(11) Application No. AU 2005249644 B2

(19) AUSTRALIAN PATENT OFFICE

(54) Title

Apparatus for filtering liquids

(51)[6] International Patent Classification(s)

B01D 35/157 (2006.01)
C02F 1/00 (2006.01)
B01D 35/157 20060101AFI2005100 8BMEP
C02F 1/00 20060101ALI2005100 8BMEP
PCT/EP2005/004484

(21) Application No: 2005249644

(22) Application Date: 2005.04.27

(87) WIPO No: WO05/118104

(30) Priority Data

(31) Number	(32) Date	(33) Country
10 2004 026 167.9	2004.05.28	DE

(43) Publication Date : 2005.12.15

(71) Applicant(s)

Brita GmbH

(72) Inventor(s)

Gross, Stefan; Walde, Hilmar; Guckes, Gunder

(74) Agent/Attorney

Spruson & Ferguson, Level 35 St Martins Tower 31 Market Street, Sydney, NSW, 2000

(56) Related Art

GB 2271106 A
EP 0324634 A
GB 2197647 A

(12) NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT) VERÖFFENTLICHTE INTERNATIONALE ANMELDUNG

(19) Weltorganisation für geistiges Eigentum
Internationales Büro

(43) Internationales Veröffentlichungsdatum
15. Dezember 2005 (15.12.2005)

PCT

(10) Internationale Veröffentlichungsnummer
WO 2005/118104 A1

(51) Internationale Patentklassifikation[7]: B01D 35/157, C02F 1/00

(21) Internationales Aktenzeichen: PCT/EP2005/004484

(22) Internationales Anmeldedatum:
27. April 2005 (27.04.2005)

(25) Einreichungssprache: Deutsch

(26) Veröffentlichungssprache: Deutsch

(30) Angaben zur Priorität:
10 2004 026 167.9 28. Mai 2004 (28.05.2004) DE

(71) Anmelder *(für alle Bestimmungsstaaten mit Ausnahme von US)*: **BRITA GMBH** [DE/DE]; Heinrich-Hertz-Strasse 4, 65232 Taunusstein (DE).

(72) Erfinder; und

(75) Erfinder/Anmelder *(nur für US)*: **WALDE, Hilmar** [DE/DE]; Auf der Langwies 4, 65510 Wallbach (DE). **GRöSS, Stefan** [DE/DE]; Immanuel-Kant-Strasse 11, 63303 Dreieich (DE). **GUCKES, Gunder** [DE/DE]; Berliner Strasse 35, 65529 Waldems (DE).

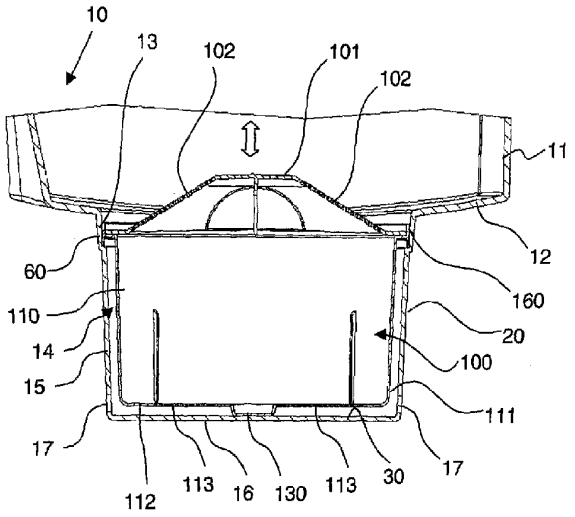
(74) Anwälte: **FUCHS, Jürgen, H.** usw.; Söhnleinstrasse 8, 65201 Wiesbaden (DE).

(81) Bestimmungsstaaten *(soweit nicht anders angegeben, für jede verfügbare nationale Schutzrechtsart)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY,

[Fortsetzung auf der nächsten Seite]

(54) Title: APPARATUS FOR FILTERING LIQUIDS

(54) Bezeichnung: VORRICHTUNG ZUR FILTRATION VON FLÜSSIGKEITEN



(57) **Abstract:** Disclosed are an apparatus for filtering liquids and an associated filter cartridge (100) by means of which the throughput through the filter cartridge (100) can be reduced and adjusted in a simple manner. The inventive apparatus is characterized in that at least one throttling mechanism (200, 200') is disposed between the outlet (113) of the filter cartridge (100) and the outlet (17) of the reservoir (14).

[Fortsetzung auf der nächsten Seite]

WO 2005/118104 A1

TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) **Bestimmungsstaaten** (*soweit nicht anders angegeben, für jede verfügbare regionale Schutzrechtsart*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), eurasisches (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), europäisches (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Erklärung gemäß Regel 4.17:
— *Erfindererklärung (Regel 4.17 Ziffer iv) nur für US*

Veröffentlicht:
— *mit internationalem Recherchenbericht*

Zur Erklärung der Zweibuchstaben-Codes und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

(57) **Zusammenfassung:** Es wird eine Vorrichtung zur Filtration von Flüssigkeiten und eine dazugehörige Filterkartusche 100 beschrieben, mit der die durch die Filterkartusche vorgesehene Durchflussmenge auf einfache Weise reduziert und eingestellt werden kann. Die Vorrichtung ist dadurch gekennzeichnet, dass zwischen der Auslauföffnung 113 der Filterkartusche 100 und der Auslassöffnung 17 der Aufnahmekammer 14 mindestens eine Drosseleinrichtung 200, 200' angeordnet ist.

2005249644 30 Oct 2009

Apparatus for filtering liquids

Description

The invention relates to an apparatus for the filtration of liquids.

Filter cartridges are to be understood as meaning on the one hand cartridges which have a screen-like formation for mechanical filtration. On the other hand, filter cartridges are also to be understood as meaning cartridges which, in addition to a screen-like formation, contain at least one filter medium, e.g. in granule form, which is used for the chemical and/or mechanical removal of organic and/or inorganic contaminants and/or to lower the levels of such contaminants. Filter cartridges equipped in this way therefore allow non-mechanical filtration, which may be combined with mechanical filtration. These filter cartridges are used to optimize water, the term optimization being understood as meaning mechanical and/or non-mechanical filtration. This includes, for example, softening and decalcification of drinking water.

A very wide range of embodiments of apparatuses for the filtration of liquids are known.

By way of example, there are filter apparatuses with spherical filter cartridges, which are screwed onto the inlet funnel from below by means of a bayonet catch, as described in WO 2004/014519 A2.

DE 199 05 601 A1 has disclosed an apparatus for the treatment of liquids, having an inlet funnel which has a receiving opening with a sealing rim. The filter cartridge is likewise fitted into the receiving opening from below and is pressed into the receiving opening by

means of a separate securing ring. For this purpose, the filter cartridge is provided with a groove on the cartridge upper part below the sealing rim; the lower portion of the securing ring engages in this groove. The upper portion of the securing ring is guided in a groove of a connection piece formed integrally on the funnel base. The filter cartridge is complex to install and remove, requiring particular skill on the part of the operator.

Other embodiments provide for the inlet funnel to have, in its base wall, a receiving opening, into which the filter cartridge is fitted from above. The filter cartridge generally has a conical sealing rim, which bears against the edge of the receiving opening. The filter cartridge may become tilted during insertion, so that the intended sealing position is not adopted.

DE 199 158 29 A1 has disclosed a filter cartridge and an apparatus for treating liquids, in which the sealing rim has additional latching means, which interact with corresponding latching means in the region of the opening in the base of the inlet funnel. The latching means are brought into engagement with one another by a rotational movement.

In this embodiment, the filter cartridge is held only at the edge and is located in the filtrate space. If the apparatus is a kettle, therefore, the filter cartridge is also in the boiling space, which means that the filter cartridge could be damaged during the heating of the filtered liquid. Therefore, it is desirable for the filter cartridge to be arranged such that it is shielded from the filtrate space or boiling space.

Inlet funnels with a receiving chamber for the filter cartridge are used to remedy this problem. In this design too, the conical sealing rim of the filter

2005249644 30 Oct 2009

cartridge bears against the rim of the receiving opening in the base wall of the inlet funnel.

The peripheral and base wall of the filter cartridge is arranged at a distance from the peripheral and base wall of the receiving chamber, so that during filtration, although filtered liquid can collect in this intermediate space, this liquid does not limit the quantitative flow through the apparatus. An outflow opening provided with a closure element is located in the base wall of the receiving chamber.

DE 198 46 583 A1 has disclosed a water filter device of this type, with a collection can and a heating element. The inlet funnel has a receiving chamber, into which the filter cartridge is fitted from above. The receiving chamber is formed by a filter insert, which may be fixedly connected to the inlet funnel or can be fitted into the receiving opening. The filter insert is matched to the conical shape of the filter cartridge and forms a guide element for the filter cartridge. Since the peripheral wall of the filter cartridge bears against the filter insert over its full surface, the two components can only be separated from one another with difficulty, in particular if the user pushes the filter cartridge too deep into the filter insert. On account of the fact that two conical surfaces are sliding along one another, it is not clear to the user when he has reached the limit position which is required for optimum seating of the filter cartridge and defines the sealing position of the filter cartridge.

In all the known filter apparatuses, it is necessary for the filter cartridge to be matched to the desired quantitative flow.

2005249644 30 Oct 2009

It is desirable to provide a filter cartridge and an apparatus for the filtration of liquids which makes it easy to reduce and adjust the quantitative flow through the filter cartridge.

It is the object of the present invention to substantially overcome or at least ameliorate one or more of the prior art disadvantages or at least provide a useful alternative.

The present invention provides an apparatus for the filtration of liquids having:

a filter cartridge, which includes a cartridge upper part with at least one inlet opening, a cartridge lower part with at least one outlet opening and a sealing rim,

an inlet funnel with a peripheral wall, a funnel base wall and a receiving opening which is arranged in the funnel base wall and into which the filter cartridge can be fitted from above, the sealing rim of the filter cartridge bearing against the edge of the receiving opening,

a receiving chamber which has at least one outflow opening, a peripheral wall and a base wall, extending downwards from the receiving opening, wherein

the inlet funnel has at least one first fixing means below the receiving opening,

the filter cartridge has at least one second fixing means below and at a distance from the sealing rim, which second fixing means interacts with the first fixing means when the filter cartridge is being fitted into the receiving opening, so that the first and second fixing means define the position of the filter cartridge, and

at least one of the first and second fixing means forms a throttling device, to reduce the flow quantity delivered by the filter cartridge.

Preferred embodiments of the present invention will now be described.

The preferred embodiment provides an apparatus in which at least one throttling device is arranged between the outlet opening in the filter cartridge and the outflow opening in the receiving chamber.

The quantitative flow through the filter cartridge substantially depends on the type of filter medium and the size of the outlet opening(s) in the filter cartridge. Depending on the particular application, for example in filter systems of which a high performance is demanded of the filter medium, it may be necessary to reduce the quantitative flow which is predetermined by the filter cartridge. To achieve this, hitherto the cartridge has been modified, i.e. suitable filter cartridges had to be produced and kept in stock for every desired quantitative flow. The advantage of the throttling device is

2005249644 30 Oct 2009

firstly that only one type of filter cartridge is required, and the quantitative flow can be set by selecting a suitable receiving chamber or a suitable inlet funnel.

Secondly, it is advantageous with this configuration that if the cartridge is not present the appliance can be operated without any flow restrictions.

It is preferable for the throttling device to be designed in such a manner that the quantitative flow delivered by the filter cartridge can be reduced by more than 0 up to 95%, in particular by 10 to 80%, particularly preferably by 20 to 70%.

It is preferable for the filter cartridge to be arranged in the region between outlet opening and outflow opening, at a distance from the peripheral wall and/or base wall of the receiving chamber, thereby forming a flow passage. The minimum cross section of

the flow passage then forms the throttling device.

Alternatively, the outflow opening or outflow openings may form the throttling device, in which case the cross section of the outflow opening/openings is smaller than the cross section of the outlet opening/outlet openings in the filter cartridge.

The outflow opening may preferably be arranged in the base region, in particular in the base wall, of the receiving chamber.

For a predetermined filter cartridge, the throttling device may be adjustable by selecting a receiving chamber of suitable dimensions or with a suitable cross section of the outflow opening.

The desired quantitative flow can therefore be set by means of the inlet funnel, which is advantageous in that the inflow funnel, unlike the filter cartridge, does not represent a consumable item. The consumable item formed by the filter cartridge only has to be produced and kept in stock in one design, and the quantitative flow can be defined by the selection of inlet funnel. This makes it possible to significantly reduce the manufacturing costs of the apparatus and the costs of spares.

It is preferable for the outflow opening in the receiving chamber to be arranged above the outlet opening in the filter cartridge, so as to create a siphon-like arrangement. A siphon-like arrangement of this type has the advantage, in particular in conjunction with the throttling device, that the filter medium is kept moist even in the event of breaks in filtration, and therefore its full operational readiness is ensured even without renewed conditioning.

It is preferable for the inlet funnel to have at least

one first fixing means below the receiving opening, and for the filter cartridge to have at least one second fixing means below and at a distance from the sealing rim; when the filter cartridge is being fitted into the receiving opening, the at least one second fixing means interacts with the first fixing means.

The filter cartridge can preferably be fitted into the receiving opening in its axial direction.

The fixing means are arranged in such a manner that during interaction they define the position of the filter cartridge, i.e. when the fixing means interact, on the one hand, the sealing rim of the filter cartridge in its intended position bears against the edge of the receiving opening, and, on the other hand, also defines the cross section of the flow passage and therefore the throttling device.

The interaction of the fixing means is associated with a resistance, which is perceptible to the user when he is fitting the filter cartridge and indicates to the user that the intended position of the filter cartridge has been reached.

Since the fixing means define the position of the filter cartridge, it is advantageous if the distance between sealing rim and fixing means is selected to be as great as possible. This prevents the filter cartridge from tilting or being incorrectly positioned.

Therefore, the second fixing means are preferably arranged on the lower half, preferably in the bottom third, of the filter cartridge, in particular in the region of the base wall of the filter cartridge.

The first and/or second fixing means may be spacer elements and/or guide elements and/or latching elements. This means that a fixing means can perform

one or more functions, and that it is also possible for a plurality of fixing means of different configurations to be realized in an apparatus.

The cross section of the flow passage can be accurately set by the fixing means.

A preferred embodiment provides for at least one fixing means to form the throttling device. By way of example, if a spacer element formed integrally on the filter cartridge or the receiving chamber is arranged in the flow passage, the cross section is reduced at this location. The action of the throttling device can easily be set by means of the dimensions of one or more spacer elements of this type.

The fixing means are preferably projections or recesses. The projections or recesses may be cylindrical, conical or frustoconical in form. These forms also include, for example, indentations and protuberances or beads.

In the case of latching elements, latching bosses, latching recesses or annular beads are preferred.

In the simplest case, the fixing means may be spacer elements. By way of example, at least one outwardly facing projection may preferably be formed integrally on the base wall of the filter cartridge as second fixing means, which projection, during fitting of the filter cartridge, is seated on a holding element which is arranged on the inlet funnel and forms the first fixing means.

The first fixing means may, for example, also be the base wall of a receiving chamber arranged at the inlet funnel.

Conversely, by way of example, it is also possible for

the holding element, which may form the base wall of the receiving chamber, to have at least one inwardly facing projection, which interacts with the base wall of the filter cartridge, which in this case forms the second fixing means.

The fixing means may also be guide elements, which means that the filter cartridge is guided into its intended position when it is being fitted. By way of example, projections and recesses, in particular indentations on the filter cartridge and on the holding element which, by way of example, may be cylindrical, conical or frustoconical in form, are suitable for this purpose.

According to a further embodiment, the fixing means may also be latching elements which engage in one another as they interact. The latching or snapping into place is generally associated with a noise which indicates to the user that the filter cartridge has reached its intended position.

The fixing means are preferably matched to one another in such a manner that fitting the filter cartridge in the axial direction is sufficient to bring the fixing means together. Therefore, there is no need either for rotary, tilting or other movements of the filter cartridge or for additional components, such as securing rings or the like, which overall makes insertion of the filter cartridge user-friendly.

Furthermore, the fixing means are matched to one another in such a manner that they can be detached from one another without particular effort when the filter cartridge is being exchanged.

This is achieved, inter alia, by the contacting surfaces of the fixing means being kept small in the case of guide elements, in order to prevent the filter

cartridge from jamming or sticking in place.

If the fixing means are designed as latching elements, the latching or clamping forces are kept low, in such a manner that the filter cartridge can be removed by simply being pulled out of the receiving opening in the axial direction. The latching elements are therefore preferably designed in such a manner that an axial movement of the filter cartridge is sufficient to fit or remove it.

It is preferable for the first fixing means to be arranged on a holding element arranged at the underside of the funnel base wall. A holding element of this type may be designed in various ways.

According to a particular embodiment, the holding element may be a receiving chamber which is arranged in the funnel base wall, has at least one outflow opening and has a base wall and a peripheral wall.

Preferably, the base wall of the receiving chamber has at least one first indentation, and the base wall of the filter cartridge has at least one second indentation, which engages over the first indentation. These two indentations may interact in a sliding manner and thereby form guide elements. Moreover, these indentations may also be provided with latching elements which engage in one another when the filter cartridge is being fitted.

It is preferable for the indentations of filter cartridge and receiving chamber to be arranged at a distance from one another at least in subregions, so that a reduced cross section of flow, which forms the throttling device, is set between the indentations.

Preferably, the first indentation is a cylindrical or frustoconical hollow body, which is formed integrally

on the base wall of the receiving chamber, faces inwards and has at least one inwardly facing first bead, which is in the shape of an arc of a circle and leaves clear at least one outflow opening, arranged on its free edge, wherein an outwardly facing mandrel, which engages in the cylindrical or frustoconical hollow body when fitting the filter cartridge, is arranged in the second indentation.

In this embodiment, the first guide element is formed by the at least one bead, which is in the form of an arc of a circle and slides along the outer side of the mandrel when the filter cartridge is being inserted. The bead does not extend over the entire inner periphery of the hollow body, and consequently a free space remains which, after fitting of the mandrel, which represents the second guide element, forms the outflow opening. A plurality of arcuate beads or bead segments may be arranged at a distance from one another in the peripheral direction, so that a plurality of outflow openings are created.

A preferred embodiment provides for the cross section of the outflow opening(s) defined by the bead(s) on the cylindrical or frustoconical hollow body to be selected in such a way that this/these outflow opening(s) has/have a throttling action.

According to a further embodiment, the mandrel has at least one second bead in the shape of an arc of a circle on its outer side, which second bead engages behind the first bead during fitting of the filter cartridge. In this case, the first and second beads form latching elements.

It is preferable for the hollow body and the mandrel each to be arranged centrally. This arrangement has the advantage that in each case only one fixing means is required, and as a result the space required for the

fixing means can be kept small, and consequently more volume is available for the filter medium.

It is preferable for the receiving chamber to have the first indentation in the region of base and peripheral wall and for the filter cartridge to have the second indentation likewise in the base and peripheral wall.

The first and second indentations may preferably be cuboidal in form, so that the two indentations each have two side walls, one end wall and one covering wall. The two indentations may be in the form of guide elements which engage in one another or slide into one another.

It is advantageous if the first indentation has first latching means on two side walls and the second indentation has second latching means on two side walls. This embodiment has the advantage that it is possible to realize greater latching forces, for example in devices in which water is heated. The two indentations may have different dimensions, which brings the advantage that there is only one possible position for the filter cartridge.

The fixing elements allow accurate positioning of the filter cartridge, so that not only is the optimum position of the sealing rim at the receiving opening ensured, but also a defined distance can be set between the filter cartridge and the wall of the receiving chamber. The cross section of the flow passage between outlet opening of the filter cartridge and outflow opening of the receiving chamber can thus likewise be set in a targeted way.

The presence of fixing means also allows a new type of configuration of the sealing rim of the filter cartridge, allowing the correct seating of the filter cartridge and the sealing position to be improved

further.

For this purpose, it is provided that the sealing rim is a snap-action rim which is connected to one of the two cartridge parts via an integral hinge, it being possible for the sealing rim to be flipped from a first, lower snap-action position into an upper, second snap-action position and vice versa, and the funnel base having a sealing seat which surrounds the receiving opening and into which the snap-action rim snaps in its second position.

With the snap-action rim in its lower snap-action position, the filter cartridge is fitted into the receiving opening from above and pressed downwards until the snap-action rim flips upwards and in the process snaps into the sealing seat. The sealing seat is matched to the snap-action rim in such a manner that when the snap-action rim has snapped into place, the filter cartridge bears in a sealing manner against the edge of the receiving opening and is fixed in place.

The snap-action indicates to the user that the filter cartridge has adopted its predetermined sealing position. This prevents both incorrect positioning by the user and slipping of the filter cartridge during transport.

To remove the filter cartridge, it is simply pulled out upwards, during which operation the snap-action rim flips into its lower snap-action position.

The snap-action rim is preferably formed by a flat edge strip which extends outwards in the radial direction.

In this embodiment, fixing means in the form of guide elements are sufficient. Fixing means in the form of latching elements could be disadvantageous, insofar as with so-called double latching at the sealing rim and,

for example, in the base region, the production costs are high on account of the need to maintain tolerances.

In the case of a filter cartridge in which the cartridge upper part has an outwardly facing first securing flange and the cartridge lower part has an outwardly facing second securing flange, via which the two cartridge parts are connected to one another, the snap-action rim is preferably connected to one of the two securing flanges by way of the integral hinge.

The sealing seat at the inlet funnel is matched to this snap-action rim. It is preferable for the sealing seat to merge into a conically protruding rim section with an inwardly open abutment section, on which the outer edge of the snap-action rim engages.

The abutment section may be a groove or a step with at least one inclined surface.

The filter cartridge, which can be fitted into the inlet funnel and has a cartridge upper part with at least one inlet opening, a cartridge lower part with at least one outlet opening and a sealing rim, is characterized by at least one fixing means arranged below and at a distance from the sealing rim.

The fixing means at the filter cartridge is preferably a spacer element and/or guide element and/or latching element. The fixing means may be recesses and projections, the projections or recesses preferably being cylindrical, conical or frustoconical in form. The latching element may be a latching boss, a latching recess or an annular bead.

The fixing means is preferably arranged in the region of the lower half of the filter cartridge, preferably in the region of the bottom third and in particular in the region of the base wall of the filter cartridge.

The cartridge lower part has at least one indentation, with an outwardly facing mandrel preferably being arranged in the indentation.

According to a further embodiment, the indentation may also be cuboidal in form.

The sealing rim is preferably a snap-action rim which is connected to one of the two cartridge parts via an integral hinge, it being possible for the snap-action rim to be flipped from a first, lower snap-action position into an upper, second snap-action position and vice versa.

If the filter cartridge has a sealing flange on its upper and lower parts, the snap-action rim is preferably connected to one of the two securing flanges by way of the integral hinge.

The snap-action rim is preferably formed by a flat edge strip which is directed radially outwards.

Exemplary embodiments of the invention are explained in more detail below with reference to the drawings, in which:

Figures 1 and 2 show vertical sections through an inlet funnel with fitted filter cartridge in accordance with two embodiments,

Figure 3 shows a vertical section through an inlet funnel with fitted filter cartridge in accordance with a further embodiment, before the filter cartridge has reached its limit position,

Figure 4 shows a section on line F-F through the apparatus shown in Figure 3,

Figure 5 shows an enlarged sectional illustration of the region of the two indentations in accordance with Figure 3,

Figure 6 shows an enlarged sectional illustration of the region of the two indentations after the filter cartridge has been fitted and positioned,

Figure 7a shows a plan view of the frustoconical hollow body in accordance with Figure 3,

Figure 7b shows a plan view of a frustoconical hollow body in accordance with the a further embodiment,

Figure 8 shows a vertical section through the frustoconical hollow body on line H-H in Figure 7b,

Figure 9 shows an enlarged sectional illustration of the lower region of the two indentations in accordance with a further embodiment, on line G-G through the frustoconical hollow body in Fig. 7a,

Figure 10 shows a vertical section through a filter cartridge,

Figure 11 shows a plan view of the filter cartridge shown in Figure 10,

Figure 12 shows an enlarged sectional illustration of an edge region of the filter cartridge illustrated in Figures

10 and 11,

Figure 13 shows an enlarged sectional illustration of a region of the receiving opening in the inlet funnel,

Figure 14 shows an enlarged sectional illustration of the region of the receiving opening in the inlet funnel with initially positioned snap-action rim of a filter cartridge,

Figure 15 shows an enlarged illustration of the region of the receiving opening of an inlet funnel with the snap-action rim of the filter cartridge snapped into position,

Figure 16 shows a vertical section through the region of the receiving opening in the inlet funnel in accordance with a further embodiment,

Figure 17 shows a vertical section through an inlet funnel with a fitted filter cartridge in accordance with a further embodiment,

Figure 18 shows a section on line B-B through the apparatus shown in Figure 17,

Figure 19 shows an enlarged sectional illustration of the region of the outflow opening of the apparatus shown in Figure 17.

Figure 1a illustrates a vertical section through an inlet funnel 10 with fitted filter cartridge 100. The inlet funnel 10 has a peripheral wall 11, which merges

into a funnel base wall 12 which has a receiving opening 13. A receiving chamber 14, which once again has a peripheral wall 15 and a base wall 16, extends downwards from the receiving opening 13 as holding element 20.

The filter cartridge 100 is fitted into this receiving chamber 14 axially from above; the filter cartridge 100 comprises a cartridge upper part 101 and a cartridge lower part 110. The cartridge upper part 101 is configured in the shape of a roof and has inlet openings 102. A sealing rim 160, which bears against the sealing seat 60 of the inlet funnel 10 in the region of the receiving opening 13, is provided in the connection region of cartridge upper part 101 and cartridge lower part 110.

The cartridge lower part 110 of the filter cartridge 100 has a peripheral wall 111 and a base wall 112, in which outflow openings 113 are arranged.

The receiving chamber 14 is configured in such a manner that the peripheral wall 111 of the filter cartridge 100 is arranged at a distance from the peripheral wall 15 and from the base wall 16. Consequently, the filtered liquid collects in the lower region of the receiving chamber 14 and flows away via the outflow openings 17 shown to the right and left in the figure.

The receiving chamber 14 with the peripheral wall 15 and the base wall 16 forms a holding element 20 for the filter cartridge 100. A second fixing means 130, which in the embodiment shown here forms a spacer element, is formed integrally in the centre of the base wall 112 of the filter cartridge 100. This second fixing element 130 bears against the inner side of the base wall 16, which therefore performs the function of a first fixing element 30.

The filter cartridge 100 is fitted into and removed from the receiving chamber 14 of the inlet funnel 10 in the axial direction, as indicated by the double arrow. When the limit position provided during fitting is reached, the second fixing means 130 bears against the first fixing means 30, i.e. the base wall 16 of the receiving chamber 14. The operator notices this as a result of the resistance which then occurs, which indicates to the operator that the limit position has been reached. In this limit position, the sealing rim 160 bears in a sealing manner against the sealing seat 60 of the receiving opening 13. As a result, the optimum position of the filter cartridge 100 has been reached.

Fig. 2 illustrates a further embodiment of the apparatus, which differs from the apparatus shown in Fig. 1 by virtue of the fact that two first fixing means 30, in the form of indentations 31 designed as spacer elements, are formed integrally on the inner side of the base wall 16. The base wall 112 of the filter cartridge 100 bears against these two spacer elements 30.

In this embodiment, the base wall 112 performs the function of the second fixing means 130.

The two first fixing means 30 are arranged in the flow passage 201 between the outlet openings 113 and the outflow openings 17 and at this location reduce the cross section of flow. Depending on the particular configuration and dimensions, the fixing elements 30 in each case form a throttling device 200.

Figure 3 illustrates a vertical section through a further embodiment of the apparatus. The inlet funnel 10, of which the upper part has been omitted for the sake of clarity, has a first indentation 31, which is designed a frustoconical hollow body 32, arranged in

the centre of its base wall 16. A bead 34 in the form of an arc of a circle is formed integrally on the inner side of the free edge 33 of the hollow body 32, which bead 34, as illustrated in Figure 7a, does not form a continuous ring, but rather has a free space 18 which forms the outflow opening 17 after the filter cartridge has been fitted.

In its base wall 112, the filter cartridge 100 likewise has an indentation 131 in which a mandrel 132, which extends vertically downwards, is formed integrally. When the filter cartridge 100 is being fitted into the receiving chamber 14, the mandrel 132 engages in the frustoconical hollow body 32, with the outer surface 133 of the mandrel 132 sliding along the bead 34. In this embodiment, the mandrel 132 and the bead 34 form first and second fixing means 30, 130 which serve as guide elements. The outflow opening 17 is formed between the outer surface 133 of the mandrel 132 and the wall 35 of the hollow body 32.

Figure 3 illustrates the filter cartridge 100 at the start of the fitting operation. The sealing rim 160, which in the embodiment shown here is designed as a snap-action rim 161, is therefore not yet in its limit position. The snap-action rim 161 will be described separately below.

Figure 4 illustrates a section on line F-F through the apparatus shown in Figure 3. It can be seen from this figure that the mandrel 132 bears against the bead 34 in the form of an arc of a circle and at this location also forms a seal apart from the outflow opening 17 (which is not visible in Fig. 4).

Figure 5 illustrates an enlarged view of the lower region of filter cartridge 100 and receiving chamber 14, illustrating the fitting state in accordance with Figure 3. The second indentation 131 has a base wall

134a and an annular wall 134b, which extends upwards from the base wall 112. Spacer ribs 139 are formed integrally on the underside of the base wall 134a.

In Figure 6, the filter cartridge 100 has reached its limit position and therefore its sealing position. A flow passage 201 is formed between the base wall 112 of the filter cartridge 100 and the base wall 16 of the receiving chamber 14 and merges, in the region of the two indentations 31, 131, into a rising annular passage 202 which is formed between wall 35 of the hollow body 32 and the annular wall 134b. The cross section of the annular passage 202 is smaller than that of the flow passage 201, so that a throttling device 200' is formed.

However, the annular passage 202 only forms the throttling device 200' if the outflow opening 17 has a significantly larger cross section. In the embodiment shown here, there is only a single outflow opening 17, which has a smaller cross section of flow than the cross section of the annular passage 202, and consequently the outflow opening 17 can be equated to the throttling device 200'. The two fixing elements 30, 130 in the form of the annular bead 34 and in the form of the mandrel 132 therefore form the throttling device 200 in the assembled state. The spacer ribs 139 bear against the end face 39 of the hollow body 32 and therefore, as spacer elements, form second fixing means 130.

Figure 7b illustrates a further embodiment of the hollow body 32, which differs from the embodiment illustrated in Figure 7a by virtue of the fact that a total of four beads 34 in the form of arcs of a circle are arranged spaced apart from one another, so that free spaces 18 for the outflow openings 17 in each case remain between the beads 34. Whether the combination of these outflow openings form a throttling device 200

depends on the cross-sectional dimensions of the flow passage, in particular of the annular passage 202 in the region of the frustoconical hollow body 32.

Figure 8 illustrates the hollow body 32 in vertical section on line H-H in Fig. 7b. The triangular shape of the arcuate beads 34 has the advantage of minimizing the surface area of the contact surface with the mandrel that is to be introduced, so that the frictional forces are correspondingly low and the filter cartridge can be fitted and removed without difficulty.

Figure 9 illustrates a further embodiment, in which the mandrel 132 is likewise provided with a bead (second bead) 135 on its outer surface. In this case, the section through the frustoconical hollow body 32 is taken on line G-G from Fig. 7a. When the filter cartridge 100 is being fitted, the mandrel 132 engages in the hollow body 32, with the annular bead 135 engaging behind the bead 34 when the spacer ribs 139 are bearing against the end face 39. Free spaces (not visible in this figure) are between the spacer ribs 139, so that the liquid can flow to the outflow opening 17. In this embodiment, the beads 34 and 135 form latching elements, and the spacer ribs 139 form spacer elements, with the end face 39 of the hollow body 32, as first fixing means 30, forming a stop.

Figure 10 illustrates a vertical section through a filter cartridge 100 in order to explain the function of the sealing rim 160 in conjunction with the following figures. The cartridge upper part 101 has a securing flange 120, which is joined to the securing flange 121 of the cartridge lower part 110, preferably by welding. The securing flange 120 extends radially outwards and has an integral hinge 162, via which the snap-action rim 161 is attached in jointed fashion. The snap-action rim 161 is formed by a flat edge strip

directed radially outwards.

Figure 10 illustrates the snap-action rim 161 in its lower position. As illustrated in Figure 11, the snap-action rim 161 is designed to run continuously all the way around, as is the integral hinge 162. A dead centre has to be overcome when the snap-action rim is being flipped from a lower snap-action position into an upper snap-action position.

Figure 12 illustrates the snap-action rim 161 on an enlarged scale. The integral hinge 162 is formed as an encircling groove 163 on the underside of the securing flange 120.

Figure 13 illustrates the corresponding receiving opening 13 in section and on an enlarged scale. The sealing seat 60 with which the snap-action rim 161 interacts during fitting of the filter cartridge has a conically protruding edge section 61, which merges into the abutment section 62, which in the embodiment shown in Figure 13 is designed as a groove 63. The groove 63 is open on the radially inner side, so that the snap-action rim 161 can engage therein, as can be seen in the following Figures 14 and 15.

Figure 14 illustrates the start of the snap-action process. The snap-action rim 161 is still in its lower position and is engaging against the conically protruding edge section 61.

As the filter cartridge 100 continues to be lowered, the snap-action rim 161 is moved into its upper position, with the outer edge 164 of the snap-action rim 161 engaging in the groove 63, as illustrated in Figure 15. There is no need for the whole of the surface of the snap-action rim 161 to bear against the surface 61. Sealing is effected in the region of the groove 63.

Figure 16 illustrates an alternative to the groove 63. The abutment section 62 comprises a step 64 which has a substantially horizontal surface 66 and an inwardly inclined surface 65.

Figure 17 illustrates a vertical section through an inlet funnel 10 with fitted cartridge 100 in accordance with a further embodiment. The filter cartridge 100 has a conventional sealing rim 160, which bears against the sealing seat 60 in the region of the receiving opening 13. Two cuboidal indentations 36 and 37 are formed integrally in the peripheral wall 15 and the base wall 16 of the receiving chamber 14. These indentations 36, 37 each have two side walls 40, 41 (not visible), an end wall 42 and a covering wall 43. The outflow opening 17 is located in the end wall 42.

The cartridge 100 also has corresponding indentations 136 and 137, which are likewise cuboidal in design, with side walls 140, 141 (not visible in Fig. 17), end wall 142 and covering wall 143, with the mutually corresponding walls of cartridge and receiving chamber being arranged at a distance from one another, so that flow passages 201 are formed between the walls.

Figure 18 illustrates a section on line B-B. Fixing means 30, 130 in the form of latching elements are provided in the two side walls 40, 41, 140, 141 of the cuboidal indentations 36, 136. The latching elements are latching bosses 38 which engage in corresponding latching recesses 138.

This configuration of the latching elements is to be found on both cuboidal indentations 36, 37, 136, 137.

Figure 19 shows an enlarged illustration of the cuboidal indentations 37, 137.

List of designations

10	Inlet funnel
11	Peripheral wall
12	Funnel base wall
13	Receiving opening
14	Receiving chamber
15	Peripheral wall
16	Base wall
17	Outflow opening
18	Free space
20	Holding element
30	First fixing means
31	First indentation
32	Frustoconical hollow body
33	Free edge
34	Bead in the form of an arc of a circle
35	Wall of the hollow body
36	Cuboidal indentation
37	Cuboidal indentation
38	Latching boss
39	End face
40	Side wall
41	Side wall
42	End wall
43	Covering wall
60	Sealing seat
61	Conically protruding edge section
62	Abutment section
63	Groove
64	Step
65	Inclined surface
66	Horizontal surface
100	Filter cartridge
101	Cartridge upper part
102	Inlet opening
110	Cartridge lower part
111	Peripheral wall
112	Base wall

113	Outlet opening
120	Securing flange on upper part
121	Securing flange on lower part
130	Second fixing means
131	Second indentation
132	Mandrel
133	Outer surface
134a	Base wall
134b	Annular wall
135	Second bead
136	Cuboidal indentation
137	Cuboidal indentation
138	Latching recess
139	Spacer rib
140	Side wall
141	Side wall
142	End wall
143	Covering wall
160	Sealing rim
161	Snap-action rim
162	Integral hinge
163	Encircling groove
164	Outer edge
200, 200'	Throttling device
201	Flow passage
202	Annular passage

2005249644 30 Oct 2009

The claims defining the invention are as follows:

1. Apparatus for the filtration of liquids having:

a filter cartridge, which includes a cartridge upper part with at least one inlet opening, a cartridge lower part with at least one outlet opening and a sealing rim,

an inlet funnel with a peripheral wall, a funnel base wall and a receiving opening which is arranged in the funnel base wall and into which the filter cartridge can be fitted from above, the sealing rim of the filter cartridge bearing against the edge of the receiving opening,

a receiving chamber which has at least one outflow opening, a peripheral wall and a base wall, extending downwards from the receiving opening, wherein

the inlet funnel has at least one first fixing means below the receiving opening,

the filter cartridge has at least one second fixing means below and at a distance from the sealing rim, which second fixing means interacts with the first fixing means when the filter cartridge is being fitted into the receiving opening, so that the first and second fixing means define the position of the filter cartridge, and

at least one of the first and second fixing means forms a throttling device, to reduce the flow quantity delivered by the filter cartridge.

2. Apparatus according to Claim 1, wherein the throttling device can be set by selecting a receiving chamber of suitable dimensions for a predetermined filter cartridge.

3. Apparatus according to Claim 1 or 2, wherein the outflow opening in the receiving chamber is arranged above the outlet opening in the filter cartridge.

4. Apparatus according to any one of Claims 1 to 3, wherein the filter cartridge can be fitted into the receiving opening in the axial direction.

5. Apparatus according to Claim 3 or 4, wherein the second fixing means is arranged in the region of the lower half of the filter cartridge.

6. Apparatus according to Claim 5, wherein the second fixing means is arranged in the region of the bottom third of the filter cartridge.

7. Apparatus according to Claim 5 or 6, wherein the second fixing means is arranged in the region of the base wall of the filter cartridge.

8. Apparatus according to any one of Claims 4 to 8, wherein the first and/or second fixing means are spacer elements and/or guide elements and/or latching elements.

9. Apparatus according to any one of Claims 4 to 8, wherein the fixing means are projections or recesses.

2005249644 30 Oct 2009

10. Apparatus according to Claim 9, wherein the projections or recesses are cylindrical, conical, or frustoconical.

11. Apparatus according to Claim 8, wherein the first and/or second fixing means are latching elements comprising latching bosses, latching recesses, or annular beads.

12. Apparatus according to any one of Claims 1 to 11, wherein the base wall of the receiving chamber has at least one first indentation and the base wall of the filter cartridge has at least one second indentation which engages the first indentation.

13. Apparatus according to Claim 12, wherein the first and second indentations, at least in subregions are arranged spaced apart from one another.

14. Apparatus according to Claim 12 or 13, wherein the first indentation is a cylindrical or frustoconical hollow body, which is formed integrally on the base wall of the receiving chamber, faces inward and has at least one inwardly facing first bead, which is in the shape of an arc of a circle and leaves clear at least one outflow opening, arranged on its free edge, and

an outwardly facing mandrel, which engages in the cylindrical or frustoconical hollow body when fitting the filter cartridge, is arranged in the second indentation.

15. Apparatus according to Claim 14, wherein the mandrel, on its outer side, has at least one second bead in the shape of an arc of a circle, which engages behind the first bead during fitting of the filter cartridge.

16. Apparatus according to Claim 14 or 15, wherein the hollow body and the mandrel, are arranged centrally.

17. Apparatus according to any one of Claims 1 to 11, wherein the receiving chamber has a first indentation in the region of base and peripheral walls, and

the filter cartridge has a second indentation in its peripheral and base walls.

18. Apparatus according to Claim 17, wherein the first and second indentations are designed in a cuboidal form.

19. Apparatus according to Claim 17 or 18, wherein the first indentation has first latching means on two of its side walls, and the second indentation has second latching means on two of its side walls.

20. Apparatus according to any one of Claims 1 to 19, wherein the sealing rim is a snap-action rim which is connected to one of the cartridge upper and lower parts via an integral hinge, it being possible for the snap-action rim to be flipped from a first, lower snap-action position into an upper, second snap-action position and vice versa, and

the funnel base wall has a sealing seat, which surrounds the receiving opening and into which the snap-action rim snaps in its second snap-action position.

Dated 29 October, 2009
Brita GmbH
Patent Attorneys for the Applicant/Nominated Person
SPRUSON & FERGUSON

2352358 1:TCW

Abstract

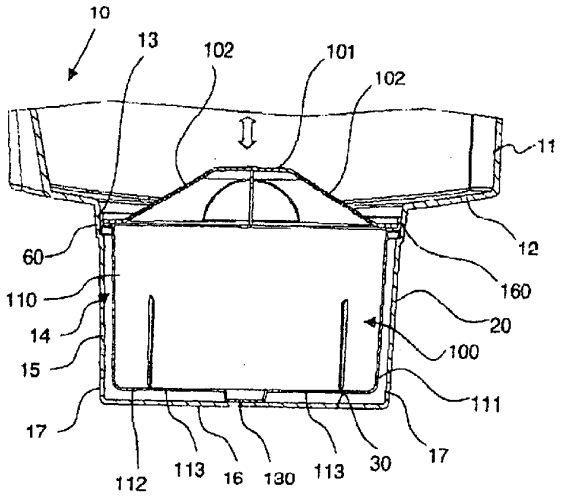


Fig. 1

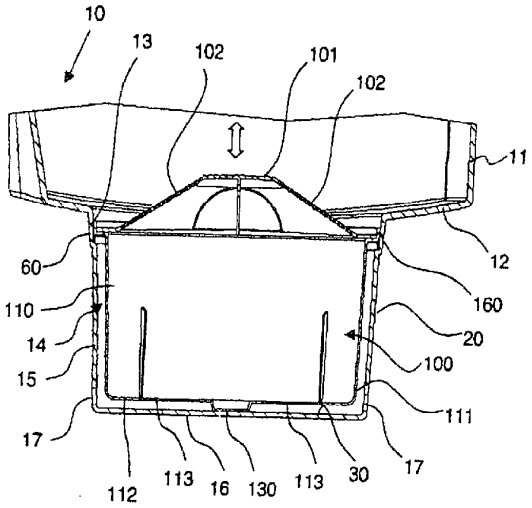

10
13
102
101
102
11
12
60
160
110
20
14
100
15
111
17
17
112
113
16
130
113
30

Fig. 1

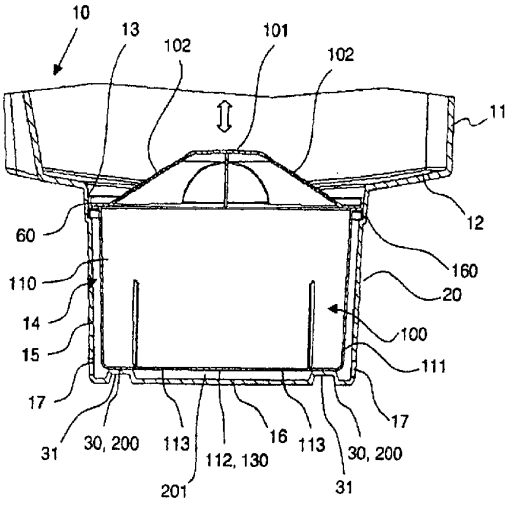

10
13
102
101
102
11
60
12
160
110
20
14
100
15
111
17
17
31
30, 200
113
112, 130
16
113
30, 200
31
201

Fig. 2

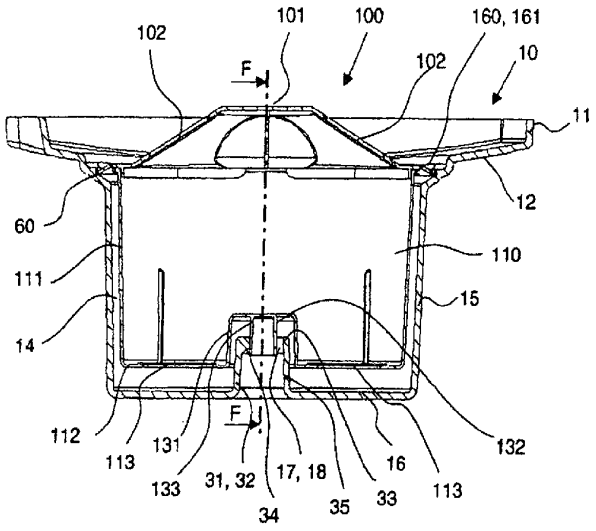

102
101
100
160, 161
10
F
102
11
12
60
110
111
15
14
132
112
131
113
133
31, 32
17, 18
16
113
35
33
34

Fig. 3

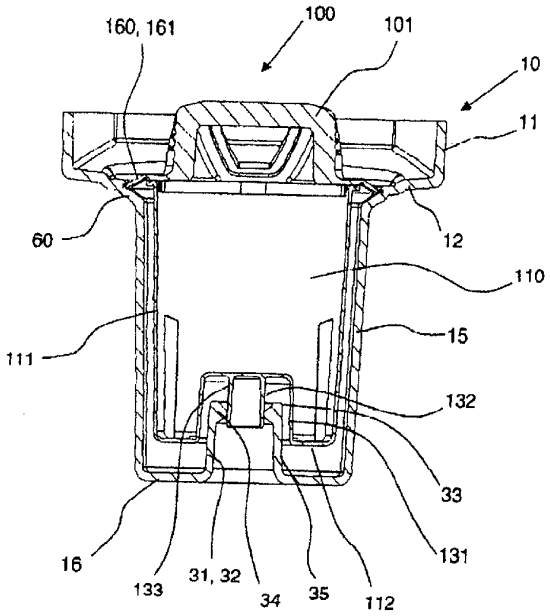

160, 161
100
101
10
11
60
12
110
111
15
132
33
131
16
133
31, 32
34
35
112

Fig. 4

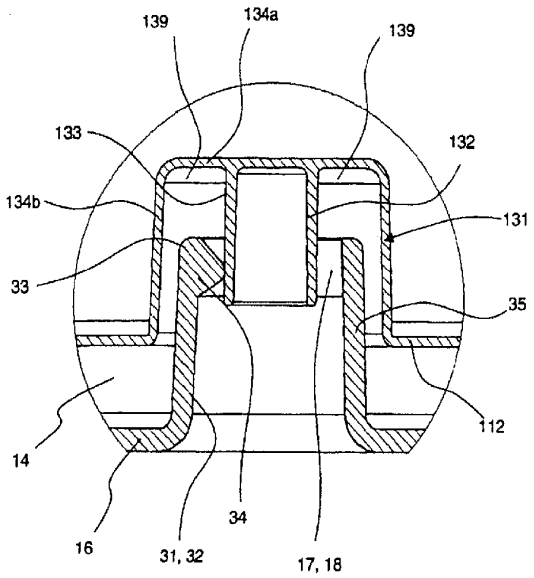


Fig. 5

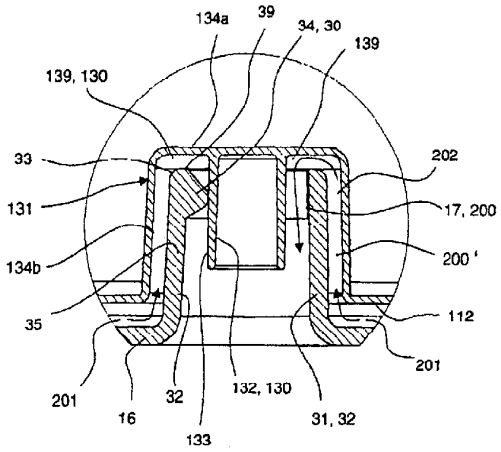

134a
39
34, 30
139
139, 130
33
202
131
17, 200
134b
200
35
112
201
201
32
132, 130
16
31, 32
133

Fig. 6

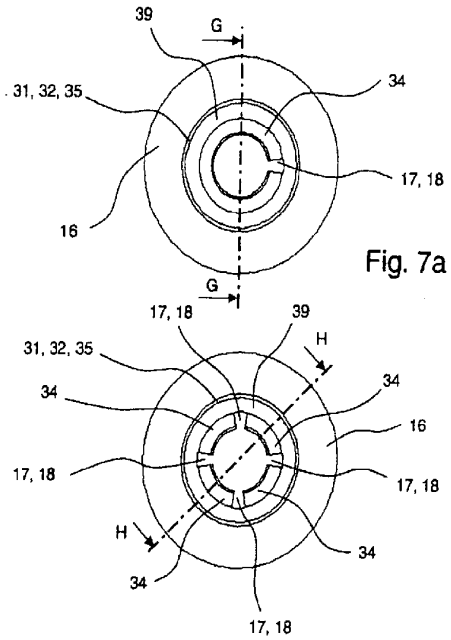

39
G
31, 32, 35
34
17, 18
16
G
17, 18
39
H
31, 32, 35
34
34
16
17, 18
17, 18
H
34
34
17, 18

Fig. 7a

Fig. 7b

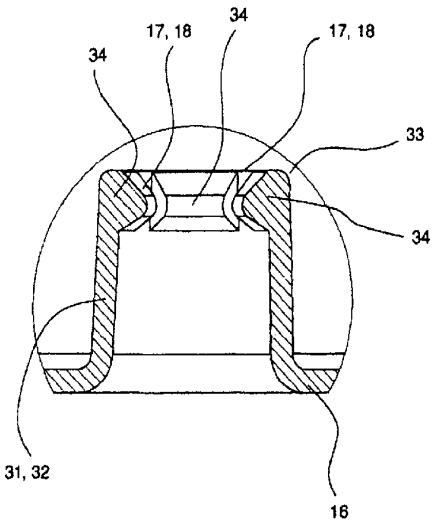


Fig. 8

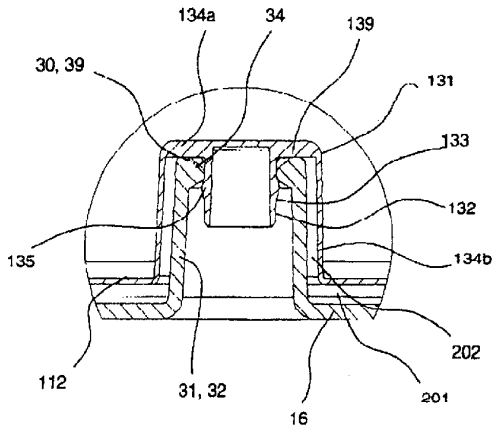


Fig. 9

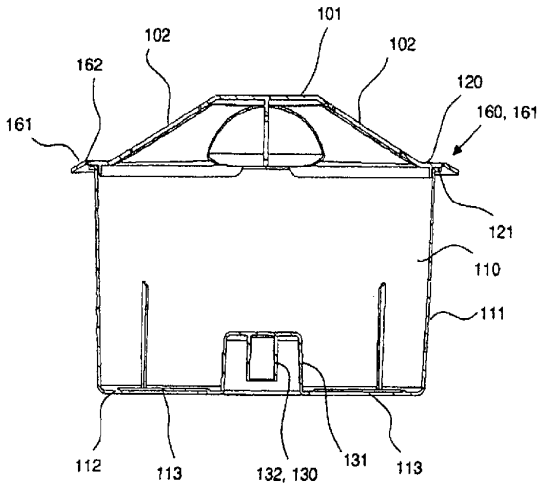

101
102
102
162
120
160, 161
161
121
110
111
112
113
132, 130
131
113

Fig. 10

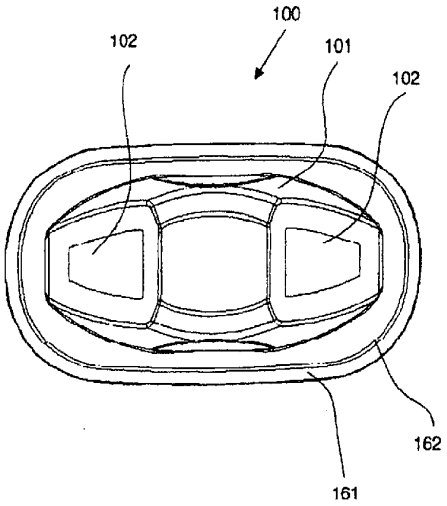


Fig. 11

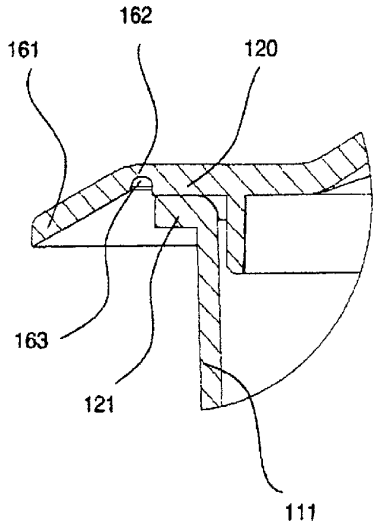


Fig. 12

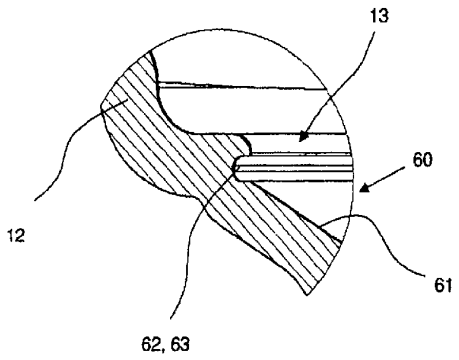


Fig. 13

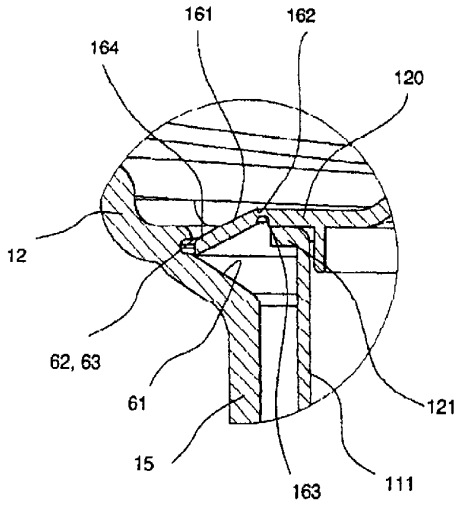


Fig. 14

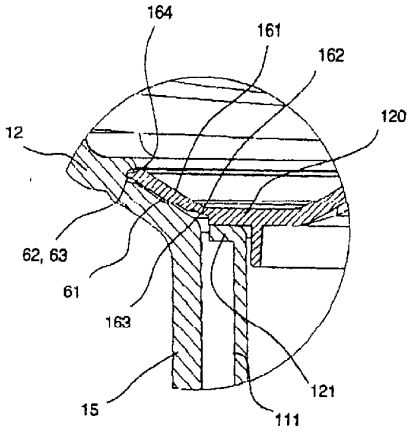


Fig. 15

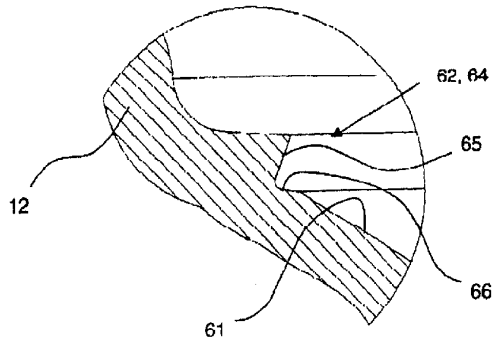


Fig. 16

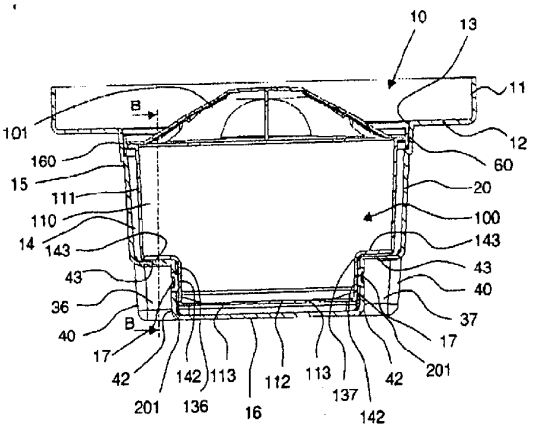

10
13
11
101
B
12
160
60
15
20
111
100
110
143
14
143
43
43
40
36
37
B
40
17
17
42
142
113
112
113
42
201
201
136
16
137
142

Fig. 17

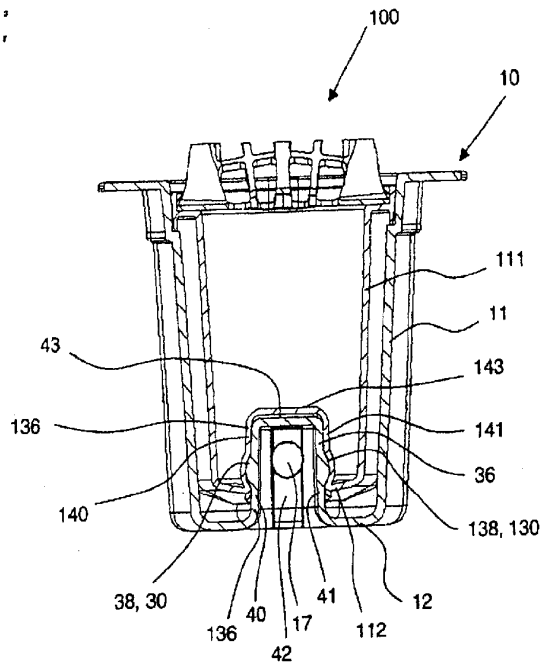

100
10
111
11
43
143
136
141
36
140
138, 130
38, 30
136
40
17
42
41
112
12

Fig. 18

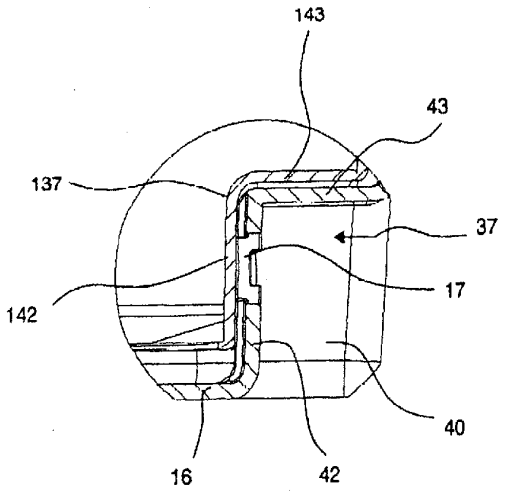


Fig. 19