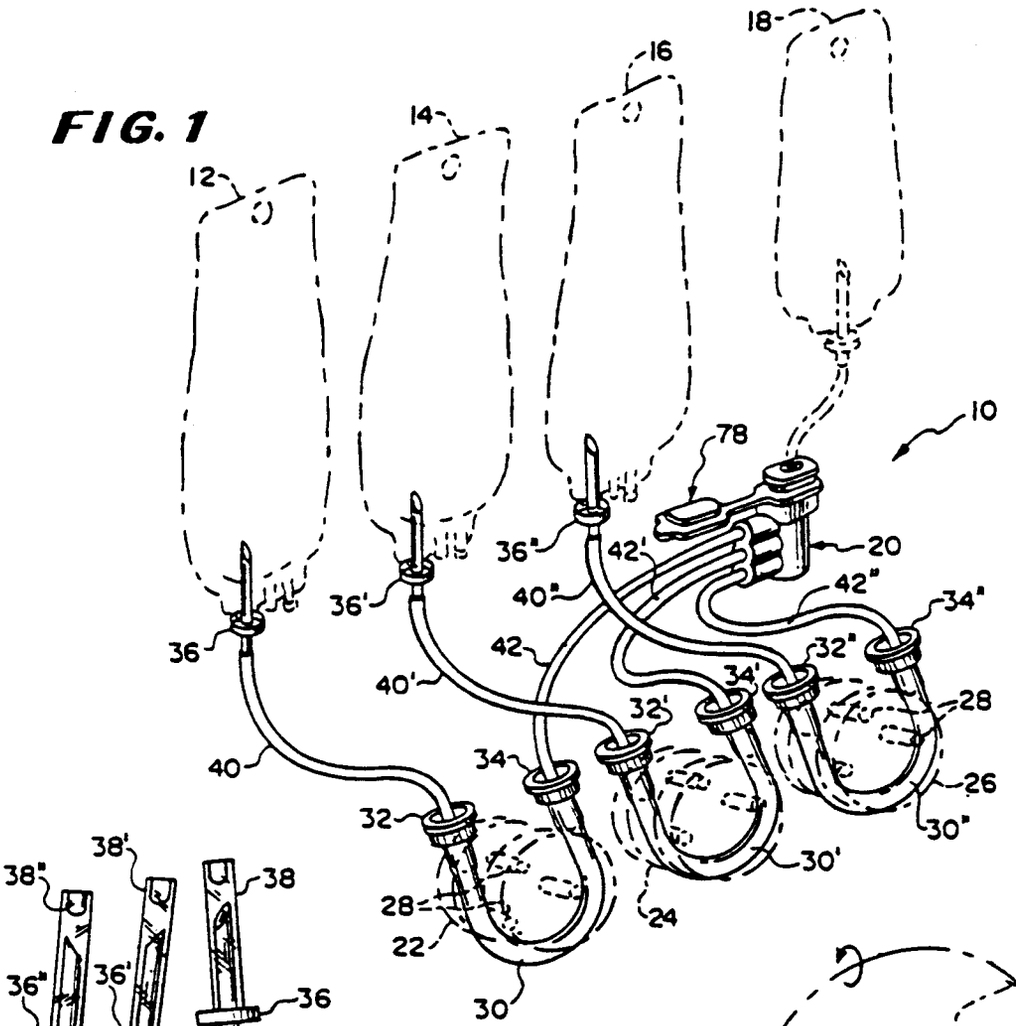
4. Dispositif suivant l'une quelconque des revendications précédentes, dans lequel chacun desdits segments de tube de pompe (30, 30', 30'') est un corps en élastomère qui peut être placé en tension autour de galets associés d'une pompe péristaltique respective, afin d'engendrer un écoulement de fluide dans ledit tube.

5. Dispositif suivant l'une quelconque des revendications précédentes, dans lequel la longueur de chacun desdits segments de tube de pompe (30, 30', 30'') est de 10 cm (4 inches) à 15 cm (6 inches) et de préférence de 12, 5 cm (5 inches) environ.

6. Dispositif suivant l'une quelconque des revendications précédentes dans lequel ledit passage de fluide (66) comporte des orifices espacés sensiblement parallèles (60, 60', 60'') pour recevoir lesdites deuxièmes conduites de fluide et maintenir lesdites deuxièmes conduites de fluide (42, 42', 42'') en relation espacée et sensiblement parallèle, de manière à éviter un pliage.

7. Dispositif suivant l'une quelconque des revendications précédentes, dans lequel ledit orifice de sortie (74) est prévu pour recevoir de façon étanche une autre communication de fluide près de l'extérieur dudit bloc de jonction commun, afin de constituer un chemin pour la communication de fluide.

FIG. 1


18
16
14
12
10
78
20
36"
42'
40"
42"
34"
36'
36
42
32"
40'
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32'
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30"
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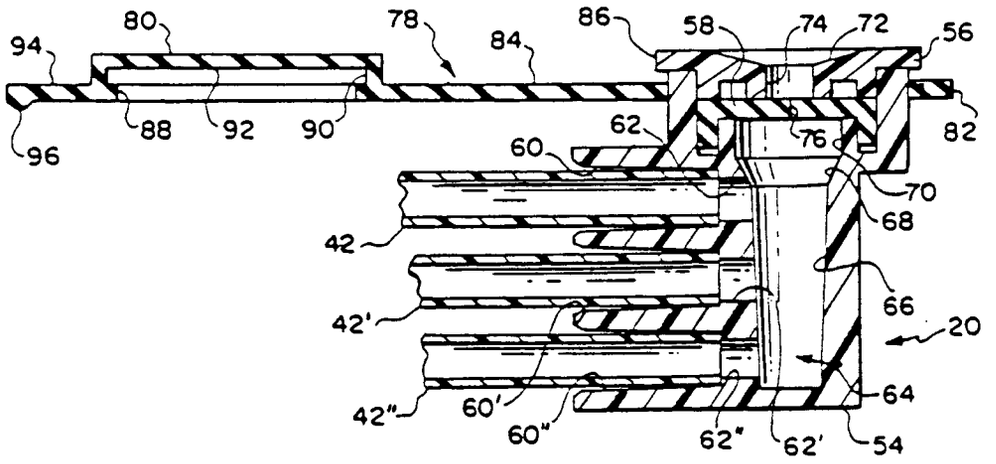
38'
38"
38
28
24
22
36"
36'
36
30
40
32
34
58
56
78
20
30
42
40'
34'
32'
54
42'
30'
34"
40"
42"
32"
30"

FIG. 2

FIG. 3


80
78
86
58
74
72
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94
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82
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76
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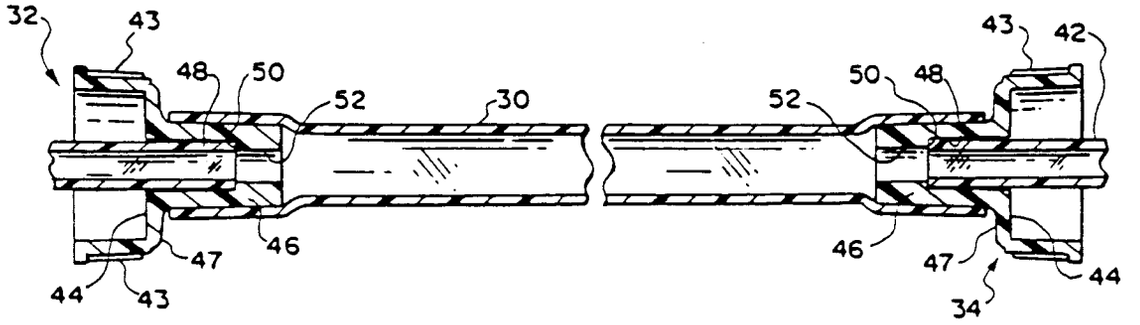
70
68
42
66
42'
20
64
42"
60'
60"
62"
62'
54

FIG. 4


32
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