DUAL-TIPPED NASAL SYRINGE AND ASPIRATING DEVICE

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ABSTRACT OF THE DISCLOSURE

A nasal syringe and aspirating device having a pair of liquid flow path tubes or tube means, each provided with its own flexible, collapsible syringe bulb. The syringe bulbs are separated by a relatively rigid stiffening wall which permits simultaneous and similar operation of the syringe bulb tip end of each liquid flow path tube to be operated in either a pumping or suction fashion to substantially the same extent.

Generally speaking, the present invention comprises a dual tipped nasal syringe and aspirating device for use in dispensing and applying an applicatory liquid into a pair of nostrils and/or for evacuating liquid therefrom through a pair of similar longitudinal, hollow applicatory and/or withdrawal liquid flow path tubes or tube means having physically laterally separated similar forward end portions thereof carried by the tubes or tube means and provided with similar open forward tip ends (appropriately spaced and, in certain forms, provided with specially shaped and sized nostril-engageable exterior portions) defining liquid egress and ingress openings for the passage of liquid from the corresponding ones of said tubes or tube means outwardly therefrom or inwardly thereinto, respectively, depending upon whether the complete syringe is used as a liquid applicatory syringe or as a liquid aspirating and evacuating syringe. The rear ends of the liquid flow path tubes or tube means are provided with a pair of similar, hollow, interiorly non-communicating and hydraulically independent and isolated, flexible, collapsible syringe bulbs, each having a closed rear end and a forward end sealingly coupled to and engaged around and with respect to a corresponding one of said pair of tubes or tube means and effectively comprises a corresponding hand-operable, two-way pump and aspirating device in communication with the hollow bore of the corresponding one of said pair of tubes or tube means but in a manner completely hydraulically isolated and independent of the other one of said pair of syringe bulbs. Each of said pair of syringe bulbs is adapted to be simultaneously and substantially similarly manually operated for either outflow pumping purposes or inflow pumping and aspirating purposes with respect to the corresponding forward open tip ends of the corresponding tubes or tube means in communication therewith.

One preferred form of the invention shows each of the syringe bulbs as being mechanically physically joined together in laterally adjacent relationships so that lateral manual squeezing action of a person's hand applied thereto will simultaneously and substantially similarly collapse both of the syringe bulbs and cause a similar pumping action thereof (either an outflow pumping or an inflow suction pumping action, depending upon the mode of use of the complete device).

In one preferred form of the invention, the above-described simultaneous manual collapsing of both syringe bulbs in substantially the same manner is facilitated by means making it difficult, if not virtually impossible, to manually collapse one of the syringe bulbs without collapsing the other. One form of such means comprises a stiffening wall or means lying in a junction plane between and effectively bisecting the region where the pair of syringe bulbs are effectively physically connected and joined together, with said stiffening wall or means having a substantial degree of stiffness in the junction plane thereof to an extent such as to make it very difficult to collapse either or both of the bulbs in a direction parallel to said junction plane while making it extremely easy and simple to simultaneously collapse both of the syringe bulbs in an operating plane substantially transverse to said junction plane.

In one specific form of the invention, the open forward tip ends of the tubes or tube means are positionally reversed so that they will be upwardly directed for engagement within the nostrils of a person whose head is in an erect position while the syringe bulbs are positioned at the top of the upwardly directed rear ends of the corresponding tubes or tube means. This facilitates the most effective dual operation of the device without the necessity of a person reclining on a bed, or the like, in the conventional prior art manner.

In one preferred form of the invention, the pair of laterally spaced tubes, adjacent to and between their forward end portions, define an open septum-receiving recess to facilitate nasal engagement in an optimum, effectively sealed manner.

Also, in one preferred form of the invention, the pair of tubes or tube means are made of a light-transmissive material, such as glass or certain light-transmissive or partially light-transmissive plastic materials and, in certain preferred forms thereof, the material may be of a very difficult-to-break or substantially unbreakable type, such as tempered or flexible glass or flexible plastic or rigid non-frangible material.

With the above points in mind, it is an object of the present invention to provide a novel, dual-tipped syringe capable of functioning as an applicatory device for matched applicatory liquid feeding into a pair of nostrils.

It is a further object of the present invention to provide a novel dual-tipped syringe capable of functioning as a liquid evacuating and withdrawing aspirating syringe for matched withdrawal of liquid from a person's nostrils.

It is a further object of the present invention to provide a novel dual-purpose dual-tipped syringe capable of performing in either of the manners set forth in the two preceding objects and provided with a novel means for causing the operation of the pumping means to be of substantially equal magnitude.

It is a further object of the present invention to provide a device of the character set forth in the preceding object wherein the two pumping means comprise a pair of similar syringe bulbs and wherein the means for causing the pumping action of each of the syringe bulbs to be of substantially equal magnitude comprises means rendering it difficult to independently operate one of the syringe bulbs without simultaneously operating the other syringe bulb.

It is a further object of the present invention to provide a device of the character set forth in the preceding object wherein, the means referred to in the preceding object for rendering it difficult to operate one syringe bulb without similarly operating the other syringe bulb, comprises a stiffening wall or means lying between the two syringe bulbs and adapted to substantially prevent the operation of either or both of the syringe bulbs in a direction substantially parallel to the stiffening wall or means while freely allowing similar collapsing operation of both of said syringe bulbs in an operating plane substantially transverse to the junction plane in which said stiffening wall or means lies.
It is a further object of the present invention to provide a novel dual-tipped syringe wherein the open forward tips ends of a similar pair of tubes thereof are appropriately laterally spaced and shaped and provided with an appropriate septum-receiving recess therebetween to facilitate optimum nasal engagement thereof.

It is a further object to provide a dual-tipped nasal syringe of the character referred to herein, wherein the tube means are made of a light-transmissive material to allow the amount, level, orientation, and movement or displacement of liquid therein to be visually observed and, in one preferred form, the material may also be of a substantially unbreakable nature.

It is a further object of the present invention to provide a device of the character referred to herein, which is provided with means for reversing the position of the dual nasal engagement portions of the device relative to the dual, simultaneously operable syringe bulbs so that optimum operation of the device can be effected with respect to a person's nostrils while the person remains erect rather than reclining.

It is a further object of the present invention to provide a dual-tipped nasal syringe device of the character referred to herein, having any or all of the advantages or features referred to herein, generically and/or specifically, either individually or in combination, and which is of extremely simple and very inexpensive construction, both as to the cost of tooling preparatory to production thereof, and as to the cost of production per item subsequently, and which is of virtually foolproof, easy-to-clean, and easy-to-use construction, all of which are conducive to widespread manufacture, distribution, and use of the invention for the purposes briefly outlined herein or for other substantially equivalent purposes.

Further objects are implicit in the detailed description which follows hereinafter (which is to be considered as exemplary of, but not specifically limiting the present invention), and said objects will be apparent to persons skilled in the art after a careful study of the detailed description which follows, and all such implicit objects are intended to be included and comprehended within the broad scope of the present invention as fully as if illustrated and described in specific and particular detail herein.

For the purpose of clarifying the nature of the present invention, several exemplary embodiments of the invention are illustrated in the hereinbelow-described figures of the accompanying two sheets of drawings and are described in detail hereinafter.

FIG. 1 is a perspective view of one exemplary embodiment of the present invention.

FIG. 2 is an enlarged, fragmentary, cross-sectional view, taken substantially along the plane and in the direction indicated by the arrows 2—2 of FIG. 1, illustrating the interior construction of one exemplary form of the pair of syringe bulbs.

FIG. 3 is a view similar to FIG. 2 but illustrates the fact that the pair of syringe bulbs collapse simultaneously and substantially to the same extent when squeezed in an operation plane transverse to a junction plane containing the mechanical or physical junction of the pair of syringe bulbs with respect to each other.

FIG. 4 is an enlarged cross-sectional view, taken substantially along the plane and in the direction indicated by the arrows 4—4 of FIG. 1, illustrating the web joining the pair of tubes.

FIG. 5 is a fragmentary view taken substantially along the plane and in the direction indicated by the arrows 5—5 of FIG. 1 and shows the forward portion of the device, including the two forward open ends and the septum-engaging recess formed in the web therebetween, in a closed engaged relationship with respect to a pair of nostrils and an intervening septum which are shown fragmentarily in phantom in FIG. 5.

FIG. 6 is a fragmentary, perspective view showing a slightly modified type of exterior nostril-engaging means carried by the forward open tip ends of the pair of tube means.

FIG. 7 is a fragmentary view taken substantially along the plane and in the direction indicated by the arrows 7—7 of FIG. 6 and shows in phantom the appropriate position of corresponding nostrils when engaged therewith.

FIG. 8 is a perspective view illustrating a modified form of the invention having effectively reversed nostril-engaging portions or forward open tip end portions which make it possible to position the pair of syringe bulbs upwardly while the device is engaged with a person's nostrils when a person's head is erect rather than in the conventional reclining position for applying medication to a person's nostrils.

FIG. 9 is a somewhat diagrammatic and schematic, cross-sectional view of a portion of a modified form of the invention in the act of being molded.

FIG. 10 illustrates the part produced in FIG. 9 in the act of having a pair of syringe bulb outer enclosing walls molded onto a divider wall portion of the structure formed in FIG. 9 so as to form the complete device.

FIG. 11 shows the complete device removed from the mold of FIG. 10 and with the tubes bent outwardly to provide an appropriate spacing approximately equal to the normal width between a person's nostrils and thus shows this modification of the device in its final form.

Generally speaking, the exemplary first form of the invention illustrated in FIGS. 1—5 may be said to comprise a dual-tipped syringe of the applicatory and/or the aspirating or suction type, which is generally designated by the reference numeral 20.

The complete syringe device 20 is shown as including a pair of similar, longitudinal, hollow liquid flow path tubes or tube means 22 having physically laterally separated similar forward end portions 24 thereof provided with similar open forward tip ends 26 defining liquid egress and ingress openings 28 for the passage of liquid from the corresponding interior bores 30 of the tubes 22 either outwardly therefrom or inwardly thereinto, respectively, depending upon whether the complete device 20 is used as a liquid applicatory syringe or as a liquid aspirating and evacuating syringe.

In the exemplary first form of the invention illustrated, the rear ends of the liquid flow path tubes 22 are provided with a pair of hollow (interiorly non-communicating and effectively hydraulically independent and isolated), flexible, collapsible syringe bulbs, generally designated as 24, each having a closed rear end 24 and an open forward end 36 which is sealingly coupled to and engaged around and with respect to a corresponding communication opening 38 at the rear end of the corresponding bore 30 of the corresponding tube 22. However, the mode of connection of each syringe bulb 32 with respect to the corresponding bore 30 of the corresponding tube 22, but completely hydraulically isolated from, and independent of, the other syringe bulb 32.

Each of the pair of syringe bulbs 32 is adapted to be substantially simultaneously and similarly manually operated for either outflow pumping purposes with respect to the corresponding tube 22 and forward open tip end 26 thereof or for inflow pumping and aspirating purposes with respect to the corresponding forward open tip end 26 and the communicating bore 30 of the corresponding one of the pair of tubes 22.
The important point to note is that the intended mode of operation of the pair of syringe bulbs 32 is such that they are adapted to be manually pumped in a substantially equal-volume displacement manner, whether for outflow pumping purposes or for inflow pumping purposes, and this important feature of the invention, as best illustrated operationally in FIG. 3, is made virtually mandatory by the novel construction of the exemplary first form of the invention wherein each of the pair of syringe bulbs 32 is effectively mechanically or physically joined together by what might be termed a central junction wall 40, which effectiely divides and separates the two syringe bulbs 32 from each other insofar as hydraulic communication is concerned, but which mechanically and physically joins them together in side-by-side, laterally adjacent relationship, so that the simultaneous cooperating manual collapsing and hand-pumping operation of both of the syringe bulbs 32 in substantially the same manner may be facilitated by reason of their lateral physical juxtaposition. This makes possible the type of lateral manual squeezing action illustrated fragmentarily in FIG. 3, which will be the most natural attempted mode of operation of the pair of syringe bulbs 22.

However, the above-described preferred mode of simultaneous and substantially similar pumping operation of the pair of syringe bulbs 32 is further provided for by reason of the fact that the syringe bulbs 32 are of collapsible construction in what might be termed an operation plane, which is indicated diagrammatically in broken lines at 42 in FIG. 3, which is substantially transverse and perpendicular to a junction plane, such as is indicated diagrammatically at 44 in FIG. 3, which effectively bisects the region where the syringe bulbs 32 are effectively physically interconnected and joined together by the previously mentioned junction wall 40, which is of effectively relatively rigid and difficult-to-collapse construction and which, thus, may be said to effectively comprise a wall or means lying substantially parallel to and coincident with the junction plane 44 and providing a very substantial degree of stiffness and non-collapsibility to the pair of laterally joined syringe bulbs 32 in a direction parallel to said stiffening wall 40 and the junction plane 44 whereby to make it virtually impossible for the collapsing manual operation of the pair of syringe bulbs 32 to occur substantially transverse thereto in a direction parallel to the previously mentioned operation plane 42. This, of course, virtually makes it mandatory that both syringe bulbs 32 be collapsed substantially simultaneously and in substantially the same degree, thus bringing about the substantially equal-volume pumping action of both syringe bulbs 32, which is a major and extremely important feature of the present invention.

In connection with the foregoing equal-volume pumping action of each of the two syringe bulbs 32 and of each of the two tubes 22 and of each of the two open forward tip ends 26, it should be noted that this is an important feature because, in various prior art attempts to provide a dual syringe, but where such hydraulic isolation was not provided, it was found that any variation in the conditions encountered by either forward open tip end merely had the effect of causing an ineffective pumping malfunction of one or the other of the two forward tip ends. For example, if one of them encountered a much greater flow restriction than did the other, this normally merely meant that virtually the entire pumping action was effective on the other open forward tip end and virtually no pumping occurred through the effectively restricted forward end. This was true with such prior art devices whether they were employed for outflow or inflow pumping purposes. However, in the novel hydraulically isolated construction of the present invention, it will be found that if either open forward tip end 26 encounters such a flow restriction, it will not change the effective pumping action of the other open forward tip end 26 whatsoever because of the hydraulic isolation therefrom. All that will happen is that pressure or suction will build up relative to the effectively restricted open forward tip end 26 to a degree such as to bring about a corrective liquid feeding action therethrough, leading to a very substantial degree, the effect of the effective restriction on the liquid flow therethrough.

It should be noted that each forward open tip end 26 may be effectively provided with a similar exterior nostril-engaging means for effectively engaging the interior of a corresponding nostril when inserted therein, in a manner facilitating the simultaneous and similar liquid feeding action, either thereinto or therefrom, depending upon whether the entire device is employed in a liquid applicatory manner or in a liquid aspirating and evacuating manner.

In the exemplary first form of the invention illustrated in FIGS. 1-5, each of said exterior nostril-engaging means may be said to comprise merely the outer surface of the corresponding forward end portions 24, as indicated at 46, and it will be noted that said nostril-engaging means 46 are laterally spaced apart a lateral width slightly larger than the width of a conventional human septum and substantially equivalent to the lateral separation of a normal pair of human nostrils of a person whose nostrils are intended to be engaged thereby. Thus, it may be said that the forward end portions 24 of the tubes 22 and the so-called effective exterior nostril-engaging means 46 effectively define an open septum-receiving recess 50 therebetween into which a human septum, such as is shown fragmentarily and somewhat diagrammatically in phantom at 52 in FIG. 5, is adapted to be received when the device is fully engaged with the nostrils, indicated diagrammatically and fragmentarily in phantom at 54 in FIG. 5, of the human nose, indicating an effective and fragmentarily in phantom at 56 in FIG. 5.

Also, it should be noted that, in the example illustrated in the exemplary first form of the invention, the pair of tubes 22 are laterally joined together along most of their forwardly extending lengths by interconnected web means 58 which terminates at the front in, and effectively forms a portion of, the previously mentioned septum-receiving recess 50. However, it should be noted that the invention is not limited to the exemplary first form illustrated as being provided with such a web means 58. The web means may be modified substantially or eliminated entirely in certain forms of the invention.

FIGS. 6 and 7 illustrate fragmentarily a slightly modified form of nostril-engaging means, and because it is a slight modification of the first form of the invention, similar parts are designated by similar reference numerals, followed by the letter "A", however. In this modification, it will be noted that each nostril-engaging means 46A has at its inner side a flattened septum-engageable surface means 60 adapted to lie right against the corresponding flat, outer surface of the septum, such as that shown fragmentarily in phantom at 52A, for example. Also, in the modification illustrated in FIGS. 6 and 7, each of the nostril-engaging means 46A comprises a forward exterior part of the forward open tip end 26A which diverges and effectively increases in diameter in a rearward direction and, thus, upon insertion into a corresponding nostril, such as that shown fragmentarily in phantom at 54A in FIG. 7, for example, is adapted to substantially sealingly engage the nostril 54A.

The modified form of the invention illustrated in FIGS. 6 and 7 may be employed for liquid applicatory purposes, but it is particularly important when the entire device is to be used as a liquid aspirating or suction-applying syringe device 20A because, without the effective substantially sealing engagement of the nostril-engaging means 46A with respect to the nostrils 54A, a very substantial loss of suction will occur, and the device will be rendered largely ineffective for liquid aspirating or evacuating purposes.
FIG. 8 illustrates a further slight modification of the invention, and, therefore, similar parts are designated by similar reference numerals, followed by the letter "b," however.

In the FIG. 8 modification, a pair of laterally adjacent tubes 22b are effectively positionally reversed by having an effective direction-reversing bent or curved portion 62 in each of said tubes 22b, which allows both of the syringe bulbs 32b to be positioned uppermost as shown in FIG. 8, while the corresponding pair of forward open tip ends 26b are similarly upwardly directed so as to be received within the notches 54b in a liquid passage relationship relative thereto when the person's head 64 is in a normal, erect position as shown in FIG. 8 rather than being in a reclining position as is normally required when using syringe bulbs for nasal applicatory or aspirating purposes.

It should be noted that a pair of tubes such as that shown at 22 in the first form of the invention, or any of the corresponding tubes of the various modifications thereof, are preferably made of a light-transmissive material so as to allow a user of the device to visually observe and determine the amount, level, orientation, and movement or displacement of liquid therein and therefore during operation of the device. In certain forms of the invention, each of the syringe bulbs, such as those shown at 32 in the first form of the invention but not specifically limited thereto, may similarly be of light-transmissive material for similar purposes. It is also desirable that the tubes be substantially unbreakable, and this may be accomplished by using an extremely rigid, non-frangible material therefor, or by using a relatively flexible material such as a plastic material. For example, polyethylene or any of certain other plastics is both sufficiently light-transmissive to accomplish the above-mentioned purposes and sufficiently flexible to be substantially unbreakable, and thus illustrates an exemplary form of the invention.

FIGS. 9-11 illustrate a slight modification of the invention which lends itself to very inexpensive, large-scale manufacture thereof from plastic material by conventional plastic-molding techniques. Because it is a modification, functionally or structurally similar parts will be designated by similar reference numerals, followed by the letter "c," however.

In this modification the pair of tubes 22c are molded in a pair of molds 66 and the hollow bores 30c within the tubes are formed through mold portions 72 which is rearwardly extended and forms the junction wall or stiffening wall 40c. This molding operation is illustrated in FIG. 9. Upon completion of the molding operation (usually, injection molding) of FIG. 9, with the device being molded out of some suitable plastic material such as butyrate or any other suitable moldable plastic, the molded article is removed from the pair of molds 66 and is then inserted into another pair of molds 72 with the rear dividing or stiffening wall 40c being effectively an insert member initially positioned between the mold portions 72 which then may have the outer syringe bulb portions 74 which may be made of polyvinyl chloride or equivalent molded by either blow-molding, shush-molding, or any other suitable process onto the exterior of the butyrate stiffening wall 40c so as to effectively define thereon two complete syringe bulbs 32c. The two butyrate tubes 22c which were previously substantially parallel after completion of the injection molding operation illustrated in FIG. 9, may be heated and reformed so as to have the proper lateral separation between the open forward tip ends 26c thereof.

It will be noted that the novel modification illustrated in FIGS. 9-11 has all the functional aspects of the first form of the invention, but comprises only three method steps—the injection molding step shown in FIG. 9, the blow or shush molding step shown in FIG. 10, and the tube heating and bending step referred to above, to produce the final product shown in FIG. 11. Thus, this form of the invention can be manufactured very inexpensively and provides a completely functional and yet non-breakable dual-tipped double syringe device having all of the previously mentioned advantages of the present invention.

It should be understood that the figures and the specific description thereof set forth in this application are for the purpose of illustrating the present invention and are not to be construed as limiting the ped to any position to the precise and detailed specific structure shown in the figures and specifically described hereinbefore. Rather, the real invention is intended to include substantially equivalent constructions embodying the basic teachings and inventive concept of the present invention.

We claim:

1. A dual tipped nasal syringe or aspirating device, comprising: a pair of liquid flow path tube means having physically laterally separated forward end portions thereof carried by said tube means and provided with similar open forward tip ends defining liquid egress and ingressing passage and position, the one of the corresponding ones of said tube means outwardly therefrom or inwardly thereinto, respectively, depending upon whether the device is used as a liquid applicatory syringe or as a liquid aspirating and evacuating syringe; and a pair of hollow interiorly non-communicating and hydraulically independent and isolated flexible, collapsible syringe bulbs, each having a closed rear end and an open forward end normally adapted to be sealingly coupled to and engaged with respect to a communication opening at the rear end of a corresponding different one of said pair of tube means, each of said syringe bulbs effectively comprising a corresponding hand-operable two-way pump and aspirating device in communication with the corresponding one of said pair of tube means but hydraulically isolated and independent of and in interiorly non-communicating relationship with respect to the other one of said pair of syringe bulbs, said pair of syringe bulbs being mechanically physically joined together in laterally adjacent relationship for simultaneously cooperating manual laterally directed collapsing and hand-pumping operation of both of said syringe bulbs in substantially the same manner in a lateral operation plane by reason of their physical juxtaposition for outflow pumping purposes with respect to said corresponding one of the pair of tube means and the corresponding forward open tip ends thereof and for similar simultaneous manual lateral operation in the lateral operation plane for inflow pumping and aspirating purpose with respect to each corresponding one of the pair of tube means and the corresponding forward open tip ends thereof, said physically joined and laterally adjacent pair of syringe bulbs being of collapsible construction in the lateral operation plane which is substantially transverse and perpendicular to a junction plane bisecting the region where said pair of syringe bulbs are effectively physically interconnected and joined together, said syringe bulbs being provided with a relatively rigid and difficult-to-collapse stiffening wall lying substantially parallel to and coincident with the junction plane bisecting the region where said pair of syringe bulbs are effectively interconnected and joined together, said stiffening wall providing a substantial degree of stiffness and non-collapsibility to the pair of syringe bulbs in a direction parallel to said stiffening wall and the junction plane whereby to make it necessary for the manual collapsing operation of the syringe bulbs to occur substantially transversely thereto in the lateral operation plane in a manner which makes it probable that both syringe bulbs will be collapsed simultaneously and in substantially the same degree.

2. A device as defined in claim 1, wherein each of said forward open tip ends is provided with a similar exterior nostril engaging means for effectively engaging
the interior of a corresponding nostril when inserted thereinto in a manner facilitating the simultaneous and similar liquid applicatory manual operation of the pair of syringe bulbs or the simultaneous and similar aspirating and evacuating manual suction-producing operation of the pair of syringe bulbs.

3. A device as defined in claim 2, wherein each of said nostrils engaging means comprises a forward exterior part of the forward open tip end diverging and effectively increasing in diameter in a rearward direction and thus, upon insertion into a corresponding nostril, being adapted to ultimately sealingly engage same.

4. A device as defined in claim 1, wherein said pair of tube means is provided along at least a portion of their similar forwardly extending lengths with interconnecting web means which terminates short of the laterally spaced forward end portions thereof and thus defines an open septum receiving recess between said forwardly extending laterally spaced forward end portions thereof.

5. A device as defined in claim 4, wherein said physically laterally separated forward end portions of said pair of tube means are separated by a distance substantially equivalent to the lateral separation of a normal pair of human nostrils of a person whose nostrils are intended to be engaged thereby.

6. A device as defined in claim 1, wherein the inner adjacent side of each of said physically laterally separated forward end portions of said pair of tube means is provided with a corresponding open forward tip end having a flattened septum-engageable surface means.

7. A device as defined in claim 1, wherein said pair of tube means is provided with similar effective direction reversing bent and curved portions adapted to substantially reverse the direction of flow of liquid between the pair of syringe bulbs and the corresponding pair of forward open tip ends thereof thus facilitating the positioning of the device with the pair of syringe bulbs uppermost and with the pair of forward open tip ends directed upwardly for insertion into the normally downwardly directed nostrils of a person whose head is in a normal erect position.

8. A device as defined in claim 7, wherein said pair of tube means are made of a light transmissive material allowing a user of the device to visually observe and determine the amount, level, orientation, and movement or displacement of liquid therein and therethrough during operation of the device.

9. A device as defined in claim 1, wherein said pair of tube means are made of a light transmissive substantially unbreakable material allowing a user of the device to visually observe and determine the amount, level, orientation, and movement or displacement of liquid therein and therethrough during operation of the device.

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