US 20190300225A1

(19) **United States**

(12) **Patent Application Publication**

Allgor et al.

(10) **Pub. No.: US 2019/0300225 A1**

(43) **Pub. Date: Oct. 3, 2019**

(54) **DEVICE FOR STORAGE AND DISPOSAL OF WASTE OIL AND GREASE**

(71) Applicants: **Ella Cecelia Allgor**, Seattle, WA (US); **Mira Rose Shupe**, Seattle, WA (US); **Thomas Reed Bioren**, Seattle, WA (US)

(72) Inventors: **Ella Cecelia Allgor**, Seattle, WA (US); **Mira Rose Shupe**, Seattle, WA (US); **Thomas Reed Bioren**, Seattle, WA (US)

(21) Appl. No.: **16/296,597**

(22) Filed: **Mar. 8, 2019**

Related U.S. Application Data

(60) Provisional application No. 62/648,931, filed on Mar. 27, 2018.

Publication Classification

(51) **Int. Cl.**

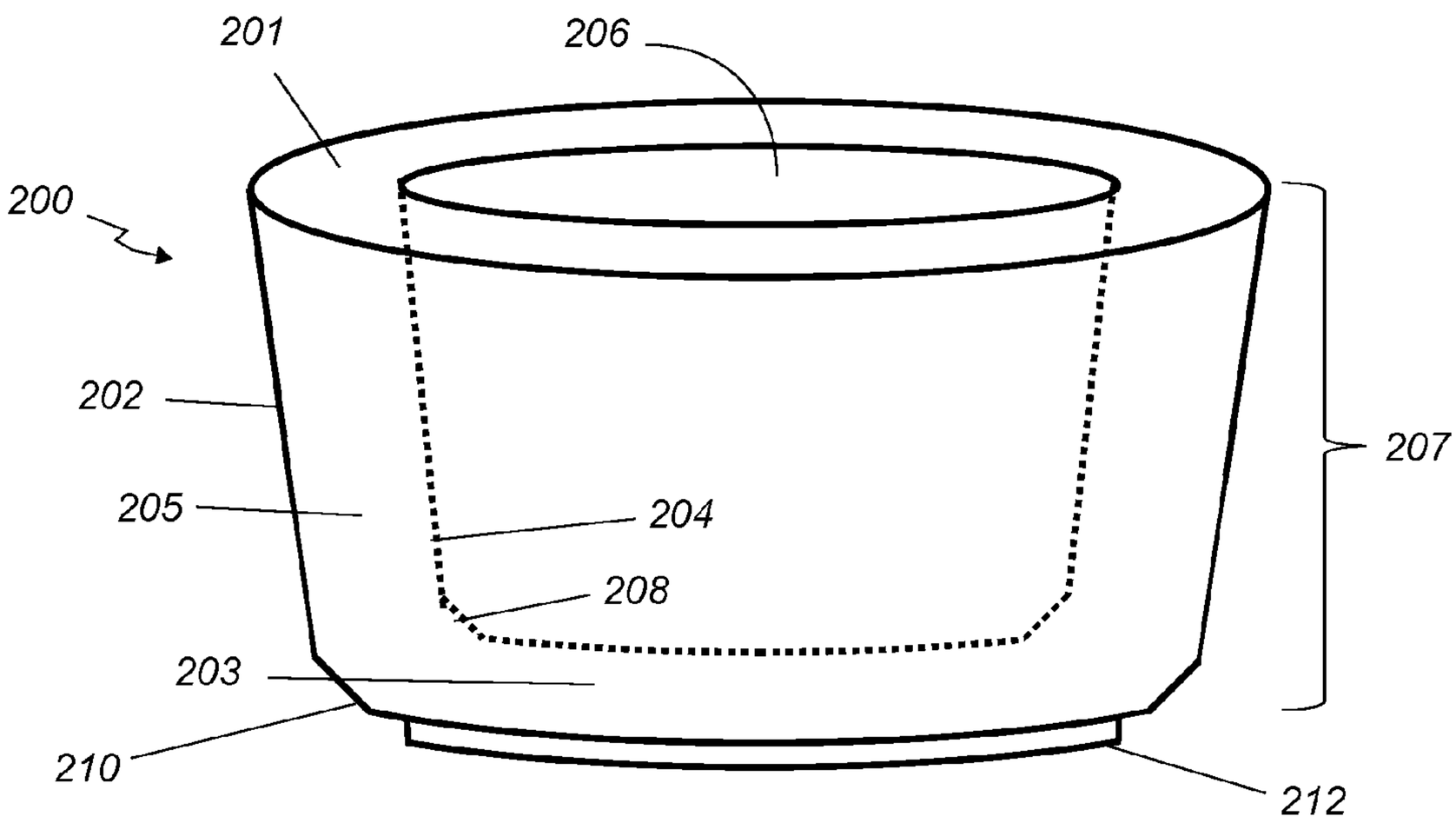
B65D 1/26	(2006.01)
B01J 20/22	(2006.01)
B65D 1/24	(2006.01)
A47J 47/00	(2006.01)

(52) **U.S. Cl.**

CPC ***B65D 1/26*** (2013.01); ***A47J 47/00*** (2013.01); ***B65D 1/24*** (2013.01); ***B01J 20/22*** (2013.01)

(57) **ABSTRACT**

Devices and associated methods for containing and/or disposing of hydrocarbon fluids are disclosed herein. One aspect of the present technology, for example, includes a vessel formed of a plant-based absorbent substrate with an interior region configured to receive and retain a hydrocarbon fluid of at least 250 degrees Fahrenheit for at least 14 days without substantial deformation of the vessel or leaching of the hydrocarbon fluid.



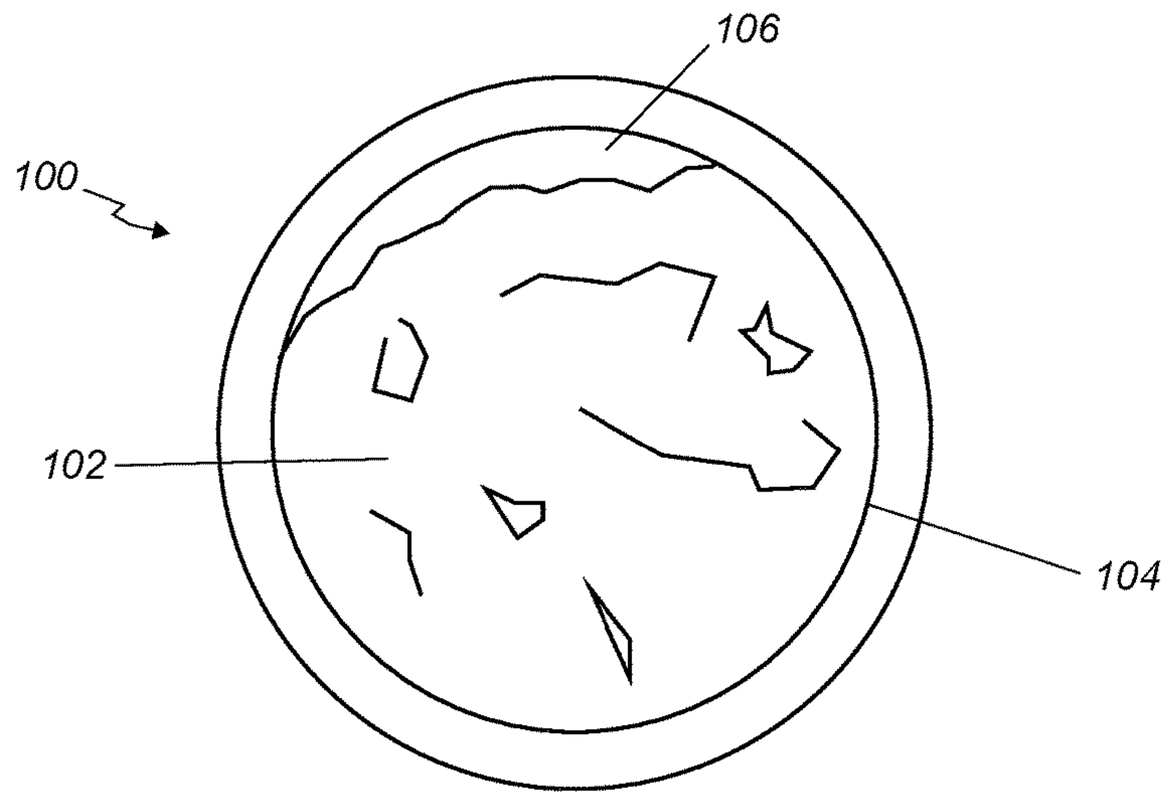


FIG. 1A

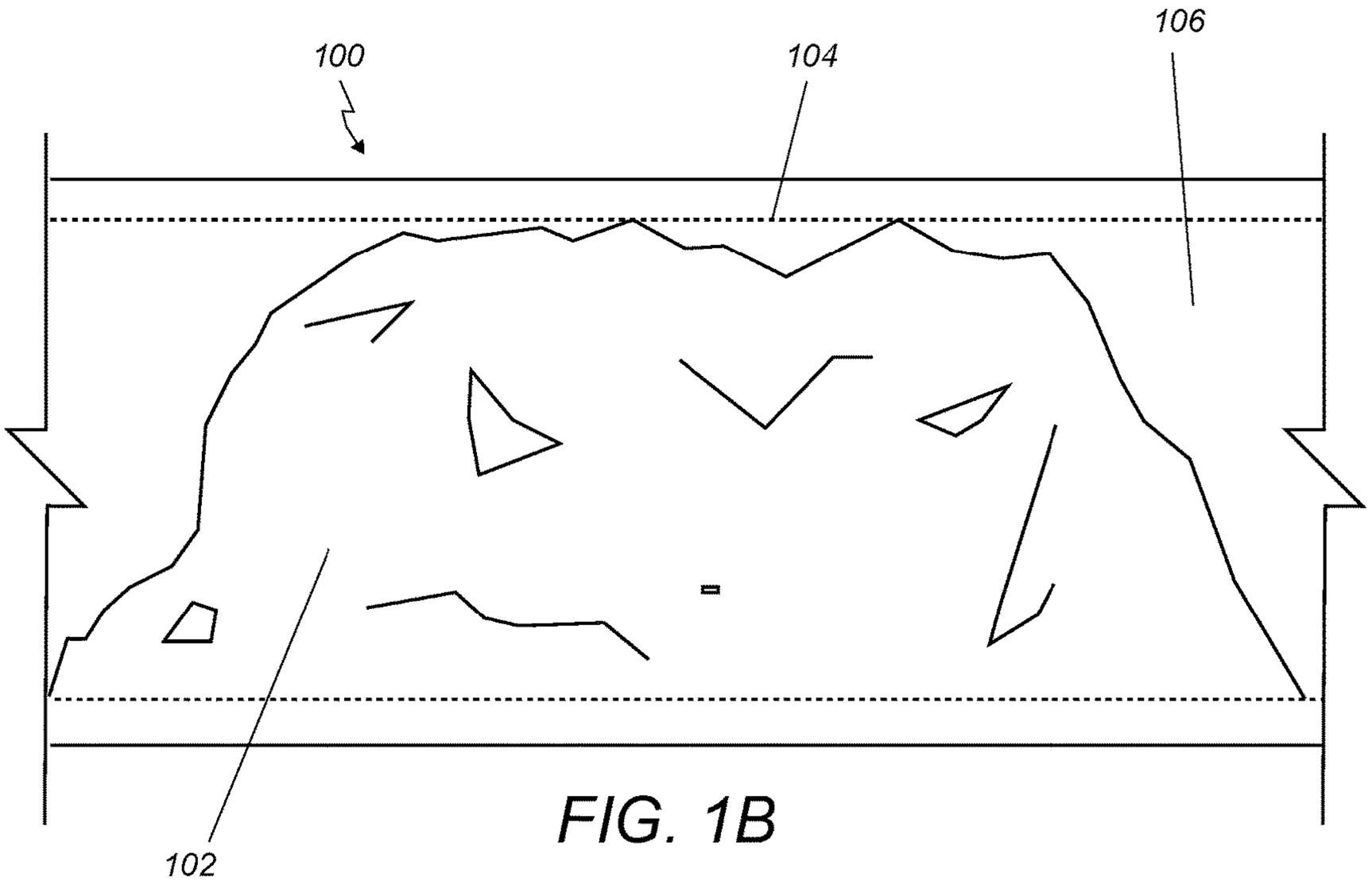


FIG. 1B

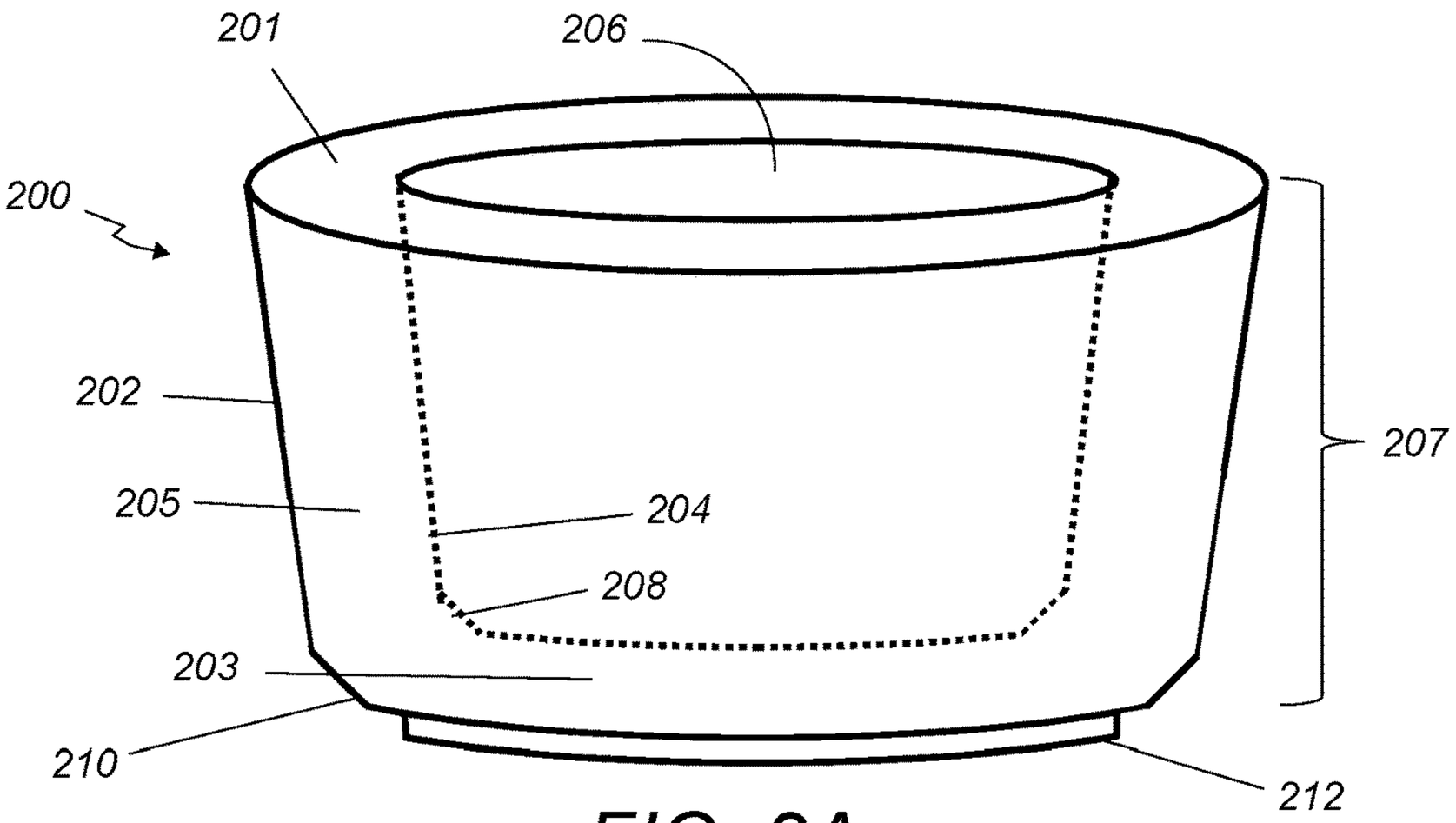

201
206
200
202
205
204
208
203
210
207
212

FIG. 2A

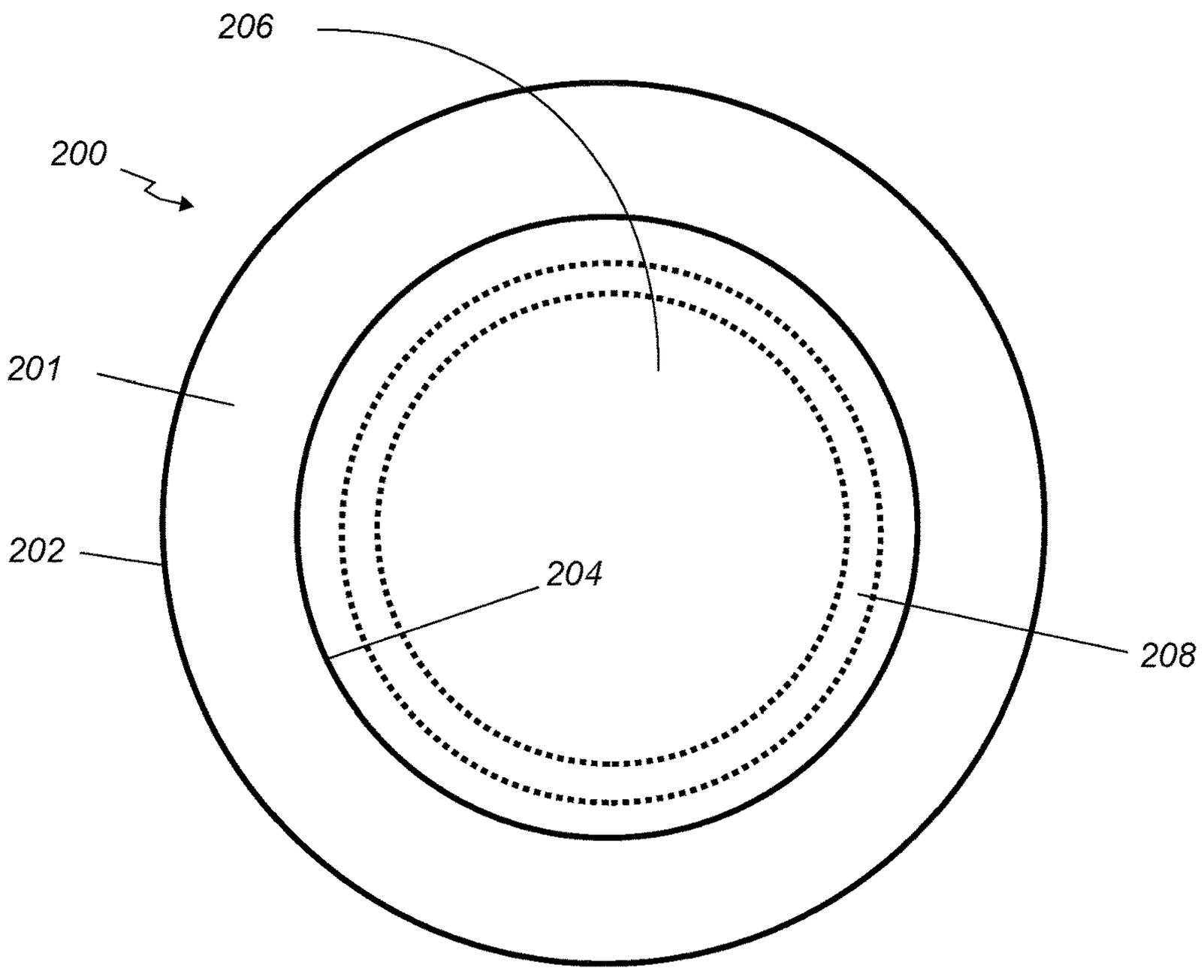

206
200
201
202
204
208

FIG. 2B

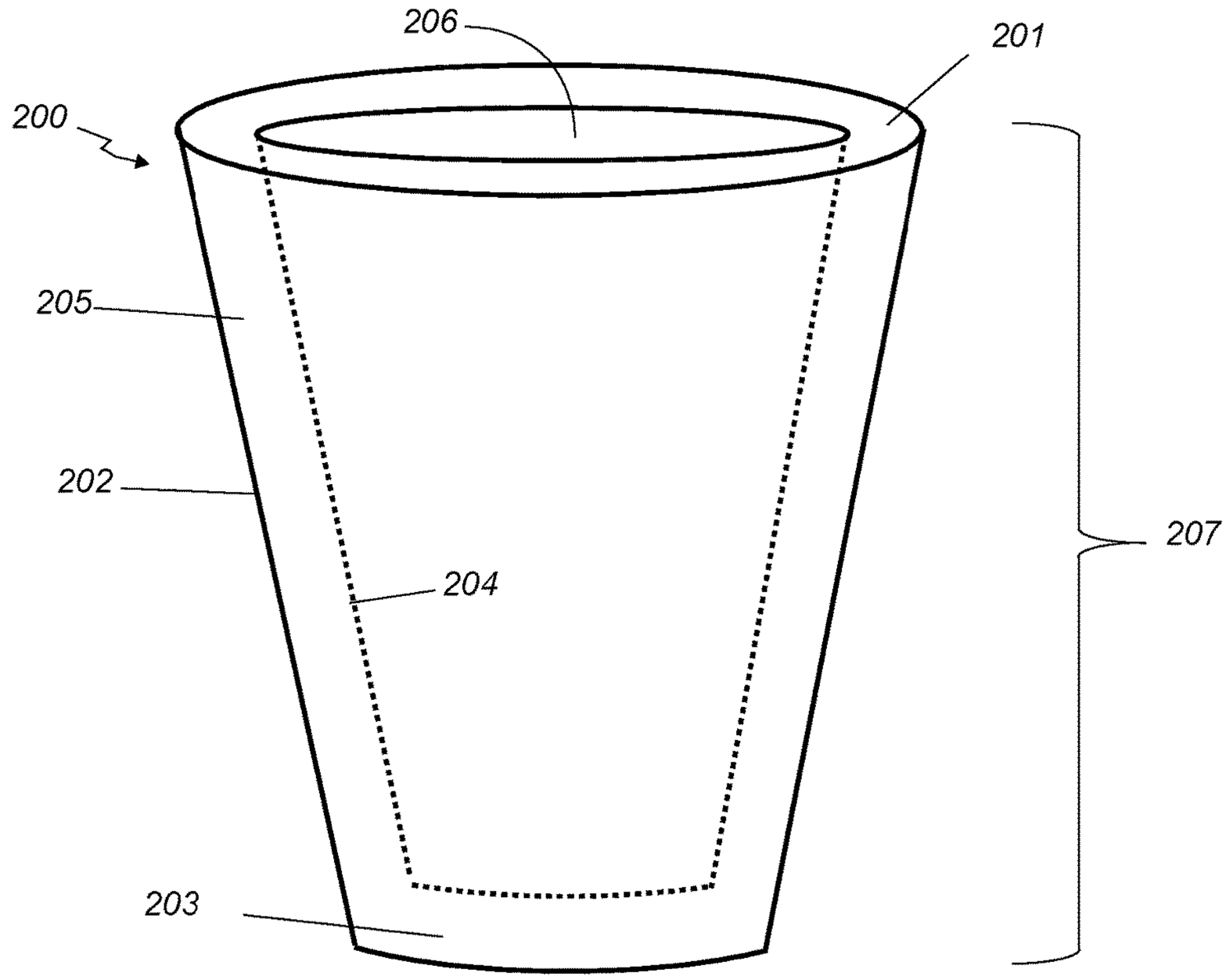


FIG. 3

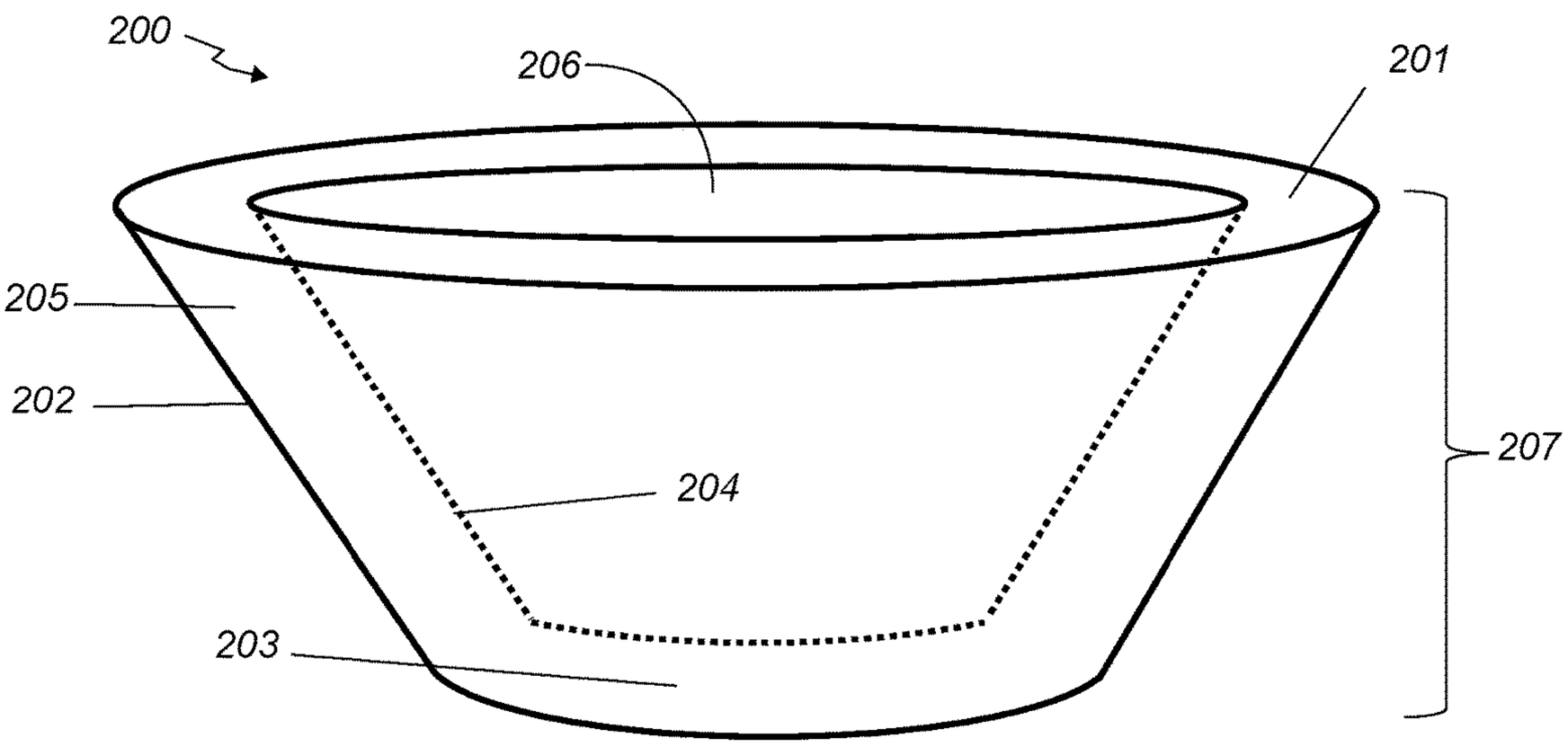


FIG. 4

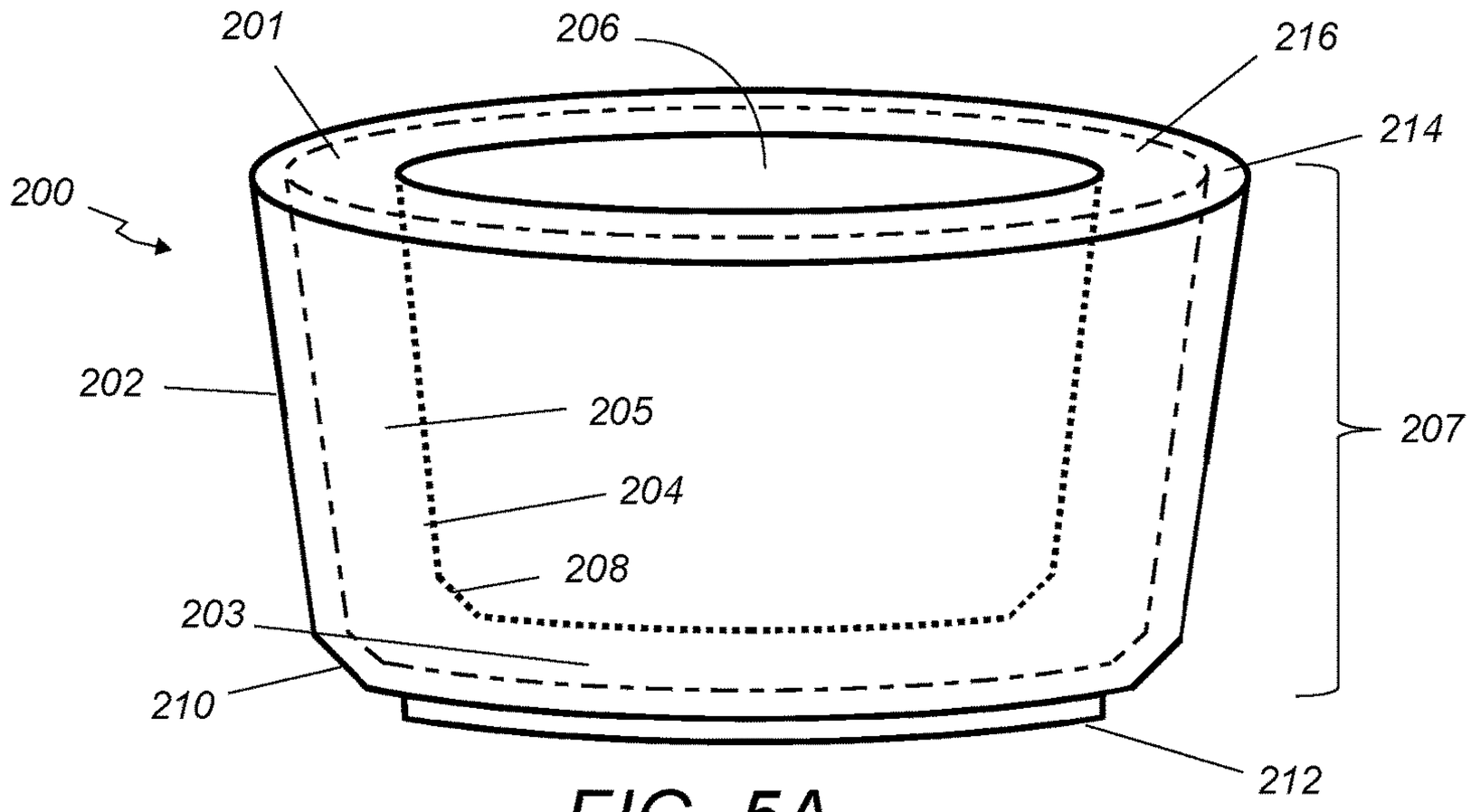

201
206
216
214
200
202
205
204
208
207
203
210
212

FIG. 5A

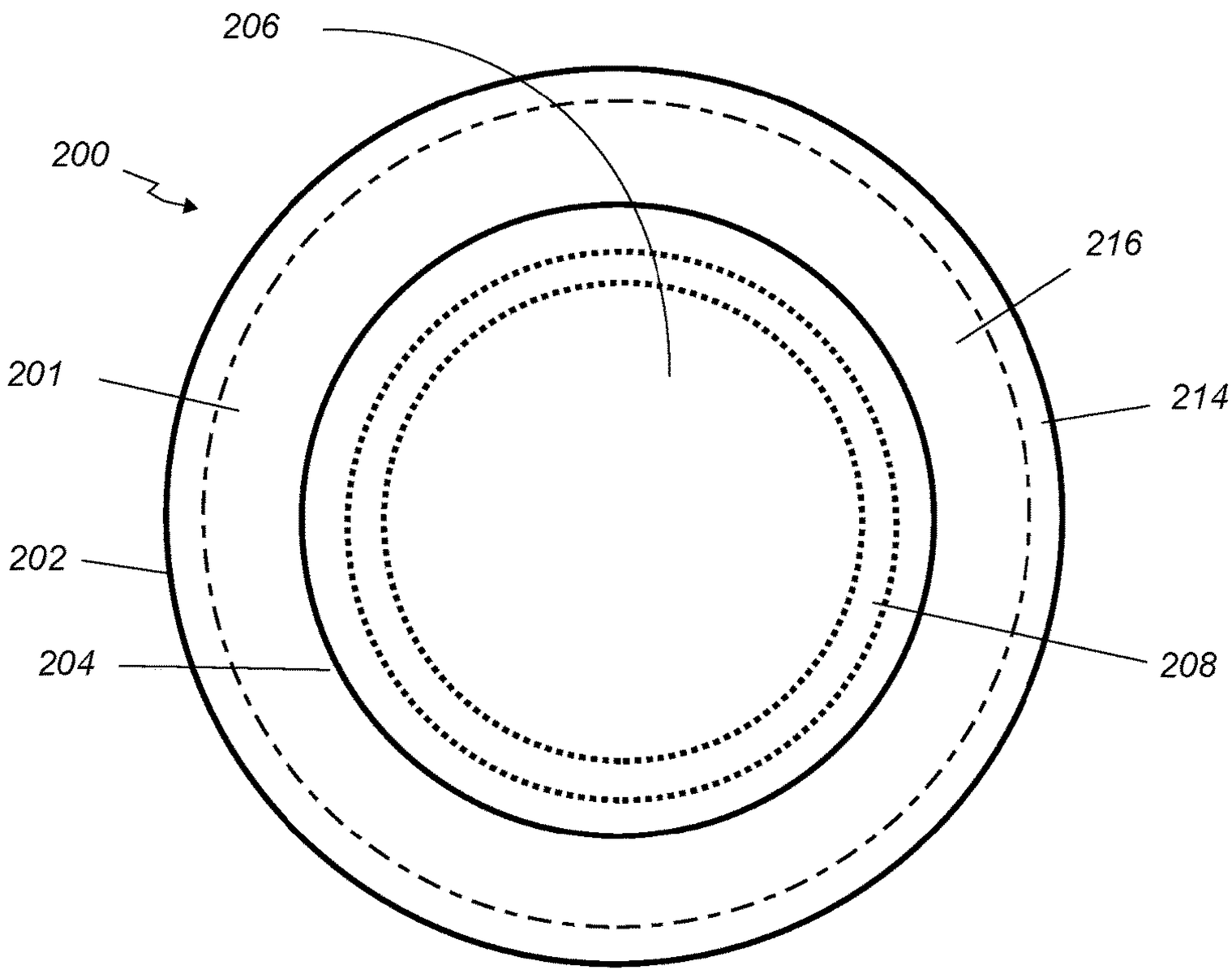

206
200
216
201
214
202
204
208

FIG. 5B

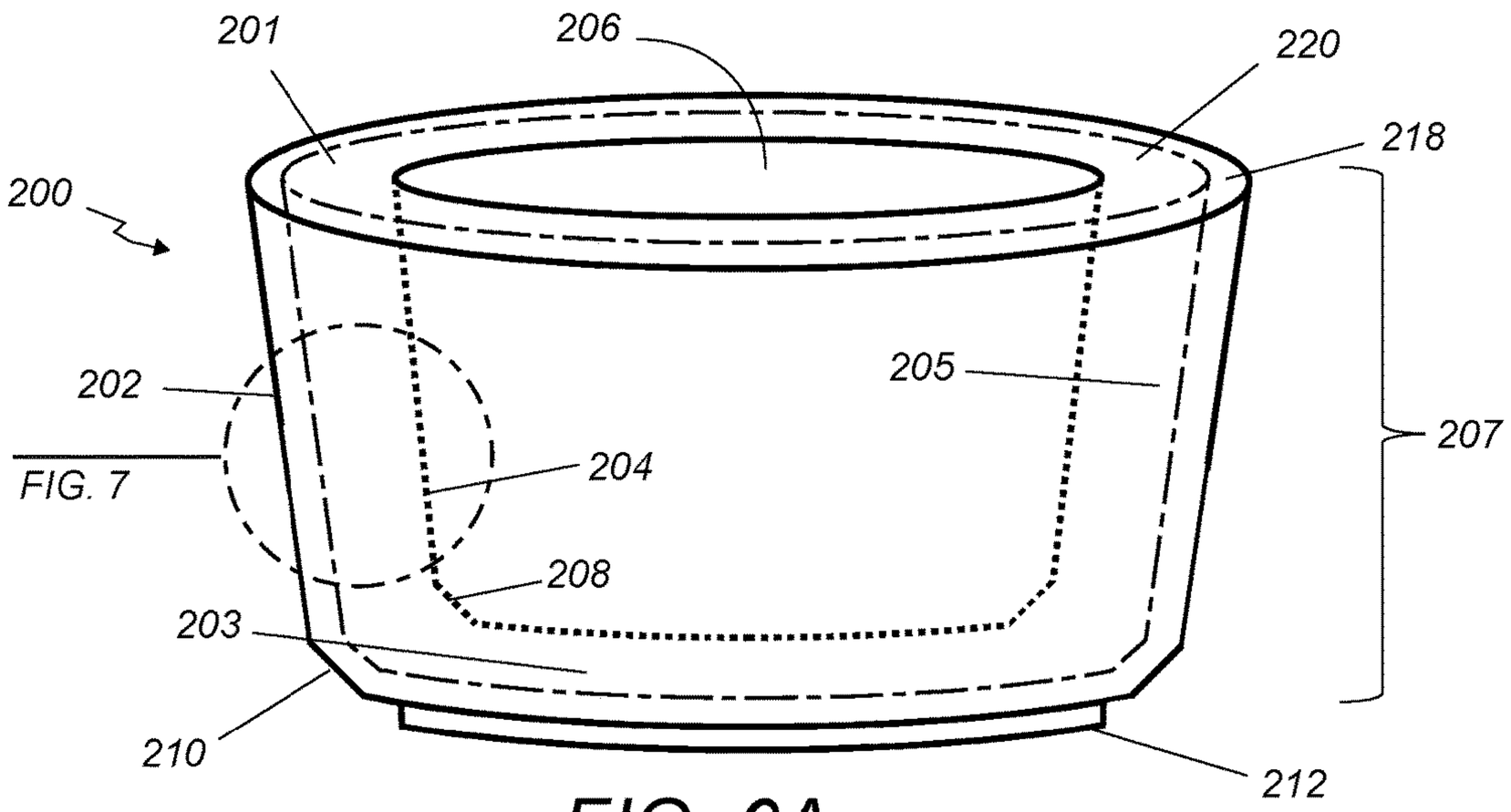


FIG. 7

FIG. 6A

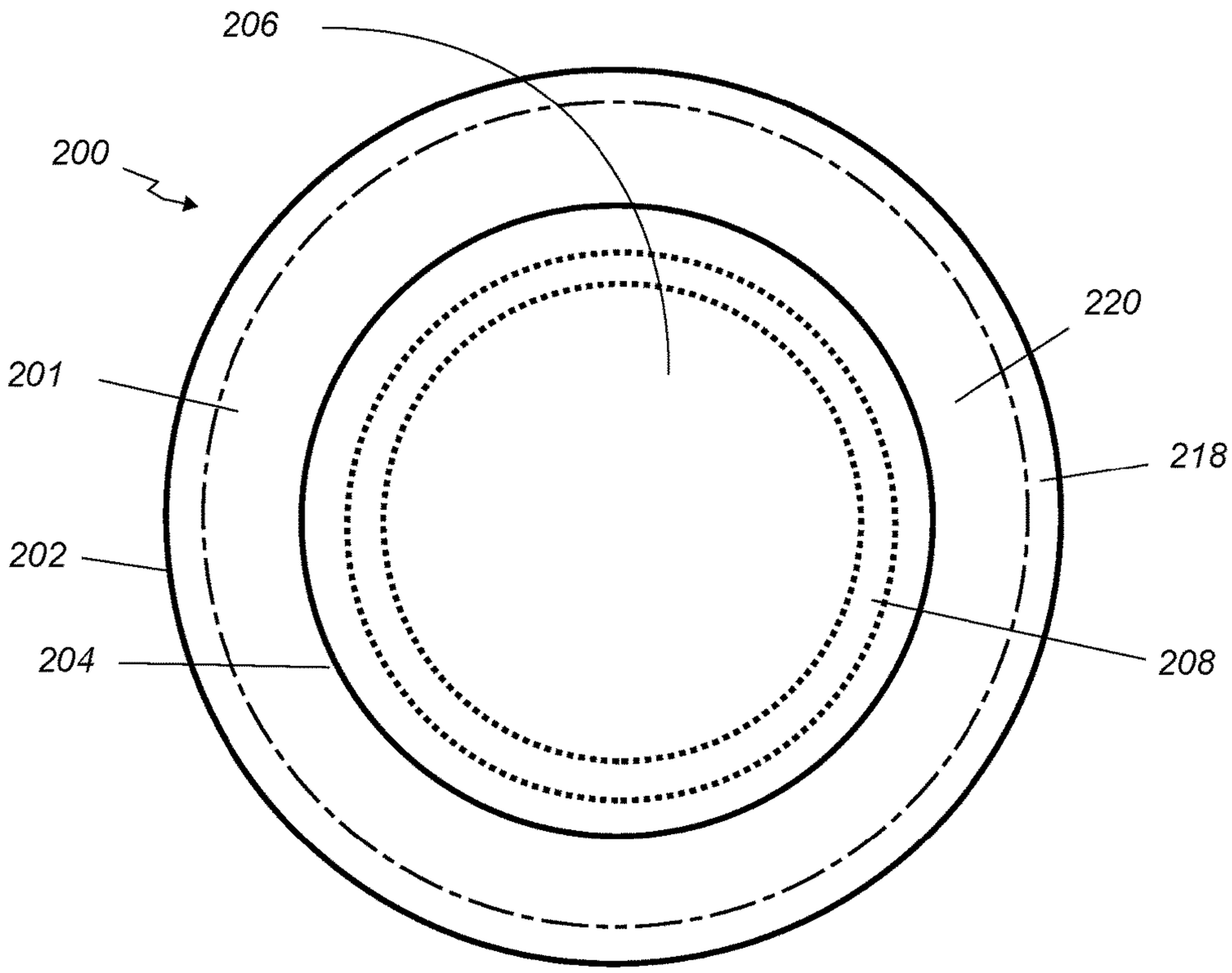


FIG. 6B

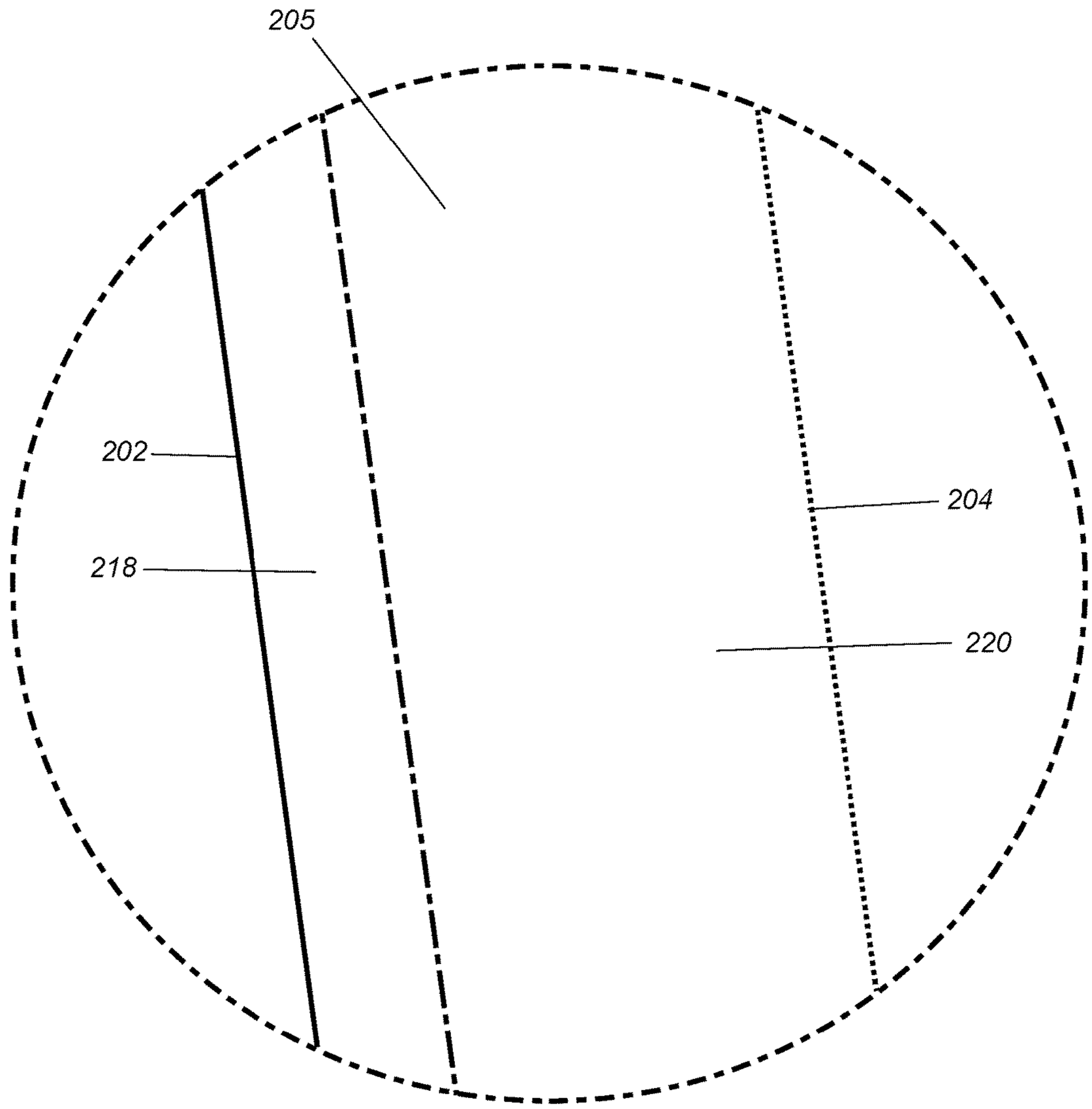


FIG. 7

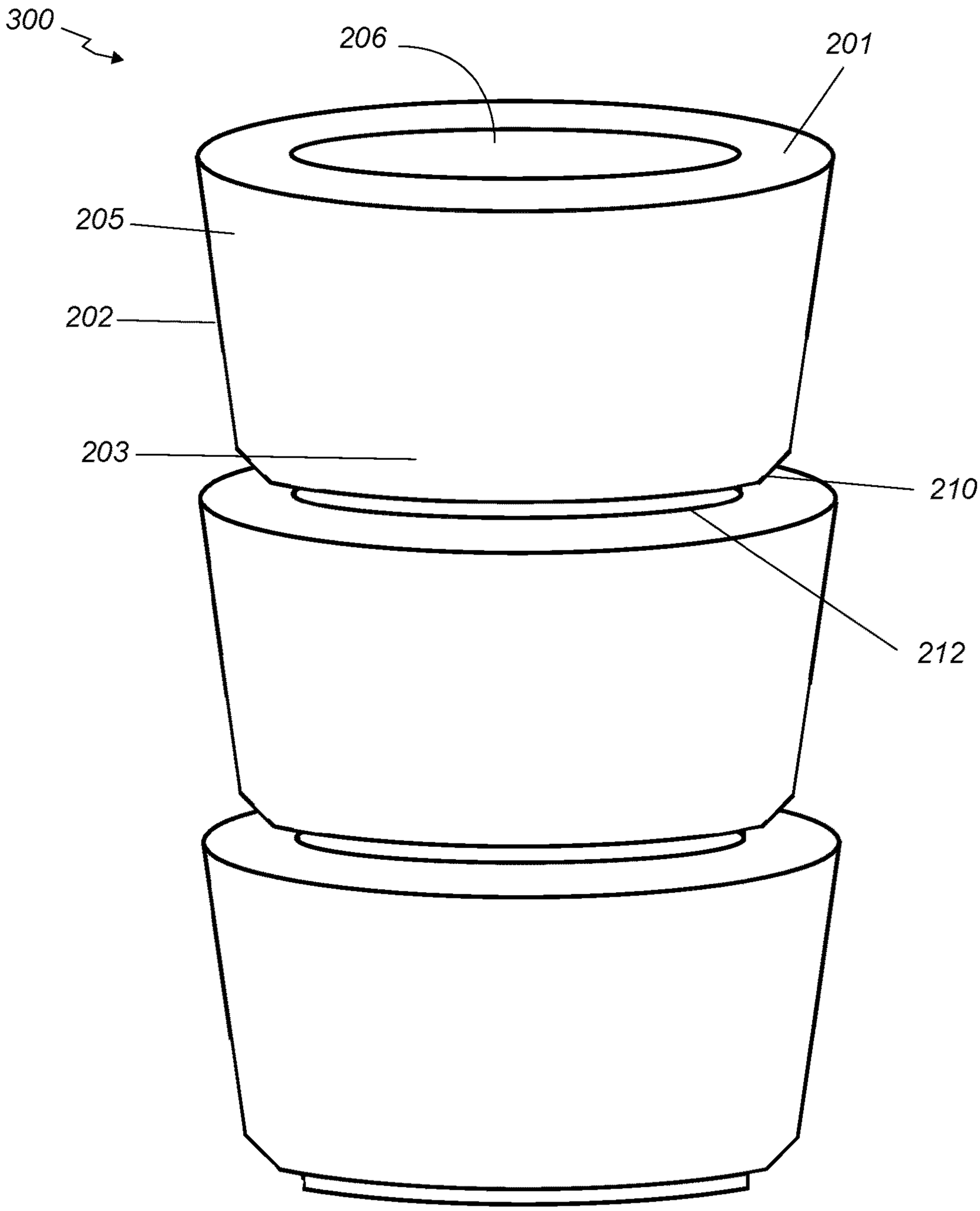


FIG. 8A

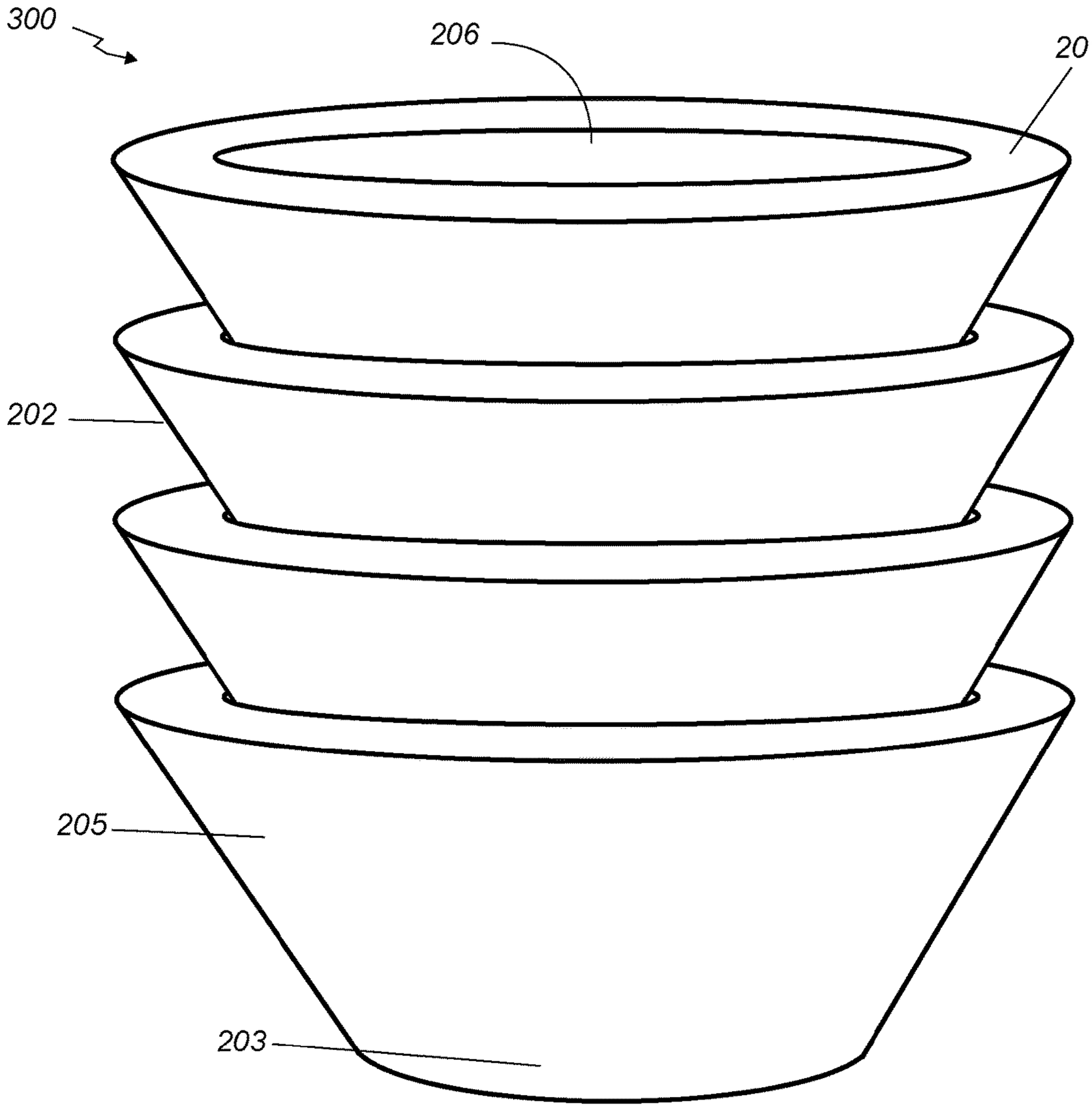


FIG. 8B

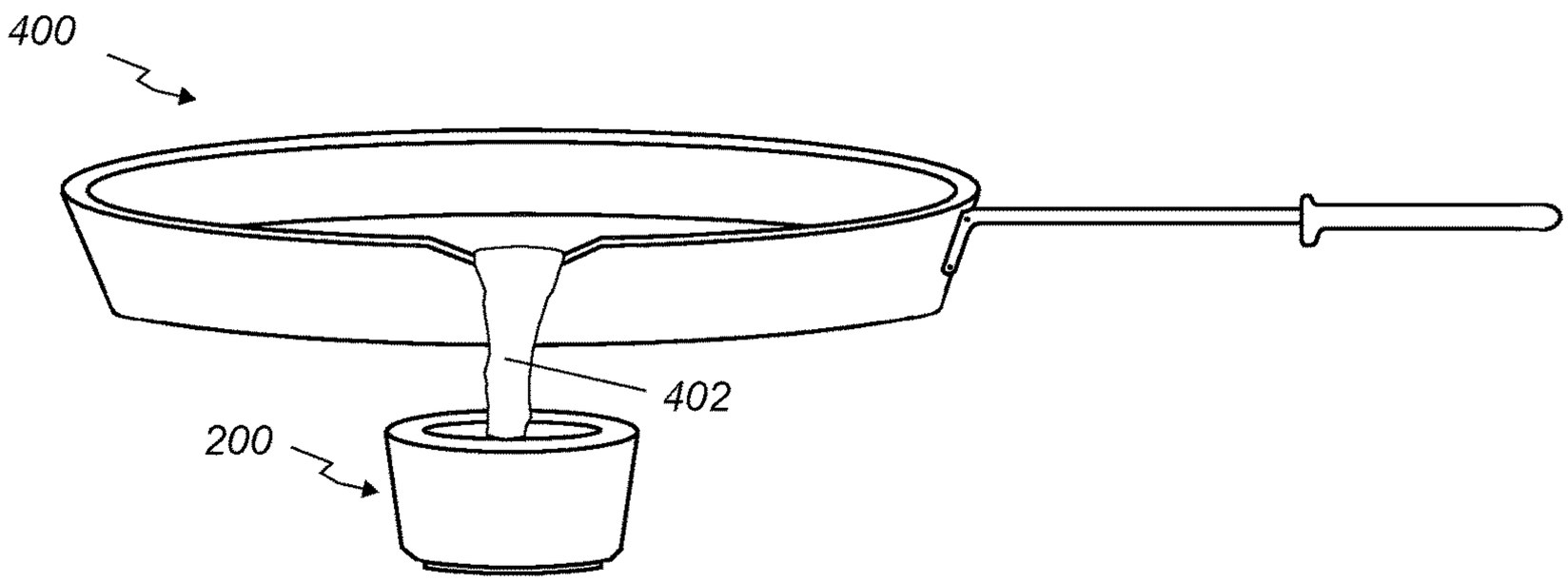


FIG. 9A

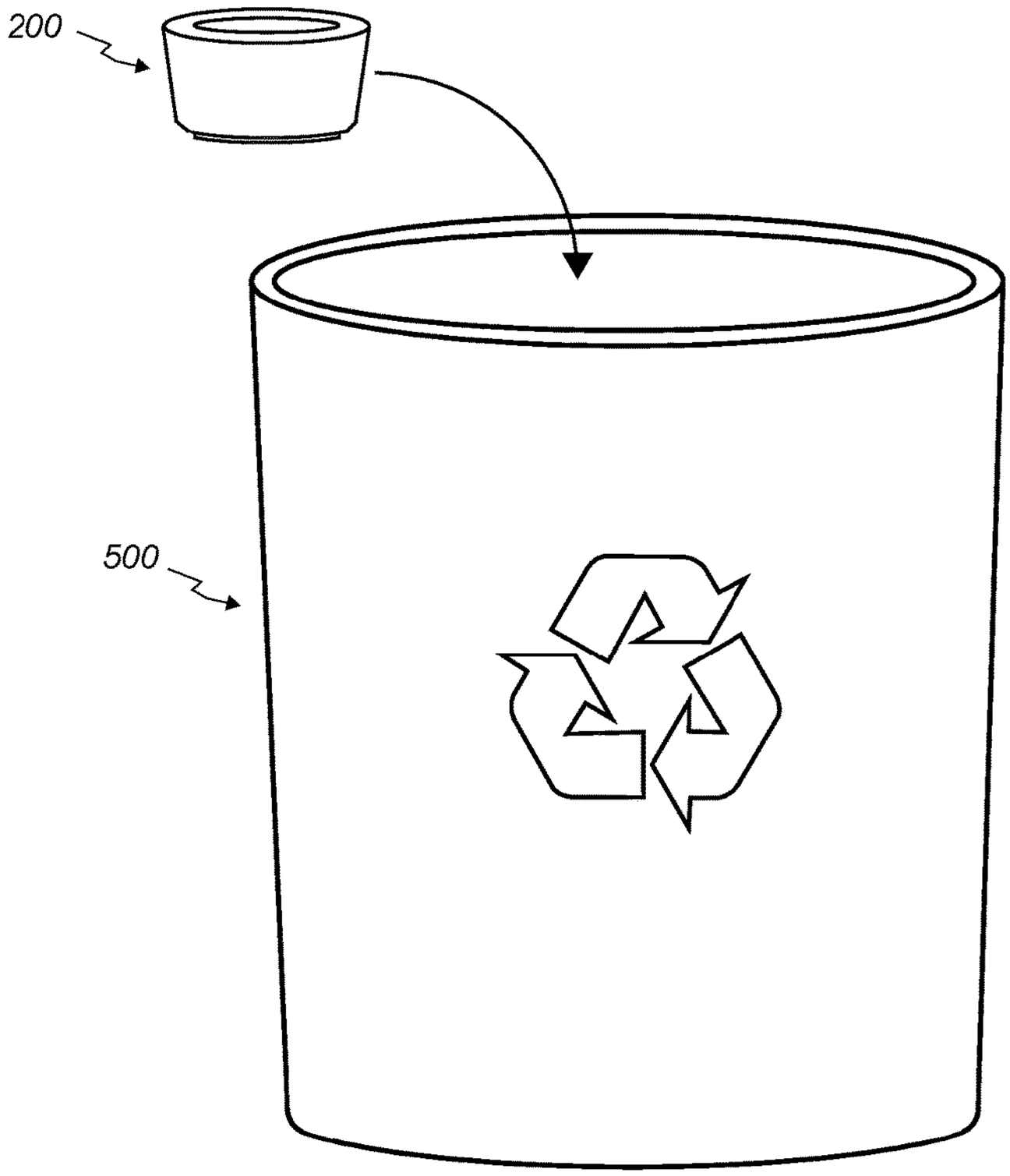


FIG. 9B

DEVICE FOR STORAGE AND DISPOSAL OF WASTE OIL AND GREASE

CROSS-REFERENCE TO RELATED APPLICATION(S)

[0001] The present technology claims the benefit of priority to U.S. Provisional Application No. 62/648,931, filed Mar. 27, 2018, which is incorporated by reference herein in its entirety.

TECHNICAL FIELD

[0002] The present technology relates to the disposal of waste fats, oils, and grease, and associated systems and methods of use. In particular, the present technology is directed to devices for the collection, storage, and disposal of waste cooking oils and preventing damage to sanitary drains, sewers, and pipes, and the manufacture thereof.

BACKGROUND

[0003] The consolidation and saponification of fats, oils, and grease with other inert objects such as baby wipes, cigarettes, and construction debris can occlude residential and municipal sanitary drains and sewers. The resulting occlusions, known as "fatbergs", restrict flow through the system and cause system backups, overflows, and system failures.

[0004] Fats, oils, and grease enter the system via disposal of waste cooking products in drains by individuals without an improved means of disposal. Once within the system, the fatty acids of the fats, oils and grease saponify and harden through a chemical salt reaction with the basic surface of sewer pipes. The resultant salt builds up on sewer walls and restricts the conduit of flow.

[0005] Fatbergs are wreaking havoc on city sewers throughout the world. London recently had a fatberg the size of a Boeing 737 weighing over 130 tons clogging its sewer system. New York City spends over $5 million annually fighting fatbergs. The problem is not limited to large cities. Small cities also deal with the problem.

[0006] Accordingly, there is a need for improved methods of disposal of fats, oils, and grease.

SUMMARY

[0007] The present technology is directed to an improved device for the collection and disposal of wastefats, oils, and grease. The improved device is manufactured with a plant-based substrate and is suitable for biological treatment and disposal.

[0008] The subject technology is illustrated, for example, according to various aspects described below, including with reference to FIGS. **1**-**9**B. Various examples of aspects of the subject technology are described as numbered clauses (**1**, **2**, **3**, etc.) for convenience. These are provided as examples and do not limit the subject technology.

[0009] Clause 1. A device for containing hydrocarbons comprising:

[0010] a vessel formed of a plant-based absorbent substrate with an interior region configured to receive and retain a hydrocarbon fluid of at least 250 degrees Fahrenheit for at least 1 day without substantial deformation of the vessel or leaching of the hydrocarbon fluid.

[0011] Clause 2. The device of Clause 1, wherein the substrate is sawdust.

[0012] Clause 3. The device of Clause 1 or Clause 2, wherein a volume of voids of the underlying substrate of the formed vessel is equal to or greater than a volume of the interior region of the vessel.

[0013] Clause 4. The device of any one of Clauses 1 to 3, wherein at least 90% of the substrate can be converted into carbon dioxide, water, and minerals by biological processes within a period of 6 months.

[0014] Clause 5. The device of any one of Clauses 1 to 4, wherein the vessel has a tapered profile in which a bottom portion of the vessel has a smaller diameter than a top portion of the vessel.

[0015] Clause 6. The device of any one of Clauses 1 to 5, wherein the substrate is substantially impermeable to the hydrocarbon fluid.

[0016] Clause 7. The device of any one of Clauses 1 to 6, wherein the substrate includes sugarcane bagasse.

[0017] Clause 8. The device of any one of Clauses 1 to 7, wherein the substrate includes coconut coir.

[0018] Clause 9. The device of any one of Clauses 1 to 8, wherein the substrate includes rice husk.

[0019] Clause 10. The device of any one of Clauses 1 to 9 wherein the hydrocarbon fluid is at least one of a fat, an oil, and/or a grease.

[0020] Clause 11. A device for containing hydrocarbons comprising:

[0021] a vessel formed of a plant-based absorbent substrate with an interior region configured to receive and retain a hydrocarbon fluid of at least 250 degrees Fahrenheit for at least 2 days without substantial leaching of the hydrocarbon fluid,

[0022] wherein the vessel includes an outer substrate and an interior substrate, the outer substrate having a lower hydraulic conductivity than the interior substrate, and wherein, at least when the vessel first receives the hydrocarbon fluid, the interior substrate is closer to the hydrocarbon fluid than the outer substrate.

[0023] Clause 12. The device of Clause 11, wherein the outer substrate and the interior substrate are the same material, and wherein the outer substrate has a different degree of compaction and a different degree of bulk density than the interior substrate.

[0024] Clause 13. The device of Clause 11 or Clause 12, wherein the outer substrate and the interior substrate are different materials, and wherein the outer substrate has a different degree of compaction and a different degree of bulk density than the interior substrate.

[0025] Clause 14. The device of any one of Clauses 11 to 13, wherein the substrate of the outer layer is wax.

[0026] Clause 15. The device of any one of Clauses 11 to 14, wherein the substrate of the outer layer is lignin.

[0027] Clause 16. The device of any one of Clause 11 to 15, wherein the substrate of the outer layer is a polymer.

[0028] Clause 17. A method of manufacture, comprising:

[0029] forming a vessel by applying a pressure of at least 24,000 psi to a plant-based substrate, the vessel having an interior region configured to receive and retain a hydrocarbon fluid.

[0030] Clause 18. The method of Clause 17 within the vessel is formed without the aid of an external binding agent.

[0031] Clause 19. The method of Clause 17 or Clause 18, wherein the pressure is applied hydraulically.

[0032] Clause 20. The method of any one of Clause 17 to 19, wherein the vessel is a bowl.

[0033] Clause 21. The method of any one of Clause 17 to 20, wherein the vessel is a cup.

[0034] Clause 22. The method of any one of Clause 17 to 21, wherein the vessel includes a plurality of discrete compartments, each of which is configured to retain a discrete volume of the hydrocarbon fluid.

[0035] Clause 23. The method of any one of Clause 17 to 22, wherein an outer layer of the vessel is compacted to provide a substantially impermeable layer.

[0036] Clause 24. The method of any one of Clause 17 to 23, wherein the innermost layer of the vessel is compacted to provide a substantially permeable layer.

[0037] Clause 25. The device of any one of Clauses 1 to 10, wherein the interior region is configured to receive and retain the hydrocarbon fluid of at least 250 degrees Fahrenheit for at least 2 days without substantial deformation of the vessel or leaching of the hydrocarbon fluid.

[0038] Clause 26. The device of any one of Clauses 1 to 10, wherein the interior region is configured to receive and retain the hydrocarbon fluid of at least 250 degrees Fahrenheit for at least 3 days without substantial deformation of the vessel or leaching of the hydrocarbon fluid.

[0039] Clause 27. The device of any one of Clauses 1 to 10, wherein the interior region is configured to receive and retain the hydrocarbon fluid of at least 250 degrees Fahrenheit for at least 4 days without substantial deformation of the vessel or leaching of the hydrocarbon fluid.

[0040] Clause 28. The device of any one of Clauses 1 to 10, wherein the interior region is configured to receive and retain the hydrocarbon fluid of at least 250 degrees Fahrenheit for at least 5 days without substantial deformation of the vessel or leaching of the hydrocarbon fluid.

[0041] Clause 29. The device of any one of Clauses 1 to 10, wherein the interior region is configured to receive and retain the hydrocarbon fluid of at least 250 degrees Fahrenheit for at least 6 days without substantial deformation of the vessel or leaching of the hydrocarbon fluid.

[0042] Clause 30. The device of any one of Clauses 1 to 10, wherein the interior region is configured to receive and retain the hydrocarbon fluid of at least 250 degrees Fahrenheit for at least 7 days without substantial deformation of the vessel or leaching of the hydrocarbon fluid.

[0043] Clause 31. The device of any one of Clauses 1 to 10, wherein the interior region is configured to receive and retain the hydrocarbon fluid of at least 250 degrees Fahrenheit for at least 8 days without substantial deformation of the vessel or leaching of the hydrocarbon fluid.

[0044] Clause 32. The device of any one of Clauses 1 to 10, wherein the interior region is configured to receive and retain the hydrocarbon fluid of at least 250 degrees Fahrenheit for at least 9 days without substantial deformation of the vessel or leaching of the hydrocarbon fluid.

[0045] Clause 33. The device of any one of Clauses 1 to 10, wherein the interior region is configured to receive and retain the hydrocarbon fluid of at least 250 degrees Fahrenheit for at least 10 days without substantial deformation of the vessel or leaching of the hydrocarbon fluid.

[0046] Clause 34. The device of any one of Clauses 1 to 10, wherein the interior region is configured to receive and retain the hydrocarbon fluid of at least 250 degrees Fahrenheit for at least 11 days without substantial deformation of the vessel or leaching of the hydrocarbon fluid.

[0047] Clause 35. The device of any one of Clauses 1 to 10, wherein the interior region is configured to receive and retain the hydrocarbon fluid of at least 250 degrees Fahrenheit for at least 12 days without substantial deformation of the vessel or leaching of the hydrocarbon fluid.

[0048] Clause 36. The device of any one of Clauses 1 to 10, wherein the interior region is configured to receive and retain the hydrocarbon fluid of at least 250 degrees Fahrenheit for at least 13 days without substantial deformation of the vessel or leaching of the hydrocarbon fluid.

[0049] Clause 37. The device of any one of Clauses 1 to 10, wherein the interior region is configured to receive and retain the hydrocarbon fluid of at least 250 degrees Fahrenheit for at least 14 days without substantial deformation of the vessel or leaching of the hydrocarbon fluid.

BRIEF DESCRIPTION OF THE DRAWINGS

[0050] Many aspects of the present disclosure can be better understood with reference to the following drawings. The components in the drawings are not necessarily to scale. Instead, emphasis is placed on illustrating clearly the principles of the present disclosure.

[0051] FIGS. **1**A and **1**B are a side view and an end view, respectively, of a drain or sewer occluded by fats, oils and grease.

[0052] FIGS. **2**A and **2**B are a side view and an end view, respectively, of a plant-based vessel for retaining hydrocarbon fluids in the shape of a bowl, according to some embodiments.

[0053] FIG. **3** is a side view of a plant-based vessel for retaining hydrocarbon fluids in the shape of a cup, according to some embodiments.

[0054] FIG. **4** is a side view of a plant-based vessel for retaining hydrocarbon fluids in an alternative shape, according to some embodiments of the present technology.

[0055] FIGS. **5**A and **5**B are a side view and an end view, respectively, of a plant-based vessel for retaining hydrocarbon fluids with outer and interior substrates of differing hydraulic conductivities, according to some embodiments.

[0056] FIGS. **6**A and **6**B are a side view and an end view, respectively, of a plant-based vessel for retaining hydrocarbon fluids with differing outer and interior substrates, according to some embodiments.

[0057] FIG. **7** illustrates a detail view of the vessel wall comprised of differing substrates, according to some embodiments.

[0058] FIGS. **8**A and **8**B illustrates an alternative embodiment of a plant-based vessel for retaining hydrocarbon fluids in which a plurality of vessels stack within themselves, according to some embodiments.

[0059] FIGS. **9**A and **9**B schematically illustrate a system for receiving and retaining a hydrocarbon fluid in a plant-based vessel and disposing thereof.

DETAILED DESCRIPTION

[0060] The detailed description set forth below is intended as a description of various configurations of the subject technology and is not intended to represent the only configurations in which the subject technology may be practiced. The detailed description includes specific details for the purpose of providing a thorough understanding of the subject technology. However, the subject technology may be practiced without these specific details. In some instances,

well-known structures and components are not shown, or are shown schematically or in block diagram form, to avoid obscuring the concepts of the subject technology.

[0061] FIGS. **1**A and **1**B depict the occlusion of a conduit **100** by the collection of fats, oils or grease **102** on the surface **104** of the conduit **100** and within channel of flow **106**. As illustrated in FIGS. **1**A and **1**B, the conduit **100** can be part of a household sewer line, a branch sewer line, a mainline sewer, or a trunk sewer and measure between about 2 inches and about 144 inches in internal diameter. The conduit **100** can be manufactured from a variety of materials including plastic, concrete, iron, clay, wood, and bituminous fiber. The collection of the fats, oils or grease **102** can include other inert and resilient materials common to sewer systems including baby wipes, cigarettes, wood, steel, and general detritus. The collection of fats, oils or grease **102** can form locally on the surface **104** of the conduit **100** through a chemical salt reaction between acidic hydrocarbons and a basic pipe surface **104**. Alternatively, the collection **102** can be generated upstream, transported downstream through hydraulic flow through the conduit **100**, and deposited on the pipe, typically at hydraulically restricted areas such as bends, reducers, low slope sections, roughened surfaces, or other inert blockages. The channel of flow **106** can be blocked partially or entirely by the collection **102**.

[0062] FIGS. **2**A and **2**B depict a vessel **200** according to some embodiments of the subject technology. As illustrated in FIGS. **2**A and **2**B, the vessel **200** may comprise a sidewall **207** surrounding an interior region **206** configured to receive and retain a fluid. The sidewall **207** may include an interior surface **204** and an exterior surface **202**. The sidewall **207** may comprise a base portion **203**, a side portion **205** extending upwardly from the base portion **203**, and a top surface **201**. All or a portion of the vessel **200** may be formed of a plant-based substrate configured to retain a hydrocarbon fluid of up to or exceeding 250 degrees Fahrenheit. The vessel can retain the fluid for at least 14 days without substantial deformation of the vessel or leaching of the hydrocarbon fluid. A vessel formed of a plant-based substrate can be disposed in a wide variety of ways including through biological treatment. A vessel that can retain fluids up to and exceeding 250 degrees Fahrenheit without leaching could receive and retain waste cooking oils, fats, or grease as they are generated and reduce disposal of hydrocarbon fluids into the sewer system.

[0063] As depicted in FIGS. **2**A and **2**B, in some embodiments of the technology the interior surface **204** of the vessel **200** can be chamfered along all or a portion of its bottom edge **208**. Additionally, or alternatively, the exterior surface **202** of the vessel **200** can be chamfered along all or a portion of its bottom edge **210**. Chamfered edges can facilitate the removal of the vessel **200** from a cast mold during manufacture and reduce the likelihood of cracking and breaking during packing, shipping, handling, and use.

[0064] As depicted in FIGS. **2**A and **2**B, in some embodiments of the technology the vessel **200** may optionally include a pedestal rib **212** at the base **203**. The pedestal rib **212** can have a diameter smaller than that of the base **203**, which reduces the total surface area in contact with a table, counter, or similar support plane. The reduced surface area of the pedestal rib **212** may also reduce the tendency of the vessel **200** to rock or shift while in use. A stable device, through the action of the pedestal rib **212**, is less likely to tip or spill, which is a beneficial feature for a device that is receiving and retaining fluids up to or exceeding 250 degrees Fahrenheit.

[0065] In some embodiments of the technology, the vessel **200** can be monolithically formed by applying a pressure of at least 24,000 psi to a plant-based substrate within a cast mold of the desired physical configuration. In some embodiments the applied pressure may be less than or greater than 24,000 psi depending on the physical properties of the substrate and the desired configuration of the vessel **200**. The applied pressure can be applied hydraulically or through other means such as actuation of a screw. The applied pressure can compact and densify the plant-based substrate and cause physical bridging and entanglement of individual particles. In some embodiments, the applied pressure can express from the substrate a solution with binding properties. By example, lignin can be expressed by hydraulic pressure from sawdust. The lignin solution can flow to occupy interstices and fasten individual sawdust particles to one another. After compaction and densification, the vessel **200** can be resilient to deformation and be expelled from the mold.

[0066] In some embodiments of the technology, the vessel **200** can be manufactured with or without the application of external binding agents which are used to hold the underlying substrate particles together in the desired configuration. External binding agents may include wax, lignin, polymers, water, starch, and other suitable agents.

[0067] In some embodiments of the technology, the vessel **200** can be manufactured with or without the application of external heat. Heat can be used to increase the plastic deformation of the substrate at the particle level and increase bridging and entanglement interactions, which produces a vessel **200** more resilient to deformation.

[0068] In some embodiments of the technology, the vessel **200** can be formed of a single homogenous plant-based substrate. The substrate particle can be less than about 0.5 mm, less than about 1.0 mm, less than about 2.0 mm, less than about 4.0 mm, or greater than about 4.0 mm in diameter. By example a wood substrate can be used as a fine dust less than 0.5 mm in particle size, or in another embodiment, as a wood chip greater than about 4.0 mm in diameter. Depending on the particle size, the applied pressure, the use of external binding agents, or heat, the resultant vessel **200** can be substantially permeable or impermeable to a hydrocarbon fluid. In some aspects of the technology, the vessel **200** may be formed of two or more different plant-based substrates. The different plant-based substrates may have generally the same particle size or different particle sizes. In some embodiments, the vessel **200** may be formed of substrate particles of different sizes of the same plant-based substrate.

[0069] The plant-based substrate could be sawdust, or sugarcane bagasse, or coconut coir, or rice husk, or any combination thereof. Plant-based substrates are generally low cost and readily available in a variety of markets and geographies. Plant-based substrates also have the advantage that they are biodegradable and can be converted through biological processes into carbon dioxide, water, and minerals within a period of 6 months.

[0070] Plant-based substrates contain natural binding agents, such as lignin, which can be expressed and used to hold the vessel together. The fibrous and vascular structure of plant tissue can increase absorption of the hydrocarbon

fluid through capillary action and by providing interstitial space into which the hydrocarbon fluid can move be absorbed.

[0071] In some embodiments of the technology, the substrate can be substantially impermeable to hydrocarbon fluids. In such embodiments the hydrocarbon fluid can be retained within the vessel and allowed to cool, congeal, or solidify. The interior region **206** of the vessel **200** can be sized to retain between approximately 25 mL and 500 mL of a hydrocarbon fluid or other sizes suitable for application within a household. An embodiment of this nature could be useful for the collection of saturated fats, oils and greases which can solidify at room temperature.

[0072] In some embodiments of the technology, the substrate can have absorbent properties and the vessel **200** can be formed such that the volume of the interstitial space between the particles comprising the wall **205** and base **203** is equal to or greater than the volume of the interior region **206** of the vessel. In such an embodiment, hydrocarbons can be poured into the vessel and allowed to percolate or absorb into the interstitial space of the vessel **200**. An embodiment of this nature may be useful for the collection of unsaturated fats, oils and greases which remain liquid at room temperature.

[0073] As illustrated in FIGS. **3** and **4** in some embodiments of the technology, the vessel **200** can be formed in a variety of configurations including a generally cup-like configuration or a bowl-like configuration. For example, in such embodiments, the vessel can have a tapered profile in which the outer diameter of the bottom portion of the vessel is smaller than the inner diameter a top portion of the vessel.

[0074] In some embodiments of the technology, the sidewall **207** of the vessel **200** may be formed of multiple substrates. For example, as shown in FIGS. **5**A and **5**B, the sidewall **207** of the vessel **200** may include an outer portion **214** formed of a first substrate and an inner portion **216** formed of a second substrate different than the first substrate. As such, when the vessel **200** receives a hydrocarbon fluid within the interior region **206**, the second substrate of the inner portion **216** is in direct contact with and closer to the hydrocarbon fluid than the first substrate of the outer portion **214**. In some embodiments, for example, the second substrate may have a higher hydraulic conductivity than the first substrate. Having a substrate with a higher hydraulic conductivity at the inner portion **216** (relative to the hydraulic conductivity of the substrate at the outer portion) may be advantageous as it provides the vessel **200** with a more absorbent surface for first contact with the hydrocarbon fluid while keeping the vessel **200** substantially resilient to leaching via the lower hydraulic conductivity at the outer portion **214**. In contrast, in some embodiments the vessel **200** may have a higher hydraulic conductivity at the outer portion **214** than at the inner portion **216**, for example as shown in FIGS. **6**A and **6**B. For instance, in some aspects of the technology the vessel **200** may include a sugarcane bagasse at the outer portion **214** and sawdust at the inner portion **216**.

[0075] A sidewall and/or vessel having differing hydraulic conductivities can be achieved in a variety of manners including using the same substrate with a differing degree of compaction, the same substrate with different particle sizes, the same substrate with and without a binding agent, or the same substrate with and without the application of heat during the manufacturing process.

[0076] As illustrated in FIG. **8**A, the present technology may include a plurality of vessels **300**, each of which is configured to stack within or on top of one another. In an example of such embodiments, the vessel **200** may include a pedestal rib **212** that is sized with an outer diameter about 1.0 mm less than the internal diameter of the aperture of the top surface **201** of the vessel. In such a configuration, one vessel **200** can be stacked on top of another vessel **200** with the pedestal rib **212** of the top vessel protruding into the aperture of the top surface **201** of the bottom vessel. The protrusion of the pedestal rib **212** can restrain the top vessel from moving laterally relative to the bottom vessel. This configuration could reduce space required for packing, shipping, and storing.

[0077] FIG. **8**B shows another example of stackable vessels in which the vessels have a tapered profile (i.e., the outer diameter of the bottom portion of the vessel **203** is smaller than the inner diameter a top portion of the vessel **201**). In such a configuration, one vessel **200** can be stored within the interior region **206** of another vessel **200**. The protrusion of the top vessel **200** into another vessel **200** can restrain the top vessel from moving laterally relative to the bottom vessel.

[0078] In some embodiments, the vessel **200** may include a plurality of discrete compartments (not shown), each of which is configured to retain a discrete volume of the hydrocarbon fluid.

[0079] FIGS. **9**A and **9**B depict a method for using the vessel **200** to safely contain and/or dispose of waste cooking oil, fats, grease, or other waste hydrocarbon fluids **402** (referred to collectively in the following description as "waste **402**"). As depicted in FIG. **9**A, the vessel **200** may receive waste into its interior region from a frying pan **400** or other cooking implement, such as a pot, a wok, a griddle, a sheet, a basket, a cup, a bowl, etc. After receiving the waste **402**, the vessel **200** and waste **402** may sit for 15-30 minutes or other duration depending on the temperature of the waste **402** when poured into the vessel **200**. During this time the waste **402** cools, and in some embodiments, solidifies, or congeals, or percolates and absorbs into the vessel **200**.

[0080] As illustrated in FIG. **9**B, once the waste **402** has cooled to a temperature at which it may be safely disposed, the vessel **200** and waste **402** contained therein can be transferred to a waste receptacle. Preferably, the vessel **200** and waste **402** are disposed in such a manner that the waste **402** is subjected to one or more biological disposal processes **500**, such as composting, anaerobic digestion, aerobic digestion, and waste-activated sludge processes. Biological disposal of the hydrocarbon fluid and vessel segregates hydrocarbons from the drain and sewer system and helps to prevent occlusions and blockages. Accordingly, the devices and associated methods disclosed herein provide a clean and discrete method of hydrocarbon disposal for households while reducing environmental impact and potentially providing a valuable end product in the form of compost, soil amendments, or renewable energy.

CONCLUSION

[0081] Although many of the embodiments are described above with respect to systems, devices, and methods for an improved device for the collection and disposal of waste household fats, oils, and grease, the technology is applicable to other applications and/or other approaches, such as the collection and disposal of other household waste fluids and

food waste and the collection and disposal of waste fats, oils, and grease at different scales and locations such as restaurants, schools, industrial and manufacturing facilities, laboratories, or any other facility requiring waste fluid disposal. Moreover, other embodiments in addition to those described herein are within the scope of the technology. Additionally, several other embodiments of the technology can have different configurations, components, or procedures than those described herein. A person of ordinary skill in the art, therefore, will accordingly understand that the technology can have other embodiments with additional elements, or the technology can have other embodiments without several of the features shown and described above with reference to FIGS. **1**-**9**B.

[0082] The above detailed descriptions of embodiments of the technology are not intended to be exhaustive or to limit the technology to the precise form disclosed above. Where the context permits, singular or plural terms may also include the plural or singular term, respectively. Although specific embodiments of, and examples for, the technology are described above for illustrative purposes, various equivalent modifications are possible within the scope of the technology, as those skilled in the relevant art will recognize. For example, while steps are presented in a given order, alternative embodiments may perform steps in a different order. The various embodiments described herein may also be combined to provide further embodiments.

[0083] Moreover, unless the word "or" is expressly limited to mean only a single item exclusive from the other items in reference to a list of two or more items, then the use of "or" in such a list is to be interpreted as including (a) any single item in the list, (b) all of the items in the list, or (c) any combination of the items in the list. Additionally, the term "comprising" is used throughout to mean including at least the recited feature(s) such that any greater number of the same feature and/or additional types of other features are not precluded. It will also be appreciated that specific embodiments have been described herein for purposes of illustration, but that various modifications may be made without deviating from the technology. Further, while advantages associated with certain embodiments of the technology have been described in the context of those embodiments, other embodiments may also exhibit such advantages, and not all embodiments need necessarily exhibit such advantages to fall within the scope of the technology. Accordingly, the disclosure and associated technology can encompass other embodiments not expressly shown or described herein.

I/We claim:

1. A device for containing hydrocarbons comprising:

a vessel formed of a plant-based absorbent substrate with an interior region configured to receive and retain a hydrocarbon fluid of at least 250 degrees Fahrenheit for at least 7 days without substantial deformation of the vessel or leaching of the hydrocarbon fluid.

2. The device of claim **1**, wherein the substrate is sawdust.

3. The device of claim **1**, wherein a volume of voids of the underlying substrate is equal to or greater than a volume of the interior region of the vessel.

4. The device of claim **1**, wherein at least 90% of the substrate can be converted into carbon dioxide, water, and minerals by biological processes within a period of 6 months.

5. The device of claim **1**, wherein the vessel has a tapered profile in which a bottom portion of the vessel has a smaller diameter than a top portion of the vessel.

6. The device of claim **1**, wherein the substrate is substantially impermeable by the hydrocarbon fluid.

7. The device of claim **1**, wherein the substrate includes sugarcane bagasse.

8. The device of claim **1**, wherein the substrate includes coconut coir.

9. The device of claim **1**, wherein the substrate includes rice husk.

10. The device of claim **1** wherein the hydrocarbon fluid is at least one of a fat, an oil, and/or a grease.

11. A device for containing hydrocarbons comprising:

a vessel formed of a plant-based absorbent substrate with an interior region configured to receive and retain a hydrocarbon fluid of at least 250 degrees Fahrenheit for at least 2 days without substantial leaching of the hydrocarbon fluid,

wherein the vessel includes an outer substrate and an interior substrate, the outer substrate having a lower hydraulic conductivity than the interior substrate, and wherein, at least when the vessel first receives the hydrocarbon fluid, the interior substrate is closer to the hydrocarbon fluid than the outer substrate.

12. The device of claim **11**, wherein the outer substrate and the interior substrate are the same material, and wherein the outer substrate has a different degree of compaction and a different degree of bulk density than the interior substrate.

13. The device of claim **11**, wherein the outer substrate and the interior substrate are different materials, and wherein the outer substrate has a different degree of compaction and a different degree of bulk density than the interior substrate.

14. The device of claim **11**, wherein the substrate of the outer layer is wax.

15. A method of manufacture, comprising:

forming a vessel by applying a pressure of at least 24,000 psi to sawdust, the vessel having an interior region configured to receive and retain a hydrocarbon fluid.

16. The method of claim **15** within the vessel is formed without the aid of an external binding agent.

17. The method of claim **15**, wherein the pressure is applied hydraulically.

18. The method of claim **15**, wherein the vessel is a bowl.

19. The method of claim **15**, wherein the vessel is a cup.

20. The method of claim **15**, wherein the vessel includes a plurality of discrete compartments, each of which is configured to retain a discrete volume of the hydrocarbon fluid.

21. The method of claim **15**, wherein an outer layer of the vessel is compacted to provide a substantially impermeable layer.

22. The method of claim **15**, wherein the innermost layer of the vessel is compacted to provide a substantially permeable layer.

* * * * *