

State of the Art Search Report

Title: Filter as you pour technology

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Executive Summary

A comprehensive patent search is conducted to identify the relevant prior art documents. We have identified 9 relevant patent publications. A detail analysis of each relevant patent publication is presented in the following report. Additionally, 10 other related patent documents are also listed in the report.

Results summary table:

Document Number	Publication Number	Assignee
D1	US5688397	Malmborg; Rick
D2	US6602406B1	Innova Pure Water Inc.
D3	US5846418	Teledyne Industries, Inc.
D4	US20040149643A1	Vandenbelt Rudy A
D5	US8142654B2	Kohl Abraham K
D6	US4605499	WISE Lawrence
D7	US20110300275A1	Protect Plus, Llc
D8	US2008035553A1	Dennis Brown

RESEARCH HIGHLIGHTS

The state of the art technologies discloses different configurations of filter as you pour pitchers.

- Brita launched a filter while pouring water pitcher with patent pending status in multiple countries.
- Increased demand for instant water filter technologies.
- Teledyne Industries using granulated activated charcoal as a filtering medium.
- The Sichuan University introduced XXXXXXXX preparation method to filter the water during discharging.
- Less market players in developing state of the art technologies in XXXXXXXXXXXXXXXXXXXX.
- XXXXX licensed the XXXXX patent which discloses pitcher configured with a filter at outlet.
- XXXXX is an emerging player in USA, UK, Germany and Japan.

Relevant Publications

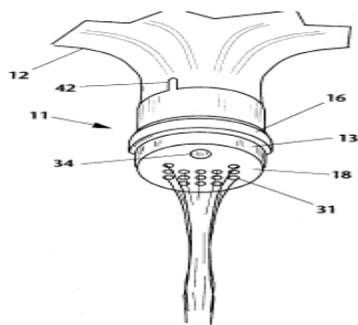
Document Number	D1
Publication Number	US5688397
Title	Combination bottle cap and filter
Filing Date	5 Jun 1995
Publication Date	18 Nov 1997
Priority Date	5 Jun 1995
Assignee	Malmborg; Rick
Also published as	None
Abstract	<p>A combination bottle cap and filter cartridge for use with a reservoir water bottle includes an outer sidewall having a generally cylindrical configuration and an end wall joined to the outer edge of the sidewall. The sidewall is dimensioned to be received about the mouth and neck of the bottle. A cylindrical filter cartridge extends from the cap end wall and is disposed concentrically within the sidewall. The filter cartridge includes an inner end wall disposed within the bottle neck, and a curved inner panel extends from the inner end wall to the cap end wall to define two chambers within the cartridge. A filter chamber contains a charge of granulated filter medium. A plurality of holes are formed in the inner end wall and the cap end wall to admit water from the bottle to the filter cartridge and discharge water therefrom, respectively. A pair of fiber scrims are interposed in the filter chamber between the inner and outer end walls and the filter medium to retain the granulated particles therein. The other chamber within the cartridge comprises a tubular air passage, with an inlet port extending through the cap end wall and an outlet port extending through the inner end wall. A check valve is disposed within the air passage to admit air through the passage to the bottle and prevent discharge of water therethrough.</p>

Relevant Text

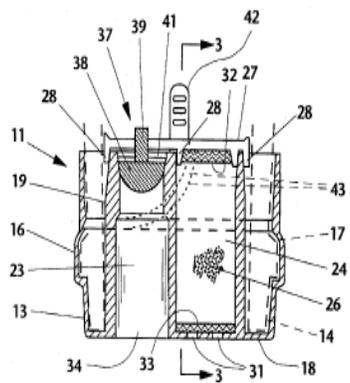
IN DESCRIPTION:

With regard to FIGS. 1-4, one embodiment of the invention includes a combination bottle cap and filter cartridge assembly 11 adapted to be secured to a standard water reservoir bottle 12, commonly provided in a range of two to six gallons and typically three, five, and six gallon capacities, used to supply water to water dispensers and coolers in domestic and business settings. **The assembly 11 is secured to the mouth and upper neck portion of the bottle 12 to filter the water discharged therefrom, and is adapted to be removed and discarded when the bottle is emptied.** The bottle may then be refilled and a fresh assembly 11 replaced on the bottle. Thus a clean new filter is added to the bottle with each new charge of water therein, assuring optimal purification of the water.

Diagram



Figure_1

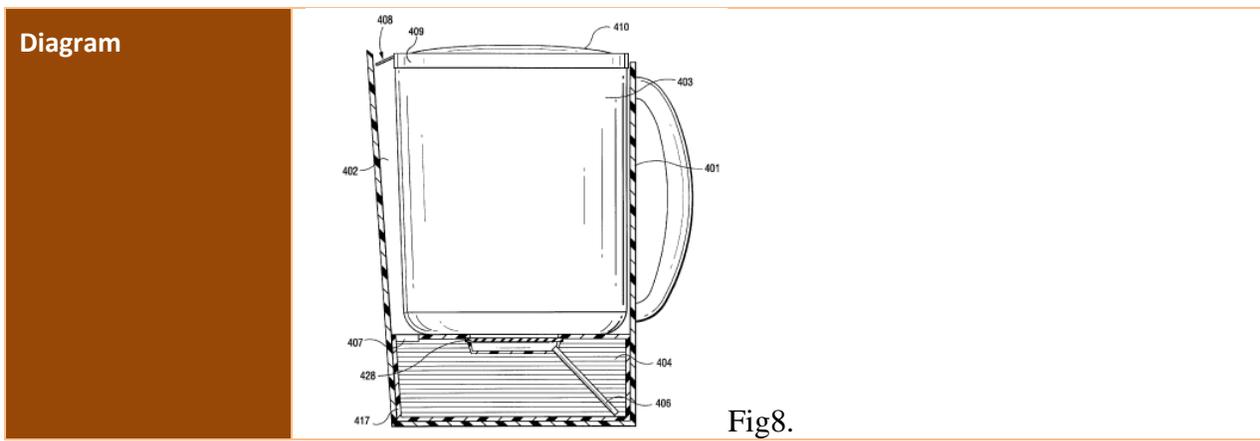


Figure_2

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Document Number	D2
Publication Number	US6602406B1
Title	Static filter pitcher
Filing Date	18 Feb 2000
Publication Date	05 Aug 2003

Priority Date	19 Feb 1999
Assignee	Innova Pure Water Inc.
Also published as	AU2787501, AU5380001, US2002108901, US2002020673, WO0151422, WO0180972
Abstract	<p>A pitcher or carafe housing is provided that has a raw water reservoir. A high performance filter receives raw water from a lower portion of the reservoir. The water is preferably received at or travels through a water entry tube to the back and bottom of the filter. In about 1-3 minutes the water percolates through the filter element, until it reaches a water exit port. A pouring chamber may be provided at the side of the pitcher for receiving the water from the water exit port, so that the water will continue to be treated and flow up into the pouring chamber until the water level equalizes in height in the reservoir and the pouring chamber. The filter and its housing may be placed into and removed from the inside of the raw water reservoir, or the filter housing may be side loaded. The filter media may be a polyester non-woven mat with a weight of 4-7 oz./yd.² impregnated with carbon or zeolite and subject to compression between about 25-75% (e.g. about 50%).</p>
Relevant Text	<p><u>IN DESCRIPTION:</u></p> <p>FIG. 1 schematically illustrates an exemplary exit filtration pitcher/carafe according to the invention. The carafe housing 1 contains the raw water reservoir 3, which is in the inner housing 13, into which the high performance filter 4 is placed. The water enters the filter 4 through the water entry port 5 and in turn travels down the water entry tube 6 to the back and bottom of the filter. In 1-3 minutes_the_water percolates through the filter element 4, until it reaches the water exit port 7. The water will continue to be treated and flow up into the pouring chamber 2 until the water level equalizes in height in the reservoir 3 and the pouring chamber 2.</p>



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Document Number	D3
Publication Number	US5846418
Title	Point of use water treatment system
Filing Date	18 Jul 1997
Publication Date	8 Dec 1998
Priority Date	6 Dec 1995
Assignee	Teledyne Industries, Inc.
Also published as	BR9611909, WO9720776
Abstract	<p>The point-of-use water treatment system for treating water to be dispensed from a container includes a filter media positioned adjacent a water input opening of the container, through which water is filtered into the container. The filter media includes a water soluble disinfectant positioned thereon or therein, with the preferred disinfectant tetraglycine hydroperiodide, chloramine-T, or calcium hypochlorite. The disinfectant dissolves in the water as it passes through the filter, and reduces the biological activity of microbiological agents in the water. A point-of-use method of the present invention which reduces microbiological contamination in a predetermined volume of water to be dispensed from a container which utilizes a filter media containing a water soluble disinfectant impregnated thereon is also disclosed.</p>

The method includes the steps of positioning the filter media adjacent the opening of the container, filtering water through the filter media, dissolving the disinfectant in the water as it passes through the filter media, allowing the disinfectant to contact and deactivate microbiological agents in the water, and disposing of the filter media.

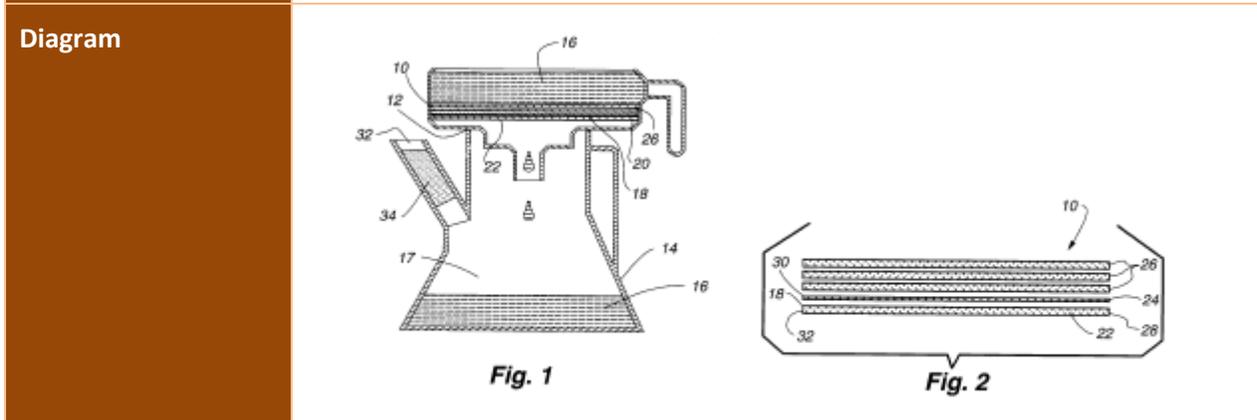
Relevant Text

IN DESCRIPTION:

To use the point-of-use water treatment system 10 of the present invention, the filter pack 18 containing the filter media 22 and the water soluble disinfectant 24 is placed in the housing 20, which preferably has an inside housing diameter (not shown) substantially the same as the diameter of the filter pack 18, so as to snugly receive the filter pack 18 therein. **Two liters of water 16 are then poured onto the filter pack 18, allowed to filter there through at an average rate of two to five minutes per liter, and collect in the dwelling chamber 17 of the container 14. The water 16 and the disinfectant dissolved therein are maintained in the dwelling chamber 17 for zero to ten minutes after filtration of the two liters of water 16 is complete,** with effective reduction of *Klebsiella terrigena* bacteria achieved when the water 16 and the dissolved disinfectant have been tested immediately after collecting in the dwelling chamber 17.

In yet other alternative embodiment **of the point-of-use water treatment system of the present invention, an exit filter 34 is positioned in a dispensing port 36 of the container 14. The exit filter 34 is preferably constructed of approximately 5 grams of an ion exchange fiber** such as that marketed under the VION® tradename by Techmashimport of Moscow, Russia. **The exit filter 34 removes residual disinfectant dissolved in the water 16. It is disposable, and may be used to process 500 liters or more of water 16 treated with a filter pack 16.** More particularly, an exit filter 34 manufactured from an ion exchange fiber such as VION® has a high sorption rate (i.e., 50% saturation of fibers in 5-10 minutes), a large surface area, a linear density of 0.1-1.0 tex, elongation at rupture of 15-30%, a static exchange capacity for anion exchange of 1.8-3.0 mg eq/gm, and a capacity for cation exchange of 3.0-5.0 mg eq/gm.

In yet another alternative embodiment, the exit filter 34 comprises approximately 50 grams of granulated activated charcoal. An exit filter 34 so constructed is disposable, and may be used to process 200 liters or more of water 16 treated with a filter pack 16.



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Document Number	D4
Publication Number	US20040149643A1
Title	Portable, refillable water dispenser serving batches of water purified of organic and inorganic pollutants
Filing Date	03 Dec 2003
Publication Date	08 Aug 2004
Priority Date	05 Dec 2002
Assignee	Vandenbelt Rudy A., Jeremy Hamilton, Anderson Troy C., Lanning Charles R.
Also published as	AU2003298795 , US2006157399, US2006231476, US2004149642, US2008314808, WO2004052789
Abstract	A portable, refillable water dispenser serving batches of water purified of organic and inorganic pollutants includes a portable, refillable and hand-hold able vessel for holding and pouring water having a spout and, inside the portable, refillable and hand-hold able vessel, moving water and still water processing module cooperative to remove inorganic and organic pollutants from water received batch wise by the vessel.

Relevant Text

IN DESCRIPTION:

As best seen in FIG. 2, a bucket generally designated 28 is mounted inside the pitcher 12 having side and bottom walls 30, 32 that bound a volume whose capacity, when filled, accepts water to be purified poured batch wise all at once there into. **A flow-through filter generally designated 34 is removably mounted in an opening provided therefor in the bottom wall 32 of the bucket 28 that is fed with water to be processed received batch wise in the bucket 28 by action of gravity.** Water to be processed received batch wise by the bucket 28 flows into inlet ports generally designated 36 of flow-through filter 34.

A single UV line radiator generally designated 48 is upstanding in, and centrally positioned within, the basin of the pitcher 12. The UV line radiator 48 includes a two hundred fifty-four (254) nm cold cathode fluorescent lamp (CCFL) 50 and protective, UV transparent quartz sheath 52 mounted in water-tight sealing relation to the bottom wall 46 of the pitcher 12. **Water to be processed received batch wise by the bucket 28 of the moving water processing module is received in the basin of the pitcher 12 as it flows stream wise through the flow-through filter 34 thereof, which, after all the water of a batch has flowed there through, is contained batch wise as a body of still water in the basin of the pitcher 12 in fluid communication with the spout 16.**

Diagram

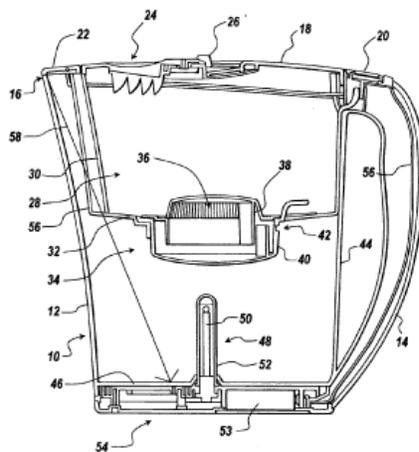


Fig. 2

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Document Number	D5
Publication Number	US8142654B2
Title	Water bottle with filter
Filing Date	24 Sep 2009
Publication Date	27 Mar 2012
Priority Date	07 Jan 2009
Assignee	Kohl Abraham K
Also published as	WO2011037605
Abstract	<p>A disposable and recyclable water bottle formed of a non-toxic plastic composition includes a flexible sidewall, a neck with an open top and cap, and an open bottom end. A filter cartridge is received within the open bottom and contains activated carbon sandwiched between 0.7 to 50 microns filtration membranes, all contained between upper and lower perforated plates. A lower portion of the filtration cartridge provides a filling chamber for receiving a flow of unfiltered water on to the lower perforated plates for passage through the filter. An arrangement of slots in the walls of the filling chamber allows a portion of the flowing water to bypass the filter in order to prevent overflow when filling the bottle. A cap containing internal screw threads attaches to the external screw threads of the open bottom end, sealing the interior of the bottle. Once sealed, the contained water is allowed to move around in a fluid motion between the interior of the bottle and the filling chamber.</p>
Relevant Text	<p><u>IN DESCRIPTION:</u></p> <p>A filtration cartridge 30 is inserted into the bottle through the bottom opening 22. The filtration cartridge 30 comprises an upper compartment 32 fitted with a filtration assembly which filters water that passes through the upper compartment 32. The filtration assembly includes a carbon based media</p>

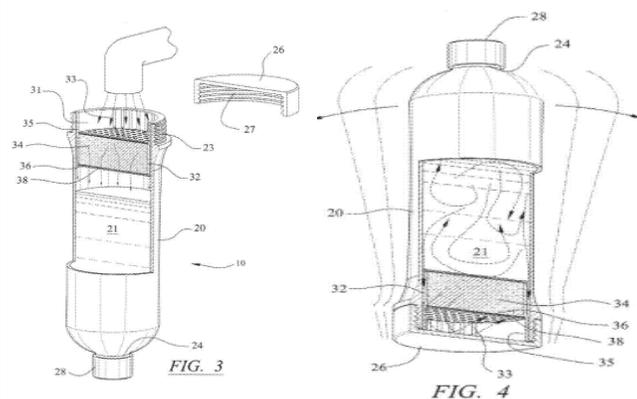
34, two sheets of filtration membranes 36 which have a pore size of between 0.7 and 50 microns, and rigid or semi-rigid covers (e.g., disks) 38 that have an arrangement of small holes or openings formed there through.

The filtration cartridge 30 further comprises a lower compartment 31 which acts as a filling chamber for water entering the device 10.

Referring to FIG. 3, the manner of filling the bottle 20 is shown. Specifically, a flow of municipal water from a faucet is directed into the bottom opening 22 of the bottle 20 and fills within the filling chamber 31. **A portion of this water immediately passes through the filter assembly in the upper compartment 32 of filter cartridge 30 for filtration. The remaining water bypasses the filter assembly and passes through the slots 33 along the side wall 35 of the filling chamber 31 to prevent a backup of water and overflow of the filling chamber 31.** The water that passes through the slots goes directly into the interior 21 of bottle 20. Once the filtered portion of the water passes through the upper chamber 32 and the filtration assembly of the membrane filters 36 and carbon media 34, it also enters and fills into the interior 21 of bottle 20. After the desired level of water has been filled within the interior of the bottle, the bottom cap 26 is attached and sealed by aligning the interior threads 27 of cap 26 with the exterior threads 23 of bottom opening 22 and twisting the cap 26 until hand tight.

Referring to FIG. 4, once the bottle 20 has been filled with water and sealed, the remainder of the unfiltered water will eventually pass back through the slots 33 and into the filling chamber 31. Some of this water will then pass through the upper compartment 32 and filtration assembly of the filter cartridge 30. Due to the motion of the water, almost all if not all of the initially unfiltered water will eventually pass through the upper filtration compartment 32 of filter cartridge 30 and will therefore be filtered.

Diagram



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Document Number	D6
Publication Number	US4605499
Title	Water filter
Filing Date	19 Feb 1985
Publication Date	12 Aug 1986
Priority Date	19 Feb 1985
Assignee	WISE Lawrence
Also published as	None
Abstract	<p>A disposable, portable water filter that is suited for filtering small quantities of drinking water. In one embodiment the filter may be placed over a jar or drinking glass and unfiltered water poured into the jar or glass through the filter. In another embodiment, the filter includes the jar which has a lid with a rim that fits tightly around the neck of the jar. The lid may have an opening for pouring unfiltered water into the jar and filtered water out from the jar. The lid may have an opening for pouring unfiltered water into the jar and filtered water out from the jar. The filter thereby provides twice the filtering effect. The filter in a preferred embodiment consists of containing material that forms a pouch for holding the filter medium and a skirt for suspending the filter. In another embodiment the filter may consist of one sheet of metal foil shaped</p>

	like a bowl for containing the filter medium, and has handles extending from the bowl for holding the filter over a jar or drinking glass.
Relevant Text	<p><u>IN DESCRIPTION:</u></p> <p>In operation, unfiltered water may be poured through the opening 17, e.g. via the hose 13 from where it percolates through the filter medium 21 and drops into the jar 10 as filtered water. After some use, the filter medium will be saturated with accumulated impurities from the water and the whole filter unit 20 may be discarded and replaced with a new unit. When not in use, the opening 17 in the lid 11 may be closed with a snap-on cap 12. FIG. 6 shows in an exploded view the screw lid 11 with the opening 17 before it is screwed onto the neck 14, where it holds a filter unit 30 of a somewhat different construction than the construction 20, described hereinabove. In the embodiment 30 according to FIG. 6, the filter unit 30 consists of a circular piece of containing fabric 22 and 26 containing granulated filter medium 21. Another separate piece of containing fabric 27, cut as a coordinated substantially circular piece of fabric 27 is attached, at the edges 27a, to the inside of the skirt 22 by sewing, adhesive, cementing or any other suitable process, so that the filter medium 21 is contained between the two layers of fabric 26 and 27.</p>

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Document Number	D7
Publication Number	US20110300275A1
Title	Water purifying and flavor infusion device
Filing Date	02 Jun 2011
Publication Date	08 Dec 2011
Priority Date	02 Jun 2010
Assignee	Protect Plus, Llc
Also published as	US2012148707

Abstract	<p>A water purifying and flavor infusion device that includes a lower reservoir for storing filtered water, and a pitcher top removably affixed to the lower reservoir. The pitcher top includes a lid, an upper reservoir, and a filter housing affixed to and extending below the upper reservoir. The filter housing is adapted to contain a filter cartridge wherein the upper reservoir and the filter housing are in liquid communication. The device also includes an infusion tube for infusing filtered water with an additive.</p>
Relevant Text	<p><u>IN DESCRIPTION:</u></p> <p>During use, the user opens the lid 16 of the pitcher top 12 and pours water into the upper reservoir 18. As the water is poured into the upper reservoir 18 of the device 10, it flows downwardly through the upper reservoir 18 into the filter housing 20. The water is directed into the filter cartridge and is filtered as it passes through the filter cartridge.</p>

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Document Number	D8
Publication Number	US20080035553 A1
Title	Portable Filtration System
Filing Date	09 Aug 2006
Publication Date	14 Feb 2008
Priority Date	09 Aug 2006
Assignee	Dennis Brown
Also published as	none
Abstract	<p>A portable filter and filter system. The filter has a filter housing defining a liquid channel from an inlet to an outlet. The portable filter includes a liquid filter located in the filter housing, a mouthpiece mechanically associated with the dispensing end of the filter housing, and a liquid receiving means connected to the receiving end of the filter housing. The device can include a</p>

	<p>pre-filter assembly of which the liquid receiving means is a part. The liquid receiving means can include multiple connection members to receive liquid from a variety of liquid sources. The filter can be combined with a liquid container to form a portable filter system. The container can be a flexible bladder having a strap to connect the filtration device to the bladder.</p>
<p>Relevant Text</p>	<p>FIG. 1 and FIG. 2, FIG. 1 illustrates a portable filter 10 according to the invention. The filter is preferably formed and sized to be hand held and portable. Filter 10 operates by filtering liquid passing through it from inlet 14, particularly from opening 32 in this embodiment, to dispensing end 12, from where a user can withdraw a liquid from a mouthpiece 45. More particularly, a user can hold the device 10 at grip 16, connect the inlet 14 to a liquid source, remove cap 20 as described below and illustrated in FIG. 2, and suction or otherwise receive liquid that enters opening 32 and is filtered by filter 10. One significant advantage of preferred embodiments of the invention is that, unlike many conventional filters, the inventive filters can work by user suction and therefore include no levers or pumps that are bulky and heavy and tend to fail.</p>

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Other Related Patent Publications:

S.NO	Publication Number	Title
1	US2013199989	Squeezable beverage bottle and filter system
2	US5928512	Demountable filter for a bottle or the like
3	US2781312	Self-indicating ion exchange and/or filter apparatus
4	US4529511	Water treatment container
5	US2005139540	Static filtration media vessels
6	US2010102002	Portable Drinking Water Purification Device
7	US2011168644	Systems and methods for personal water filtration
8	US2014151284	Water pitcher with filter
9	WO2015059504	Water bottle filter arrangement

10	CN205241263	portable water bottle
11	US20140102962A1	Portable water filtration bottle

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NON PATENT LITERATURES

S. No	URL
1.	https://www.amazon.com/Brita-Stream-Filter-Pitcher-Rapids/dp/B01N3LBPYA
2.	https://www.amazon.com/Anself-Portable-Hydrogen-Generator-Self-cleaning/dp/B01N5JU8ZS
3.	http://netstar88.com/superfilterbottle/
4.	https://www.amazon.es/Vessel-Tritan-Filtration-Bottle-Gallon/dp/B018FAOYK8/ref=sr_1_fkmr1_1?ie=UTF8&qid=1494578530&sr=8-1-fkmr1&keywords=water+filter+pour+vessel

Search Strategy

Database:

Search was conducted in the following databases:

1. USPTO
2. Espacenet
3. Google Patents
4. Google scholar

Keywords: Below mentioned different aspects and its synonyms are used in the search strategy:

I	II	III	IV
Filter	drink	pour	Pitcher
Purify	aquapura	spill	Vase
rectify	aqua	emit	Bottle
process	liquid	splash	Jar/vessel/contianer

Classification Codes:

CPC		
Main Class	Sub Class	Definition
C02F2303	C02F2303/18	C02F2303: Specific treatment goals, e.g. disinfection, corrosion inhibition, removal of agents after treatment. C02F2303/18: Removal of treatment agents after treatment
C02F2307	C02F2307/02	C02F2307: Location of water treatment or water treatment device C02F2307/02: as part of a bottle
C02F2307	C02F2307/04	C02F2307: Location of water treatment or water treatment device C02F2307/04: a part of jug or pitcher
C02F2307	C02F2307/06	C02F2307: Location of water treatment or water treatment device. C02F2307/06: Mounted on or being part of a faucet, shower handle or showerhead
C02F2307	C02F2307/08	C02F2307: Location of water treatment or water treatment device. C02F2307/08: Treatment of wastewater in the sewer, e.g. to reduce grease, odour
C02F2307	C02F2307/12	C02F2307: Location of water treatment or water treatment device. C02F2307/12: as part of household appliances such as dishwashers, laundry washing machines or vacuum

		cleaners.
C02F2307	C02F2307/10	<p>C02F2307: Location of water treatment or water treatment device.</p> <p>C02F2307/10: as part of a potable water dispenser, e.g. for use in homes or offices</p>
USPTO		
210	210/136	<p>210: This is the primary class for patents directed to treating water or waste liquid, and when not more specifically provided for, the class for patents directed to treating liquids in general or of any kind and provides</p> <p>210/136: This subclass is indented under subclass 97. Apparatus having means responsive to a change in a flow line condition acting on the face of a valve disc or plug itself to permit flow in one direction only.</p>
210	210/502.1	<p>210: This is the primary class for patents directed to treating water or waste liquid, and when not more specifically provided for, the class for patents directed to treating liquids in general or of any kind and provides</p> <p>210/502.1: This subclass is indented under subclass 500. Compositions including a component having the property of removing at least one constituent from a liquid mixture by surface attraction or allowing said constituent to penetrate within the component.</p>
210	222/189.06	<p>210: This is the primary class for patents directed to treating water or waste liquid, and when not more specifically provided for, the class for patents directed to</p>

		<p>treating liquids in general or of any kind and provides</p> <p>WITH FILTER (E.G., STRAINER):This subclass is indented under the class definition. Subject matter wherein the dispenser includes a container for a liquid material and the container further includes a separating device having a plurality of openings for (a) retaining matter (e.g., solid or fluid) within a container when a fluid is removed from the container or (b) preventing matter (e.g., solid or fluid) from entering the container from surrounding atmosphere.</p>
210	210/266	<p>210: This is the primary class for patents directed to treating water or waste liquid, and when not more specifically provided for, the class for patents directed to treating liquids in general or of any kind and provides</p> <p>210/266:This subclass is indented under subclass 263. Apparatus combined with an additional separating means other than a particulate material type and spaced therefrom.</p>
210	210/282	<p>210: This is the primary class for patents directed to treating water or waste liquid, and when not more specifically provided for, the class for patents directed to treating liquids in general or of any kind and provides.</p> <p>210/282: This subclass is indented under subclass 263. Apparatus in which separator material is encased in a magazine type holder or container.</p>

*****END OF THE REPORT*****