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(72) Inventors; and

(75) Inventors/Applicants (for US only): **WILDER, Haim** [IL/IL]; 7 Yehuda Halevi Street, 43555 Raanana (IL). **KRYSTAL, Eyal** [IL/IL]; 19/17 Hatchia Street, 44250 Kfar Saba (IL). **BAR-ON, Omri** [IL/IL]; Hachalutz St. 24, Beit Hakerem, 96222 Jerusalem (IL). **HILLEL, Shlomo** [IL/IL]; Daphna 4, 71700 Modiin (IL). **FRENKEL, Hella** [IL/IL]; 9 Har Meron St., 44480 Kfar Saba (IL).

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(74) Agent: **REINHOLD COHN AND PARTNERS**; P.O.Box 13239, 61131 Tel Aviv (IL).

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(71) Applicant (for all designated States except US): **STRAUSS WATER LTD.** [IL/IL]; 49 Hasivim St., 49517 Petach Tikva (IL).

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(54) Title: WATER FILTERING DEVICE

(57) Abstract: The invention relates to a filtering device for filtering running water from a pressurized water source.

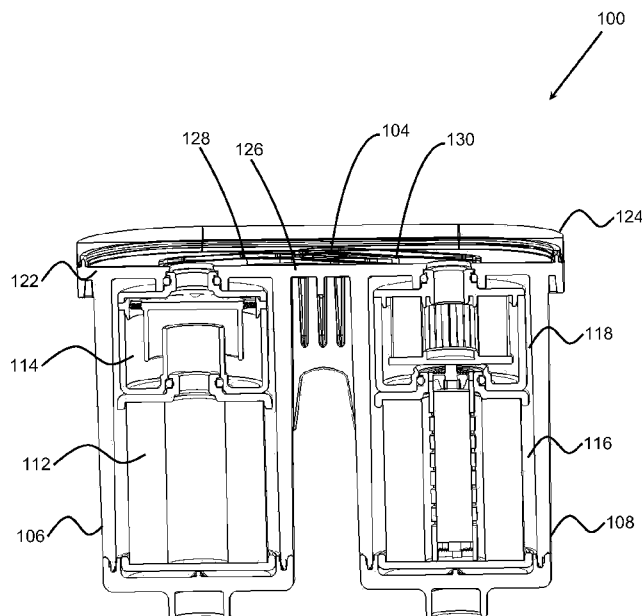


Fig. 2



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Water Filtering Device

TECHNICAL FIELD

This invention relates to a water filtering device of the kind intended for filtering running water from a domestic water supply system or other sources of pressurized water, to obtain filtered or treated water, for example, of drinking water quality.

BACKGROUND

Filtering devices and methods for filtering liquids, particularly such for filtering water, are generally known. Examples are US Patents Nos. 5,976,362, 7,441,665, 7,614,506, WO 2004/071961 and WO 2005/092798. Such filtering devices hold a filtering medium with reactants that can remove harmful or otherwise undesired substances from the filtered water.

GENERAL DESCRIPTION

Provided herein is a filtering device for filtering running water supplied by a pressurized water source, such as, but not limited to, running water from a domestic water supply. The device may be used in water dispensing systems or devices, such as countertop or floor-standing water dispensing devices, in central water filtration systems and others. The filtering device may, by some embodiments, be disposable. The filter device provided herein may also, by some embodiments, be used as a stand-alone device, e.g. for use in a centralized water filtration system. The filtering device provided herein is compartmentalized, each compartment having the capability of performing a certain water treatment function. The water treatment function may, for example, be removal of a certain component from the water, disinfection, adding a certain component to the water and others. Components to remove may, for example, be particulate matter, organic substances (particularly organic contaminants), heavy metals, arsenic, certain salts, calcium, and others. Disinfection may comprise removal of bacteria or viruses. Adding components to the water may comprise adding substances of nutritional value, or may be adding a disinfectant such as bromine and others.

A filtering device of the kind provided herein may comprise compartments with various water treatment functions. The choice of treatment functions to be included may

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be made based on the specific properties and quality of the running water to be treated, on the basis of intended properties of the filtered water, based on regulatory requirements and many others. As will be appreciated the device provided herein is not limited to a certain combination of water treatment compartments.

The device of one embodiment may comprise a housing, having at least one running water inlet and at least one filtered water outlet, with a water flow path defined within the housing between the at least one inlet and the at least one outlet. The housing accommodates a plurality of water treatment compartments that are arranged in succession along the water flow path, each of which holds at least one water treatment element or medium for performing a water treatment function. A water treatment element may, for example, be: a porous filtering element such as a sheet of filtering material (e.g., paper, cloth, plastic, fiberglass and/or others), or may be a solid body of a filtering medium (e.g. porous mass of activated carbon) and others. A water treatment medium may, for example, be: ion-exchange resinous medium, particulate activated carbon medium, particulate matter that includes a substance to be released into the water (such substance may, for example, be disinfectant such as iodine, a substance of nutritious value such as vitamins, food supplements, caffeine, or various flavoring compounds); and in general a substance that interacts with the water to remove a certain substance from the water (e.g. through physical or chemical sorption) or to release a substance of nutritional, disinfectant or other value to the water. The water treatment element or medium will be referred to herein, in some sections, as "***treatment medium/element***" (and in plural as "***treatment media/elements***"). Said treatment medium/element may include such an element, such a medium or both. It should be noted that while some treatment media/elements may include a single component, for example homogeneous solid mass, e.g. a solid body of activated carbon, a single type of resin or a filter sheet, other treatment media/elements may include a combination of different components, for example a mixture of two different particulate treatment components such as a mixture of two different resins, a mixture of a resin and activated carbon particles and a resin, a combination of a physical filter element such as a filter sheet (e.g. filter paper) and active treatment components such as activated carbon or another substance that interacts with the water by removal (e.g. through physical or chemical sorption) of a substance from the water.

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Each of the treatment compartments of said one embodiment has at least one water ingress and at least one water egress. The running water inlet is linked and in flow communication with the water ingress of a first treatment compartment, and the water egress of the last compartment is linked and in flow communication with the filtered water outlet. The arrangement in the filter is such that the water egress of each of the other compartments is linked and in flow communication with the water ingress of a succeeding compartment. In this way, a water flow path is defined between the running water inlet and the filtered water outlet through a succession of filtering compartments. In each compartment the water treatment function performed therein may be the same or different than that in other compartment, in dependence of the treatment medium/element included therein. Typically, while some compartments may perform the same treatment function as one or more other compartments, at least some perform different treatment functions than others, often a unique treatment function not performed by other compartments.

The water treatment function may be, as noted above, removal of a certain component from the water, disinfection, adding a certain component to the water and others.

The device typically includes 2, 3, occasionally 4, and at times more, water treatment compartments.

The filtering device comprises by some embodiments at least one type of water treatment compartment (to be referred to herein also as “*direct flow WTC*”) that comprises a first treatment medium/element that may, for example, be in the form of a solid porous filtering mass, enveloping a lumen that defines an axis. The lumen may, for example, be defined by a void within a solid porous filtering mass or may be a lumen defined by perforated cylinder disposed within the compartment and surrounded by the first treatment medium/element. Said first treatment medium/element is enveloped by an entry space linked and in flow communication with the compartment’s water ingress. The lumen of said direct flow WTC is linked to the compartment’s water egress. Thus, water flows in a generally radial direction (i.e. perpendicular to the axis) from said entry space to said lumen through said first treatment medium/element. Said lumen is typically substantially cylindrical and said first treatment medium is typically formed to have a substantially tubular configuration.

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The compartment egress of the direct flow WTC may be coaxial with the axis defined by the lumen.

Said first treatment medium/element may, by some embodiments, be a treatment medium/element that can sorbs a substance out the water in combination with a physical filtering element that is adapted to filter out particles or elements above a defined size, such a filter sheet. For example, a solid porous filter body may be enveloped by a first sheet of porous matrix; for example, a sheet having the general form of a corrugated or pleated sleeve. Said first sheet may, for example, be made of paper, fiberglass, polymeric material or woven or non-woven cloth. Such a first sheet separates between the entry space and the first treatment medium, such that in order for the water to reach said first treatment medium from the entry space, it has to flow through said first sheet and against the flow resistance imposed thereby. This flow resistance thus works to spread the radial flow of the water more uniformly along the surface said first treatment medium/element. This sheet often also functions to remove particulate matter from the water.

At times, the lumen of the direct flow WTC comprises a second water treatment medium, which may be the same or different than said first treatment medium. The lumen may also comprise a second sheet of a porous matrix that lines the lumen's walls and, in case the lumen comprises a water treatment medium, enveloping it. Such a second sheet may be present in addition to or as an alternative to said first sheet. Said second sheet may also serve, at times, as a barrier between said first treatment medium and said second treatment medium. In addition to other potential functions, said second sheet may also have functions similar to those noted for said first sheet and may also have a corrugated or pleated structure.

By other embodiments of the direct flow WTC, the treatment medium/element is a physical filtering element such a filter sheet, for example a pleated filter sleeve.

The filtering device comprises by some embodiments at least one type of water compartment (to be referred to herein also as “*serpentine flow WTC*”), which has a water treatment space formed between two end walls opposite to one another and having a water ingress formed substantially at the center of a first of the two opposite walls. A curvilinear flow path is defined in the water treatment space by two or more concentric cylindrical wall sections, at least one of which extends into the treatment space from said first wall and at least one of which extends into the treatment space

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from the opposite wall. The treatment space contains at least one water treatment medium. Said serpentine flow compartment has, according to some embodiments, a generally cylindrical shape with a cylinder axis that extends between the two end walls and is perpendicular thereto.

Filtering devices of the invention may comprises one or more filtering compartments of the direct flow WTC, may comprise one or more filtering compartments of the serpentine flow WTC, may comprise both one or more direct flow WTC and one or more serpentine flow WTC. In addition to said direct flow WTC and/or serpentine flow WTC, the filtering device may also include other types of water treatment compartments. The filtering compartments may be arranged along the flow path in different arrangements of the different type of compartments and the disclosure herein is not limited to any specific arrangement or sequence.

The housing may be a single structural unit and may be prismatic, cylindrical, etc; or may comprise two or more sub-housing structures, each of which houses one or more water treatment compartments. In the latter case, one or more linking elements are provided that connect the sub-housing structures and having defined therein water conduits that permit water flow between the sub-housing structures along said flow path. Each of said sub-housing structures is typically an elongated element, e.g. substantially cylindrical.

For example, the filtering device may comprise two sub-housing structures, e.g. aligned with one another. The linking element is typically formed at an end, preferably a top end, of the sub-housing structures. The sub-housing structures are typically elongated, e.g. of a cylindrical or prismatic configuration and aligned with one another (namely the axes defined by each of the sub-housing structures are substantially parallel one to the other). The linking element is typically arranged in an orientation normal to said axes.

The running water inlet may be formed at one end of one sub-housing structure and the filtered water outlet may also be formed at an end of a sub-housing structure; for example, said inlet being formed at one end of one sub-housing structure and said outlet at an end of another sub-housing structure. It is also possible for one or both of the running water inlet and the filtered water outlet to be formed at said linking element.

The treatment compartment may be defined within water treatment modules that are disposed within the housing. There may be 2, 3, occasionally 4, and at times more of

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such water treatment modules. Said modules are typically pre-assembled, each being a stand-alone module, and inserted as such into the housing. The filtering device may house one or more direct flow water treatment modules ("**WTM**") having defined therein a direct flow WTC, serpentine flow WTM having defined therein a serpentine flow WTC or other types.

The water egress of one or more of said modules may be defined within a projection adapted for being received into a matching depression formed in another component of the filter device, e.g. another water treatment module or a component that is in direct flow communication with the running water inlet or filtered water outlet, to thereby define a portion of the flow path. The water ingress of one or more of said modules may be formed in a depression adapted to receive a matching projection of another component of the filter device, e.g. a matching projection of another of the modules or a component that is in direct flow communication with the running water inlet or filtered water outlet, to thereby define a portion of the flow path.

By an embodiment of the disclosure herein, the filtering device comprises at least one enveloping compartment, having a general annular shape formed about an axis that envelopes at least one enveloped compartment which is, thus, situated within a space defined by the enveloping compartment. The at least one enveloping compartment and the at least one enveloped compartment are typically concentric. By one embodiment the enveloping compartment has a filtering medium or element defined between external and internal faces thereof and the water flows in a substantially radial direction from said external to said internal face. The enveloping compartment may be formed with an entry space enveloping the water treatment medium or element and a water collecting space enveloped by the water treatment medium or element. The water collecting space is linked to a water egress which is in flow communication with the water ingress of the enveloped compartment. The filter of the embodiments described in this paragraph may also include one or more end compartments situated between the enveloping and the enveloped compartments and one of the ends of the filtering device; the ends being defined by said axis that extends therebetween. The treatment medium or element in the end compartment may be formed with a cavity and the water ingress of the end compartments opens into said cavity; whereby the water flows therefore through the water treatment medium or element of the end compartment.

EMBODIMENTS

Some of the novel features of the current disclosure are defined in the following numbered embodiments. It is to be noted that these numbered embodiments intend to add on and not limit the disclosure herein in the above General Description and in the Detailed Description of Embodiments, below.

1. A filtering device for filtering running water from a pressurized water source, comprising:

- a housing with at least one running water inlet and at least one filtered water outlet with a water flow path defined within the housing between the at least one inlet and at least one outlet;

- two or more water treatment compartments within the housing arranged in succession along the water flow path, each of which has a water treatment space with at least one water treatment medium or element for performing a defined water treatment function, and each having at least one water ingress and at least one water egress; the running water inlet being linked and in flow communication with the water ingress of a first compartment, the water egress of a last compartment being linked and in flow communication with the filtered water outlet, the water egress of each of the other compartments being linked and in flow communication with the water ingress of a succeeding compartment; and preferably comprising also

- at least one of the compartments (i) has a curvilinear flow path being defined in its water treatment space by two or more concentric cylindrical wall sections, at least one of which extends into the treatment space from said first wall and at least one of which extends into the treatment space from the opposite wall, or (ii) has a corrugated or pleated filter sheet enveloping or being enveloped by another treatment medium or element.

2. The filtering device of embodiment 1, comprising a succession of 2 or more water treatment compartments.

3. The filtering device of embodiment 2, comprising a succession 3 or 4 water treatment compartments.

4. The filtering device of any one of embodiments 1-3, wherein the water treatment medium or element is one or more of the groups consisting of a porous filtering element such as a sheet of filtering material (e.g., paper, cloth, plastic,

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fiberglass and/or others), a solid body of a filtering medium (e.g. porous mass of activated carbon), an ion-exchange resinous medium, particulate activated carbon medium, particulate matter that includes a substance to be released into the water (e.g. a disinfectant such as iodine, a substance of nutritious value such as vitamins, food supplements, caffeine, or various flavoring compounds).

5. The filtering device of any one of embodiments 1-4, wherein the treatment media or elements comprises: (i) a single component, for example homogeneous solid mass, e.g. a solid body of activated carbon, a single type of resin or a filter sheet; or (ii) a combination of different components, for example a mixture of two different particulate treatment components such as a mixture of two different resins, a mixture of a resin and activated carbon particles and a resin, a combination of a physical filter element such as a filter sheet (e.g. filter paper) and active treatment components, such as activated carbon or another substance that interacts with the water by removal (e.g. through physical or chemical sorption) of a substance from the water.

6. The filtering device of any one of embodiments 1-5, wherein a defined water treatment function is being performed by more than one compartment.

7. The filtering device of any one of embodiments 1-5, comprising compartments that perform a unique water treatment function.

8. The filtering device of any one of embodiments 1-7, wherein

- at least one direct flow water treatment compartment comprises a first water treatment medium or element enveloping a lumen, the lumen defining an axis;
- the first treatment medium or element being enveloped by an entry space linked and in flow communication with the compartment's water ingress; and
- the lumen being linked to the compartment's water egress;
- whereupon water flows in a general radial direction from said entry space to said lumen through said first treatment medium or element.

9. The filtering device of embodiment 8, wherein the treatment medium or element is a solid porous filtering body.

10. The filtering device of embodiment 8 or 9, wherein said lumen is substantially cylindrical.

11. The filtering device of any one of embodiments 8-10, wherein the lumen is defined by a void within a solid porous filtering mass.

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12. The filtering device of any one of embodiments 8-10, wherein the lumen is defined by a perforated cylinder disposed within the compartment and surrounded by the treatment medium or element.

13. The filtering device of any one of embodiments 8-12, wherein said treatment medium or element is substantially of tubular form.

14. The filtering device of any one of embodiments 8-13, wherein the compartment egress is coaxial with said axis.

15. The filtering device of any one of embodiments 8-14, wherein said treatment medium or element is enveloped by a first sheet of porous matrix.

16. The filtering device of any one of embodiments 8-15, wherein the inner wall of said lumen is lined by a second sheet of a porous matrix.

17. The filtering device of embodiment 15 or 16, wherein said sheet has the general form of a corrugated or pleated sleeve.

18. The filtering device of embodiment 15 or 16, wherein said sheet improves uniformity of radial water flow from the entry space to the lumen along said treatment medium or element, as compared to such flow without said sheet.

19. The filtering device of any one of embodiments 8-18, wherein said lumen comprises a second water treatment medium or element which may be of the same or different substance(s) than that of said first water treatment medium or element.

20. The filtering device of any one of embodiments 8-14, wherein the treatment medium or element is a physical filtering medium or element.

21. The filtering device of embodiment 20, wherein the filtering medium or element is a corrugated or pleated filter sheet.

22. The filtering device of any one of embodiments, 1-21 wherein the water treatment medium in at least one compartment comprises activated carbon.

23. The filtering device of any one of embodiments 1-22, wherein

- at least one serpentine flow type water treatment compartment has a water treatment space formed between two end walls opposite to one another and having a water ingress formed at substantially the center of a first of the two opposite walls;

- a curvilinear flow path being defined in the water treatment space by two or more concentric cylindrical wall sections, at least one of which extends into the

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treatment space from said first wall and at least one of which extends into the treatment space from the opposite wall; and

- said treatment space containing at least one water treatment medium.

24. The filtering device of embodiment 23, wherein said serpentine flow compartment has a generally cylindrical shape with a cylinder axis extending between the two end walls and perpendicular thereto.

25. The filtering device of any one of embodiments 1-24, wherein the housing comprises

- two or more sub-housing structures, each of which houses one or more water treatment compartments; and
- one or more linking elements connecting the sub-housing structures and having water conduits defined therein to permit water flow between said sub-housing structures along said flow path.

26. The filtering device of embodiment 25, wherein each of said sub-housing structures is an elongated element.

27. The filtering device of embodiment 26, wherein the sub-housing structures are substantially cylindrical.

28. The filtering device of embodiment 26 or 27, comprising two sub-housing structures aligned with one another with the linking element being in normal orientation to that of said sub-housing structures.

29. The filtering device of embodiment 28, wherein the running water inlet and the filtered water outlet are formed within the linking element.

30. The filtering device of embodiment 29, wherein the linking element is formed at a top end of the housing.

31. The filtering device of any one of embodiments 1-24, wherein at least one enveloping compartment, having a general annular shape formed about an axis envelopes at least one enveloped compartment.

32. The filtering device of any one of embodiments 1-24, comprising at least two concentric compartments, at least one of which is an enveloping compartment enveloping at least one other enveloped compartment.

33. The filtering device of embodiment 31 or 32, wherein the enveloping compartment has a filtering medium or element defined between external and internal

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faces thereof and the water flows in a substantially radial direction from said external to said internal face.

34. The filtering device of embodiment 33, wherein the enveloping compartment is formed with an entry space enveloping the water treatment medium or element and a water collecting space enveloped by the water treatment medium or element.

35. The filtering device of embodiment 34, wherein the enveloped compartments has a water ingress linked to and in flow communication with the water collecting space.

36. The filtering device of any one of embodiments 31-35, wherein said axis extends between a first and a second end of the filter, and comprising at least one end compartment situated between the at least one enveloping and the at least one enveloped compartments and one of the ends.

37. The filtering device of embodiment 36, comprising a conduit linking the water egress of one of the enveloping or enveloped compartments and the water ingress of the end compartment; said end compartment comprising a treatment medium or element formed with a cavity and said water ingress opens into said cavity.

38. The filtering device of embodiment 37, wherein the water inlet is linked to said entry space and the water outlet is linked to the water egress of the end compartment.

39. A filtering device for filtering running water from a pressurized water source, comprising:

- a housing with at least one running water inlet and at least one filtered water outlet;

- two or more water treatment modules disposed within the housing, each of which defines a water treatment space that holds at least one water treatment medium for either removing a component from or adding a component to the water, and having a water ingress and a water egress; the running water inlet being linked and in flow communication with the water ingress of a first water treatment module, the water egress of a last water treatment module being linked and in flow communication with the filtered water outlet, the water egress of each of the other compartments being linked and in flow communication with the water ingress of a succeeding compartment,

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to thereby define a water flow path from the water inlet to the water outlet through a succession of the water treatment modules; and preferably comprising also

- at least one of the modules (i) defines a curvilinear flow path its water treatment space by two or more concentric cylindrical wall sections, at least one of which extends into the treatment space from said first wall and at least one of which extends into the treatment space from the opposite wall, or (ii) comprises a corrugated or pleated filter sheet enveloping or being enveloped by another treatment medium or element.

40. The filtering device of embodiment 39, comprising a succession of at least 3 water treatment modules.

41. The filtering device of embodiment 40, comprising a succession of 4 water treatment modules.

42. The filtering device of any one of embodiments 39-41, wherein the water treatment medium or element is one or more of the group consisting of a porous filtering element such as a sheet of filtering material (e.g., paper, cloth, plastic, fiberglass and/or others), a solid body of a filtering medium (e.g. porous mass of activated carbon), an ion-exchange resinous medium, particulate activated carbon medium, particulate matter that includes a substance to be released into the water (e.g. a disinfectant such as iodine, and a substance of nutritious value such as vitamins, food supplements, caffeine, or various flavoring compounds).

43. The filtering device of any of embodiments 39-42, wherein the treatment media or elements comprises: (i) a single component, for example homogeneous solid mass, e.g. a solid body of activated carbon, a single type of resin or a filter sheet; or (ii) a combination of different components, for example a mixture of two different particulate treatment components such as a mixture of two different resins, a mixture of a resin and activated carbon particles and a resin, a combination of a physical filter element such as a filter sheet (e.g. filter paper) and active treatment components such as activated carbon or another substance that interacts with the water by removal (e.g. through physical or chemical sorption) of a substance from the water.

44. The filtering device of any one of embodiments 39-43, wherein a defined water treatment function is being performed by more than one compartment.

45. The filtering device of any one of embodiments 39-43, comprising compartments that perform a unique water treatment function.

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46. The filtering device of any one of embodiments 39-45, wherein

- at least one direct flow water treatment module comprises a first water treatment medium or element enveloping a lumen, the lumen defining an axis;
- the first treatment medium or element being enveloped by an entry space linked and in flow communication with the module's water ingress; and
- the lumen being linked to the module's water egress;
- whereupon water flows in a general radial direction from said entry space to said lumen through said first treatment medium or element.

47. The filtering device of embodiment 46, wherein the treatment medium is a solid porous filtering body.

48. The filtering device of embodiment 46 or 47, wherein said lumen is substantially cylindrical.

49. The filtering device of any one of embodiments 46-48, wherein the lumen is defined by a void within a solid porous filtering mass.

50. The filtering device of any one of embodiments 46-48, wherein the lumen is defined by a perforated cylinder disposed within the compartment and surrounded by the treatment medium or element.

51. The filtering device of any one of embodiments 46-50, wherein said treatment medium or element is substantially tubular.

52. The filtering device of any one of embodiments 46-51, wherein the water egress of the first module is coaxial with said axis.

53. The filtering device of any one of embodiments 46-52, wherein said treatment medium or element is enveloped by first sheet of a porous matrix.

54. The filtering device of any one of embodiments 46-53, wherein the inner wall of said lumen is lined by a second sheet of a porous matrix.

55. The filtering device of embodiment 53 or 54, wherein said sheet has the general form of a corrugated or pleated sleeve.

56. The filtering device of any one of embodiments 53-55, wherein said sheet improves uniformity of radial water flow from the entry space to the lumen along said treatment medium or element, as compared to such flow without said sheet.

57. The filtering device of any one of embodiments 46-56, wherein said lumen comprises a second water treatment medium or element which may be of the same or different substance(s) than that of said first water treatment medium or element.

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58. The filtering device of any one of embodiments 46-52, wherein the treatment medium or element is a physical filtering medium or element.

59. The filtering device of embodiment 58, wherein the filtering medium or element is a corrugated or pleated filter sheet.

60. The filtering device of any one of embodiments 39-59, wherein the water treatment medium in at least one compartment comprises activated carbon.

61. The filtering device of any one of embodiments 39-60, wherein

- at least one serpentine flow water treatment module has a water treatment space formed between two end walls opposite to one another and having a water ingress formed at substantially the center of a first of the two opposite walls;
- a curvilinear flow path being defined in the water treatment space by two or more concentric cylindrical wall sections, at least one of which extends into the treatment space from said first wall and at least one of which extends into the treatment space from the opposite wall; and
- said treatment space containing at least one water treatment medium.

62. The filtering device of embodiment 61, wherein said serpentine flow module has a generally cylindrical shape with a cylinder axis extending between the two end walls and perpendicular thereto.

63. The filtering device according to any one of embodiments 39-62, wherein one or more of said modules are pre-assembled, stand-alone modules.

64. The filtering device of embodiment 63, wherein the water egress of one or more of said modules is defined within a projection that is adapted for being received into a matching depression formed in another component of the filtering device to thereby define the flow path.

65. The filtering device of embodiment 64, wherein the water ingress of one or more of said modules is formed in a depression adapted to receive a matching projection of another component of the filtering device to thereby define the flow path.

66. The filtering device of any one of embodiments 63-65, wherein one or more modules snap fit into engagement with another module.

67. The filtering device of any one of embodiments 58-66, wherein the housing comprises

- two or more sub-housing structures, each of which house one or more water treatment compartments; and

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- one or more linking elements connecting the sub-housing structures and having water conduits defined therein to permit water flow between said sub-housing structures along said flow path.

68. The filtering device of embodiment 67, wherein each of said sub-housing structures is an elongated element.

69. The filtering device of embodiment 68, wherein the sub-housing structures are substantially cylindrical.

70. The filtering device of embodiment 68 or 69, comprising two sub-housing structures aligned with one another with the linking element being in normal orientation to that of said sub-housing structures.

71. The filtering device of embodiment 70, wherein the running water inlet and the filtered water outlet or formed within the linking element.

72. The filter device of embodiment 71, wherein the linking element is formed at a top end of the housing.

BRIEF DESCRIPTION OF THE DRAWINGS

In order to understand the invention and to see how it may be carried out in practice, embodiments will now be described, by way of non-limiting example only, with reference to the accompanying drawings showing schematic representations of such embodiments, in which:

Fig. 1 is a perspective view of a filtering device with two aligned sub-housing structures according to an embodiment of the disclosure herein.

Fig. 2 is a longitudinal cross-section of the filtering device of Fig. 1.

Fig. 3 is an exploded cross-sectional view of the filtering device of Figs. 1 and 2.

Figs. 4A-4D are enlarged cross-sectional views of each of the water treatment modules of Fig. 3.

Figs. 5A-5D are exploded perspective views of the water treatment modules of Figs. 4A-4D, respectively.

Fig. 6A shows a longitudinal cross-section perspective view of Fig. 2, illustrating the water flow path through the device (**Fig. 6B**).

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Fig. 7 is a top perspective view, with cover of the linking element removed, to illustrate the water flow pattern therein.

Figs. 8 and 9 show longitudinal cross-sections through water filtering devices.

Fig. 10 is a schematic illustration of a succession of water treatment functions, along the water flow path in an embodiment of the filtering device.

Fig. 11 is a perspective view of a filtering device according to another embodiment of this disclosure.

Fig. 12 is a longitudinal cross-section of the device of Fig. 11.

Fig. 13A shows a longitudinal cross-sectional and partial perspective view of a filtering device according to an embodiment of the current disclosure and with the linking member made to be transparent to show internal structure thereof.

Fig. 13B and 13C shows the two filtering modules of the filtering device of Fig. 13A in longitudinal cross-sectional view.

Fig. 13D shows an exploded perspective view of the module of Fig. 13C.

DETAILED DESCRIPTION OF EMBODIMENTS

A filtering device for filtering running water from a pressurized water source is illustrated in **Figs. 1-3**. The device **100** has a housing with a running water inlet **102** and a filtered water outlet **104**. The housing houses a plurality of water treatment modules, four in this specific embodiment – **112**, **114**, **116** and **118**, as can be seen in **Fig. 2** – each of which defines a water treatment compartment holding a water treatment medium or element, as will be further described below, performing a defined water treatment function. Each module, as will also be illustrated below, has a water ingress and a water egress: the water ingress of compartment **112** being linked and in flow communication with the running water inlet **102**; the water egress of compartment **112** being linked and in flow communication with the water ingress of compartment **114**; the water egress of compartment **114** being linked and in flow communication with the water ingress of compartment **116**; the water egress of compartment **116** being linked and in flow communication with the water ingress of compartment **118**; and the water egress of compartment **118** being linked and in flow communication with the filtered water outlet **104**; to thereby defined a water flow path within the housing between the

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running water inlet **102** and the filtered water outlet **104** through the water treatment modules.

The housing has two cylindrical and aligned sub-housing structures **106** and **108**, each of which houses water treatment modules, sub-housing structure **106** housing water treatment modules **112** and **114** and sub-housing structure **108** housing water treatment modules **116** and **118**. A linking element **120** (best seen in **Fig. 7**) connects the two sub-housing structures. Linking element **120** includes a base member **122** integrally formed with an end of sub-housing structures **106** and **108** and a cover member **124**. Formed in base member **122** are grooves that define three water conduits **126**, **128** and **130** (best seen in **Fig. 7**) to permit water flow between said sub-housing structures along the water flow path as will be explained below.

The water treatment modules can best be seen in **Figs. 4A-5D**.

As can be seen in **Fig. 3**, each of the modules **112**, **114**, **116** and **118** may be pre-assembled, substantially stand-alone modules, with the modules being fitted together and inserted into sub-housing structures **106** and **108** in the manner shown. As can be seen, modules **112** and **116** have respective projections **132** and **136**, defining the water egresses of these modules, that are received into respective matching depressions **142** and **146** of respective water treatment modules **114** and **118**, which depressions are the water ingresses of the two latter modules; modules **114** and **118** have respective projections **134** and **138**, defining the water egresses of these modules, that are received in respective depressions **144** and **148** formed in base member **122**. Fluid-tight fit between the respective projections and depressions is achieved through an O-ring received in a lateral groove which will be further described below. Once the modules are accommodated within the sub-housing structures, sub-housing structures **106** and **108** are sealed with respective closure members **146** and **148**, each having respective downward projections **147** and **149** for securing the fitting of filtering device **100** in a countertop drinking water dispensing device.

Cross-sectional views of each of modules **112**, **114**, **116** and **118** are seen, in isolation, in **Figs. 4A-4D**, respectively; respective exploded perspective views of each of these modules are seen in **Figs. 5A-5D**.

Module **112**, which is seen in isolation **Figs. 4A** and **5A**, is of the kind referred to above as the "*direct flow WTM*", and has a water treatment compartment generally designated **150**, including a tubular porous activated carbon body **152** defining a

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cylindrical lumen **154**. Lumen **154** defines a longitudinal axis and is coaxial with projection **132** formed in a top plate **156** and with the opening **158** defined therein serving as the module's water egress. Module **112** further includes a bottom plate **160**, both top plate **156** and bottom plate **160** have respective skirts **162** and **164** which snap-fit over the upper and lower edges of body **152**. As can be noted, plates **156** and **160** have a larger diameter than that of body **152** and thus an entry space is defined between it and opposite inner walls of sub-housing structure **106**, as will also be illustrated below (can be seen best in **Fig. 6A** further described below). Once assembled, a direct flow path is formed between lumen **154** and opening **158** such that water that flows radially from said entry space, through body **152** flows into lumen **154** and therethrough out of opening **158**. Projection **132** has a lateral annular groove **166** accommodating an O-ring **168**, the function of which has already been mentioned above.

Module **114**, seen in isolation in **Figs. 4B** and **5B**, is of the kind referred to above as the "*serpentine flow WTM*", and has a water treatment space **170**, formed between a bottom wall **172** and a top wall **174**. An opening **176** is formed in bottom wall **172**, serving as the water ingress of this module and opening **178**, formed in projection **134**, serves as the water egress of the module. Two concentric cylindrical walls extend into the water treatment space **170**, consisting of wall **180** surrounding opening **176** and extending upward from bottom wall **172**; and wall **182** extending downwards from wall **174** into the treatment space. These two concentric walls jointly define a radial, curvilinear flow path of the water between ingress **176** and egress **178**.

As can be seen particularly in **Fig. 5B**, module **114** is assembled from four elements, including a housing element **184**, defining the bottom wall **172**, the cylindrical wall section **180** and side walls **186** of the water treatment space **170**; an element **188** that defines the downwardly projecting cylindrical wall **182**, defining the upper wall **174** of the water treatment space, which includes in its periphery a plurality of apertures **190** that permit water egress from the water treatment space **170**. Also included is a top plate **179**, which once fitted over element **188**, leaves a clearance permitting water to flow from apertures **190** out through water egress **178**. Projection **134** has a lateral, annular groove **192**, accommodating an O-ring **194**, the function of which has already been noted above. Prior to the assembly of these four elements, a water treatment medium which may be, for example, activated carbon in granular form, is inserted into the water treatment space. Typically, apertures **190** are formed with a

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mesh to block outflow of components of the water treatment medium contained in water treatment space **170**.

Module **116**, seen in isolation **Figs. 4C** and **5C**, is also of direct flow WTM. This module has similar elements to those of module **112**, and like elements to those of module **112** have been given the like reference numerals, shifted by **100**. The reader is referred to the description of module **112** for an explanation their structure and function. Carbon body **252** may be of the same or different composition than carbon body **152** of module **112**. The main structural difference is the inclusion of a cylindrical element **210** with a plurality of perforations **212** formed thereon, downwardly extending from top plate **256**, which may be integrally formed or snap-fitted therewith, and having a lumen **254** which is in direct flow communication with component **258**. As can be seen in **Fig. 4C**, cylindrical element **210** holds water treatment medium **214** which may be the same or different that carbon body **252** (typically different) and may, for example, be a disinfectant compound, such as resinous or polymeric material that can release disinfecting molecules, e.g. bromine or iodine, into the water. Thus, water passing through carbon body **252**, enters lumen **254** through the perforations **212** and then flows through the water treatment medium **214** to eventually egress through opening **258**, which serves as a water egress of module **116**. Snap-fitted onto component **258** is a sieve element **218** which includes sieve opening **220**, intended to permit outflow of water but block components of the water treatment medium that may be carried thereby.

Module **118**, seen in isolation in **Figs. 4D** and **5D**, is also of direct flow WTM. Water treatment module **118** has a water treatment space, defined between a bottom plate **226** and a top plate **228**. Water ingressing through opening **146**, serving as the water egress of module **118**, enters into a water entry space **230** which includes a portion below plate **226** and a lateral portion along side walls **232**. Module **118** has a treatment element **234** formed around a lumen **236** in flow communication with opening **238**, defined in projection **138**. The element **234** is, by some embodiments a corrugated or pleated filter sheet. In the specifically illustrated embodiment it is a pleated filter sheet. Water ingressing through egress **146** enters the entry space **230** and then flows laterally through treatment element **234** into lumen **236**; and then out through opening **238** that serves as a water egress of module **118**. Optionally, peripheral to the element **234**, a water treatment medium may be disposed.

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As can be seen, in particular, in **Fig. 5D**, water treatment module **118** has five structural elements, fitted with one another, and includes a main housing element **240** defining side walls **232** and the bottom wall with opening **146**, a bottom plate **226**, filter element **234**, top plate **242** defining the upper wall **228** and projection **138** with its opening **238**, with annular groove **244** accommodating an O-ring **246**.

Figs. 6A-6B are cross-sectional views of the filter and **Fig. 7** is a perspective view with top cover **124** removed, illustrating the water flow path within the filtering device **100**. In **Fig. 6B** and **Fig. 7**, the water flow path is schematically illustrated through the use of arrows.

Water ingressing through running water inlet **102**, flows along the water conduit defined by groove **126**, to enter a lateral space **302** formed between side walls **186** of treatment module **114** and internal walls of sub-housing structure **106**, and then through a lateral clearance **304** formed peripheral to skirt **162** of top plate **156**, which serves as a water ingress of module **112**. Water entering into entry space **150**, flows then radially through carbon body **152** into lumen **154** and then egresses through water egress **158** into water ingress **176** of treatment module **114**. From water ingress **176**, the water flows radially, in a curvilinear path, through the medium contained in treatment space **170**, and exiting through apertures **190** into the space formed between walls **174** and top plate **179** to egress through opening **178**. The water then flows through the conduit defined by groove **128** to enter into the lateral space defined between side walls **232** of treatment module **118** and internal walls of sub-housing structure **108**; then through clearance **306** that serves as the water ingress of module **116** and enters the entry space **250** of module **116**. The water then flows radially through carbon body **252** into lumen **210**, to then flow through treatment medium **214** towards water egress **258**.

Water entering into module **118** flows into entry space **230**; and then, radially through filter element **234** into lumen **236** to eventually exit through egress **238** into the conduit defined by groove **130**, to exit through filtered water outlet **104**.

Reference is made to **Figs. 8** and **9** showing filtering devices **400** and **500**, respectively, of other embodiments to those of the filtering device described above. As noted, both devices include three water treatment modules (as compared to the four of device **100**) including modules **412**, **414** and **416** of device **400** and modules **512**, **514** and **516** of device **500**. Modules **414** and **514** are similar in structure and function to modules **114** of device **100**; and likewise, modules **416** and **516** are similar in structure

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and function to module **116** of device **100**. The reader is referred to the description of the structure and function of modules **114** and **116** in explanation of the structure and function of modules **414**, **416**, **514** and **516**.

Module **412** is similar to module **112** of device **100**, the difference being the inclusion of a corrugated sheet **422**, made of a porous matrix, lining the inner walls of lumen **454** of module **412**. This sheet serves for filtering out coarse, particulate matter that may be carried by the water or released by carbon body **452**, as well for providing a pressure element for ensuring relatively uniform, radial flow of water along carbon filter body **452**. Other than these differences, module **412** is similar in structure and function to module **112** of device **100**; and the reader is referred to the description above to gain a full understanding of the structure and function of module **412**.

Module **512** is also of similar structure and function to module **112** of device **100**; the difference being that carbon body **552** is enveloped by a corrugated sheet **524** made of a porous matrix, such as a filter paper, that serves to filter out coarse, particulate matter that may be carried by the water and also serves as a pressure element to ensure relatively uniform flow of water throughout the length of carbon body **552**.

Overall, the water flow path throughout filtering devices **400** and **500** is similar to that of device **100**.

Reference is now made to **Fig. 10**, which is a schematic illustration of a succession of water treatment functions, along the water flow path in an embodiment of the filtering device. Shown are different stages of water treatment, each achieving a specific treatment function. It should be noted that some successive stages may, by some embodiments, be carried out within the same compartment or module, the succession of stages being ensured by the arrangement of different treatment media/elements in the compartments or module. However, some of the stages may each be carried out in a different compartment or module. It should also be noted that the illustrated stages and their treatment functions are but an example and the sequence of stages may be different by some embodiments, some functions may be missing in other embodiments, some embodiments may involve treatment stages where other functions are being carried out, etc.

The following treatment functions are carried out in the 6 treatment stages of the water treatment process schematically illustrated in **Fig. 10**:

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- Stage I: pre-filtration treatment function of removal of particulate matter, humates, colloids, microbiological contaminates as bacteria virus and cyst from the water. This stage can be performed by either one or more media. Examples of treatment elements to perform this function are filter sheets such as a pleated paper filter sheet.
- Stage II: treatment function of removal of heavy metals and/or volatile organic compounds (VOC). Examples of a treatment media/elements to achieve this function are a variety of forms of activated carbon, e.g. in the form of a solid block.
- Stage III: treatment function of removal of inorganic contaminates such as arsenic, fluoride and/or calcium. Examples of treatment medium/element to achieve this function are specific resins, activated alumina and forms of nano-carbons.
- Stage IV: a second treatment function identical to Stage II.
- Stage V: disinfecting treatment function through release of a bactericide such bromide, iodine, fluorine bearing compounds into the water, or any filtration media/element with microbial contaminates removal ability. Examples of treatment media/elements to achieve this function are resinous or polymeric materials that release bromine into the water such as HaloPure[®] (a product distributed by HaloSource, Inc., USA).
- Stage VI: final stage of filtering for improving taste, malodor nutriling effects, final solid particulate matter removal and/or enrichment of the water with a substance having a flavoring or nutritional value. Examples of treatment media/elements to achieve this function are activated carbon in particulate or solid porous block form, a filter sheet with final polishing effect, water soluble flavoring compounds, etc.

The implementation of the different treatment stages in the different modules of the filtering device 100 of Figs. 1-7, filtering device 400 of Fig. 8 and filtering device 500 of Fig. 9 is shown in the following table (where more than one treatment stage is carried in a module, shown in brackets are the numbers of the respective element of the module):

Device	Stage I	Stage II	Stage III	Stage IV	Stage V	Stage VI
100	None	Module 112	Module 114	Module 116 (252)	Module 116 (214)	Module 118

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400*	Module 412 (422)	Module 412 (452)	Module 414	Module 416 (456)	Module 416 (458)	None
500	Module 512 (524)	Module 512 (552)	Module 514	Module 516 (526)	Module 516 (528)	None

* In filtering device 400, Stage II precedes Stage I.

Reference is now being made to **Figs. 11 and 12** showing a filtering device **700** according to another embodiment of this disclosure. Device **700** includes a housing **702** with a running water inlet **704** and a filtered water outlet **706**. As can be seen in **Fig. 12**, housing **702** houses three water treatment modules **710**, **712** and **714**.

Module **710** defined between side wall **716**, bottom wall **718**, side wall **720** and top wall **724** of the generally cylindrical cavity **722** formed at the center of bottom wall **718**, and top wall **724**. It includes a water ingress **726**, in flow communication with running water inlet **704**, leading into an entry space **728**, defined between wall **720** and water treatment assembly **730**. Assembly **730** includes a sleeve of a filter matrix **732**, enveloping a porous tubular body **734** made, for example, of activated carbon. Assembly **730** is being held together and in position by two flanking members **736** and **738**. Defined between internal walls of body **734** and wall **720** is a water collecting space **740** linked to a head space **742**. A water egress **744** is formed as an opening in wall **721**. Water ingressing through running water inlet **704**, flows through ingress **726**, entry space **728**, and then radially through the treatment assembly **730** into collecting space **740** and eventually egresses out of water egress **744**.

Module **712** includes a generally cylindrical housing with side wall **752** and top and bottom walls **754** and **756**, respectively, and having a water ingress **758** and water egress **760** defined by respective tubular bodies **762** and **764**, integrally formed with and extending upwards from wall **754**. Module **712** houses a water treatment compartment **766**, filled with a water treatment medium that may, for example, be activated carbon or resinous ion exchange substance. A divider wall **768** divides compartment **766** into two sub-compartments **770** and **772** leaving a clearance **774** at the bottom through which water can flow. Thus, water ingressing through water ingress **758**, flows through the length sub-compartment **768**, through clearance **774**, then through the length of sub-compartment **772** to egress out of water egress **760**.

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As can be seen, tubular body **762** is accommodated within downwardly extending cylindrical sleeve **776**, flanking water ingress **758**. A fluid-tight seal is achieved through an O-ring **778**, held in an annular groove on tubular body **762**. Tubular body **764**, which is longer than tubular body **762**, extends through tubular sleeve **780**, downwardly extending from wall **721**, then through head space **742** with its top portion being accommodated within sleeve **782** extending upwardly from horizontal wall **724**. Fluid-tight seal between tubular body **764** and sleeves **780** and **782** is achieved through respective O-rings **784** and **786** held each in its respective annular groove.

Module **714** is defined between horizontal wall **724**, side walls **788** extending upwardly therefrom and top cover **790**. Water ingress **792**, defined by the upper opening of tubular body **764**, leads into a water treatment compartment **794**, which holds a block **796** of water treatment medium, which may, for example, be activated carbon, flavoring releasing compounds, polymeric compounds, etc. Block **796** is formed with a bottom cavity **798**, situated over water ingress **792** and has an abutment **802** formed at its top that bears upon an internal face portion of cover **790**. Consequently, water ingressing through ingress **792** spreads in an upwardly-curved radial direction into the head space **804** defined peripheral to abutment **802**, to eventually egress through water egress **806** and then out through filtered water outlet **706** being linked and in flow communication therewith.

Fig.13A shows a filtering device **900** of another embodiment having two sub-housing structures **906** and **908** and linking element **920**, in some similarity to the embodiment shown in **Figs. 1-3**. Elements having similar function to the elements of the device of **Figs. 1-3** have been given like reference numeral shifted by **800** and the reader is referred to the description of these figures for explanation of their function. In distinction from the device of **Figs. 1-3**, that of **Fig. 13A** has two treatment modules **912** and **916**, shown in details in **Figs. 13B-13D**, performing a function somewhat similar to the corresponding modules of **Figs. 1-3**.

As can be seen in **Fig. 13B** the water treatment element **952**, typically solid porous mass made of or comprises activated carbon, is an annular member enveloping a lumen **954** which accommodates a channeling member **910**, which in this example is frustum-conical but may also have other shape, e.g. cylindrical. Member **910** has perforated walls, e.g. a mesh layer, permitting passage of water while filtering-out

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particulate matter, typically calcium carbonate particles. In addition, member **910** may prevent the accumulation and formation of calcium carbonates sediments within the filtering device, namely member **910** may have anti-scaling function. The channeling member may, by some embodiments, include a water treatment medium, such as a medium that leaches out a substance of nutritional value to the water, a medium with disinfectant properties, etc. As can be seen in **Fig. 13A**, the module, when *in situ* is enveloped by an entry space whereby the water and the water flows essentially radially through element **952** to lumen **954** and then through member **910** to egress out of egress **978**.

Module **912**, seen in **Figs. 13C** and **13D**, comprises an annular water treatment element **958**, which may be the same or different than element **952**, and which is enveloped by a pleated filtering sheet **936**, which filters out particulate matter and also serves to evenly distribute the radial flow through element **958** along the length of the said element, as described above.

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CLAIMS:

1. A filtering device for filtering running water from a pressurized water source, comprising:
 - a housing with at least one running water inlet and at least one filtered water outlet with a water flow path defined within the housing between the at least one inlet and at least one outlet;
 - two or more water treatment compartments within the housing arranged in succession along the water flow path, each of which has a water treatment space with at least one water treatment medium or element for performing a defined water treatment function, and each having at least one water ingress and at least one water egress; the running water inlet being linked and in flow communication with the water ingress of a first compartment, the water egress of a last compartment being linked and in flow communication with the filtered water outlet, the water egress of each of the other compartments being linked and in flow communication with the water ingress of a succeeding compartment; and
 - at least one of the compartments (i) has a curvilinear flow path being defined in its water treatment space by two or more concentric cylindrical wall sections, at least one of which extends into the treatment space from said first wall and at least one of which extends into the treatment space from the opposite wall, or (ii) has a corrugated or pleated filter sheet enveloping or being enveloped by another treatment medium or element.
2. The filtering device of claim 1, wherein said water treatment medium or element is one or more of the group consisting of a porous filtering element, a solid body of a filtering medium, an ion-exchange resinous medium, a particulate activated carbon medium, and a particulate matter that includes a substance to be released into the water .
3. The filtering device of claim 1 or 2, wherein the treatment media or elements comprise a single component or a combination of different components.
4. The filtering device of any one of claims 1-3, wherein each compartment performs a different water treatment function.
5. The filtering device of any one of claims 1-4, comprising at least one direct flow water treatment compartment that comprises a first water treatment medium or element enveloping a lumen, the lumen defining an axis; the first treatment medium or element

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being enveloped by an entry space linked and in flow communication with the compartment's water ingress; and the lumen being linked to the compartment's water egress; whereupon water flows in a general radial direction from said entry space to said lumen through said first treatment medium or element.

6. The filtering device of claim 5, wherein said lumen is defined by a void within a solid porous filtering mass or by a perforated cylinder disposed within the compartment and surrounded by the treatment medium or element.

7. The filtering device of any one of claims 4-6, wherein the compartment egress is coaxial with said axis.

8. The filtering device of any one of claims 4-7, wherein said treatment medium or element is enveloped by a first corrugated or pleated sleeve.

9. The filtering device of any one of claims 4-8, wherein the inner wall of said lumen is lined by a second corrugated or pleated sleeve.

10. The filtering device of any one of claims 7-9, wherein said lumen comprises a second water treatment medium or element which may be of the same or different substance(s) than that of said first water treatment medium or element.

11. The filtering device of any one of claims 1-10, wherein the treatment medium or element is a physical filtering medium or element that is adapted to filter out particles or elements above a defined size.

12. The filtering device of any one of claims 1-11, comprising at least one serpentine flow type water treatment compartment having a water treatment space formed between two end walls opposite to one another and having a water ingress formed at substantially the center of a first of the two opposite walls; a curvilinear flow path being defined in the water treatment space by two or more concentric cylindrical wall sections, at least one of which extends into the treatment space from said first wall and at least one of which extends into the treatment space from the opposite wall; and said treatment space containing at least one water treatment medium.

13. The filtering device of claim 12, wherein said serpentine flow compartment has a generally cylindrical shape with a cylinder axis extending between the two end walls and perpendicular thereto.

14. The filtering device of any one of claims 1-13, wherein the housing comprises
- two or more sub-housing structures, each of which houses one or more water treatment compartments; and

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- one or more linking elements connecting the sub-housing structures and having water conduits defined therein to permit water flow between said sub-housing structures along said flow path.

15. The filtering device of claim 14, wherein each of said sub-housing structures is an elongated element.

16. The filtering device of claim 14 or 15, wherein the sub-housing structures are aligned with one another with the linking element being in normal orientation to that of said sub-housing structures.

17. The filtering device of claim 16, wherein the running water inlet and the filtered water outlet or formed within the linking element.

18. The filtering device of any one of claims 1-13, comprising at least two concentric compartments, at least one of which is an enveloping compartment enveloping at least one other enveloped compartment.

19. A filtering device for filtering running water from a pressurized water source, comprising:

- a housing with at least one running water inlet and at least one filtered water outlet;

- two or more water treatment modules disposed within the housing, each of which defines a water treatment space that holds at least one water treatment medium for either removing a component from or adding a component to the water, and having a water ingress and a water egress; the running water inlet being linked and in flow communication with the water ingress of a first water treatment module, the water egress of a last water treatment module being linked and in flow communication with the filtered water outlet, the water egress of each of the other compartments being linked and in flow communication with the water ingress of a succeeding compartment, to thereby define a water flow path from the water inlet to the water outlet through a succession of the water treatment modules; and

- at least one of the modules (i) defines a curvilinear flow path its water treatment space by two or more concentric cylindrical wall sections, at least one of which extends into the treatment space from said first wall and at least one of which extends into the treatment space from the opposite wall, or (ii) comprises a corrugated or pleated filter sheet enveloping or being enveloped by another treatment medium or element.

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20. The filtering device of claim 19, wherein the water treatment medium or element is one or more of the group consisting of a porous filtering element, a solid body of a filtering medium, an ion-exchange resinous medium, a particulate activated carbon medium, and a particulate matter that includes a substance to be released into the water.

21. The filtering device of claim 19 or 20, wherein each of said modules comprises treatment media or elements comprises: (i) a single treatment media or elements, or (ii) a combination of different treatment media or elements.

22. The filtering device of any one of claims 19-21, wherein

- at least one direct flow water treatment module comprises a first water treatment medium or element enveloping a lumen, the lumen defining an axis;
- the first treatment medium or element being enveloped by an entry space linked and in flow communication with the module's water ingress; and
- the lumen being linked to the module's water egress;

whereupon water flows in a general radial direction from said entry space to said lumen through said first treatment medium or element.

23. The filtering device of claim 22, wherein the lumen is defined by a void within a solid porous filtering mass or by a perforated cylinder disposed within the compartment and surrounded by the treatment medium or element.

24. The filtering device of any one of claims 19-23, wherein one or more of said modules are pre-assembled, stand-alone modules.

25. The filtering device of any one of claims 19-24, wherein the water egress of one or more of said modules is defined within a projection that is adapted for being received into a matching depression formed in another component of the filtering device to thereby define the flow path.

26. The filtering device of claim 25, wherein the water ingress of one or more of said modules is formed in a depression adapted to receive a matching projection of another component of the filtering device to thereby define the flow path.

27. The filtering device of claim 25 or 26, wherein one or more modules snap fit into engagement with another module.

28. The filtering device of any one of claims 19-27, wherein the housing comprises

- two or more sub-housing structures, each of which house one or more water treatment compartments; and

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- one or more linking elements connecting the sub-housing structures and having water conduits defined therein to permit water flow between said sub-housing structures along said flow path.

29. The filtering device of claim 28, wherein each of said sub-housing structures is an elongated element.

30. The filtering device of claim 29, comprising two sub-housing structures aligned with one another with the linking element being in normal orientation to that of said sub-housing structures.

31. The filtering device of claim 30, wherein the running water inlet and the filtered water outlet or formed within the linking element.

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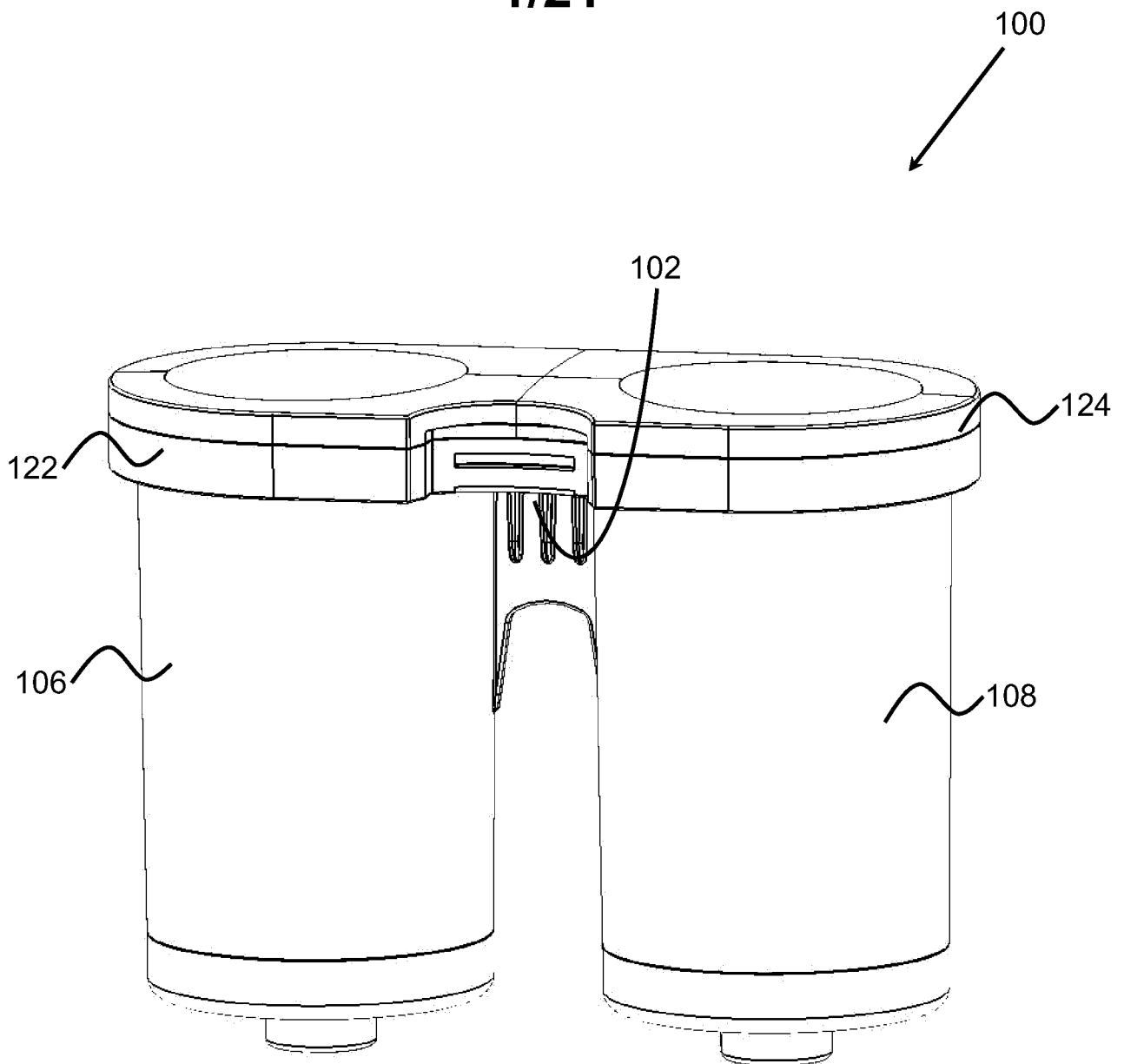


Fig. 1

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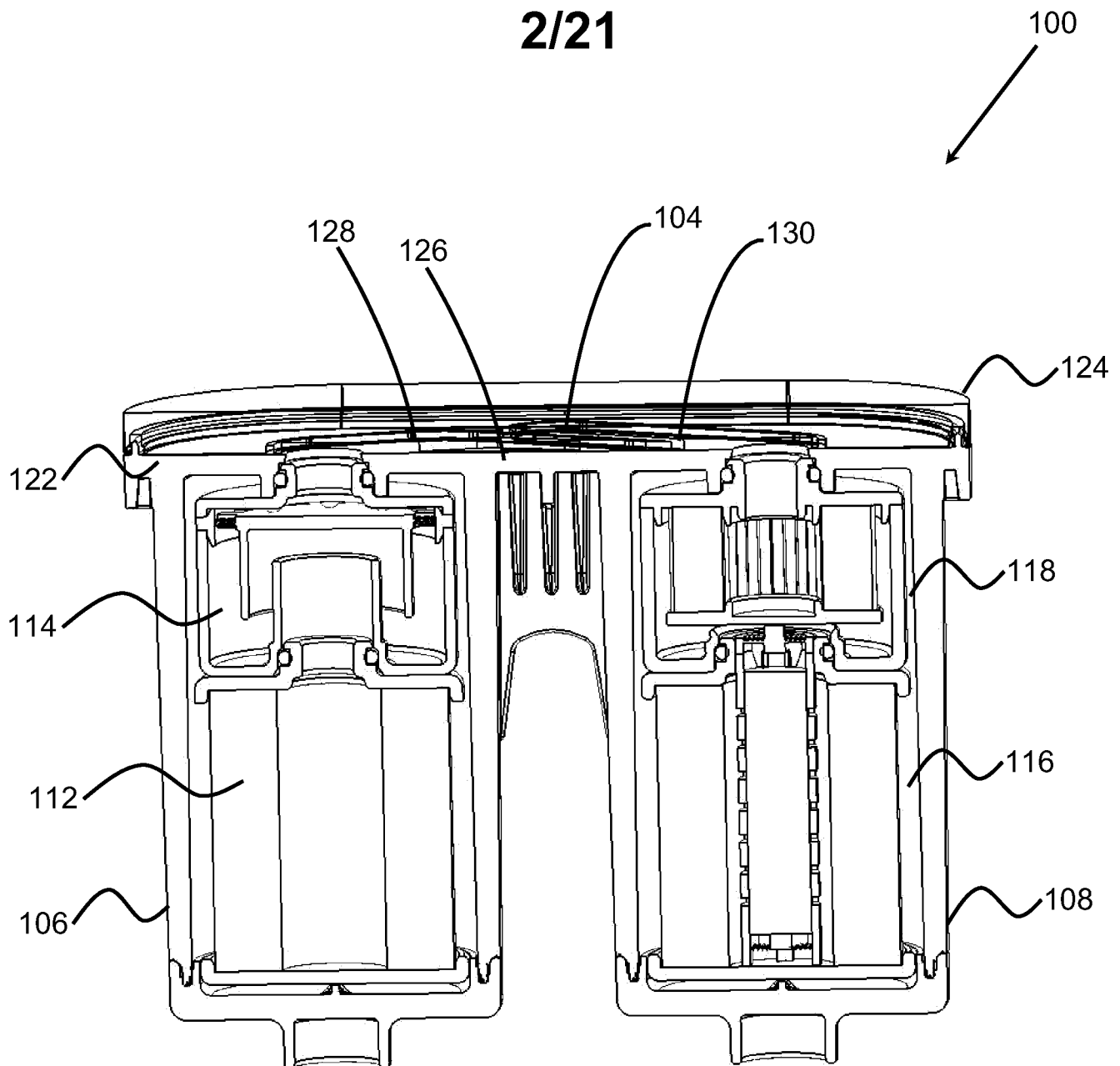
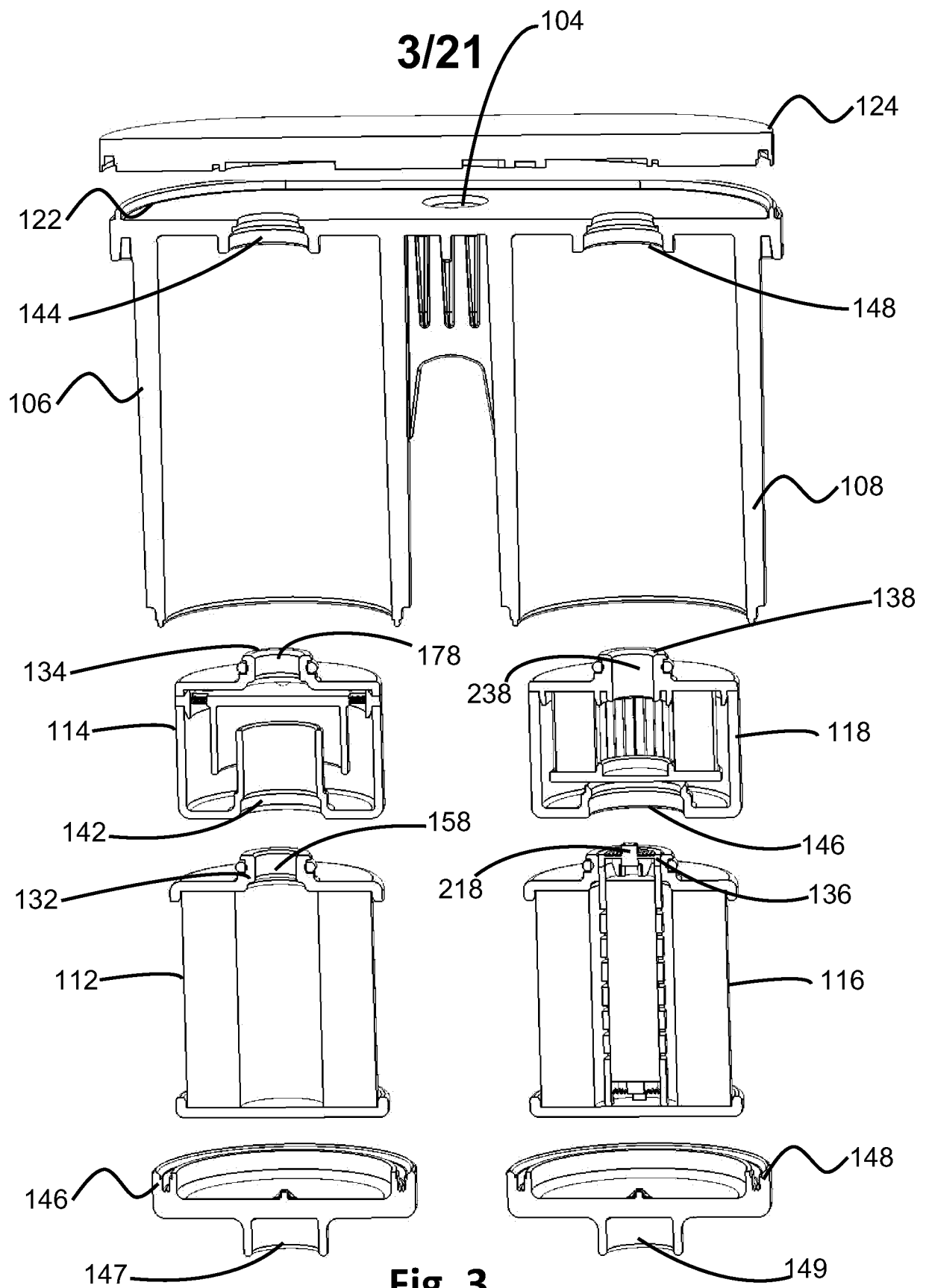


Fig. 2



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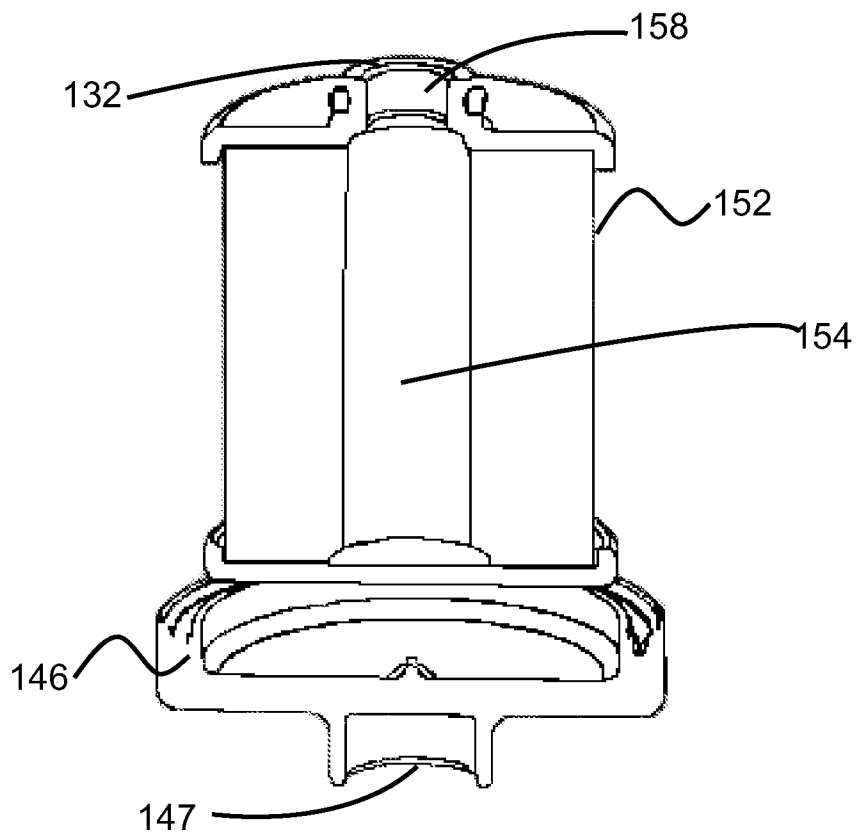


Fig. 4A

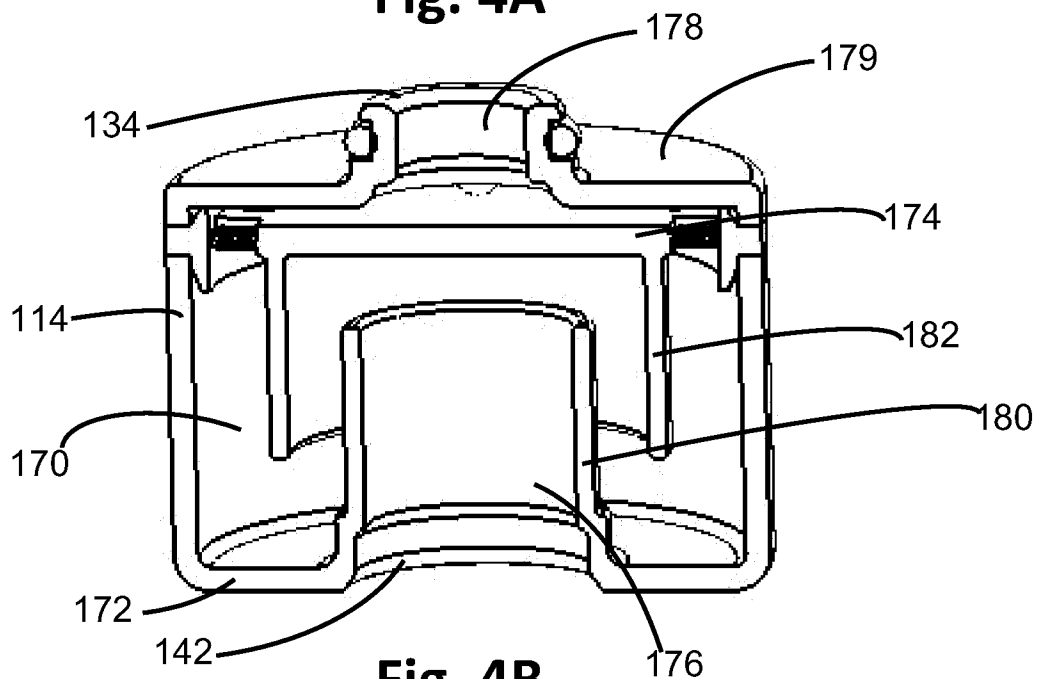


Fig. 4B

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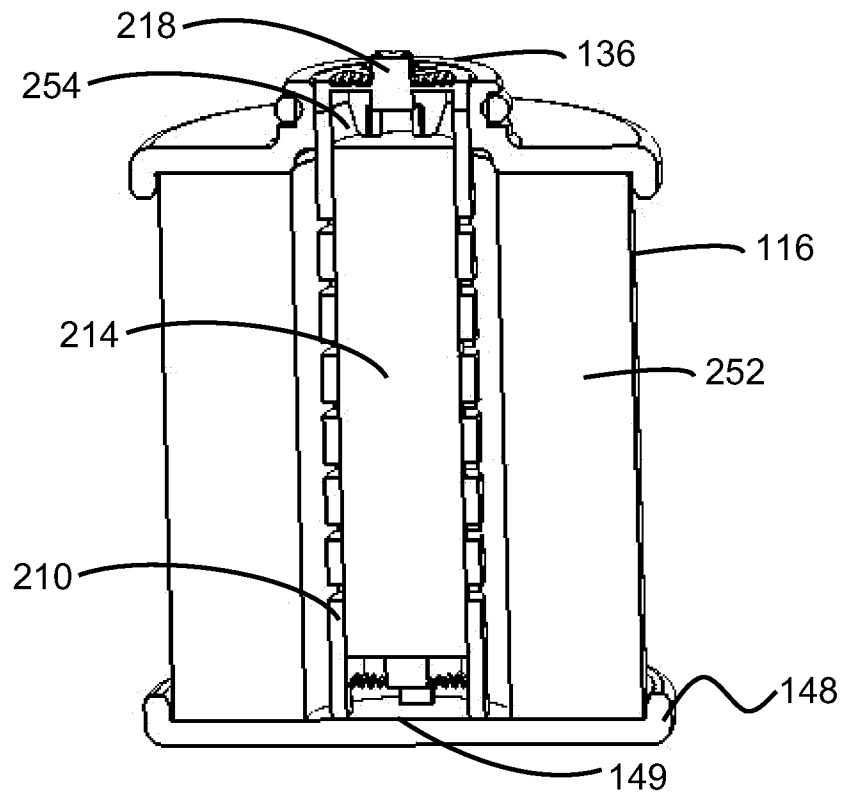


Fig. 4C

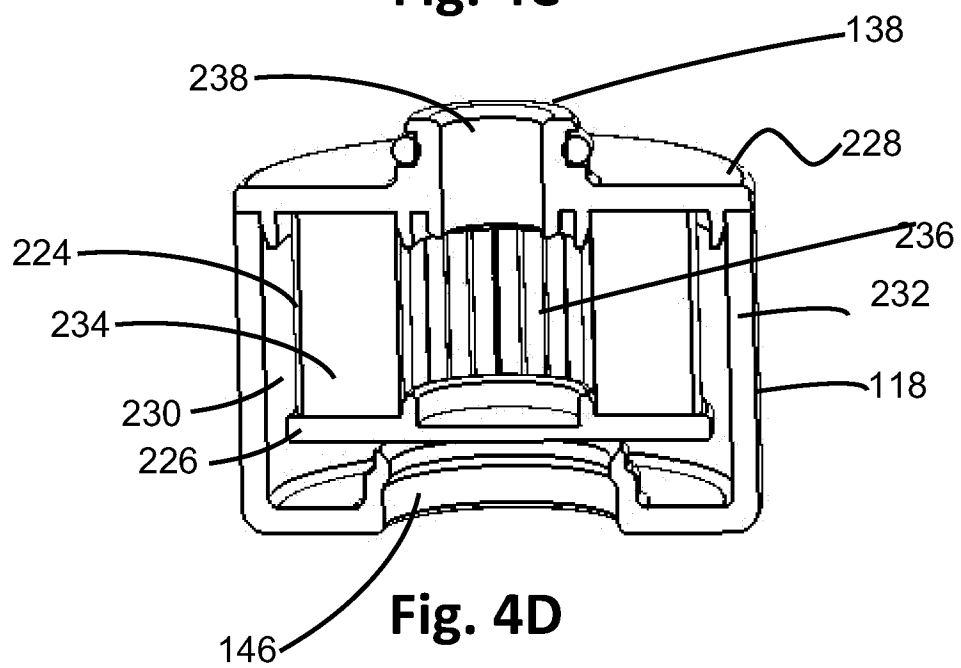


Fig. 4D

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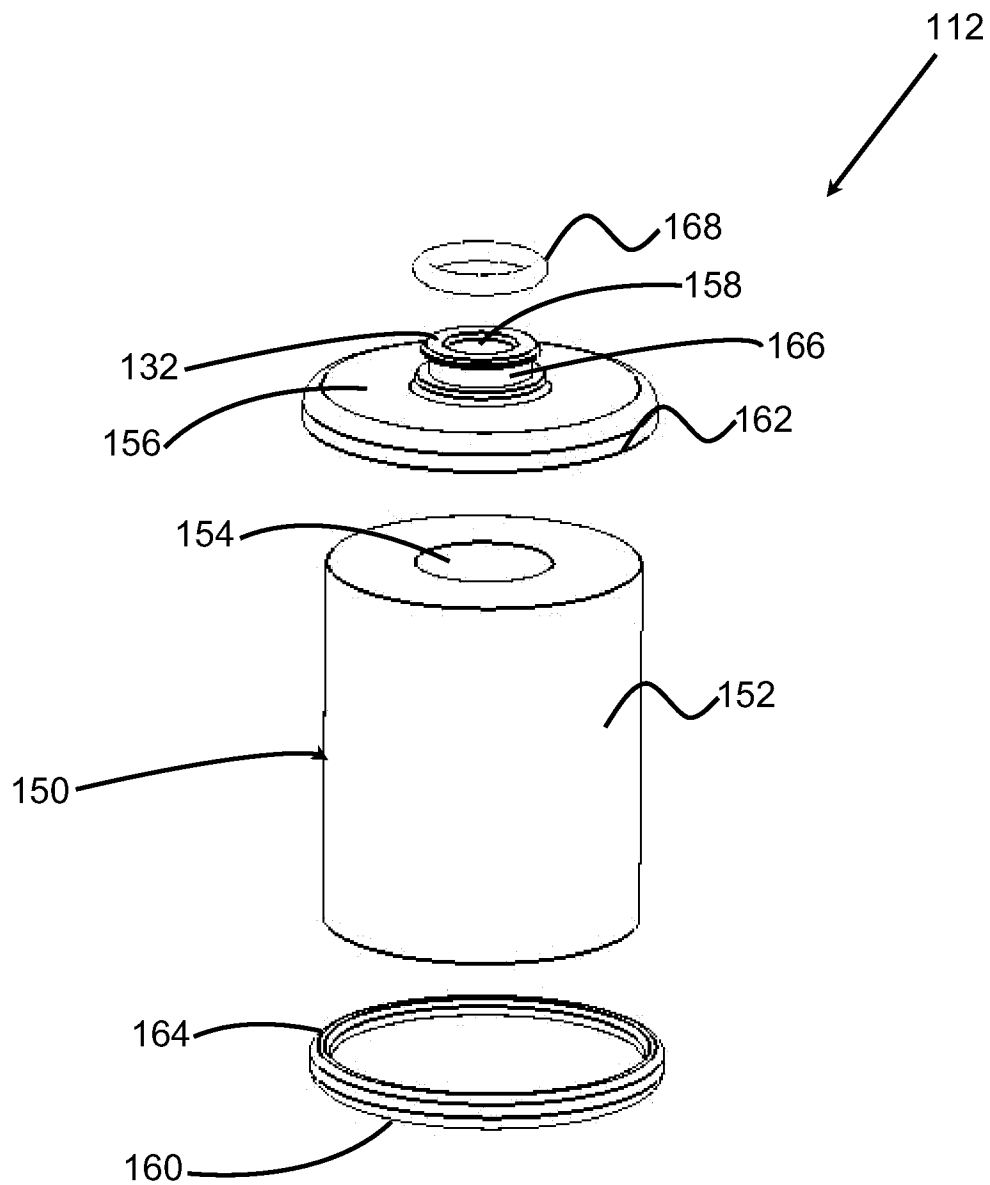


Fig. 5A

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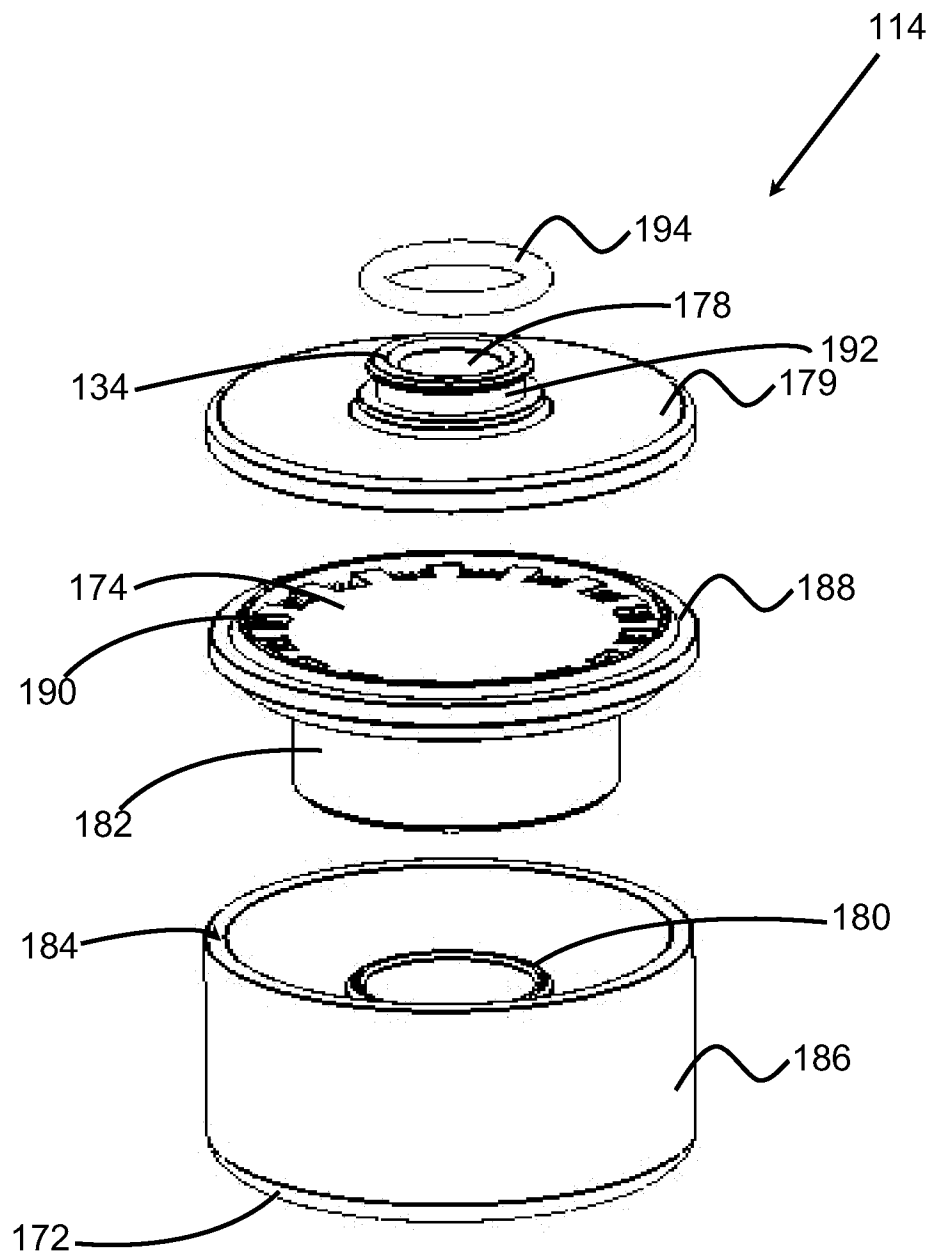


Fig. 5B

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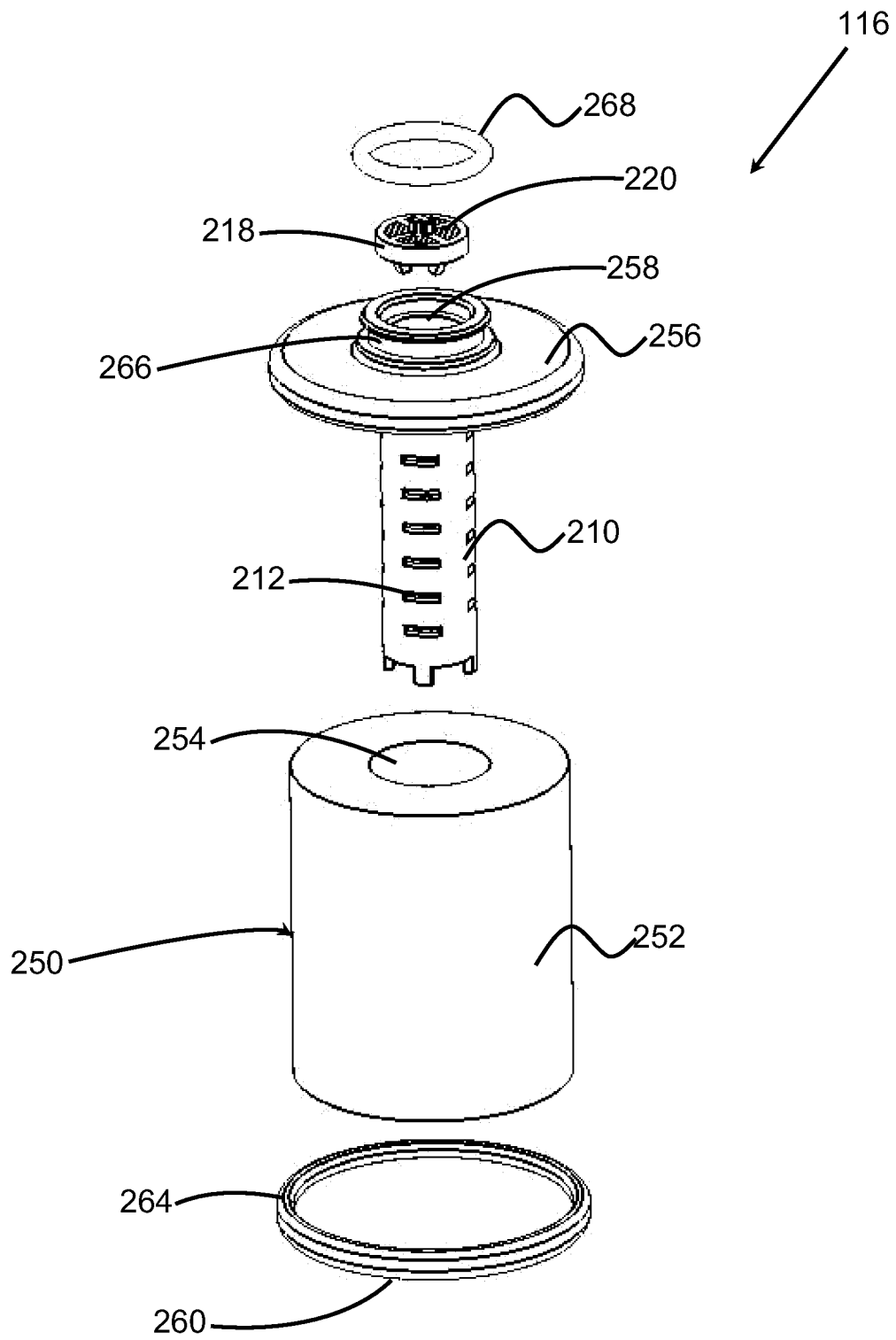


Fig. 5C

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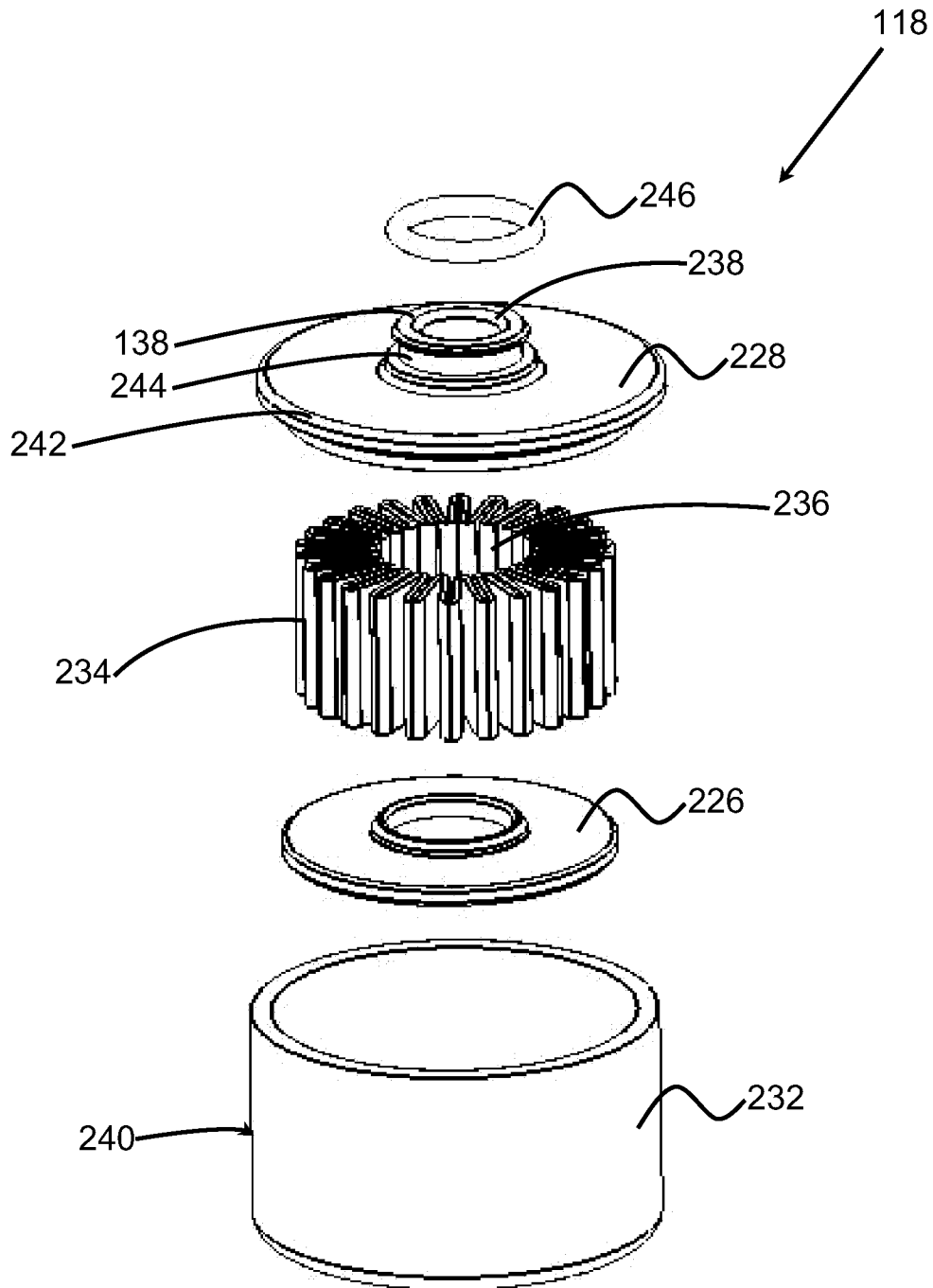


Fig. 5D

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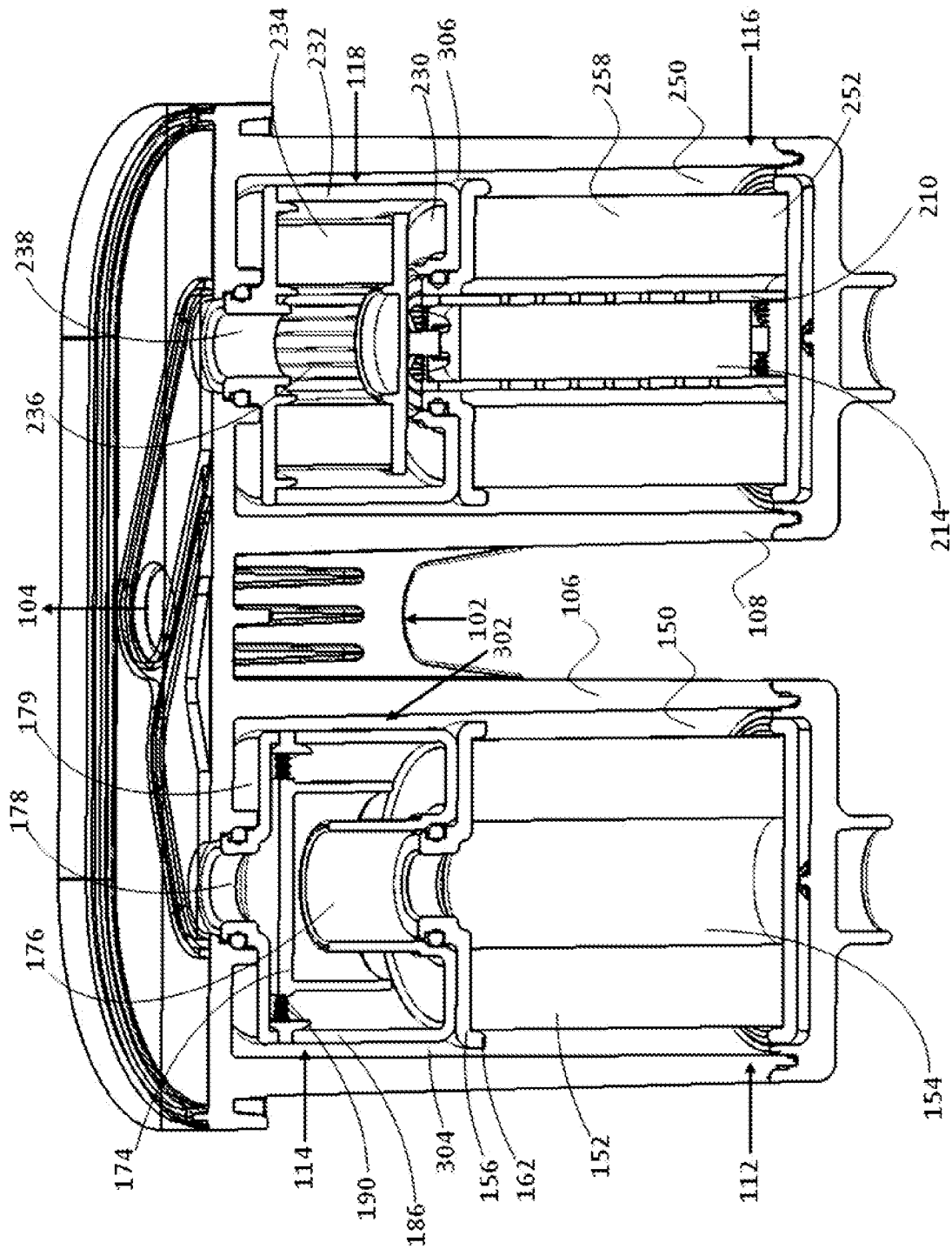


Fig. 6A

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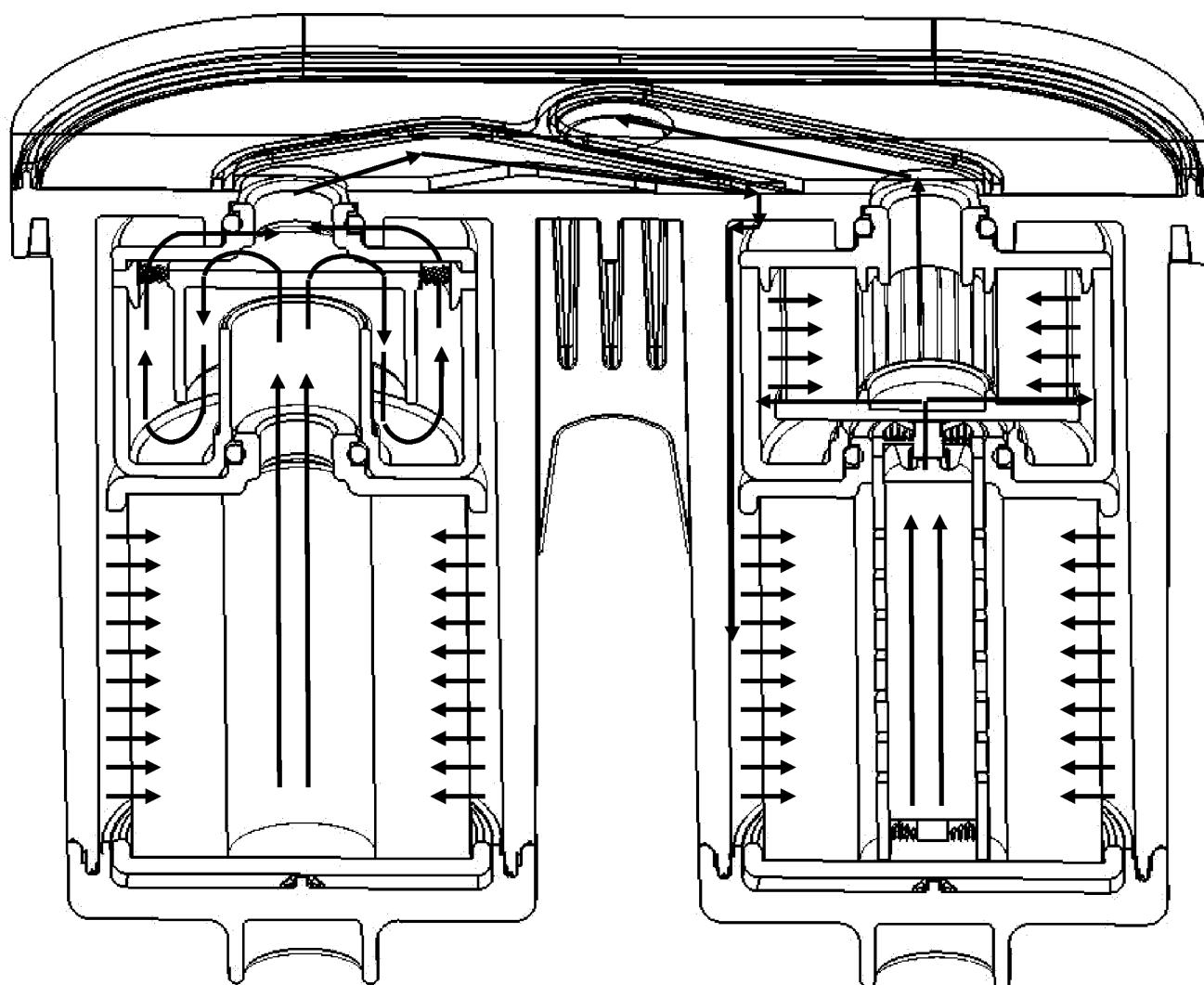


Fig. 6B

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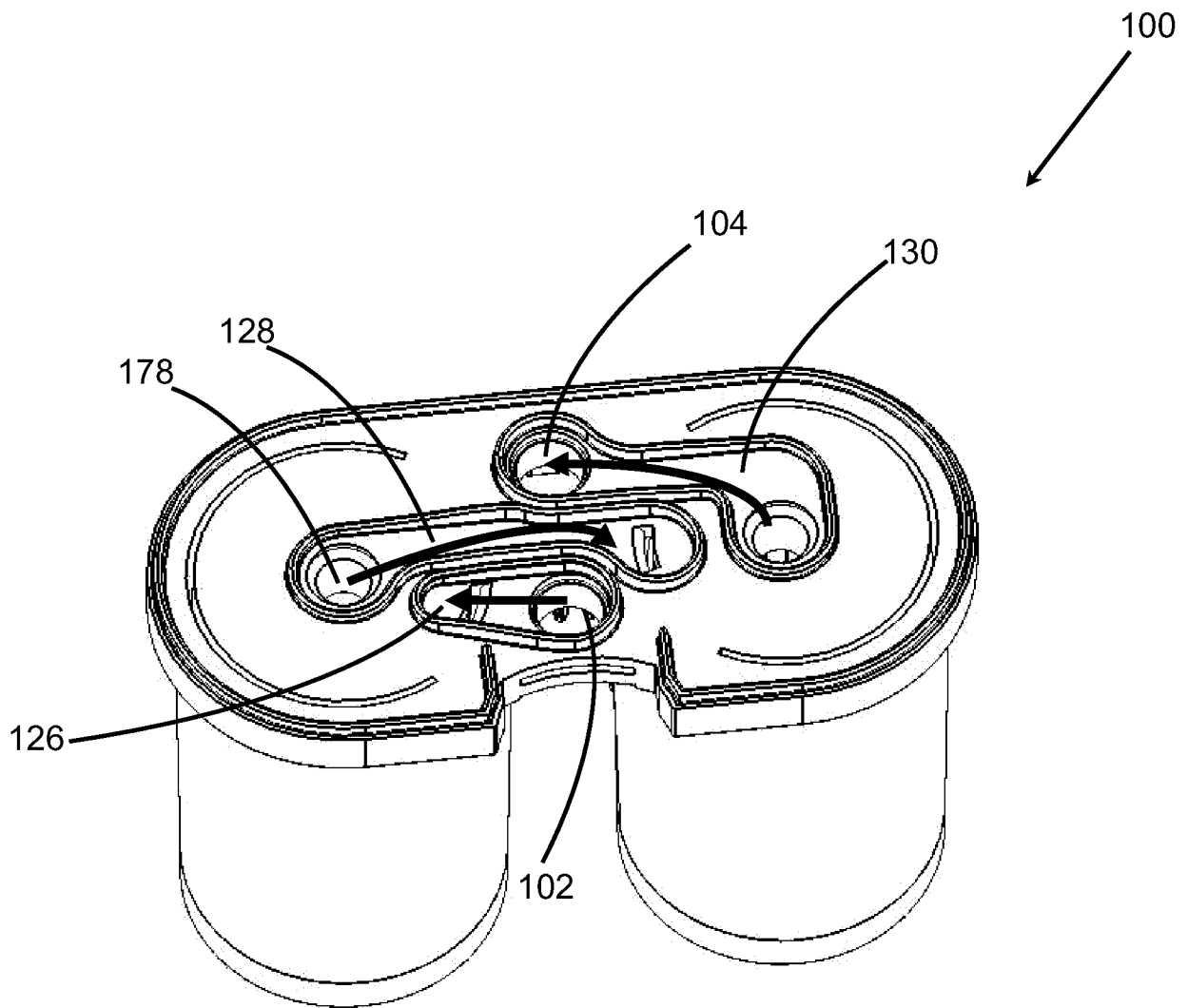


Fig. 7

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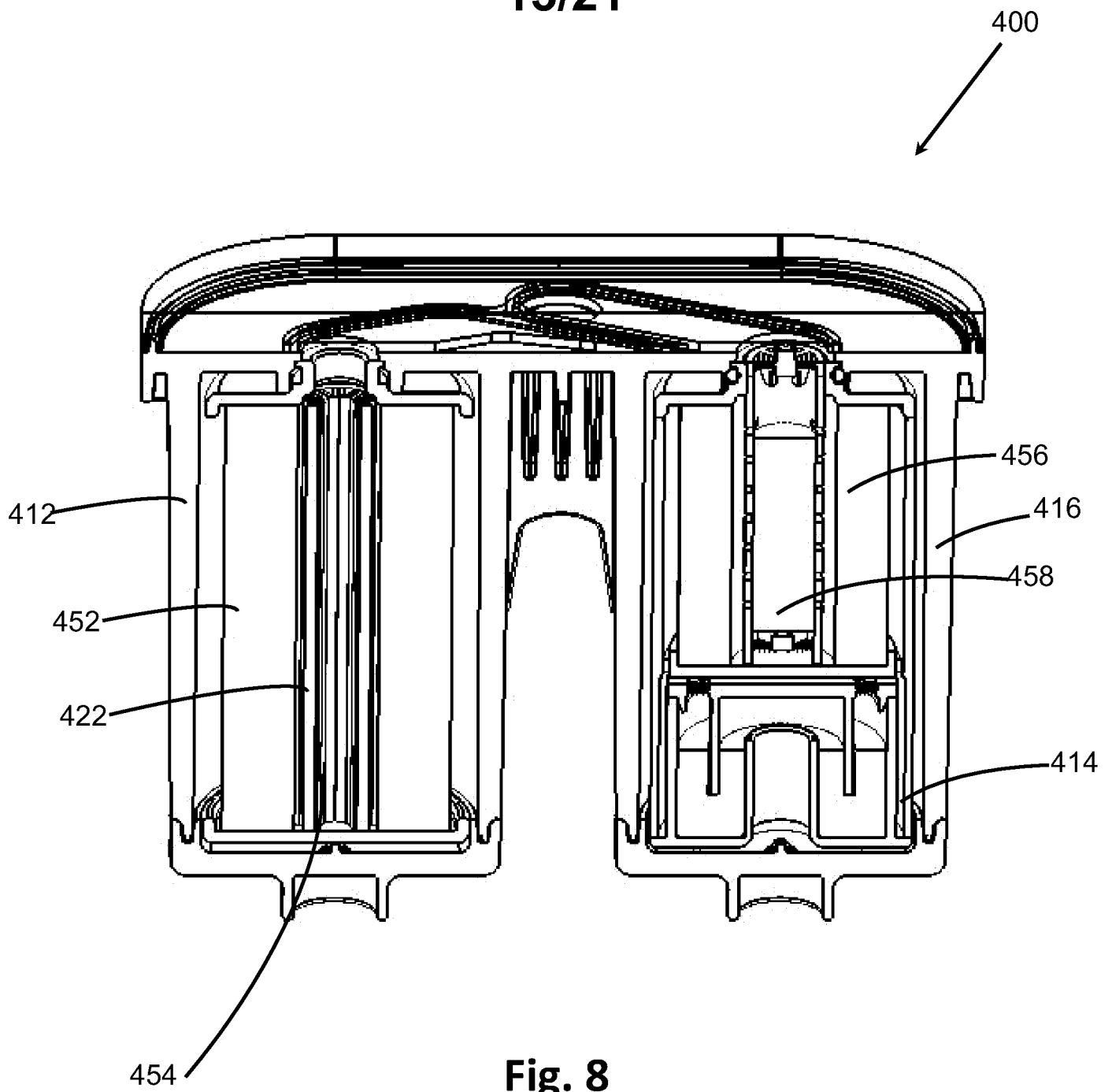


Fig. 8

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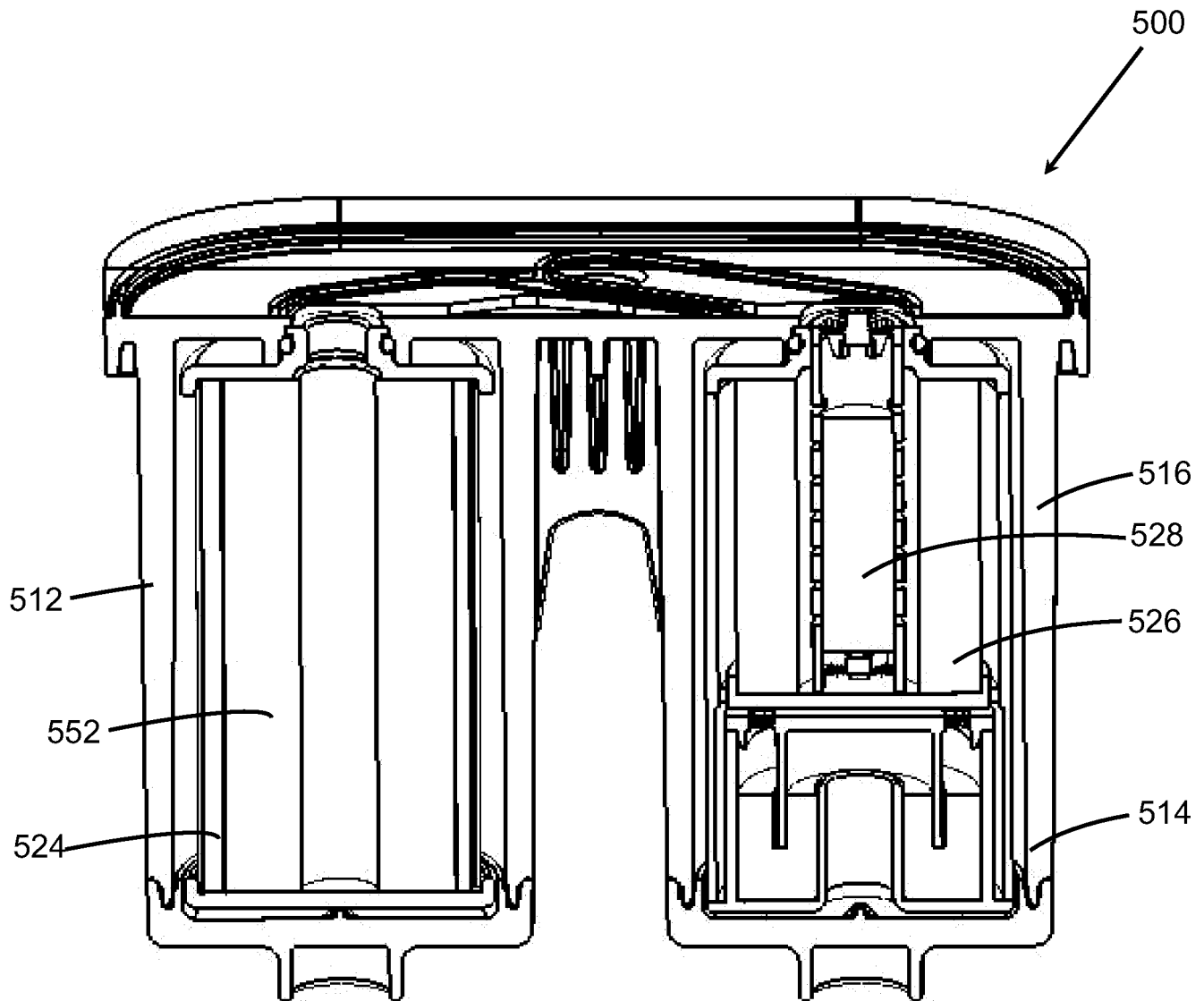


Fig. 9

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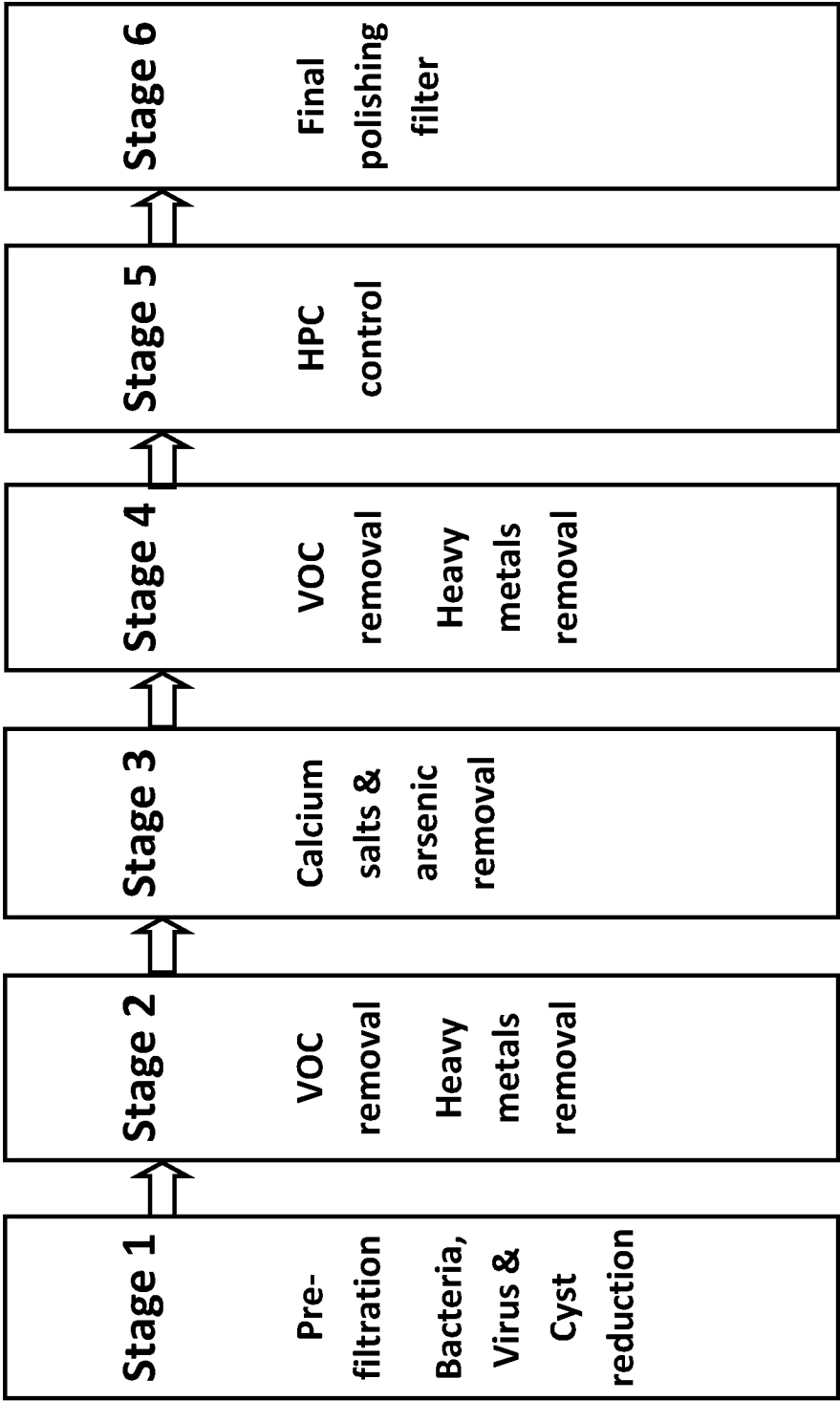


Fig. 10

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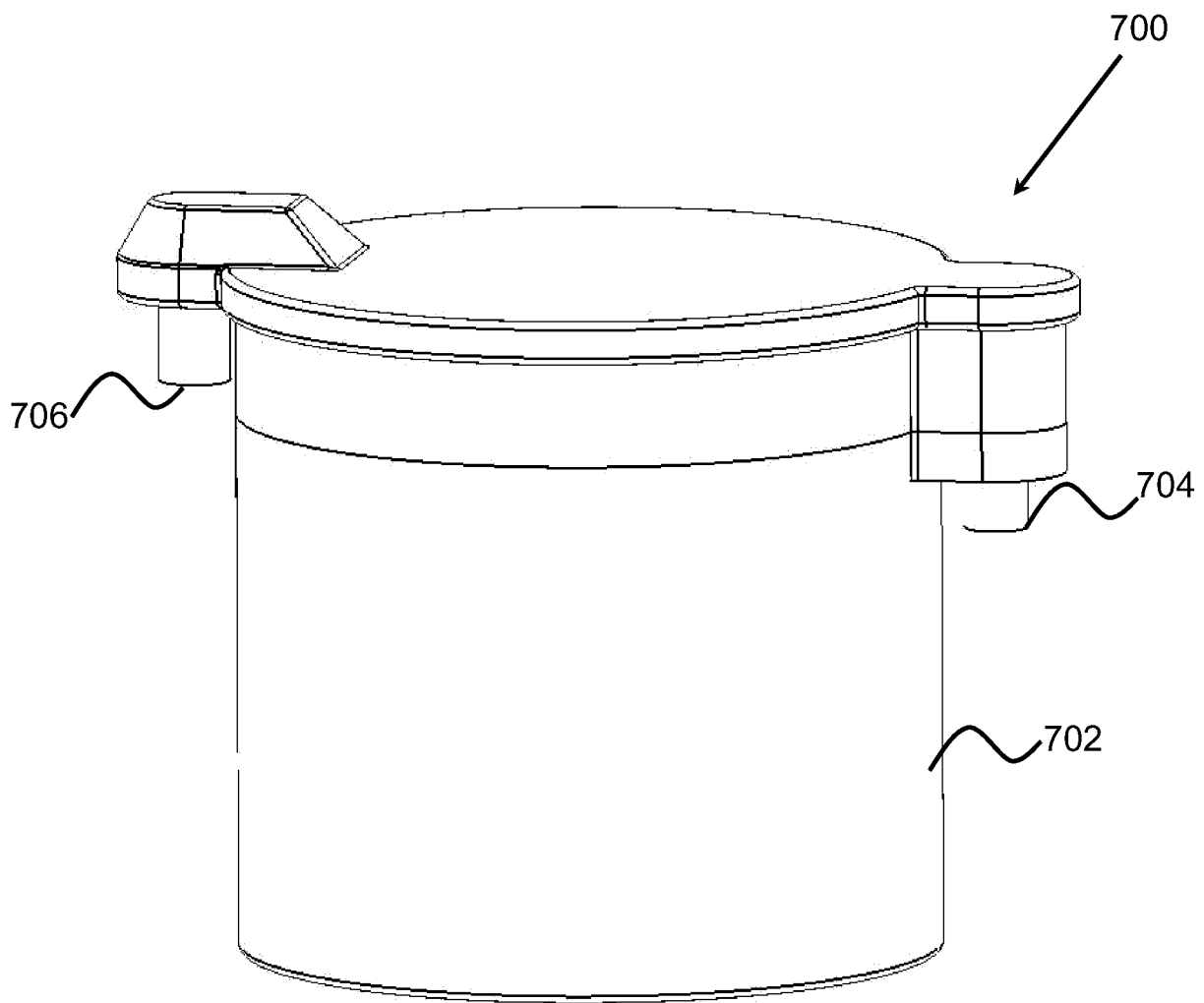


Fig. 11

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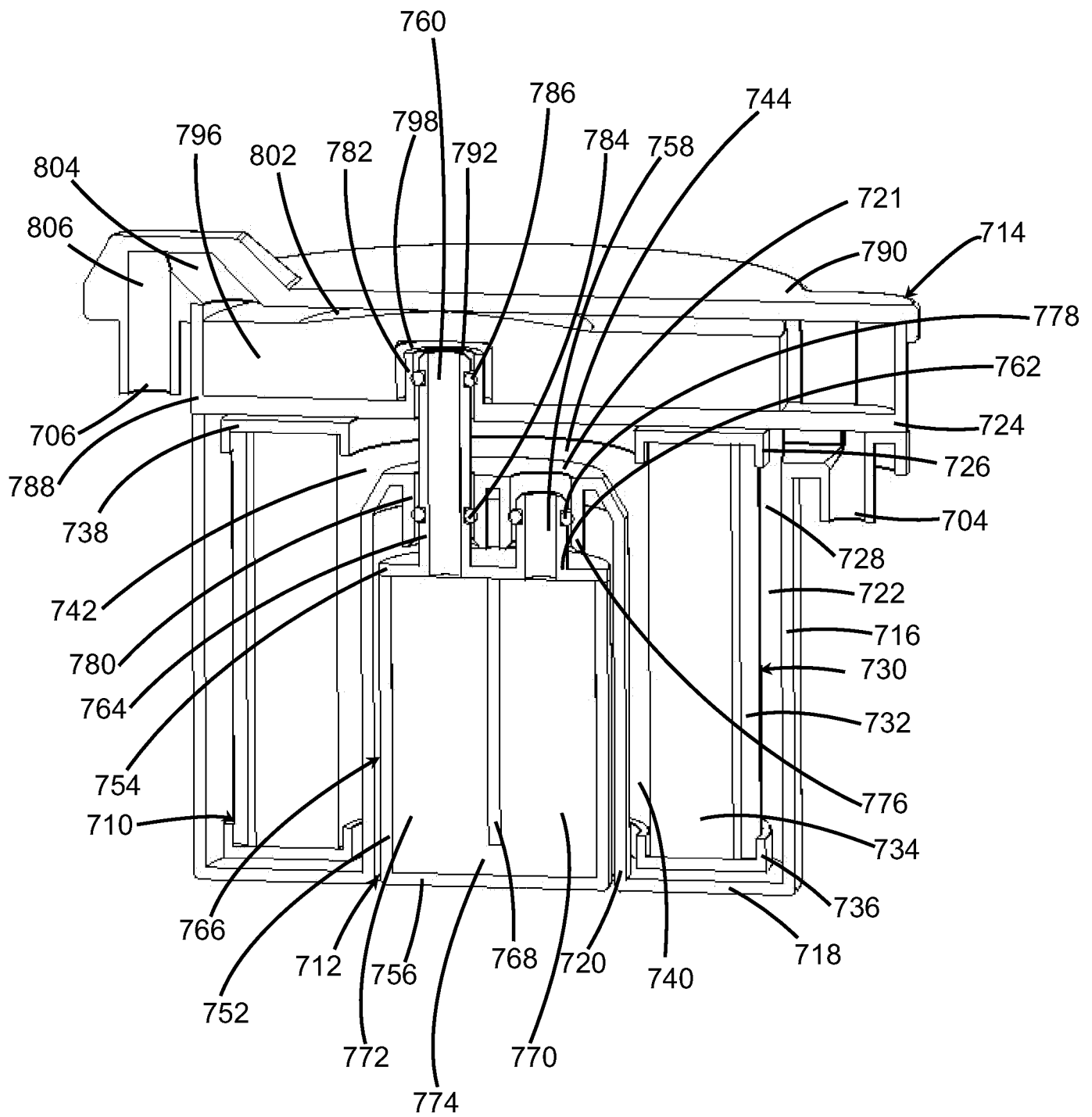


Fig. 12

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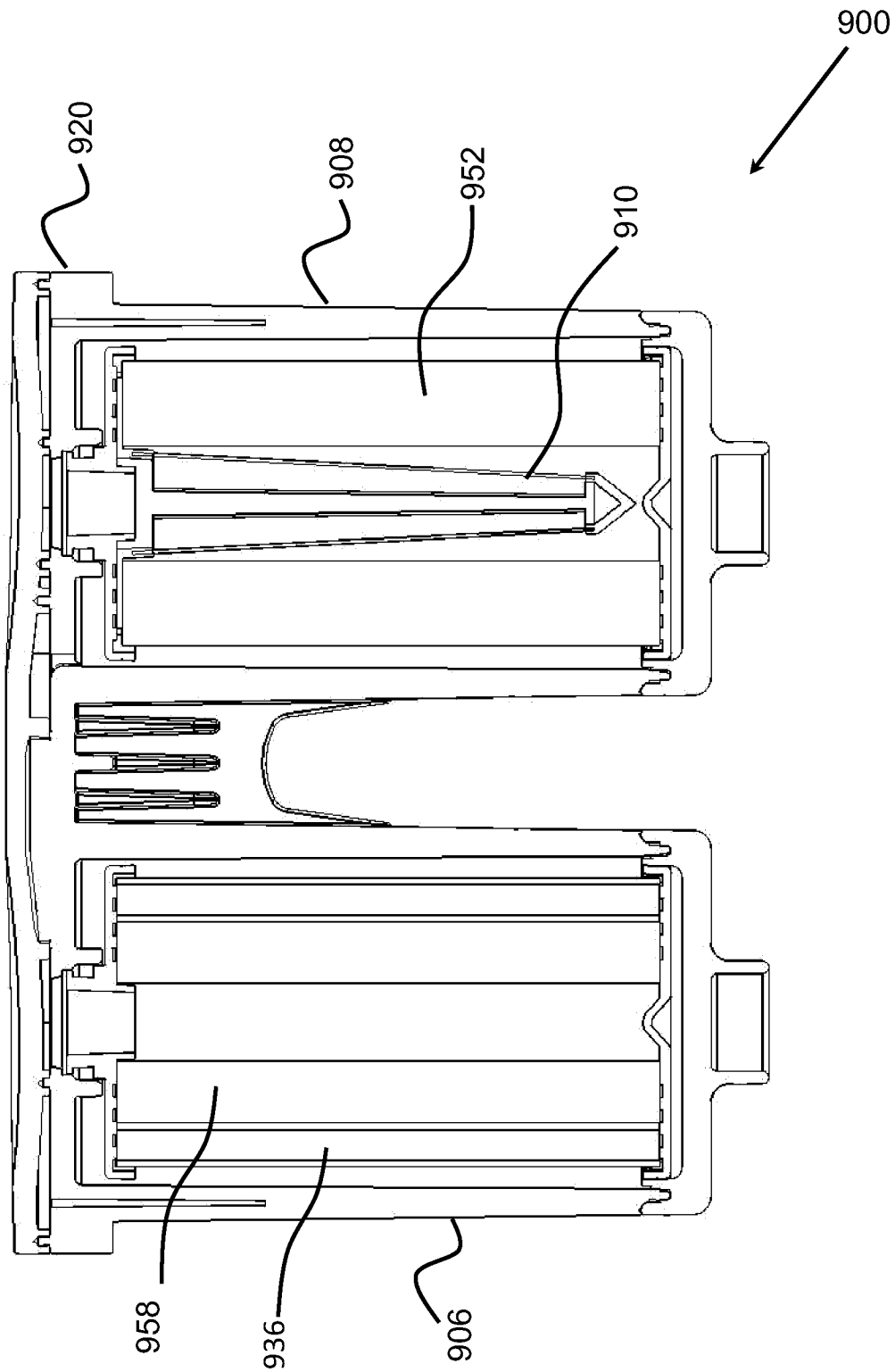


Fig. 13A

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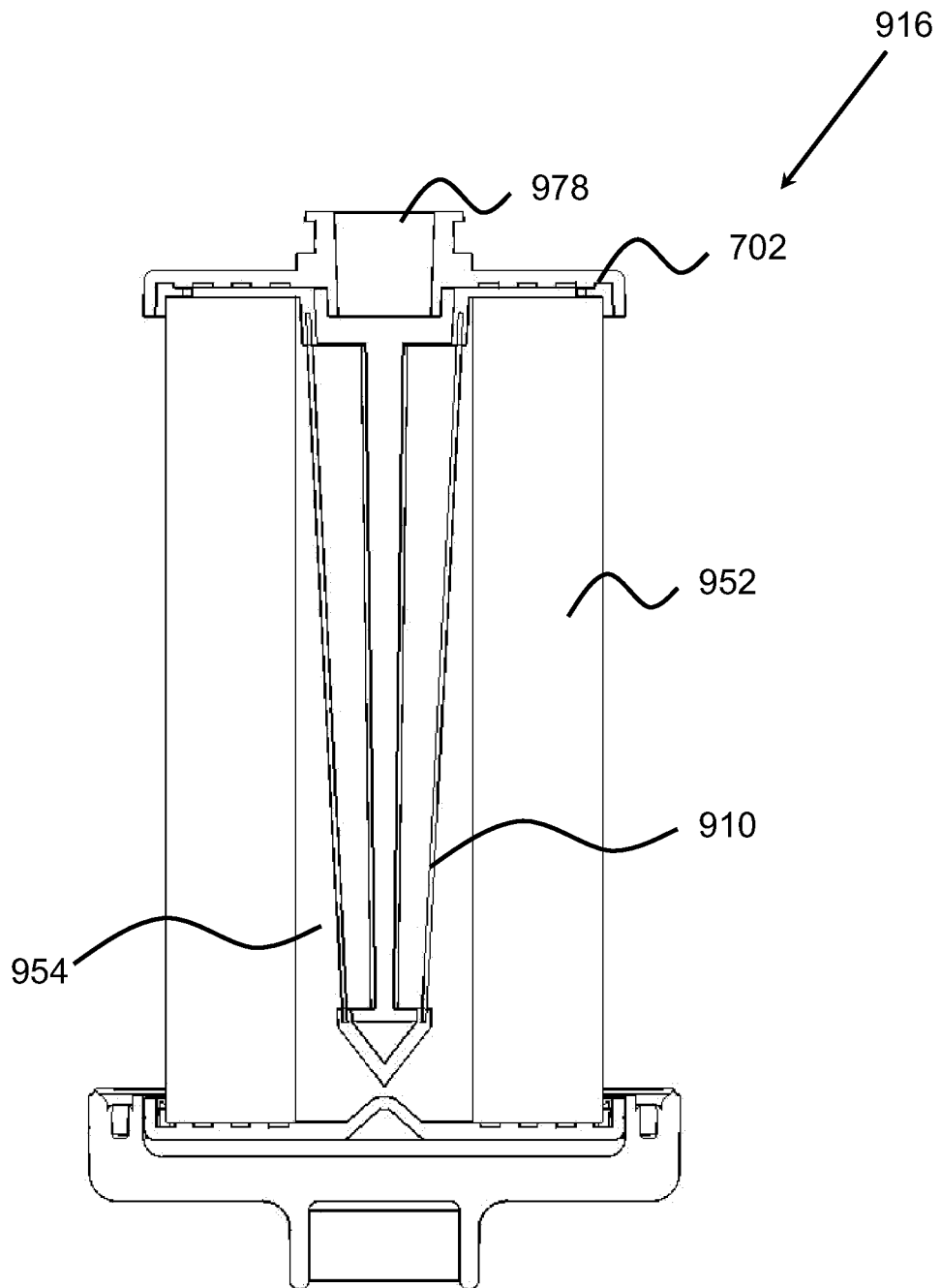


Fig. 13B

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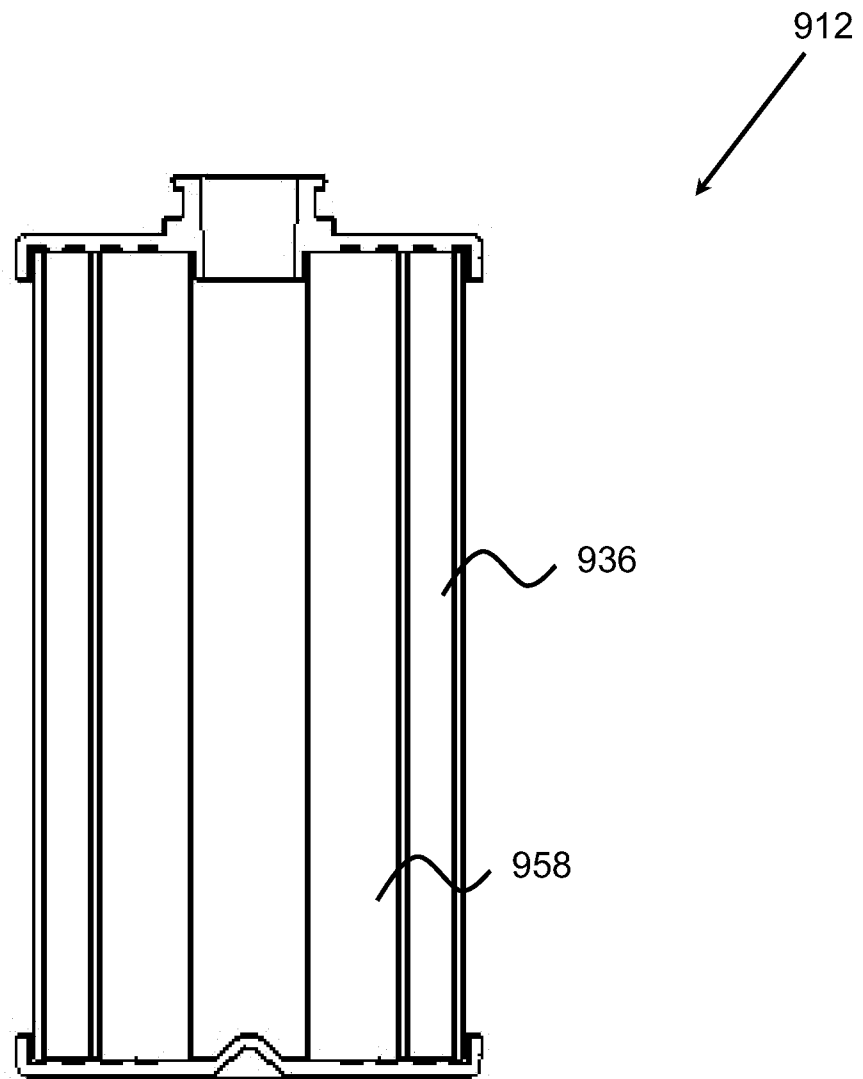


Fig. 13C

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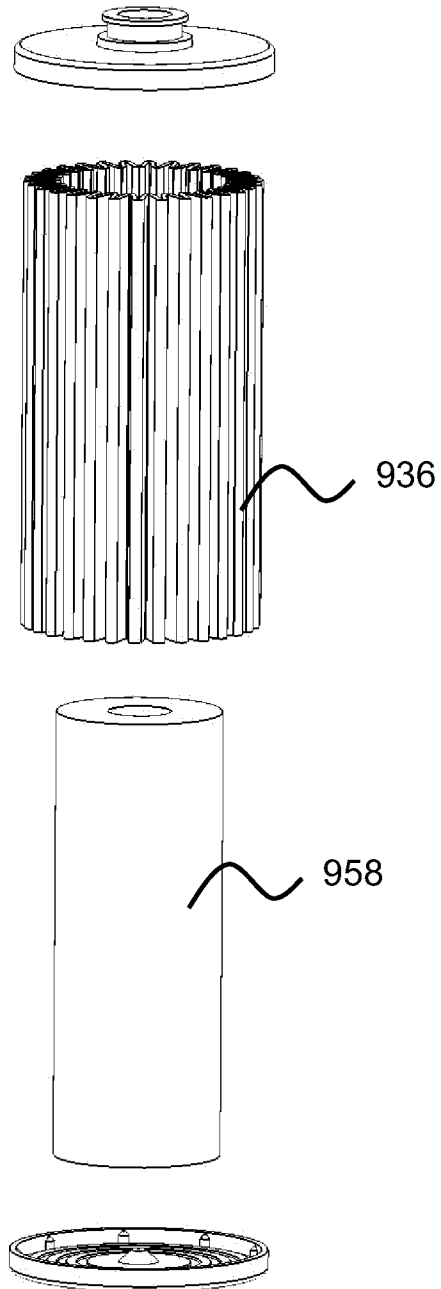


Fig. 13D