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(54) **Cseppkamra szellőztető szeleppel**

The present invention relates to a drip chamber for an infusion set for delivering an infusion and/or medicament liquid to a patient, according to the precharacterising clause of Claim 1. Such a drip chamber, or such a diffuser, is described in US 2009/259 199 A1 and US 5 242 424 A.

Drip chambers, and diffusion sets having drip chambers, have been known for a long time in the prior art. A drip chamber is in this case used to avoid transfer of gas bubbles into the bloodstream of the patient. To this end, it is necessary for the drip chamber to have a corresponding liquid level in its drip chamber volume. Such a level is established at the start of the infusion and is also to be re-established when changing an infusion or working on the infusion set before resuming the infusion, in order to avoid serious harm to the patient.

In the case of known drip chambers for infusion sets, there are two types to distinguish between. On the one hand, drip chambers for simple applications without side lines are sometimes configured in such a way that they can be inserted directly into an infusion container, and to this end have a puncture needle connected directly to the drip chamber. In such cases, direct return venting through a second puncture needle is known.

On the other hand, in the prior art there are drip chambers which are connected via a tube, optionally with connectors lying in between, and finally through a puncture needle to an infusion container. In such infusion sets, the drip chamber is generally configured so as to be flexible, so that after closure of the patient connection it is possible to press back from the drip chamber into the infusion by compressing the drip chamber, and the drip chamber volume made free during release is at least partially filled with infusion liquid. This entails the risk that, if the patient connection is not closed, air or infusion is brought under pressure into the bloodstream of the patient, and in other regards it is also relatively complicated since, particularly in the case of longer feed tubes, air can be pressed back from the drip chamber into the infusion only with difficulty, and when the drip chamber is released only very little infusion liquid is sucked into the drip chamber, but instead initially the air still lying in the feed tube returns into the drip chamber.

It is therefore an object of the present invention to improve a drip chamber of the type mentioned in the introduction, in such a way that air and/or waste gases can be removed reliably, rapidly and simply from it and collected, and the liquid level in the drip chamber can be brought to the normal

or desired level by refilling with infusion liquid, and also the initial filling of the drip chamber and of the line tube can be carried out simply, reliably and rapidly.

This object is achieved by a drip chamber according to Claim 1. Dependent Claims 2 to 12 specify advantageous refinements.

According to the invention, a flexible balloon is provided for receiving the waste gases and/or aerosols emerging through the at least one passage opening. Such a venting gas involves, for example, gases which evaporate from the infusion solution or aerosols of the infusion solution, although these may at least for the most part already be retained by a 0.2 µ hydrophobic filter.

Such a balloon is therefore to be fastened in such a way that the venting gases usually occurring are collected reliably in this balloon. To this end, it is advantageously connected circumferentially and gas-tightly to the upper end of the drip chamber. In this case, the control elements may also be arranged inside the flexible balloon and nevertheless operable from the outside. This allows a particularly simple embodiment of the venting valve, together with ensuring full collection of the venting gases. If the balloon becomes hard in such an arrangement, then further operation may sometimes no longer be possible. In such a case, the venting valve is closed automatically.

In order to use such a flexible balloon, a pipe or a tube is initially fastened to a sleeve at the feed tube connection, the connection for a feed tube being provided on the sleeve. In such an arrangement, the balloon is fixed to the sleeve, so that the balloon is then fixed at its lower end for example on the upper end of the drip chamber and is fastened to the sleeve at another point. This prevents the balloon from migrating around the vicinity, and instead offers it a predefined position. This prevents disturbance by a loosely fitted balloon flapping around. Furthermore, the security of the balloon against rupture is thereby also improved because of the restriction of its movement.

The drip chamber, and an infusion set for delivering an infusion and/or medicament liquid to a patient, have a feed tube connection arranged at the upper end of the drip chamber for connecting a feed tube, and an outlet tube connector arranged at a lower end of the drip chamber for connecting an outlet tube. The feed tube is generally provided, optionally via connectors lying in between, with a puncture needle for insertion into an infusion container. The outlet tube connection generally has at the end a possibility for connecting it to an infusion cannula. To this

end, a patient connection is generally provided. Arranged lying between them, there are usually further elements, such as taps or flow regulators.

The drip chamber is distinguished in that at least one passage opening is formed at the upper end of the drip chamber. Such a passage opening allows a gas flow from a drip chamber volume lying inside the drip chamber outwards. Furthermore, a venting valve is provided at the upper end of the drip chamber for applying gas to and/or releasing gas from the latter. The venting valve comprises a resilient closure element for automatic closure of the at least one passage opening. In this way, the passage opening is closed in the resting state, and there is precisely no gas passage between the drip chamber volume and the balloon in the resting state. Furthermore, the venting valve comprises for example control wings for manual and elastic deformation of the closure element with at least partial uncovering of the at least one passage opening. The closure elements can be deformed by the control elements in such a way that the passage opening is at least partially uncovered. In this way, by operation of the control wings and the deformation of the closure element caused thereby, it is possible to achieve opening of the passage opening. More precisely, the passage opening per se is always a passage opening. Rather, it is blocked by the closure element and uncovered by operation of the control wings and the elastic deformation of the closure element. The blocking need not in this case be carried out by closing the passage openings directly at the end of the passage openings. What is important is merely that the connection of the passage openings to the balloon is interrupted by the closure element.

Advantageously, an in particular circumferential venting channel is formed, which is connected to the passage openings so that connection of the passage openings to the balloon during opening, mediated via the venting channel, is made possible independently of the geometry of the deformation. With such a configuration, the venting valve comprises a venting channel which is also formed in the resting state and is connected to the passage openings. It is advantageously configured circumferentially, so that connection between the passage openings and the venting channel is ensured even in the event of rotation of the venting valve. This venting channel is sealed from the surroundings by the closure element in the resting state. The passage openings are thereby closed, and their connection to the balloon is interrupted. By the elastic deformation of the closure element during opening, the seal is broken and the venting channel is connected to the balloon.

By the choice of two control elements, it is possible to prevent the need to hold the drip chamber, usually hanging freely from tubes, firmly during operation, or the drip chamber moving away under the force exerted on only one control element and therefore making operation more difficult.

By an arrangement according to the invention, which is technically simple to produce, at the upper end of the drip chamber, it is possible to form a drip chamber which is closed in the resting state and is re-closed automatically by itself, but which is simple to apply gas to and/or release gases from. The choice of control wings allows particularly simple operation. Automatic closure is advantageous since the patient safety can thereby be increased.

When such a drip chamber is used for the first time and connected to an infusion container, the venting valve may be kept open by operating the control wings, and while it is being kept open infusion liquid can then flow into the drip chamber and into the outlet tube. Once the outlet tube is filled and a desired liquid level is reached in the drip chamber, closure of the venting valve can be achieved by simple release of the control wings and the infusion set, or the drip chamber, can thereby be put into the state ready for use.

If the liquid level in the drip chamber volume falls below a desired amount, venting and simultaneous replenishing of infusion liquid can be achieved by simple operation of the control wings. Conversely, however, it is also conceivable for air to be brought into the drip chamber through the venting valve.

Advantageously, the venting valve is configured according to Claim 2 in such a way that the control wings can be moved towards one another by two fingers with manual elastic deformation for at least partial release of the at least one passage opening. In such an embodiment, the control wings may be operated simply with two fingers and at least partial uncovering of the passage opening can thereby be achieved.

Advantageously, at least two, in particular four, passage openings are provided according to Claim 3. Advantageously, the passage openings are arranged on a circle around the feed tube connection, which is in general likewise configured circularly. This, in particular with the choice of an annular resilient closure element, in particular according to Claim 4, allows particularly easy opening of the venting valve and particularly reliable closure thereof. In this case, the control elements and the

venting valve in the resting state are advantageously arranged in such a way that the control elements lie respectively on a line starting from the middle of the feed tube connection through one of the passage openings.

This allows particularly simple configuration of the closure element and particularly reliable opening and closing, or uncovering and blocking, of the passage openings.

Furthermore, it has the advantage that venting is possible even in the event of obstruction of a passage opening.

Preferably, the closure element is configured annularly according to Claim 4 and arranged concentrically around the feed connection. The symmetrical configuration allows particularly simple handling and production.

Advantageously, the control wings are arranged according to Claim 5 extending radially outward starting from the closure element. In this case, in the resting state, they advantageously make an angle of at least 40° and less than 180°, in particular an angle of 120°. Such an arrangement of the control wings allows particularly simple and intuitive operation of the control wings with two fingers.

An arrangement of the control wings directed radially outwards does not, however, mean that the control wings have to be thin and straightly configured elements. Rather, they may also be configured in a rounded fashion and finally merging into the annular closure element. What is important is merely that an imaginary line through their longitudinal extent makes this angular dimension.

Advantageously, according to Claim 6, the venting valve comprises an annular fastening section for form-fit engagement in an annular indentation, which is concentric with the feed connection, provided at the upper end of the drip chamber. In this case, the fastening section may be formed by a part of the closure element.

Such a configuration of a section of the venting valve offers the advantage of being able to connect the venting valve to the upper end of the drip chamber in a simple way.

Furthermore, such an annular configuration of a fastening section, which is in particular configured so as to be resilient, allows particularly reliable functioning of the venting valve since, when the venting valve is opened, it is jointly deformed and therefore likewise contributes to the restoring force.

The fastening section may therefore also act as a closing and/or sealing section.

Advantageously, according to Claim 7, a securing element for securing the closure element is provided, and is arranged above and directly adjacent to the closure element. In such a case, the closure element has at least one gas recess on an upper end adjacent to the securing element. The air, or the corresponding gas, emerging from the passage openings and passed through the venting valve emerges from the arrangement through such a gas recess. It is likewise possible to provide such gas outlet recesses at other positions. The configuration described here is, however, an embodiment which is particularly simple to form.

According to Claim 8, a filter membrane is advantageous arranged between the drip chamber volume and the at least one passage opening. Such an arrangement prevents liquid from emerging through the venting valve, in particular when the drip chamber needs to be turned or tilted for some reason.

Advantageously, a 0.2 µ hydrophobic filter membrane having an effective filtration area of advantageously from 50 to 120 mm^2, in particular 85 m^2, is used as the filter membrane. If such a filtration area is effectively to be provided, a volume which has a corresponding contact area with the filter membrane must be provided between the filter membrane and the passage openings, which are generally configured to be relatively small.

Advantageously, according to Claim 9, an outlet filter, for example a filter fabric having a mesh width of from 5 to 15 µ, in particular of 15 µ, is provided between the drip chamber volume and the outlet connection. To this end, a PA (polyimide) filter fabric is advantageously used. As an alternative, a hydrophilic PES (polyethersulfone) filter may be used.

Providing such a filter fabric on the outlet side prevents particles from the drip chamber from entering the outlet connection and therefore reaching the outlet tube and the patient connection.

By the use of a hydrophilic PES, dry-running protection of the drip chamber can be achieved by its special hydrophilic property.

Advantageously, according to Claim 10, the upper end of the drip chamber is formed from ABS (acrylonitrile butadiene styrene copolymer) and the lower part of the drip chamber, i.e. the part which is arranged below the upper end, is formed from PP/SEB (polypropylene/styrene-ethylene butylene-styrene copolymer).

Such a choice of material has proven particularly favourable and advantageous in practical use.

Advantageously, according to Claim 11, the closure element is formed from silicone. The choice of silicon allows particularly simple production and a reliable restoring force, and not too great a resistance during operation, or the deformation of the closure element.

Advantageously, according to Claim 12, the balloon is formed from PE (polyethylene) and the sleeve is formed from ABS.

Other advantages and possible embodiments will be described by way of example in the purely schematically figures.

In the figures, in detail:

Figure 1 shows a view of an infusion set with a main line and a side line;

Figure 2 shows the assembly of a drip chamber;

Figure 3 shows a venting valve;

Figure 4 shows an upper end of a drip chamber with a venting valve;

Figure 5 shows a view from above of an upper end of a drip chamber with a venting valve in the open state;

Figure 6 shows two cross sections through a drip chamber with a balloon; and

Figure 7 shows a cross section through an upper part of a drip chamber.

Figure 1 shows a view of an infusion set 27 having a main line and a side line. A puncture needle 16 is in each case inserted into two infusion containers 15 arranged above. The right-hand infusion container 15 and the right-hand insertion needle 16 in Figure 1 are assigned to the main line. Downstream underneath, they are followed by a main line tube 17 and various connectors 28. A side line tube is fed to one such connector 28. The side line tube in this case comes from the left-hand infusion container and the left-hand insertion needle 16. After the main and side lines have been combined, the infusion set 27 opens into a feed tube connection of a drip chamber 1. This connection is arranged on an upper part 24 of the drip chamber 1. There, there is also a venting valve 3. Below the upper part 24 of the drip chamber 1, there is a lower part 25 of the drip chamber 1. The lower part 25 of the drip chamber 1 and an upper part 24 of the drip chamber 1 enclose a drip space volume 26. An outlet tube connection 21 is arranged in the lower region of the lower part 25. Downstream thereof, arranged on the outlet tube 23, there are a flow regulator 18 and a patient connection 19.

The infusion can now pass from the infusion container through the tubes into the drip chamber 1. There, it is possible to ensure that no air enters the outlet tube 23, and therefore the patient.

Figure 2 shows in its Figures a, b and c, the assembly or structure of parts of a drip chamber 1 according to the invention. Figure 2a shows an assembled drip chamber 1 according to the invention comprising an outlet tube 21, which is arranged on the lower region of a lower part 25 of the drip chamber 1. Enclosed by the lower part of the drip chamber 25 and an upper part 24 of the drip chamber 1, there is a drip chamber volume 26. A venting valve 3, secured by a securing element 8, is arranged on the upper part 24 of the drip chamber 1. There is furthermore a feed tube connection 20 there.

Figure 2c shows the individual components in a dismantled state. The lower part 25 of the drip chamber, and a hydrophilic outlet filter 11 to be fitted 15 underneath in the drip chamber can be seen. Furthermore, a 0.2 µ hydrophobic filter 10 and the upper part 24 of the drip chamber 1 are shown. Likewise represented separately are the venting valve 3 and the securing disc 8.

Figure 2b shows a section through a substantially dismantled drip chamber 1. The lower part 25 of the drip chamber 1, in which the outlet filter 11 is arranged in front of the outlet tube connection 21, can be seen in the left-hand region. Two passage openings 2 can be seen on the upper part 24 of the drip chamber 1. These passage openings have a common enlarged collection space, which is adjacent to the filter 10, in order to use the filter surface as effectively as possible. Further on, the passage openings 2 are narrowed. Indentations 7, into which a fastening section 6 of the venting valve 3 can be inserted, can furthermore be seen. The upper part 24 of the drip chamber furthermore comprises a feed-through, opening into the feed tube connection 20, for the infusion. This feed-through extends through the hole present in the filter 10 so that the infusion, which is introduced into the drip chamber through a feed tube and the feed tube connection, does not have to pass through the filter 10 but can flow through the hole provided therein.

The venting valve comprises a fastening section 6, which can be introduced with a form fit into the annular indentation 7 provided on the upper part 24. By means of this, the venting valve 3 can be fastened to the upper part 24. Furthermore, the venting valve 3 comprises a resilient closure element 4, which in the resting state blocks the passage openings 2. A control wing 5 can furthermore be seen on the venting valve 3. Represented next to it is the securing element 8, which is configured as a disc and is used for further fastening of the venting valve 3.

Figure 3 shows a detailed view of the venting valve 3. First, two wings 5 can be seen. These are arranged as radial projections on an annular closure element 4. The annular closure element 4 comprises two gas outlet recesses 9. The venting valve furthermore comprises an annular fastening section 6. In the resting state of the venting valve 3 as shown here, the resilient closure element 4 is annular. When the two control wings 5 are compressed, i.e. moved towards one another, the resilient closure element 4 is thereby deformed. By means of this, the passage openings 2 are uncovered.

Figure 4 shows the installation of a venting valve 3 of Figure 3 in a drip chamber 1 according to the invention. A small section of the lower part 25, which is adjoined by an upper part 24, can be seen. The upper element 24 comprises an annular indentation 7. The annular fastening section 6 of the venting valve 3 is inserted into this indentation 7. The venting valve 3 is in this case arranged concentrically around a feed tube connection 20. A part of the annular closure element 4, as well as the two control wings 5, can be seen. The venting valve 3 is furthermore secured by means of a securing element 8 likewise arranged concentrically with the feed tube connection 20. This securing element 8 furthermore clamps a feed tube 22 on the feed tube connection connection 20.

Figure 5 shows the arrangement of Figure 4, but from above and without the securing element 8 and the feed tube 22. Furthermore, in Figure 5 the venting valve 3 is not in the resting state but in the opened state. To this end, the control wings 5 are moved towards one another. This has led to a deformation of the closure element 4. In this way, the closure element 4 has uncovered the passage openings 2. Gas can now flow into or out of drip space volume through them. So that the gas can flow unimpeded even when the securing element 8 is fitted on, the gas outlet recesses are provided. These are likewise distorted relative to the representations in Figure 3 by the actuation of the control wings 5. The annular fastening section 6, which is likewise slightly deformed, can also be seen in Figure 5. By such a deformation during actuation of the control wings 5, the annular fastening section can likewise be reinforced to the restoring force, which is otherwise exerted above all by the annular closure element. A part of the indentation 7 can also be seen because of the deformation of the annular fastening element..

When the control wings 5 are released, the annular closure element 4 returns automatically back into its original annular shape arranged concentrically around the feed-through tube connection 20, and thereby closes the passage openings 2. The annular fastening element in this case also returns to its original annular shape, likewise arranged concentrically around the feed tube connection 20.

Figure 6 shows two cross-sectional views of a drip chamber according to the invention with a balloon. Figure 6a shows it in the delivery state with a substantially emptied balloon, and Figure 6b shows it with a filled balloon.

In Figure 6a, it can be seen that a balloon 12 is fitted on the upper part 24 of the drip chamber 1 in the outer circumference. On the feed tube connection, there is furthermore a fastened tube 13 to

which a sleeve 14 is in turn fastened. This sleeve 14 is configured in such a way that a feed tube 22 can be fastened to it. The balloon 12 is furthermore fastened to the sleeve 14. A venting valve in the resting state, which closes two passage openings 2 in the upper part 24 of the drip chamber 1, can furthermore be seen. Likewise shown are a filter 10 as well as an outlet filter and an outlet tube connection 21. Enclosed by a lower part 25 and an upper part 24, there is a drip chamber volume 26.

Figure 6b shows the arrangement of Figure 6a but with the venting valve 3 opened and the balloon 12 substantially filled. It can be seen that the venting valve is shown in the opened estate, so that the annular closure element 4 is not blocking the two passage openings 2 and gas can flow between the balloon and the drip chamber volume.

In this case, it can be seen that any gas which filters through the 0.2 µ hydrophobic filter membrane and flows through the passage openings 2 is collected in the balloon 12. This is ensured in that the balloon 12 is not fastened to the venting valve 3 but is connected directly to the upper part 24.

Fig. 7 shows a cross section through an upper part 24. A securing element 8, the feed connection 22, a closure element 4 with a fastening section 6, and a hydrophobic filter 10, passage openings 2, an annular indentation 7, a gas outlet recess 9 and the venting channel 29 can be seen.

In the resting state, the closure element 4 seals with a small interruption at the level of the circumferential venting channel 29. In this case, its lower section is simultaneously used as a fastening section 6. The drip chamber volume is in communication via the hydrophobic filter 10 with the passage openings 2, which open into the circumferential venting channel 29. In the resting state, this channel is sealed from the surroundings by the closure element 29, which seals as described above.

The closure element 4, which is secured by the securing element 8, comprises gas outlet recesses 9 over a few angular ranges on its upper end.

When the closure element is elastically deformed in order to open the venting valve, the circumferential venting channel 29 is brought into communication with at least one gas outlet recess 9, so that gas from the interior of the drip chamber can be exchanged with the surroundings

through the hydrophobic filter 10, the passage openings 2 and the venting channel 29, as well as the space provided by the elastic deformation and the gas outlet recesses 9. Gas can thus be applied to and removed from the drip chamber.

Other refinements, which may be adapted to the respective application case, may be found easily by the person skilled in the art.

List of References

1	Drip chamber	16	Insertion needle
2	Passage opening	17	Main line tube
3	Venting valve	18	Flow regulator
4	Resilient closure element	19	Patient connection
5	Control wing	20	Feed tube connection
6	Fastening section	21	Outlet tube connection
7	Indentation	22	Feed tube
8	Securing element	23	Outlet tube
9	Gas outlet recess	24	Upper part
10	Hydrophobic filter membrane	25	Lower part
11	Hydrophilic outlet filter	26	Drip chamber volume
12	Flexible balloon	27	Infusion set
13	Tube	28	Connector
14	Sleeve	29	Circumferential venting channel
15	Infusion container		

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SZABADALMI IGÉNYPONTOK

CSEPPKAMRA SZELLŐZTETŐ SZELEPPEL

1. Cseppkamra (1) egy infúziós eszközhöz (27) egy infúziós- és/vagy gyógyszerfolyadék páciensnek történő adagolására, amelynek van egy, a cseppkamra egy felső végénél (24) elrendezett bevezető tömlőcsatlakozása (20) és egy, a cseppkamra egy alsó végénél elrendezett kimeneti tömlőcsatlakozása (21), ahol a cseppkamra (1) felső végénél (24) legalább egy átömlőnyílás (2) van kialakítva, és a cseppkamra (1) levegőztetésére vagy levegőtlenítésére, a felső részén (24) tartalmaz egy levegőztető szelepet (3), és a levegőztető szelep (3) magába foglal egy rugalmas záróelemet (4) a legalább egy átömlőnyílás (2) automatikus elzárására, és két oldalsó szárnyat (5) a záróelem (4) kézi rugalmas alakítására, mialatt az átömlőnyílás (2) legalább részben szabadon válik, azzal jellemezve, hogy a cseppkamra (1) felső végén (24) egy flexibilis ballon (12) van elrendezve a legalább egy átömlőnyíláson (2) keresztül kilépő leszellőző gáz felfogására, és hogy a bevezető tömlőcsatlakozáson (20) egy cső vagy tömlő (13) egy hüvely (14) segítségével egy bevezető tömlőhöz (22) van csatlakoztatva, és a ballon (12) a hüvelyhez (14) van rögzítve.

2. Az 1. igénypont szerinti cseppkamra (1), azzal jellemezve, hogy a szellőztető szelep (3) úgy van kialakítva, hogy az oldalsó szárnyak (5) két ujjal a kézi rugalmasan deformálással az átömlőnyílás (2) legalább részben való szabaddá tételére összenyomhatóak.

3. Az előző igénypontok egyike szerinti cseppkamra (1), azzal jellemezve, hogy legalább kettő, előnyösen négy átömlőnyílás (2) van kialakítva.

4. A 3. igénypont szerinti cseppkamra (1), azzal jellemezve, hogy a záróelem (4) gyűrűszerűen van kialakítva és a bevezető tömlőcsatlakozás (20) körül koncentrikusan van elrendezve.

5. Az 5. igénypont szerinti cseppkamra (1), azzal jellemezve, hogy az oldalsó szárnyak (5) a záróelemtől (4) sugárirányban kifelé, előnyösen legalább 40° de legfeljebb 180°-ban terjednek ki.

6. Az előző igénypontok egyike szerinti cseppkamra (1), azzal jellemezve, hogy a szellőztető szelep (3) tartalmaz egy gyűrűszerű rögzítő részt (6) egy, a cseppkamra (1) felső

végén (24) található gyűrű alakú és egy, a bevezető tömlőcsatlakozással (20) koncentrikusan kialakított mélyedéssel (7) való alakzáró összekapcsolódásához.

7. Az előző igénypontok egyike szerinti cseppkamra (1), azzal jellemezve, hogy a szellőztető szelep (3) biztosítására tartalmaz egy biztosító elemet (8) a záróelem (4) fölött és követlen mellett, és a záróelem (4) egy felső biztosítóelemmel (8) határolt végén legalább egy gázkivezető nyílással (9) van ellátva.

8. Az előző igénypontok egyike szerinti cseppkamra (1), azzal jellemezve, hogy egy egy legalább 85 mm^2 szűrőfelülettel rendelkező szűrőmembrán (10), előnyösen 0,2µ hidrofób szűrőmembrán (10) van a legalább egy átömlőnyílás (2) és a cseppkamra tér (26) között beépítve.

9. Az előző igénypontok egyike szerinti cseppkamra (1), azzal jellemezve, hogy a cseppkamra tér (26) és a kimeneti csatlakozó (21) között egy előnyösen PA (Poliamid) vagy hidrofil PES (Poliétersziilfon) szűrőszövetből kialakított kimeneti szűrő (11) van kialakítva.

10. Az előző igénypontok egyike szerinti cseppkamra (1), azzal jellemezve, hogy a felső vég (24) egy ABS (Akrilnitril-butadién-sztirol kopolimerből) és a felső vég (24) alatt elrendezett részen (25) PP/SEB (Polipropilén/Sztirol-etilén-butilén-sztirol kopolimerből) áll.

11. Az előző igénypontok egyike szerinti cseppkamra (1), azzal jellemezve, hogy a rugalmas csatlakozóelem (4) szilikonból van.

12. Az 1. igénypont szerinti cseppkamra (1), azzal jellemezve, hogy a ballon PE (polietilénből) és a hüvely (14) ABS-ből áll.

A meghatalmazott:

Mészárosné Dénes Katalin
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EP 2 399 621 B1

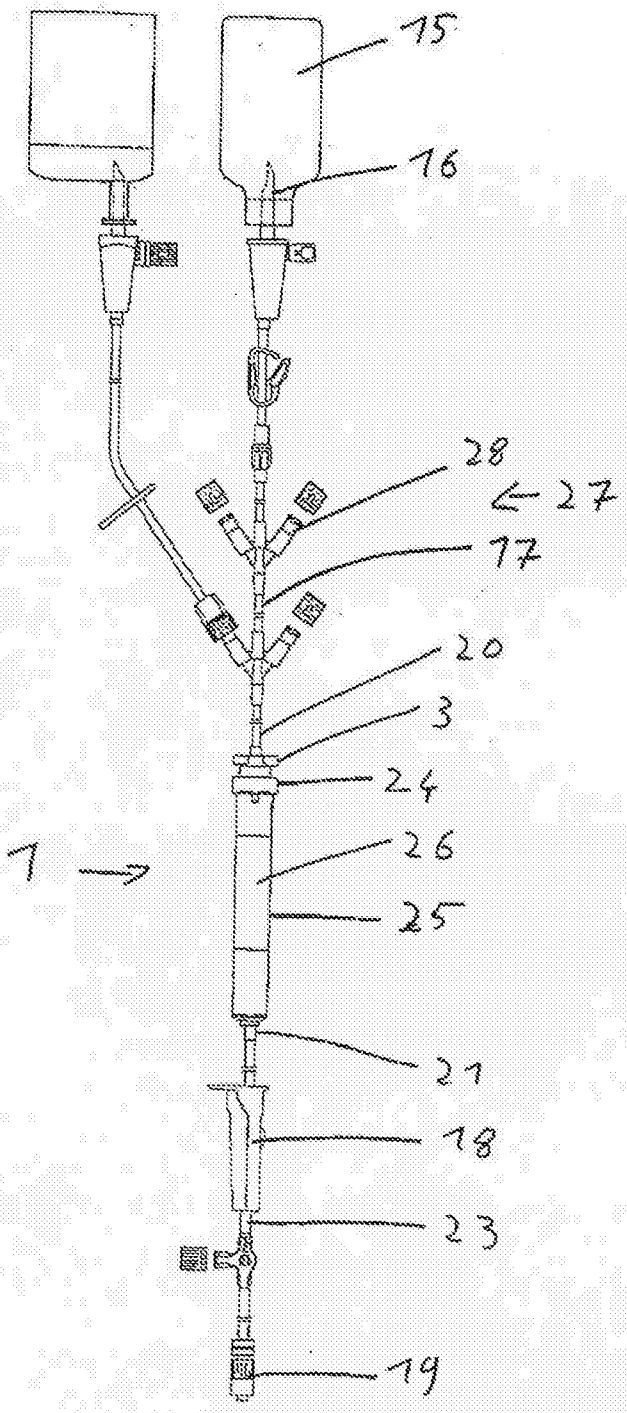

Fig. 1

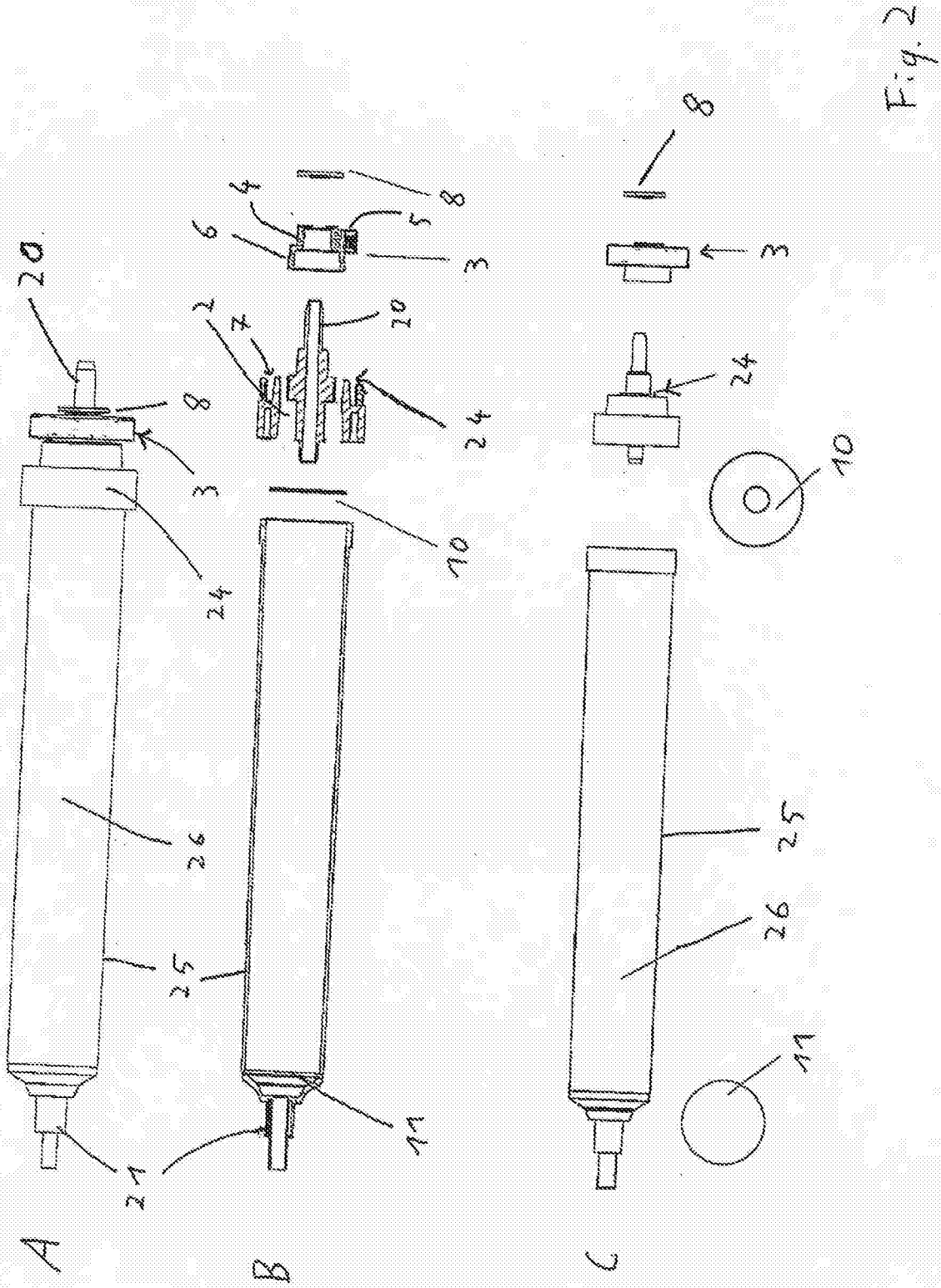

Fig. 2

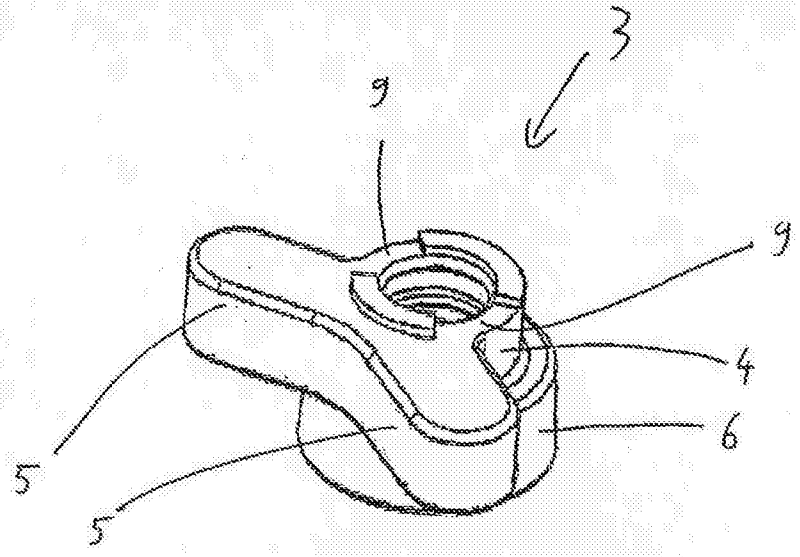

Fig. 3

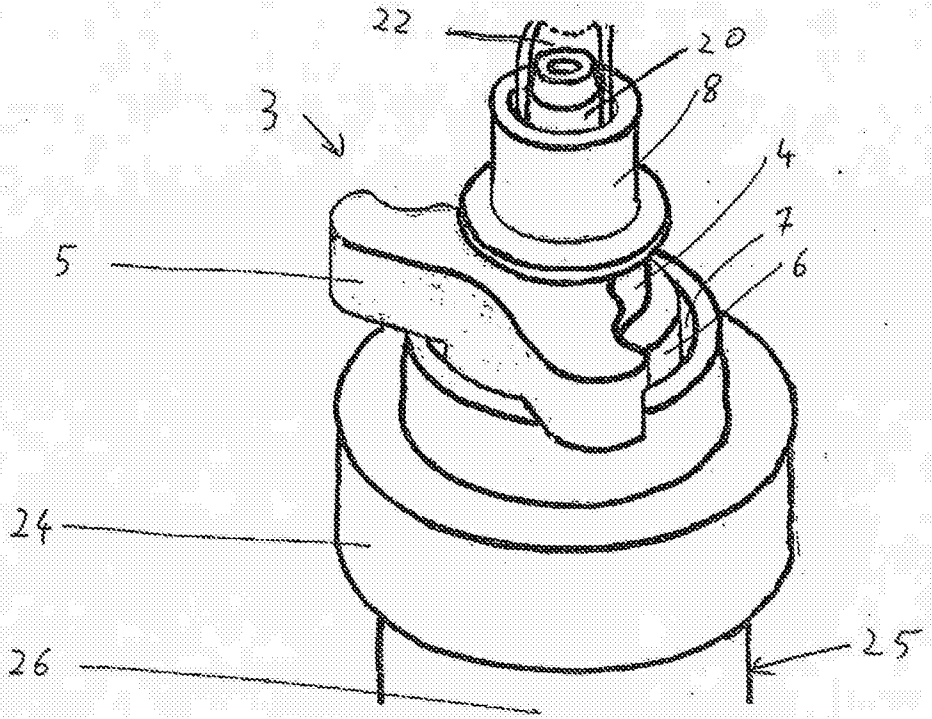

Fig. 4

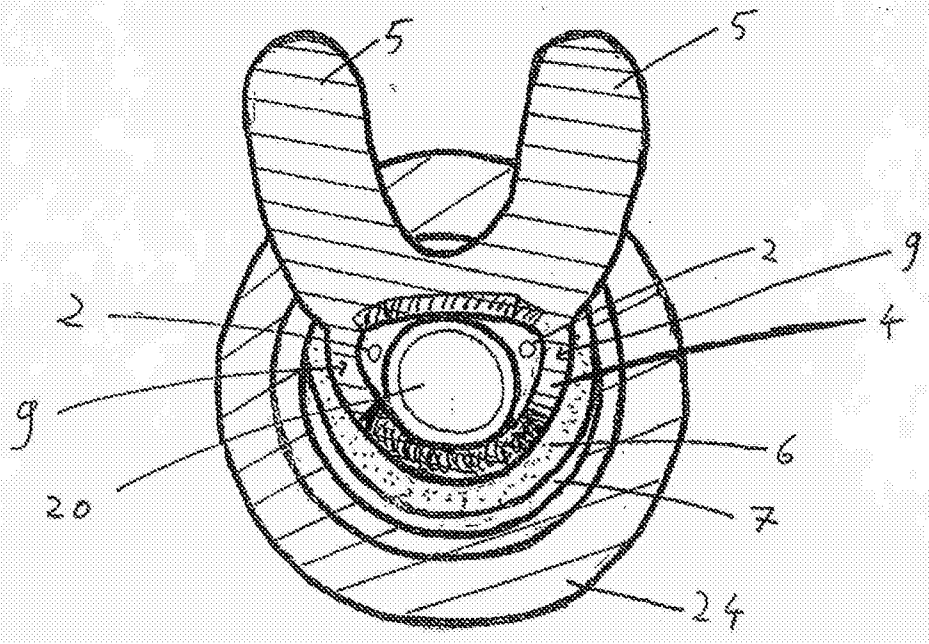

Fig. 5

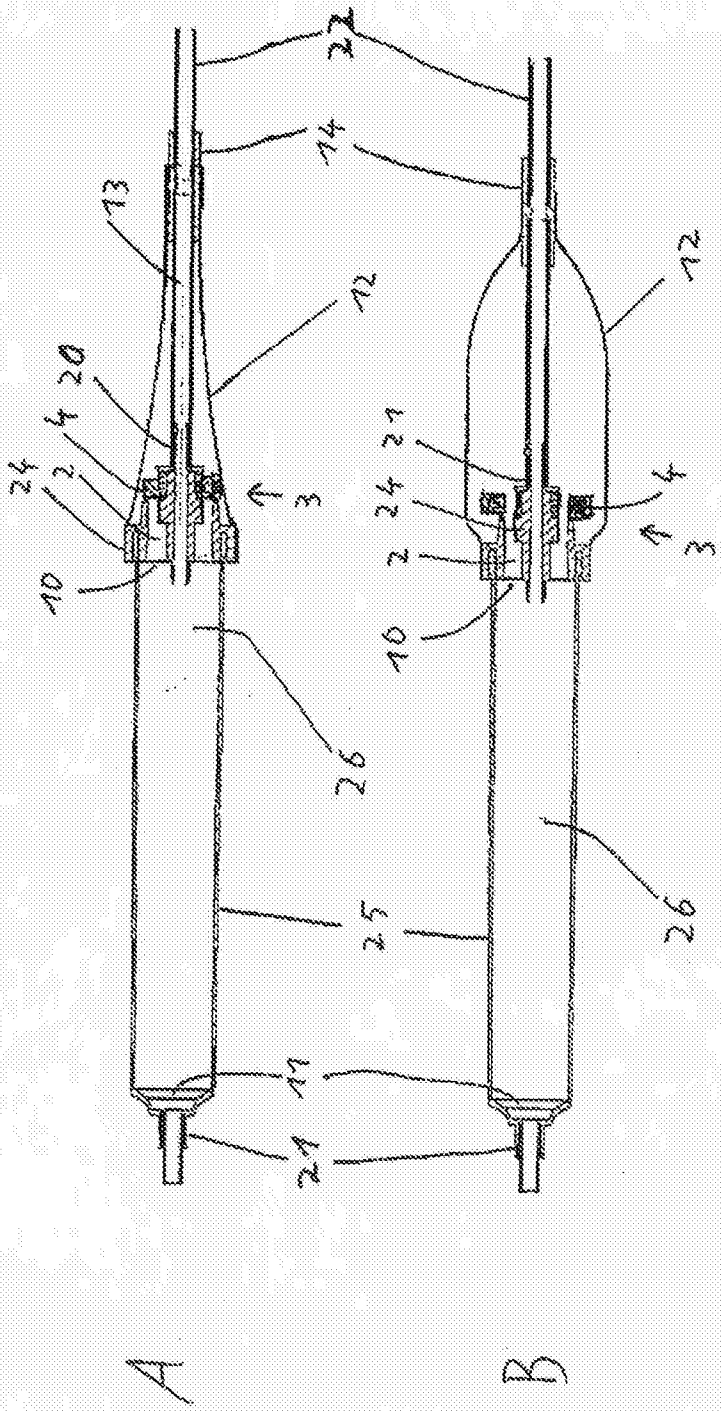

Fig. 6

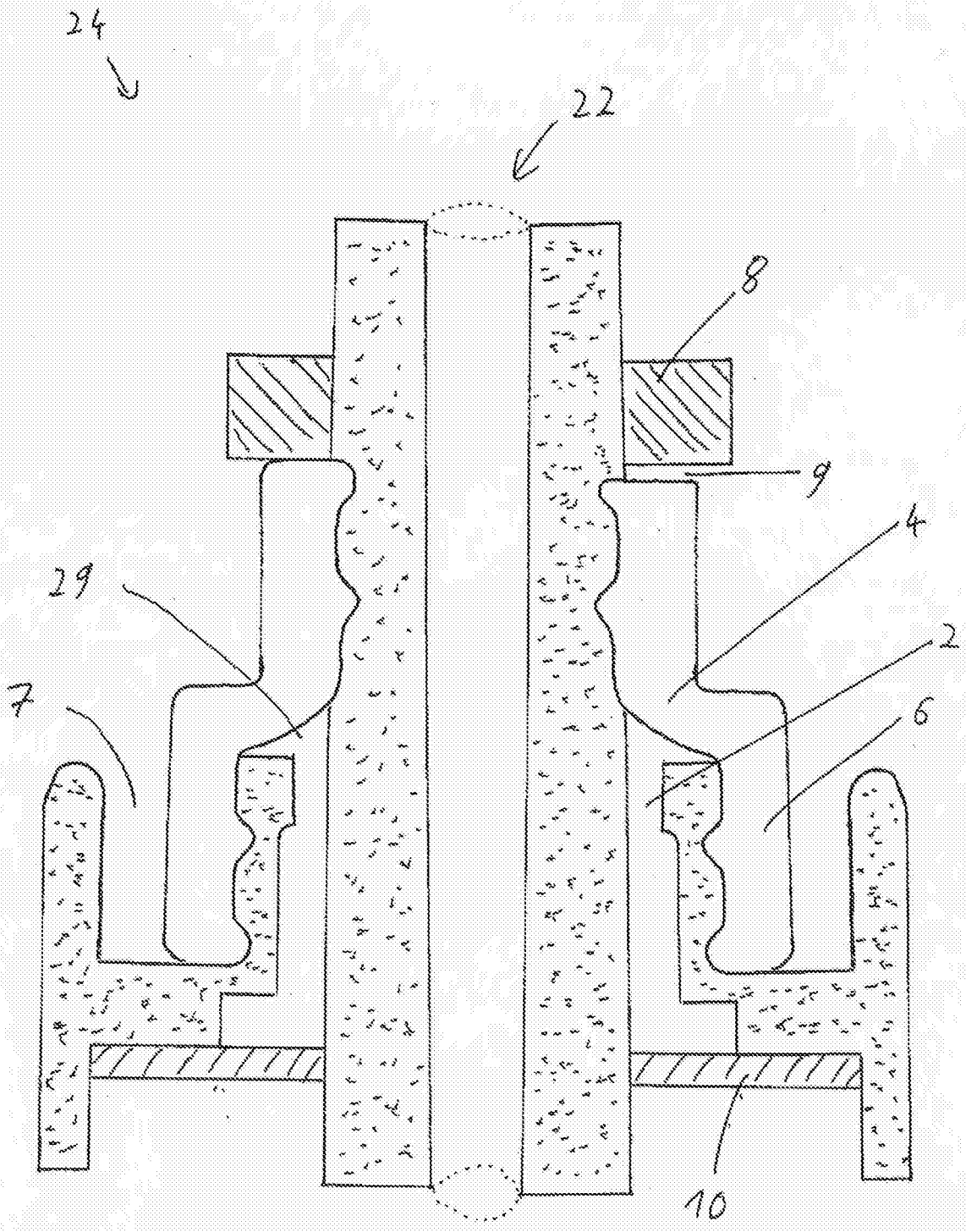

Fig. 7