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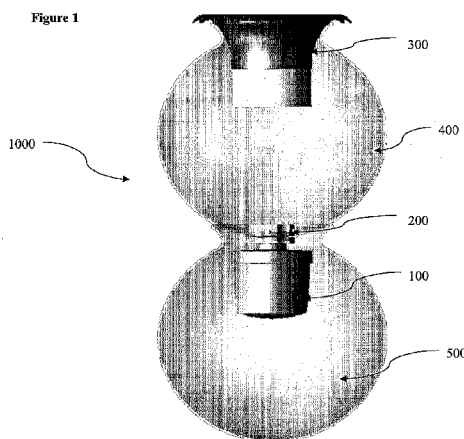
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(54) Title: A SYSTEM AND METHOD FOR WATER PURIFICATION



(57) Abstract: The invention relates to a water purification system comprising a filter for placement at an inlet of a water storage vessel; the filter including a filter material through which water passes to enter the water storage vessel; and a purifier configured for placement on the outside surface of the water storage vessel and including an inlet for receiving water through an opening in the water storage vessel; the purifier comprising a purification chamber holding a composition for water purification; the composition for water purification includes rice husk ash; water received from the storage vessel passing in a reverse flow through the purification chamber. The invention also relates to a method of water purification comprising a first stage of passing water through a filter placed at the inlet of a water storage vessel to remove particulate matter and to obtain filtered water, and a second stage of passing the filtered water through a purifier connected to an outside surface of the water storage vessel and containing a composition for purification of water to obtain purified water, the composition including rice husk ash; the flow of water through the purifier in a reverse flow.

A SYSTEM AND METHOD FOR WATER PURIFICATION

The invention relates to the treatment of water. More particularly the invention relates to a system and method for water purification.

DESCRIPTION OF RELATED ART

Clean potable water is a basic human requirement. However, a large portion of the world's population, especially those living in developing countries do not have access to clean potable water.

Growing population, lack of sanitary conditions, poverty, poor planning, industrial pollution, over exploitation of natural water and natural disasters are the main reasons of contamination of water. This contaminated water is the source of many diseases such as diarrhea, dysentery, fever, abdominal pain, and constipation, caused due to bacterial contamination transmitted through water. In India for example, as per the data collected by the Ministry of Health and Family Welfare, in 2003 there were 10.5 million cases of diarrhea with 4709 deaths resulting majorly due to consumption of contaminated water. According to the World Health Organization, the provision of safe water alone can reduce diarrheal and enteric disease by up to 50%, even in the absence of improved sanitation and other hygiene measures.

Many water purification devices like in-line (electricity operated) devices, terminal end devices including counter top and faucet mounted filtration and self-contained batch system including gravity fed systems have been introduced into the market. However, many communities of the developing countries do not have access to piped water or reliable electricity connection to make use of inline or electrically driven purification units. They also do not have access to central water purification units installed near the water bodies from where they source their water. Moreover, the people in these communities cannot afford the point-of-use water purifiers currently available in the market. The maintenance requirements and the high cost of consumables of these purifiers pose further hurdles for the adoption of these devices.

Thus there is a need for a simple gravity driven water purification system that is inexpensive, easy to use and effective in purifying common drinking water.

SUMMARY

The invention relates to a water purification system comprising a filter for placement at an inlet of a water storage vessel; the filter including a filter material through which water passes to enter the water storage vessel; and a purifier configured for placement on the outside surface of the water storage vessel and including an inlet for receiving water through

an opening in the water storage vessel; the purifier comprising a purification chamber holding a composition for water purification; the composition including rice husk ash; water received from the storage vessel passing in a reverse flow through the purification chamber.

The invention relates to a water purification system comprising a purifier and a filter, the purifier comprising an outer casing configured for connecting the purifier to an outside surface of a water storage vessel; the purifier comprising a purification chamber configured to hold a composition for water purification; the composition including rice husk ash; an upper chamber formed above the purification chamber and a bottom chamber formed below the purification chamber; a channel for conveying water received from the storage vessel to the bottom chamber, water entering the purification chamber from the bottom chamber and passing through the purification chamber; and an outlet passage for conveying the water exiting the purification chamber to an outlet of the purifier and; the filter comprising, a receptacle having a hollow body extending between a first and second end, the receptacle having an opening at the first and second end for allowing the flow of water through the receptacle; the first end sized smaller than the inlet of the storage vessel and the second end sized larger than the inlet of the storage vessel; and a filter bag open at one end, the open end of the filter bag detachably coupled to the first end of the receptacle, the filter bag covering the opening of the receptacle at the first end.

The invention relates to a water purification system comprising a purifier and a connector for attaching the water purifier to a storage vessel, the storage vessel having an opening for the flow of a liquid from the vessel under gravity, the purifier comprising an outer casing configured for connecting the purifier to an outside surface of a water storage vessel; a purification chamber configured to hold a composition for water purification; the composition including rice husk ash; an upper chamber formed above the purification chamber and a bottom chamber formed below the purification chamber; a channel for conveying water received from the storage vessel to the bottom chamber, water entering the purification chamber from the bottom chamber and passing through the purification chamber; and an outlet passage for conveying the water exiting the purification chamber to an outlet of the purifier and; the connector comprising a retainer for placement within the storage vessel comprising a hollow channel configured to align with the opening of the storage vessel; and an adaptor for placement outside the storage vessel comprising a hollow channel axially aligned with the channel of the retainer; the channel of the adaptor configured to retentively couple with the channel of the retainer such that the channel of the retainer and the channel of

the adaptor form a channel of variable length for the flow of liquid from the storage vessel to the purifier.

The invention relates to a method of water purification comprising a first stage of passing water through a filter placed at the inlet of a water storage vessel to remove particulate matter and to obtain filtered water, and a second stage of passing the filtered watered through a purifier connected to an outside surface of the water storage vessel and containing a composition for purification of water to obtain purified water, the composition for water purification including rice husk ash; the flow of water through the purifier in a reverse flow.

BRIEF DESCRIPTION OF ACCOMPANYING DRAWINGS

The accompanying drawing illustrates the preferred embodiments of the invention and together with the following detailed description serves to explain the principles of the invention.

FIG 1 illustrates a water purification system in accordance with an embodiment of the invention.

FIG 2 illustrates a sectional view of the purifier in accordance with an embodiment.

FIG 3 illustrates a sectional view of an outer casing in accordance with an embodiment of the invention.

FIG 4 illustrates an isometric view of a lid of the outer casing in accordance with an embodiment of the invention.

FIG 5 illustrates a sectional view of an inner container in accordance with an embodiment of the invention.

FIG 6 illustrates a top view of an inner container with an intermediate plate in accordance with an embodiment of the invention.

FIG 7 illustrates an intermediate plate in accordance with an embodiment of the invention.

FIG 8 illustrates a purifier in accordance with an alternate embodiment.

FIG 9 illustrates a sectional view of an embodiment of channel and outlet passage.

FIG 10 illustrates a sectional view of the purifier attached to the water storage vessel through a connector in accordance with an embodiment.

FIG 11 illustrates an embodiment of the connector with its parts in an un- assembled form.

FIG 12 illustrates an isometric view of an embodiment of the connector as illustrated by figure 11.

FIG 13 illustrates a front view of a retainer in accordance with an embodiment of the invention.

FIG 14 illustrates an isometric view of a retainer in accordance with an embodiment of the invention.

FIG 15 illustrates a front view of an adaptor in accordance with an embodiment of the invention.

FIG 16 illustrates an isometric view of an adaptor in accordance with an embodiment of the invention.

FIG 17 illustrates a connector in assembly in accordance with an embodiment of the invention.

FIG 18 illustrates an isometric view of a connector in assembly in accordance with an embodiment of the invention.

FIG 19 and 20 illustrate a tool for forming an opening in the storage vessel in accordance with an embodiment.

FIG 21 illustrates a tool connected to a tool holder for forming an opening in the storage vessel.

FIG 22 illustrates a sectional view of a filter in assembly in accordance with an embodiment.

FIG 23 illustrates a receptacle in accordance with an embodiment.

FIG 24 illustrates a receptacle in accordance with another embodiment.

FIG 25 illustrates a filter bag in accordance with an embodiment.

FIG 26 illustrates an embodiment of the mechanism for coupling the filter bag to the receptacle.

DETAILED DESCRIPTION

To promote an understanding of the principles of the invention, reference will be made to the embodiment and specific language will be used to describe the same. It will nevertheless be understood that no limitation of scope of the invention is thereby intended, such alterations and further modifications in the illustrated system and such further applications of the principles of the inventions as disclosed therein being contemplated as would normally occur to one skilled in art to which the invention relates.

Rice husk is a perennially renewable agro-waste available at virtually no cost wherever rice paddy is grown. On combustion, the rice husk ash residue contains 75-95% silica, 4-12% carbon and the rest comprising various metal oxides such as alkali, alkali earth metal and iron oxides. On account of its crypto-crystalline or amorphous and highly porous structure, the BET (Brunauer Emmett Teller) surface area of rice husk ash can be as high as 80-100 square meters per gram, depending on the conditions employed for the combustion of rice husk. Its high surface area and porosity make rice husk ash an effective filtration medium that removes particulate matter as well as color and odor from water. Rice husk ash is a highly adsorbent material and is capable of removing bacteria as well as turbidity from the water.

Rice husk ash is thus a suitable water purifier material as it contains an activated surface with abundant pores, has a large surface area, is easily available and is cheap. Rice husk when used in a water purifier that modulates the flow of water over the rice husk ash is suitable for the purification of the water.

The rice husk ash used for the composition of treatment of water may be any rice husk ash that is produced by burning rice husk. The rice husk may be produced by burning rice husk in heaps, in a step grate furnace, fluidized bed furnace or tube-in-basket (TiB) burner. The rice husk ash may also be obtained from boilers and brick kiln, provided it is free of unburned husk and wood tar, grit, stone, and fused lumps of silica. The particle size of rice husk ash may be in the range of 38 to 850 microns and preferably the particle size is less than 425 microns.

Bactericidal agents are known to remove bacteria from water. The bactericidal agent silver is particularly useful in removing bacteria from water. In accordance with an embodiment the composition for treatment of water comprises of rice husk ash and a bactericidal agent bonded to the rice husk ash.

The composition for water purification comprises of rice husk ash and at least one bactericidal agent bonded to the rice husk ash. More than one bactericidal agent may be bonded to the rice husk ash or a mixture of one or more bactericidal agents may be bonded to the rice husk ash.

The composition for water purification comprises of at least ten percent by weight of rice husk ash and preferably sixty percent. The composition for treatment of water comprises at least 0.01 % by weight of a bactericidal agent.

The bactericidal agent may be any compound with bactericidal property including but not limited to silver, copper, copper sulphate and their compounds.

As used herein the bonding of a bactericidal agent to the rice husk ash includes a chemical bonding, adsorption or trapping of bactericidal particles in the pores of the rice husk ash.

The composition for treatment of water comprises rice husk ash and silver particles as a bactericidal agent bonded to the rice husk ash. In accordance with an embodiment the composition for treatment of water comprises rice husk ash and nano silver particles as a bactericidal agent bonded to the rice husk ash.

A water purification system is described. With reference to the accompanying figures and initially to figure 1 a water purification system (1000) in accordance with an embodiment is illustrated. The water purification system comprises of a purifier (100) and a filter (300).

The water purifier (100) is configured for attachment to commonly available water storage vessels and functions on a reverse flow of water through the purifier. The purifier does not require any external energy for operation as the flow of water through the purifier is under the force of gravity. The filter is configured for placement at the inlet of the water storage vessel such that filtered water enters the water storage vessel for subsequent purification by the purifier. As illustrated, the filter (300) is placed at the inlet while the purifier is connected on an outside surface of the storage vessel (400). The water storage vessel (400) along with the filter and the purifier may be placed on another storage vessel (500) that collects the water purified by the purifier. The filter and the purifier provide for a two stage water purification system that is easily assembled using any storage vessel including commonly available pots.

The purifier is configured to form a fluid passage between the water storage vessel and the purifier outlet. The fluid passage is a reverse flow of the water through the purification chamber, a reverse flow signifying the movement of water through the purification chamber in a direction against the force of gravity or in an upward direction. A reverse flow through the purification chamber provides for a controlled purification with a longer and uniform period of contact between the water and the purification bed. The reverse flow of the water prevents formations of channels within the purification bed and consequently provides a uniform purification throughout the life of the water purifier.

Figures 2 illustrate a water purifier (100) in accordance with an embodiment. The purifier (100) includes an outer casing (120) having an attachment means (190) configured

for attaching the purifier to an outside surface of a water storage vessel. The attachment means is also configured for allowing the passage of water in to the purifier. The attachment means may be integrally formed on the outer casing or may be an external component connected to it.

The purifier includes a purification chamber (140), a bottom chamber (160) and an upper chamber (150). The bottom chamber is positioned below the purification chamber while the upper chamber is positioned above the purification chamber. The purifier is also provided with a channel (170) configured for conveying water received from the storage vessel to the bottom chamber and an outlet passage (180) for conveying the water exiting the purification chamber to a purifier outlet (123). The purification chamber holds the composition for water purification (101).

In the embodiment illustrated, the outer casing includes within it an inner container (130), that forms a bottom chamber (160) between the outer casing and the inner container. The inner container includes the purification chamber (140) and the upper chamber (150).

The outer casing in accordance with the embodiment illustrated comprises of a main body (121) and a lid (122). Figure 3 illustrates a main body of the outer casing of a purifier, while figure 4 illustrates a lid of the outer casing. The lid (122) is configured for attachment with the main body (121) such that in the assembled condition forms a closed container. The main body is a hollow receptacle with the bottom surface (128) having a purifier outlet (123).

In the illustrated embodiment the attachment means is in the form of a projection (124) comprising of internal threads (125) that connect with corresponding threads or slots on the water storage vessel or on a connector element provided on the water storage vessel.

The lid (122) may be attached to the main body (121) by any means including but not limited to threads, push fit, snap fit or ultrasonic welding.

Figures 5 and 6 illustrate an inner container (130) in accordance with an embodiment of the invention. The inner container (130) is sized smaller than the outer casing (120) such that when the inner container is placed within the outer casing gaps or channels are formed between the outer casing and the inner container. The inner container includes a main body (131) and a lid (132). The main body (131) is also a hollow receptacle, preferably of the same shape as the main body of the outer casing, having a bottom surface (134). The lid (132) and the main body (131) together form a closed container in assembly.

In the embodiment illustrated, the inner container is configured to include the purification chamber (140) and the upper chamber (150). The purification chamber is formed

between the bottom surface (134) of the inner container and an intermediate surface (135) while the upper chamber is formed between the intermediate surface (135) and the lid (132).

The bottom surface of the inner container may be integrally formed with the main body (131) or may be formed separately as a lid or plate that fits on the main body (131). It is preferred that at least one of the lid (132) or the bottom surface (134) be integrally formed with the main body, while the other surface be attached to the main body as a lid. In the embodiment illustrated, the bottom surface is integrally formed with the main body while the lid is attached to the main body as a lid.

The inner container includes an intermediate surface (135) that forms the purification chamber and the upper chamber. The intermediate surface may be integrally formed with the main body or may be formed separately as a plate that fits within the inner container. The inner container may be provided with grooves or slots to receive the intermediate plate. It is preferred that the intermediate plate is separately formed. A separately formed intermediate plate allows for easy filling of a water purification composition in the purification chamber.

In accordance with the embodiment illustrated, the bottom surface (134) is provided with perforations (137) that allow the entry of water into the purification chamber. The intermediate plate (135) is also provided with perforations (136) that allow the exit of water from the purification chamber. The intermediate plate (135) holds the water purification composition in place within the inner container.

The inner container contains an outlet passage (180) for conveying water exiting the purification chamber to the outlet (123) of the purifier. In the embodiment illustrated, the outlet passage is a hollow stem (133) centrally placed within the main body (131). One or more such hollow stems may be formed for conveying the water exiting the purification chamber to the outlet (123). The hollow stem illustrated in the embodiment passes through the purification chamber.

The lid (132) may be attached to the main body (131) by any means including threads, push fit, snap fit or by ultrasonic welding. The lid may be used to keep the intermediate plate (135) pressed against the water purification composition (101) of the purification chamber so as to provide a compact purification bed in the purification chamber, and at least one spring may be placed between the lid and the intermediate plate for this.

The composition for water purification may also be kept under compaction by any means including but not limited to the use of springs, swelling chemicals and direct pressing.

In the embodiment illustrated the outer casing has a slot (127) formed on the bottom surface (128) that connects the outlet passage to the purifier outlet (123). A corresponding projection is provided on the outlet passage that fits within the slot (127) to form a leak proof joint between the outlet passage and the purifier outlet. In the embodiment illustrated, the hollow stem (133) formed in the inner container as an outlet passage includes a projection (139) that fits within the slot (127).

The purifier is also provided with a channel (170) for conveying the water received from the storage vessel to the bottom chamber. The channel may be in the form of a hollow stem or tube that connects the storage vessel to the bottom chamber. The channel may also be formed between at least one side edge of the outer casing and the inner container. In the illustrated embodiment the inner container is placed centrally within the outer casing such that a channel (170) is formed along the gaps between the inner surface of the outer casing and the inner container.

With reference again to figure 2 the flow of water through the water purifier is illustrated. Water from the storage vessel enters the water purifier through the inlet (126), as marked by the numeral (1). This water then flows along the top surface of the lid (132) into channel (170) as marked by the numeral (2). Water from the channel (170) enters the bottom chamber for subsequent entry in to the purification chamber (140). This has been depicted in the figure 2 by the numeral (3). Water from the bottom chamber enters the purification chamber and passes over the purification bed that includes rice husk ash, as marked by numeral (4). Water exiting the purification chamber is received in an upper chamber (150) as marked by the numeral (5). This water then flows in to the outlet passage towards the purifier outlet, as marked by the numeral (6). Lastly, water exits the purifier through the purifier outlet as marked by the numeral (7).

With reference to figure 8 a water purifier in accordance with an alternate embodiment is illustrated. The purifier includes a purification chamber (140), a bottom chamber (160) and an upper chamber (150). The bottom chamber is positioned below the purification chamber while the upper chamber is positioned above the purification chamber. The purifier is also provided with a channel (170) configured for conveying water received from the storage vessel to the bottom chamber and an outlet passage (180) for conveying the water purified by the chamber to a purifier outlet (123).

In the embodiment illustrated, the purification chamber is formed in the purifier by a pair of perforated plates (145, 146) placed between the bottom surface (128) and a top surface

(122) of the outer casing. The first perforated plate (145) is placed closer to the top surface of the outer casing and forms an upper chamber (150) between itself and the top surface (122). The second plate (146) is placed closer to the bottom surface (128) and forms a bottom chamber (160) between itself and the bottom surface. The plates (145, 146) are similar to the intermediate plate as illustrated in figure 7, and have openings (136) formed on them. The second plate (146) allows for the entry of water in to the purification chamber from the bottom chamber while the first plate (145) allows for the exit of water from the purification chamber. The plates are configured to fit into slots provided in the main body (121) of the outer casing. One of the plates may be integrally formed within the outer casing with the second plate positioned after the water purification composition has been placed within the purification chamber.

The intermediate plate (135) or the perforated plates (45, 46) may have a porous mesh attached on at least one surface covering the perforations. The mesh may be attached to the perforated plate by any means including but not limited to gluing, heat welding and ultrasonic welding and preferably the mesh is attached to the perforated plate by heat welding.

A channel (170) for conveying water received from the storage vessel through inlet (126) to the bottom chamber is provided. In the illustrated embodiment the channel is a hollow stem (171) that passes through the purification chamber and connects the inlet (126) with the bottom chamber. The hollow stem has been illustrated as centrally placed within the outer casing and passing through the purification chamber. However, one or more such hollow stems may be placed between the inlet and the bottom chamber. The inlet (126) is also configured to form a leak proof joint with the water storage vessel or a connector provided on the water storage vessel.

Water from the bottom chamber enters the purification chamber and exits in to the upper chamber. An outlet passage is provided for conveying water from the upper chamber to the purifier outlet. In the embodiment illustrated the outlet passage is formed as a hollow stem that is placed centrally within the purification chamber.

The channel (170) and the outlet passage (180) may be formed as concentric hollow stems passing through the purification chamber as illustrated in figure 9. The combined hollow stem (190) includes a central channel (171) and an outer outlet passage (181). The top end (172) of the channel (171) may be connected with the inlet (126) for receiving water from the storage vessel and having an outlet (173) opening into the bottom chamber. The outlet passage (181) surrounds the channel (171) and has an inlet (182) operatively connected

to the upper chamber (150) for receiving water exiting the purification chamber and an outlet (183) for conveying water to the purifier outlet (123). The combined channel and outlet passage (190) is provided with a projection (191) that fits within slot (127) of the outer casing.

With reference again to figure 8 the flow of water through the purifier is explained. Water enters the purifier from the storage vessel through inlet (126) into the channel (170) to reach the bottom chamber (160). Water from the bottom chamber enters the purification chamber (140) through the perforations on plate (146). Water passes through the purification chamber and over the rice husk ash and exits the purification chamber through the perforations of plate (145) into the upper chamber (150). The water collected in the upper chamber enters the outlet passage (180) and is conveyed to the purifier outlet (123).

In accordance with an aspect a nozzle (161) to meter the flow of the water is placed at the purifier outlet (123). The nozzle controls the rate of flow of water through the water purifier such that the flow of water is maintained nearly constant throughout the life of the purifier. The nozzle also helps in regulating the time of contact of water with the water purification composition. The contact time is adjusted to provide maximum purification while providing a reasonable flow rate. As illustrated in figure 2 and 8 the nozzle is placed within the outer casing of the water purifier. The nozzle is configured to fit into a slot (127) formed in the outer casing.

The purifier is attached to the water storage vessel by an attachment means that is present on the outer casing. In the embodiment illustrated the attachment means (190) is formed on the lid (122) of the outer casing. The attachment means may be any means including but not limited to threads, push fit or snap fit that connect with corresponding threads or slots on the water storage vessel or on a connector element provided on the water storage vessel.

Figure 10 illustrates a purifier connected to a connector element (200) for attaching the purifier to an outside surface of a storage vessel (400) such that a leak proof fluid passage is formed between the storage vessel (400) and the purifier (100). An embodiment of a connector (200) in accordance with an embodiment for attaching a purifier to a storage vessel is illustrated in figure 11. The connector is capable of attaching a purifier to most water storage vessels including earthen pots, plastic pots and plastic buckets. The connector is also capable of connecting a purifier to different water storage vessels having different thickness. The connector provides a leak proof joint between a water storage vessel and a purifier. To

accommodate the storage vessels of different thickness the connector provides a leak proof channel between the storage vessel and the purifier, such that the channel has varying length adaptable to the thickness of the storage vessel.

The connector is capable of connecting a purifier to any surface of a storage vessel, though it is preferred that the purifier is connected to a surface towards the lower half or the bottom of the storage vessel. The storage vessel preferably has an opening for the passage of water from the storage vessel. It is preferable that the opening of the storage vessel is of a specific size such that the channel of the connector firmly fits in the opening while providing a leak proof joint.

With reference to the accompanying drawings and initially to figures 11 and 12 a connector (200) in accordance with an embodiment is illustrated. The connector (200) includes a retainer (220) for placement within the storage vessel and an adaptor (230) for placement outside the storage vessel. The retainer and adaptor include hollow channels that are axially aligned that mate with each other when the connector is assembled.

Figures 13 and 14 illustrate a retainer (220) in accordance with an embodiment. The retainer includes a laterally extending flange (222) that is larger than the opening in the vessel and retains the connector to the storage vessel. The retainer has a hollow channel (221) formed on the flange (222) that is configured to align with the opening of the storage vessel. The channel (221) may be a cylindrical opening extending through the thickness of the flange. In the embodiment illustrated the channel (221) includes an extension (224) that is configured to enter the opening of the storage vessel. The channel (221) allows water or any liquid stored in the vessel a passage out of the vessel, while the flange covers the sides of the opening in the storage vessel. The flange exerts a compressive force on the washer (240) which in-turn form a leak-proof joint surrounding the opening in the storage vessel to ensure a leak proof passage from the vessel.

The retainer is also preferably provided with a grip (223), four in the embodiment illustrated, to facilitate handling of the retainer and to turn the retainer for engagement with other parts of the connector.

Figures 15 and 16 illustrate an adaptor in accordance with an embodiment of the invention. The adaptor (230) includes a laterally extending flange (232) that is larger than the opening of the storage vessel and is configured to rest against the outside surface of the storage vessel. The flange exerts a compressive force on the washer (250) which in-turn form

a leak-proof joint surrounding the opening in the storage vessel to ensure a leak proof passage from the vessel.

The adaptor also includes a hollow channel (231) that is configured to axially align with the channel (221) of the retainer (220). The channel (231) may be a cylindrical opening extending through the thickness of the flange (232). In the embodiment illustrated the channel (231) includes an extension (234) that is configured to enter the opening of the storage vessel.

The channel (231) of the adaptor is configured to retentively couple with the channel (221) of the retainer such that the channel of the retainer and the channel of the adaptor form a channel (260) of variable length for the flow of the liquid from the storage vessel to the purifier. The channel (260) allows water or any liquid stored in the vessel a passage out of the vessel, while the flanges (222, 232) along with the washers (240, 250) cover the sides of the opening in the storage vessel to ensure a leak proof passage from the vessel.

The adaptor includes a purifier coupler (236) at the lower end for attaching a purifier to the storage vessel. In the embodiment illustrated the purifier coupler (236) includes screw threads (237) that are configured to mate with corresponding mates provided on the purifier. The purifier coupler (236) of the adaptor may be any means including but not limited to threads, snap fit or push fit. The adaptor may be integrally formed with the purifier as illustrated in figure 8. The adaptor is integrally formed on the top surface of the outer casing in the embodiment.

The adaptor is preferably provided with a grip (233), four in the embodiment illustrated to facilitate handling of the adaptor and to turn the adaptor for engagement with other parts of the connector.

In the embodiment illustrated the channels of both the retainer and the adaptor extend into the opening of the storage vessel. However, in accordance with other embodiments either channel may extend in to the opening of the storage vessel, or one channel may extend more than the other. As the channels of the retainer and the channel of the adapter are retentively coupled to each other, in the case of a channel extension, then that extension is configured to retentively couple with the other channel or the extension of the other channel to provide a channel (260) of the connector.

The channels (221 and 231) are coupled by any means that allows a variable height of the channel (260) or a variable distance between the flanges (222 and 232) of the retainer and the adaptor.

The channels may be retentively coupled by any of the following, but not limited by threads, stepped snap or a stepped push fit. The channel (260) formed by coupling the channel (221) of the retainer and the channel (231) of the adaptor is capable of variable length to accommodate for different thickness of storage vessels without comprising on the leak proof passage from the storage vessel to the purifier.

By way of specific example, and as illustrated in the embodiments of figures 17 and 18, the channel (221) of the retainer is provided with external threads (225). In the embodiment illustrated these threads are provided on the channel extension (224). The adaptor is provided with corresponding internal threads (235). In the embodiment illustrated these threads are provided on the channel extension (234). The external threads (225) of the retainer mate with the internal threads (235) of the adaptor to retentively couple the retainer to the adaptor. The channel (221) including the channel extension (224) of the retainer joins with the channel (231) including the channel extension (234) to form the channel (260) of the connector. The length of the channel (260) can be varied by screwing the retainer and adaptor towards or away from each other. The grips (223 and 233) are used to screw the retainer and the adaptor together.

As illustrated in figure 17, the retainer and the adaptor are screwed towards each other till the passage is adapted for the thickness of the storage vessel (400) and a leak proof joint is formed. For a storage vessel with a different thickness, the length of the channel (260) can be increased or decreased by moving the retainer and adaptor towards or against each other.

In accordance with another embodiment, the external threads may be provided on the adaptor and the corresponding internal threads may be provided on the retainer. In the case of only one of the retainer or the adaptor having a channel extension, the external threads are provided on the channel extension with the corresponding internal threads formed on the channel of the other element.

It is preferred that the external threads be formed on the channel of the retainer and corresponding internal threads be formed on the channel of the adaptor such that minimum opportunity for leakage is provided for the passage of water.

As the connector is capable of attaching a purifier to any commonly used storage vessel, such as earthen ware pots and plastic buckets, a system for attaching a purifier to a storage vessel is provided. The system includes the connector and its various embodiments described and a cutting tool. The cutting tool is configured to make an opening in the storage

vessel of the required size that corresponds to the size of the channels in the retainer and the adaptor.

With reference to figure 19 and 20, a cutting tool configured to make an opening in a storage vessel is illustrated. The cutting tool (270) comprises of a cutting head (271), configured to form an opening in the storage vessel and an attachment means (272) for attaching the cutting tool to a tool holder. Alternatively, the tool may be integrally formed with a tool holder and the cutting tool will not require an attachment means.

The cutting head (271) comprises of cutting teeth (273) that are configured to form an opening in the vessel that corresponds to the size of the channel of the retainer of the adaptor. In the specific embodiment illustrated, the cutting tool is provided with two outside teeth (274 and 275) and a locating tooth (276). The teeth (274 and 275) define the diameter of the opening to be formed in the storage vessel while the tooth (276) assists in centering the tool.

As illustrated in figure 21, the cutting tool is attached to a tool holder (280) that is adapted to receive a cutting tool. In the embodiment illustrated, the tool holder is provided with a socket (281) configured to receive the attachment means (272) of the cutting tool. The tool holder (280) is provided with at least one grip (282), four in the embodiment illustrated, that assist in using the tool holder to cut an opening in the storage vessel.

The attachment means (272) may also be configured to attach the cutting tool to the retainer (220) or the adaptor (230). The grip (223) of the retainer is useful in using the retainer as a tool holder to cut an opening in the storage vessel.

For making an opening in the storage vessel, the tool (270) is attached to either a tool holder or the retainer or adaptor. The tool so attached is then placed at the point on a storage vessel where the opening is required, such that the cutting edge (273) of the cutting tool is in touch with the wall of the vessel. The tool is then rotated in a circular motion until the tool passes through the wall of the vessel and an opening is formed of the desired size.

Figure 22 illustrates a water filter (300) in accordance with an embodiment. The water filter is configured such that it can be used on different water storage vessels having inlets of different sizes.

The water filter includes a receptacle (320) for retaining the filter to a water storage vessel and a filter bag (330) detachably coupled to the receptacle. The filter is placed at the inlet or mouth of a storage vessel as illustrated in figure 22. The filter is placed such that at least some portion of the receptacle (320) is retained at the inlet (460) of the storage vessel while remaining portion of the receptacle along with the filter bag (330) extends down into

the storage vessel. Water entering the storage vessel is guided by the receptacle into the filter bag where particulate matter is retained.

Figure 23 illustrates the receptacle (320) of the water filter in accordance with an embodiment. The receptacle has a hollow main body (321) extending between a first end (340) and a second end (350) of the receptacle. The first end (340) has an opening (341) and the second end (350) has an opening (351) for allowing the flow of water through the receptacle. In accordance with an aspect the first end (340) of the receptacle is sized smaller than the inlet of the storage vessel and the second end (350) of the receptacle is sized larger than the inlet of the storage vessel such that receptacle is retained by the storage vessel at its inlet while the first end (340) extends down into the storage vessel. The main body of the receptacle may have any shape including but not limited to cylindrical or conical and preferably the main body has a conical shape.

In accordance with an embodiment the second end (350) of the receptacle has at least one extension configured for retaining the filter to the inlet of the water storage vessel. In the illustrated embodiment the extension (323) is in the form of a ledge present around the periphery of the second end (350) of the receptacle. In the illustrated embodiment a peripheral lip (324) extends downwards from the ledge such that when the filter is put on the storage vessel the ledge may overlap with the edge of the inlet of the storage vessel. In accordance with an embodiment the extension is in the form of a flat plate that extends on at least one side of the receptacle. In the embodiment illustrated in figure 24 the plate extends around the periphery of the second end (350). The second end, or the body between the first end and the second end of the receptacle allows the filter to be retained by a number of storage vessels having inlet of different sizes, therefore allowing the filter to be used for a wide variety of storage vessels.

Figure 25 illustrates an embodiment of the filter bag (330). The filter bag has a main body (331) with an opening (332) at one end. The main body (330) of the filter bag may be of any shape including but not limited to cylindrical or conical. The main body (331) in the illustrated embodiment is a hollow cup shaped cylinder having a closed end (336) and an opening (332).

The filter bag may be made of fine porous material capable of removing floating debris and particulate matter from water. In accordance with an aspect the filter bag is made of non woven sandwiched material including but not limited to cotton cloth, canvas, melt blown polypropylene fabric, melt blown polyester fabric, spun bound woven fabric, spun

bound non-woven fabric, needle punched polyester fabric, needle punched polypropylene fabric, mix of spun or melt blown fabric and preferably the filter bag is made of non woven needle punched polypropylene fabric.

In accordance with an aspect the filter bag is adapted to be detachably coupled to the first end of the receptacle such that the filter bag covers the opening (341) of the first end of the receptacle. This allows the filter bag to be removed from the receptacle with ease for washing or cleaning and removal of retained particulate matter. Moreover the filter bag can be replaced without the need to replace the entire filter.

Figure 26 illustrates an embodiment of the mechanism for coupling the filter bag to the receptacle. In the embodiment illustrated, a coupler (333) is present at the opening (332) of the filter bag. A holder (322) is present at the first end (340) of the receptacle for coupling with the coupler (333) of the filter bag. The coupler may be coupled to the holder by any means including but not limited to threads, snap fit or a notch joint. In the embodiment illustrated the coupler (333) on the filter bag is in the form of ring (334) that is attached to the main body (331) of the filter bag at the opening (332). The ring (334) has a projection (335) configured for fitting into a slot (325) on the first end (340) of the receptacle. The slot (325) is formed between a collar (326) present at edge of the first end (340) of the receptacle and a projection (327) present at the inner surface of the opening (341).

In accordance with an aspect the coupler is made of food grade plastic. In accordance with an aspect the ring (334) may be attached to the filter bag by any means including but not limited to heat sealing, ultrasonic sealing or by molding and preferably the ring should be attached to the filter bag by molding.

To assemble the filter (300), the filter bag (330) is placed inside the receptacle (320) such that the projection (335) of the filter bag snap fits into the slot (325) of the receptacle to form a mostly leak proof joint.

In accordance with an aspect the receptacle is sized corresponding to average sizes of inlets of commonly used storage vessels. In accordance with an aspect the preferred diameter of the opening (350) of the receptacle body should be between 50 to 500 mm and preferably the opening diameter of the receptacle is 200mm. In accordance with an aspect the preferred diameter of the opening (340) of the receptacle body should be between 10 to 500 mm and preferably the diameter of the receptacle is 100mm. In accordance with an aspect the distance between the first end and the second end of the receptacle should be between 20 to 300mm

and preferably the distance should be 80mm. In accordance with an embodiment the receptacle is made of food grade plastic.

In accordance with an aspect the thickness of the fabric may be between 0.1mm to 20 mm and preferably the thickness of the fabric should be 1.9 mm. In accordance with an aspect the pore size of the filter bag should be between 0.2 to 50 micrometers and preferably the pore size of the filter bag is 5 micrometers. In accordance with an aspect the length of the filter bag should be made such that the flow rate of should be between 0.1 and 100 liters per minute and preferably the flow rate of the filter bag should be 10 litres per minute. In accordance with an aspect the length of the filter bag may be between 0 to 300 mm and preferably the length of the filter bag is 100 mm.

In accordance with an aspect the purifier is made of food grade plastic. In accordance with an aspect the retainer and the adaptor is made of food grade plastic.

A method for water purification using the water purification system is described. The filter of the system is placed at the inlet of the water storage vessel and the purifier is connected to the water storage vessel using a connector. A second storage vessel is placed below the first vessel to receive the water purified by the purifier.

The water to be purified is first passed through the filter in to the first storage vessel. The filter retains particulate matter and filtered water is collected in the purifier. This filtered water then passes through the connector in to the purifier under gravity and is sent to the bottom chamber of the purifier. Water from the bottom chamber enters and passes through the purification chamber where a composition for purification of water is contained. Purified water exits the purification chamber and is passed by the purifier to a purifier outlet where it is collected in the second water storage vessel. The easily detachable components of the system allow for easy maintenance and cleaning and the system can be assembled for purification quickly.

The effectiveness of the water purification depends to a large extent on the water purification composition. Various such compositions may be used including but not limited to alum, charcoal or rice husk ash with or without coating of bactericidal agents.

The water purifier as described by this document is a simple and effective water purifier that can remove contaminants from water. Moreover the water purifier may be attached to any water storage vessel.

We claim:

1. A water purification system comprising:
 - a filter for placement at an inlet of a water storage vessel; the filter including a filter material through which water passes to enter the water storage vessel; and
 - a purifier configured for placement on the outside surface of the water storage vessel and including an inlet for receiving water through an opening in the water storage vessel; the purifier comprising a purification chamber holding a composition for water purification, the composition for water purification including rice husk ash; water received from the storage vessel passing in a reverse flow through the purification chamber.
2. A water purifier as claimed in claim 1 wherein the composition for treatment of water comprises at least one bactericidal agent bonded to the rice husk ash.
3. A water purifier as claimed in claim 1 wherein the composition for water purification includes at least ten percent by weight of rice husk ash.
4. A water purifier as claimed in claim 2 wherein the bactericidal agent may be any one of silver, copper, copper sulphate and their compounds and preferably the bactericidal agent is silver.
5. A water purifier as claimed in claim 2 wherein the bactericidal agent is nano silver.
6. A water purification system as claimed in claim 1 comprising a connector for connecting the purifier to the outside surface of the water storage vessel.
7. A water purification system as claimed in claim 6 wherein the connector includes a tool for forming the opening in the water storage vessel.
8. A water purification system wherein the filter has at least one extension configured for retaining the filter to the inlet of the water storage vessel.

9. A water purification system comprising a purifier and a filter, the purifier comprising an outer casing configured for connecting the purifier to an outside surface of a water storage vessel; the purifier comprising a purification chamber configured to hold a composition for water purification; the composition of water including rice husk ash; an upper chamber formed above the purification chamber and a bottom chamber formed below the purification chamber; a channel for conveying water received from the storage vessel to the bottom chamber, water entering the purification chamber from the bottom chamber and passing through the purification chamber; and an outlet passage for conveying the water exiting the purification chamber to an outlet of the purifier and; the filter comprising, a receptacle having a hollow body extending between a first and second end, the receptacle having an opening at the first and second end for allowing the flow of water through the receptacle; the first end sized smaller than the inlet of the storage vessel and the second end sized larger than the inlet of the storage vessel; and a filter bag open at one end, the open end of the filter bag detachably coupled to the first end of the receptacle, the filter bag covering the opening of the receptacle at the first end.
10. A water purification system as claimed in claim 9 wherein the filter has at least one extension at the second end of the receptacle configured for retaining the filter to the water storage vessel.
11. A water purification system as claimed in claim 10 wherein the extension is a ledge around the periphery of the second end of the receptacle configured for retaining the filter to the inlet of the water storage vessel.
12. A water purification system as claimed in claim 9 comprising a connector for attaching the water purifier to a storage vessel, the storage vessel having an opening for the flow of a liquid from the vessel under gravity, the connector comprising a retainer for placement within the storage vessel comprising a hollow channel configured to align with the opening of the storage vessel; and an adaptor for placement outside the storage vessel

comprising a hollow channel axially aligned with the channel of the retainer; the channel of the adaptor configured to retentively couple with the channel of the retainer such that the channel of the retainer and the channel of the adaptor form a channel of variable length for the flow of liquid from the storage vessel to the purifier.

13. A water purification system comprising a purifier and a connector for attaching the water purifier to a storage vessel, the storage vessel having an opening for the flow of a liquid from the vessel under gravity,

the purifier comprising an outer casing configured for connecting the purifier to an outside surface of a water storage vessel;

a purification chamber configured to hold a composition for water purification; the composition for water purification including rice husk ash;

an upper chamber formed above the purification chamber and a bottom chamber formed below the purification chamber;

a channel for conveying water received from the storage vessel to the bottom chamber, water entering the purification chamber from the bottom chamber and passing through the purification chamber; and

an outlet passage for conveying the water exiting the purification chamber to an outlet of the purifier and;

the connector comprising:

a retainer for placement within the storage vessel comprising a hollow channel configured to align with the opening of the storage vessel; and an adaptor for placement outside the storage vessel comprising a hollow channel axially aligned with the channel of the retainer; the channel of the adaptor configured to retentively couple with the channel of the retainer such that the channel of the retainer and the channel of the adaptor form a channel of variable length for the flow of liquid from the storage vessel to the purifier.

14. A water purifier as claimed in claim 12 or 13 wherein the adaptor is integrally formed on the purifier.

15. A water purification system as claimed in claim 9 or 13 comprising a pair of perforated plates placed within the outer casing, the pair of perforated plates forming a purification chamber between them for holding the composition for water purification.
16. A water purification system as claimed in claim 9 or 13 comprising an inner container placed within the outer casing and forming a bottom chamber between the inner container and the outer casing, the inner container including the purification chamber and the upper chamber, the purification chamber holding the composition for water purification.
17. A water purifier as claimed in claim 9 or 13 wherein the composition for treatment of water comprises at least one bactericidal agent bonded to the rice husk ash.
18. A water purifier as claimed in claim 9 or 13 wherein the composition for water purification includes at least ten percent by weight of rice husk ash.
19. A water purifier as claimed in claim 17 wherein the bactericidal agent may be any one of silver, copper, copper sulphate and their compounds and preferably the bactericidal agent is silver.
20. A water purifier as claimed in claim 17 wherein the bactericidal agent is nano silver.
21. A method of water purification comprising a first stage of passing water through a filter placed at the inlet of a water storage vessel to remove particulate matter and to obtain filtered water, and a second stage of passing the filtered watered through a purifier connected to an outside surface of the water storage vessel and containing a composition for purification of water to obtain purified water, the composition including rice husk ash, the flow of water through the purifier in a reverse flow.
22. A water purification system substantially as herein described with reference to and as illustrated by the accompanying drawings.

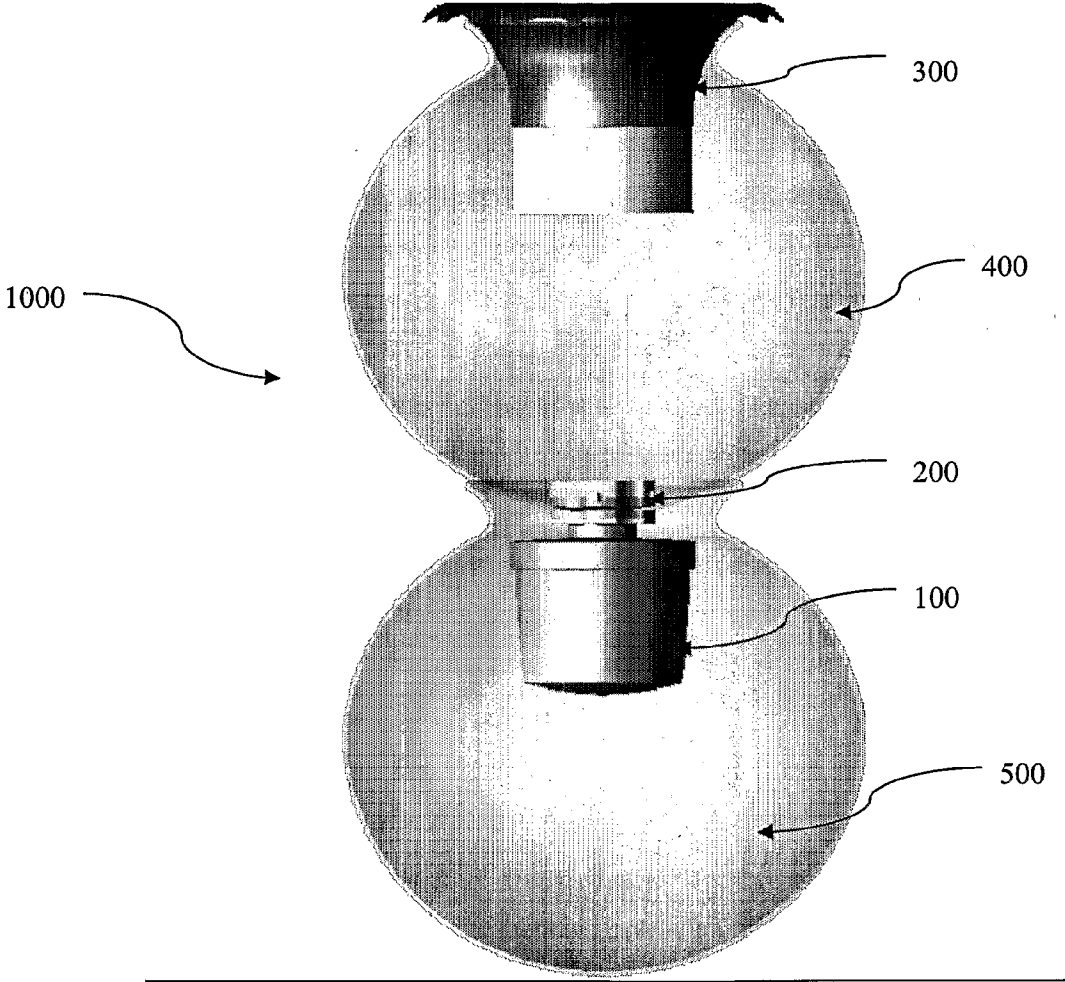


Figure 1

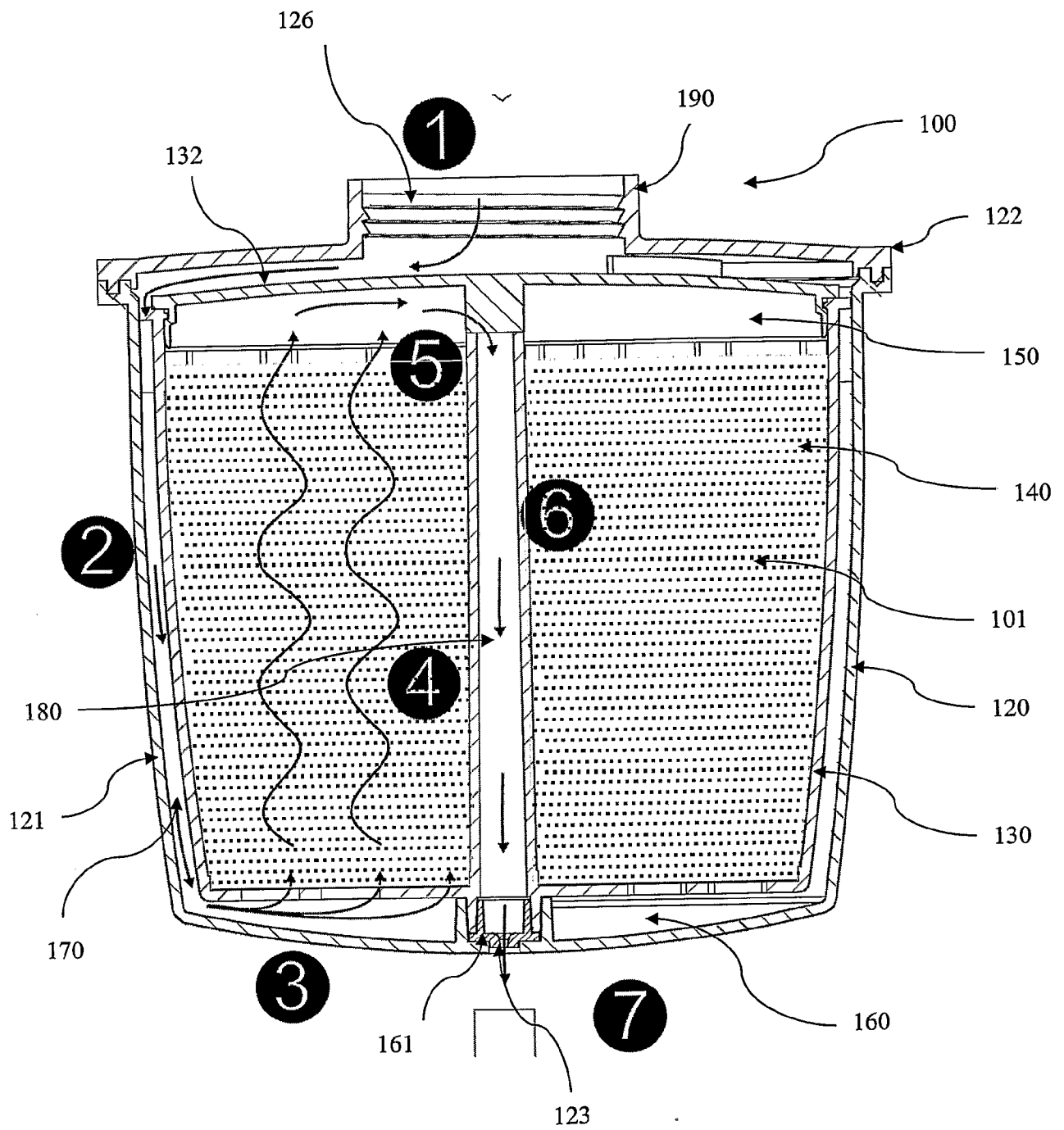


Figure 2

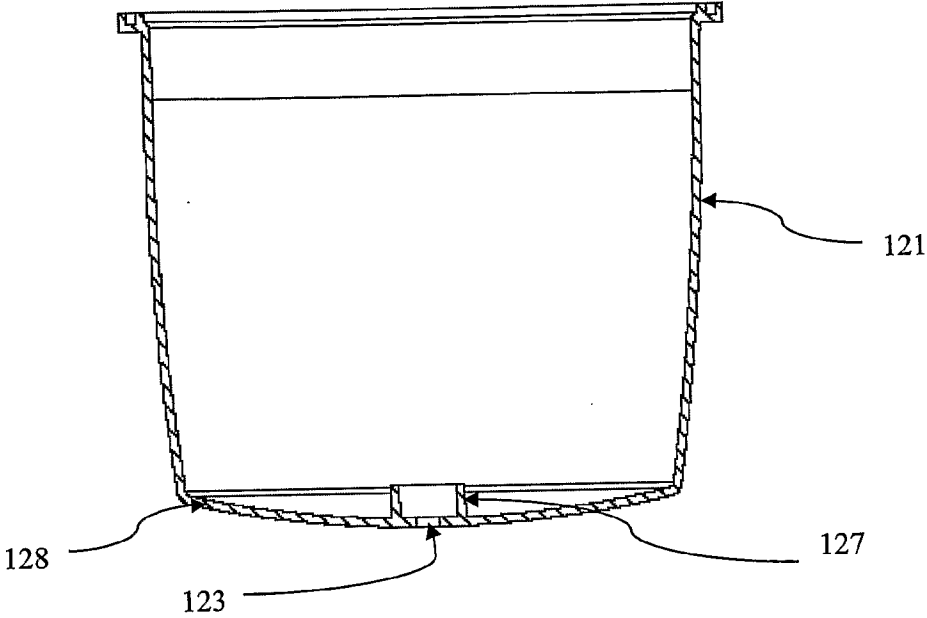


Figure 3

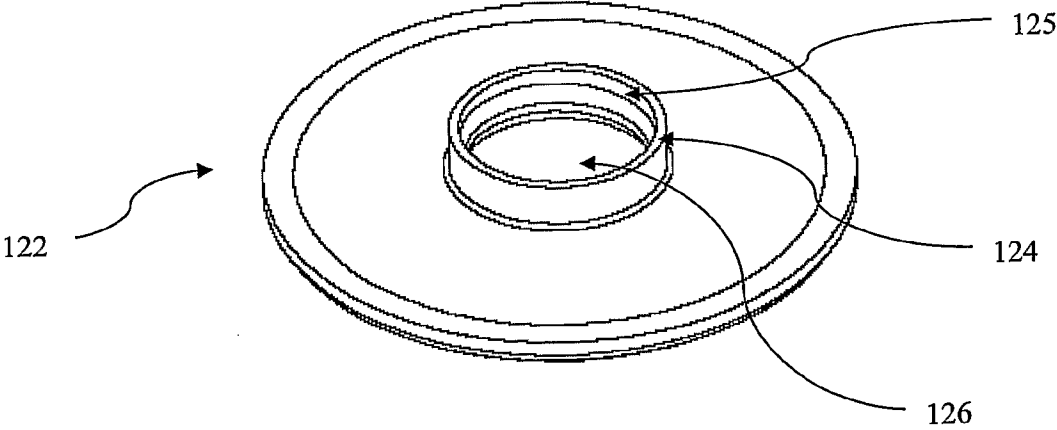


Figure 4

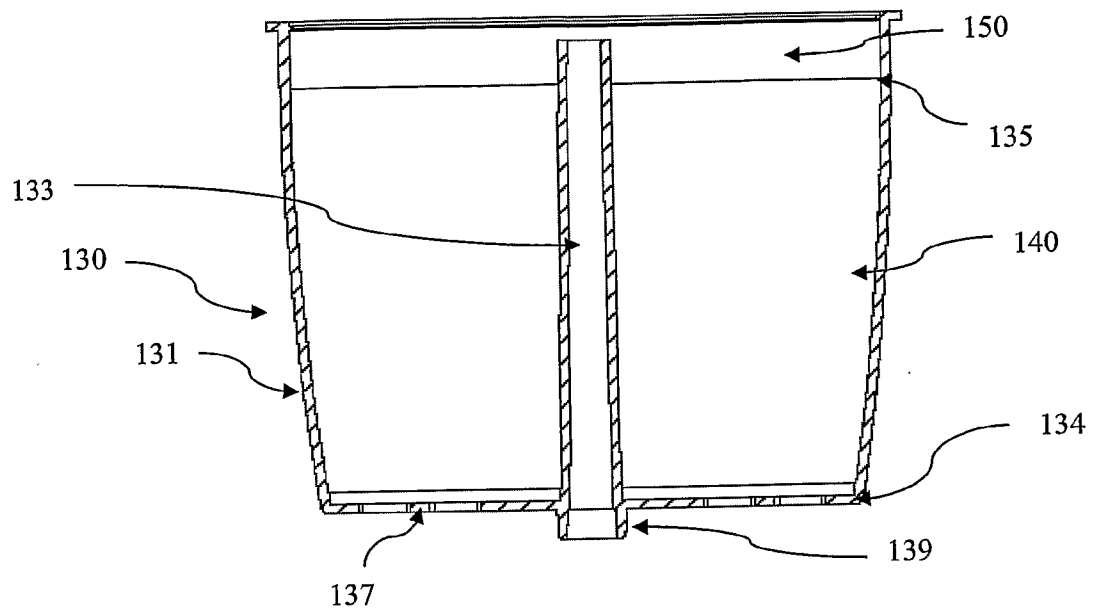


Figure 5

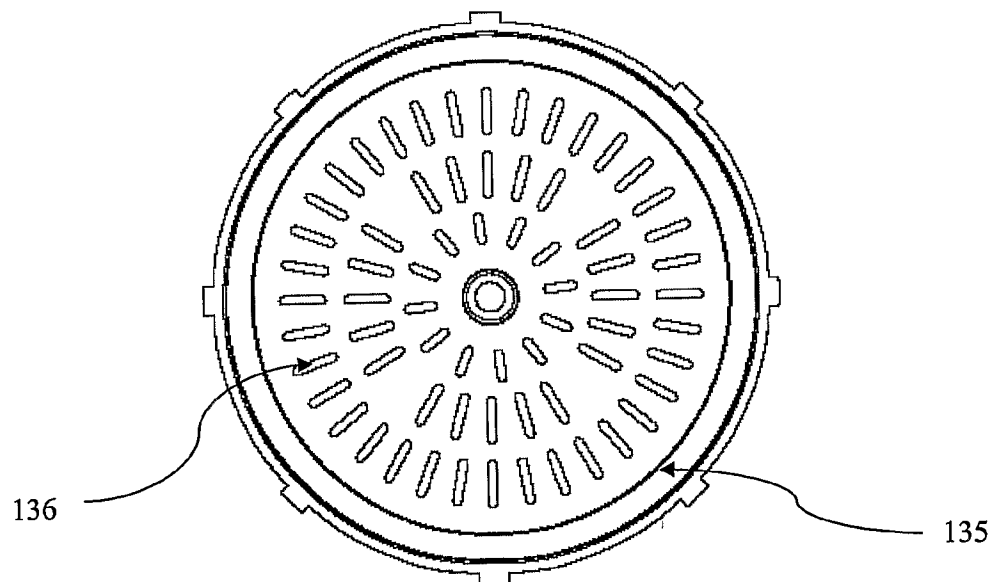


Figure 6

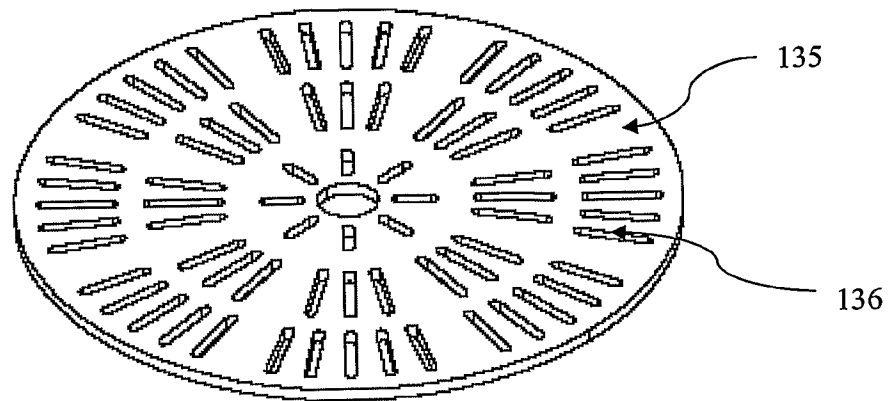


Figure 7

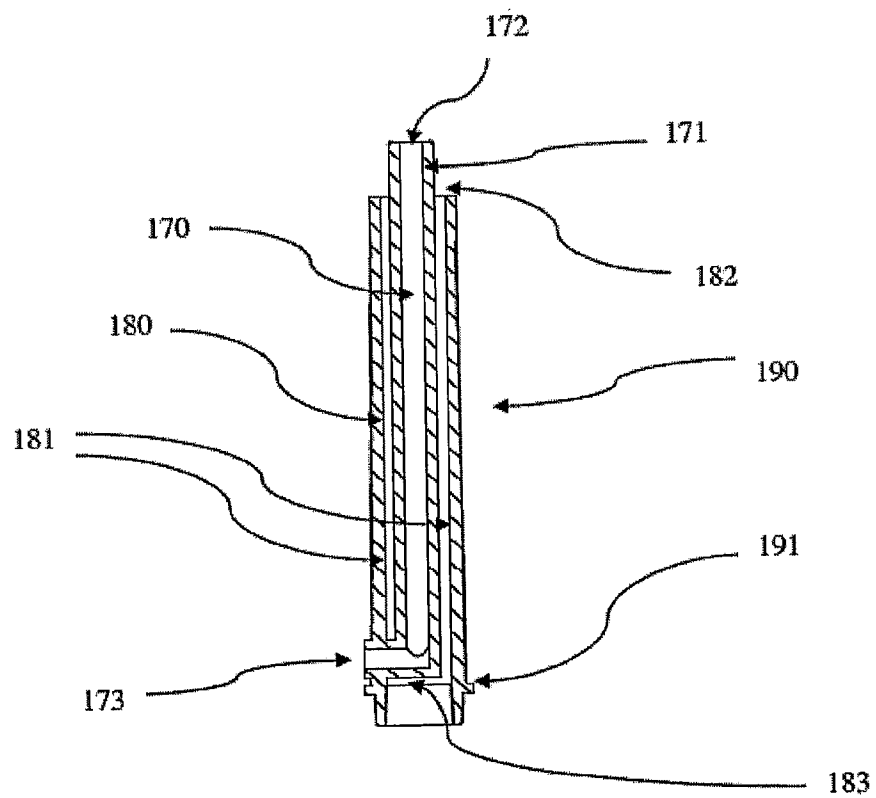


Figure 9

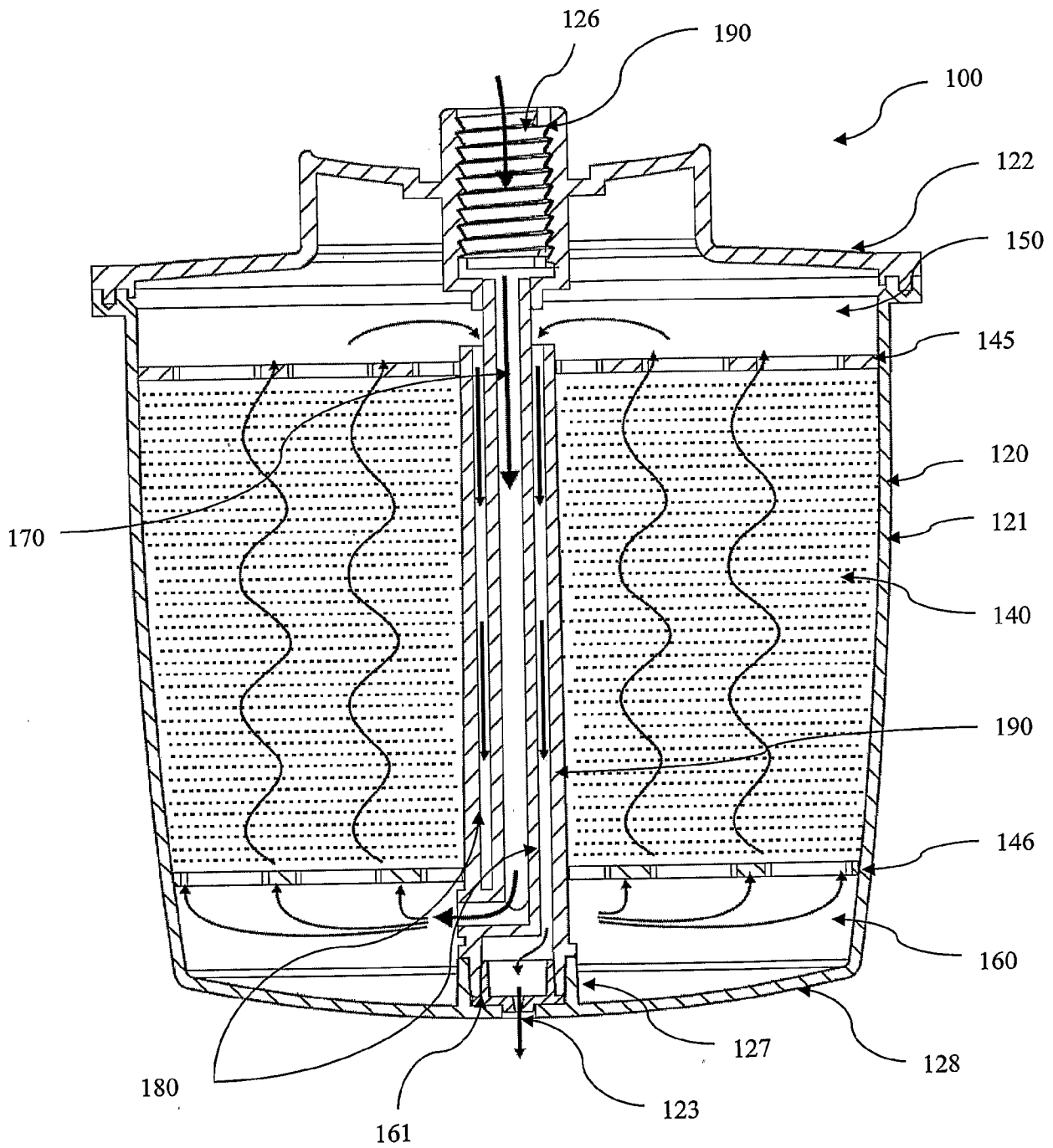
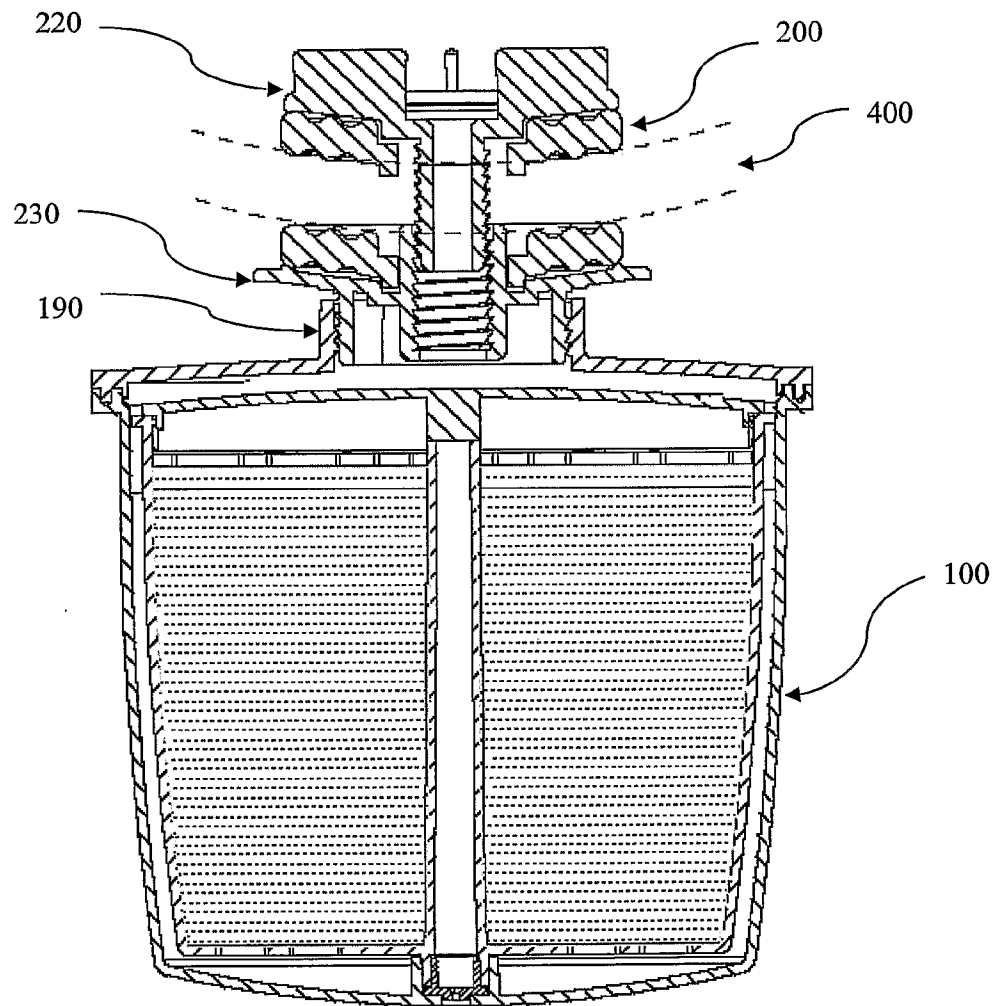


Figure 8

**Figure 10**

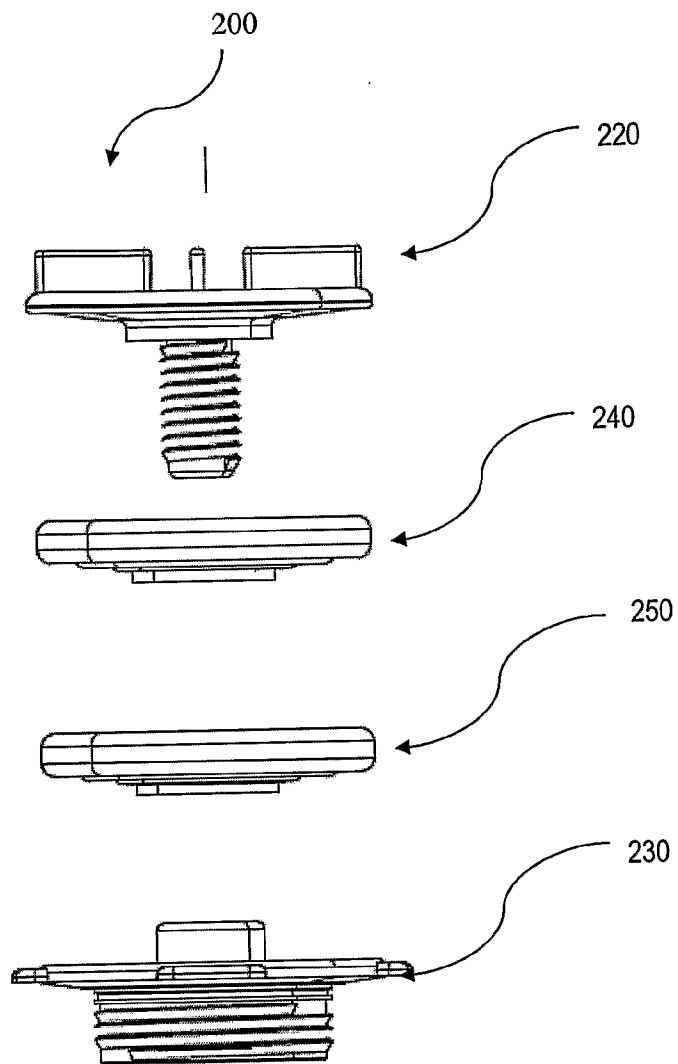


Figure 11

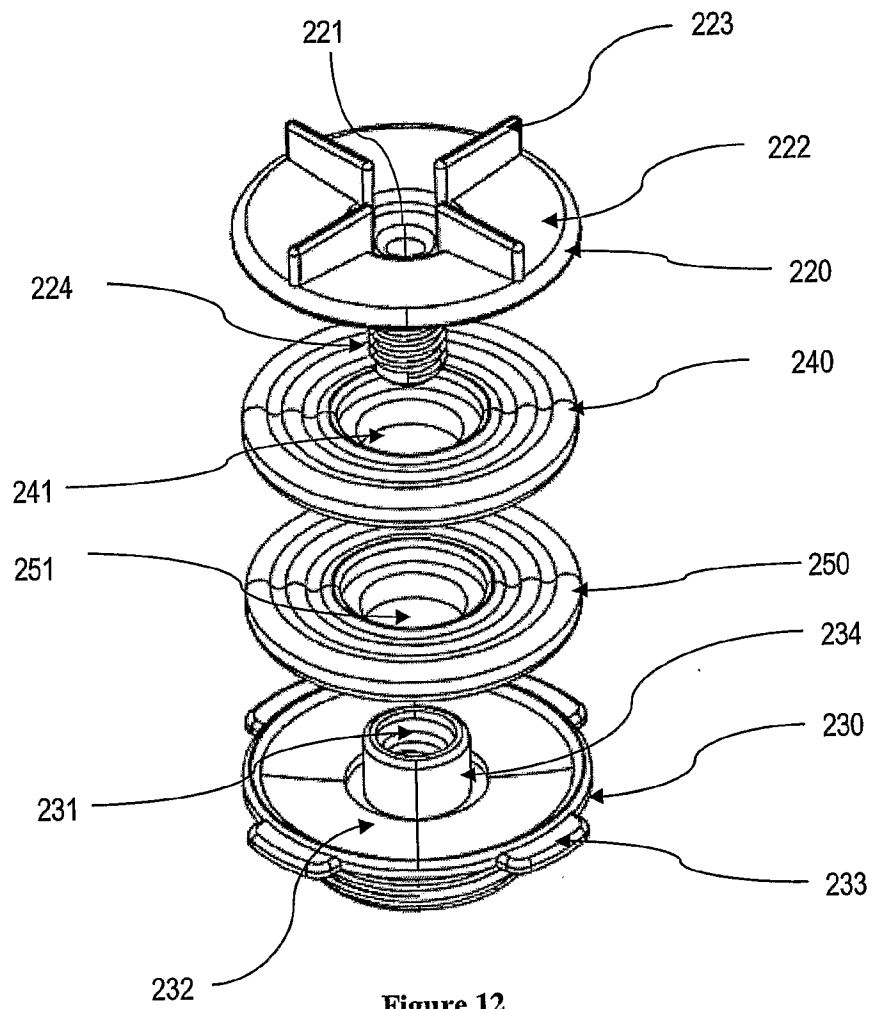


Figure 12

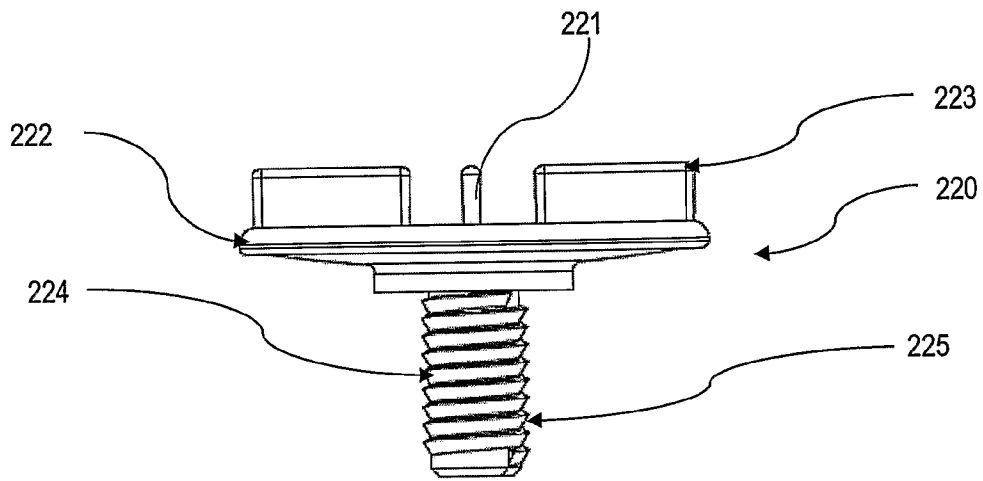


Figure 13

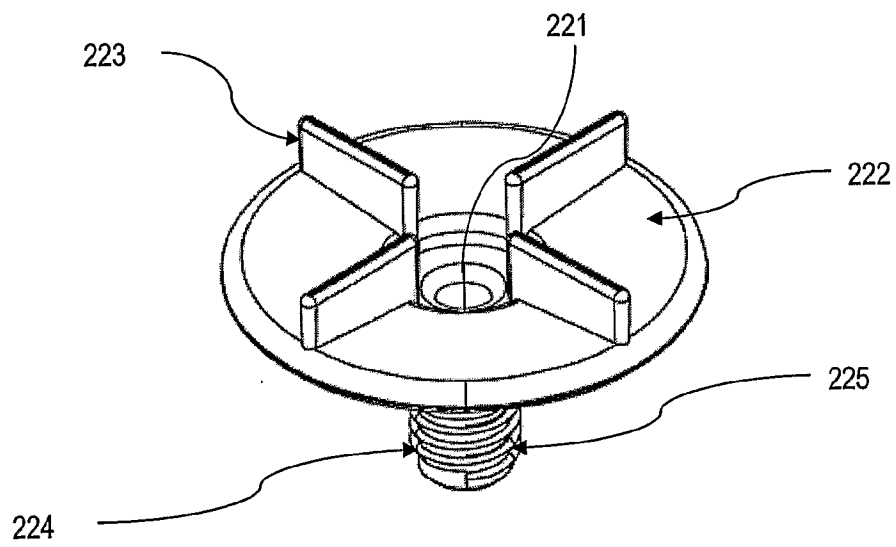


Figure 14

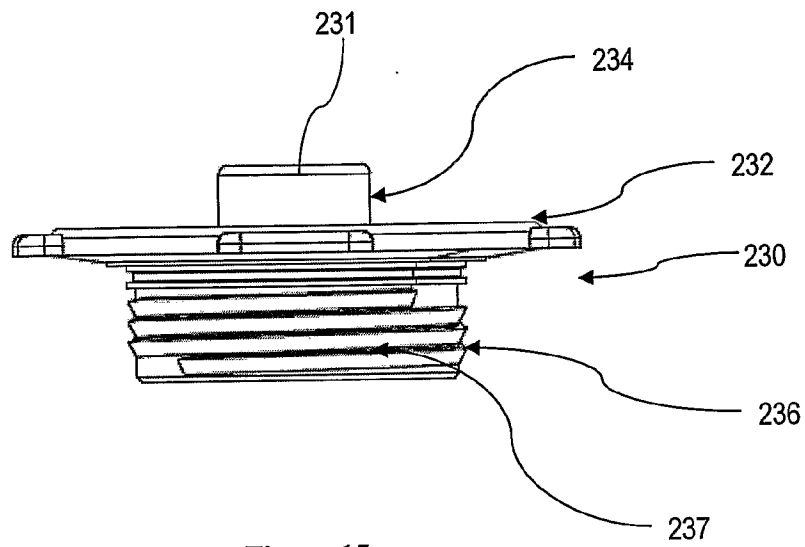


Figure 15

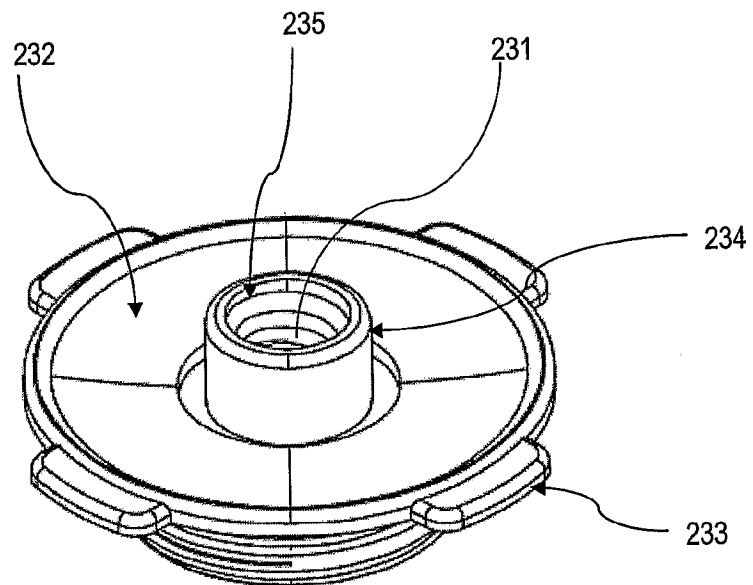


Figure 16

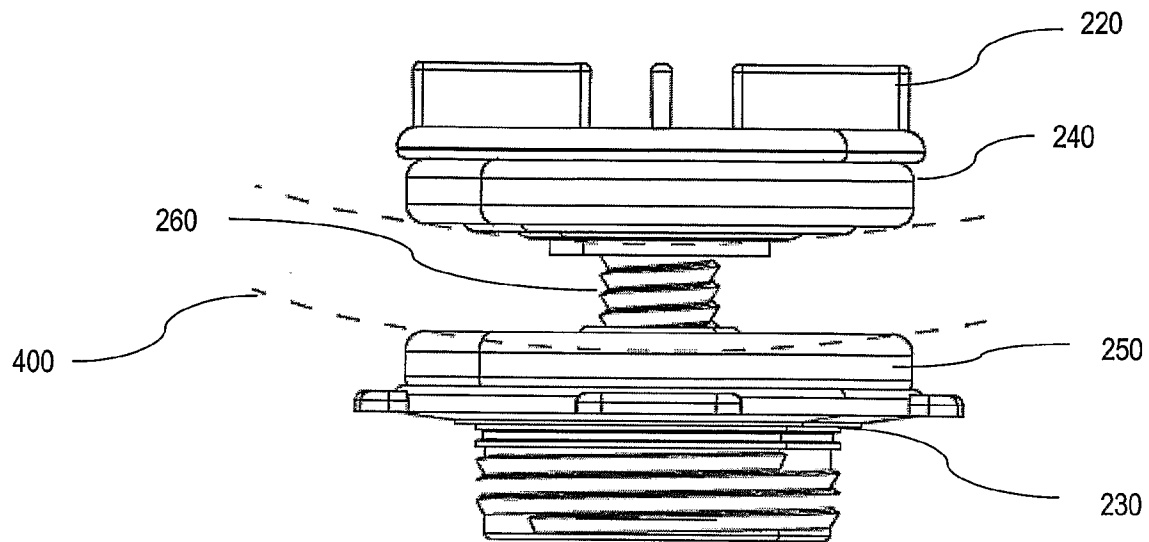


Figure 17

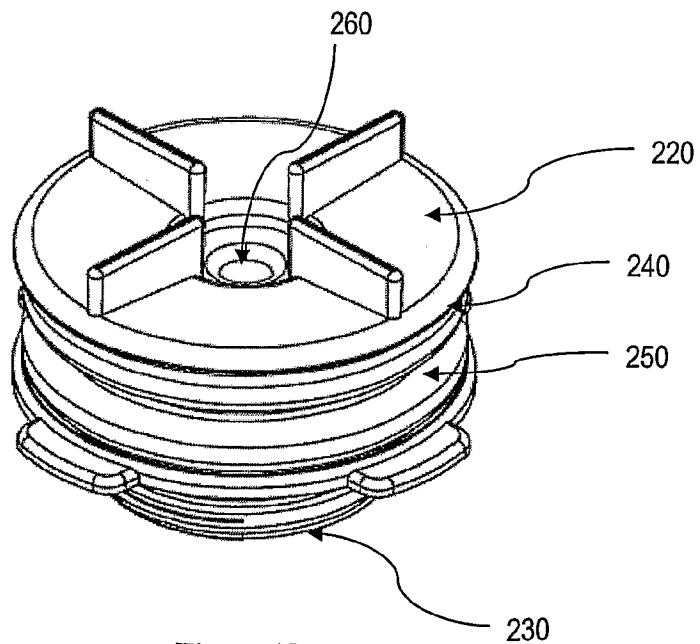


Figure 18

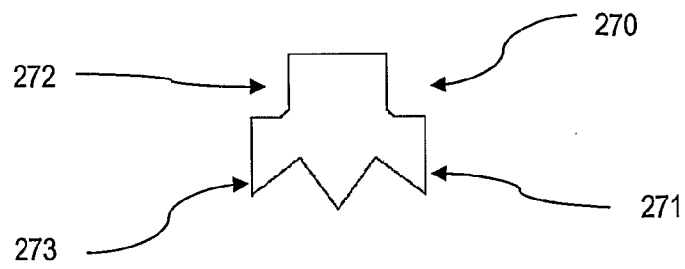


Figure 19

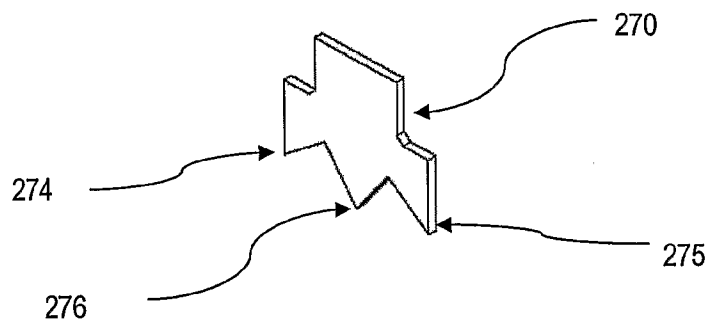


Figure 20

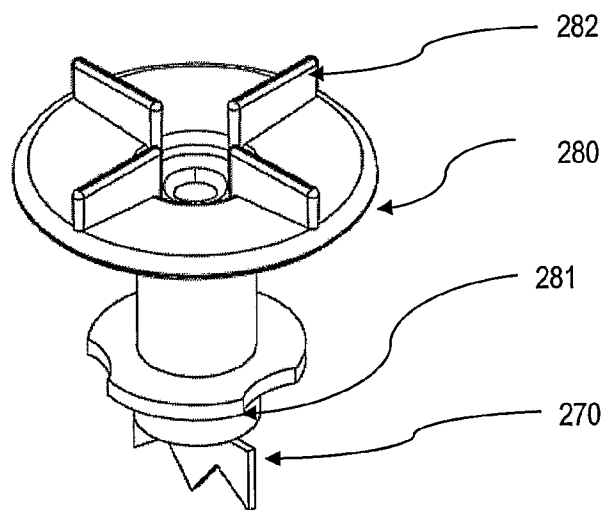


Figure 21

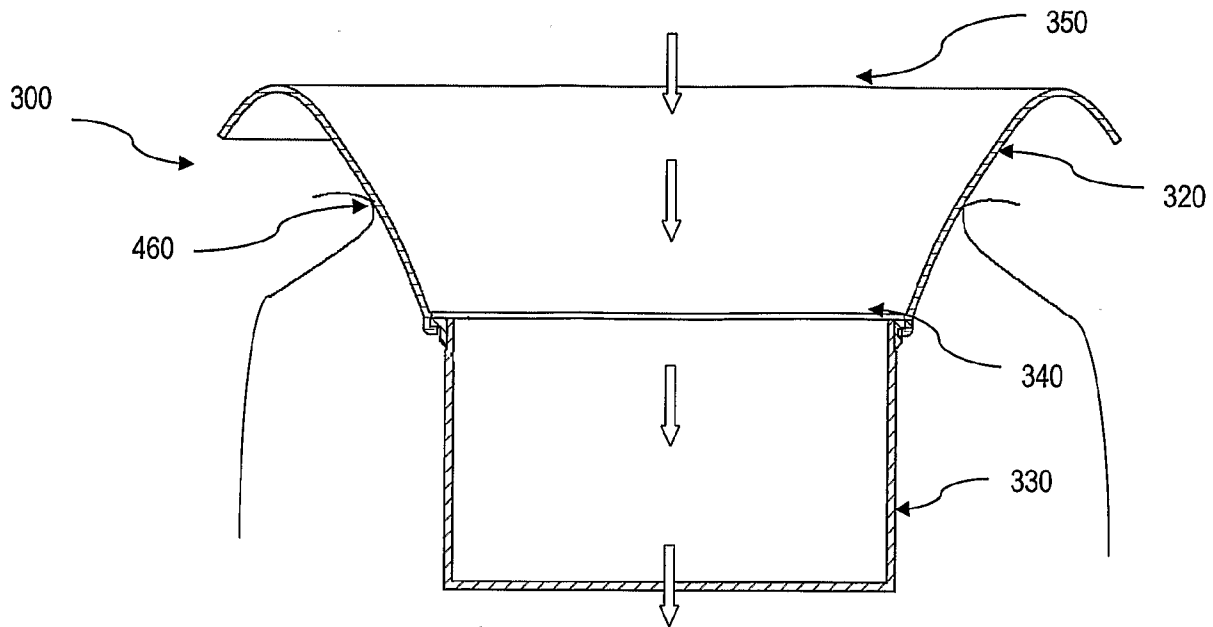


Figure 22

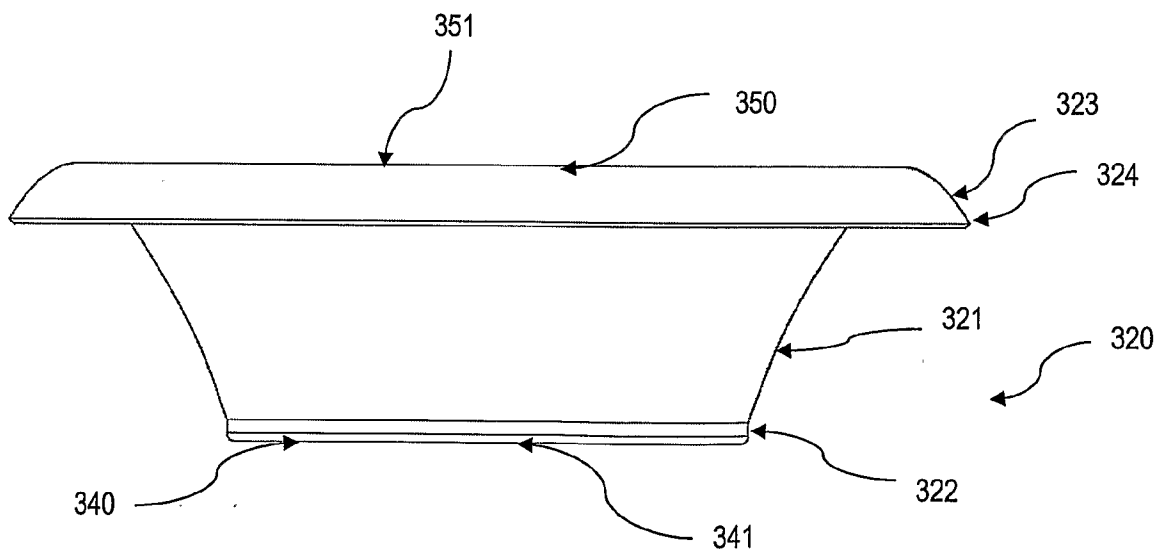


Figure 23

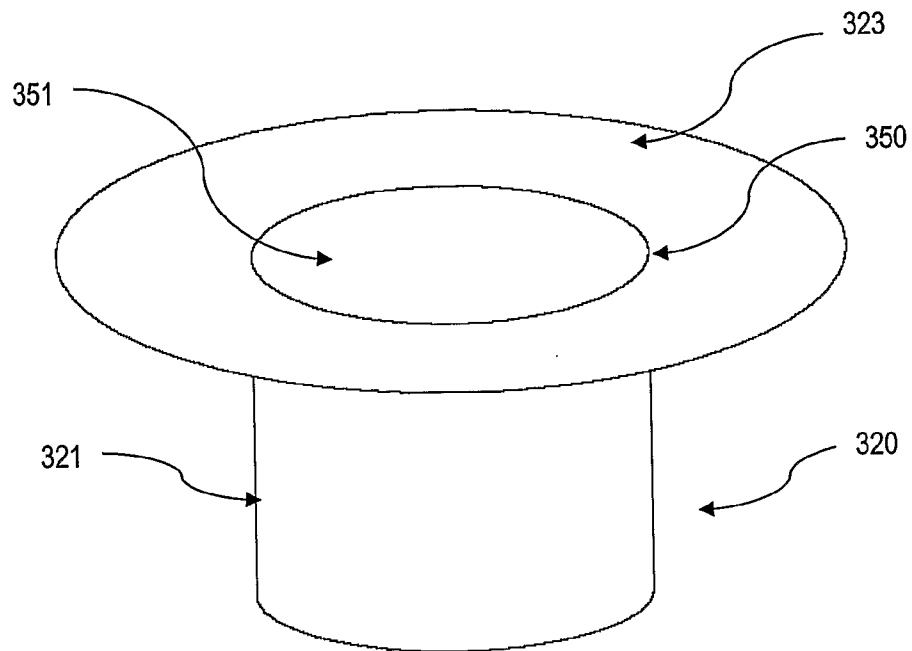


Figure 24

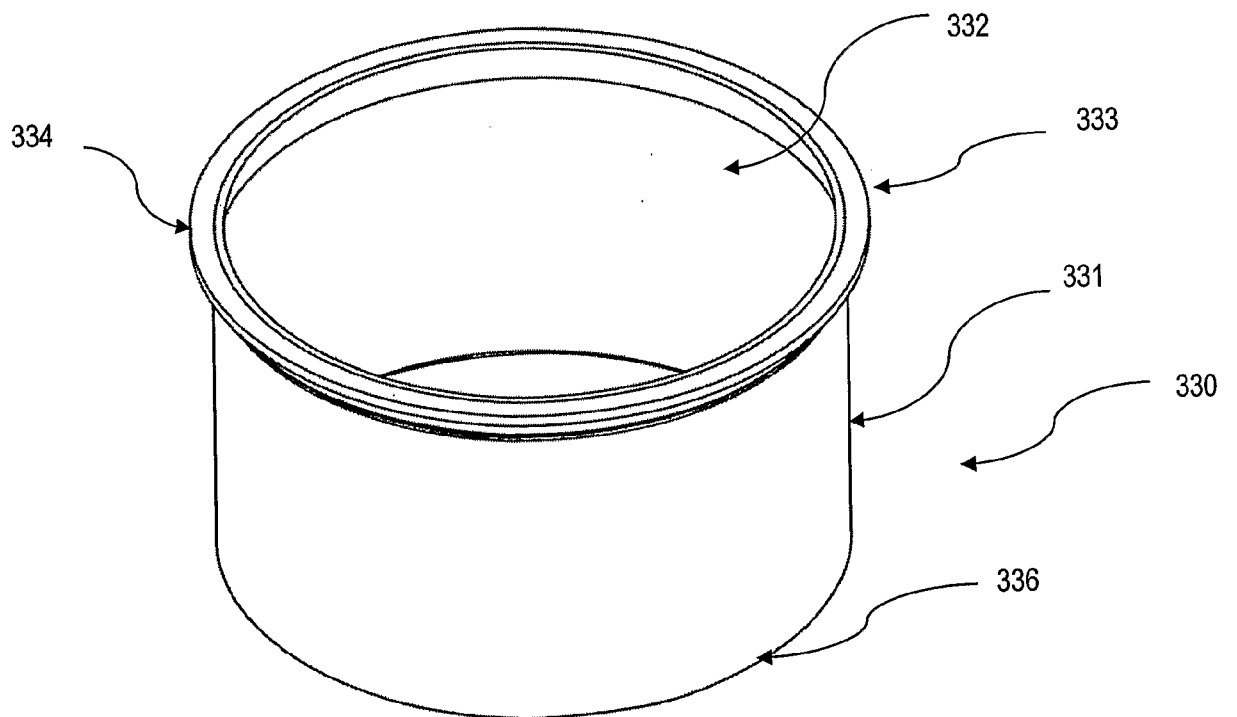


Figure 25

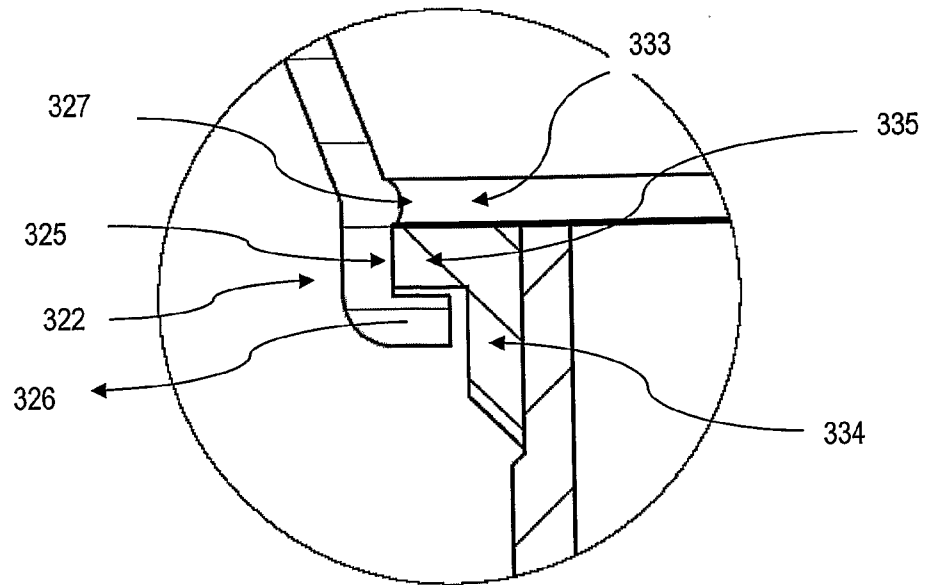


Figure 26

INTERNATIONAL SEARCH REPORT

International application No

PCT/IN2008/000826

A. CLASSIFICATION OF SUBJECT MATTER

INV. C02F1/00

ADD. C02F1/28

B01J20/28

B01J20/32

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

C02F

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

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

EPO-Internal, WPI Data, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 069 077 A1 (MEYER DIETER [DE]; BRAUN HANS PETER [DE]) 17 January 2001 (2001-01-17) paragraph [0039] paragraph [0070] - paragraph [0074] figure 1	1-5, 15-21
A	EP 0 269 769 A1 (AGRITEC [US]) 8 June 1988 (1988-06-08) the whole document	1-5, 15-21
A	Kalyan K Das: "Rice husk ash filter"[Online] 2003, XP002534376 Catch Water, April-May Retrieved from the Internet: URL: http://www.tcs-trddc.com/2004-clip7.htm m> [retrieved on 2009-06-25] the whole document	1-5, 15-21
-/--		



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the international filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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

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

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

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

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

G document member of the same patent family

Date of the actual completion of the international search

29 June 2009

Date of mailing of the international search report

22/09/2009

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Janssens, Christophe

INTERNATIONAL SEARCH REPORT

International application No

PCT/IN2008/000826

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2005/124482 A1 (HARVEY ANTHONY R [US] HARVEY ANTHONY REID [US]) 9 June 2005 (2005-06-09) figure 5 paragraph [0057] paragraph [0087] - paragraph [0088] -----	1-5, 15-20
A	FAROOK ADAM ET AL: "Silver modified porous silica from rice husk and its catalytic potential" JOURNAL OF POROUS MATERIALS, KLUWER ACADEMIC PUBLISHERS, BO, vol. 15, no. 4, 12 May 2007 (2007-05-12), pages 433-444, XP019609407 ISSN: 1573-4854 paragraph [02.2] -----	1-5, 15-20
A	CHANG F-W ET AL: "Dehydrogenation of ethanol over copper catalysts on rice husk ash prepared by incipient wetness impregnation" APPLIED CATALYSIS A: GENERAL, ELSEVIER SCIENCE, AMSTERDAM, NL, vol. 246, no. 2, 30 June 2003 (2003-06-30), pages 253-264, XP004433221 ISSN: 0926-860X paragraph [02.2] -----	1-5, 15-20
A	CHANG F W ET AL: "Ethanol dehydrogenation over copper catalysts on rice husk ash prepared by ion exchange" APPLIED CATALYSIS A: GENERAL, ELSEVIER SCIENCE, AMSTERDAM, NL, vol. 304, 10 May 2006 (2006-05-10), pages 30-39, XP025142250 ISSN: 0926-860X [retrieved on 2006-05-10] paragraph [02.2] -----	1-5, 15-21
A	WO 2005/095285 A1 (CUNO INC [US]; YEH ESHAN B [US]; GOVERNAL ROBERT A [US]; HAMLIN THOMAS) 13 October 2005 (2005-10-13) the whole document -----	1-5, 15-20

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN2008/000826

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 22
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers allsearchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-5, 21

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 22

No meaningful search could be done for claim 22, because claim 22 is not clear (Rule 6 PCT). The claim contains a reference to the description and/or the drawings. According to Rule 6.2(a) PCT, claims should not contain such references except where absolutely necessary, which is not the case here. The subject-matter for which protection is sought is therefore not clear for this claim.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.2), should the problems which led to the Article 17(2)PCT declaration be overcome.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-5, 21

A purifier configured for placement on the outside surface of the water storage vessel and including an inlet for receiving water through an opening in the water storage vessel, the purifier comprising a purification chamber holding a composition for water purification, the composition for water purification including rice husk ash; water received from the storage vessel passing in reverse flow through the purification chamber; a method for treating water using this purifier.

2. claims: 8-12(completely); 14-20(partially)

A filter comprising a receptacle having a hollow body extending between a first and a second end; the receptacle having an opening at the first and second end; the first end sized smaller than the inlet of a storage vessel and the second end larger than the inlet of the storage vessel; and a filter bag open at the one end, the open end of the filter bag detachably coupled to the first end of the receptacle the filter bag covering the opening of the receptacle at the first end; a method of treating water using this filter.

3. claims: 6-7, 13(completely); 14-20(partially)

A connector comprising a hollow channel configured to align with an opening of the storage vessel; and an adaptor for placement outside the storage vessel comprising a hollow channel axially aligned with the channel of the retainer; the channel of the adaptor configured to retentively couple with the channel of the of the retainer such that the channel of the retainer and the channel of the adaptor form a channel of variable length for liquid flow outside the storage vessel.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IN2008/000826

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