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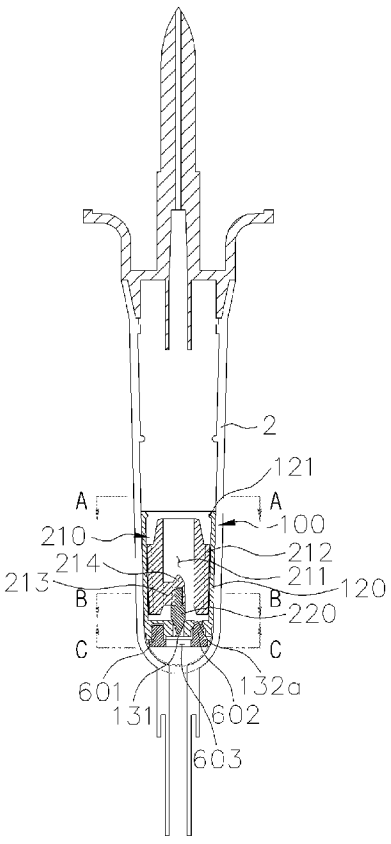
(54) **Title:** DEVICE FOR PROTECTING BACKWARD FLOWING IN INFUSION SOLUTION DELIVERING SET



(57) **Abstract:** A device for preventing backward flowing in an infusion solution delivery set is allowed to avoid discomfort caused by checking a remaining amount of the infusion solution when the infusion solution contained in a Ringer's solution bottle or a sack is injected into a human body, to prevent blood from flowing backwards through carelessness when administration of the infusion solution is completed, and to deliver the infusion solution into the human body in a smooth and convenient way. The device includes a fixture and a floater, and is inserted into a dropper of the infusion solution delivery set, thereby preventing the blood from flowing backwards.

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Description

DEVICE FOR PROTECTING BACKWARD FLOWING IN INFUSION SOLUTION DELIVERING SET

Technical Field

[1] The present invention relates, in general, to a device for preventing backward flowing in an infusion solution delivery set capable of preventing blood from flowing backwards and smoothly delivering infusion solution into a human body in a medical infusion solution delivery set, and more particularly, to a device for preventing backward flowing in an infusion solution delivery set, capable of avoiding discomfort caused by checking a remaining amount of infusion solution when the infusion solution contained in a Ringer's solution bottle or a sack is introduced into a human body, and preventing blood from flowing backwards through carelessness when administration of the infusion solution is completed, as well as delivering the infusion solution into the human body in a smooth and convenient way.

Background Art

[2] As illustrated in FIGS. 1 and 2, a conventional infusion solution delivery set includes a dropper 2 from which infusion solution is dripping, an adjuster 4 installed on a portion of a flexible hose 3, and an injection needle 5 connected to one end of the hose 3. When an insertion 2a of the dropper 2 that is integrally provided with an air inlet 2b and an infusion solution outlet 2c is inserted into a Ringer's solution bottle or a sack and thereby the infusion solution is delivered, the infusion solution delivered to the dropper 2 flows to the injection needle 5 through the flexible hose 3 and then is administered into a human body. At this time, the adjuster 4 installed on the flexible hose 3 through which the infusion solution flows functions to adjust a rate of delivery.

[3] This conventional infusion solution delivery set has the following problems. In the case in which the injection needle is not removed as soon as the administration of the infusion solution is completed, there is a high possibility of the blood flowing backwards or air entering the human body to cause a side effect. Further, it takes much time for the infusion solution contained in the Ringer's solution bottle or the sack to be administered into the human body, so that it is very difficult to continuously observe a time when the administration of the infusion solution is completed to take proper measures.

[4] In addition, during administering the infusion solution through the injection needle for administering the infusion solution, when a position of the infusion solution delivery set becomes sharply lower than the body of a patient or when a position of the heart of the patient becomes higher than that of the infusion solution delivery set due to

movement of the patient, the pressure of a blood vessel is increased, and thereby the pressure of the infusion solution is relatively decreased. As a result, the infusion solution is caused to flow backwards out of the body of the patient through the injection needle.

[5] Meanwhile, the related art incorporated herein by reference is disclosed in Korean Utility Model Publication No. 1997-056956 (published on November 10, 1997), titled "Apparatus for adjusting delivery and preventing backflow of Ringer's solution."

[6] The related art discloses a spherical valve body operated by buoyancy of the infusion solution and an unladen weight thereof. However, this spherical valve body has the following problems.

[7] In the case in which the spherical valve body is formed of plastic, the surface of a sphere inevitably has protrusions (caused by a resin injection port or a mold joint) in the process of the production. When these protrusions are formed on the surface of the sphere, the valve body does not become a complete sphere, and thus incomplete closing occurs. Further, in the case in which the valve body is operated by the buoyancy of the infusion solution and the unladen weight thereof, the weight of the spherical valve body should be determined within an extremely restricted range. Thus, when a very light material is selected so as to increase buoyancy, a closing force by the unladen weight of the valve body becomes weak. In other words, the closing force is generated by the unladen weight of the valve body, and thus when the unladen weight of the valve body is light, the closing force itself is weakened. Further, the valve body is fluctuated by external weak shocks, so that the closing force is lost.

[8] Meanwhile, as the related art incorporated herein by reference, a "device for preventing backflow of blood" disclosed in Korean Patent No. 622017, issued to the applicant of the present invention, is designed to be mounted on an injection needle to prevent blood from flowing backwards under any circumstances. This art is innovative in that the backflow of the blood is completely interrupted, but it cannot prevent the infusion solution from leaking from a dropper when the delivery of the infusion solution from a Ringer's solution bottle is stopped. In other words, according to this art, when the infusion solution is no longer delivered from Ringer's solution bottle, a level of the infusion solution in a hose is lastingly lowered although the backflow of the blood does not occur, so that the hose is filled with air.

[9]

Disclosure of Invention

Technical Problem

[10] Accordingly, the present invention has been made in an effort to solve the problems occurring in the related art, and an object of the present invention is to provide an

improved device for preventing backward flowing in an infusion solution delivery set, capable of very conveniently performing the work of an initial setting of the infusion solution delivery set, backflow prevention of the infusion solution delivery set, exchange of a Ringer's solution bottle, and so on.

[11]

Technical Solution

[12] In order to achieve the above object, according to one aspect of the present invention, there is provided a device for preventing backward flowing in an infusion solution delivery set injecting infusion solution into a human body through an injection needle, which functions to prevent blood from flowing backwards. The device includes: a fixture provided therein with a floater receiving space, an upper portion of which is open, defined by a pipe-like cylindrical wall and a base formed at a lower portion of the cylindrical wall, and having an infusion solution outflow passage formed at the base; and a floater including a buoyancy generator that moves up and down in the floater receiving space by force of buoyancy, and a packing that is connected to the buoyancy generator and functions to block the infusion solution outflow passage when the buoyancy generator is lowered.

[13]

Advantageous Effects

[14] According to the present invention, the backflow of the infusion solution delivery set can be effectively prevented by interaction between the packing of the floater and the infusion solution outflow passage of the fixture in the case in which the infusion solution is administered.

[15] More specifically, the discomfort caused by checking a remaining amount of infusion solution when the infusion solution contained in a Ringer's solution bottle or a sack is injected into a human body, and the backflow of the blood through carelessness when administration of the infusion solution is completed can be prevented, and the infusion solution into the human body can be delivered in a smooth and convenient way.

[16] Further, a total length of the device can be considerably decreased using the floater moving in the fixture.

Brief Description of the Drawings

[17] FIGS. 1 and 2 schematically illustrate a conventional infusion solution delivery set;

[18] FIG. 3 is a longitudinal sectional view illustrating the state in which a first embodiment of the present invention is inserted into a dropper;

[19] FIG. 4 is a sectional view taken along line A-A of FIG. 3;

[20] FIG. 5 is a sectional view taken along line B-B of FIG. 3;

[21] FIG. 6 is a sectional view taken along line C-C of FIG. 3;

[22] FIG. 7 is a sectional perspective view illustrating the first embodiment of FIG. 3;

[23] FIG. 8 is an exploded perspective view illustrating main parts of the first embodiment of FIG. 3;

[24] FIG. 9 is an exploded sectional perspective view illustrating main parts of the first embodiment of FIG. 3;

[25] FIG. 10 illustrates the operation of the first embodiment of FIG. 3 step by step;

[26] FIG. 11 is a longitudinal sectional view illustrating a second embodiment of the present invention;

[27] FIG. 12 is a disassembled perspective view illustrating main parts of a third embodiment of the present invention;

[28] FIG. 13 is a longitudinal sectional view illustrating the state in which a fourth embodiment of the present invention is inserted into a dropper, and a longitudinal sectional view and a top plan view of a floater;

[29] FIG. 14 is a longitudinal sectional view illustrating the state in which a fifth embodiment of the present invention is inserted into a dropper;

[30] FIG. 15 is a longitudinal sectional view illustrating the state in which a sixth embodiment of the present invention is inserted into a dropper;

[31] FIG. 16 is a sectional view taken along line D-D of FIG. 15;

[32] FIG. 17 is a sectional view taken along line E-E of FIG. 15;

[33] FIG. 18 is a sectional view taken along line F-F of FIG. 15;

[34] FIG. 19 is a sectional view taken along line G-G of FIG. 15;

[35] FIG. 20 is a sectional view taken along line H-H of FIG. 15;

[36] FIG. 21 is a disassembled perspective view illustrating a sixth embodiment of the present invention;

[37] FIG. 22 is a partial cut-away disassembled perspective view corresponding to FIG. 21;

[38] FIG. 23 is a partial cut-away assembled perspective view corresponding to FIG. 21;

[39] FIG. 24 is a perspective view illustrating the auxiliary packing of FIG. 15;

[40] FIGS. 25 and 26 illustrate states for explaining the operation of the sixth embodiment of FIG. 15; and

[41] FIG. 27 is a sectional view illustrating the state in which a seventh embodiment of the present invention is mounted in a dropper.

[42]

Best Mode for Carrying Out the Invention

[43] Parts having the same or like names and reference numerals should be understood as the same configurations performing the same operation throughout the drawings and

the description.

[44] Reference will now be made in greater detail to configuration and operation of a first embodiment of the present invention.

[45] FIG. 3 is a longitudinal sectional view illustrating the state in which a first embodiment of the present invention is inserted into a dropper. FIG. 4 is a sectional view taken along line A-A of FIG. 3. FIG. 5 is a sectional view taken along line B-B of FIG. 3. FIG. 6 is a sectional view taken along line C-C of FIG. 3. FIG. 7 is a sectional perspective view illustrating the first embodiment of FIG. 3. FIG. 8 is an exploded perspective view illustrating main parts of the first embodiment of FIG. 3. FIG. 9 is an exploded sectional perspective view illustrating main parts of the first embodiment of FIG. 3.

[46] The present embodiment is inserted in a dropper 2 of an infusion solution delivery set for use.

[47] The present embodiment roughly includes a fixture 100, a floater 200, and a lower auxiliary packing 600.

[48] The fixture 100 includes a pipe-like cylindrical wall 120, and a base 130 formed at a lower portion of the cylindrical wall 120. Thereby, the fixture 100 is provided therein with a floater receiving space 110 having an open upper portion. The floater 200, which will be described, is inserted into the floater receiving space 110 so as to be movable up and down.

[49] The upper portion of the cylindrical wall 120 of the fixture 100 is provided with a plurality of floater guide steps 121 protruding inwards therefrom. The floater guide steps 121 serve to restrict upward movement of the floater 200 within a predetermined range. Of course, as technology for restricting the upward movement of the floater 200, various methods can be suggested except the floater guide steps 121.

[50] The bottom of the floater receiving space 110, i.e. a base 130, is provided with an infusion solution outflow passage 131 at the center thereof.

[51] An outer circumference of the fixture 100, i.e. an outer circumference of the cylindrical wall 120 is inserted into and fixed to the dropper 2.

[52] Therefore, the infusion solution can basically run down the fixture 100 only through the infusion solution outflow passage 131.

[53] Meanwhile, the bottom of the floater receiving space 110, i.e. the base 130, is formed with an auxiliary hole 132a on one side thereof. The auxiliary hole 132a is closed and opened by a lower auxiliary packing 600 that will be described below.

[54] The floater 200 is inserted in the floater receiving space 110 of the fixture 100.

[55] The floater 200 includes a pipe-like cylindrical body 210 that is therein provided with a central through-hole 211 in a longitudinal direction, and a packing 220 conne cted to the cylindrical body 210.

[56] An outer circumference of the cylindrical body 210 is formed with a plurality of guide ridges 212 in a vertical direction.

[57] Each of the guide ridges 212 is substantially triangular in cross section. The guide ridges 212 serves not only to guide the cylindrical body 210 to be positioned in the middle of the floater receiving space 110 when the cylindrical body 210 moves up and down, but also causes an inner circumference of the cylindrical wall 120 to be spaced apart from the outer circumference of the cylindrical body 210 by a predetermined interval, thereby preventing the vertical movement of the cylindrical body 210 from being hindered due to the infusion solution covered on the inner circumference of the cylindrical wall 120.

[58] In this embodiment, the number of guide ridges 212 amounts to eight, but it can be varied according to an embodiment.

[59] The cylindrical body 210 has only to be made of a material having buoyancy, and move up and down in the floater receiving space 110 due to the buoyancy as a level of the infusion solution is raised and lowered.

[60] Therefore, in this embodiment, the cylindrical body 210 acts as a buoyancy generator.

[61] Meanwhile, the cylindrical body 210 is connected with a packing 220.

[62] The packing 220 functions to block the infusion solution outflow passage 131 of the fixture 100 when the floater 200 is lowered. In this embodiment, the packing 220 has a conical lower portion, and thus blocks the infusion solution outflow passage 131 when it is inserted into the infusion solution outflow passage 131 of the fixture 100.

[63] The packing 220 is preferably formed of a high-flexibility material such as silicon rubber. However, any existing material known as a packing member may be selected as the material of the packing 220.

[64] In order to connect the packing 220 and the cylindrical body 210, a plurality of connecting bars 213 protrude from the inner circumference of the cylindrical body 210 toward the center of the cylindrical body 210, and the connecting bars 213 are collected at the center to form a packing connector 214.

[65] In this embodiment, the number of connecting bars 213 amounts to three, and an upper portion of the packing connector 214 has a streamlined shape or a conical shape so as not to hinder smooth flow of the infusion solution.

[66] The packing 220 is fixed to the packing connector 214 by adhering or fitting.

[67] Meanwhile, a lower auxiliary packing 600 is installed under the fixture 100.

[68] The lower auxiliary packing 600 is provided with a fixture connector 601 coupled to the fixture 100 on one end thereof, and an auxiliary hole valve 602 opening and closing the auxiliary hole 132a of the fixture 100 on the other end thereof.

[69] Further, the lower auxiliary packing 600 is formed with an infusion solution

through-hole 603 at the center thereof so as not to hinder the flow of the infusion solution.

[70] In other words, the lower auxiliary packing 600 has a kind of a cantilever structure in which one end thereof is fixed by coupling the fixture connector 601 to the bottom of the fixture 100 in an adhering or force-fitting way, and the other end is moved so as to open and close the auxiliary hole 132a by means of external force or pressure.

[71] Hereinafter, the operation of the embodiment will be described with reference to FIG. 10.

[72] FIG. 10 illustrates states for explaining the operation of a first embodiment, in which:

[73] FIG. 10(a) illustrates the state in which no infusion solution is present;

[74] FIG. 10(b) illustrates the state in which a large volume of infusion solution is dripping for initial setting of the dropper. At this time, the floater 200 is not yet raised due to insufficient buoyancy, and thus blocks the infusion solution outflow passage 131 of the fixture 100.

[75] FIG. 10(c) illustrates the state in which, as the level of infusion solution is raised due to continuation of the state of FIG. 10(b), the floater 200 is raised by its buoyancy, and thus the filled infusion solution flows through the infusion solution outflow passage 131 of the fixture 100 past the central through-hole 211 of the floater 200. Thereby, the initial setting of the infusion solution delivery set is completed.

[76] At this time, the central through-hole 211 of the floater 200 is allowed to secure a wider channel cross section, thereby serving to prevent the floater 200 from being lowered by the flow of the infusion solution flowing through the floater 200 at a rapid speed. In other words, without the central through-hole 211, the floater 200 can be pushed downwards by the flow of the infusion solution running down at a rapid speed, and thus the floater 200 cannot be smoothly raised upwards.

[77] FIG. 10(d) illustrates the state in which the infusion solution is normally delivered. Because the floater 200 is raised by buoyancy, the infusion solution smoothly runs down.

[78] FIG. 10(e) illustrates the state in which, as the delivery of the infusion solution is stopped, the level of the infusion solution is lowered, and simultaneously the floater 200 is lowered, and thus the packing 220 of the floater 200 closes the infusion solution outflow passage 131 of the fixture 100, thereby preventing the infusion solution from escaping from the dropper 2.

[79] Because the infusion solution does not escape from the dropper 2, the blood does not flow backwards even though the delivery of the infusion solution is stopped.

[80] Meanwhile, in this state, the packing 220 of the floater 200 is subjected to negative pressure from the infusion solution of the hose 3 to some extent. In other words, the

packing 220 is subjected to vacuum to some extent by means of the downward flow of the infusion solution, and thus blocks the infusion solution outflow passage 131 of the fixture 100. This state is very preferable in that the packing 220 blocks the infusion solution outflow passage 131 of the fixture 100, but it can serve as an disadvantage in that, when the floater 200 is intended to be again raised by buoyancy after the Ringer's solution bottle is replaced, and when the negative pressure applied to the packing 220 is higher than the buoyancy applied to the floater 200, the floater 200 is not raised.

[81] In order to solve this problem, states of FIGS. 10(f) and 10(g) are introduced to smoothly raise the floater 200 again through the buoyancy.

[82] FIG. 10(f) illustrates the state in which a medical person such as a nurse closes the adjuster 4 for adjusting an open-closed degree of the hose before the Ringer's solution bottle is replaced. The adjuster 4 that has currently come into the market is designed so that a wheel-like grip 4a is inclined with respect to the hose 3, and adjusts a degree of pressing the hose while moving up and down.

[83] Thus, as illustrated in FIG. 10(f), when the grip 4a is turned to move downwards such that the adjuster 4 is closed, the infusion solution in the hose 3 located below the adjuster 4 is pushed downwards, and in proportion to the pushed distance, the negative pressure is applied to the upper portion of the hose 3. In this way, the negative pressure applied to the hose 3 located above the adjuster 4 pulls the auxiliary hole valve 602 of the lower auxiliary packing 600 in this embodiment. Then a very small amount of infusion solution flows out through the auxiliary hole 132a, and thereby offsets the pressure corresponding to the negative pressure.

[84] FIG. 10(g) illustrates the state in which a medical person such as a nurse opens the adjuster 4 for adjusting an open-closed degree of the hose after the Ringer's solution bottle is replaced. In the state of FIG. 10(g) that is opposite to that of FIG. 10(f), the hose 3 above the adjuster 4 is subjected to positive pressure, which serves to slightly push the packing 220 of the floater 200. Thereby, the initial negative pressure applied to the packing 220 of the floater 200 is released, and then the floater 200 can be smoothly raised again as the level of the infusion solution is raised.

[85] FIG. 11 is a longitudinal sectional view illustrating a second embodiment of the present invention.

[86] The second embodiment is equal to the first embodiment, except that the packing 220 is integrally formed with the cylindrical body 210.

[87] Thus, the floater 200 should be selected from the same material as the packing material, and be formed of a material capable of being subjected to the buoyancy of the infusion solution.

[88] The second embodiment can provide the device for preventing backward flowing in infusion solution delivery sets using three parts. In contrast, the first embodiment has

provided that using four parts.

[89] FIG. 12 is a disassembled perspective view illustrating main parts of a third embodiment of the present invention.

[90] The third embodiment is different from the first embodiment, in that the fixture 100 is provided, at an upper portion thereof, with a plurality of cutout slots 123 between the floater guide steps 121.

[91] Due to the plurality of cutout slots 123, the upper portion of the fixture 100 can become wider, and thus it is very convenient to insert the floater 200 into the floater receiving space 110. In other words, because the floater guide steps 121 hinders the floater 200 from into the floater receiving space 110, the cutout slots 123 are formed in advance in order to widen the upper portion of the fixture 100. Thus, the cutout slots 123 are preferably formed between the floater guide steps 121.

[92] FIG. 13 is a longitudinal sectional view illustrating the state in which a fourth embodiment of the present invention is inserted into a dropper, and a longitudinal sectional view and a top plan view of a floater. FIG. 14 is a longitudinal sectional view illustrating the state in which a fifth embodiment of the present invention is inserted into a dropper.

[93] In FIGS. 13 and 14, the cylindrical wall 120 is connected with the base 130 at a smoothly inclined angle rather than at a right angle, and the infusion solution outflow passage 131 formed at the center of the base 130 extends up to a location where the dropper 2 is connected with the hose 3.

[94] Further, in FIG. 13, the cylindrical body 210 of the floater 200 has no central through-hole. In this case, a wider allowance space is formed between the cylindrical body 210 and the cylindrical wall 120 so as to avoid hindering the floater 200 from being raised due to a rapid flow of the infusion solution at the time of initial setting.

[95] Hereinafter, the configuration and operation of a sixth embodiment of the present invention will be described in detail.

[96] FIG. 15 is a longitudinal sectional view illustrating the state in which a sixth embodiment of the present invention is inserted into a dropper. FIG. 16 is a sectional view taken along line D-D of FIG. 15. FIG. 17 is a sectional view taken along line E-E of FIG. 15. FIG. 18 is a sectional view taken along line F-F of FIG. 15. FIG. 19 is a sectional view taken along line G-G of FIG. 15. FIG. 20 is a sectional view taken along line H-H of FIG. 15. FIG. 21 is a disassembled perspective view illustrating a sixth embodiment of the present invention. FIG. 22 is a partial cut-away disassembled perspective view corresponding to FIG. 21. FIG. 23 is a partial cut-away assembled perspective view corresponding to FIG. 21. FIG. 24 is a perspective view illustrating the auxiliary packing of FIG. 15.

[97] The sixth embodiment roughly includes a fixture 100, a floater 200, a sheet-like

packing 300, a pressing member 400, an infusion solution inducer 500, and an upper auxiliary packing 700.

[98] The bottom of a floater receiving space 110, i.e. a base 130, is provided with an auxiliary hole 132b. The auxiliary hole 132b is closed and opened by an upper auxiliary packing 700.

[99] The upper auxiliary packing 700 is installed at an upper portion of the base 130 of the fixture 100.

[100] The upper auxiliary packing 700 is provided with fixture couplers 720 that are coupled to the fixture 100 at opposite ends thereof, and an auxiliary hole valve 710 that closes and opens the auxiliary hole 132b at the upper portion of the base 130 at the center thereof.

[101] Specifically, the upper auxiliary packing 700 is fixed at opposite ends thereof in a manner such that the fixture couplers 720 thereof are coupled to the top of the base 130 by adhering or force-fitting. The auxiliary hole valve 710 at the center of the upper auxiliary packing 700 is designed to open the auxiliary hole 132b when subjected to pressure from the lower portion to the upper portion of the base 130, and close the auxiliary hole 132b when not subjected to separate pressure.

[102] The method of closing and opening the auxiliary hole 132b in this way can be applied in various types.

[103] Next, the infusion solution outflow passage 131 will be described.

[104] The infusion solution outflow passage 131 is divided into a first transfer section 131a at a upper portion and a second transfer section 131b at a lower portion according to a flow direction of the infusion solution. The first transfer section 131a is provided with a support step 131c at one end thereof which communicates with the second transfer section 131b. The second transfer section 131b at which the support step 131c is located is provided with a sheet-like packing 300.

[105] The sheet-like packing 300 is a little curved toward the second transfer section 131b, is in contact with the support step 131c at an edge thereof, is pushed toward the first transfer section 131a at the center thereof by means of a pressing rod 410 of the pressing member 400 that is mounted in the second transfer section 131b, and is located in a/the second transfer section 131b that is bounded on the first transfer section 131a by the support step 131c.

[106] The first transfer section 131a is formed with a packing stopper 131d.

[107] The packing stopper 131d has a cross section such that the center of the sheet-like packing 300 can be prevented from being excessively pushed into the first transfer section 131a.

[108] The second transfer section 131b is provided with a plurality of packing guides 131e, which protrude in a radial direction and guide a position of the sheet-like

packing 300.

[109] The packing guides 131e function not only to induce the infusion solution to smoothly flow through but also guide the sheet-like packing 300 to be centered without deviating to one side.

[110] The pressing member 400 includes the pressing rod 410 pushing the center of the sheet-like packing 300 in one direction, has a criss-cross shape when viewed from the top, and is fitted into or adhered to the second transfer section 131b at the criss-cross end thereof.

[111] The pressing member 400 is provided, at a lower portion thereof, with a coupling projection 420 on which an infusion solution inducer 500 is mounted. However, the coupling of the pressing member 400 and the infusion solution inducer 500 can be very variously modified.

[112] The infusion solution inducer 500 is formed with an infusion solution reservoir 510, which is open at the top thereof and is conical downwards at a lower portion thereof.

[113] Therefore, the infusion solution running through the second transfer section 131b and the pressing member 400 flows downward over a wall of the infusion solution reservoir 510. In this manner, the flow of the infusion solution formed by the infusion solution inducer 500 forms a continuous flow, thereby serving to prevent minute air bubbles from being formed in the dropper or in the hose.

[114] Hereinafter, the operation of a sixth embodiment will be described with reference to FIG. 25.

[115] FIG. 25 illustrates states for explaining the operation of a sixth embodiment, in which:

[116] FIG. 25(a) illustrates the state in which no infusion solution exists;

[117] FIG. 25(b) illustrates the state in which a large volume of infusion solution is dripping for initial setting of the dropper. At this time, the floater 200 is not yet raised due to insufficient buoyancy, and thus blocks the infusion solution outflow passage 131 of the fixture 100.

[118] FIG. 25(c) illustrates the state in which, as the level of infusion solution is raised due to continuation of the state of FIG. 25(b), the floater 200 is raised by its buoyancy, and thus the filled infusion solution flows through the infusion solution outflow passage 131 of the fixture 100 past the central through-hole 211 of the floater 200. Thereby, the initial setting of the infusion solution delivery set is completed.

[119] The flow of the infusion solution flowing through the infusion solution outflow passage 131 will be described in greater detail.

[120] The infusion solution introduced into the first transfer section 131a of the infusion solution outflow passage 131 runs through the packing stopper 131d to apply pressure to the sheet-like packing 300.

[121] At this time, the sheet-like packing 300, which is a little curved toward the second transfer section 131b, is kept in place by the pressing rod 410 of the pressing member 400 pressed at the lower portion of the sheet-like packing 300 in spite of the pressure of the infusion solution.

[122] However, the edge of the sheet-like packing 300, which is supported on the support step 131c formed at one end of the first transfer section 131a, is bent toward the second transfer section 131b by means of the pressure of the infusion solution.

[123] When the edge of the sheet-like packing 300 is bent, the infusion solution is allowed to flow through the sheet-like packing 300. Then, the flowing infusion solution passes between the external criss-cross gaps of the pressing member 400 mounted on the second transfer section 131b, is introduced into the infusion solution reservoir 510 of the infusion solution inducer 500, and flows downwards over the infusion solution reservoir 510.

[124] FIG. 25(d) illustrates the state in which the infusion solution is normally delivered. Because the floater 200 is raised by its buoyancy, the infusion solution smoothly runs down. Further, the edge of the sheet-like packing 300 is kept open.

[125] FIG. 25(e) illustrates the state in which, as the delivery of the infusion solution is stopped, the level of the infusion solution is lowered, and simultaneously the floater 200 is lowered, and thus the packing 220 of the floater 200 closes the infusion solution outflow passage 131 of the fixture 100, thereby preventing the infusion solution from escaping from the dropper 2.

[126] Because the infusion solution does not escape from the dropper 2, the blood does not flow backwards although the delivery of the infusion solution is stopped.

[127] Further, when the delivery of the infusion solution is stopped, the pressure applied to the sheet-like packing 300 from the top is lowered, and thus the edge of the sheet-like packing 300 is in contact with the support step 131c.

[128] Meanwhile, in order to allow the blood to flow backwards when the patient raises his/her hand in the state of FIGS. 25(C), 25(d) or 25(e), the fluid pressure of the lower portion of the sheet-like packing 300 should be raised, and thereby the fluid of the lower portion of the sheet-like packing 300 should flow backwards to the upper portion of the sheet-like packing 300 past the sheet-like packing 300. However, in the sixth embodiment, the edge of the sheet-like packing 300 is hooked on the support step 131c, and thus the upward movement of the fluid is hindered, so that the backflow of the blood is prevented.

[129] Meanwhile, FIG. 26 illustrates the state in which air collected at a lower portion of a sixth embodiment is exhausted.

[130] In the sixth embodiment, the air of the lower portion of the fixture 100 can hardly move upward the fixture 100 due to the sheet-like packing 300, and thus air bubbles

can be collected at the lower portion of the fixture 100.

[131] At this time, the auxiliary hole valve 710 of an upper auxiliary packing 700 is slightly separated from the auxiliary hole 132b when the pressure of the lower portion of the fixture 100 is increased, the air collected at the lower portion of the fixture 100 is caused to be exhausted upwards.

[132] Specifically, when a small pressure is applied to the hose as illustrated on the right side of FIG. 26, the pressure moves upward the auxiliary hole valve 710 by which the auxiliary hole 132b is closed, and thus the air is exhausted through the opened auxiliary hole 132b. Of course, a fixture coupler 720 is being fixed to the base 130.

[133] FIG. 27 is a section view illustrating the state in which a seventh embodiment of the present invention is mounted on a dropper.

[134] The seventh embodiment is equal to the sixth embodiment, except that an auxiliary hole 132b and an auxiliary packing 700 for the same are removed.

[135] In the drawings and specification, typical exemplary embodiments of the invention have been disclosed, and although specific terms are employed, they are used in a generic and descriptive sense only and are not for the purposes of limitation, the scope of the invention being set forth in the following claims.

[136]

Industrial Applicability

[137] The present invention can provide to a device for preventing backward flowing in an infusion solution delivery set, capable of avoiding discomfort caused by checking a remaining amount of infusion solution when the infusion solution contained in a Ringer's solution bottle or a sack is injected into a human body, and preventing blood from flowing backwards through carelessness when administration of the infusion solution is completed, as well as delivering the infusion solution into the human body in a smooth and convenient way.

[138]

Claims

[1] A device for preventing backward flowing in an infusion solution delivery set injecting infusion solution into a human body through an injection needle, which is capable of preventing blood from flowing backwards, the device comprising:
a fixture provided therein with a floater receiving space, an upper portion of which is open, defined by a pipe-like cylindrical wall and a base formed at a lower portion of the cylindrical wall, and having an infusion solution outflow passage formed at the base; and
a floater including a buoyancy generator that moves up and down in the floater receiving space by means of buoyancy, and a packing that is connected to the buoyancy generator and functions to block the infusion solution outflow passage when the buoyancy generator is lowered.

[2] The device as set forth in claim 1, wherein the cylindrical wall has a plurality of floater guide steps protruding inwards from an upper portion thereof.

[3] The device as set forth in claim 2, wherein the cylindrical wall has a plurality of cutout slots formed between the floater guide steps.

[4] The device as set forth in claim 1, wherein the packing has a conical lower portion.

[5] The device as set forth in claim 1, wherein the buoyancy generator of the floater has a cylindrical body.

[6] The device as set forth in claim 5, wherein the cylindrical body has a central through-hole that is formed at the center thereof in a longitudinal direction.

[7] The device as set forth in claim 5, wherein the cylindrical body facing the cylindrical wall has a plurality of guide ridges that are formed on a circumferential surface thereof in a vertical direction.

[8] The device as set forth in claim 1, wherein:
the base of the fixture includes an auxiliary hole; and
the base is provided, at an bottom thereof, with a lower auxiliary packing having an auxiliary hole valve for closing and opening the auxiliary hole.

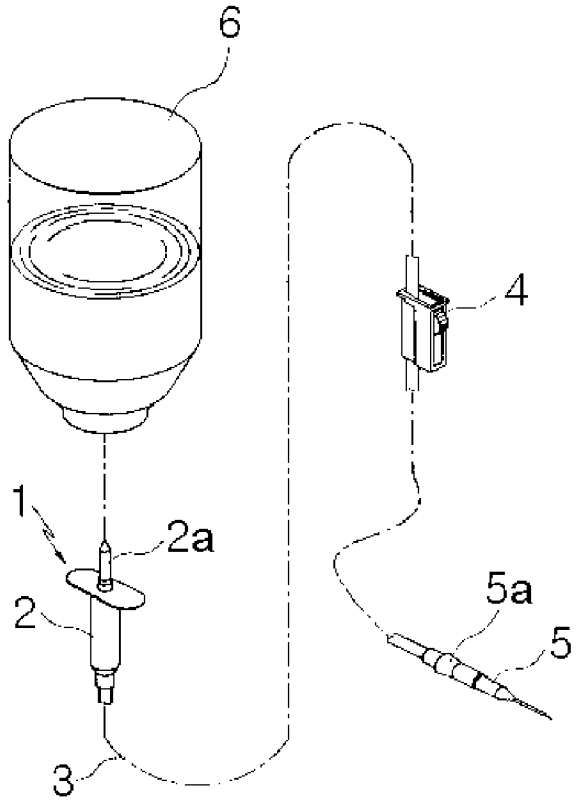
[9] The device as set forth in claim 1, wherein:
the infusion solution outflow passage is divided into a first transfer section at a upper portion and a second transfer section at a lower portion according to a flow direction of the infusion solution, the first transfer section being provided with a support step at a low end thereof;
the second transfer section is provided therein with a sheet-like packing, an upper edge of which is supported on the support step; and
the second transfer section is provided therein with a pressing member that has a

pressing rod formed to push the center of the sheet-like packing toward the first transfer section.

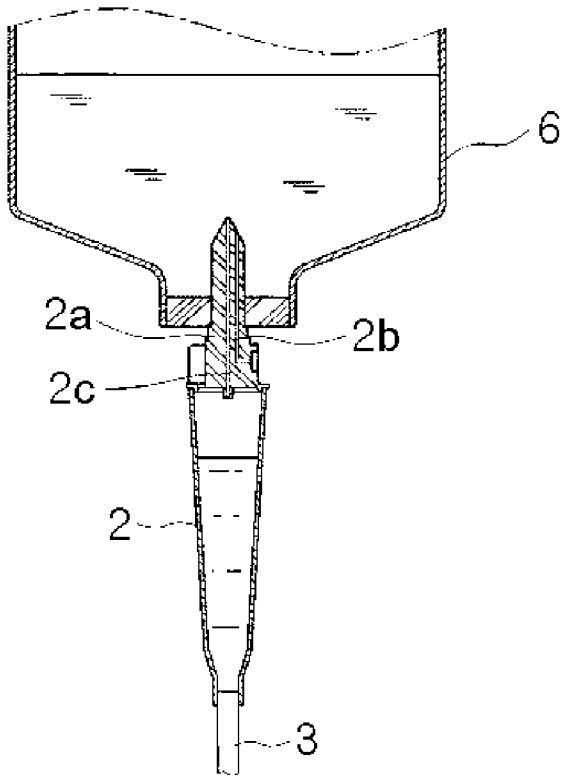
[10] The device as set forth in claim 9, wherein:
the pressing member has an infusion solution inducer mounted at a lower portion thereof; and
the infusion solution inducer has an infusion solution reservoir, an upper surface of which is open, such that the infusion solution passing through the pressing member flows over the infusion solution reservoir.

[11] The device as set forth in claim 9, wherein:
the base of the fixture is provided with an auxiliary hole; and
the base is provided, at an upper portion thereof, with an upper auxiliary packing that has an auxiliary hole valve for closing and opening the auxiliary hole.

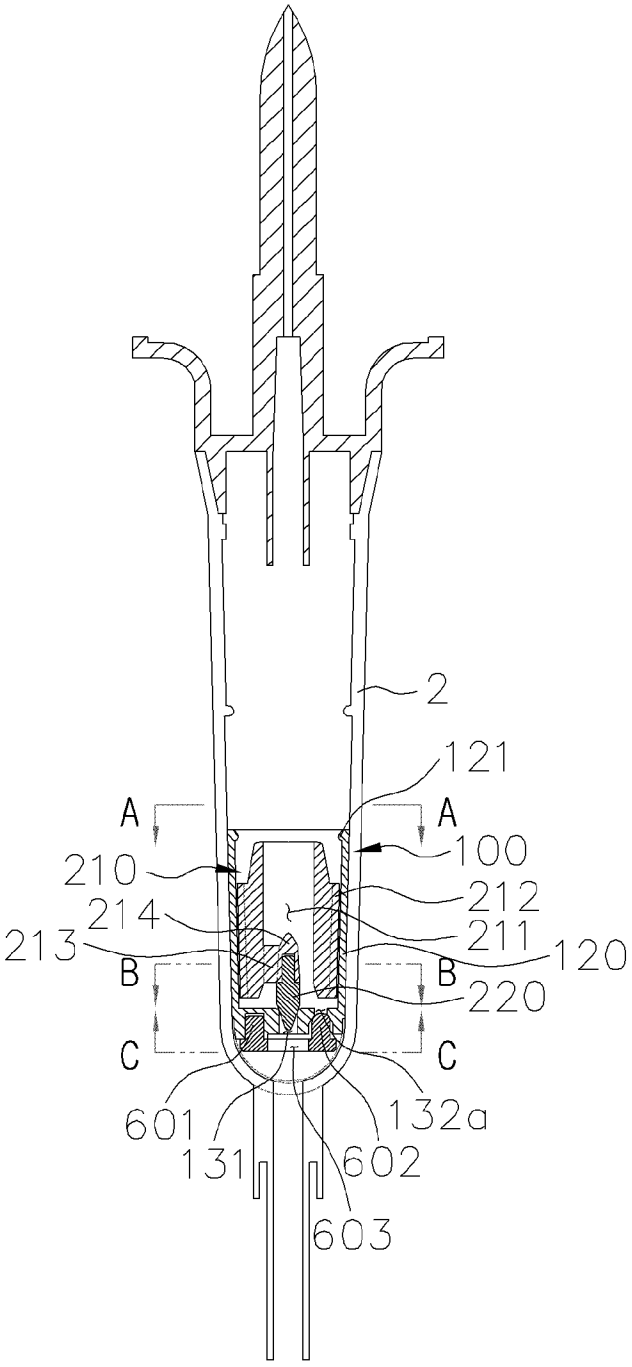
[Fig. 1]



[Fig. 2]



[Fig. 3]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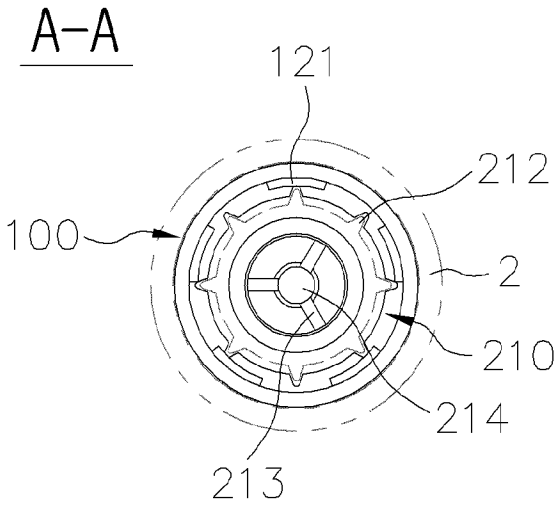
[Fig. 4]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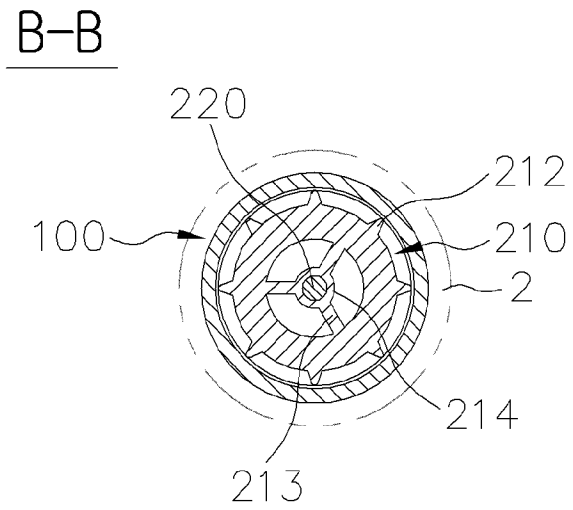
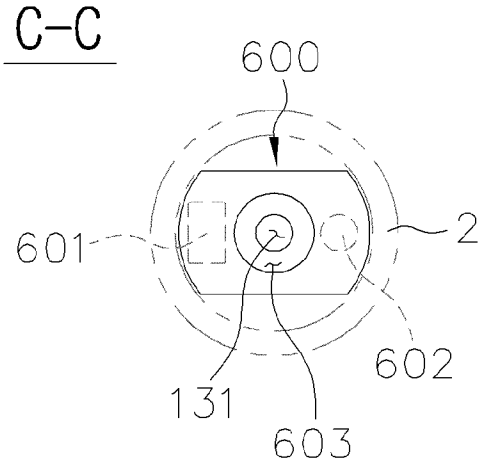
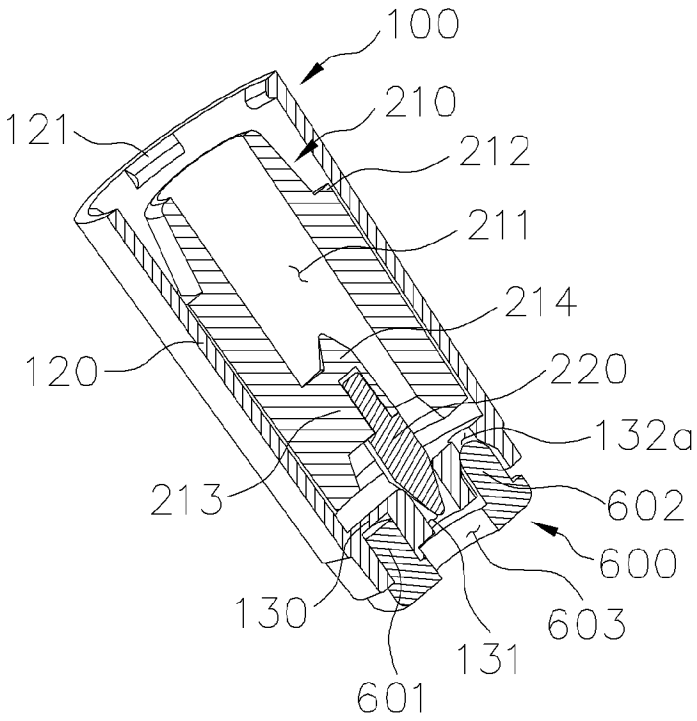
[Fig. 5]



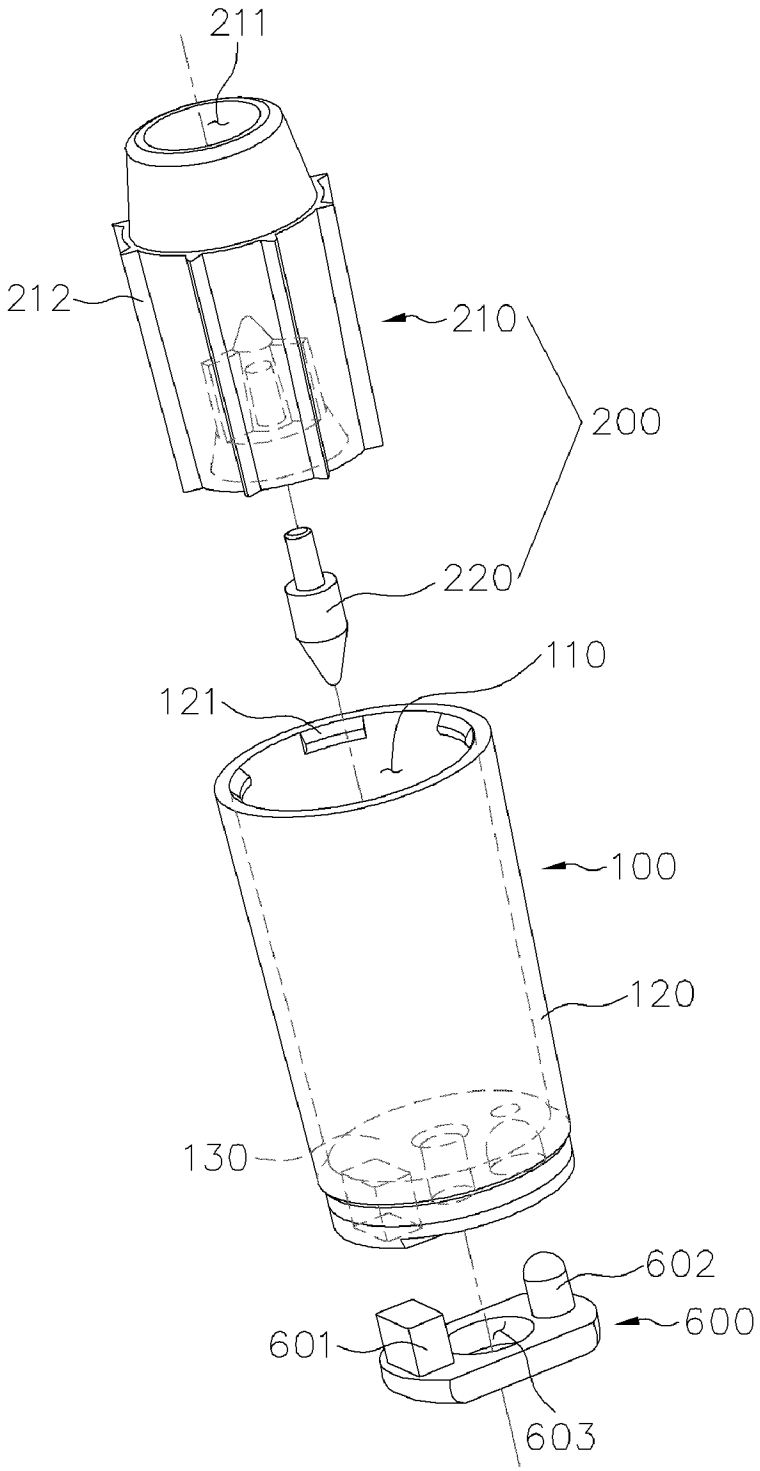
[Fig. 6]



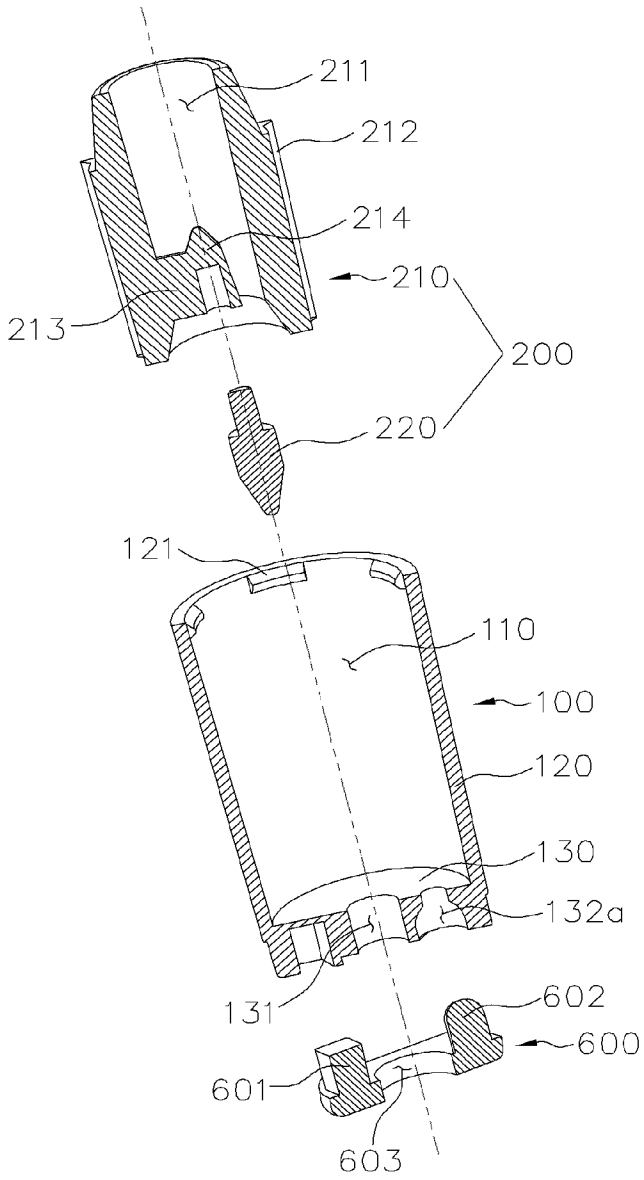
[Fig. 7]



[Fig. 8]



[Fig. 9]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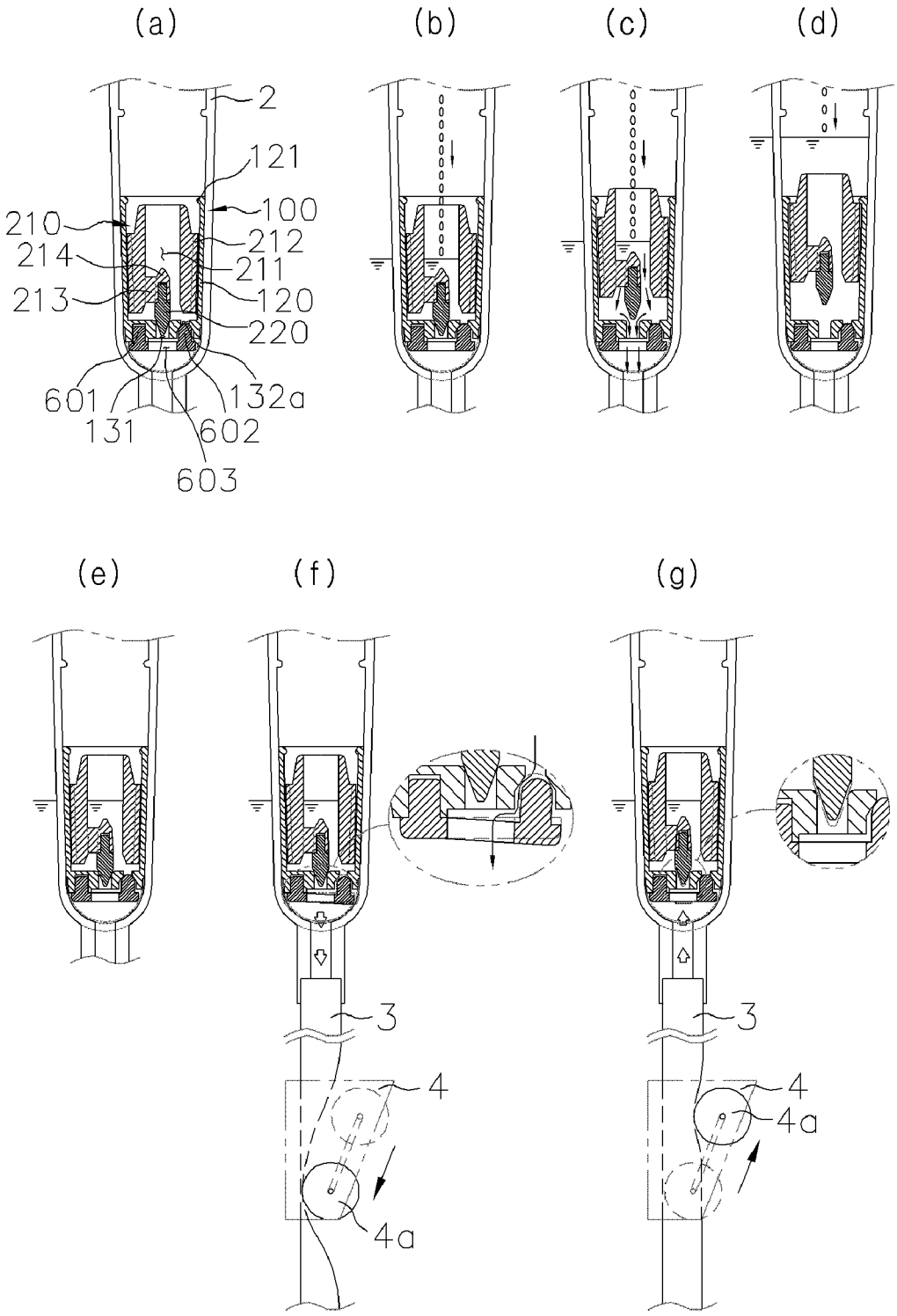
[Fig. 10]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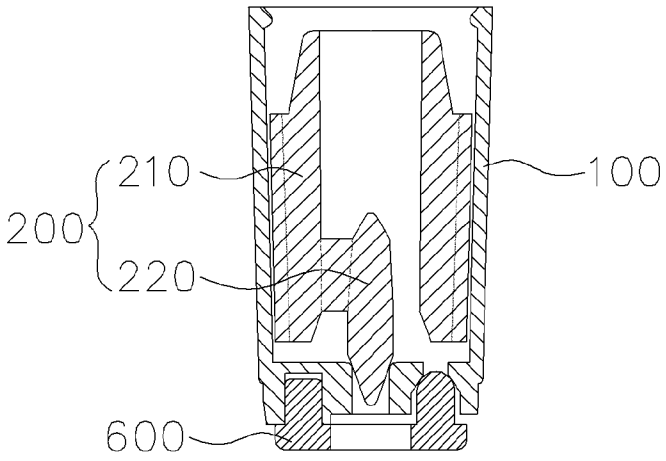
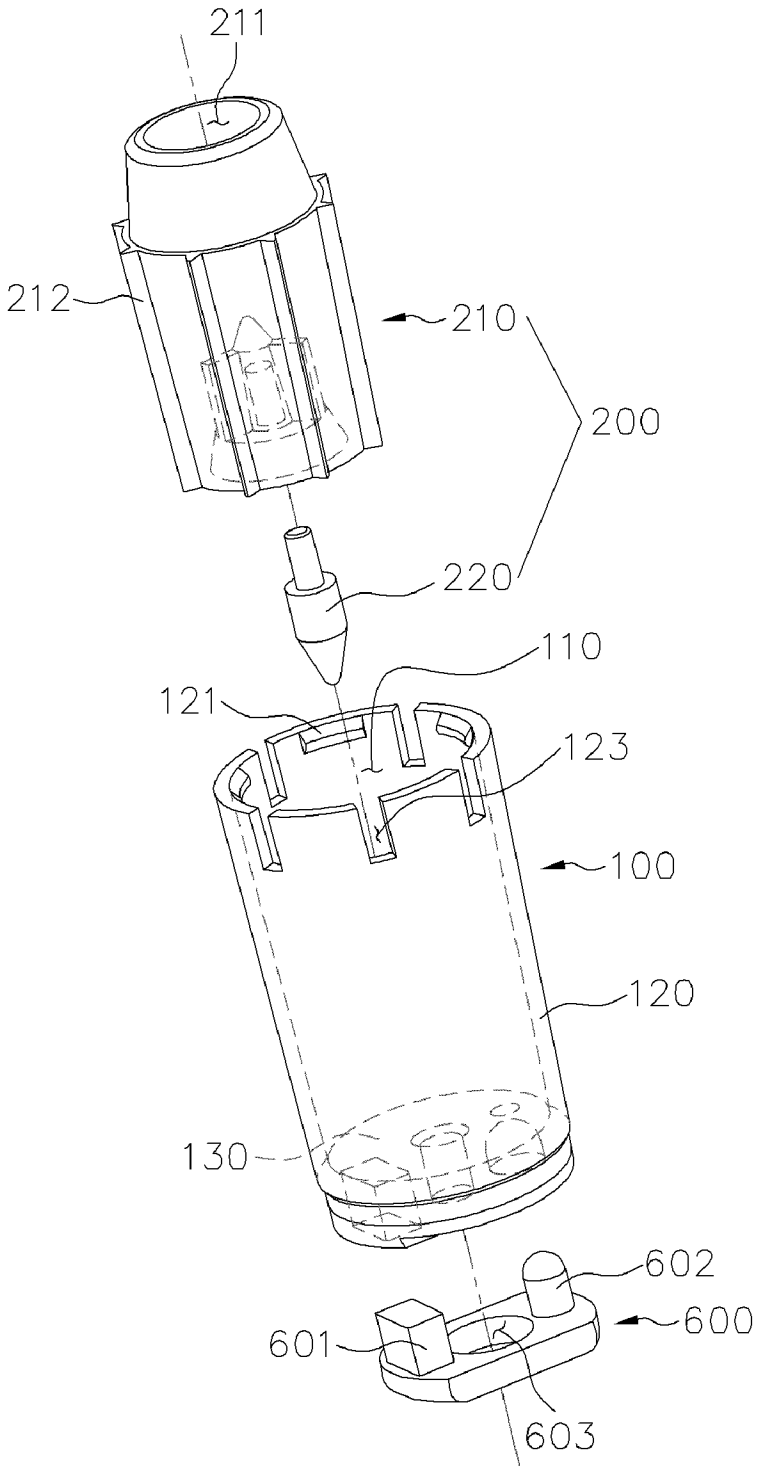
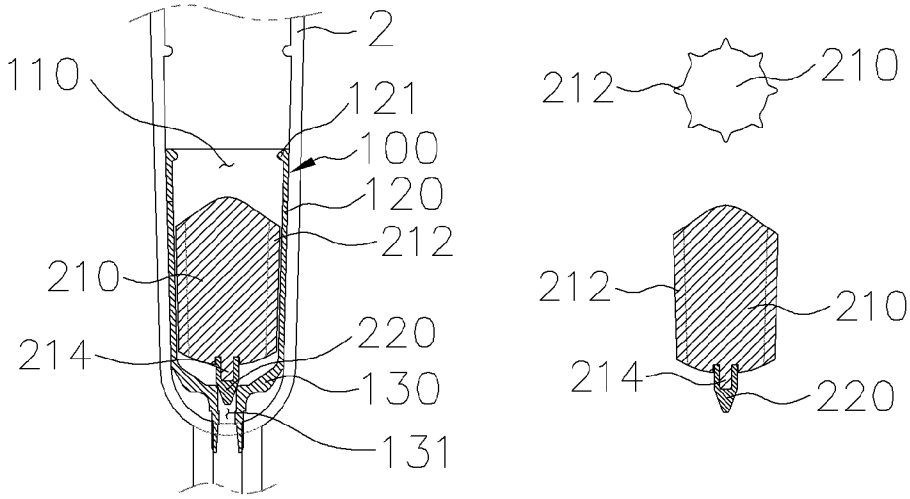
[Fig. 11]



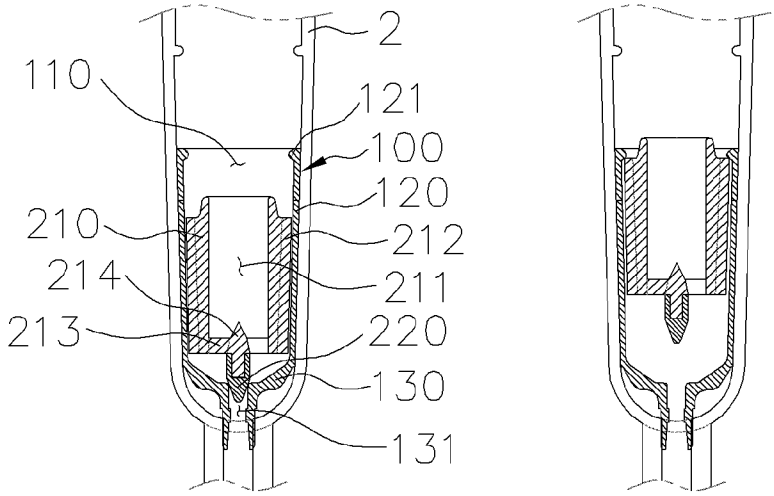
[Fig. 12]



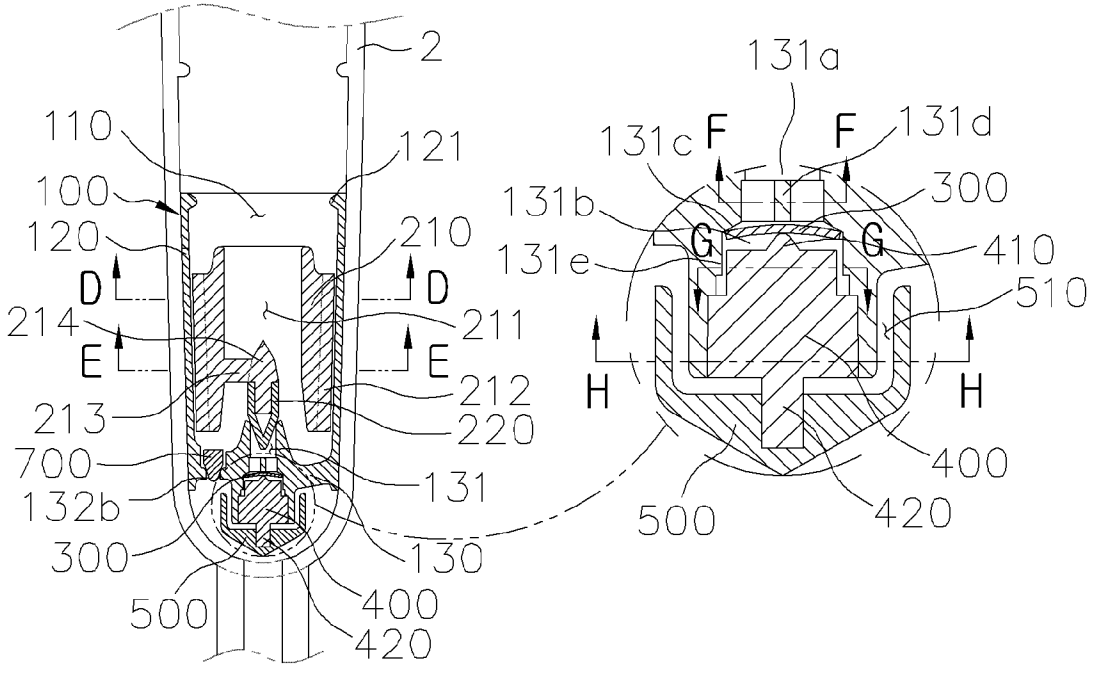
[Fig. 13]



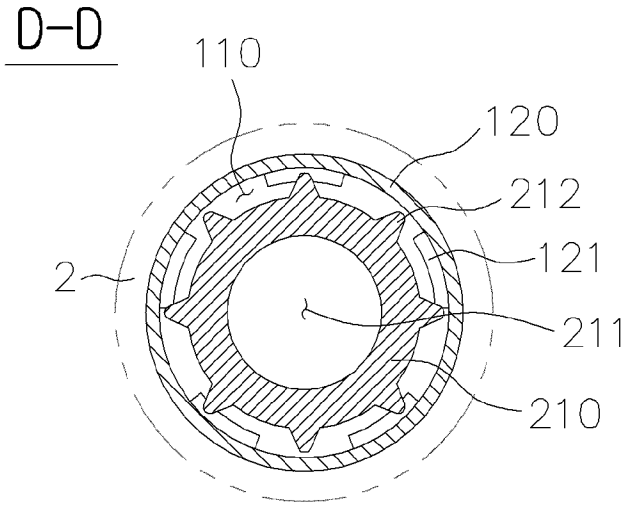
[Fig. 14]



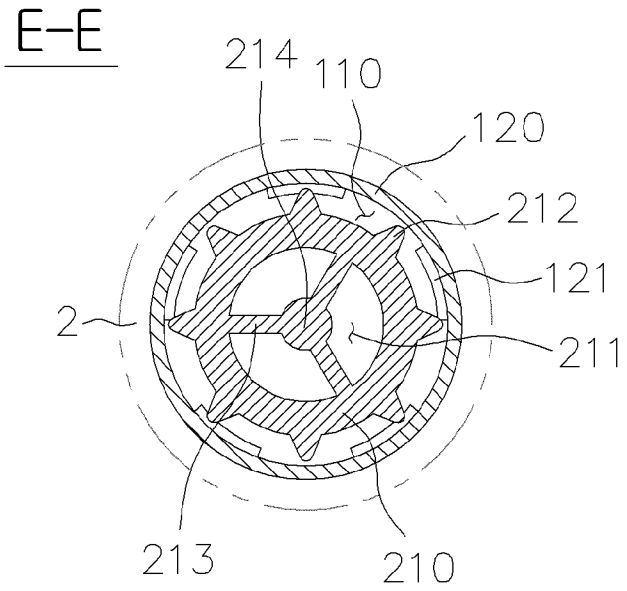
[Fig. 15]



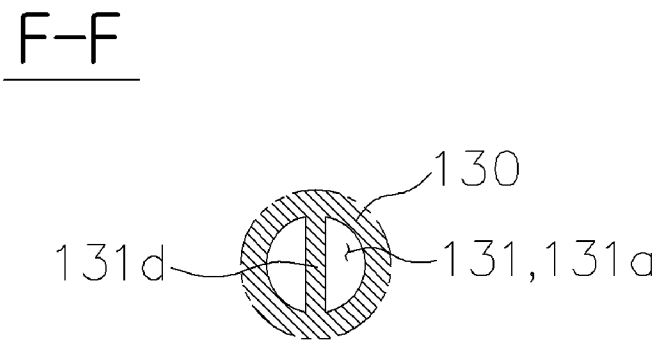
[Fig. 16]



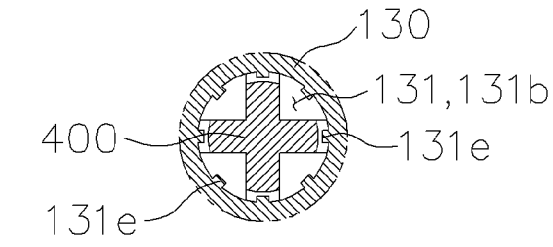
[Fig. 17]



[Fig. 18]

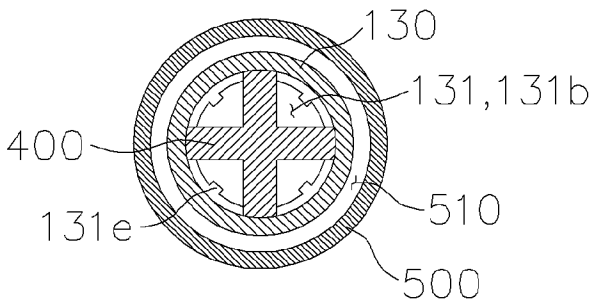


[Fig. 19]

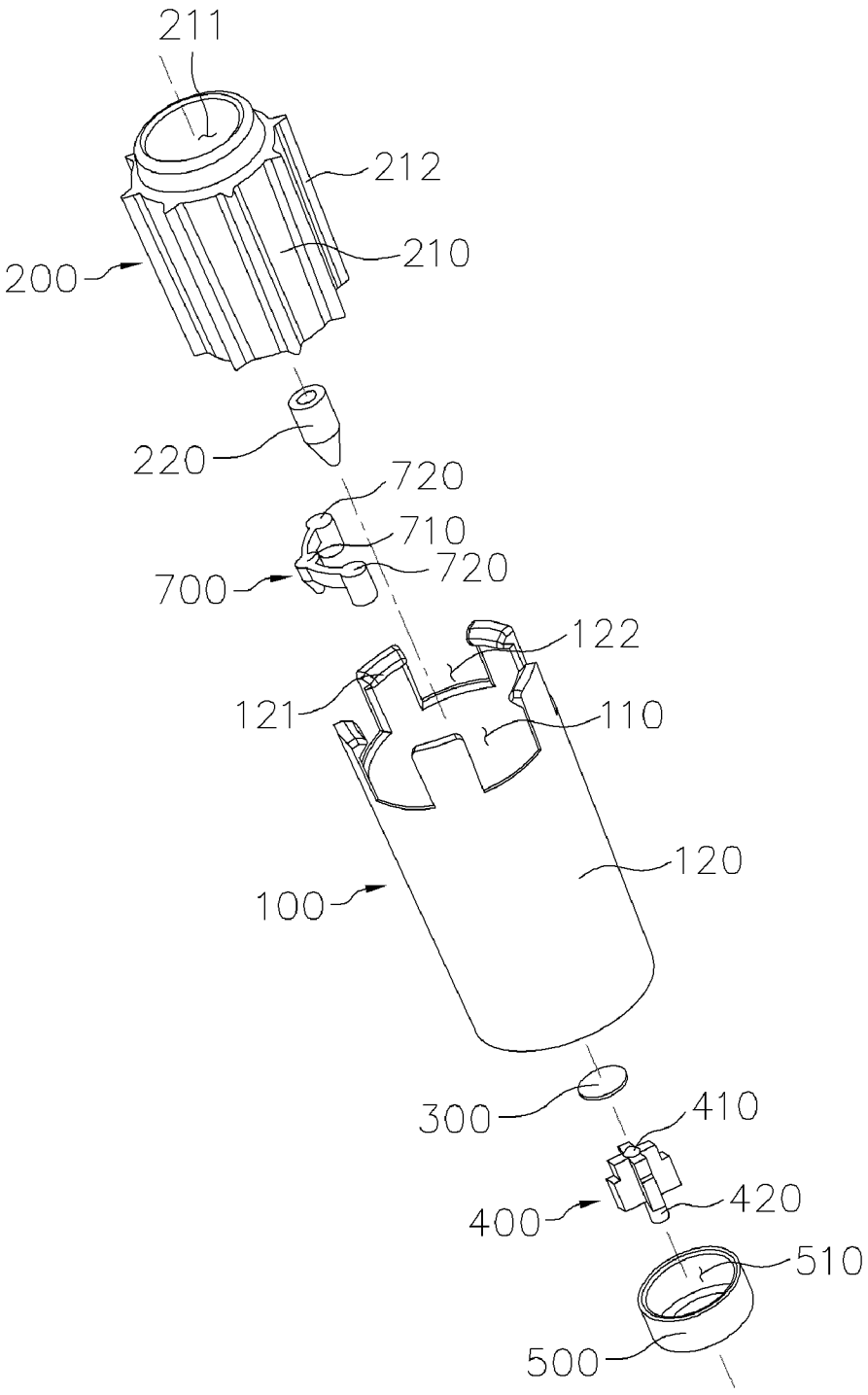


[Fig. 20]

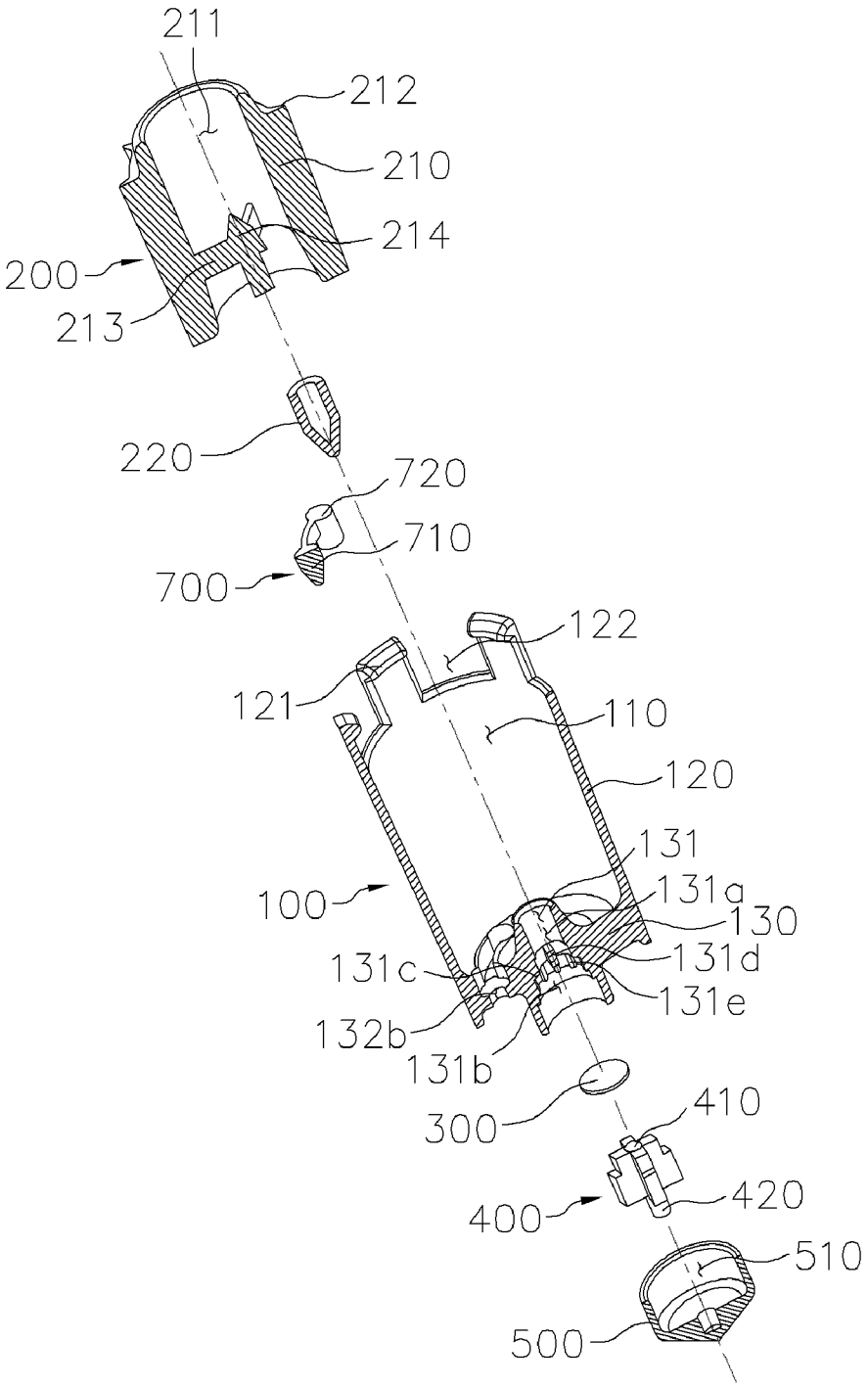
H-H



[Fig. 21]



[Fig. 22]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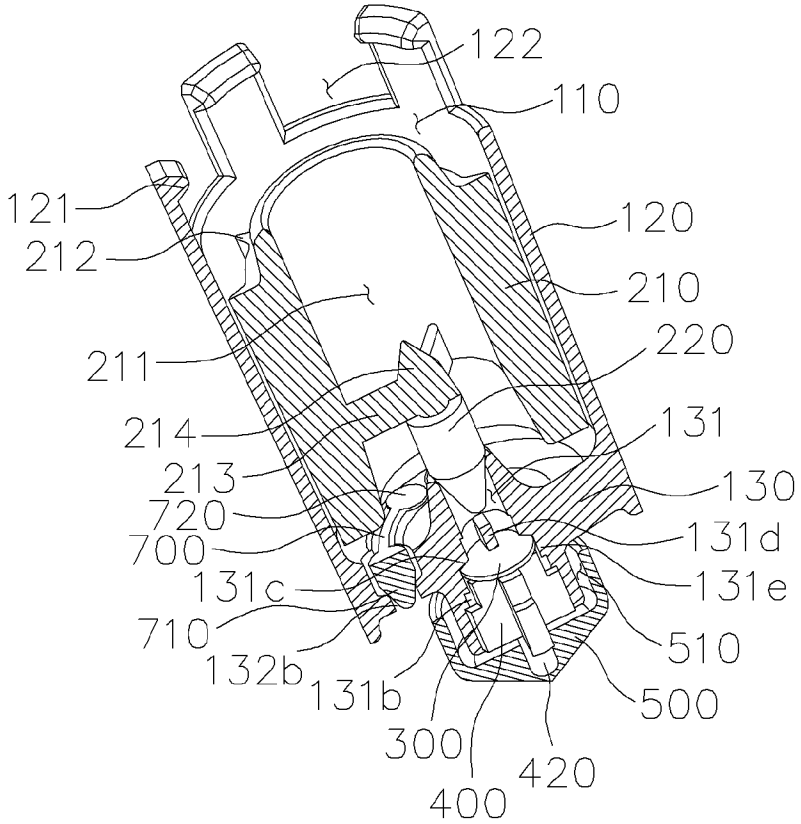
[Fig. 23]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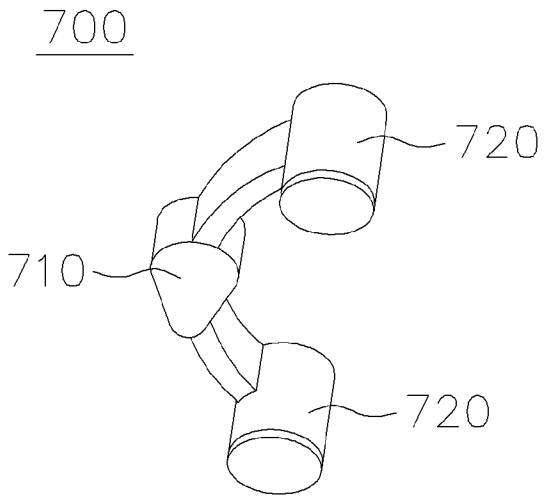
[Fig. 24]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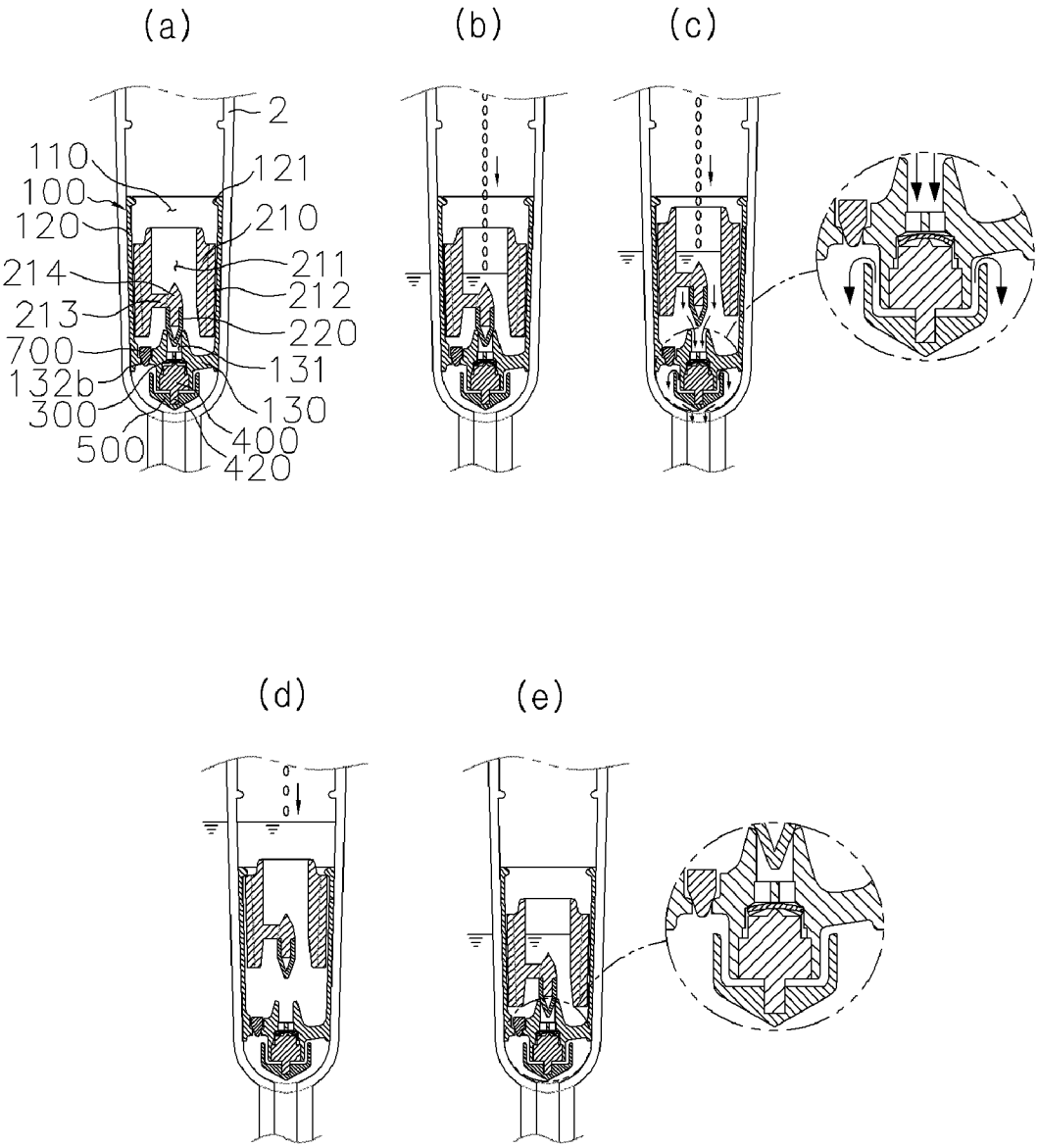
[Fig. 25]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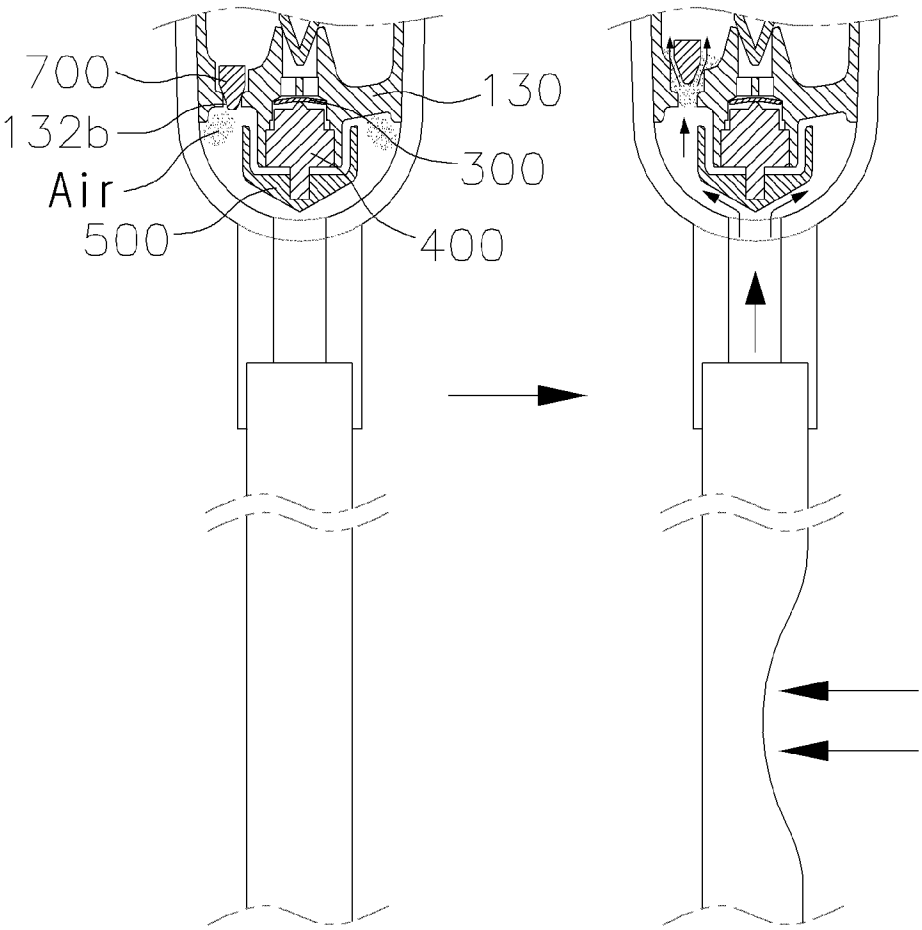
[Fig. 26]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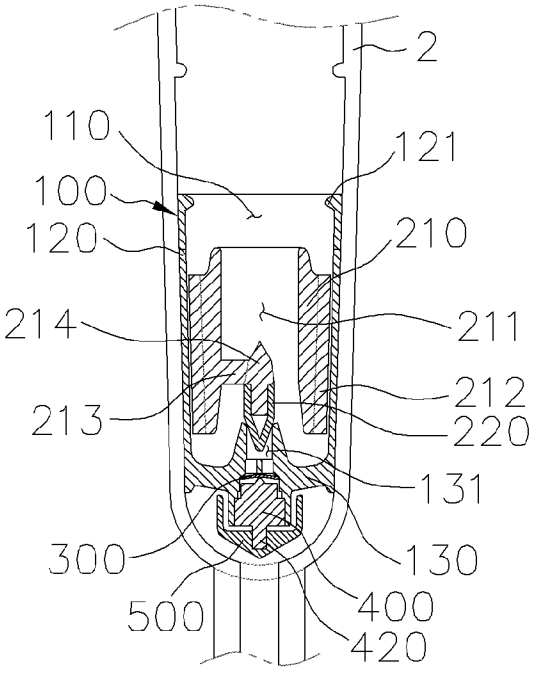
[Fig. 27]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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2007/001378

A. CLASSIFICATION OF SUBJECT MATTER

A61M 5/168(2006.01)i, A61M 5/40(2006.01)i, A61M 5/36(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC8 A61M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility Models since 1975

Japanese Utility models and applications for Utility Models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKIPASS(KIPO internal), DELPHION, "infus*, liquid, valve, float*, buoyant, and similar terms"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6695004 B1(JOHN L. RAYBUCK et al.) 24 February 2004 See the whole document.	1 - 11
A	GB 2266842 A (HUNG YUNG FENG) 17 November 1993 See the whole document.	1 - 11
A	WO 200189608A3 (MAKKINK ANDREW EUGENE) 07 March 2002 See the whole document.	1 - 11
A	US 5730730 A (PHILLIP H. DARLING, Jr.) 24 March 1998 See the whole document.	1 - 11

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 JULY 2007 (13.07.2007)	**13 JULY 2007 (13.07.2007)**

Name and mailing address of the ISA/KR

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Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

KIM Jung Tae

Telephone No. 82-42-481-8385

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2007/001378

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