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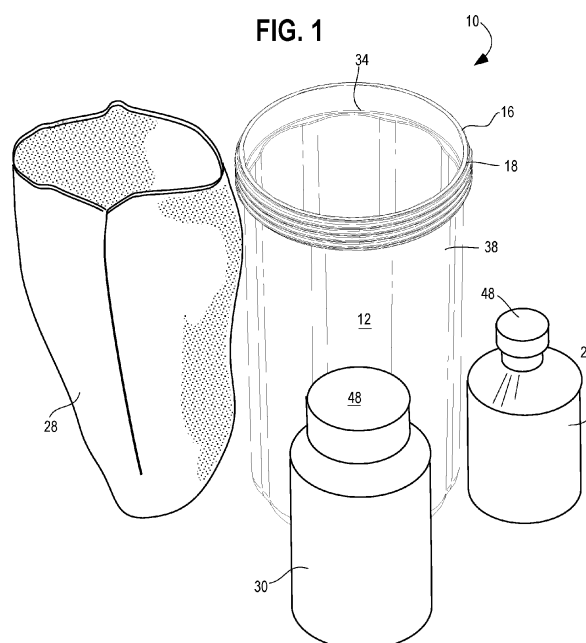
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(54) **CONTAINER FOR SHIPPING HAZARDOUS MATERIALS**

(57) A hazardous material shipping container comprises a shell having a first threaded portion at a first end thereof, a closed second end opposite the first end, inwardly extending ribs, and outwardly extending flutes, wherein the ribs and flutes are disposed between the first

end and the second end. A cushioning material is inside the shell, and a cap has a second threaded portion adapted to mate with the first threaded portion and a recess on a lower surface wherein the recess is adapted to receive an upper portion of a material container.



Description**CROSS REFERENCE TO RELATED APPLICATION**

[0001] The present application claims the benefit of U.S. Provisional Patent Application No. 63/144,758, filed February 2, 2021, entitled "Container for Shipping Hazardous Materials," the entire contents of which is hereby incorporated herein.

FIELD OF DISCLOSURE

[0002] The present subject matter relates to containers, and more particularly to a container for shipping hazardous materials.

BACKGROUND

[0003] A known shipping container for shipping hazardous materials that are stored in, for example, an inner material container comprising a plastic or glass bottle, is similar to a conventional paint can having a center cover that fits over a center portion and has an outer rim that wedges into a circumferential groove of the container proper. In addition, such a "paint can" container includes a plastic ring that fits over the outer periphery of the container so that the container can withstand high pressures within the container and can survive drops and rough handling in transit. While the container may be usable to protect against an accidental release of the hazardous material and/or damage to the inner container during shipping, such a container suffers from the disadvantage that the plastic ring is difficult to remove when the contents are to be retrieved from the container. This disadvantage can render use of the shipping container inconvenient and undesirable.

SUMMARY

[0004] According to an aspect, a hazardous material shipping container comprises a shell having a first threaded portion at a first end thereof, a closed second end opposite the first end, inwardly extending ribs, and outwardly extending flutes, wherein the ribs and flutes are disposed between the first end and the second end. A cushioning material is inside the shell, and a cap has a second threaded portion adapted to mate with the first threaded portion and a recess on a lower surface wherein the recess is adapted to receive an upper portion of a material container.

[0005] Other aspects and advantages will become apparent upon consideration of the following detailed description and the attached drawings wherein like numerals designate like structures throughout the specification.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006]

FIG. 1 is a perspective view of a portion of an embodiment of a container in combination with two sample glass, plastic, or other inner containers to be transported therein;

FIGS. 2-5 are perspective views illustrating an assembly method for inserting and securing one of the glass or other containers of FIG. 1 in the container of FIG. 1;

FIG. 5A is an isometric view of the assembled shell and cap of FIG. 5;

FIG. 6 is an isometric view of the shell of FIGS. 1-4;

FIGS. 7-9 are top, bottom, and side elevational views, respectively, of the shell of FIGS. 1-4;

FIG. 10 is a cross-sectional taken generally along the lines 10-10 of FIG. 7;

FIG. 11 is a fragmentary sectional view taken generally at the view lines 11-11 of FIG. 10;

FIG. 12 is an isometric view of the container cap of FIGS. 4 and 5;

FIG. 13 is a plan view of the cap of FIG. 12;

FIG. 13A is a plan view of a cap similar to the cap FIG. of FIG. 13 with flat surfaces adapted to be engaged by a wrench;

FIGS. 14 and 15 are side elevational views of the cap taken at 90 degree spacing as indicated by the view lines 14-14 and 15-15 of FIG. 13;

FIG. 16 is a bottom elevational view of the cap of FIG. 12;

FIG. 17 is a sectional view taken generally along the lines 17-17 of FIG. 13;

FIG. 18 is a fragmentary sectional view of a portion of the cap taken generally at the view lines 18-18 of FIG. 17;

FIG. 19 is a sectional view taken generally along the lines 19-19 of FIG. 13;

FIG. 20 is a sectional view taken generally along the lines 20-20 of FIG. 13; and

FIG. 21 is an isometric view of another container cap.

DETAILED DESCRIPTION

[0007] Embodiments of a container 10 particularly suit-

ed to ship hazardous materials is shown in the FIGS. The container 10 comprises a plastic container shell 12 with a screw-on cap 14 wherein one or both of the shell 12 and the cap 14 may be fabricated of, for example, a high density polyethylene, polypropylene, a copolymer, or other suitable material. The shell 12 is preferably of a substantially circular cylindrical shape, with the exception of a slight draft angle of a sidewall 15 for molding purposes, although the shell 12 may be of any other suitable shape. An upper portion 16 of the shell 12 and the cap 14 have first and second threaded portions comprising mating circular cylindrical buttress threads 18, 19, respectively, and a rubber or other O-ring 20 (FIGS. 4 and 16) is seated in a circumferential curved recess 22 (FIGS. 16-19) in the cap 14 and seals against a curved (in cross-section as seen in FIG. 11) upper circumferential end surface 24 of the shell 12 when the cap 14 is threaded thereon. The cap 14 further preferably includes a closed bottom end opposite the threads 18.

[0008] As seen in FIG. 13A, in an embodiment comprising a cap 14a that may be used in lieu of the cap 14, one or more upwardly projecting (i.e., extending) surfaces may be formed on an upper surface of the cap 14a, for example, in a shape defining a hexagonal projection 25, to permit the cap 14 to be turned by a turning tool, such as a torque wrench (not shown), in the latter case to a desired torque magnitude on the shell 12. In any event, the shell 12 is sized, for example, to accept up to a one-liter glass, plastic, or other rigid or flexible material container therein, for example, as seen at 26 (FIG. 1), that is optionally placed in a fabric bag 28 (seen in FIGS. 1 and 2) that may be made of felt or other soft and absorbable material and placed in the shell 12 (FIGS. 3 and 4) before the cap 14 is threaded thereon (as seen in FIGS. 5 and 5A). Alternatively, a different glass, plastic, or other rigid or flexible material container 30 may be optionally placed in the bag 28 or other cushioning material (as described below) and the optional combination of the two deposited in the shell 12 and the cap 14 threaded thereon. The glass, plastic, or other rigid or flexible other material container 26, 30 may hold a hazardous liquid or dry powder.

[0009] The fabric bag 28 provides cushioning for shock isolation and is preferably liquid absorbent. The bag 28 may be replaced and/or used in conjunction with a different absorbent and/or cushioning material, such as bubble wrap, vermiculite, or the like. The shell optionally includes inwardly extending first ribs 32 (FIGS. 6, 7, and 10) on an inner surface 34 thereof. The shell further optionally includes outwardly extending bumps or flutes 36 (FIGS. 2, 6, and 8) on an outer surface 38. The first ribs 32 and/or bumps or flutes 36 may be substantially or fully equally spaced about the shell 12 and absorb and/or deflect side forces.

[0010] The cap 14 may also be of a substantially circular cylindrical shape and may include radial gussets defining second ribs 40 (FIGS. 12, 13, 17, 18, and 19) on an upper surface 42 that strengthen the cap 14. An

optional recess 44 (FIG. 16) may be provided on a lower surface 46 of the cap 14 that may receive an upper portion of a material container cap 48 (FIG. 1) screwed onto the glass containers 26, 30 and a circular wall 50 defining the recess 44 may have a depth and radius to limit longitudinal and lateral movement of the material container 26, 30 and thus promote stability of the glass or other material container 26, 30 in the container 10. Further limitations on lateral movement may be imposed by the first ribs 32, which may extend inwardly to an extent to capture the glass or other material container 26, 30 and bag 28 snugly within the shell 12.

[0011] The cap 14 may further include an upwardly extending circular cylindrical member 52 (FIGS. 12 and 13) that may coincide with or be coaxial with respect to the circular wall 50. An outer surface 54 of the member 52 may include outwardly extending features, such as lugs separated by grooves to form serrations 56 to allow a user to exert opening and closing torque forces using, for example, a suitable tool on the cap 14. Further, four sets of spaced portions 58 (FIGS. 14, 15, and 21) of an outer surface 60 of the cap 14 may also include outwardly extending portions or lugs separated by grooves (FIG. 20) defining serrations 62 (FIGS. 14 and 15) to promote gripping of the cap 14 by a user during threading and unthreading thereof.

[0012] While the first ribs 32 are illustrated as being substantially or fully identical to one another in shape and spacing and the bumps or flutes 36 are illustrated as being substantially or fully identical to one another in shape and spacing, this need not be the case inasmuch as one or more of the ribs 32 may be differently shaped and/or differently spaced with respect to the remaining rib(s) 32, as may one or more of the bumps or flutes 36 with respect to the remaining bumps or flutes 36. Also, as seen in FIG. 7, each first rib 32 is illustrated as being equally spaced between adjacent bumps or flutes 36, although this need not be the case inasmuch as the ribs 32 may be disposed at other locations relative to the bumps or flutes 36. Also, each rib 32 and bump or flute 36 may extend the full height of the shell 12, exclusive of the threads 18, or may only extend a portion of such height.

[0013] Still further, although the first ribs 32 and bumps or flutes 36 are shown as having constant inwardly extending and outwardly extending dimensions, respectively, along the height of the shell 12 exclusive of the threads 18 (neglecting taper due to the presence of the draft angle), respectively, one or more of the ribs 32 and/or bumps or flutes 36 may have varying inwardly extending and outwardly extending dimensions, respectively, along the height of the shell 12.

[0014] While inner and outer bottom surfaces 42, 43, respectively, of the shell 12 are illustrated as being flat (i.e., planar), a series of bumps, nubs, or other features (not shown) may be provided on either or both surfaces 42, 43 to provide shock absorption if the shell 12 is dropped.

[0015] Other features and/or recesses may be provided

ed on the shell 12 and/or cap 14 to provide further shock protection. An alternative or additional enclosure for the glass container 26, 30 other than the fabric bag 28 may be provided.

[0016] Another cap 14b is illustrated in FIG. 21 that is usable with the shell 12 in lieu of the cap 14. The cap 14a includes radially-extending ribs of constant height in place of some or all of the ribs 40.

[0017] Thus, in the illustrated embodiment, radially extending ribs 40a are substituted for every other radial gusset comprising a rib 40. The cap 14b is otherwise identical to the cap 14 with the exception of a shallow blind bore 100 disposed at the center of the cap 14b and is threaded onto the shell 12 in use as seen in FIGS. 5 and 5A.

INDUSTRIAL APPLICABILITY

[0018] The container disclosed herein is sufficiently strong and resilient to pass drop tests and other federally-mandated requirements and may be capable of qualifying for a special permit from the Department of Transportation that would allow the container to be shipped without the need for further protective packaging.

[0019] The use of the terms "a" and "an" and "the" and similar references in the context of describing the invention (especially in the context of the following claims) are to be construed to cover both the singular and the plural, unless otherwise indicated herein or clearly contradicted by context. Recitation of ranges of values herein are merely intended to serve as a shorthand method of referring individually to each separate value falling within the range, unless otherwise indicated herein, and each separate value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g., "such as") provided herein, is intended merely to better illuminate the disclosure and does not pose a limitation on the scope of the disclosure unless otherwise claimed. No language in the specification should be construed as indicating any non-claimed element as essential to the practice of the disclosure.

[0020] Numerous modifications to the present disclosure will be apparent to those skilled in the art in view of the foregoing description. It should be understood that the illustrated embodiments are exemplary only and should not be taken as limiting the scope of the disclosure.

[0021] All references, including publications, patent applications, and patents, cited herein are hereby incorporated by reference to the same extent as if each reference were individually and specifically indicated to be incorporated by reference and were set forth in its entirety herein.

[0022] The use of the terms "a" and "an" and "the" and similar references in the context of describing the inven-

tion (especially in the context of the following claims) are to be construed to cover both the singular and the plural, unless otherwise indicated herein or clearly contradicted by context. Recitation of ranges of values herein are merely intended to serve as a shorthand method of referring individually to each separate value falling within the range, unless otherwise indicated herein, and each separate value is incorporated into the specification as if it were individually recited herein.

[0023] All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g., "such as") provided herein, is intended merely to better illuminate the disclosure and does not pose a limitation on the scope of the disclosure unless otherwise claimed. No language in the specification should be construed as indicating any non-claimed element as essential to the practice of the disclosure.

Claims

1. A hazardous material shipping container, comprising:
 - a shell having a first threaded portion at a first end thereof, a closed second end opposite the first end, inwardly extending ribs, and outwardly extending flutes, wherein the ribs and flutes are disposed between the first end and the second end;
 - a cushioning material inside the shell;
 - a cap having a second threaded portion adapted to mate with the first threaded portion and a recess on a lower surface wherein the recess is adapted to receive an upper portion of a material container.
2. The hazardous material shipping container of claim 1, wherein the cap further has a upwardly extending member disposed on an upper surface.
3. The hazardous material shipping container of claim 1, wherein the cap further has a upwardly extending hexagonal projection disposed on an upper surface.
4. The hazardous material shipping container of claim 1, in combination with a material container disposed inside the cushioning material inside the shell wherein the container and the fabric bag are captured snugly within the shell.
5. The hazardous material shipping container of claim 1, wherein the cushioning material comprises a fabric bag.
6. The hazardous material shipping container of claim

- 1, further comprising an O-ring disposed between the shell and the cap.
7. The hazardous material shipping container of claim 1, further comprising an O-ring disposed between a curved recess in the cap and a curved upper circumferential end surface of the shell when the cap is disposed on the shell. 5
8. The hazardous material shipping container of claim 1, wherein the inwardly extending ribs comprise first ribs and the cap includes second ribs on an upper surface. 10
9. The hazardous material shipping container of claim 1, wherein the inwardly extending ribs comprise first ribs and wherein the cap includes radial gussets defining second ribs on an upper surface. 15
10. The hazardous material shipping container of claim 1, wherein the inwardly extending ribs comprise first ribs and wherein the cap includes radially extending second ribs of constant height on an upper surface. 20
11. The hazardous material shipping container of claim 1, wherein the inwardly extending ribs are substantially identical to one another and equally spaced about an inner surface of the shell and the outwardly extending flutes are substantially identical to one another and equally spaced about an outer surface of the shell and each first rib is equally spaced between adjacent flutes. 25 30
12. The hazardous material shipping container of claim 1, wherein the cap includes serrations disposed on an outer surface. 35
13. The hazardous material shipping container of claim 1, wherein the cap further has a upwardly extending member disposed on an upper surface, wherein the inwardly extending ribs comprise first ribs, wherein the cap includes second ribs on an upper surface, wherein the cushioning material comprises a fabric bag, and wherein the inwardly extending ribs are substantially identical to one another and substantially equally spaced about an inner surface of the shell and the outwardly extending flutes are substantially identical to one another and equally spaced about an outer surface of the shell and each first rib is equally spaced between adjacent flutes, and further including a an O-ring disposed between a circumferential curved recess in the cap and a curved upper circumferential end surface of the shell. 40 45 50
14. The hazardous material shipping container of claim 13, wherein the cap includes serrations disposed on an outer surface. 55
15. The hazardous material shipping container of claim 13, in combination with a material container disposed inside the fabric bag and wherein the fabric bag is disposed inside the shell wherein the container and the fabric bag are captured snugly within the shell.

FIG. 1

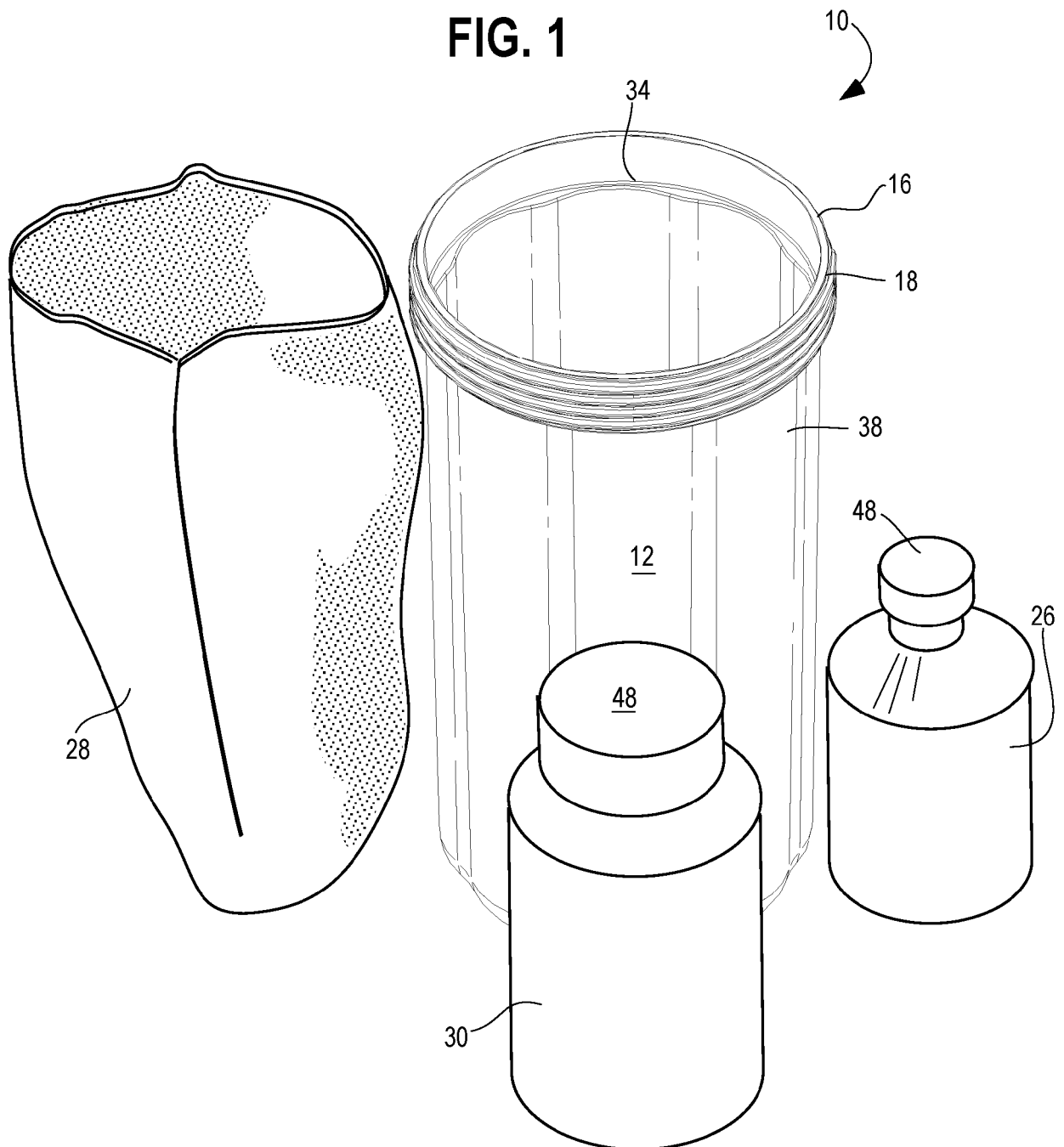


FIG. 2

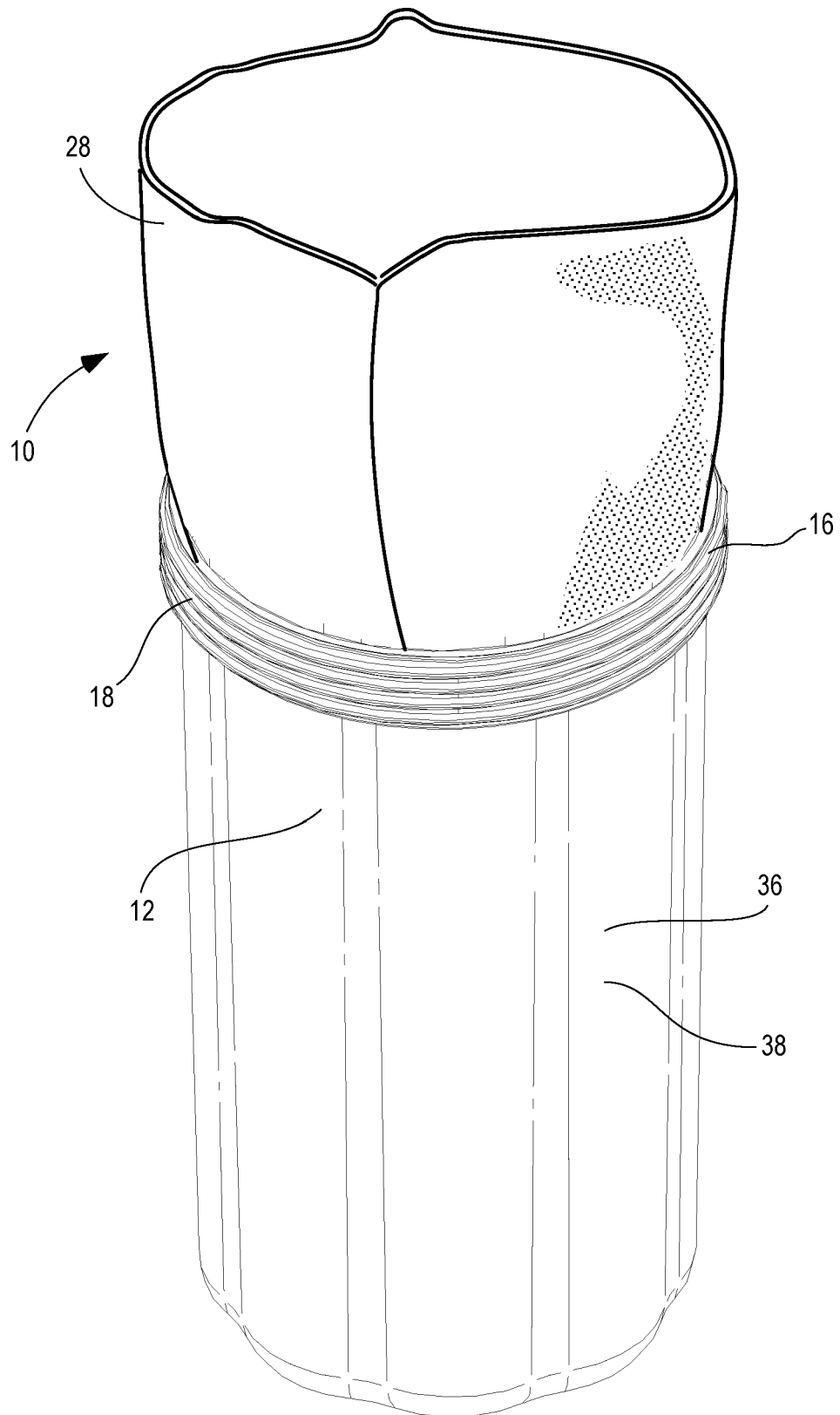


FIG. 3

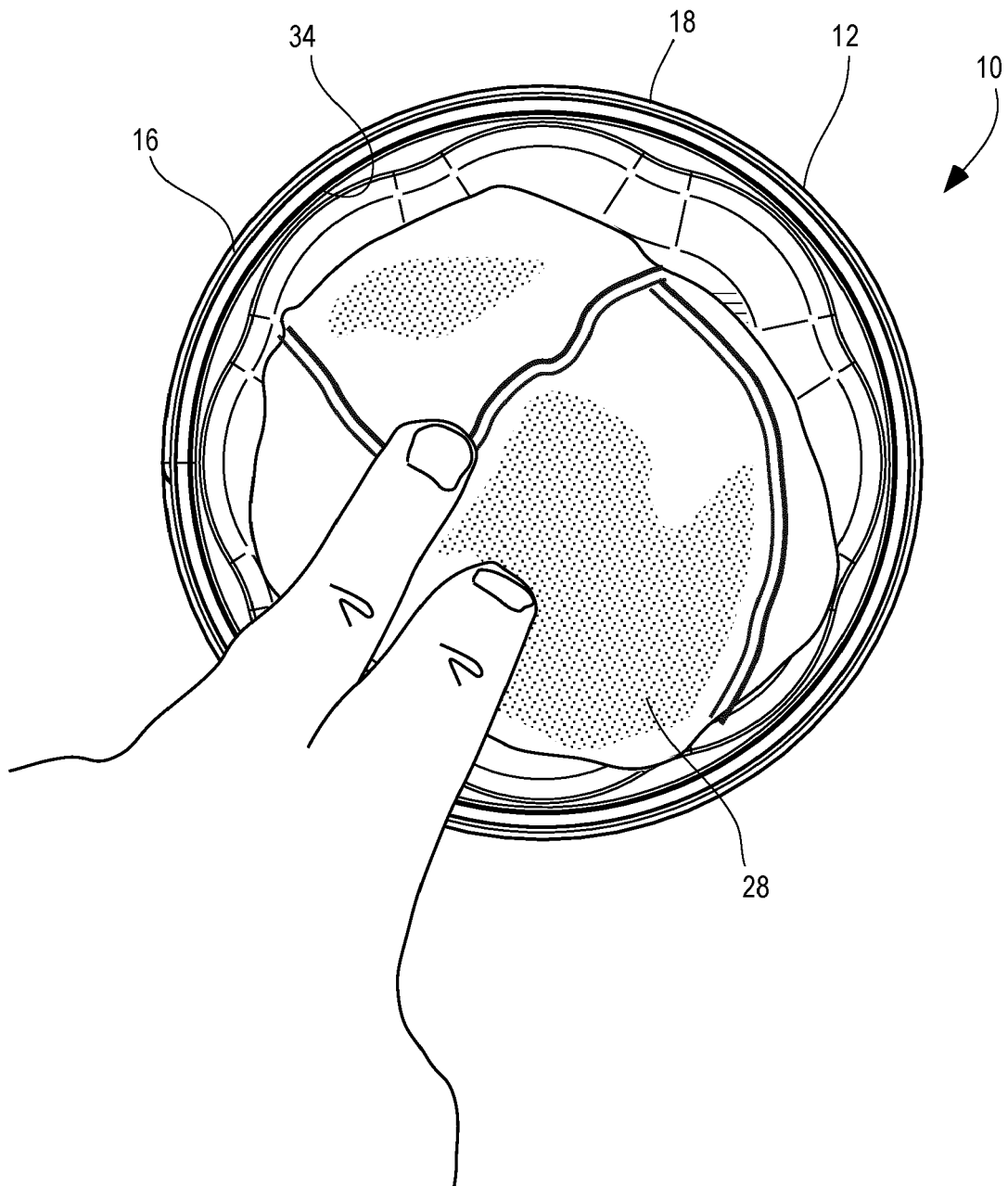


FIG. 4

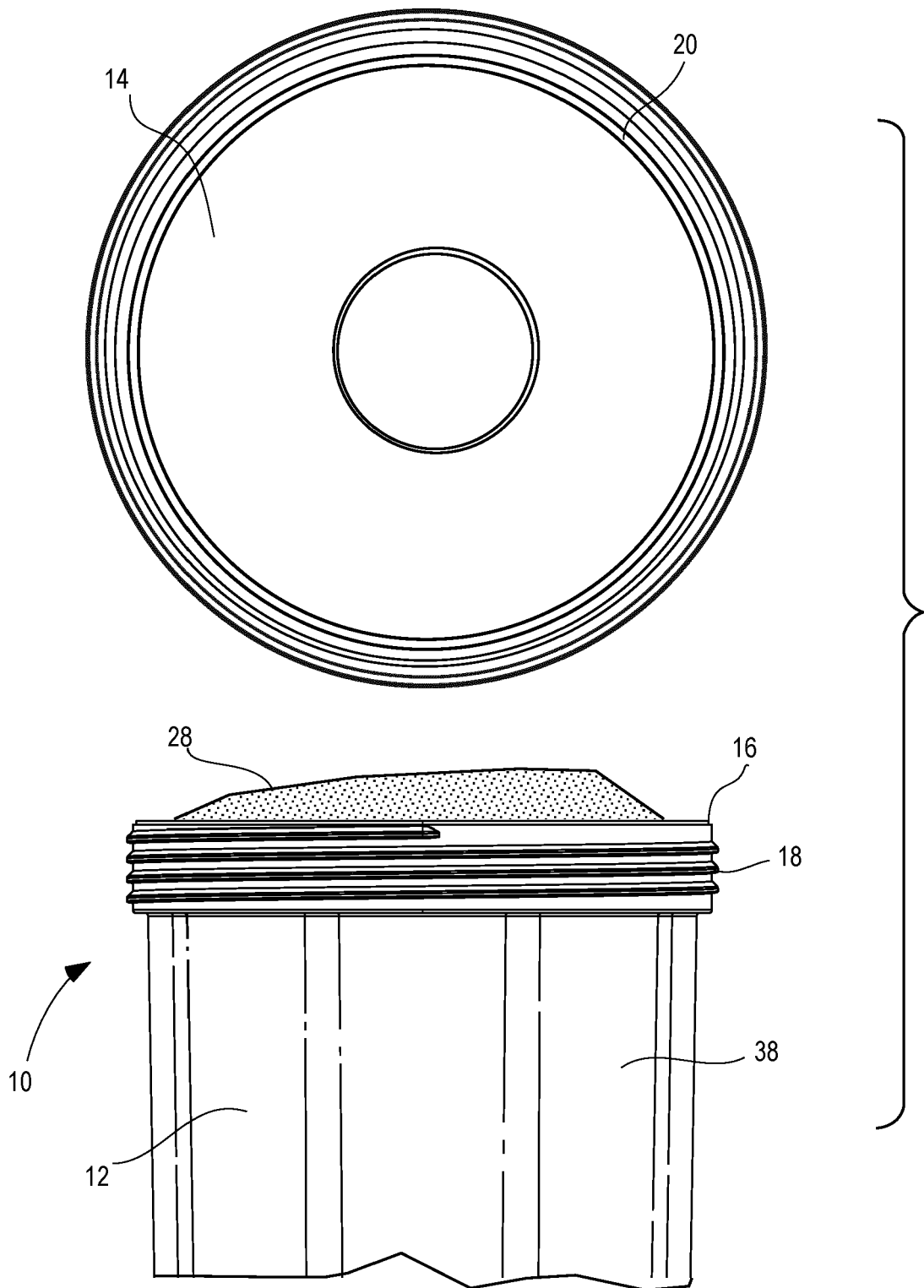


FIG. 5

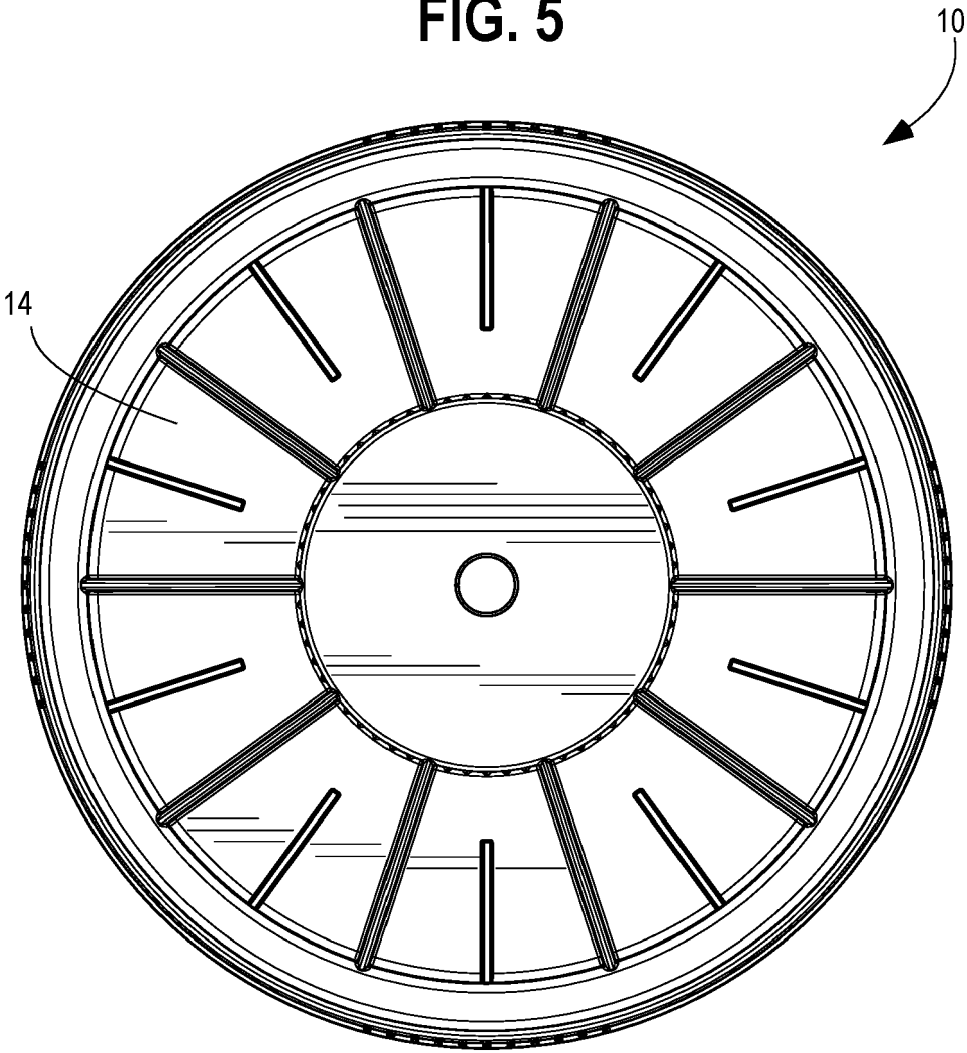


FIG. 5A

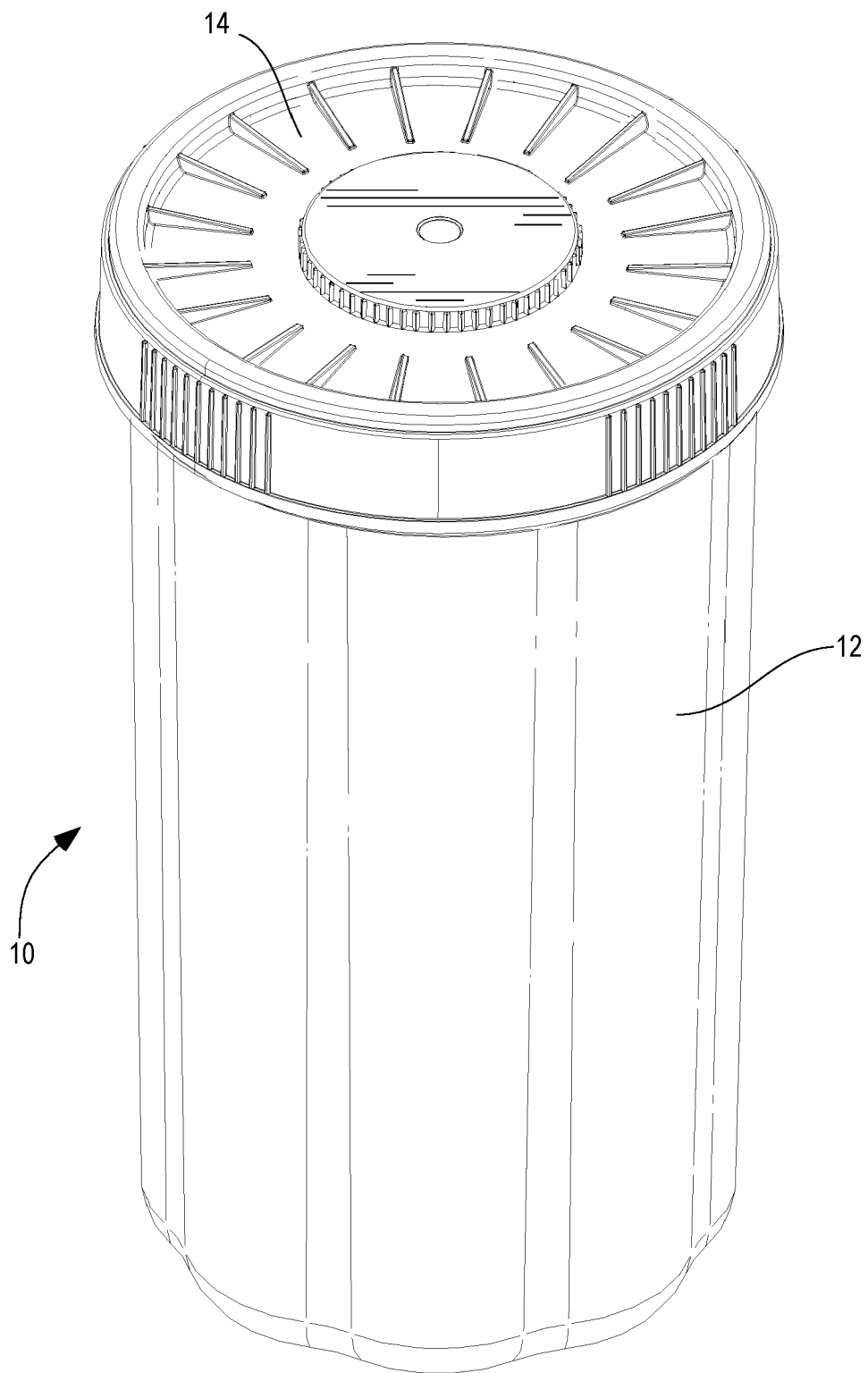


FIG. 6

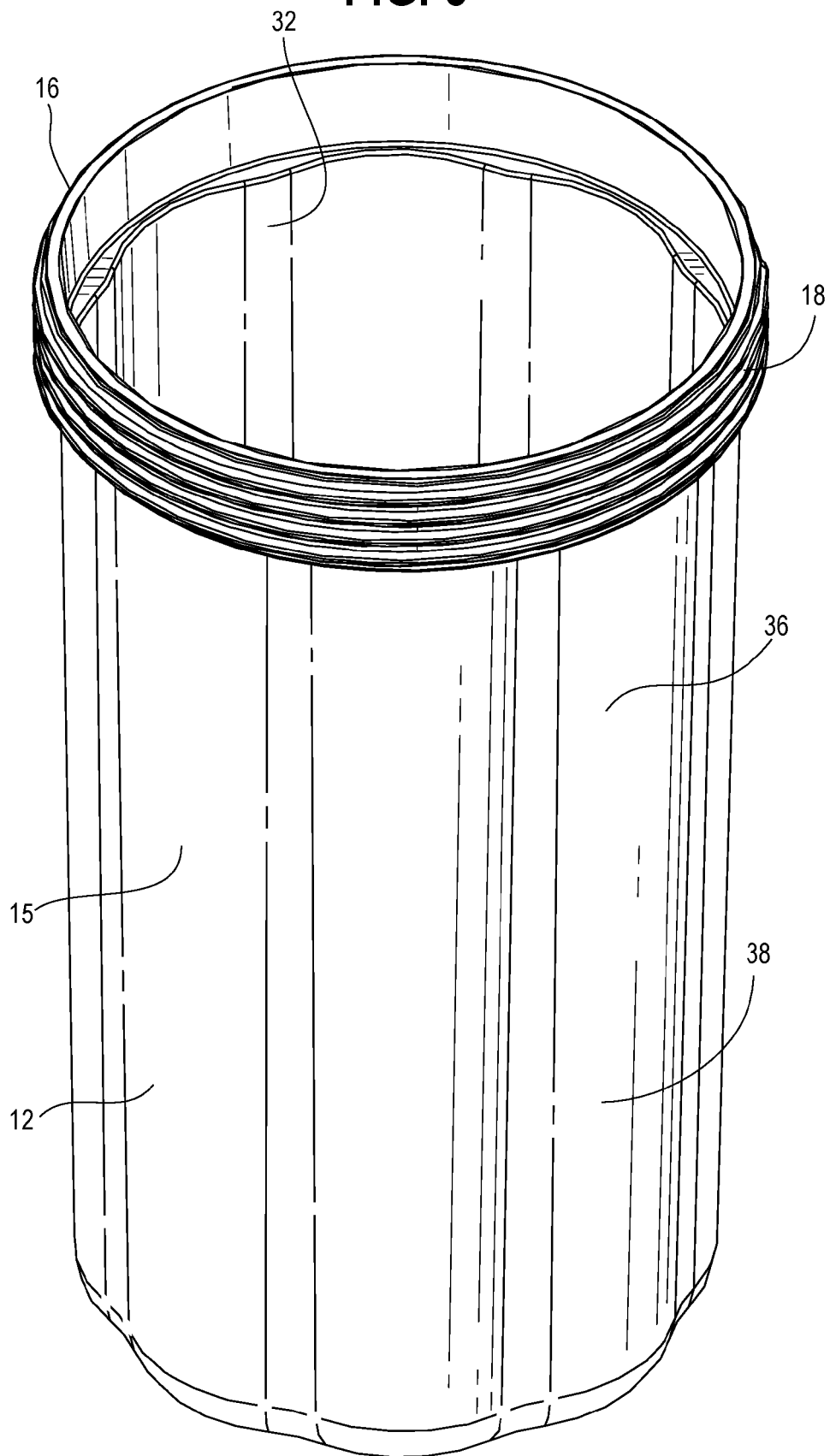


FIG. 7

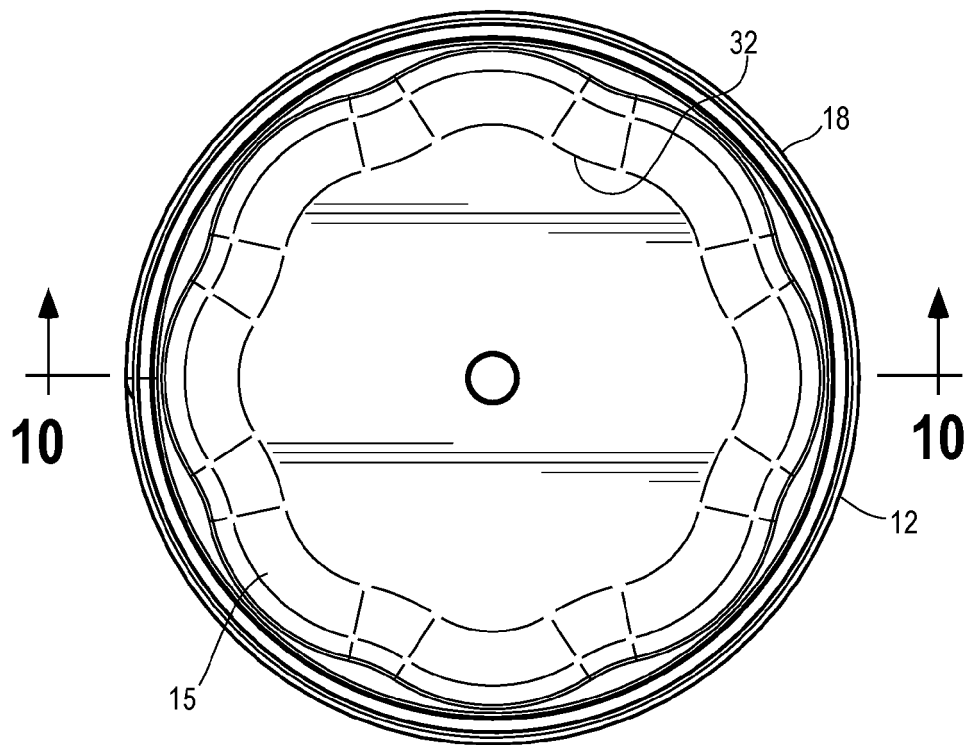


FIG. 8

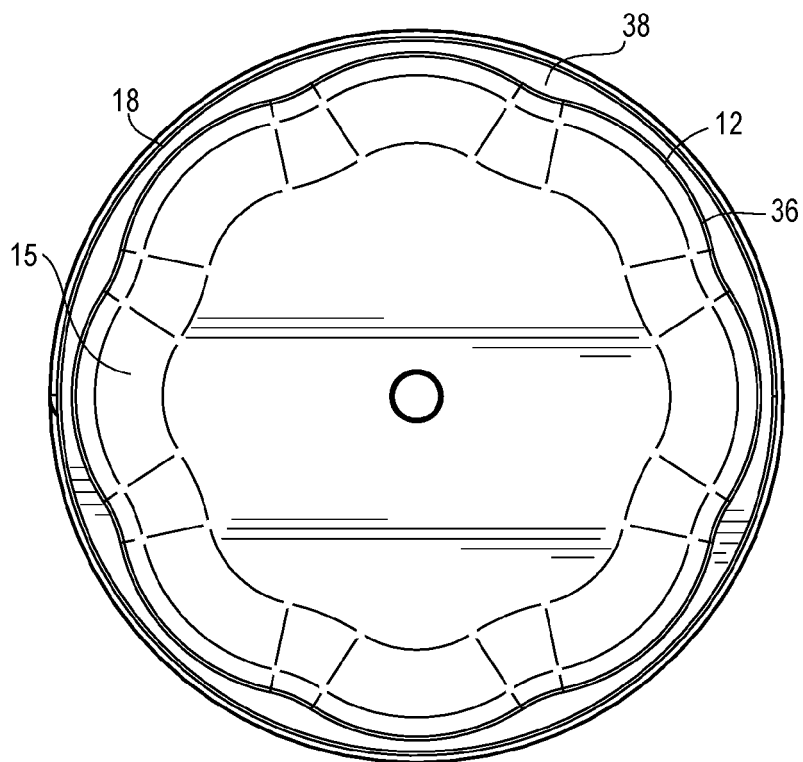


FIG. 9

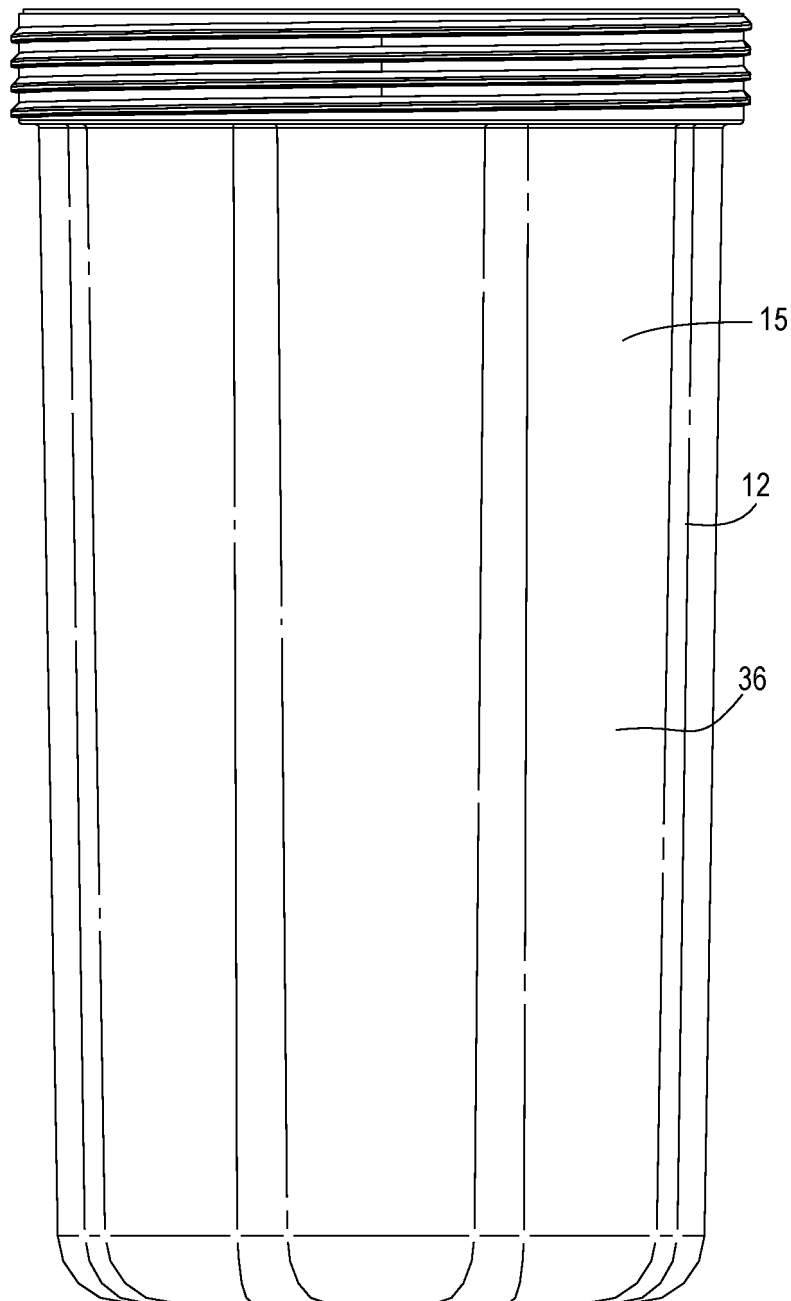


FIG 10

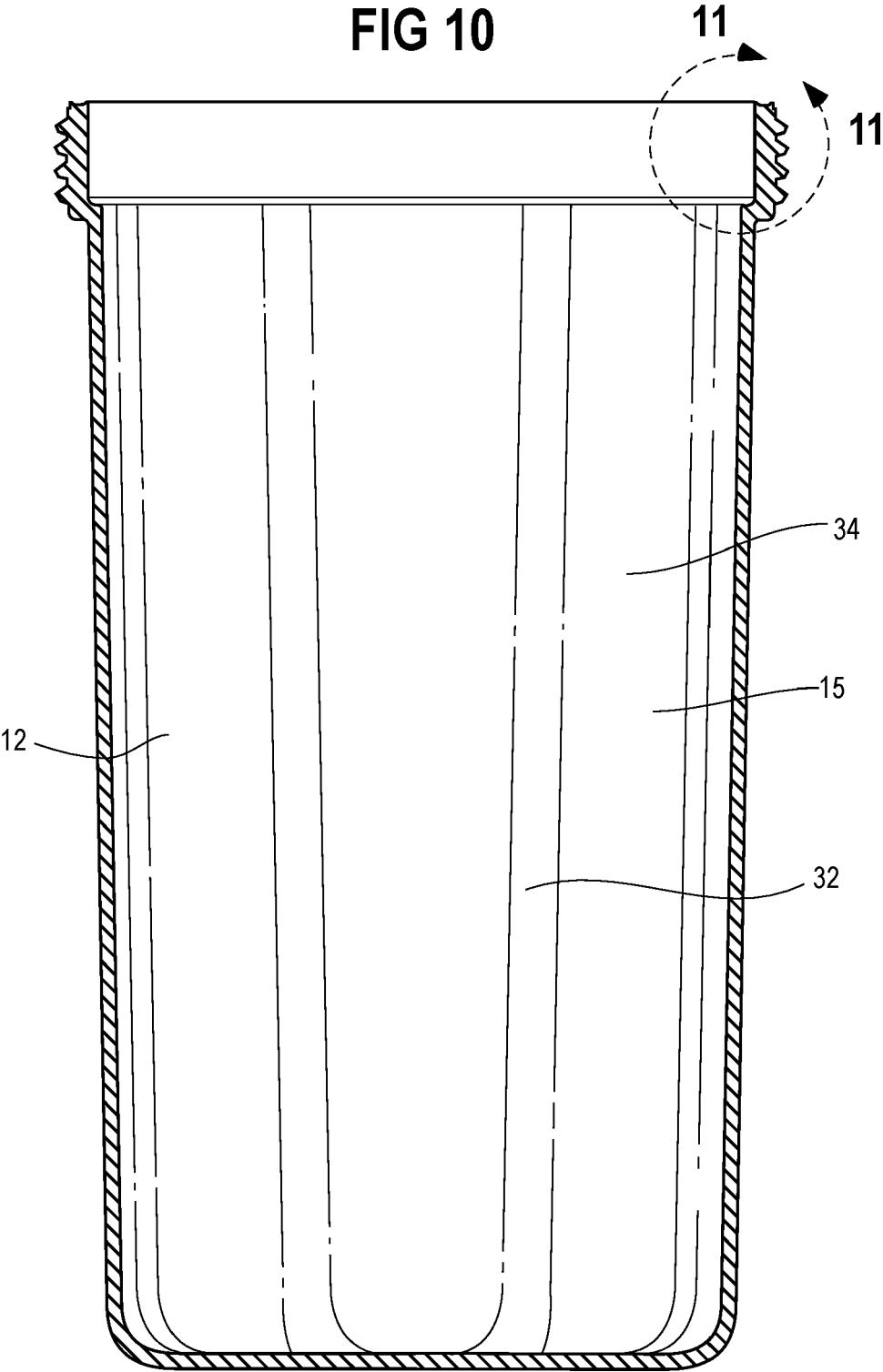


FIG. 11

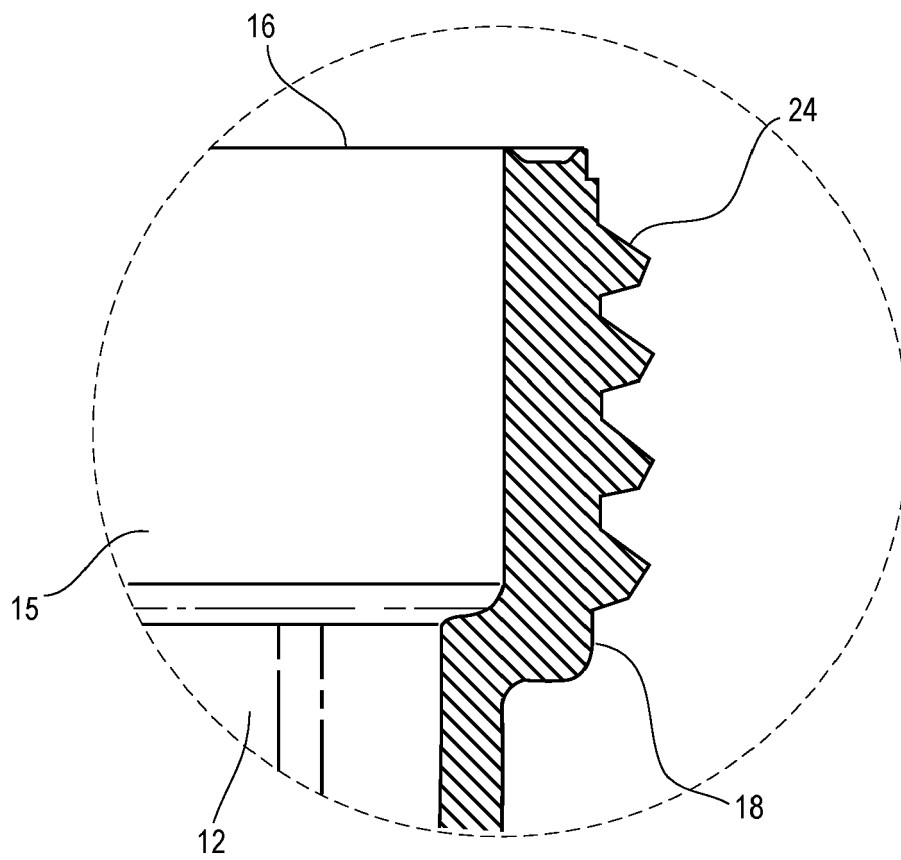


FIG. 12

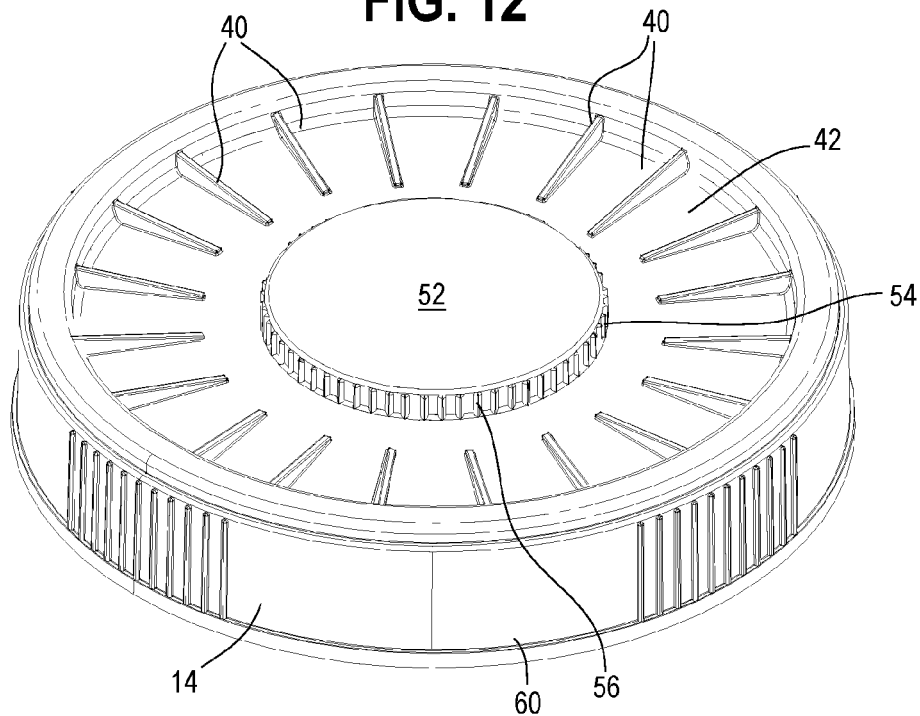


FIG. 13

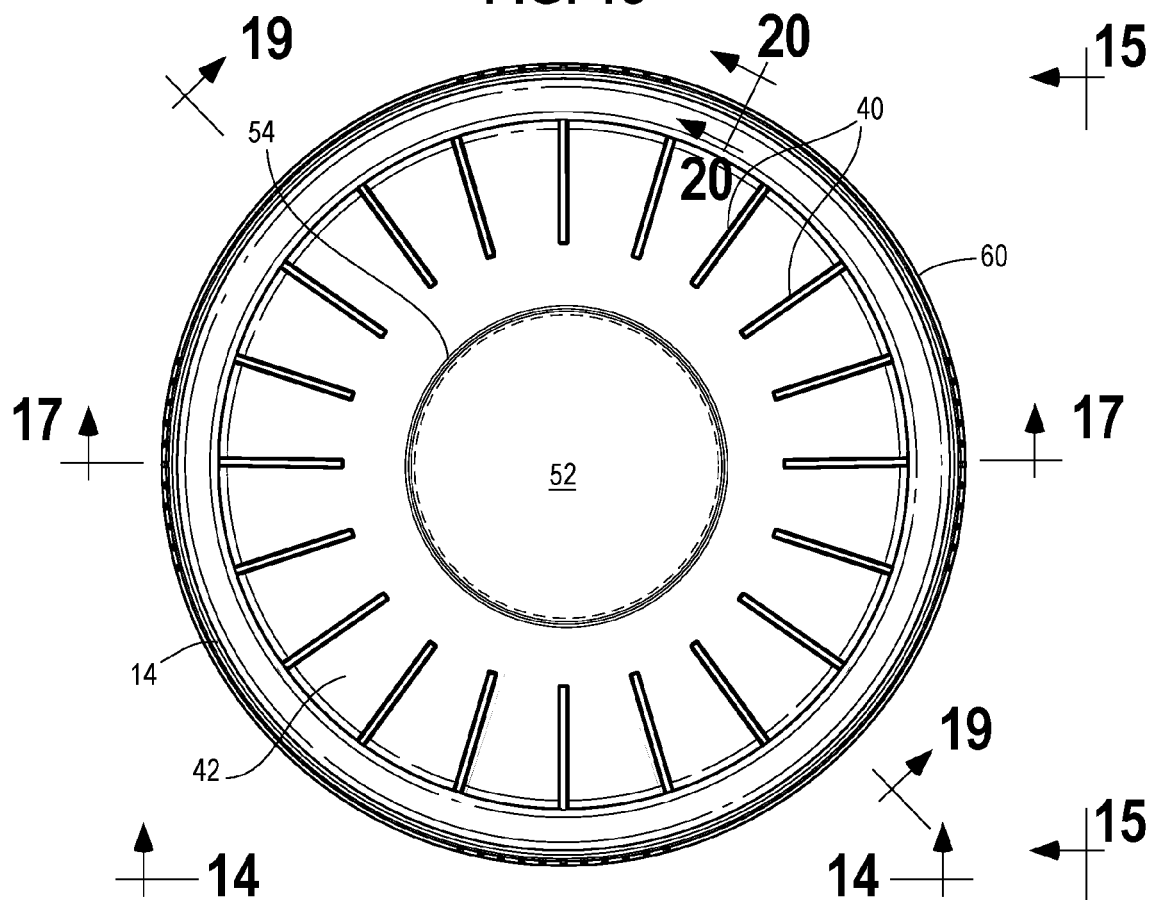


FIG. 13A

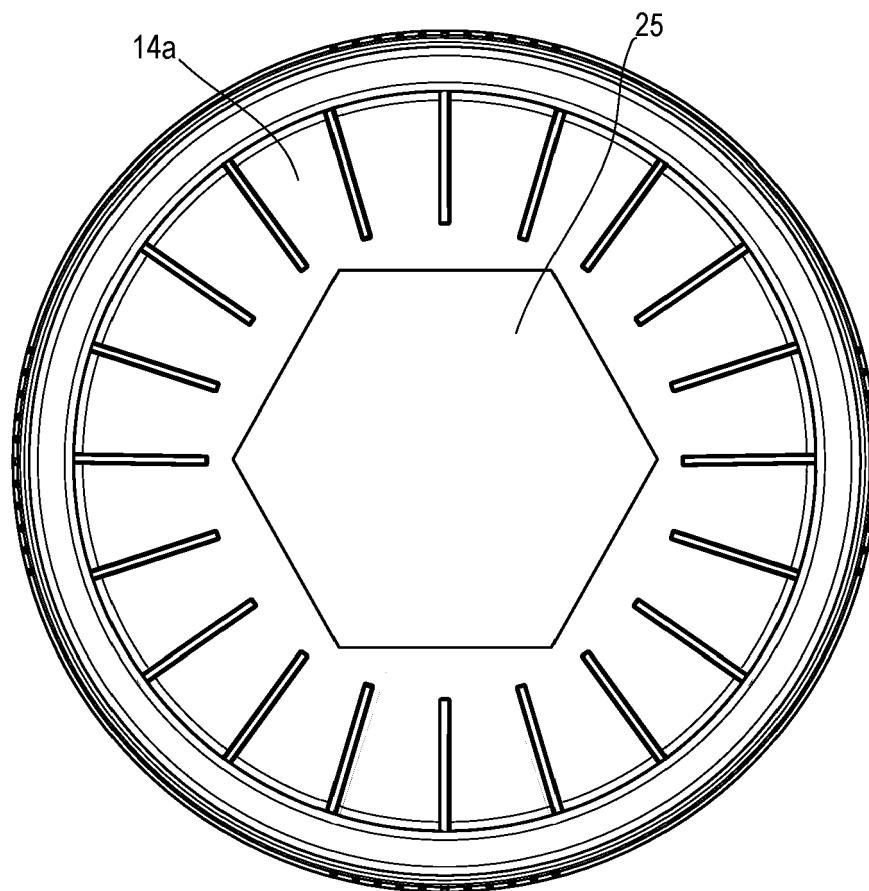


FIG. 14

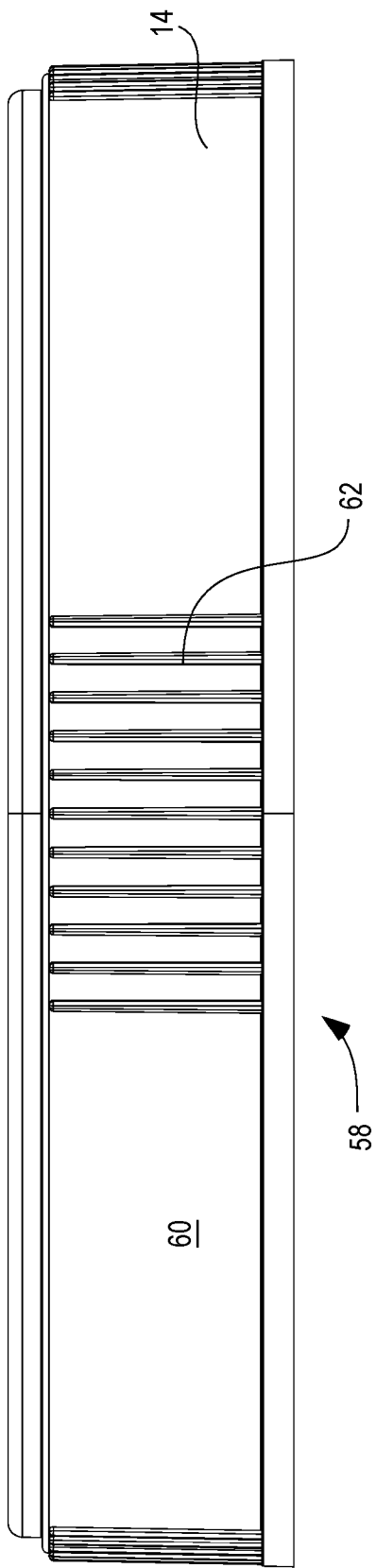


FIG. 15

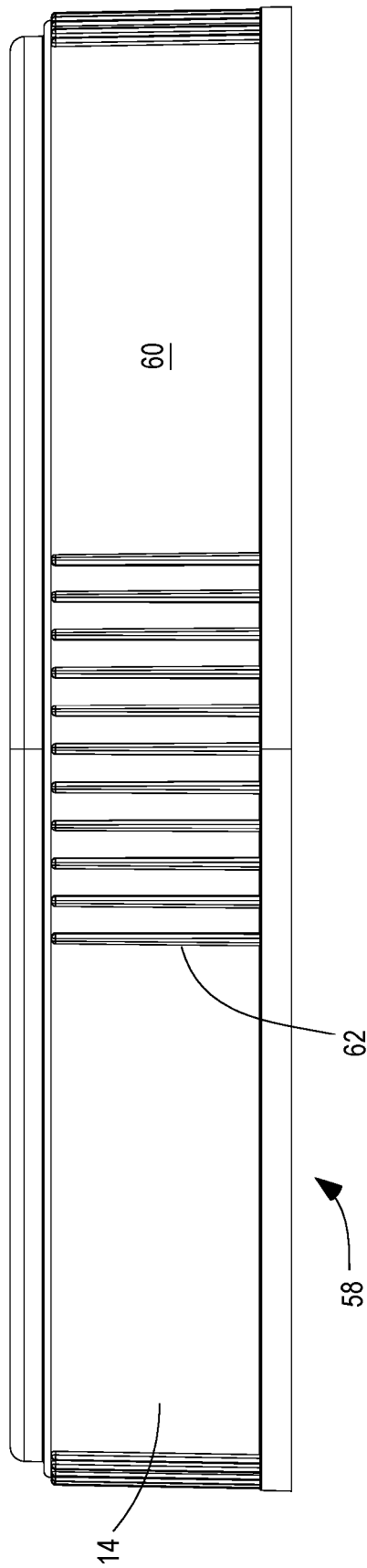


FIG. 16

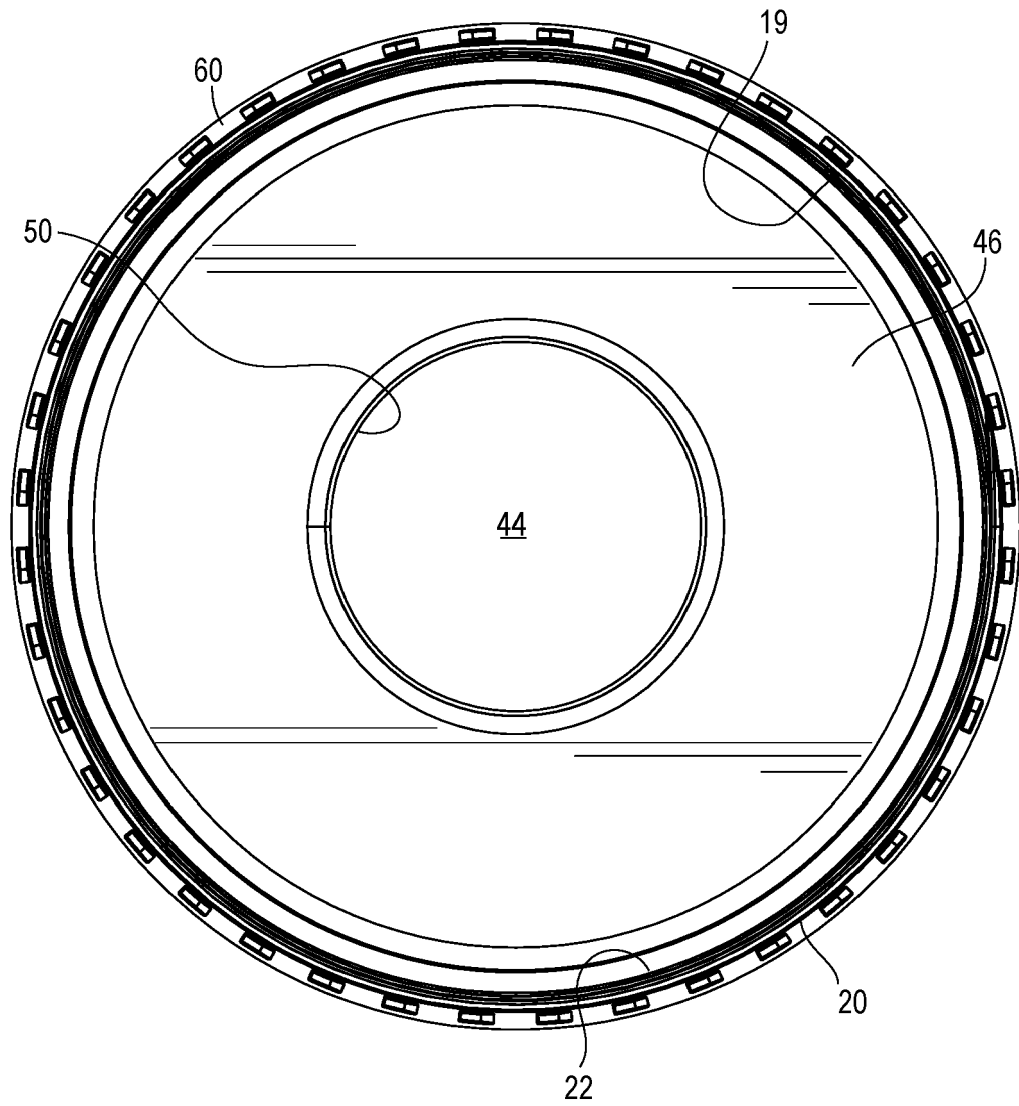


FIG. 17

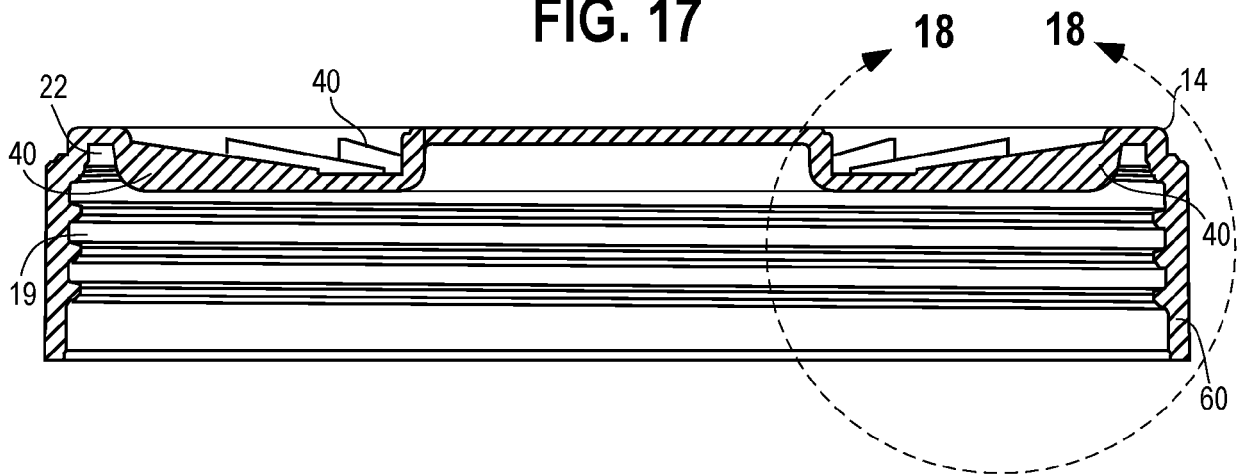


FIG. 18

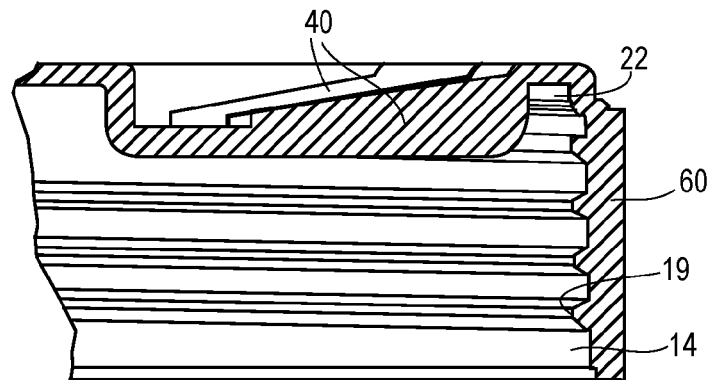


FIG. 19

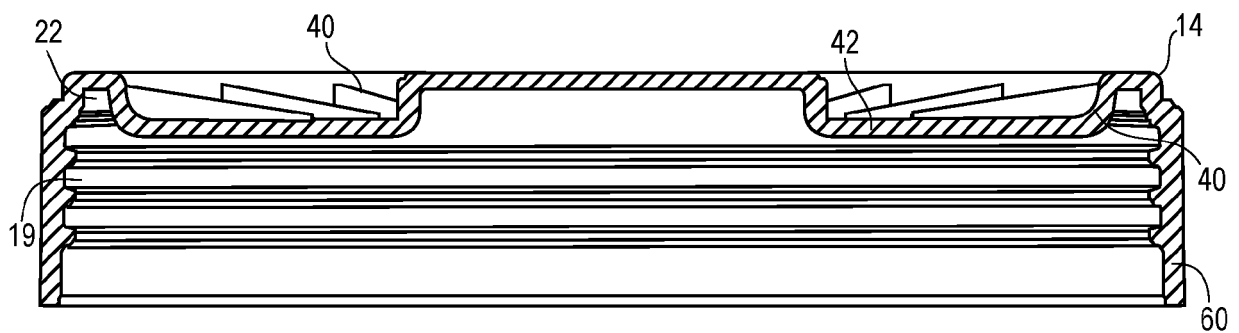


FIG. 20

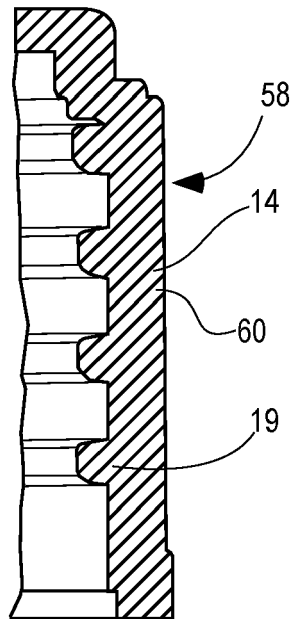
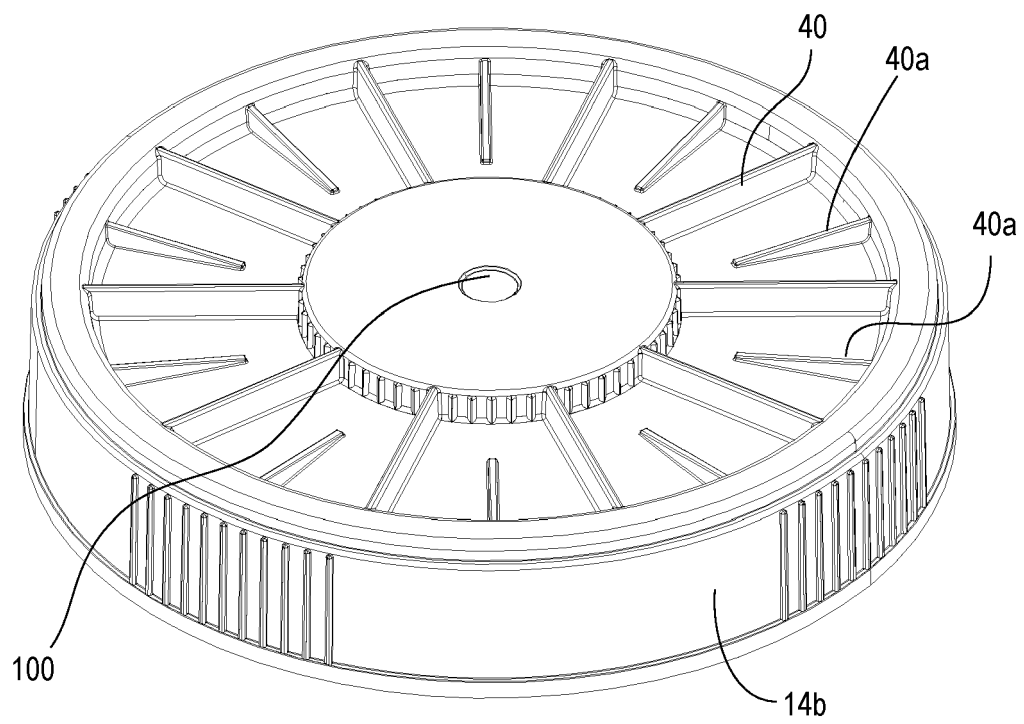


FIG. 21





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Application Number

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 13 May 2022	Examiner Lämmel, Gunnar
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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