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(54) **DEVICE, SEALING MEMBER AND FLUID CONTAINER**

VORRICHTUNG, DICHTELEMENT UND FLÜSSIGKEITSBEHÄLTER

DISPOSITIF, ÉLÉMENT D'ÉTANCHÉITÉ ET CONTENANT DE FLUIDE

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Description

TECHNICAL FIELD

[0001] The present invention concerns a device for transferring a fluid to and/or from a fluid container having a sealing member. The present invention also concerns a sealing member and a fluid container. The device, sealing member and fluid container of the present invention are particularly, but not exclusively intended for transferring medical substances to and/or from a fluid container, however they may be used for transferring any kind of fluid, i.e. any continuous, amorphous substance whose molecules move freely past one another and that has the tendency to assume the shape of its container, to and/or from a fluid container.

BACKGROUND

[0002] Medical drugs and solvents are often supplied in glass or plastic containers, such as vials, bottles or bags, which are sealed by a rubber, plastic or elastomeric bung, stopper, membrane or puncturable cap. Such sealing members prevent deterioration or contamination of the drug, allow the contents of a container to be mixed by shaking, and prevent the contents of the container from leaking out and contaminating the surroundings. A cannula or a hollow spike comprising a flow channel and an opening that communicates with the flow channel, is usually inserted through such a sealing member to supply fluids to the container and to withdraw fluid therefrom.

[0003] If an infusion fluid container is made of a rigid or semi-rigid material, i.e. if its walls are non-collapsible, an air inlet is required to withdraw medical fluid from the infusion fluid container and prevent the formation of a vacuum therein. When withdrawing fluid from a rigid or semi-rigid infusion fluid container, a spike having a medical fluid flow channel and an air inlet passage, usually comprising an air filter, is therefore used.

[0004] When a container comprising medical fluid is nearly empty a cannula or spike is often used to withdraw the last few drops of the medical fluid (which may be very expensive and/or toxic) from the container to minimize waste and to facilitate cleaning/disposal of the container. The cannula or spike is slowly and carefully retracted through the sealing member while withdrawing the medical fluid remaining in the container. However, a toxic drug may leak out and contaminate the surroundings during such a procedure and non-filtered air containing undesirable particles such as dust, pollen or bacteria may be drawn into the cannula and thus contaminate the medical fluid therein.

[0005] In some cases containers are in fact provided with an extra amount of the drug that is to be withdrawn to allow for the fact that not all of the drug will be withdrawn from the container. A user is then able to withdraw the recommended number of doses from the container but doing so will increase the cost of each container of medical fluid, increase waste and make cleaning or disposal of the container more complex.

[0006] Since sealing members are available in a wide variety of configurations, sizes and thicknesses, it is difficult to design a spike that is suitable for use with a plurality of different sealing members and which makes it possible to withdraw the last few drops of a medical fluid out of the containers in a safe and convenient way.

[0007] US 5,902,298 concerns a closure assembly/container combination for delivering media fluid to a patient by needleless access means. The closure assembly comprises an elastomeric stopper for sealing the container at its open end and a spike access means equipped with a luer connector.

[0008] US 2002/022804 discloses a syringe comprising a barrel having inner walls defining a compartment in the barrel, a closable nozzle at the base of the barrel and a plunger movable longitudinally within the barrel compartment. The plunger has inner walls defining a chamber suitable to receive a vial. A hollow needle extends through the plunger to enable fluid communication between the plunger chamber and barrel compartment. A compressible and puncturable sealing element within the plunger chamber provides a sterile seal for the needle and barrel compartment.

[0009] US 2007/156112 describes a vented vial adapter for reconstitution of a medicament in a vial which includes a vent lumen and a medicament lumen. The vent lumen has a cross-sectional area equal to or greater than that of the medicament lumen so that the fluid flow rate through the vent lumen is equal to or greater than that of the medicament lumen. As a result, aerosols of the medicament outside the adapter are avoided as is the withdrawal of air bubbles from the vial as the reconstituted medicament is withdrawn from the vial. To maintain the diameter of the sharpened cannula of the vial adapter as small as possible, the vent lumen includes a concave wall facing the medicament lumen and a convex outer wall.

SUMMARY OF THE INVENTION

[0010] An object of the present invention is to provide a device that enables an efficient transfer of fluid into and/or out of a fluid container having a sealing member.

[0011] This object is achieved by a device according to claim 1 whereby the device comprises a piercing member for penetrating the sealing member and an elongated body defining a longitudinal flow channel through which a fluid may flow into or out of the fluid container. The device comprises at least one opening that communicates with the flow channel whereby the at least one opening is arranged to extend along at least 20%, or at least 30%, or at least 50% or most preferably at least 70% or 100% of the length of the piercing member to ensure that at least part of the at least one opening is located substantially adjacent to the innermost side of a

sealing member when the device is in use.

[0012] The length of the piercing member is defined as the distance from the tip of the piercing member to the point at which the width of the device increases by an amount that would require a substantially increased force to push that part of the device more deeply into an infinitely wide sealing member of a bottomless fluid container. In cases where the device has a substantially uniform cross section along its entire length, the length of the piercing member is defined as the distance from the tip of the piercing member to opposite end of the device.

[0013] Such a device allows the entire contents, or essentially the entire contents of the fluid container to be drained from an inverted fluid container.

[0014] The inventive device also improves the mixing of fluids inside the container when the fluid container is inverted or in an upright position. If a liquid drug is to be mixed with a liquid solvent in an inverted or upright fluid container, for example, the mixing of the two liquids is facilitated since a plurality of openings or an elongated opening allows a liquid drug/solvent to flow into the fluid container more quickly than if using a conventional device and mixing is improved due to the increased and more distributed inlet area and the increased turbulence caused thereby.

[0015] Furthermore, if the fluid container and its contents have been refrigerated, if a fluid having a higher temperature than the contents of the fluid container is supplied through the sealing member of an inverted fluid container, convection currents may speed up the mixing of the two fluids. Convection currents may also aid mixing if a refrigerated fluid enters the top of an upright fluid container containing a fluid having a higher temperature than the refrigerated fluid.

[0016] The inventive device is suitable for use with a plurality of fluid containers comprising sealing members of different thicknesses (which can range from a few millimetres to a few centimetres) and different configurations (such as concave, bi-concave or M-shaped) if the at least one opening extends over a length that is greater than the thickness of the thickest sealing member that the device is designed to penetrate.

[0017] According to an embodiment of the invention the device comprises one opening that extends substantially along the entire length of the piercing member.

[0018] According to another embodiment of the invention the device comprises a plurality of openings that are uniformly or non-uniformly spaced along the length of the piercing member.

[0019] According to the invention the device comprises a retractable sleeve, such as a rubber, plastic or elastomeric sheath, that is arranged to at least partially cover and seal the at least one opening before the device is inserted into the sealing member of a fluid container. The retractable sleeve is arranged to abut against the outermost side of the sealing member when the device has been inserted into a sealing member of a fluid container and retract as the piercing member penetrates more deeply into the sealing member so that it will cover and seal only the part of the opening, or the openings that are located outwards of the outermost side of the sealing member when the device is in use and thus prevent any medical fluid from leaking out of that opening or those openings.

[0020] According to an embodiment of the invention the device comprises connecting means to connect it to a fluid container so that the device will not accidentally become detached from the fluid container when the device is in use, or prior to or after use.

[0021] According to an embodiment of the invention, the device comprises a ruled scale, which for example extends from the outermost edge of an opening in the direction from the interior of the fluid container outwards towards the sealing member. If the thickness of a sealing member at the point of insertion of the device is known, the ruled scale may be used to indicate to a user how far the device has to be inserted into the sealing member to ensure that the outermost edge of the opening becomes located substantially adjacent to the innermost side of a sealing member when the device is in use. The ruled scale may also be used to measure the thickness of the sealing member before the device is inserted into it.

[0022] The present invention also concerns a sealing member, such as a rubber, plastic or elastomeric bung, stopper, membrane or puncturable cap, for sealing an outlet of a fluid container, which sealing member comprises a device according to any of the embodiments of the invention whereby the device is integrally formed with the sealing member or releasably/non-releasably connected thereto.

[0023] According to an embodiment of the invention the device is slidably mounted on the sealing member so that the at least one opening of the device may be opened and closed by sliding the device back and forth with respect to the sealing member.

[0024] The present invention further concerns a fluid container that comprises a sealing member according to any of the embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] The present invention will hereinafter be further explained by means of non-limiting examples with reference to the appended figures where;

Figure 1 shows a conventional device for transferring fluid to and/or from a fluid container,

Figures 2-5 show devices for transferring fluid to and/or from a fluid container according to embodiments of the invention, and

Figures 6-7 show sealing a sealing member according to an embodiment of the invention.

[0026] It should be noted that the drawings have not

been drawn to scale and that the dimensions of certain features have been exaggerated for the sake of clarity.

[0027] Furthermore, it should be noted that irrespective of whether a rigid, semi-rigid or flexible fluid container is exemplified in the appended figures, the present invention is suitable for use with any type of fluid container having a sealing member.

DETAILED DESCRIPTION OF EMBODIMENTS

[0028] Figure 1 shows a conventional device 10 for transferring fluid to and/or from an inverted fluid container 12 having a sealing member 14 that hermetically seals the contents 22 of the fluid container 12. The device 10 comprises a piercing member 16 for penetrating the sealing member 14 and an elongated body defining a longitudinal flow channel 18 through which the contents of the fluid container may flow into and/or out of the fluid container 12 and one lateral opening that communicates with the flow channel 18. Since sealing members 14 vary in thickness and toughness, the opening 20 of the device can become located at any of an infinite number of positions in the fluid container 12 depending on how much force the user applies when inserting the device 10 through the sealing member 14 and depending on whether the device is inserted substantially vertically or at an angle to the longitudinal axis of the fluid container 12. Once the contents 22 of the fluid container 12 have drained to a level just under the outermost edge 20a of the opening, no more fluid will be able to drain from the fluid container unless the device is withdrawn slightly.

[0029] Figure 2 shows a device 24 in accordance with the present invention for transferring a fluid to and/or from an inverted fluid container 12 having a sealing member 14. The device 24 comprises a piercing member 16 having a bevelled tip for penetrating the sealing member 14 and may also optionally comprise an elongated tubular body portion 24a of any symmetrical or non-symmetrical cross-sectional form, such as circular, square, hexagonal or octagonal. The elongated body portion 24a has a greater width than the width of the piercing member 16 and is not intended to be inserted through the sealing member 14 of a fluid container 12. The elongated body portion 24a may comprise a drop chamber. The device 24 may also optionally comprise an air/liquid inlet 24b.

[0030] The piercing member 16 defines a substantially longitudinal flow channel (not shown) through which the contents of the fluid container may flow into and/or out of the fluid container 12 and one elongated opening 20, that can be of any shape, such as rectangular, square, circular or oval, which communicates with the flow channel. The opening 20, extends longitudinally along about 50% of the length, L, of the piercing member 16, either from the tip of the piercing member or a few millimetres from the tip of the piercing member, to ensure that at least part of the at least one opening is located substantially adjacent to the innermost side 14a of a sealing member 14 when the device 10 is in use. The maximum width of the opening 20 is equal to at least 20% of the maximum width of the piercing member 16, preferably at least 50% of the maximum width of the piercing member 16.

[0031] In the example shown, the innermost side 14a of the sealing member 14 overlaps the elongated opening 20 when the device is in use. The device 24 also comprises a ruled scale 26 to allow a user to accurately position the outermost edge 20a of the opening 20 if he/she knows the thickness of the sealing member 14 at the point of insertion of the device 24.

[0032] The device 24 may comprise plastic, such as thermoplastic material; metal, glass or a ceramic material. The length of the piercing member 16 may range from 0.5 - 5.0 cm or more, whereby the length of the piercing member is preferably 5 to 20 times its maximum width.

[0033] It should be noted that although a rigid or semi-rigid fluid container 12, such as a glass bottle, has been illustrated in figure 2, the inventive device 24 is equally suitable for use with a non-rigid fluid container, such as an infusion bag. Furthermore, even though an air inlet would be necessary when draining fluid from a rigid or semi-rigid fluid container, air inlets and air channels have not been illustrated in any of the drawings for the sake of clarity. The inventive device could however comprise any number of channels for air or other fluids.

[0034] Figure 3 shows a device 24 in accordance with the invention before the device has been inserted into the sealing member of a fluid container. The device comprises one opening 20 that extends substantially along the entire length, L, of the piercing member 16 from behind its solid beveled tip towards the opposite end of the piercing member 16. The length of the opening 20 will of course depend on the thickness of the thickest sealing member 14 that it is intended to penetrate. The device 24 comprises a tightly fitting elastic retractable sleeve 28, comprising silicone rubber for example, that is arranged to at least partially cover and seal the at least one opening 20 before the device is inserted into a fluid container. The retractable sleeve 28 is arranged to abut against the outermost side 14b of the sealing member 14 when the device has been inserted into a fluid container 12 and to retract as the piercing member 16 penetrates more deeply into sealing member 14.

[0035] Figure 4 shows the device 24 of figure 3 after it has been inserted into the sealing member 14 of a fluid container 12. It can be seen that the part of the opening 20 inwards of the innermost side 14a of the sealing member 14 is exposed to the interior of the fluid container whereas the part of the opening 20 outwards of the outermost side 14b of the sealing member 14 is sealed, thereby preventing deterioration or contamination of the contents of the fluid container 12, allowing the contents of a fluid container 12 to be mixed by shaking, and preventing the contents of the fluid container 12 from leaking out and contaminating the surroundings.

[0036] The device 24 shown in figures 3 and 4 also comprises connecting means 30, to grippingly engage

the rim of the fluid container 12 to hold the device 24 firmly in place on the fluid container 12. The connecting means 30 comprises two manually operable resilient arms comprising curved end regions that slidably engage the rim of the fluid container 12 when the device 24 has been pushed through the fluid container's sealing member 14. The connecting means 30, which may be a snap-fit mechanism, a luer lock or any other mechanical or non-mechanical connecting means, may be arranged to cause the piercing member 16 of the device to penetrate the sealing member 14 of a fluid container 12 as the connecting means are engaged, thus providing fluid communication between the interior of the fluid container 12 and the flow channel of the device 24, i.e. fluid communication is provided when a luer lock is twisted into a locked position for example.

[0037] According to another embodiment of the invention, the device comprises a piercing member shield/guard to prevent users from being hurt by the piercing member 16 and to prevent contamination of the piercing member 16. In the embodiment shown in figures 3 and 4, the connecting means 30 also act as a piercing member shield/guard.

[0038] It should be noted that the at least one opening 20 of the inventive device 24 need not necessarily extend in a direction parallel or collinear to the longitudinal axis of the device 24, it/they may extend in a zig-zag pattern along the length of the piercing member 16 or even be constituted by a plurality of openings that extend transversely to the longitudinal axis of the device 24.

[0039] Figure 5 shows a device 24 according to a further embodiment of the invention. The device 24 comprises a plurality of openings 20 uniformly spaced along a distance d, which extents substantially along the entire length of the piercing member 16. If the length of the piercing member is 3 cm, the device 24 may for example comprise ten uniformly spaced openings 20 that extend 2 mm along the longitudinal direction of the piercing member 16, each thereby spaced 1 mm apart. In the illustrated embodiment the piercing member 16 comprises a blunt end, which may be used to pierce a sealing member 14 having a thin central portion, or to pierce a pre-slit sealing member 14. It is to be understood, of course, that a pointed piercing member may also be used in relation to this embodiment.

[0040] Figures 6 and 7 show a sealing member 32 according to an embodiment of the invention. The sealing member 32 comprises natural or synthetic rubber or any other elastomer, plastic or glass for example. The sealing member 32 comprises a device 24 according to any of the embodiments of the invention whereby the device 24 is integrally formed with the sealing member 32 or releasably/non-releasably connected thereto. The device 24 is slidably mounted on the sealing member 32 so that the at least one opening 20 of the device may be opened and closed by sliding the device back and forth with respect to the sealing member from a closed position as shown in figure 6 to an open position as shown in figure 7. The device 24 may of course be arranged to stop at any number of further positions in addition to the fully open and fully closed positions that have been illustrated.

[0041] In figure 7, the entire piercing member 16 of the device 24 has been pushed through the sealing member 32 until a shoulder 34 on the device abuts against the outermost edge 32a of the sealing member 32. In this position the lower edge 20a of the opening is aligned with the innermost edge 32b of the sealing member 32 so that the whole opening 20 will be exposed to the interior of the fluid container in which the sealing member 32 is inserted.

[0042] The inventive sealing member 32 may be inserted into the inlet/outlet of a fluid container 12 or may comprise means, such as a thread, to enable it to be attached to a fluid container for example.

[0043] Further modifications of the invention within the scope of the claims would be apparent to a skilled person.

Claims

1. Device (24) for transferring a fluid (22) to and/or from a fluid container (12) having a sealing member (14), whereby the device (24) comprises a piercing member (16) for penetrating the sealing member (14) and an elongated body defining a longitudinal flow channel (18) through which a fluid (22) may flow into and/or out of the fluid container (12) and at least one opening (20) that communicates with the flow channel (18), **characterized in that** said at least one opening (20) is arranged to extend along at least 20% of the length (L) of the piercing member (16) to ensure that at least part of said at least one opening (20) is located substantially adjacent to the innermost side (14a) of a sealing member (14) when the device is in use and **in that** said device (24) comprises a retractable sleeve (28) that is arranged to at least partly cover and seal said at least one opening (20) when the device has not been inserted into a sealing member (14) of a fluid container (12), whereby the sleeve (28) is arranged to abut against the outermost side (14b) of the sealing member (14) when the device has been inserted into a sealing member (14) of a fluid container (12) and be retracted as the piercing member (16) penetrates more deeply into the sealing member (14), whereby the retractable sleeve (28) is arranged to abut against the outermost side (14b) of the sealing member (14) when the device (24) has been inserted into a sealing member (14) of a fluid container (12) and retract as the piercing member penetrates more deeply into the sealing member (14) so that it will cover and seal only the part of said at least one opening (20) that is located outwards of the outermost side (14b) of the sealing member (14) when the device (24) is in use and thus prevent any medical fluid from leaking out of said part of said at least one opening (20).

2. Device (24) according to claim 1, **characterized in that** it comprises one opening (20) that extends substantially along the entire length (L) of the piercing member (16).

3. Device (24) according to claim 1, **characterized in that** it comprises a plurality of openings (20) that are uniformly or non-uniformly spaced along the length (*l*) of the piercing member (16).

4. Device (24) according to any of the preceding claims, **characterized in that** it comprises connecting means (30) to connect it to the fluid container (12).

5. Device (24) according to any of the preceding claims, **characterized in that** it comprises a ruled scale (26).

6. Device (24) according to any of the preceding claims, **characterized in that** it comprises a sealing member (32), such as a rubber, plastic or elastomeric bung, stopper, membrane or puncturable cap, for sealing an inlet/outlet of a fluid container (12) which is integrally formed with said device (24) or releasably/non-releasably connected thereto.

7. Device (24) according to claim 6, **characterized in that** said device (24) is slidably mounted on the sealing member (14) so that said at least one opening (20) of the device (24) may be opened and closed by sliding the device (24) back and forth with respect to the sealing member (14).

8. Fluid container (12), **characterized in that** it comprises a device (24) according to claim 6 or 7.

Patentansprüche

1. Vorrichtung (24) zum Übertragen einer Flüssigkeit (22) zu und/oder von einem Flüssigkeitsbehälter (12) mit einem Dichtelement (14), wobei die Vorrichtung (24) ein Einstechelement (16) zum Eindringen in das Dichtelement (14) und einen langgestreckten Korpus aufweist, welcher einen in Längsrichtung verlaufenden Strömungskanal (18) bildet, durch welchen eine Flüssigkeit (22) in den und/oder aus dem Flüssigkeitsbehälter (12) fließen kann, und mindestens eine Öffnung (20) besitzt, welche mit dem Strömungskanal (18) in Strömungsverbindung steht, **dadurch gekennzeichnet, dass** mindestens eine Öffnung (20) so angeordnet ist, dass sie sich über mindestens 20 % der Länge (L) des Einstechelements (16) erstreckt, um sicherzustellen, dass sich zumindest ein Teil der mindestens einen Öffnung (20) im Wesentlichen nahe der am weitesten innen liegenden Seite (14a) eines Dichtelements (14) befindet, wenn die Vorrichtung im Einsatz ist, und dass die Vorrichtung (24) eine zurückziehbare Hülse (28) aufweist, welche so angeordnet ist, dass sie die mindestens eine Öffnung (20) zumindest zum Teil abdeckt und abdichtet, wenn die Vorrichtung nicht in ein Dichtelement (14) eines Flüssigkeitsbehälters (12) eingesetzt wurde, wobei die Hülse (28) so angeordnet ist, dass sie gegen die am weitesten außen liegende Seite (14b) des Dichtelements (14) anliegt, wenn die Vorrichtung in ein Dichtelement (14) eines Flüssigkeitsbehälters (12) eingesetzt wurde und umso weiter zurückgezogen wird, je tiefer das Einstechelement (16) in das Dichtelement (14) eindringt, wobei die zurückziehbare Hülse (28) so angeordnet ist, dass sie gegen die am weitesten außen liegende Seite (14b) des Dichtelements (14) anliegt, wenn die Vorrichtung in ein Dichtelement (14) eines Flüssigkeitsbehälters (12) eingesetzt wurde und sich umso weiter zurückzieht, je tiefer das Einstechelement (16) in das Dichtelement (14) eindringt, so dass sie nur den Teil der mindestens einen Öffnung (20) abdeckt und abdichtet, der sich von der am weitesten außen liegenden Seite (14b) des Dichtelements (14) aus weiter außen befindet, wenn die Vorrichtung (24) im Einsatz ist, und so dass sie verhindert, dass von der medizinischen Flüssigkeit etwas aus dem Teil der mindestens einen Öffnung (20) austritt.

2. Vorrichtung (24) nach Anspruch 1, **dadurch gekennzeichnet, dass** sie eine Öffnung (20) aufweist, die sich im Wesentlichen über die gesamte Länge (L) des Einstechelements (16) erstreckt.

3. Vorrichtung (24) nach Anspruch 1, **dadurch gekennzeichnet, dass** sie eine Vielzahl von Öffnungen (20) aufweist, die über die Länge (l) des Einstechelements (16) gleichmäßig oder ungleichmäßig voneinander beabstandet sind.

4. Vorrichtung (24) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** sie Verbindungsmittel (30) zu ihrem Anschluss an den Flüssigkeitsbehälter (12) aufweist.

5. Vorrichtung (24) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** sie eine Skala mit Linienmarkierung (26) aufweist.

6. Vorrichtung (24) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** sie ein Dichtelement (32) wie beispielsweise einen Stöpsel, einen Pfropfen, eine Membran oder eine durchstechbare Kappe aus Gummi, Kunststoff oder Elastomermaterial zum Abdichten eines Einlasses/Auslasses eines Flüssigkeitsbehälters (12) aufweist, welcher bzw. welche einstückig mit der Vorrichtung (24) ausgebildet oder lösbare/nicht-lösbar mit dieser verbunden ist.

7. Vorrichtung (24) nach einem der vorhergehenden

Ansprüche, **dadurch gekennzeichnet, dass** die Vorrichtung (24) verschieblich so auf dem Dichtelement (14) angebracht ist, dass die mindestens eine Öffnung (20) der Vorrichtung (24) dadurch geöffnet und verschlossen werden kann, dass die Vorrichtung (24) bezüglich des Dichtelements (14) vorwärts und rückwärts verschoben wird.

8. Flüssigkeitsbehälter (12), **dadurch gekennzeichnet, dass** er eine Vorrichtung (24) nach Anspruch 6 oder 7 aufweist.

Revendications

1. Dispositif (24) destiné à transférer un fluide (22) vers un contenant de fluide (12) comportant un élément d'étanchéité (14), et/ou à partir de celui-ci, de telle sorte que le dispositif (24) comprend un élément de perforation (16) destiné à pénétrer l'élément d'étanchéité (14) et un corps allongé définissant un canal d'écoulement longitudinal (18) à travers lequel un fluide (22) peut s'écouler vers un contenant de fluide (12) et/ou à partir de celui-ci et au moins une ouverture (20) qui communique avec le canal d'écoulement (18), **caractérisé en ce que** ladite au moins une ouverture (20) est agencée de manière à s'étendre sur au moins 20 % de la longueur (L) de l'élément de perforation (16) afin d'assurer qu'au moins une partie de ladite au moins une ouverture (20) est située sensiblement de manière adjacente au côté le plus interne (14a) de l'élément d'étanchéité (14) lorsque le dispositif est utilisé et **en ce que** ledit dispositif (24) comprend un manchon rétractable (28) qui est agencé de manière à recouvrir au moins partiellement et d'obturer ladite au moins une ouverture (20) lorsque le dispositif n'a pas été inséré dans un élément d'étanchéité (14) d'un contenant de fluide (12), de telle sorte que le manchon (28) est agencé de manière à venir en butée contre le côté le plus externe (14b) de l'élément d'étanchéité (14) lorsque le dispositif a été inséré dans un élément d'étanchéité (14) d'un contenant de fluide (12) et est rétracté lorsque l'élément de perforation (16) pénètre plus profondément dans l'élément d'étanchéité (14), de telle sorte que le manchon rétractable (28) est agencé de manière à venir en butée contre le côté le plus externe (14b) de l'élément d'étanchéité (14) lorsque le dispositif (24) a été inséré dans l'élément d'étanchéité (14) d'un contenant de fluide (12) et se rétracte lorsque l'élément de perforation pénètre plus profondément dans l'élément d'étanchéité (14) de telle sorte qu'il va recouvrir et sceller seulement la partie de ladite au moins une ouverture (20) qui est située à l'extérieur du côté le plus externe (14b) de l'élément d'étanchéité (14) lorsque le dispositif (24) est utilisé et empêche ainsi tout fluide médical de fuir par ladite partie de ladite au moins ouverture (20).

2. Dispositif (24) selon la revendication 1, **caractérisé en ce qu'**il comprend une ouverture (20) qui s'étend sensiblement sur la totalité de la longueur (1) de l'élément de perforation (16).

3. Dispositif (24) selon la revendication 1, **caractérisé en ce qu'**il comprend une pluralité d'ouvertures (20) qui sont espacées de manière uniforme ou non sur la longueur (1) de l'élément de perforation (16).

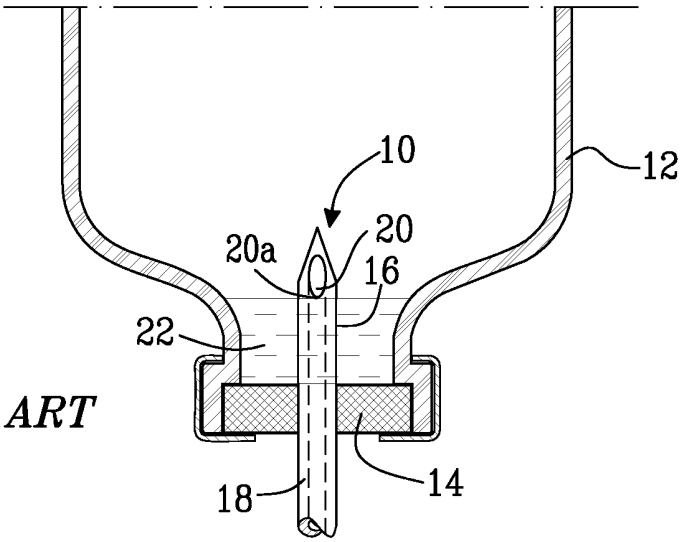
4. Dispositif (24) selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'**il comprend un moyen de raccordement (30) afin de le raccorder au contenant de fluide (12),

5. Dispositif (24) selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'**il comprend une échelle graduée (26).

6. Dispositif (24) selon l'une quelconque des revendications précédentes, **caractérisé, en ce qu'**il comprend un élément d'étanchéité (32), tel qu'un bouchon en caoutchouc, en matière plastique ou en élastomère, un opercule, une membrane ou un obturateur pouvant être perforé, de manière à sceller une entrée/sortie d'un contenant de fluide (12) qui est formé de manière unitaire avec ledit dispositif (24) ou raccordé de manière amovible/non amovible à celui-ci.

7. Dispositif (24) selon la revendication 6, **caractérisé en ce que** ledit dispositif (24) est monté de manière à pouvoir coulisser sur l'élément d'étanchéité (14) de telle sorte que ladite au moins une ouverture (20) du dispositif (24) peut être ouverte et fermée par coulissement du dispositif (24) vers l'avant et l'arrière par rapport à l'élément d'étanchéité (14).

8. Contenant de fluide (12), **caractérisé en ce qu'**il comprend un dispositif (24) selon la revendication 6 ou 7.



PRIOR ART

Fig. 1

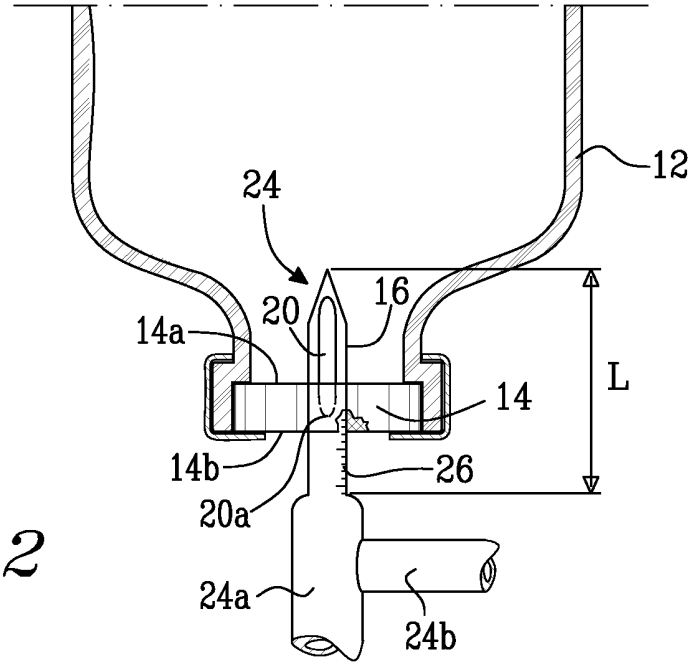


Fig. 2

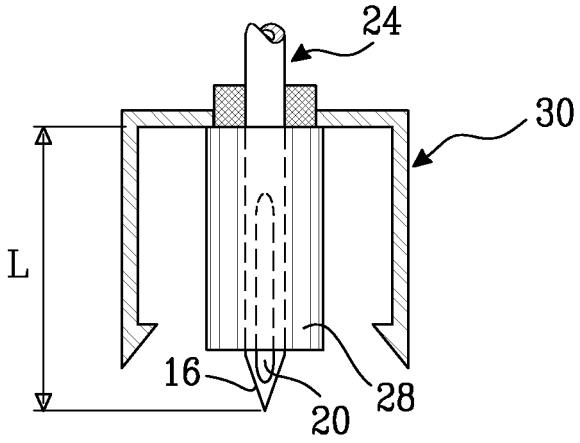


Fig.3

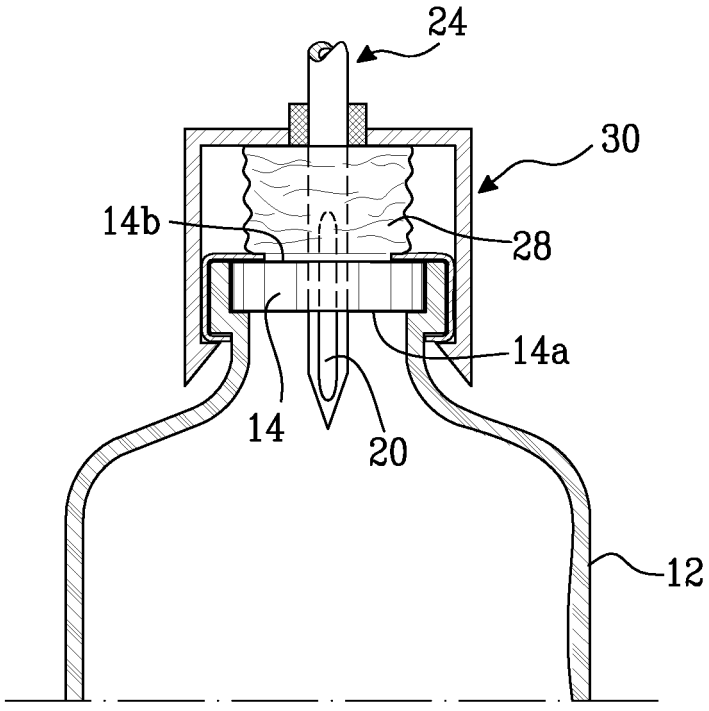


Fig.4

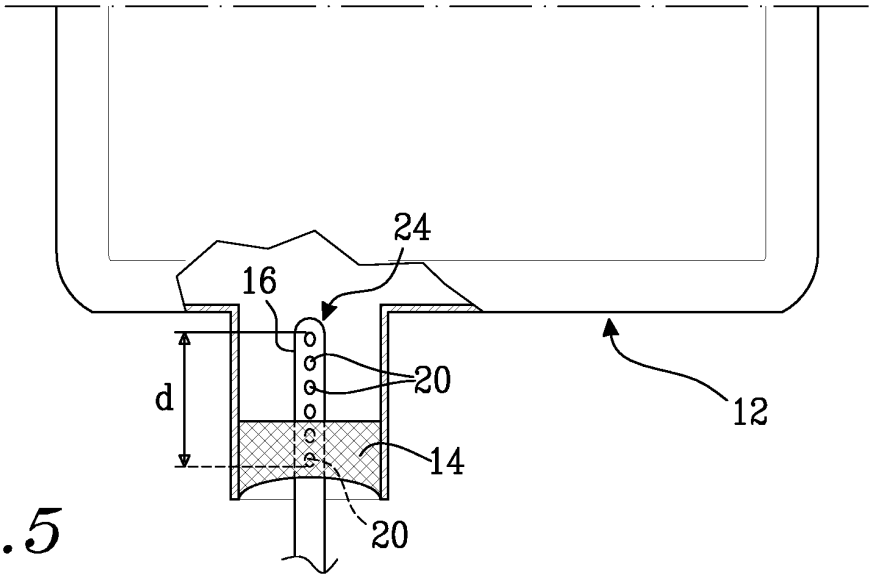


Fig.5

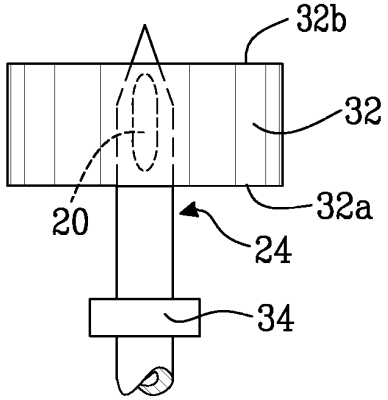


Fig.6

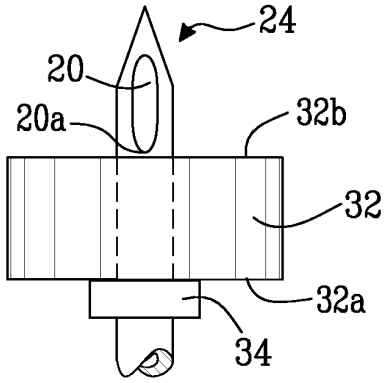


Fig.7

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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