

(19)



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(11)

EP 0 779 477 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:

27.03.2002 Bulletin 2002/13

(51) Int Cl.7: **F24D 3/10**

(21) Application number: **96203476.5**

(22) Date of filing: **09.12.1996**

(54) **Expansion vessel**

Ausdehnungsgefäß

Vase d'expansion

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB IE IT LI LU NL PT SE

(30) Priority: **15.12.1995 NL 1001915**

(43) Date of publication of application:
18.06.1997 Bulletin 1997/25

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(56) References cited:
EP-A- 0 602 430 **DE-U- 8 507 701**
DE-U- 8 507 703

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Description

[0001] The invention relates to an expansion vessel according to the preamble of claim 1.

[0002] Such an expansion vessel is known from EP-A-0 602 430.

[0003] The known expansion vessel is used in open pipe systems with a heating unit, for example for tap water for the kitchen or shower, in which the expansion vessel takes care of the change in volume of the water which is the result of the water being heated by the heating unit. Water flows, if water is drawn off, from the supply pipe through the first conduit in the through-flow means into the liquid chamber of the expansion vessel and through the second conduit in the through-flow means out of the liquid chamber, such that the liquid chamber is flown-through.

[0004] The known expansion vessel has the drawback that one of the first and second conduits is formed by a pipe extending axially into the expansion vessel, almost over the entire height thereof. This pipe limits the movements of the dividing means in the form of a balloon-shaped membrane and may damage this membrane.

[0005] The object of the invention is to provide an expansion vessel of the abovementioned type, of which the liquid chamber can be completely flown-through but which does not have the abovementioned drawback.

[0006] This object is achieved by an expansion vessel of claim 1.

[0007] The first conduit and the second conduit débouche at a relatively large distance from each other so that the through-flow through the liquid chamber is excellent and no areas with stagnant water can occur. The shape of the inner part of the through-flow means is such that the membrane will not be damaged.

[0008] Preferred embodiments of the expansion vessel according to the invention are described in subclaims 2 to 12.

[0009] The invention will be explained in greater detail in the description below of a preferred embodiment of the expansion vessel with reference to the drawing, in which:

Fig. 1 shows a section of an expansion vessel according to the invention provided with a connecting piece, when the liquid chamber is filled with water; Fig. 2 shows the connecting part of the expansion vessel of Fig. 1 on an enlarged scale;

Fig. 3 shows a section of the connecting part of the expansion vessel according to the invention shown in Fig. 2, along the line III-III in Fig. 2;

Fig. 4 shows a perspective view of the individual parts of a preferred embodiment of the through-flow means of the expansion vessel of Fig. 1;

Fig. 5 shows a diagrammatic illustration of a tap water pipe system provided with a heating unit and an expansion vessel according to the invention;

Fig. 6 shows a section corresponding to that of Fig. 1 when the membrane is resting against the through-flow means and the inside of the expansion vessel.

[0010] Fig. 1 shows a preferred embodiment of the expansion vessel according to the invention, comprising a housing formed by two parts, a top part 1 with a connecting nipple 3, by means of which the expansion vessel can be connected to a pipe system, and a bottom part 2 with a gas filling aperture 4, and a dividing means formed by a membrane 6 which is clamped between the top part 1 and the bottom part 2 by means of a clamping ring 5. This produces an expansion vessel with a gas chamber 8 and a liquid chamber 9 separated therefrom by means of the membrane 6. The expansion vessel according to the invention also comprises a through-flow means 9a, which is fitted at the position of the connecting nipple 3. Said through-flow means 9a has two conduits 10 and 11, of which one conduit, depending on the direction of flow of the medium in the pipe system, is the inflow conduit, while the other conduit is the outflow conduit. At the ends of the through-flow means 9a, which lie at a distance from each other in the expansion vessel, apertures through which medium can flow are provided. A connecting piece 12 is fitted on the connecting nipple 3.

[0011] Figs. 2 and 3 show the connecting part of the expansion vessel of Fig. 1 on an enlarged scale. The connecting piece 12 has two conduits 34, 35, which connect to the conduit 10 and the conduit 11 of the through-flow means 9a. The through-flow means 9a is composed essentially of two parts, a bush 13 and an inner part 7. The bush 13 is inserted through the connecting nipple 3, and on the inside of the expansion vessel is inserted into an aperture 16 of the inner part 7. The bush 13 and the inner part 7 are immovably connected to each other. For this purpose, according to the preferred embodiment, the bush 13 has two projections 14, 15 which are elastically movable in a plane through the axis of the bush. For the connection to the bush 13 in the aperture 16, the inner part 7 has two recesses 17, 18 which correspond to the movable projections 14, 15. In the preferred embodiment, the movable projections 14, 15 hook behind edges 19, 20 in the recesses 17, 18.

[0012] As can also be seen in Fig. 4, the bush 13 is essentially cylindrical and has at one end a flanged edge 21 with apertures. At the other end, the end face of the bush 13 is closed, and an aperture 22 is provided on the periphery of the bush 13. The axis of the aperture 22 is at right angles to the plane of the movable projections 14, 15. Diametrically opposite the aperture 22, the bush 13 has a wall 36.

[0013] When the bush 13 is inserted through the connecting nipple 3, the flanged edge 21 rests on the edge of the connecting nipple 3. The bush 13 is placed in such a way that it is coaxial with the connecting nipple 3, and is held in this position by spacing lugs 23 on the periph-

ery of the bush. In this way, two concentric connecting conduits 24, 25 are formed in the connecting nipple 3.

[0014] According to a preferred embodiment, the inner part 7 is composed of two parts (see Fig. 4): a main part 26, which rests against the inside of the top part 1 of the housing, and a wall part 27. These parts can be mass-produced in self-releasing moulds and are expediently made of plastic.

[0015] In the preferred embodiment, the main part 26 and the wall part 27 are connected to each other by means of a snap closure. Said snap closure extends in the lengthwise direction on the outside of the wall part 27 and on the inside of the main part 26. The main part 26 has two wings 28, 29 extending in the lengthwise direction, and preferably in the centre has the aperture 16 with the recesses 17, 18 for the accommodation of the projections 14, 15 of the bush 13. The main part 26 has two ends 31, 32, which in the preferred embodiment are scoop-shaped and have apertures through which a medium can flow.

[0016] Assembling the main part 26 and the wall part 27 produces the inner part 7, in which a conduit extending in the lengthwise direction is formed. The contour of the inner part 7 along the wings 28, 29 and the scoop-shaped ends 31, 32 connects accurately to the inside of the top part 1 of the housing, with the result that a conduit 33 is formed between the inner part 7 and the top part 1 of the housing (see Fig. 3).

[0017] The through-flow means 9a is assembled by inserting the bush 13 through the connecting nipple 3 and into the aperture 16 of the inner part 7. The wall 36 divides the conduit of the inner part 7, extending in the lengthwise direction, into two parts. In this case, the movable projections 14, 15 also serve as positioning lugs, in order to ensure that the connecting conduit 25 in the connecting nipple 3 opens out by way of aperture 22 in the bush 13 into a part of the conduit of the inner part 7 extending in the lengthwise direction, so that the conduit 11 is formed.

[0018] The fact that the bush 13 with the end inserted into the aperture 16 has a wall 36 means that a connection is produced between the other part of the conduit of the inner part 7 extending in the lengthwise direction and the connecting conduit 24 formed between the bush 13 and the connecting nipple 3, so that the conduit 10 is formed.

[0019] The mode of operation of the expansion vessel according to the invention will be explained below.

[0020] Fig. 5 shows diagrammatically a tap water pipe system with a supply pipe 43, to which an expansion vessel according to the invention, indicated by 40, is connected. The water is heated up by means of a heating unit 42. Hot water can be drawn from a tap 41. A non-return valve 44 is incorporated in the supply pipe.

[0021] If the volume of water in the tap water pipe system changes, for example as the result of the water being heated by the heating unit 42, and the tap 41 is closed, the water flows from the heating unit 42 to the

expansion vessel 40, since the non-return valve 44 prevents return flow into the supply pipe 43. The state of the expansion vessel is then as shown in Fig. 1. The water flows by way of the conduit 35 of the connecting piece 12 through the conduit 10 - which is acting as an inflow conduit - of the through-flow means 9a into the liquid chamber 9 of the expansion vessel. The water here flows through the apertures in the scoop-shaped end 32. Said apertures are positioned in such a way that the water flows into the liquid chamber 9 in different directions.

[0022] The change in volume of the water is taken care of by movement of the membrane 6, in which case the gas in the gas chamber 8 is compressed until the pressure in the gas chamber 8 is equal to the pressure in the tap water pipe system.

[0023] When the tap 41 is opened, the pressure in the tap water pipe system drops quickly. This pressure is lower than the pressure in the gas chamber 8 of the expansion vessel 40. The water in the expansion vessel 40 is consequently forced by way of the conduit 10 - which is now acting as an outflow conduit - and conduit 35 of the connecting piece 12 to the heating unit 42. Water also flows from the supply pipe 43 by way of the conduit 34 of the connecting piece 12 through the conduit 11 - which is now acting as an inflow conduit - to the scoop-shaped end 31. From there, the water flows by way of the apertures in the scoop-shaped end 31 into the liquid chamber 9. The apertures are positioned in such a way that the water flows into the liquid chamber 9 in different directions. The water then flows from the liquid chamber 9 by way of the apertures in the scoop-shaped end 32, the conduit 10 and the conduit 35 to the heating unit 42. Consequently the liquid chamber 9 is completely flown through and no areas with stagnant water occur. Some of the water flowing in from the supply pipe 43 will flow from the scoop-shaped end 31, by way of the conduit 33 formed between the inner part 7 and the inside of the top part 1 of the housing, to the scoop-shaped end 32.

[0024] When the tap 41 is opened and the pressure in the tap water pipe system drops so low that the membrane 6 rests against the inner part 7 and the inside wall of the top part 1 of the housing (a situation which is shown in Fig. 6), the apertures in the scoop-shaped end 31 are shut off by the membrane 6 resting against the inner part 7. The water then flows only by way of the conduit 33 to the scoop-shaped end 32 and by way of the conduit 10 and the conduit 35 of the connecting piece 12 to the heating unit 42. Here again, the expansion vessel is completely flown through. The shape of the inner part 7 is such that when the membrane 6 rests against the inner part 7 and the inside of the top part 1 it forms no angles which are smaller than preferably 120°.

[0025] Expansion vessels with other dividing means - such as, for example, a piston - for separating a gas chamber and a liquid chamber can also be improved by

fitting a through-flow means according to the invention in the expansion vessel.

Claims

1. Expansion vessel with a liquid chamber (9) and a gas chamber (8), which are separated from each other by a dividing means (6), which expansion vessel has one connecting nipple (3), by means of which the liquid chamber (9) can be connected to a pipe system, at the position of the connecting nipple (3) a through-flow means (9a) being fitted in the expansion vessel, having at least one first conduit (10) and at least one second conduit (11) which is essentially separated from the first conduit, the first conduit (10) and the second conduit (11) opening into the liquid chamber (9) of the expansion vessel at a distance from each other, **characterized in that** the first conduit (10) and the second conduit (11) are both formed by an elongate inner part (7) of the through-flow means (9a) extending diametrically inside the liquid chamber (9), the first conduit (10) and the second conduit (11) extending from a central region of the inner part (7) located near the connecting nipple (3) to the ends of the inner part (7) in diametrically opposite directions.
2. Expansion vessel according to claim 1, **characterized in that** the inner part (7) of the through-flow means (9a) forms at least one third conduit (33), which connects the ends of the first conduit (10) and the second conduit (11) directly to each other.
3. Expansion vessel according to claim 1 or 2, **characterized in that** the first conduit (10) and the second conduit (11) each open through several apertures in the through-flow means (9a) into the liquid chamber (9).
4. Expansion vessel according to claims 1 - 3, **characterized in that** the through-flow means (9a) is composed essentially of two separate parts, a bush (13) which projects through the connecting nipple (3), and the inner part (7) which is connected to the bush (13).
5. Expansion vessel according to claim 4, **characterized in that** the bush (13) in the connecting nipple (3) forms a first connecting conduit (24) and a second connecting conduit (25).
6. Expansion vessel according to claim 4 or 5, **characterized in that** the inner part (7) has one conduit which is divided by the bush (13) into two conduit parts which are separate from each other and which form the first conduit (10) and the second conduit (11) of the through-flow means (9a), the one conduit

part being connected to the first connecting conduit (24) in the connecting nipple (3), and the other conduit part being connected to the second connecting conduit (25) in the connecting nipple (3).

7. Expansion vessel according to one of claims 4 - 6, **characterized in that** the first connecting conduit (24) formed by the bush (13) in the connecting nipple (3) is essentially concentric with the second connecting conduit (25) formed by the bush (13) in the connecting nipple (3).
8. Expansion vessel according to one of claims 4 - 7, **characterized in that** the bush (13) projects into an aperture (16) in the inner part (7), and in a plane through its axis is provided with movable projections (14, 15) which fit into corresponding recesses (17, 18) made in the aperture (16) in the inner part (7), and by means of which the bush (13) is fixed to the inner part (7) of the through-flow means (9a).
9. Expansion vessel according to one of claims 1 - 8, **characterized in that** the inner part (7) is composed of two parts (26, 27), each of which forms a part of the wall of the conduit in the inner part (7), and which are connected to each other by means of a snap connection extending in the lengthwise direction of the inner part (7).
10. Expansion vessel according to one of claims 1 - 9, **characterized in that** a connecting piece (12) is mounted on the connecting nipple (3), for connecting the expansion vessel to a pipe system.
11. Expansion vessel according to claim 10, **characterized in that** the connecting piece (12) has on the inside two conduits (34, 35) which are separate from each other and each connect to a connecting conduit (24, 25) formed by the bush (13) in the connecting nipple (3) of the expansion vessel.
12. Expansion vessel according to claim 10 or 11, **characterized in that** the connecting piece (12) is in the form of a T-piece.

Patentansprüche

1. Ausdehnungsgefäß mit einer Flüssigkeitskammer (9) und einer Gaskammer (8), wobei die betreffenden Kammern durch eine Trenneinrichtung (6) voneinander getrennt sind, wobei das Ausdehnungsgefäß einen Anschlußstutzen (3) aufweist, durch den die Flüssigkeitskammer (9) mit einem Rohrleitungssystem verbunden werden kann, und wobei in der Position des Anschlußstutzens (3) eine Durchflußeinrichtung (9a) in dem Ausdehnungsgefäß angebracht ist, die

zumindest eine erste Rohrleitung (10) und zumindest eine zweite Rohrleitung (11) aufweist, die von der ersten Rohrleitung im wesentlichen getrennt ist, wobei die erste Rohrleitung (10) und die zweite Rohrleitung (11) in der Flüssigkeitskammer (9) des Ausdehnungsgefäßes in einem Abstand voneinander offen sind,

dadurch gekennzeichnet, dass die erste Rohrleitung (10) und die zweite Rohrleitung (11) beide durch ein längliches inneres Teil (7) der Durchflußeinrichtung (9a) gebildet sind, das sich diametral in der Flüssigkeitskammer (9) erstreckt, und dass die erste Rohrleitung (10) und die zweite Rohrleitung (11) sich von einem mittleren Bereich des inneren Teiles (7), der nahe des Anschlußstutzens (3) angeordnet ist, zu den Enden des inneren Teiles (7) in diametral gegenüberliegenden Richtungen erstrecken.

2. Ausdehnungsgefäß nach Anspruch 1, **dadurch gekennzeichnet, dass** der innere Teil (7) der Durchflußeinrichtung (9a) zumindest eine dritte Rohrleitung (33) bildet, welche die Enden der ersten Rohrleitung (10) und der zweiten Rohrleitung (11) direkt miteinander verbindet.

3. Ausdehnungsgefäß nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die erste Rohrleitung (10) und die zweite Rohrleitung (11) jeweils über mehrere Öffnungen in der Durchflußeinrichtung (9a) zu der Flüssigkeitskammer (9) hin offen sind.

4. Ausdehnungsgefäß nach den Ansprüchen 1 bis 3, **dadurch gekennzeichnet, dass** die Durchflußeinrichtung (9a) im wesentlichen aus zwei gesonderten Teilen besteht, einer Büchse (13), die durch den Anschlußstutzen (3) ragt, und dem inneren Teil (7), der mit der Büchse (13) verbunden ist.

5. Ausdehnungsgefäß nach Anspruch 4, **dadurch gekennzeichnet, dass** die Büchse ((13) in dem Anschlußstutzen (3) eine erste Verbindungsrohrleitung (24) und eine zweite Verbindungsrohrleitung (25) bildet.

6. Ausdehnungsgefäß nach Anspruch 4 oder 5, **dadurch gekennzeichnet, dass** der innere Teil (7) eine Rohrleitung aufweist, die durch die Büchse (13) in zwei Rohrleitungsteile aufgeteilt ist, welche voneinander getrennt sind und welche die erste Rohrleitung (10) und die zweite Rohrleitung (11) der Durchflußeinrichtung (9a) bilden, dass der eine Rohrleitungsteil mit der ersten Verbindungsrohrleitung (24) in dem Anschlußstutzen (3) verbunden ist und dass der andere Rohrleitungsteil mit der zweiten Verbindungsrohrleitung (25) in dem Anschlußstutzen (3) verbunden ist.

7. Ausdehnungsgefäß nach einem der Ansprüche 4 bis 6,

dadurch gekennzeichnet, dass die erste Verbindungsrohrleitung (24), die durch die Büchse (13) in dem Verbindungsstutzen (3) gebildet ist, im wesentlichen konzentrisch zu der zweiten Verbindungsrohrleitung (25) vorgesehen ist, die durch die Büchse (13) in dem Anschlußstutzen (3) gebildet ist.

8. Ausdehnungsgefäß nach einem der Ansprüche 4 bis 7,

dadurch gekennzeichnet, dass die Büchse (13) in eine Öffnung (16) in dem inneren Teil (7) hineinragt und in einer Ebene durch ihre Achse mit bewegbaren Vorsprüngen (14, 15) versehen ist, die in entsprechende Ausnehmungen (17, 18) passen, welche in der Öffnung (16) in dem inneren Teil (7) gebildet sind,

und dass Einrichtungen vorgesehen sind, durch die die Büchse (13) an dem inneren Teil (7) der Durchflußeinrichtung (9a) befestigt ist.

9. Ausdehnungsgefäß nach einem der Ansprüche 1 bis 8,

dadurch gekennzeichnet, dass der innere Teil (7) aus zwei Teilen (26, 27) besteht, deren jedes ein Teil der Wand der Rohrleitung in dem inneren Teil (7) bildet und die mittels einer Schnappverbindung miteinander verbunden sind, welche sich in Längsrichtung des inneren Teiles (7) erstreckt.

10. Ausdehnungsgefäß nach einem der Ansprüche 1 bis 9,

dadurch gekennzeichnet, dass ein Anschlußstück (12) an dem Anschlußstutzen (3) angebracht ist für den Anschluß des Ausdehnungsgefäßes an ein Rohrleitungssystem.

11. Ausdehnungsgefäß nach Anspruch 10, **dadurch gekennzeichnet, dass** das Anschlußstück (12) in der Innenseite zwei Rohrleitungen (34, 35) aufweist, die voneinander getrennt sind und die jeweils mit einer durch die Büchse (13) in dem Anschlußstutzen (3) des Ausdehnungsgefäßes gebildeten Verbindungsrohrleitung (24, 25) verbunden sind.

12. Ausdehnungsgefäß nach Anspruch 10 oder 11, **dadurch gekennzeichnet, dass** das Anschlußstück (12) in Form eines T-Stückes vorliegt.

Revendications

1. Récipient d'expansion comportant une chambre à liquide (9) et une chambre à gaz (8), qui sont mu-

- tuellement séparées par un moyen de division (6), le récipient d'expansion comportant un embout de raccordement (3), au moyen duquel la chambre à liquide (9) peut être raccordée à un système de tuyauterie, à l'endroit de l'embout de raccordement (3), des moyens de passage de fluide (9a) étant enfoncé dans le récipient d'expansion, ayant au moins un premier conduit (10) et au moins un second conduit (11) qui est sensiblement séparé du premier conduit, le premier conduit (10) et le second conduit (11) débouchant dans la chambre à liquide (9) du récipient d'expansion à une certaine distance mutuelle, **caractérisé par le fait que** le premier conduit (10) et le second conduit (11) sont tous les deux constitués par une partie intérieure allongée (7) des moyens de passage de fluide (9a) s'étendant diamétralement à l'intérieur de la chambre à liquide (9), le premier conduit (10) et le second conduit (11) s'étendant depuis une région centrale de la partie intérieure (7) située près de l'embout de raccordement (3) jusqu'aux extrémités de la partie intérieure (7) dans des directions diamétralement opposées.
2. Récipient d'expansion selon la revendication 1, **caractérisé par le fait que** la partie intérieure (7) des moyens de passage de fluide (9a) forme au moins un troisième conduit (33), qui directement relie mutuellement les extrémités du premier conduit (10) et du second conduit (11).
3. Récipient d'expansion selon la revendication 1 ou 2, **caractérisé par le fait que** le premier conduit (10) et le second conduit (11) débouchent chacun par plusieurs ouvertures dans le moyen de passage de fluide (9a) dans la chambre à liquide (9).
4. Récipient d'expansion selon l'une des revendications 1 à 3, **caractérisé par le fait que** les moyens de passage de fluide (9a) sont essentiellement constitués de deux parties séparées, une bague (13) qui fait saillie à travers l'embout de raccordement (3), et la partie intérieure (7) qui est reliée à la bague (13).
5. Récipient d'expansion selon la revendication 4, **caractérisé par le fait que** la bague (13) dans l'embout de raccordement (3) forme un premier conduit de raccordement (24) et un second conduit de raccordement (25).
6. Récipient d'expansion selon la revendication 4 ou 5, **caractérisé par le fait que** la partie intérieure (7) comporte un conduit qui est divisé par la bague (13) en deux parties de conduit qui sont mutuellement séparées et qui forment le premier conduit (10) et le second conduit (11) des moyens de passage de fluide (9a), l'une des parties de conduit étant reliée au premier conduit de raccordement (24) dans l'em-
- bout de raccordement (3), et l'autre partie de conduit étant reliée au second conduit de raccordement (25) dans l'embout de raccordement (3).
7. Récipient d'expansion selon l'une des revendications 4 à 6, **caractérisé par le fait que** le premier conduit de raccordement (24) formé par la bague (13) dans l'embout de raccordement (3) est sensiblement concentrique avec le second conduit de raccordement (25) formé par la bague (13) dans l'embout de raccordement (3).
8. Récipient d'expansion selon l'une des revendications 4 à 7, **caractérisé par le fait que** la bague (13) fait saillie dans une ouverture (16) dans la partie intérieure (7), et dans un plan à travers son axe comporte des saillies mobiles (14, 15) qui s'adaptent dans des cavités correspondantes (17, 18) faites dans l'ouverture (16) dans la partie intérieure (7), et au moyen desquelles la bague (13) est fixée à la partie intérieure (7) des moyens de passage de fluide (9a).
9. Récipient d'expansion selon l'une des revendications 1 à 8, **caractérisé par le fait que** la partie intérieure (7) est composée de deux parties (26, 27), chacune constituant une partie de la cloison du conduit dans la partie intérieure (7), et qui sont mutuellement reliées au moyen d'une connexion à encliquetage s'étendant dans la direction longitudinale de la partie intérieure (7).
10. Récipient d'expansion selon l'une des revendications 1 à 9, **caractérisé par le fait qu'une** pièce de raccordement (12) est montée sur l'embout de raccordement (3), pour raccorder le récipient d'expansion à un système de tuyauterie.
11. Récipient d'expansion selon la revendication 10, **caractérisé par le fait que** la pièce de raccordement (12) comporte intérieurement deux conduits (34, 35) qui sont mutuellement séparés et sont chacun reliés à un conduit de raccordement (24, 25) formé par la bague (13) dans l'embout de raccordement (3) du récipient d'expansion.
12. Récipient d'expansion selon l'une des revendications 10 et 11, **caractérisé par le fait que** la pièce de raccordement (12) est en forme de T.

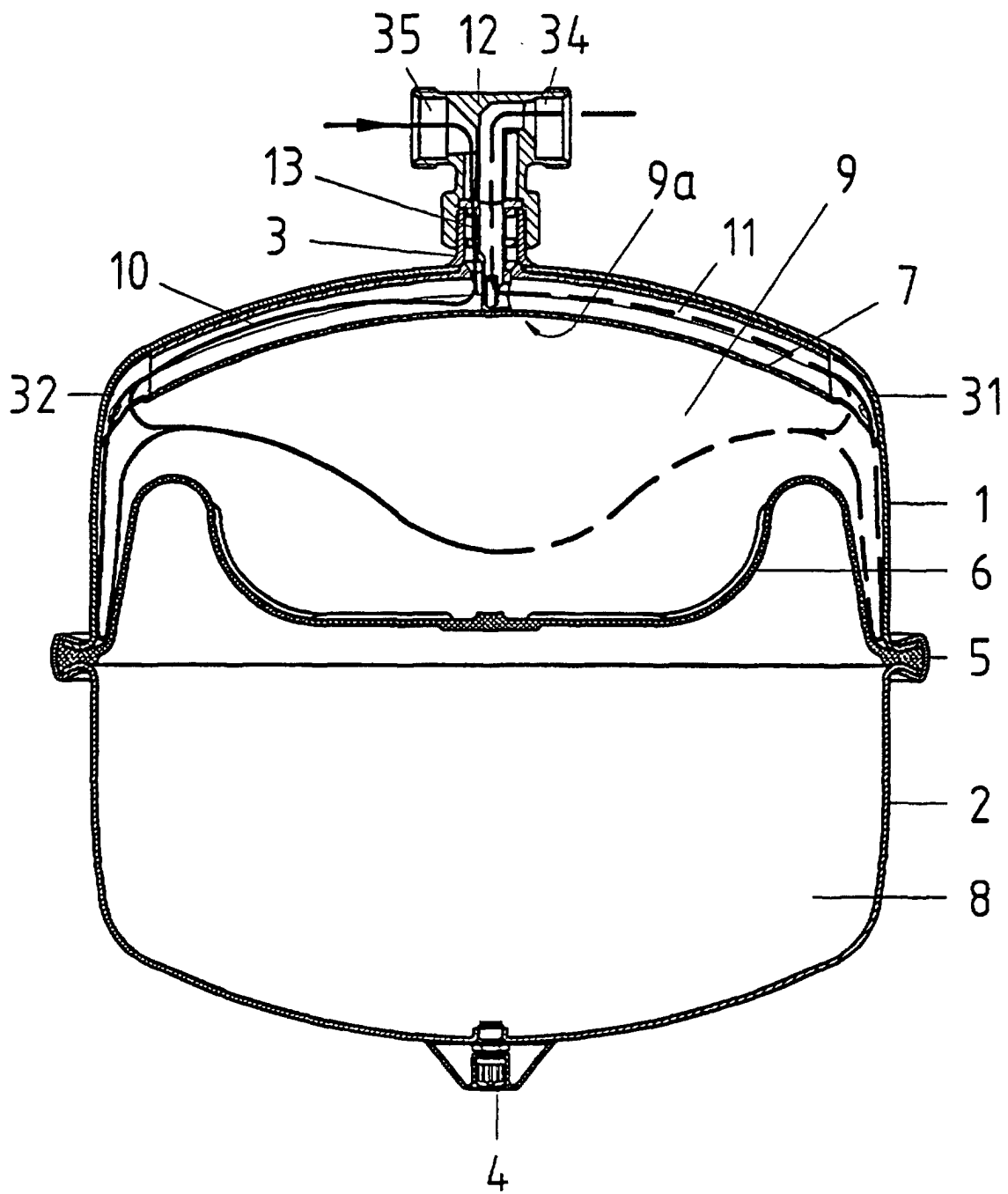


FIG. 1

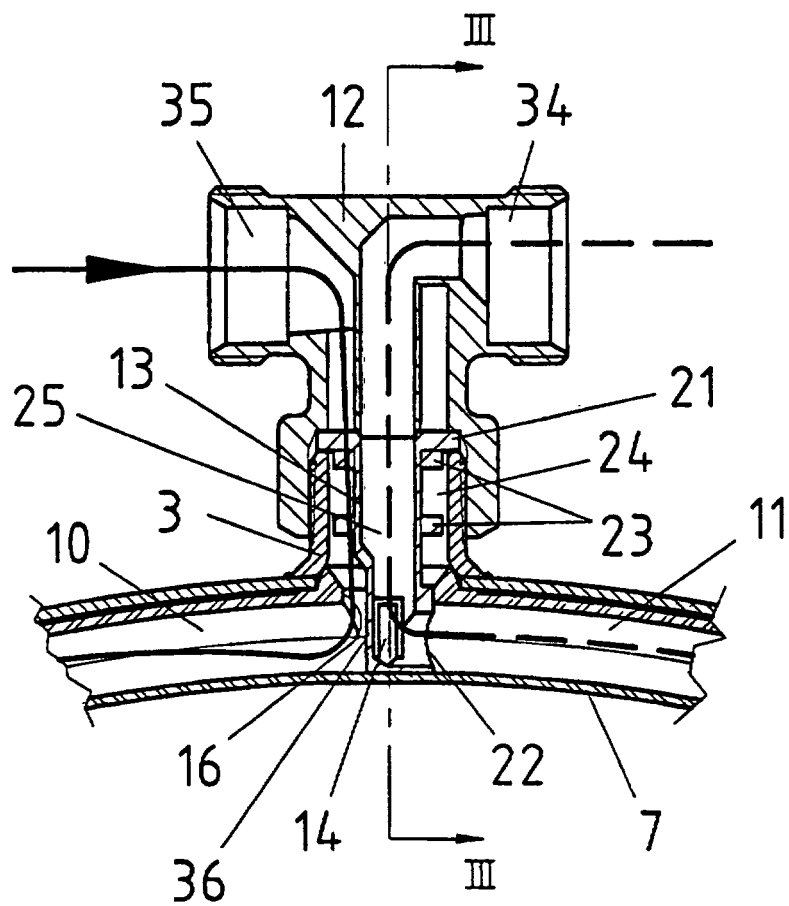


FIG. 2

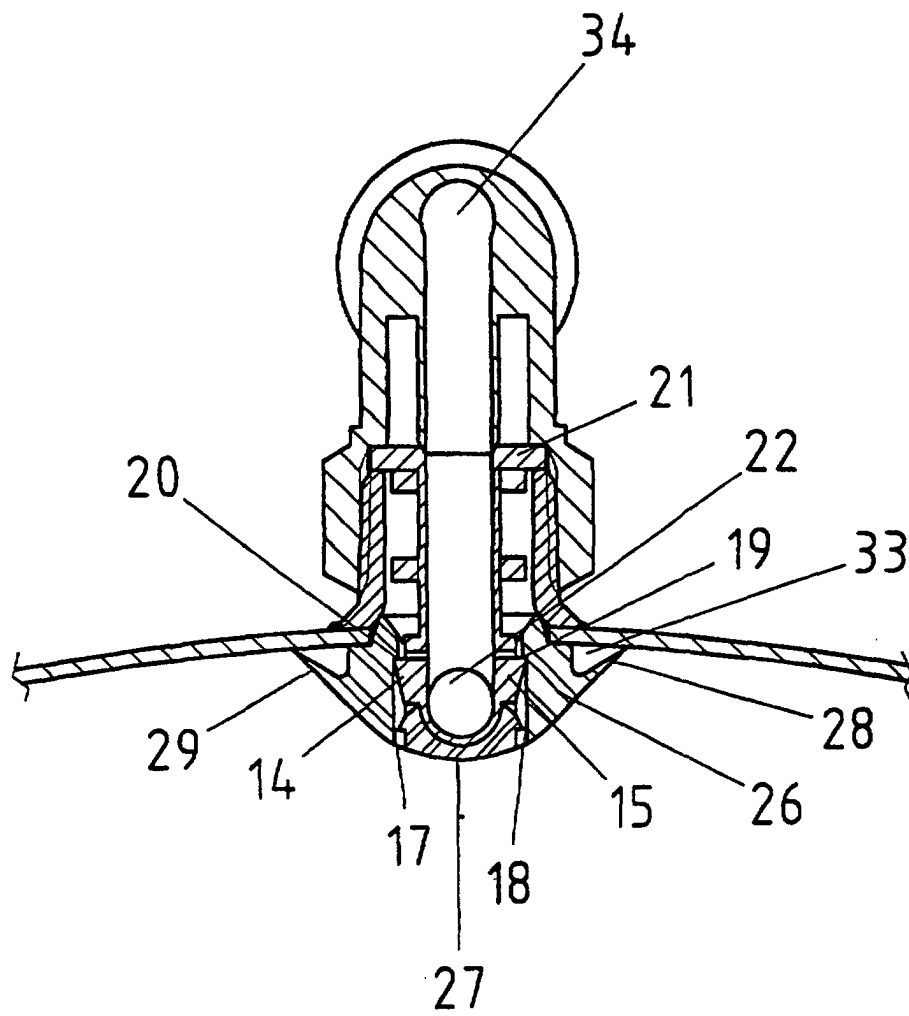


FIG. 3

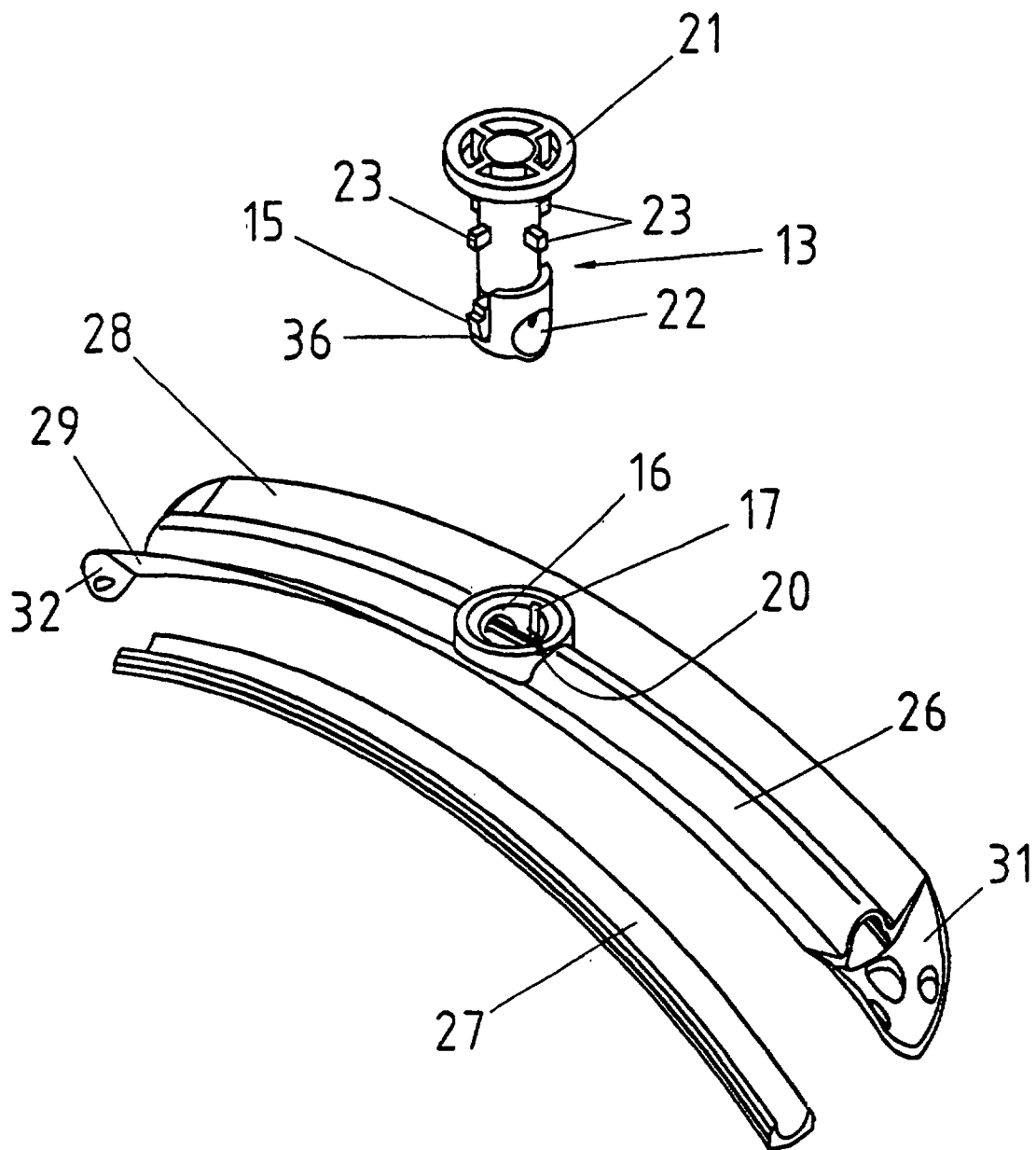


FIG. 4

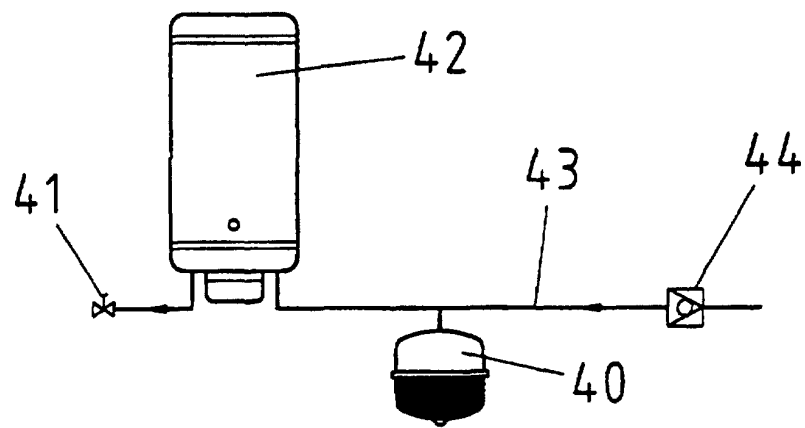


FIG. 5

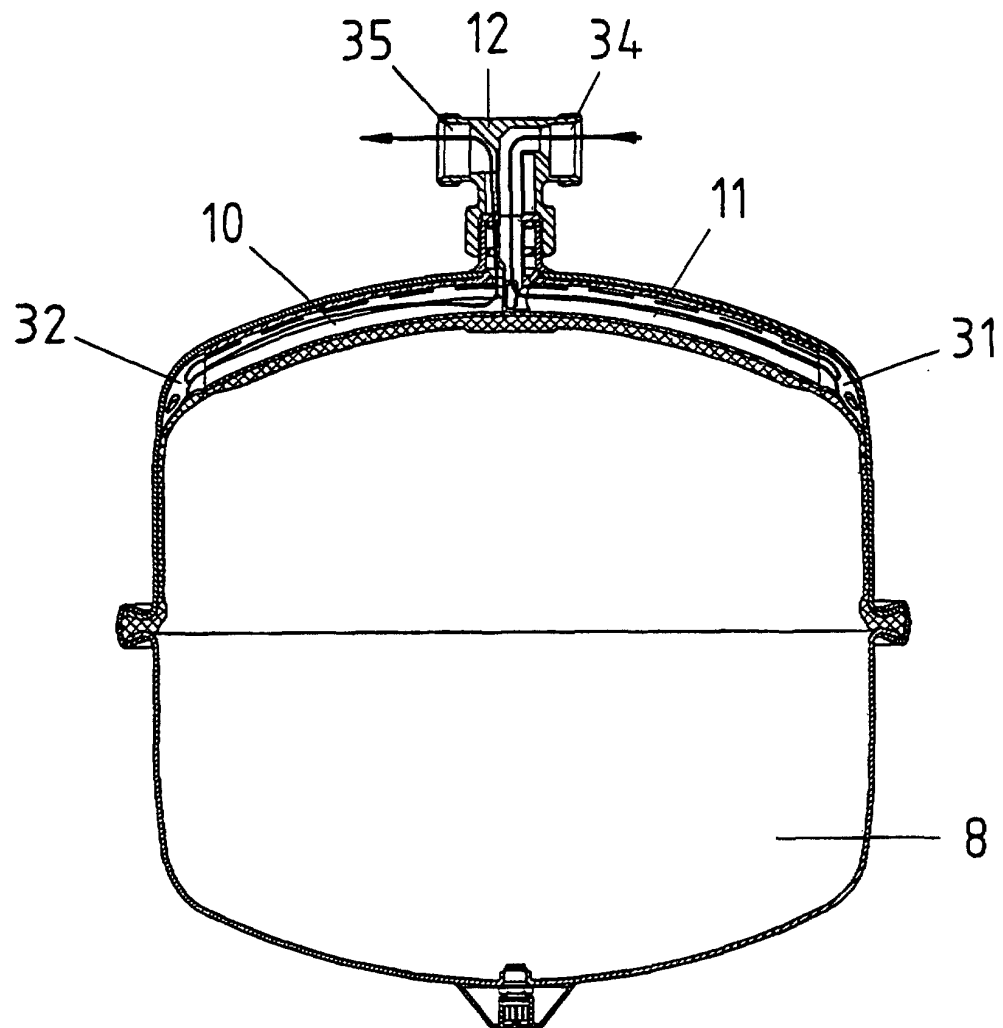


FIG. 6