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(71) Applicant: 3M INNOVATIVE PROPERTIES COMPANY [US/US]; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US).

(72) Inventor: MEIER, Thomas C.; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US).

(74) Agents: GALLAGHER, Ann K. et al.; 3M Center, Office of Intellectual Property Counsel Post Office Box 33427, Saint Paul, MN 55133-3427 (US).

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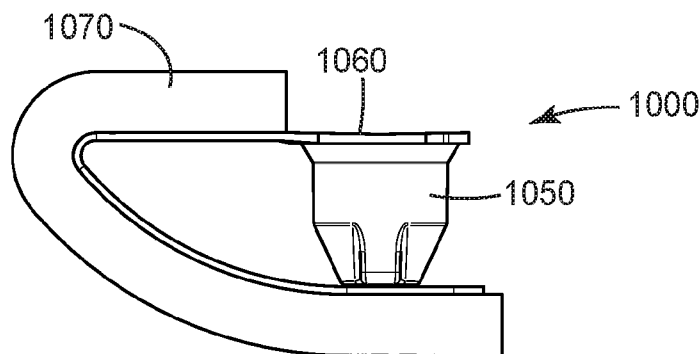


FIG. 10A

(57) Abstract: The present disclosure generally relates to a scrub head capable of use in a disposable toilet bowl cleaning system and to methods of making and using the scrub head. The present disclosure also generally relates to a disposable toilet bowl cleaning system and to methods of making and using the disposable toilet bowl cleaning system.

DISPOSABLE TOILET BOWL SCRUB SYSTEM

Field of the Disclosure

5 The present disclosure generally relates to a scrub head capable of use in a disposable toilet bowl cleaning system and to methods of making and using the scrub head. The present disclosure also generally relates to a disposable toilet bowl cleaning system and to methods of making and using the disposable toilet bowl cleaning system.

Background

10 There are currently a number of cleaning devices for cleaning toilet bowls that include a reusable handle assembly and a disposable pad that is releasably engageable with the handle assembly. U.S. Patent Nos. 2,816,313; 3,221,356; 3,383,158; 4,466,152; 4,493,124; 4,852,201; 5,488,748; 5,592,713; 5,630,243; 6,295,688; 7,127,768; 7,275,276; 7,386,910; 7,065,825; 15 Published Patent Applications US 2002/0025213A1 and 2002/0120993A1; PCT Applications WO 87/00022 and WO 01/15587; and European Patent Application EP 1 190 657 A1 provide illustrative examples.

 U.S. Patent No. 7,127,768 describes one exemplary prior art toilet cleaning device (often referred to as a “wand”). Some embodiments from this patent are shown herein as Figs. 1A and 20 1B. Toilet cleaning device 1 includes a handle 10 operatively connected to a cleaning head 20. Cleaning head 20 includes a sponge 24, a scrim 34, and a filament or top 40, each of which are described in greater detail in U.S. Patent No. 7,127,768.

Summary

25 The inventor of the present disclosure realized that existing toilet cleaning devices have various drawbacks. For example, one drawback is that many users do not want to touch the disposable cleaning pad with their hand. For many users, this means that they do not want to touch the disposable cleaning pad either during attachment of the scrub head to the handle assembly or during removal of the dirty disposable scrub head from the handle assembly. For 30 many users, it is desirable to hold the reusable handle assembly and attach the disposable scrub head – without touching the cleaning pad - instead of holding the disposable scrub head in the user’s hand during attachment to the handle assembly. Many prior art toilet cleaning devices require that the user hold the disposable cleaning pad in their hand during application to the handle assembly and/or during removal from the handle assembly. Some prior art toilet cleaning devices 35 intended for hands-free attachment of the cleaning pad to the handle are in practice difficult to use

without holding the cleaning pad while attaching to the handle, or the pad does not reliably disconnect from the handle without touching the pad.

An additional or alternative drawback is that many existing toilet cleaning devices lack secure attachment of the cleaning pad to the handle. Alternatively, the forces the user places on the cleaning pad exceed the security of attachment of the cleaning pad to the handle. Consequently, the cleaning pad falls into the toilet during use. This is especially undesirable because the user is then forced to reach into the toilet with the user's hand or another implement to remove the cleaning pad from the toilet. The cleaning pad must be thrown away and is wasted, and the entire process must begin again.

An additional or alternative drawback is that many existing toilet cleaning devices include a cleaning pad that does not clean the toilet bowl very well. In some instances, this is because the cleaning pad is poorly shaped and/or sized. In some instances, this is because the cleaning pad has minimal movement when secured to the handle assembly. In some instances, the existing cleaning pads and/or toilet cleaning devices are unable to adequately clean at least one of the following areas of the toilet: under the rim or in the drain.

The inventors of the present disclosure invented a toilet bowl cleaning device including disposable pads aligned for easy, hands-free connection to and release from the reusable handle assembly. The toilet bowl cleaning system described herein resolves or improves upon at least some of the above-identified drawbacks of existing toilet cleaning systems.

Some embodiments relate to scrub heads capable of use in a disposable toilet bowl cleaning system, comprising: a cup; a strap, at least a portion of which is adjacent to or attached to the cup; and a cleaning pad adjacent to or attached to the strap. In some embodiments, the cup includes an opening. In some embodiments, the opening has a diameter of between about 5 mm and about 30 mm. In some embodiments, the cup includes a first end and a second end between which is a cup body and wherein the cup body is substantially hollow. In some embodiments, the cup body has a height of between about 15 mm and about 70 mm. In some embodiments, the cup and strap are a unitary piece.

In some embodiments, the strap has a length that is greater than the length of the cup body. In some embodiments, the strap has an arcuate shape. In some embodiments, the strap has a radius of curvature of between about 5mm and about 25mm. In some embodiments, the strap includes a slot into which a portion of the cup engages.

In some embodiments, the cleaning pad is a nonwoven polymeric material. In some embodiments, the cleaning pad includes at least one of an abrasive, a dye, a fragrance, an abrasive slurry, a bleaching agent, a germicide, or an antimicrobial agent.

In some embodiments, the scrub head has one degree of freedom. In some embodiments, the scrub head has three degrees of freedom.

In some embodiments, a first end of the cup attaches to a first end of the strap. In some embodiments, a second end of the cup attaches to a second end of the strap. In some
5 embodiments, a second end of the strap is not connected to the cup.

Some embodiments relate to a disposable toilet cleaning system, comprising a scrub head as described herein and a handle assembly. Some embodiments further include a caddy assembly. Some embodiments further include an actuation button or switch in which when the actuation
10 button or switch is in a first position, the scrub head is held onto the handle assembly and when the actuation button or switch is in a second position, the scrub head is not held on the handle assembly.

Brief Description of the Drawings

These figures are not drawn to scale and are intended merely for illustrative purposes. The
15 disclosure may be more completely understood in consideration of the following detailed description of various embodiments of the disclosure in connection with the accompanying drawings, in which:

FIG. 1A is a perspective view of a prior art toilet bowl cleaning system.

20 FIG. 1B is an exploded side view of the scrub head of the prior art disposable toilet bowl cleaning system of FIG. 1A.

FIG. 2A is a perspective view of one exemplary embodiment of a disposable toilet bowl cleaning system of the type generally described herein.

FIG. 2B is a perspective view of another exemplary embodiment of a disposable toilet
25 bowl cleaning system of the type generally described herein.

FIGS. 3A, 3B, and 3C are respectively perspective, side, and front views of another exemplary embodiment of a disposable toilet bowl cleaning system of the type generally described herein.

FIGS. 4A, 4B, and 4C are respectively perspective, side, and front views of another
30 exemplary embodiment of a disposable toilet bowl cleaning system of the type generally described herein.

FIG. 5A is a side view of the scrub head of the disposable toilet bowl cleaning system of FIGS. 3A, 3B, and 3C.

FIG. 5B is a side view of the scrub head of the disposable toilet bowl cleaning system of
35 FIGS. 4A, 4B, and 4C.

FIG. 6 is a top view of an exemplary embodiment of a cleaning pad of the type generally described herein.

FIG. 7 is a top view of an exemplary embodiment of a cleaning pad of the type generally described herein.

5 FIGS. 8A and 8B are side views of another exemplary embodiment of a scrub head of a scrubbing tool of the type generally described herein. FIG. 8B shows the scrub head when in use and/or during application on a handle assembly.

 FIGS. 9A, 9B, and 9C are a respective side, side schematic, and front views of another exemplary embodiment of a scrub head of a scrubbing tool of the type generally described herein.
10 FIGS. 9B and 9C show the scrub head and/or scrubbing tool in use.

 FIGS. 10A and 10B show a side view and a top view, respectively, of another exemplary embodiment of a scrub head of a scrubbing tool of the type generally described herein. FIG. 10C shows a perspective side view of the scrub head in use. FIG. 10D shows a perspective top view of the scrub head in use.

15 FIGS. 11A and 11B respectively show a top view and a perspective view of an exemplary embodiment of a cleaning pad of the type generally described herein. FIG. 11C shows a front view of a scrub head of the type generally described herein with the cleaning pad shown in FIGS. 11A and 11B.

 FIG. 12 is a perspective view of an exemplary embodiment of a disposable toilet bowl
20 cleaning system with the scrub head separate from the handle assembly.

 FIG. 13 is an exploded view of the disposable toilet bowl cleaning system of FIG. 12.

 FIGS. 14A-14C show a perspective view, a side view, and a top view, respectively, of a handle assembly of the type generally described herein.

 FIG. 15 shows a cross-sectional view at line A-A of FIG. 3B.

25 FIGS. 16A-16C show a perspective view, a side view, and a bottom view, respectively, of an exemplary actuation mechanism for use in a handle assembly of a disposable toilet bowl cleaning system.

 FIG. 17 shows a cross-sectional side view at line A-A of the actuation mechanism FIG.
16B.

30 FIG. 18 shows an exploded view of an exemplary embodiment of an exemplary disposable toilet bowl cleaning system shown in FIGS. 4A, 4B and 4C including the actuation mechanism of FIGS. 19 and 20.

 FIG. 19 shows a cross-sectional view of the disposable toilet bowl cleaning system of FIG.
16B along line B-B.

35 FIG. 20 shows an enlargement of a portion of FIG. 19.

FIG. 21 is a perspective view of a plurality of exemplary scrub heads of one of the types described herein in stacked arrangement.

FIG. 22 shows one exemplary side perspective view of a scrub head refill package.

In the following detailed description, reference may be made to the accompanying set of drawings that form a part hereof and in which are shown by way of illustration several specific embodiments. It is to be understood that other embodiments are contemplated and may be made without departing from the scope or spirit of the present disclosure.

Detailed Description

The present disclosure generally relates to various toilet bowl cleaning systems or devices that improve upon some of the drawbacks of the prior art toilet bowl cleaning systems or devices. Many embodiments of the toilet bowl cleaning systems described and shown herein are no-touch solutions in which the user need not physically touch the cleaning pad during application of the cleaning pad to the handle assembly and/or during removal of the cleaning pad from the handle assembly. In some embodiments, the user need never physically touch the cleaning pad - from the time of purchase to the time of end-of-use disposal. Many embodiments of the toilet bowl cleaning systems described herein include a disposable scrub head and a reusable handle assembly. Many embodiments of the toilet bowl cleaning system include a scrubbing tool, a caddy, and a refill package. The term “scrubbing tool” as used herein can refer to the scrub head and the handle assembly when assembled.

FIGS. 2A and 2B are schematic perspective views of two exemplary embodiments of disposable toilet bowl cleaning systems, 200 and 250, respectively, of the types generally described herein. Disposable toilet bowl cleaning system 200 of Fig. 2A includes a handle assembly 210 (sometimes referred to as a “wand”), a caddy assembly 220, and one or more disposable scrub heads 230 housed in caddy assembly 220. Handle assembly 210 rests in tray 216. Handle assembly 210 and scrub heads 230 can be any of the handle assemblies or scrub heads described herein.

Caddy assembly 220 includes a lid 222, a housing 224, and a foot 226. In some embodiments, including the one shown in FIG. 2A, housing 224 is clear or translucent. This may be preferred in some embodiments, as it permits the user to see how many disposable scrub heads 230 remain in caddy assembly 220. Caddy assembly 220 is optional. In some embodiments, caddy assembly 220 serves to store extra scrub heads 230 and potentially handle assembly 210 when not in use. In some embodiments, caddy assembly 220 forms an enclosed and/or air tight environment. This may be preferred in some embodiments to minimize, reduce, or eliminate odor

and/or to keep children or pets from touching scrub heads 230. Caddy assembly 220 may be formed from any desired material. One exemplary material is a durable material, such as, for example, plastic or metal. Less durable materials such as cardboard may also be used.

5 Disposable toilet bowl cleaning system 250 of Fig. 2B includes a handle assembly 260, a caddy assembly 270, and disposable scrub heads 280 (not shown) housed in caddy assembly 270. Handle assembly 260 rests in tray 256. Handle assembly 260 and scrub heads 280 can be any of the handle assemblies or scrub heads described herein.

10 Caddy assembly 270 of FIG. 2B includes a lid 272 and a housing 274. In some embodiments, the “foot” of caddy assembly 270 is part of or integral with the tray 256. In some embodiments, including the embodiment of FIG. 2B, housing 274 is substantially opaque. This may be preferred in some embodiments, as it hides from users the contents of caddy assembly 270, which some users may find more aesthetically pleasing or desirable. In some embodiments, caddy assembly 270 forms an enclosed and/or air tight environment. This may be preferred in some
15 embodiments to minimize, reduce, or eliminate odor and/or to keep children or pets from touching scrub heads 280. Caddy assembly 270 may be formed from any desired material. One exemplary material is a durable material, such as, for example, plastic or metal. Less durable materials such as cardboard may also be used. Caddy assembly 270 is optional.

20 In some embodiments, including the one shown in FIG. 2B, disposable toilet bowl cleaning system 250 includes a sleeve 240 that wraps around handle assembly 260 and caddy assembly 270. Sleeve 240 is typically present on disposable toilet bowl cleaning system 250 during transit and sale, and the end user removes it before actual use of the disposable toilet bowl cleaning system 250. Sleeve 240 can prevent handle assembly 260 from falling off of or becoming disengaged or separated from caddy assembly 270 during transit. Sleeve 240 can be made of any
25 desired material including, for example, paper (e.g., corrugated paper, cardboard), plastic, fabric, metal, elastic, etc. Sleeve 240 can have any desired size. In some embodiments, sleeve 240 includes written text or pictorial information advertising the disposable toilet bowl cleaning system and/or instructing the user how to use the disposable toilet bowl cleaning system.

30 Many changes may be made to the specific embodiments shown in FIGS. 2A and 2B without departing from the spirit and scope of the present disclosure. For example, the size and shape of the disposable toilet bowl cleaning systems can vary in any desired way. The number of scrub heads in the caddy assemblies can vary, and can be any desired number. In some embodiments, the lid is optional and/or removeable. The sleeve is optional.

FIGS. 3A, 3B, and 3C are schematic drawings showing a perspective view, a side view, and a front view, respectively, of one exemplary disposable toilet bowl cleaning system 300 consistent with the teachings herein. Disposable toilet bowl cleaning system 300 includes a handle assembly 310 and a scrub head 320 releasably attached to handle assembly 310.

Handle assembly 310 includes a first end 312 and a second end 314 as well as a front side 316 and a back side 318.

Scrub head 320 is releasably attached to second end 314 of handle assembly 310 by an attachment mechanism. The attachment mechanism can be any desired attachment mechanism. Some attachment mechanisms are mechanical. One exemplary mechanical attachment mechanism is plastic snaps. In some embodiments, the attachment mechanism includes an actuation button or switch 340 on handle portion 310. In one embodiment, actuation button or switch 340 is positioned towards first end 312 of handle portion 310. In some embodiments, actuation button or switch 340 is a thumb push button on the top side 316 of handle assembly 310. When the actuation button is pushed forward, scrub head 320 is ejected or released from attachment to handle assembly 310.

In some embodiments, scrub head 320 is uniquely shaped for targeting under the rim of a toilet bowl. In some embodiments, scrub head 320 provides effective surface area coverage for cleaning and scrubbing the toilet bowl and/or is sized to fit in the drain hole of the toilet. Scrub head 320 includes a receptacle or cup 350, a strap 360, and a cleaning pad 370, all of which will be shown and described in greater detail in later Figures and the accompanying descriptions.

Many changes may be made to the specific embodiment shown in FIGS. 3A-3C without departing from the spirit and scope of the present disclosure. For example, the length and curvature of the handle portion, the position of the actuation button or switch, the size and angle of the scrub head, the angle of the scrub head could be fixed or variable, the size of the receptacle or cup etc.

FIGS. 4A, 4B, and 4C respectively show a perspective view, a side view, and a front view, of another embodiment of an exemplary disposable toilet bowl cleaning system 400. Disposable toilet bowl cleaning system 400 is similar to the disposable toilet bowl cleaning system 300 shown in Figs. 3A-3C. Disposable toilet bowl cleaning system 400 includes a handle assembly 410 and a scrub head 420 releasably connected to handle assembly 410. Handle assembly 410 includes a first end 412 and a second end 414 as well as a front side 416 and a back side 418.

Scrub head 420 is releasably attached to second end 414 of handle assembly 410 by an attachment mechanism. The attachment mechanism can be any desired attachment mechanism.

Some attachment mechanisms are mechanical. One exemplary mechanical attachment mechanism is plastic snaps. In some embodiments, the attachment mechanism includes an actuation button or switch 440 on handle portion 410. In one embodiment, actuation button or switch 440 is positioned towards first end 412 of handle portion 410. In some embodiments, actuation button or switch 440 is a thumb push button on the top side 416 of handle assembly 410. When the actuation button is pushed forward, scrub head 420 is ejected or released from attachment to handle assembly 410.

In some embodiments, scrub head 420 is uniquely shaped for targeting under the rim of a toilet bowl. In some embodiments, scrub head 420 provides effective surface area coverage for cleaning and scrubbing the toilet bowl and/or is sized to fit in the drain hole of the toilet. Scrub head 420 includes a receptacle or cup 450, a strap 460, and a cleaning pad 470, all of which will be shown and described in greater detail in FIG. 5A and the accompanying description.

Many changes may be made to the specific embodiment shown in FIGS. 4A-4C without departing from the spirit and scope of the present disclosure. For example, the length and curvature of the handle portion, the position of the actuation button or switch, the size and angle of the scrub head, the angle of the scrub head could be fixed or variable, the size of the receptacle or cup etc.

FIG. 5A is a side view of scrub head 320 of Figs. 3A-3C. **FIG. 5B** is a side view of scrub head 420 of Figs. 4A-4C. In **FIGS. 5A** and **5B**, scrub head 320, 420 includes a receptacle or cup 350, 450, a strap 360, 460, and a cleaning pad 370, 470.

Cup 350, 450 and strap 360, 460 in combination, are sometimes referred to as a shoe or form. As is shown in the perspective view of FIG. 10D, cup 350, 450 is cup-shaped with a concave portion or opening. Cup 350, 450 includes a first end 352, 452 and a second end 354, 454 between which is a cup body 356, 456. In some embodiments, cup body 356, 456 is hollow. In the exemplary embodiments of FIG. 5A and 10A, an opening 358, 458 extends generally from first end 352, 452 area to second end 354, 454 area of cup body 356, 456.

In some embodiments, cup body 356 includes one or more slots extending generally between first and second ends 352 and 354, respectively. Slots, opening 358, 458 and/or cup 350, 450 being hollow can be effective for a variety of different reasons, one of which is to reduce the amount of material needed to form cup 350, 450 and to decrease the overall weight of the scrubbing tool.

In some embodiments, cup 350, 450 is made of a plastic, such as, for example, polypropylene, polyethylene, and/or polystyrene.

In some embodiments, cup body 356, 456 has a height of between about 10 mm and about 70 mm. In some embodiments, cup body 356, 456 has a height of between about 20 mm and about 40 mm. In some embodiments, cup body has a height of greater than about 10 mm, greater than about 15 mm, greater than about 20 mm, greater than about 25 mm, greater than about 30 mm, or greater than about 35 mm. In some embodiments, cup body has a height of less than about 70 mm, less than about 60 mm, less than about 50 mm, less than about 40 mm, less than about 35 mm, or less than about 30 mm.

In some embodiments, cup body 356, 456 has a diameter of the opening in the cup of between about 5 mm and about 30 mm. In some embodiments, cup body 356, 456 has a diameter of the opening in the cup of between about 7 mm and about 20 mm. In some embodiments, cup opening has a diameter of greater than about 5 mm, greater than about 6 mm, greater than about 7 mm, greater than about 8 mm, greater than about 9 mm, or greater than about 10 mm. In some embodiments, cup opening has a diameter of less than about 20 mm, less than about 18 mm, less than about 16 mm, less than about 15 mm, or less than about 14 mm.

Strap 360, 460 is adjacent and/or connected to cup 350, 450 and cleaning pad 370, 470. In some embodiments, strap 360, 460 has an arcuate shape and includes a first end 362, 462, a second end 364, 464, and a contact surface 366, 466 opposite an inner surface 368, 468. First end 362, 462 of strap 360, 460 is attached to first end 352, 452 (or an area nearby) of cup 350, 450. Second end 364, 464 of strap 360, 460 is attached to second end 354, 454 (or an area nearby) of cup 350, 450.

In some embodiments, strap 360, 460 has a length that is greater than a length of cup 350, 450 such that the above attachments cause strap 360, 460 to bend and take an arcuate shape with a radius of curvature. In some embodiments, strap 360, 460 has a length of between about 80 mm and about 150 mm. In some embodiments, strap 360, 460 has a length of between about 100 mm and about 120 mm. In some embodiments, the strap has a length of greater than about 80 mm, greater than about 90 mm, greater than about 100 mm, greater than about 105 mm, or greater than about 110 mm. In some embodiments, the strap has a length of less than about 150 mm, less than about 140 mm, less than about 130 mm, less than about 120 mm, or less than about 115 mm.

In some embodiments, strap 360, 460 has a radius of curvature of between about 1 mm and about 25 mm. In some embodiments, strap 360, 460 has a radius of curvature of between about 3 mm and about 8 mm. In some embodiments, the strap has a radius of curvature greater than about 1 mm, greater than about 2 mm, greater than about 3 mm, greater than about 4 mm, greater than about 5 mm, or greater than about 6 mm. In some embodiments, the strap has a radius of curvature of less than about 25 mm, less than about 20 mm, less than about 15 mm, less than about 12 mm, or less than about 10 mm.

In some embodiments, strap 360, 460 includes at least one channel or opening. Where present, the channel or opening can assist in reducing material cost and weight of the overall scrubbing tool. In some embodiments, strap 360, 460 is made of a plastic, such as, for example, polypropylene, polyethylene, and/or polystyrene.

5 In some embodiments, first and second ends 352, 452 and 354, 454 respectively, of strap 360, 460 are attached to cup 350, 450 such that first and second ends 352, 452 and 354, 454 respectively, are substantially parallel to each other. In some embodiments, first and second ends 352, 452 and 354, 454 respectively, of strap 360, 460 are attached to cup 350, 450 such that first and second ends 352, 452 and 354, 454 respectively, are not substantially parallel to each other.

10 In some embodiments, cup 350, 450 and strap 360, 460 form a unitary piece. Such embodiments may be desirable because there are fewer parts, fewer assembly steps, and/or fewer tools needed to form the combined strap and cup. As such, the manufacturing cost is lower when a unitary cup and strap is used. In some embodiments, cup 350, 450 and strap 360, 460 are two or more pieces. In some embodiments, cup 350, 450 and strap 360, 460 are made from the same material. In some embodiments, cup 350, 450 and strap 360, 460 are formed from different materials.

Cleaning pad 370, 470 includes a first end 372, 472, a second end 374, 474, an attachment surface 376, 476, and a scrubbing surface 378, 478. Attachment surface 376, 476 of cleaning pad 370, 470 is attached to contact surface 366, 466 of strap 360, 460. In one embodiment, the cleaning pad 370, 470 is attached to contact surface 366, 466 of strap 360, 460 by ultrasonic weld bonding. Alternatively, the cleaning pad may be attached by thermal fusing, adhesive bonding, mechanical attachment such as hook and loop fasteners, etc. Any known cleaning material used as cleaning or abrasive cleaning pads can be used for cleaning pad 370, 470. In some embodiments, at least scrubbing surface 378, 478 of cleaning pad 370, 470 includes an abrasive material. Useful materials include natural or synthetic sponges, steel wool pads, paper toweling, woven cloth pads, pads formed of narrow aluminum, bronze or plastic fibers or ribbons, nonwoven fabric of varying density, porosity and thickness, nonwoven, lofty, low density abrasive scouring pads, and nonwovens with secured abrasive particles, and composite structures incorporating one or more of the foregoing as elements.

30 Nonwoven articles are particularly suitable for use as cleaning pads. Nonwoven webs comprising open, lofty, three-dimensional structure of fibers bonded to one another at their mutual contact points are used extensively in the manufacture of abrasive articles for cleaning, abrading, finishing and polishing applications on any of a variety of surfaces.

Nonwoven webs suitable for use in the abrasive cleaning article may be made of, but are not limited to, an air-laid, carded, stitch-bonded, spunbound, spunbonded, wet laid, or melt blown

construction. In one embodiment, the nonwoven web is an open, lofty, three-dimensional air-laid nonwoven substrate such as described in U.S. Pat. No. 2,958,593 to Hoover et al, the disclosure of which is herein incorporated by reference in its entirety. This nonwoven web is formed by randomly disposed staple fibers. One successful commercial product comprising such a nonwoven web is that sold under the trade designation "Scotch-Brite" available from 3M Company, St. Paul, MN.

In some embodiments, the cleaning pad is impregnated with a cleaning material (*e.g.*, soap, detergent), a dye, a fragrance, an abrasive slurry, bleaching agents, or germicides/antimicrobial agents. Examples of suitable cleaning pads and cleaning materials that may be impregnated or coated onto the cleaning pad are described in U.S. Pat. Nos. 7,146,676, 7,232,364, and U.S. Pat. Publication No. 2016/0106274, the disclosures of which are herein incorporated by reference in their entirety.

Scrub heads 320 and 420 of FIGS. 5A and 5B are generally rigid such that they each have little to no translational motion and generally have zero degrees of freedom.

One difference between scrub head 320 of FIG. 5A and scrub head 420 of FIG. 5B is the distance between first end 352, 452 and second end 354, 454 of strap 360. In the embodiment Fig. 5A, the distance between first end 352 and second end 354 is greater than the distance of first end 452 and second end 454 of FIG. 5B. In other words, the length of cup body 356 of FIG. 5A is greater than the length of cup body 456 of FIG. 5B.

Another difference between scrub head 320 of FIG. 5A and scrub head 420 of FIG. 5B is that in FIG. 5B, first and second ends 462 and 464, respectively, of strap 460 are offset from one another. More specifically, first end 462 of strap 460 is attached to a side surface 453 of cup 450 while second end 464 of strap 360 is attached along or to a portion of second end 454 of cup 450. In this way, first end 462 and second end 464 of strap 460 are offset from one another. Consequently, first and second ends 372, 472 & 374, 474, respectively, of cleaning pad 370, 470 are also offset from each other. More specifically, first end 372, 472 of cleaning pad 370, 470 is attached to a portion of first end 352, 452 of cup 350, 450 while the second end 374, 474 of cleaning pad 370, 470 extends beyond second end 354, 454 of cup 350, 450.

Many changes may be made to the specific embodiments shown in FIGS. 5A and 5B without departing from the spirit and scope of the present disclosure.

FIG. 6 shows a top view of one exemplary embodiment of a cleaning pad 600 that may be used with or on one of the scrub heads generally described herein. Cleaning pad 600 is generally rectangular in shape, having generally parallel top and bottom surfaces 602, 604, respectively, and

generally parallel side surfaces 606, 608, respectively. Fig. 6 shows the shape of the die-cut web, when viewed from the top, before attachment to the shoe which then creates the curved shape of the head.

5 **FIG. 7A** shows a top view of one exemplary embodiment of a cleaning pad 700 that may be used with or on one of the scrub heads generally described herein. Fig. 7 shows the shape of the die-cut web, when viewed from the top, before attachment to the shoe which then creates the curved shape of the head. Cleaning pad 700 is generally rectangular on a first and/or the upper end and has a bulbous or generally circular shape at the lower and/or second end. The bottom surface
10 720 of scrub head 710 has a greater surface area than the top surface 730 of scrub head 710. In some embodiments, the surface area of the top surface of the scrub head is between about 1000 mm² and about 2500 mm². In some embodiments, the bottom surface of the scrub head has a surface area of between 1000 mm² and about 6000 mm².

Many changes may be made to the specific embodiments shown in FIGS. 6 and 7 without
15 departing from the spirit and scope of the present disclosure. For example, any desired shape or size cleaning pad may be used.

FIGS. 8A and 8B show side views of another exemplary embodiment of a scrub head 800 of a disposable toilet bowl cleaning system of one of the types generally described herein. FIG.
20 8B shows a schematic side view of scrub head 800 when in use and/or during application on a handle assembly. Scrub head 800 is similar to the scrub head of FIG. 5B except that second end 864 of strap 860 is not fixedly attached to second end 854 of cup 850.

In some embodiments, the strap has a keyhole and the cup has a button. To fix the strap to the cup and get the final curved form, the strap is folded until the button on the cup can pass
25 through the hole on the strap. The keyhole has a section that is narrower than the button and has to be forced or snapped past the button until it passes into a slot. The slot perimeter creates a track to allow fore and aft translational motion. This translational motion facilitates and assists the bending properties of the strap material and gives it a range of motion indicated by theta 1 and theta 2 in FIG 8B. It is shaded to distinguish two possible positions of the strap: in this case the
30 two positions are unflexed and fully flexed.

This allows fore and aft translational motion of second end 854 of cup 850 in the second end 864 of strap 860 at the bottom surface of scrub head 800 during application and/or use. Scrub head 800 has one degree of freedom. The dashed lines in FIG. 8B represent the translational motion allowed or permitted by the one degree of freedom. As can be seen, the translational
35 degree of freedom allows the scrub head to flex up and down, creating a variable angle scrub

surface. In some embodiments, the scrub head can flex from an angle θ_1 of about 5° to an angle θ_2 of about 65° . In some embodiments, the scrub head can flex at least about 5° , at least about 10° , at least about 15° , at least about 20° , and/or at least about 25° . In some embodiments, the scrub head flexes no more than about 65° , no more than about 60° , no more than about 55° , no more than about 50° , no more than about 45° , no more than about 40° , no more than about 35° , no more than about 30° , and/or no more than about 25° .

This can be made/accomplished by how the mold is designed to make the part, *i.e.*, having a channel or slot on the end of the strap to which the bottom of the cup attached. Also how thin and/or flexible the material is that is used to make the part. This allows the bottom of the cup to slide fore and aft in the strap, enabling the flexing up and down movement of the scrub head as shown in FIG. 8B.

Many changes may be made to the specific embodiment shown in FIGS. 8A and 8B without departing from the spirit and scope of the present disclosure.

FIGS. 9A, 9B, and 9C are a respective side view, schematic side view when in use, and front view of another exemplary embodiment of a scrub head 900 of a disposable toilet bowl cleaning system of one of the types generally described herein. Scrub head 900 is similar to the scrub head of FIG. 5B except that the second end 954 of cup 950 is not attached or not fully attached to the second end 964 of the strap 960. The second end 954 of cup 950 and second end 954 of strap 950 are free, creating a cantilever. This cantilevered structure of scrub head 900 provides for three degrees of freedom, allowing fore and aft translation, up and down translation, and side-to-side or lateral motion at the bottom surface of scrub head 900. The dashed lines in FIGS. 9B and 9C respectively represent the translational and side-to-side (or lateral) motion allowed or permitted by the three degrees of freedom. As can be seen in FIG. 9B, scrub head 900 can flex fore and aft as well as up and down. In some embodiments, scrub head 900 can flex from an angle θ_1 of about 5° to an angle θ_2 of about 65° . In some embodiments, the scrub head can flex at least about 5° , at least about 10° , at least about 15° , at least about 20° , and/or at least about 25° . In some embodiments, the scrub head flexes no more than about 65° , no more than about 60° , no more than about 55° , no more than about 50° , no more than about 45° , no more than about 40° , no more than about 35° , no more than about 30° , and/or no more than about 25° .

As can be seen in FIG. 9C, scrub head 900 can also flex side-to-side or laterally. In some embodiments, the scrub head can flex side-to-side or laterally from an angle ψ of about $+50^\circ$ from vertical to an angle ψ of about -50° from vertical. In some embodiments, the scrub head can flex side-to-side or laterally from vertical to an angle ψ of about $+40^\circ$, or an angle of about $+30^\circ$, or an angle of about $+20^\circ$, or an angle of about $+10^\circ$. In some embodiments, the scrub head can flex

side-to-side or laterally from vertical from an angle ψ of about -40° , or an angle of about -30° , or an angle of about -20° , or an angle of about -10° . The three degrees of freedom allows the scrub head substantial flexibility to contact variously angled toilet surfaces in need of cleaning. This permits the scrub head and disposable toilet cleaning tool of the present disclosure to better clean a toilet and/or to get into especially hard-to-reach areas of the toilet bowl.

The angle, δ , describes how the curved, cantilever form can change from the unflexed position to a minimum position when the cup and strap bend enough to touch.

Many changes may be made to the specific embodiment shown in FIGS. 9A -9C without departing from the spirit and

FIGS. 10A and 10B show a side view and a top view, respectively, of another exemplary embodiment of a scrub head of a disposable toilet bowl cleaning system of one of the types generally described herein. FIG. 10C show a schematic side view of the scrub head 1000 in use. FIG. 10D shows a perspective top view of the scrub head 1000 in use. Scrub head 1000 is the same as the scrub head 420 of FIGS. 4A-4C.

As seen in FIG. 10A, the receptacle includes a cup 1050 adjacent and/or attached to a strap 1060 adjacent or attached to a cleaning pad 1070. As is shown in FIG. 10C, strap 1060 has a smaller surface area and/or size than cleaning pad 1070. Strap 1060 includes a slot or channel into which cup body 1056 of cup 1050 engages. **FIGS. 10A and 10B** show a side view and a top view, respectively, of another exemplary embodiment of a scrub head of a disposable toilet bowl cleaning system of one of the types generally described herein. FIG. 10C shows a perspective top view of the scrub head 1000 in use. Scrub head 1000 is the same as the scrub head 420 of FIGS. 4A-4C.

As seen in FIG. 10A, the receptacle includes a cup 1050 adjacent and/or attached to a strap 1060 adjacent or attached to a cleaning pad 1070. As is shown in FIG. 10D, strap 1060 has a smaller surface area and/or size than cleaning pad 1070. Strap 1060 includes a slot or channel 1062 into which cup body 1056 of cup 1050 engages. Cup 1050 includes a button 1052 that engages slot 1062 to maintain the position of cup 1050 in slot 1062. The assembly of cup 1050 engaged in the slot 1062 of the strap 1060 allows cup 1050 to move forward and/or rearward during use or assembly. As such, embodiments of this general type have one degree of freedom. The arrows in FIGS. 10C and 10D represent the translational movement allowed by the one degree of freedom. As can be seen, the one translational degree of freedom allows scrub head 1000 to flex up and down, creating a variable angle scrub surface. Strap 1060 is able to flex and bend during use and/or attachment of button 1052 on cup 1050 into slot 1062 on strap 1060. This ability to flex allows cup 1050 to slide forward and rearward in the slot, which assists the variable angle

motion for more conformal contact between the scrub head 1000 and a toilet bowl surface. Both the flexibility of the cleaning pad 1070 material, the flexibility of the strap 1060 material, and the slotted design on the cup 1050/strap 1060 assembly allows flexural and translational movement, both of which provide a variable angle scrubbing device that better conforms to the contours of a toilet and that better cleans the toilet.

Many changes may be made to the specific embodiment shown in FIGS. 10A and 10B without departing from the spirit and scope of the present disclosure.

FIGS. 11A and 11B respectively show a top view and a perspective view of an exemplary embodiment of a cleaning pad of a type generally described herein. Cleaning pad 1100 curves inward from the first end 1110 toward the center. Cleaning pad 1100 curves outward from the second end 1120 toward the center. Consequently, the bottom or lower portion (the area generally between first end 1110 and the middle or center) of cleaning pad 1100 has a greater surface area than the top or upper portion (the area generally between second end 1120 and the middle or center) of cleaning pad 1100. In one embodiment, the surface area of the top or upper portion of cleaning pad 1100 has a surface area of between about 1000 mm² and about 2500 mm², and the bottom or lower portion of the scrub head has a surface area of between 1000 mm² – 6000 mm².

Many changes may be made to the specific embodiment shown in FIGS. 11A and 11B without departing from the spirit and scope of the present disclosure.

FIG. 12 is a perspective view of an exemplary embodiment of a disposable toilet bowl cleaning system 1200 (the same as the disposable toilet bowl cleaning system 300 shown in FIGS. 3A-3C) with the scrub head 1220 separate from the handle assembly 1210. Handle assembly 1210 includes a first end 1212 separated from second end 1214 by the handle body 1215. Cup 1250 includes an opening 1282 that is sized to accept an insertable portion 1217 of second end 1214 of handle assembly 1210.

Many changes may be made to the specific embodiment shown in FIG. 12 without departing from the spirit and scope of the present disclosure.

FIGS. 14A-14C show a perspective view, a side view and a top view, respectively, of the handle assembly used in the disposable toilet bowl cleaning systems shown in FIGS. 2A, FIGS. 3A-3C, FIG. 12, and FIG. 13. **FIG. 15** shows a cross-sectional side view at line A-A of FIG. 3B and FIG. 14B.

Referring to **FIGS. 12-15**, handle assembly 1210 includes a first member 1211 and a second member 1213, which together form handle body 1215. First member 1211 includes a first

end 1290, a second end 1291 an inner surface 1292, and an outer surface 1293. Insertable portion 1217 extends from second end 1291 of first member 1211 and is sized to fit into opening 1082 of shoe 1250 of scrub head 1220. Toward first end 1290 of first member 1211 is a first portion 1295 of an opening 1296 in handle body 1215 that engages an actuation button or switch 1240.

5 Second member 1213 of handle body 1215 is similar to first member 1211. Second member 1213 includes a first end 1280, a second end 1281, an inner surface 1282, and an outer surface 1283. Toward first end 1280 of second member 1213 is a second portion 1285 of opening 1296 in handle body 1215 that engages an actuation button or switch 1240.

10 Flanges 1294a, 1294b, 1294c etc. are positioned along the inner surface 1292 of first member 1211 and insert and engage with mating portions 1296a, 1296b, 1296c etc. (not shown) that are positioned along the inner surface 1282 of second member 1213 to connect first and second members 1211 and 1213 together to create handle body 1215, which has a length and/or shape that can be easily gripped by a user's hand.

15 In some embodiments, first and second members 1211 and 1213 of handle assembly 1210 are molded. In some embodiments, first and second members 1211 and 1213 of handle assembly 1210 are made of a polymeric material such as, for example, acrylonitrile butadiene styrene (ABS), High Impact Polystyrene (HIPS), polycarbonate (PC), and/or polypropylene (PP).

20 Handle assembly 1210 also includes an actuation mechanism 1310 for attaching scrub head 1220 to, and detaching scrub head 1220 from, handle assembly 1210. Actuation mechanism 1310 is positioned within handle body 1215 of handle assembly 1210 and includes a plunger rod 1320, a spring stop 1330, a plunger spring 1340, and actuation button 1240. Plunger rod 1320 includes a first end 1322, which is capable of extending from the insertable portion 1217 of the first member 1211, and a second end 1326 connected to actuation button 1240. When the button is pushed, the plunger rod first end 1322 will extend from 1217. This is what pushes the head off the handle. Plunger spring 1340 is positioned around plunger rod 1320 adjacent first end 1322 of the plunger rod 1320. Spring stop 1330 is positioned between plunger spring 1340 and second end 1326 of plunger rod 1320. When handle assembly 1210 is assembled, plunger spring 1340 is positioned around plunger rod 1320 between flange 1294a at second end 1291 of first member 1211 and spring stop 1330.

30 Scrub head 1220 can be attached to handle assembly 1210 by engagement of the insertable portion 1217 of handle assembly 1210 within cup 1250 of scrub head 1220. To effect this engagement, the user inserts insertable portion 1217 of handle assembly 1210 into cup 1250 of scrub head 1220 and pushes or exerts force to guide handle assembly firmly into/onto cup 1250. The user's force causes the at least one snap 1265 in insertable portion 1217 to flex or push
35 inwardly toward plunger rod 1320. This permits insertable portion 1217 to slide into cup 1250.

When snaps 1265 align with the corresponding slots 1268 on cup 1250, snaps 1265 enter into slots 1268 and return generally to their original non-flexed (relaxed) position. In this way, snaps 1265 engage with slots 1268 of cup 1220 of scrub head 1220. In this engaged position, snaps 1265 attach scrub head 1220 to handle assembly 1210 and hold scrub head 1220 in place.

5 Alternatively, to effect engagement of handle assembly 1210 with scrub head 1220, the user can activate the activation mechanism by activating button or switch 1240 and can then insert insertable portion 1217 of handle assembly 1210 into cup 1250 of scrub head 1220. When button or switch 1240 is activated (or pushed forward in the embodiment of these Figures) towards the second end 1214 of handle assembly 1210, snaps 1265 on handle assembly 1210 flex or push
10 inwardly toward plunger rod 1320. This enables scrub head 1220 to easily slide onto handle assembly 1210. Once scrub head 1220 is on handle assembly 1210, the user releases or slides button or switch 1240 into its original position. This causes snaps 1265 to engage with slots 1268 on cup 1250 and hold scrub head 1220 firmly in place on handle assembly 1210.

Some embodiments of actuation mechanism 1310 exhibit sliding movement between a relaxed position and a detached position. When in the relaxed position, actuation mechanism 1310
15 allows scrub head 1220 to be attached to handle assembly 1210 as described above. When in the detached position, actuation mechanism 1310 forces scrub head 1220 off of or away from handle assembly 1210, which is described in more detail below. Actuation mechanism 1310 is moved from the relaxed position to the detached position by actuation button or switch 1240 that can be
20 manually moved along handle body 1215 by a thumb or finger of a person grasping the handle assembly 1210.

In the relaxed position, snaps 1265 are positioned within slots 1268 and first end 1322 of plunger rod 1320 is positioned in insertable portion 1217 of handle assembly 1210. In the relaxed position, the plunger rod is inside the handle assembly, or insertable portion 1217. However, when
25 the button is pushed forward, the end of the plunger rod 1322 extends out of the handle, out of opening 1297 in 14A.

To detach scrub head 1220 from handle assembly 1210, the user activates button or switch 1240. In this embodiment, switch 1240 is activated by pushing it forward. When button or switch 1240 is forced forward towards the second end 1214 of handle assembly 1210, plunger rod 1320 is
30 also forced forward and extends through an opening 1297 in insertable portion 1217. In this position, plunger rod 1320 is the detached position, as depicted in FIG. 14C. This causes plunger rod 1320, which is rigidly attached to actuation mechanism 1310, to move forward. Plunger rod 1320 pushes against scrub head 1220. This generates enough force to push or flex snaps 1265 inward toward plunger rod 1320. The force of plunger rod 1320 against scrub head 1220 generates
35 enough force to release snaps 1265 from slots 1268. Snaps 1265 are capable of flexural motion

such that they can flex inward, providing additional “give” to release scrub head 1250 from handle assembly 1220. Once snaps 1265 are pushed inward, scrub head 1220 slides off of insertable portion 1217. In this way, scrub head 1220 is easily detached from handle assembly 1210 without requiring the user to touch scrub head 1220.

5 Many changes may be made to the specific embodiment shown in FIGS. 12, 13, 14A-14C and 15 without departing from the spirit and scope of the present disclosure. For example, the specific embodiment of FIGS. 14A-14C and 15 includes two snaps 1265 and two slots 1268, but those of skill in the art will appreciate that any desired number of snaps or slots may be used. Further, those of skill in the art will appreciate that snaps and slots are only one exemplary
10 mechanical attachment system. Any desired mechanical attachment system may be used. Further, the button or switch can be any actuation mechanism and can be positioned anywhere on handle assembly 1210. Alternatively, one could use a frictional fit in which insertable portion 1217 expands and collapses when it engages with 1282/1250 of the scrub head.

15 **FIGS. 16A, 16B, 16C, and 17** show an exemplary embodiment of an actuation mechanism capable of being used in any of the disposable toilet bowl cleaning systems described herein. FIGS. 16A-16C show a perspective view, a side view and a bottom view, respectively, of handle assembly 1610. Handle assembly 1610 includes a first end 1612 separated from second end 1614 by the handle body 1615. Insertable portion 1617 extends from second end 1614.
20 Actuation button or switch 1640 is located on the bottom side of handle body 1615. When handle assembly 1610 is at rest or not in use and has no scrub head attached.

Scrub head 1720 can be attached to handle assembly 1610 by engagement of the insertable portion 1617 of handle assembly 1610 within cup 1750 of scrub head 1720. To effect this engagement, the user can insert insertable portion 1617 of handle assembly 1610 into cup 1750 of
25 scrub head 1720 and push or exert force to guide handle assembly 1610 firmly into/onto cup 1750. The user's force causes the at least one pin 1765 in insertable portion 1617 to collapse or retract inwardly toward button rod 1620. This permits insertable portion 1617 to slide into cup 1750. When pins 1765 align with the corresponding slots 1768 on cup 1750, pins 1765 enter into slots 1768 and return generally to their original non-retracted (emerged) position. In this way, pins
30 1765 engage with slots 1768 of cup 1750 of scrub head 1720. In this engaged position, pins 1765 attach scrub head 1720 to handle assembly 1610 and hold scrub head 1720 in place.

Alternatively, to effect engagement of handle assembly 1610 with scrub head 1750, the user can activate the activation mechanism by activating button or switch 1640 and can then insert insertable portion 1617 of handle assembly 1610 into cup 1750 of scrub head 1720. Second end
35 1622 of button rod 1620 is attached within insertable portion 1617 by one or more latch pin rods

(referred to herein as a "pin" or "pins") 1765 and the first end 1624 of button rod 1620 is attached to actuation button or switch 1640. In this specific embodiment, pins 1665 have a flexible diamond shape that expands in the relaxed position and collapses in the detach position. In the relaxed position, the flexible diamond shape is expanded and pins 1665 engage the slots 1768 of cup 1750. When actuation button or switch 1640 is forced backwards towards the first end 1612 of handle assembly 1610, the diamond shaped pins 1665 collapse to the detach position, removing pins 1665 from slots 1768 of cup 1750 of scrub head 1720. Consequently, when button or switch 1640 is activated (or pulled backward in the embodiment of these figures) towards the first end 1612 of handle assembly 1610, pins 1765 on handle assembly 1610 collapse. This enables scrub head 1720 to easily slide onto handle assembly 1610. Once scrub head 1720 is on handle assembly 1610, the user releases or slides back button or switch 1640. This causes pins 1765 to emerge. Upon emerging, pins 1765 engage with slots 1768 on cup 1750 and hold scrub head 1720 firmly in place on handle assembly 1610.

FIG. 17 shows a cross-sectional side view at line A-A of FIG. 16B. In the relaxed position, pins 1665 are positioned within slots 1768 and first end 1622 of plunger rod 1620 is positioned in insertable portion 1617 of handle assembly 1610.

To detach scrub head 1720 from handle assembly 1610, the user activates button or switch 1640 by, in this embodiment, pulling it back toward the first end 1612 of handle assembly 1610. When button or switch 1640 is pulled back towards the first end 1612 of handle assembly 1610, pins 1665 retract toward button rod 1620. Once pins 1665 are pushed inward, scrub head 1720 slides off or falls off of insertable portion 1617. In this way, scrub head 1720 is easily detached from handle assembly 1610 without requiring the user to touch scrub head 1720.

In this case, there really isn't a plunger rod that extends beyond the handle to assist in pushing the head off during ejection, like in the previous example. Everything takes place inside the handle. The button is pulled rather than pushed. The button has a rod that extends to the handle end. At the end of the button rod, there exists a diamond shaped feature with protrusions (pins) that can collapse and expand laterally and engage with the cup of a scrub head.

Many changes may be made to the specific embodiment shown in FIGS. 16A-16C and 17 without departing from the spirit and scope of the present disclosure. For example, the specific embodiment of FIGS. 16A-16C and 17 includes two pins 1765 and two slots 1768, but those of skill in the art will appreciate that any desired number of pins or slots may be used. Further, those of skill in the art will appreciate that pins and slots are only one exemplary mechanical attachment system. Any desired mechanical attachment system may be used. Further, the button or switch can be any actuation mechanism and can be positioned anywhere on handle assembly 1610.

FIG. 18 shows an exploded view of an exemplary embodiment of a disposable toilet bowl cleaning systems including the actuation mechanism of FIGS. 19 and 20. Disposable toilet bowl cleaning system 1800 includes a handle assembly 1810 and a scrub head 1820 releasably connected to handle assembly 1810.

Handle assembly 1810 includes a first member 1811 and a second member 1813 which together form handle body 1815. First member 1811 includes a first end 1890, a second end 1891 an inner surface 1892, and an outer surface 1893. First end 1890 of first member 1811 includes a flange 1894 that inserts and connects with a portion of second member 1813. Insertable portion 1817 extends from second end 1891 of first member 1811 and is sized to fit into opening 1882 of shoe 1850 of scrub head 1820. Toward first end 1890 of first member 1811 is an opening 1896 in handle body 1815 that engages an actuation button or switch 1840. Unlike previous embodiments, this embodiment only includes one hole to create the opening.

Second member 1813 of handle body 1815 is similar to first member 1811. Second member 1813 includes a first end 1880, a second end 1881, an inner surface 1882, and an outer surface 1883. First end 1880 of second member 1813 includes an insert 1884 that flange 1894 of first end 1890 of first member 1811 engages to connect first and second members 1811 and 1813. The combination of second end 1891 of first member 1811 and second end 1881 of second member 1813 creates handle body 1815, which has a length and/or shape that can be easily gripped by a user's hand. Unlike previous embodiments, the button opening is on the top side only in this specific embodiment.

In some embodiments, first and second members 1811 and 1813 of handle assembly 1810 are molded. In some embodiments, first and second members 1811 and 1813 of handle assembly 1810 are made of a polymeric material such as acrylonitrile butadiene (ABS), polyethylene, polypropylene, polycarbonate, or high impact polystyrene.

Handle assembly 1810 also includes an actuation mechanism 1860 for attaching scrub head 1820 to, and detaching scrub head 1820 from, handle assembly 1810. Actuation mechanism 1860 is positioned within handle body 1815 of handle assembly 1810 and includes a button rod 1840, a button spring 1870, and latch 1875.

In this specific embodiment, the button is comprised of multiple sections: the button, button rod, spring locator post and latch clamp. When the button is pushed forward, the button rod, spring post and latch clamp move forward and the spring is compressed due to contact with the spring post on the button rod on one end of the spring and contact with a flange located on the bottom handle on the other end of the spring. As the latch clamp moves forward, which is essentially a constant diameter cylinder, it surrounds the latch and causes the latch to contract.

Once the button is released, the compressed spring then retracts to its original position and therefore the sections of the button also return to their original positions. As the latch clamp retracts, the latch then expands to its original position, due to its 2-sided cantilever design.

A latch 1875 extends from the second end of the first and second members 1817, 1821 and is sized to fit into the opening at the first end of cup 1850 of scrub head 1820 when in a retracted position. Latch 1875 is partially positioned in handle body 1815 and is attached to the handle body 1815 at second end 1817. In some embodiments, latch 1875 is shaped like a V, with two members 1877 and 1879 extending at an angle from the first end. Extending members 1877 and 1879 are movable between a retracted position, in which the two extending members 1877 and 1879 are forced toward each other, and an extended position, in which two extending members 1877 and 1879 are extended away from each other.

Many changes may be made to the specific embodiment shown in FIG. 18 without departing from the spirit and scope of the present disclosure.

FIG. 19 shows a cross-sectional view of the disposable toilet bowl cleaning system of FIG. 4B along line B-B. **FIG. 20** shows an enlargement of a portion of FIG. 19. In use, scrub head 1920 is releasably attached to handle assembly 1910 by engagement of latch 1875 within cup 1950 of scrub head 1920. Scrub head 1920 is attached to handle assembly 1910 by inserting latch 1875 into the opening of cup 1950 of scrub head 1920. Extending members 1877 and 1879 of latch 1875 then retract towards each other until latch 1875 passes by snap undercuts of scrub head 1920 and then expands such that scrub head 1920 is rigidly attached to handle assembly 1910 and locked in place.

Handle assembly 1910 includes a seal 1895 generally at second end 1914 of handle body 1915 of handle assembly 1910. In some embodiments, seal 1895 is present to provide a water tight attachment of handle assembly 1910 to the scrub head. In some embodiments, seal 1895 is a soft material. Exemplary materials for use in seal 1895 include, for example, thermoplastic elastomer, silicone, or rubber. Seal 1895 can be of any desired size. Exemplary sizes of seal 1895 include 1, 3, 5 mm thick, etc.

When the disposable toilet bowl cleaning system of FIG. 16B is in the relaxed position, extending members 1877 and 1879 of latch 1875 are fully extended, allowing the second ends of latch 1875 to engage cup 1950. When actuation button or switch 1840 on handle assembly 1910 is forced forward towards the second end of handle assembly 1910, button clamp is forced forward and engages with latch 1875. Extending members 1877 and 1879 of latch 1875 then retract toward each other until latch 1875 clears snap undercuts 1876 on cup 1950 of scrub head 1920, allowing scrub head 1920 to disengage and/or fall off of handle assembly 1910.

Many changes may be made to the specific embodiment shown in FIGS. 18 and 19 without departing from the spirit and scope of the present disclosure. For example, any number of snaps and corresponding slots can be used without departing from the intended scope of the present disclosure. Alternatively, the actuation button or switch can be any desired mechanical design, can be more than one mechanical structure, and/or may also be positioned anywhere on the handle assembly.

FIG. 21 is a perspective view of a plurality of exemplary scrub heads of one of the types described herein in stacked arrangement. Scrub heads 2120 of FIG. 21 can be any of the scrub heads described herein. Scrub heads 2120 of FIG. 21 can be placed within a caddy assembly. An exemplary caddy assembly is shown in FIGS. 2A and 2B. In some embodiments, scrub heads 2120 can be stacked and sold as a refill package.

FIG. 22 shows one exemplary side perspective view of a scrub head refill package. Refill package 2200 includes a plurality of scrub heads 2220. Scrub heads 2220 can be any of the scrub heads described herein. In some embodiments, scrub heads 2220 are held within a packaging 2230. In some embodiments, when scrub heads 2220 have all been dispensed, packaging 2230 can be removed and either refilled or discarded. In some embodiments, scrub heads 2220 are stacked in such a way that they are easily insertable into a handle assembly and/or caddy assembly.

In some embodiments, to use the scrubbing tool, a user first inserts a portion of the handle assembly into the receptacle of the scrub head. The user then uses the scrubbing tool for cleaning purposes (*e.g.*, such as to clean a toilet bowl). When the user desires to remove the scrub head, he or she simply manually engages the actuation button, moving the plunger rod or button rod along the handle portion a short distance to detach the scrub head from the handle assembly. Thus, the dirty scrub head can be removed from the handle assembly without contact by the user.

The recitation of all numerical ranges by endpoint is meant to include all numbers subsumed within the range (*i.e.*, the range 1 to 10 includes, for example, 1, 1.5, 3.33, and 10).

The terms first, second, third and the like in the description and in the claims, are used for distinguishing between similar elements and not necessarily for describing a sequential or chronological order. It is to be understood that the terms so used are interchangeable under appropriate circumstances and that the embodiments of the disclosure described herein are capable of operation in other sequences than described or illustrated herein.

Moreover, the terms top, bottom, over, under and the like in the description and the claims are used for descriptive purposes and not necessarily for describing relative positions. It is to be

understood that the terms so used are interchangeable under appropriate circumstances and that the embodiments of the disclosure described herein are capable of operation in other orientations than described or illustrated herein.

In the event of inconsistent usages between this document and any documents so incorporated by reference, the usage in this document controls.

In this document, the terms “a” or “an” are used, as is common in patent documents, to include one or more than one, independent of any other instances or usages of “at least one” or “one or more.” In this document, the term “or” is used to refer to a nonexclusive or, such that “A or B” includes “A but not B,” “B but not A,” and “A and B,” unless otherwise indicated. In this document, the terms “including” and “in which” are used as the plain-English equivalents of the respective terms “comprising” and “wherein.” Also, in the following claims, the terms “including” and “comprising” are open-ended, that is, a system, device, article, composition, formulation, or process that includes elements in addition to those listed after such a term in a claim are still deemed to fall within the scope of that claim. Moreover, in the following claims, the terms “first,” “second,” and “third,” etc. are used merely as labels, and are not intended to impose numerical requirements on their objects.

The above description is intended to be illustrative, and not restrictive. For example, the above-described examples (or one or more aspects thereof) may be used in combination with each other. Other embodiments can be used, such as by one of ordinary skill in the art upon reviewing the above description. The Abstract is provided to comply with 37 C.F.R. §1.72(b), to allow the reader to quickly ascertain the nature of the technical disclosure. It is submitted with the understanding that it will not be used to interpret or limit the scope or meaning of the claims. Also, in the above Detailed Description, various features may be grouped together to streamline the disclosure. This should not be interpreted as intending that an unclaimed disclosed feature is essential to any claim. Rather, inventive subject matter may lie in less than all features of a particular disclosed embodiment. Thus, the following claims are hereby incorporated into the Detailed Description as examples or embodiments, with each claim standing on its own as a separate embodiment, and it is contemplated that such embodiments can be combined with each other in various combinations or permutations. The scope of the disclosure can be determined with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled.

Those having skill in the art will appreciate that many changes may be made to the details of the above-described embodiments and implementations without departing from the underlying principles thereof. Further, various modifications and alterations of the present disclosure will become apparent to those skilled in the art without departing from the spirit and scope of the

disclosure. The scope of the present application should, therefore, be determined only by the following claims and equivalents thereof.

What is claimed is:

1. A scrub head capable of use in a disposable toilet bowl cleaning system, comprising:
a cup;

5 a strap, at least a portion of which is adjacent to or attached to the cup; and
a cleaning pad adjacent to or attached to the strap.

2. The scrub head of claim 1, wherein the cup includes an opening.

10 3. The scrub head of claim 2, wherein the opening has a diameter of between about 5
mm and about 30 mm.

4. The scrub head of any of the preceding claims, wherein the cup includes a first end
and a second end between which is a cup body and wherein the cup body is substantially hollow.

15 5. The scrub head of claim 3, wherein the cup body has a height of between about 15
mm and about 70 mm.

20 6. The scrub head of any of the preceding claims, wherein the cup and strap are a unitary
piece.

7. The scrub head of any of the preceding claims, wherein the strap has a length that is
greater than the length of the cup body.

25 8. The scrub head of any of the preceding claims, wherein the strap has an arcuate shape.

9. The scrub head of any of the preceding claims, wherein the strap has a radius of
curvature of between about 5mm and about 25mm.

30 10. The scrub head of any of the preceding claims, wherein the strap includes a slot into
which a portion of the cup engages.

11. The scrub head of any of the preceding claims, wherein the cleaning pad is a
nonwoven polymeric material.

35 12. The scrub head of any of the preceding claims, wherein the cleaning pad includes at

least one of an abrasive, a dye, a fragrance, an abrasive slurry, a bleaching agent, a germicide, or an antimicrobial agent.

13. The scrub head of any of the preceding claims, having one degree of freedom.

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14. The scrub head of any of the preceding claims, having three degrees of freedom.

15. The scrub head of any of the preceding claims, wherein a first end of the cup attaches to a first end of the strap.

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16. The scrub head of any of the preceding claims, wherein a second end of the cup attaches to a second end of the strap.

17. The scrub head of any of the preceding claims, wherein a second end of the strap is not connected to the cup.

15

18. A disposable toilet cleaning system, comprising:
the scrub head of any of claims 1-17;
a handle assembly.

20

19. The disposable toilet cleaning system of claim 18, further comprising:
a caddy assembly.

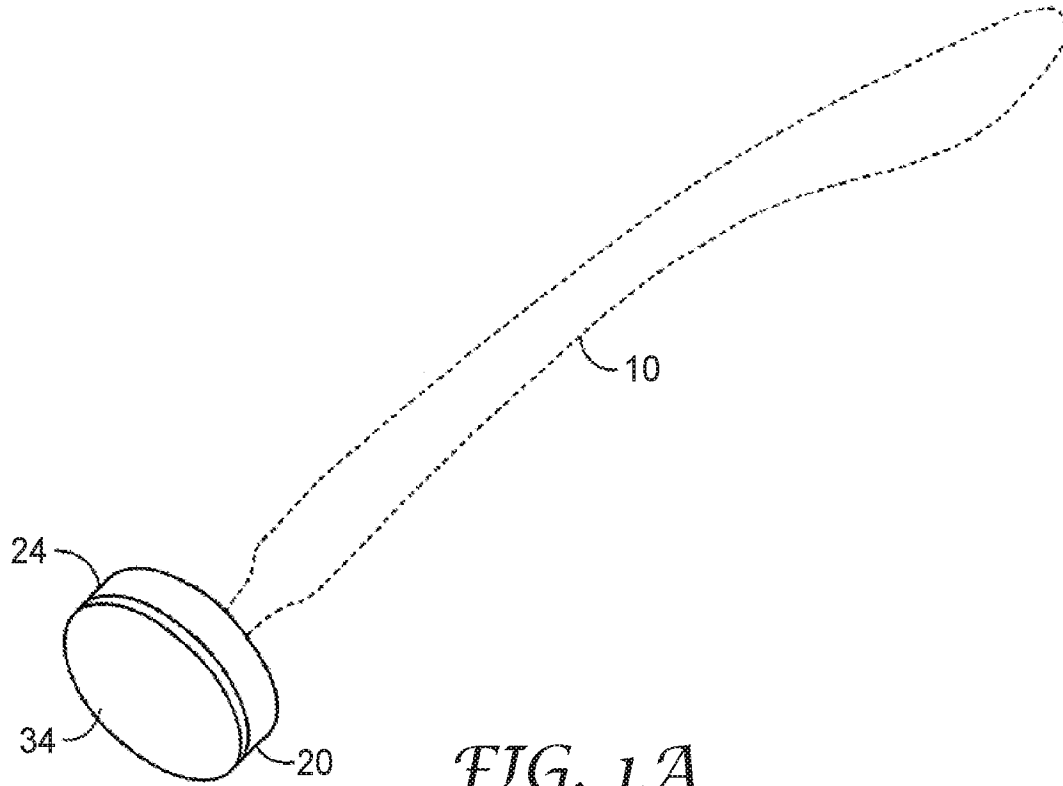
20. The disposable toilet cleaning system of any of claims 18-19, further comprising:

25

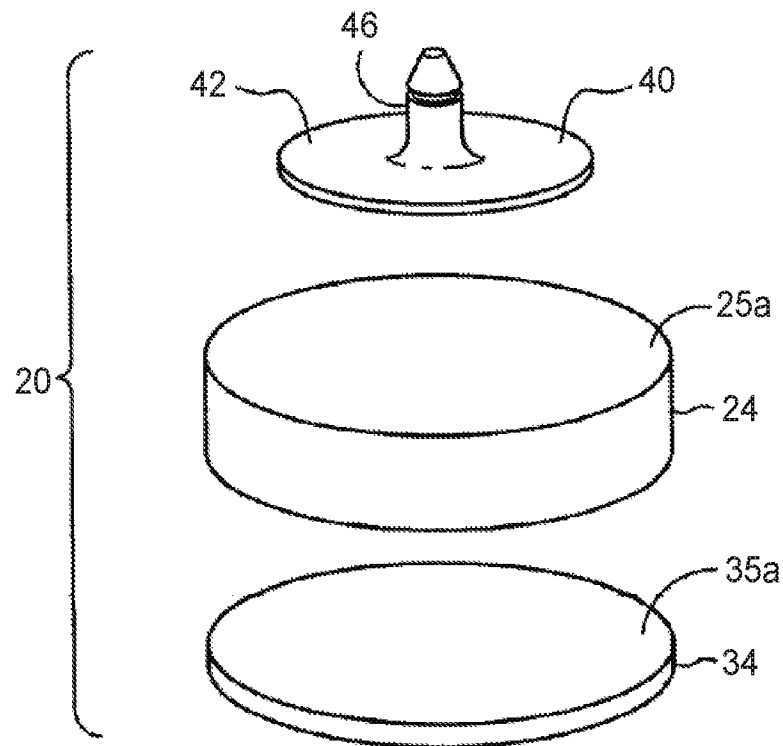
an actuation button or switch in which when the actuation button or switch is in a first position, the scrub head is held onto the handle assembly and when the actuation button or switch is in a second position, the scrub head is not held on the handle assembly.

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Prior Art



Prior Art

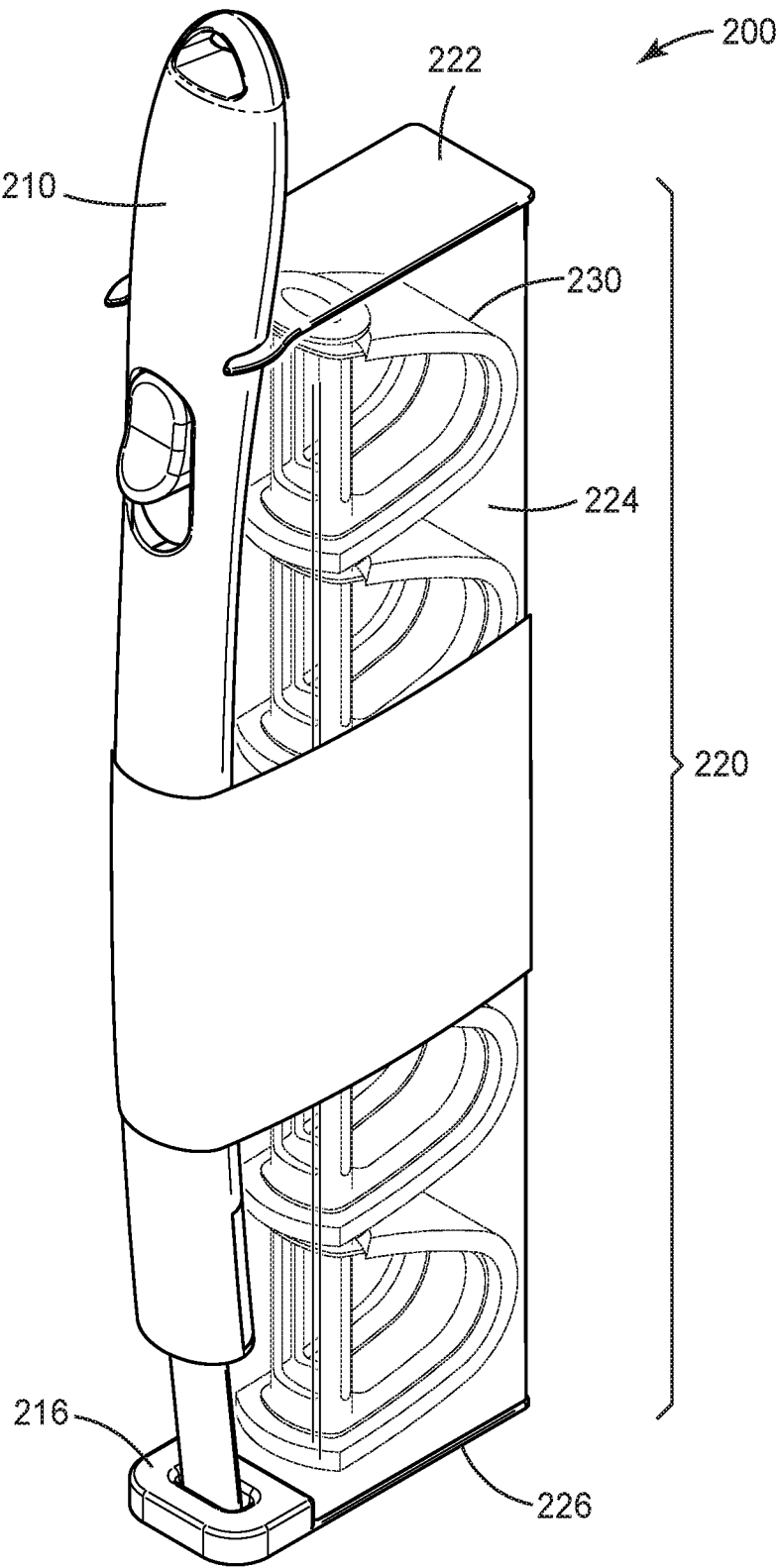


FIG. 2A

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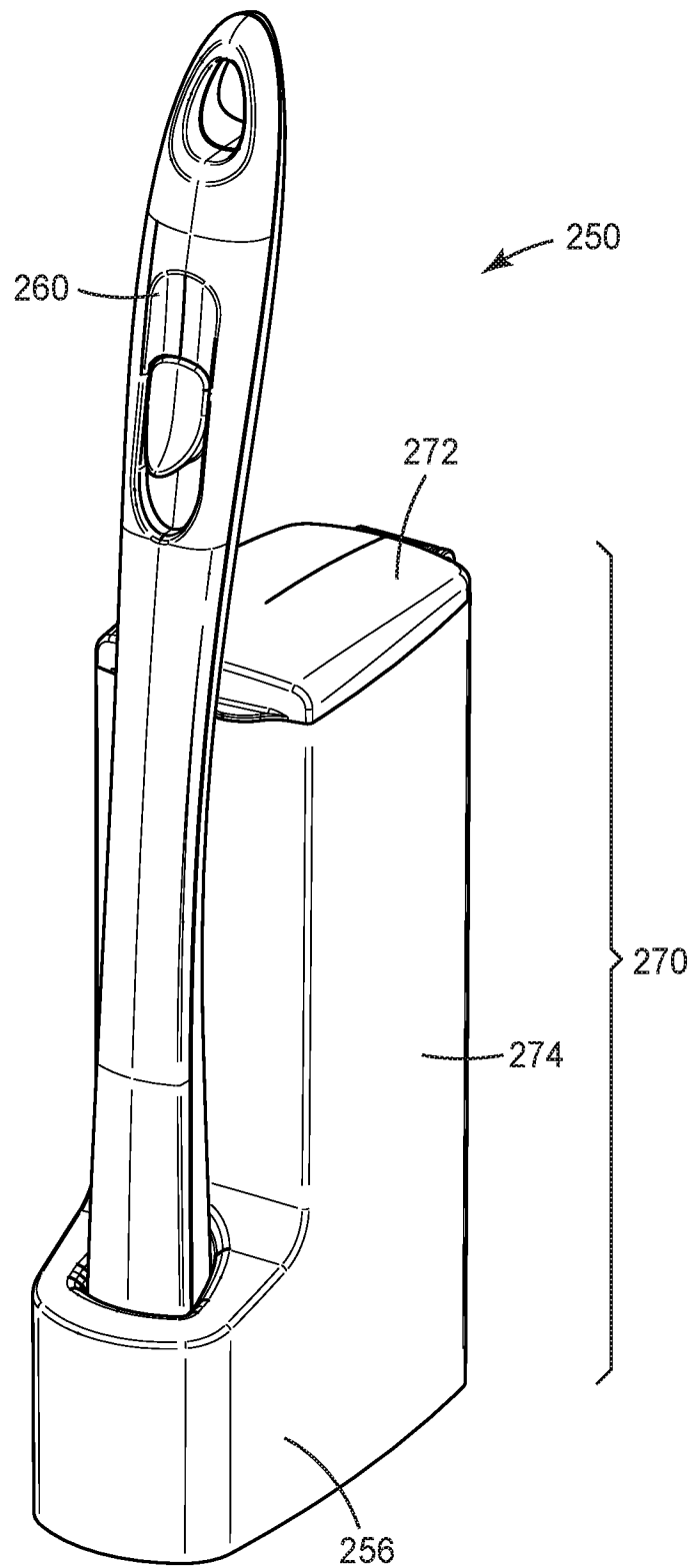


FIG. 2B

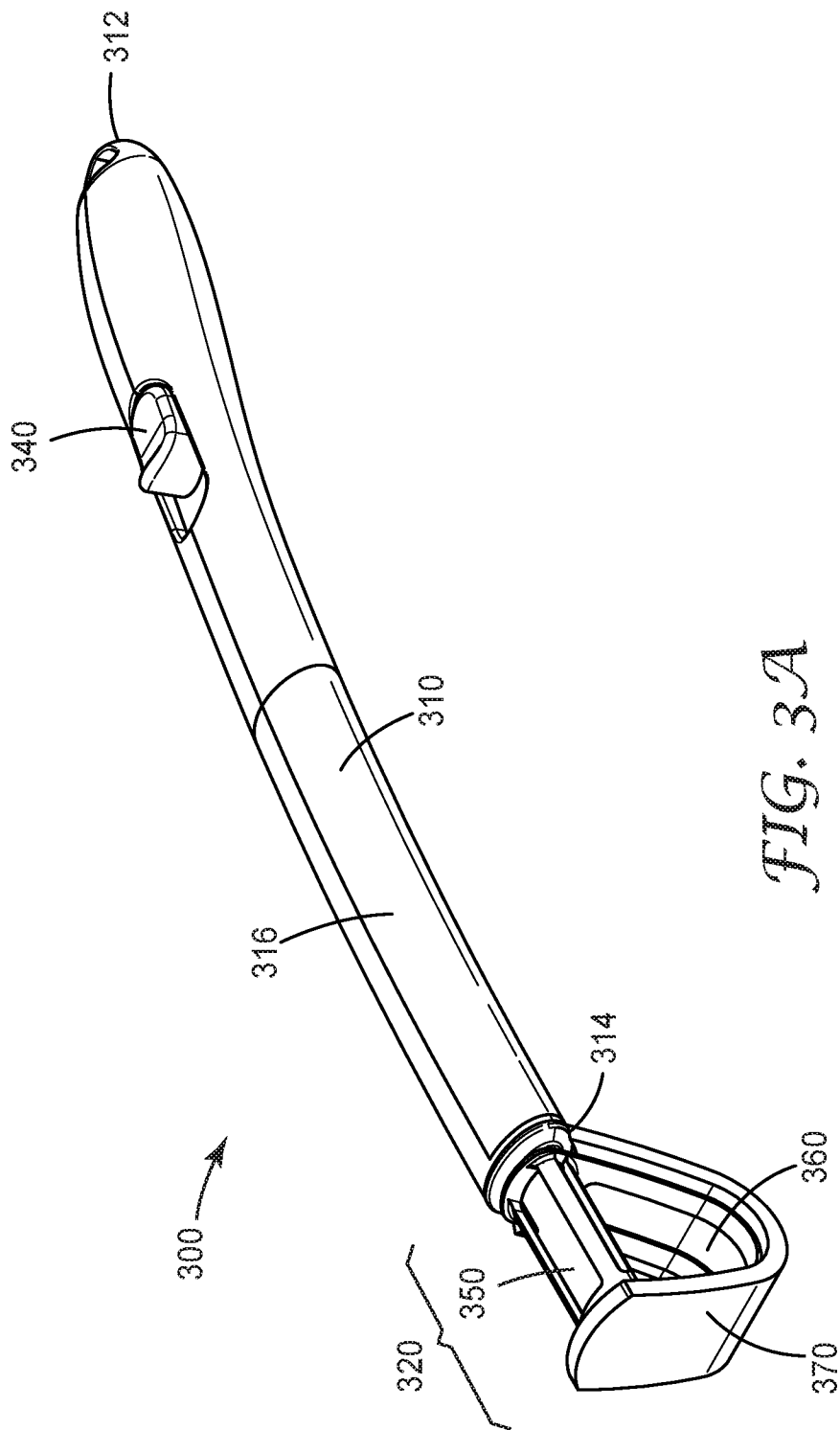


FIG. 3A

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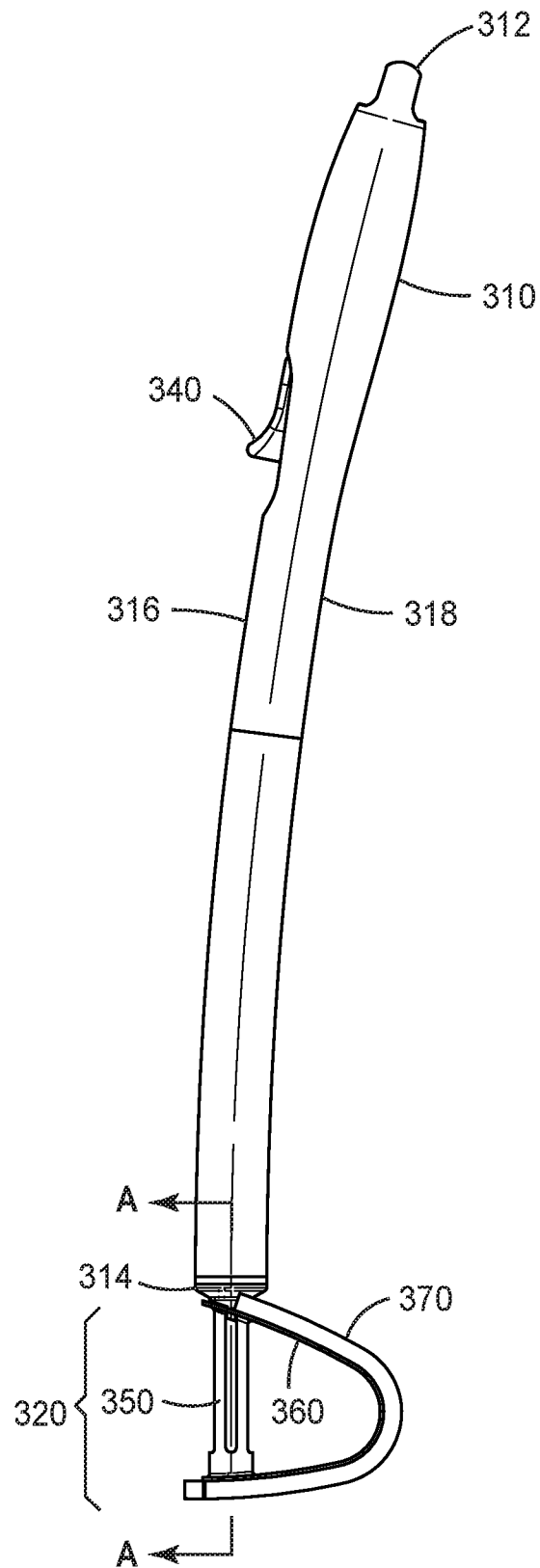


FIG. 3B

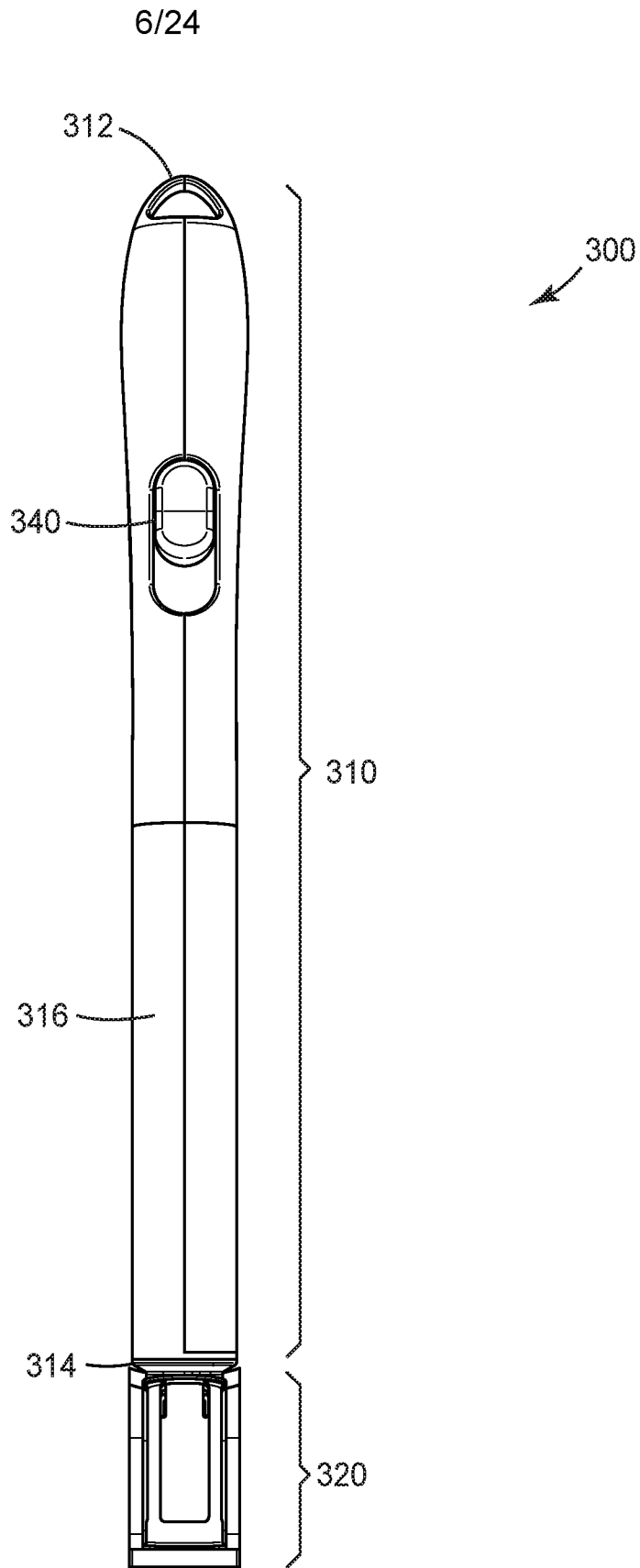
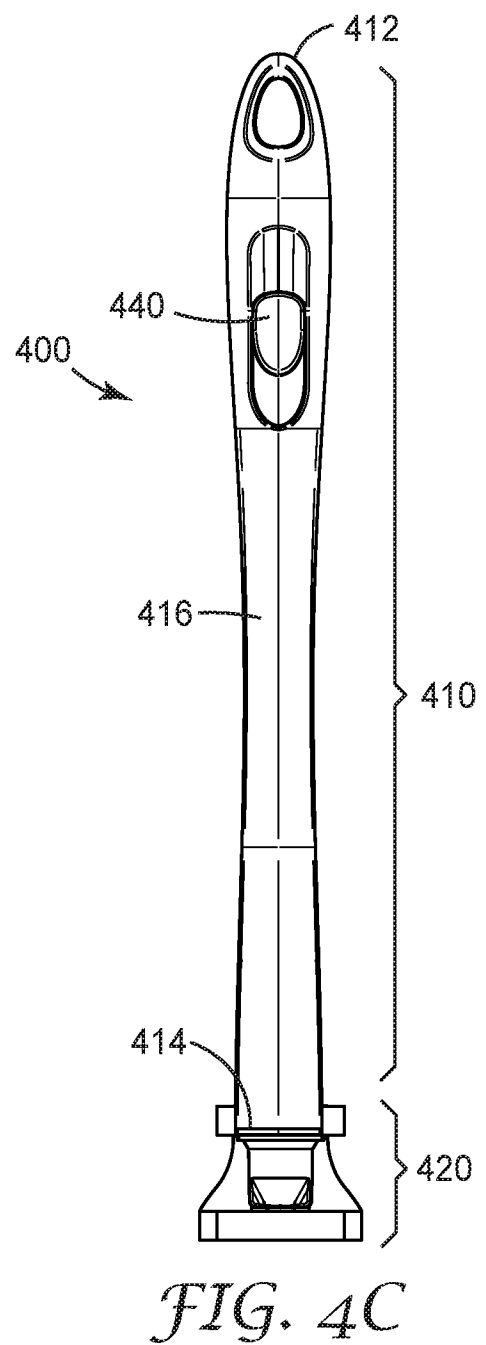
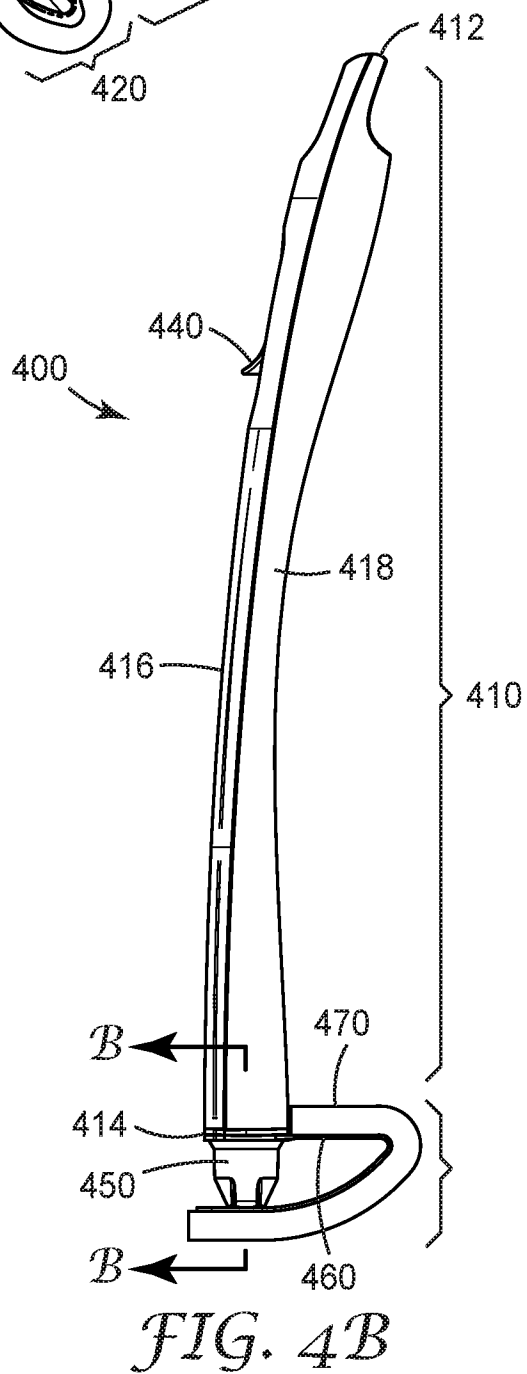
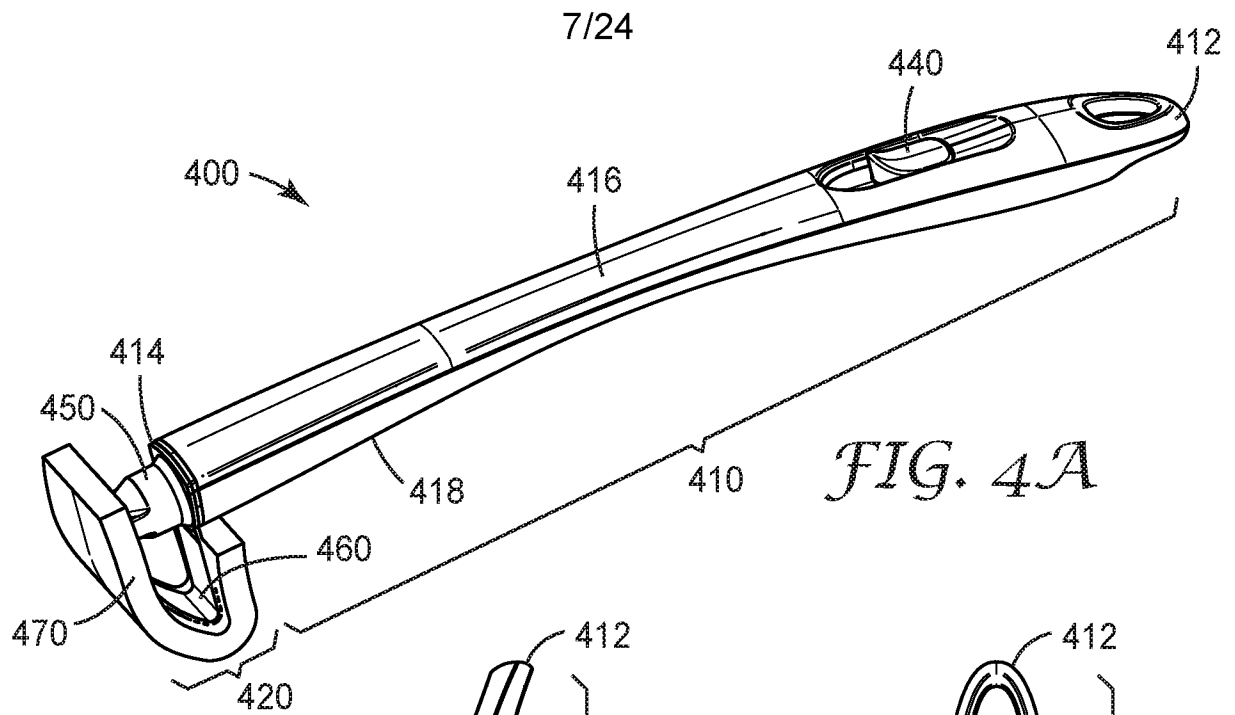


FIG. 3C



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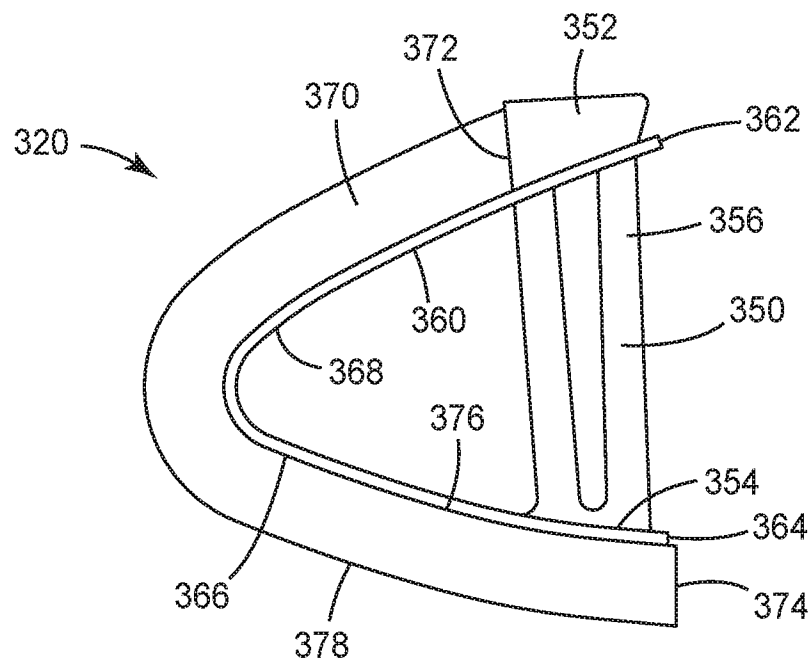


FIG. 5A

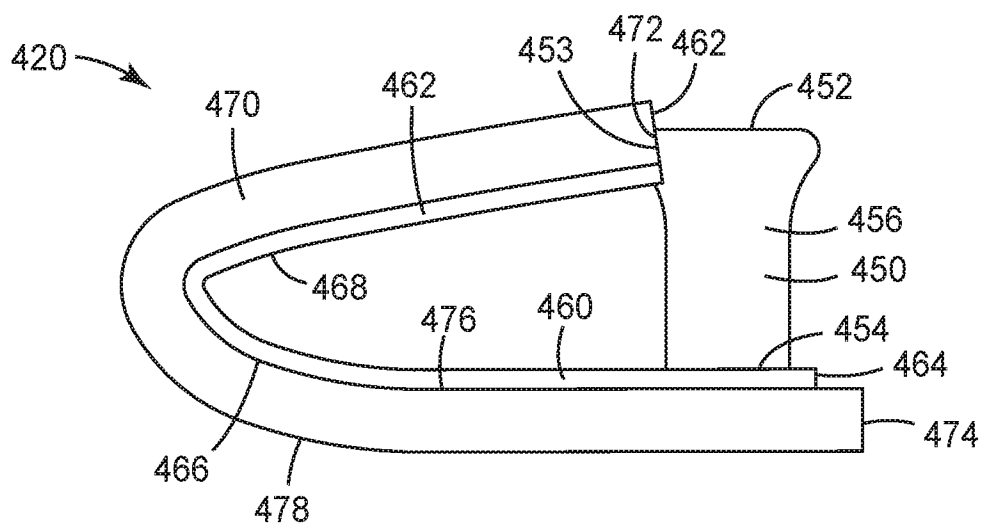


FIG. 5B

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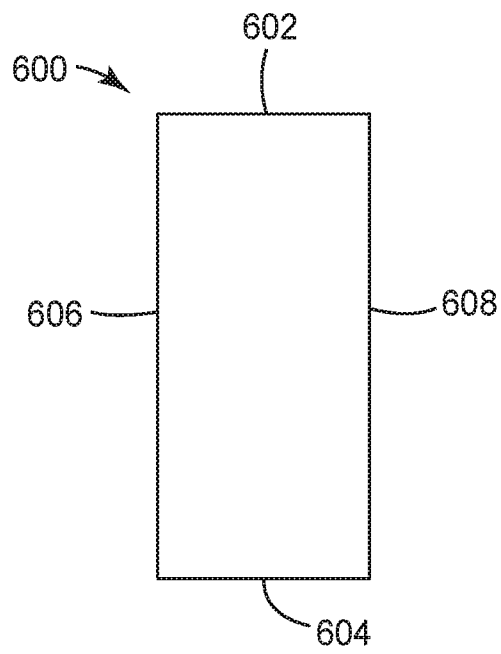


FIG. 6

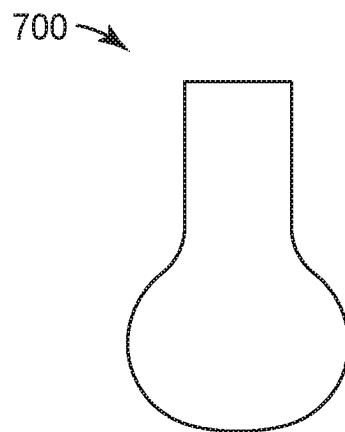
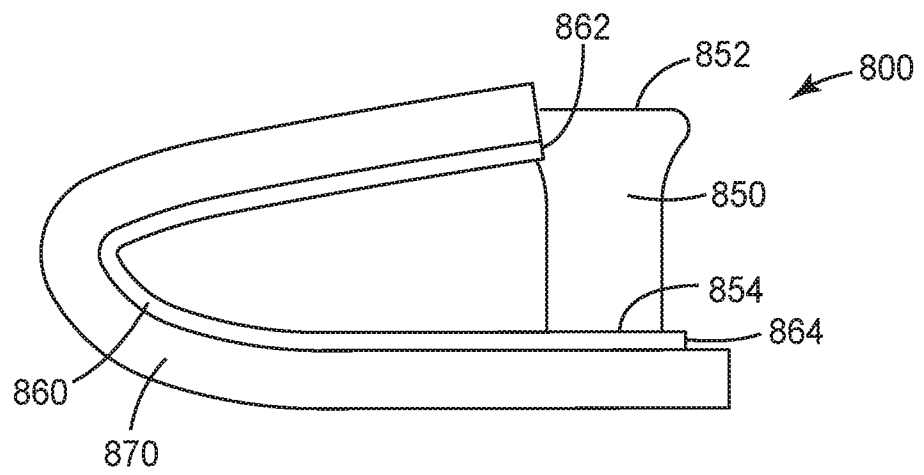
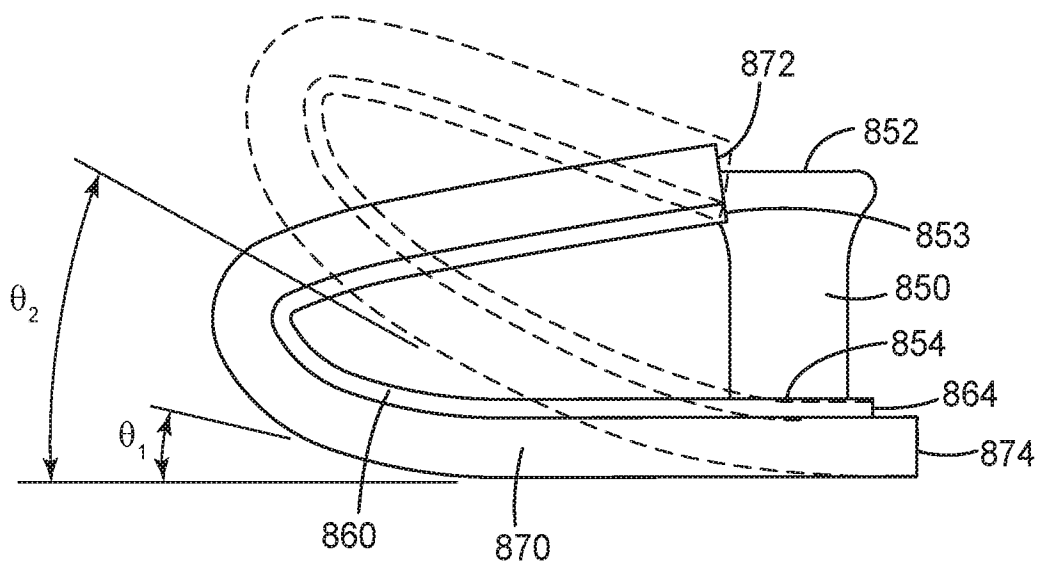


FIG. 7

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*FIG. 8A**FIG. 8B*

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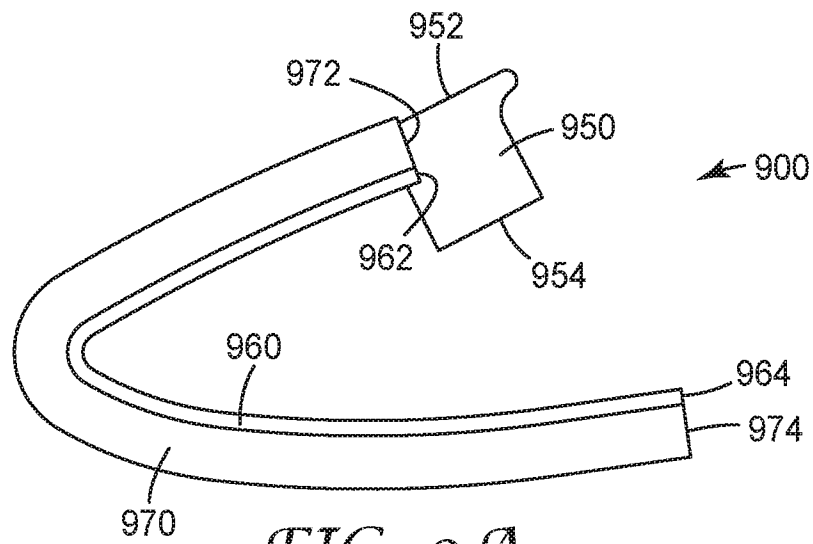


FIG. 9A

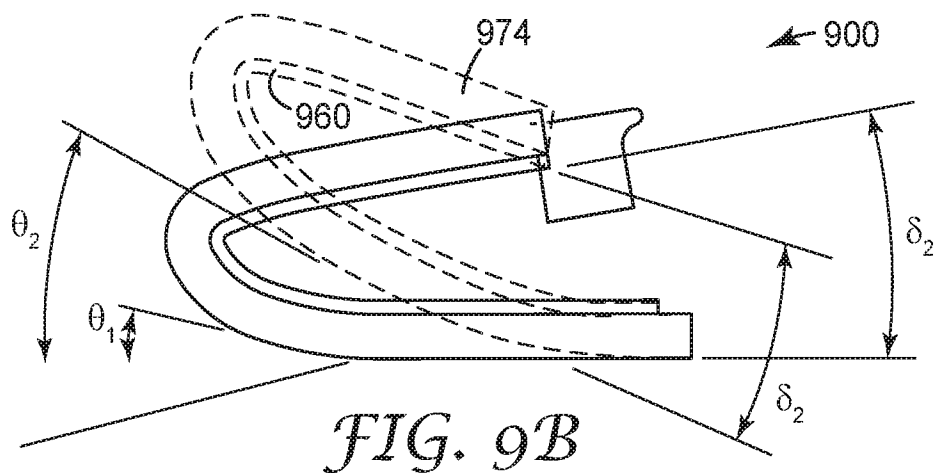


FIG. 9B

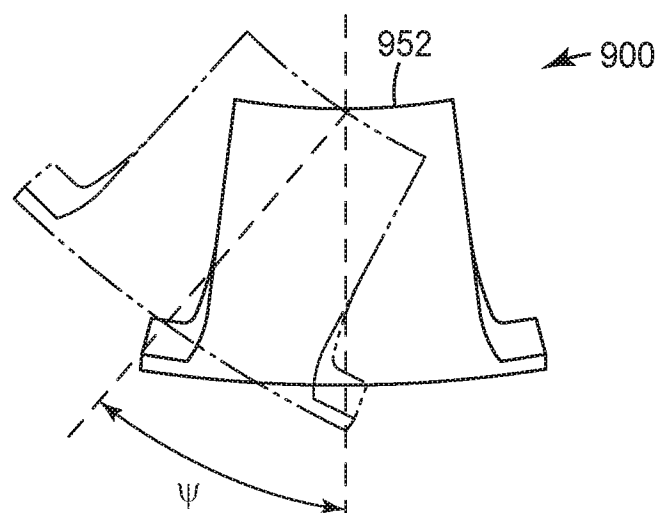


FIG. 9C

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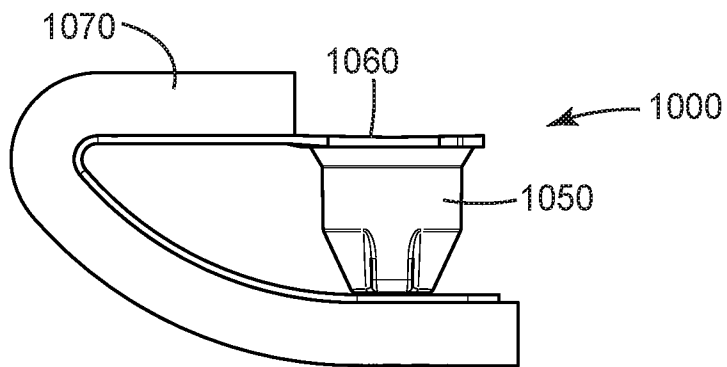


FIG. 10A

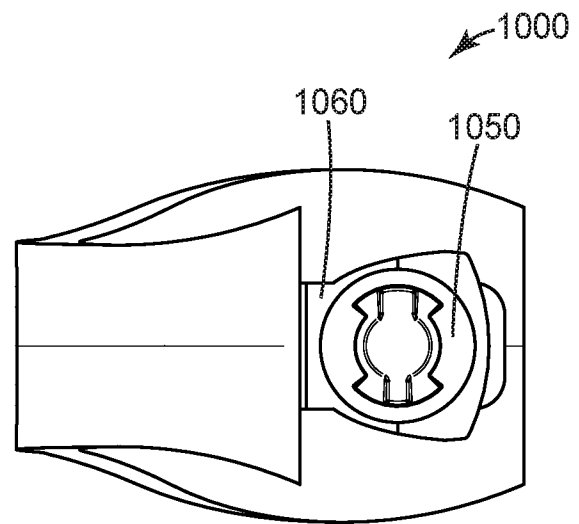


FIG. 10B

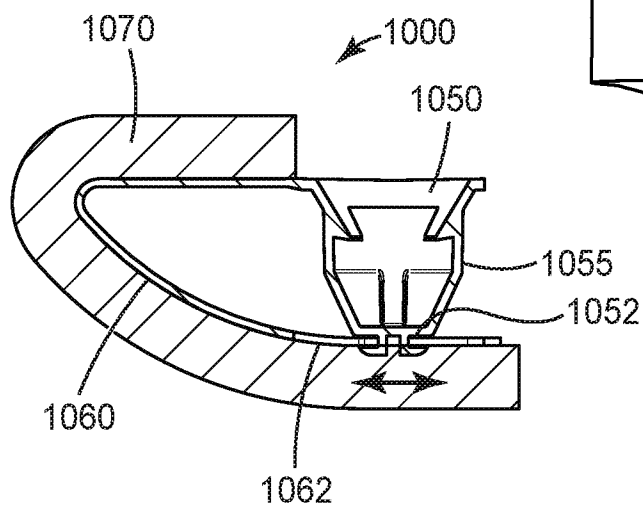


FIG. 10C

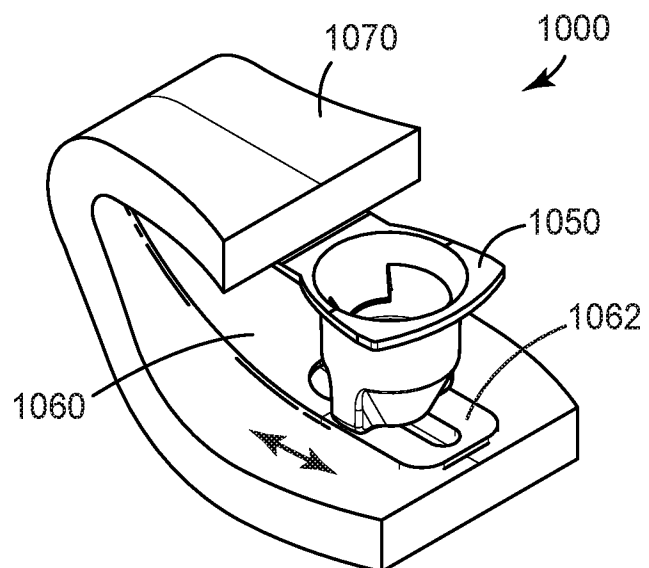


FIG. 10D

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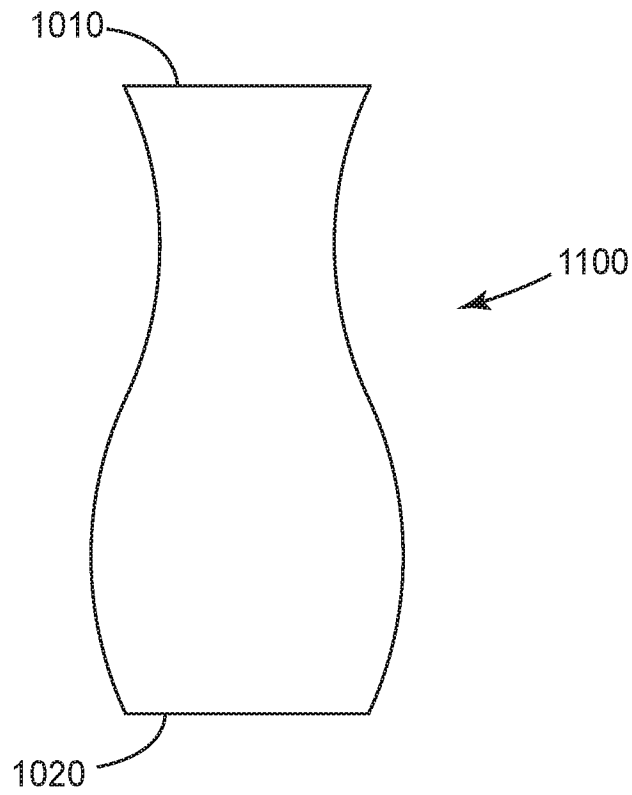


FIG. 11A

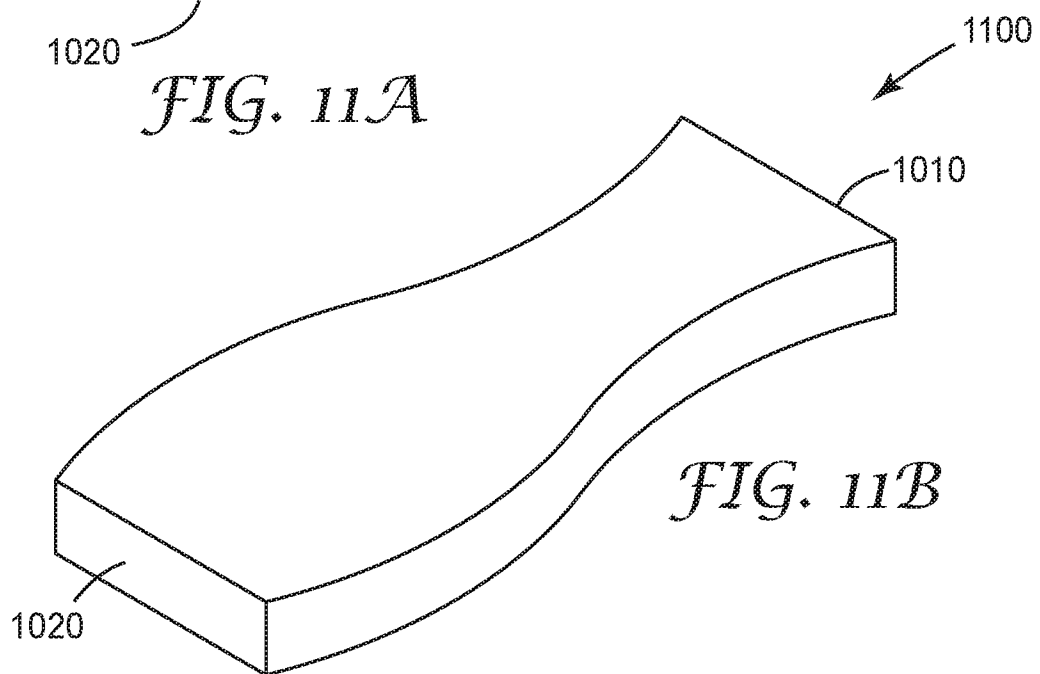


FIG. 11B

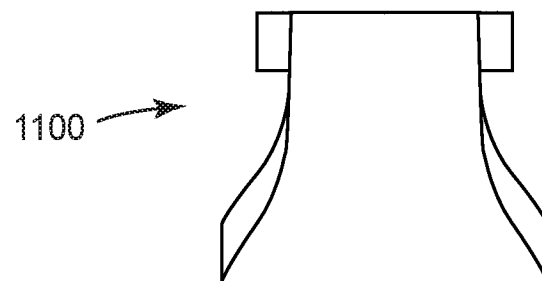


FIG. 11C

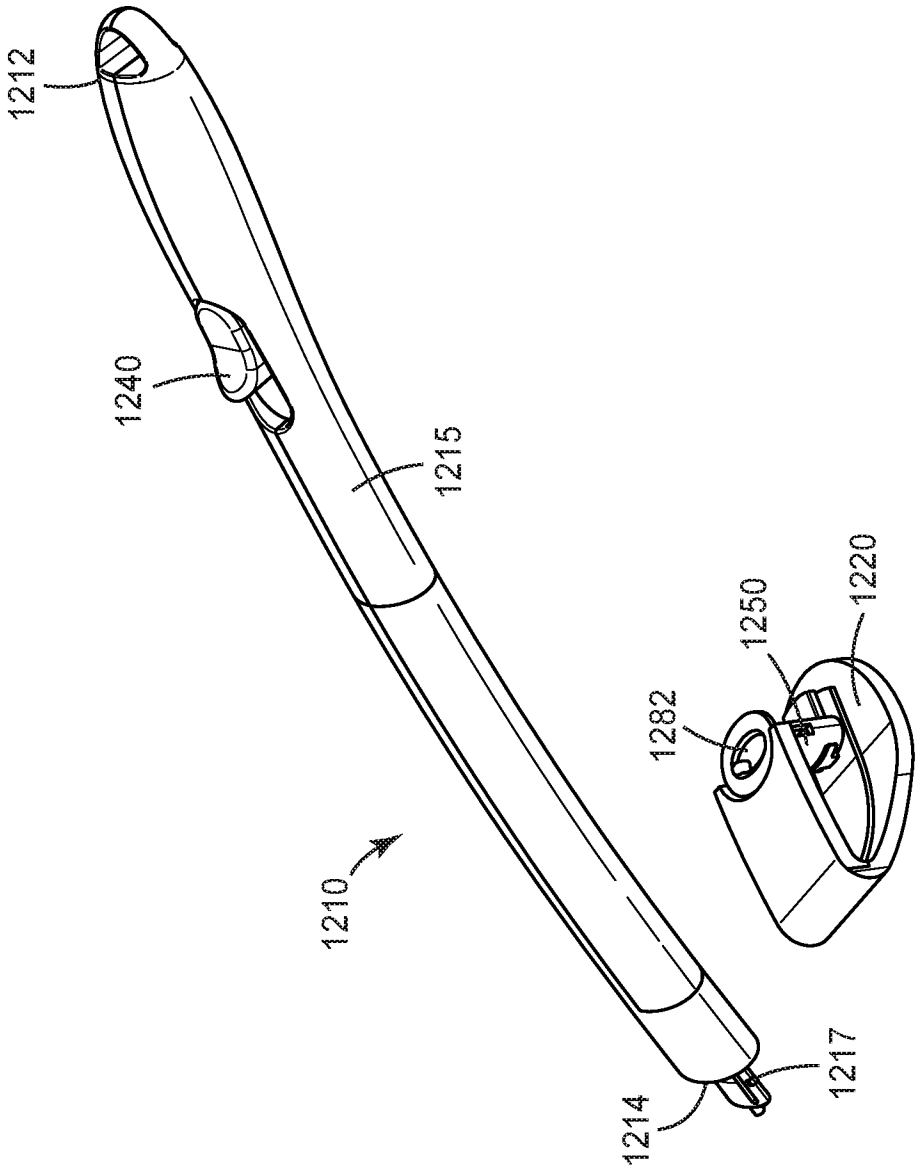
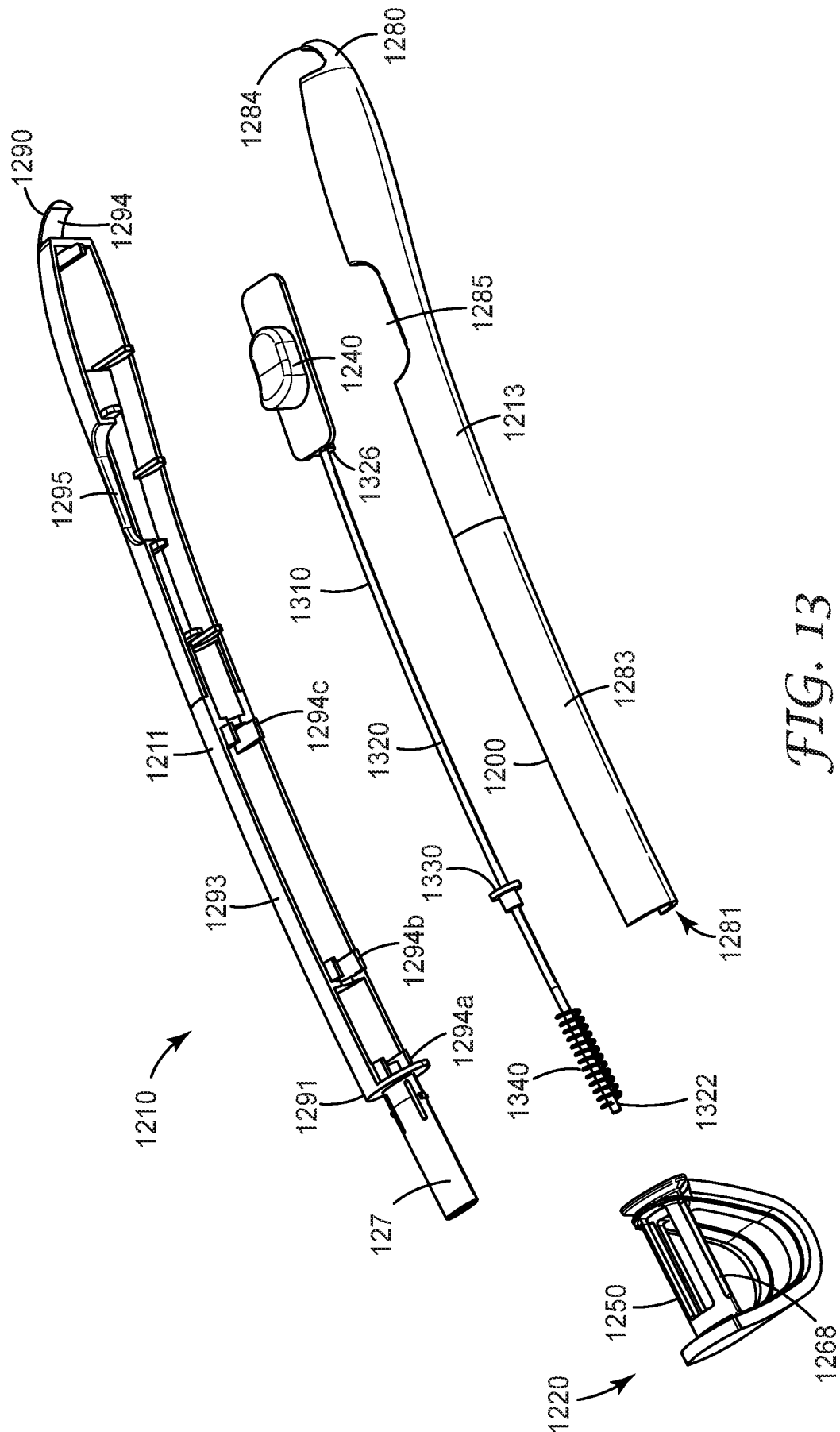


FIG. 12



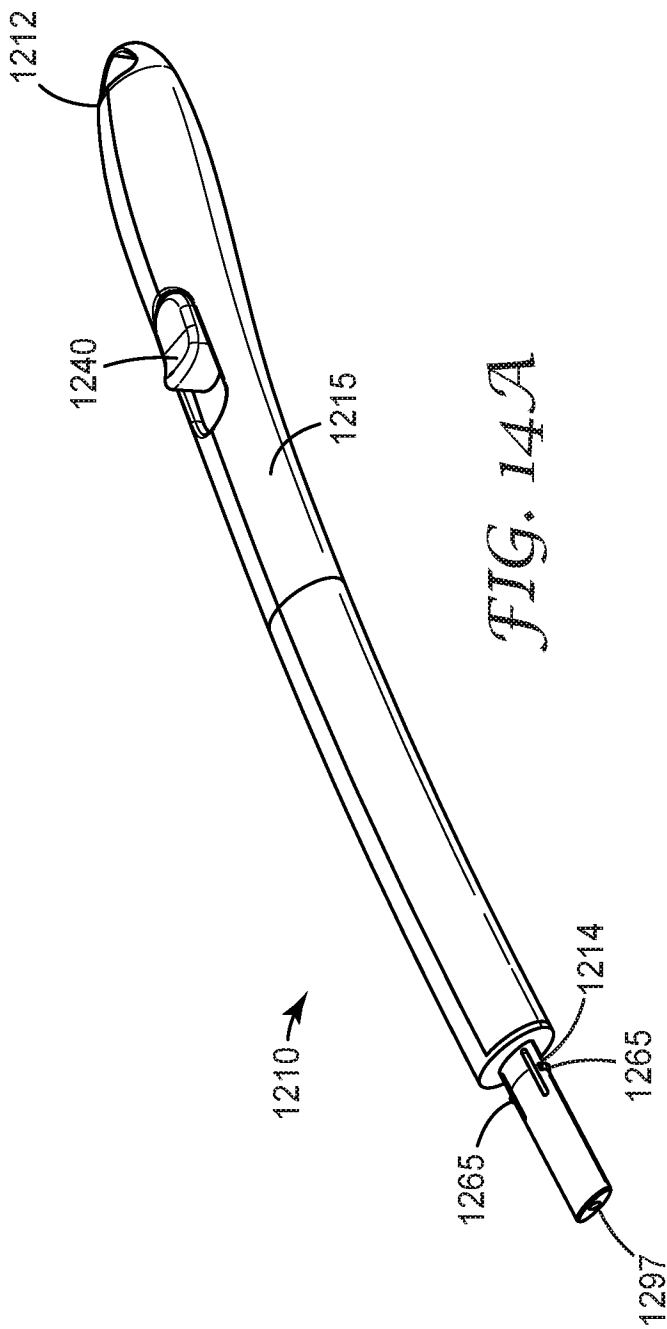


FIG. 14A

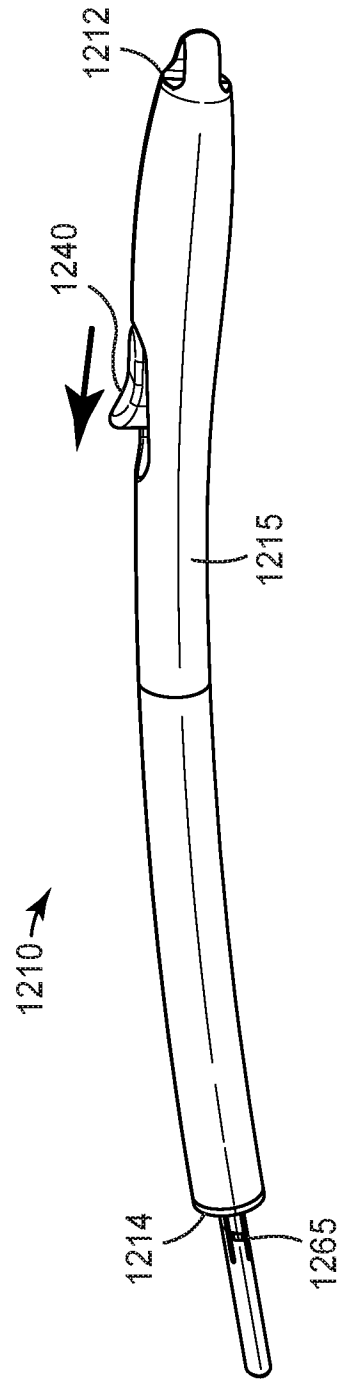


FIG. 14B

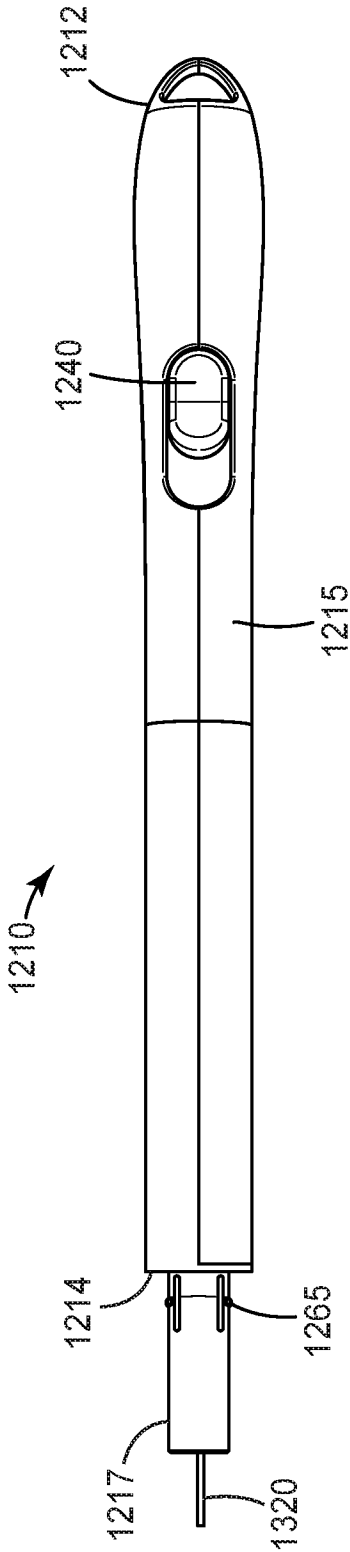


FIG. 14C

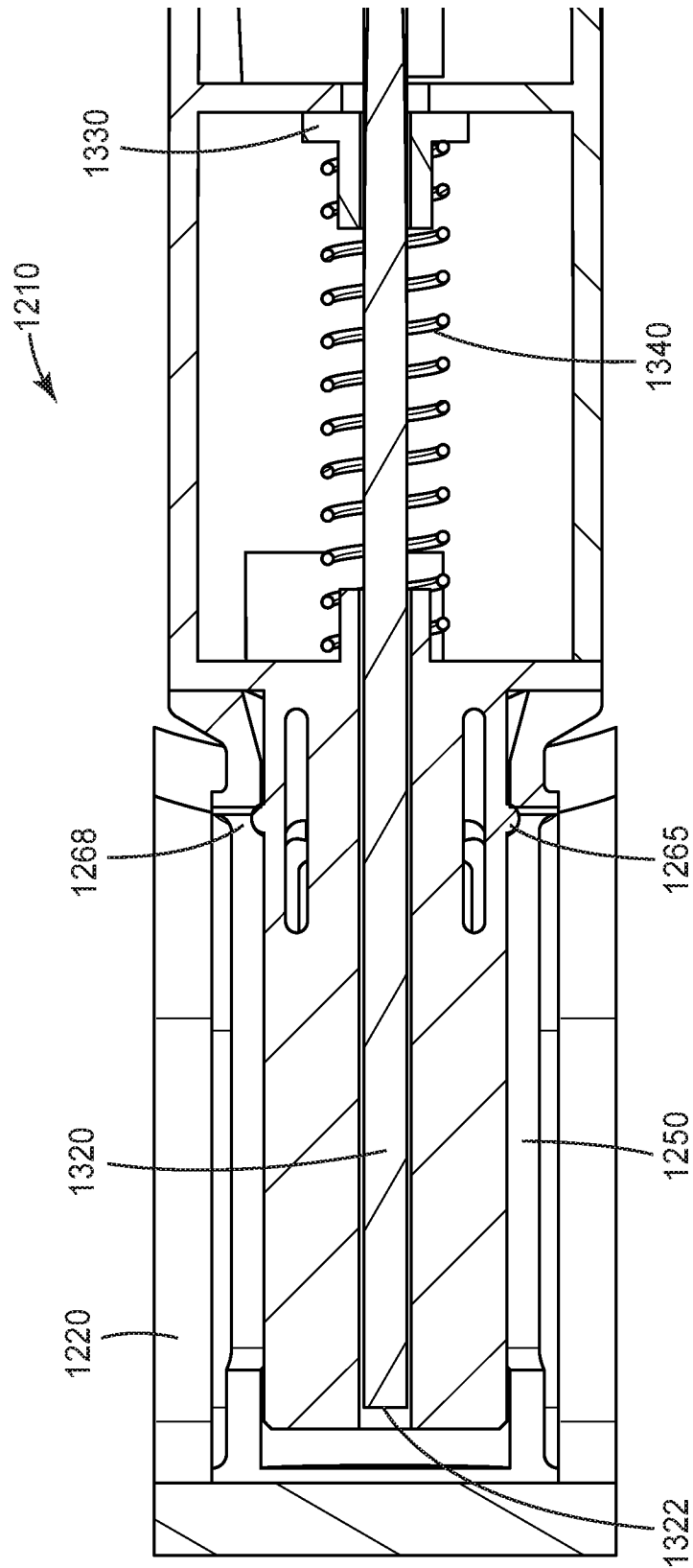
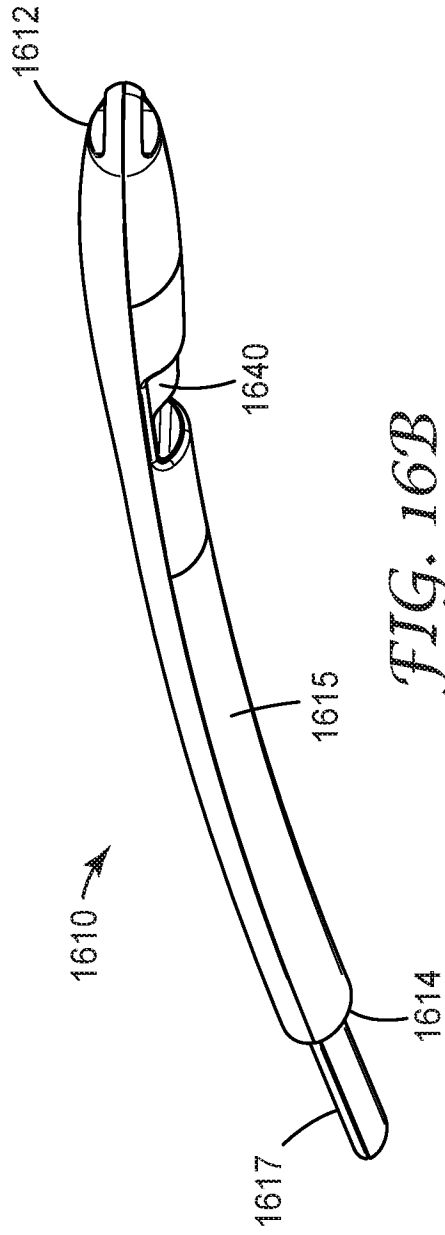
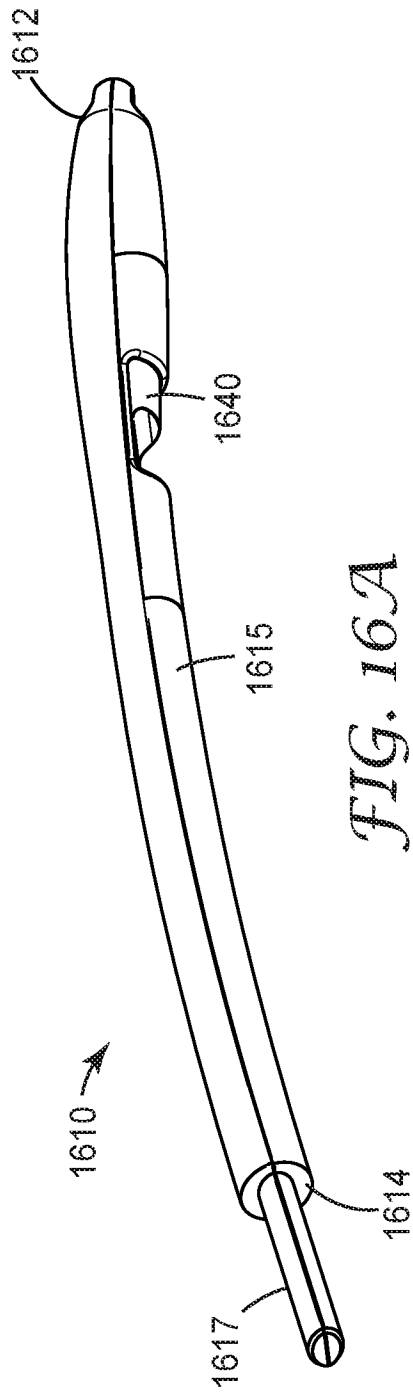


FIG. 15



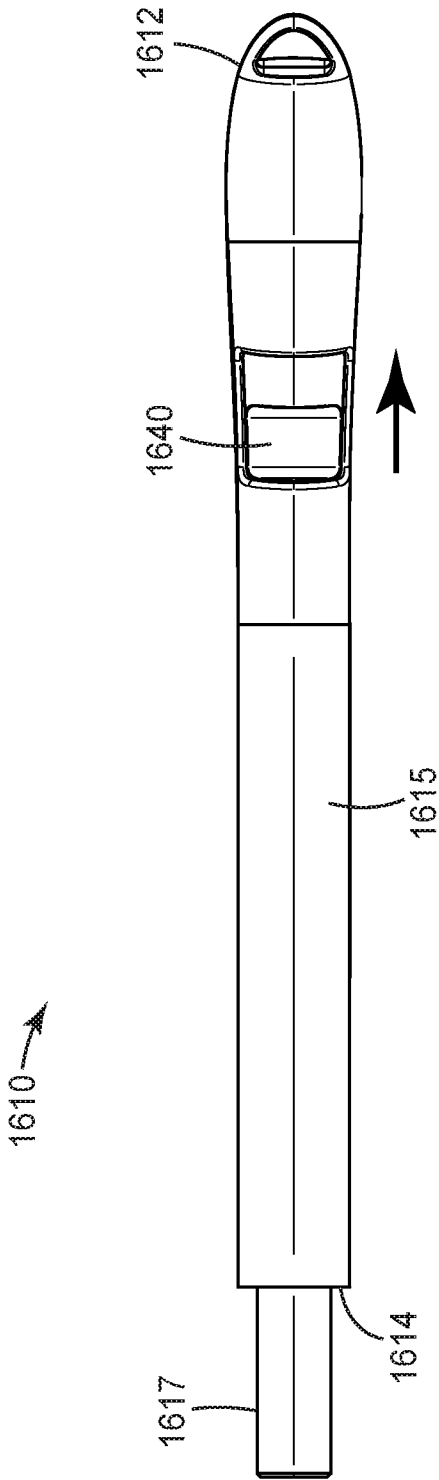


FIG. 16C

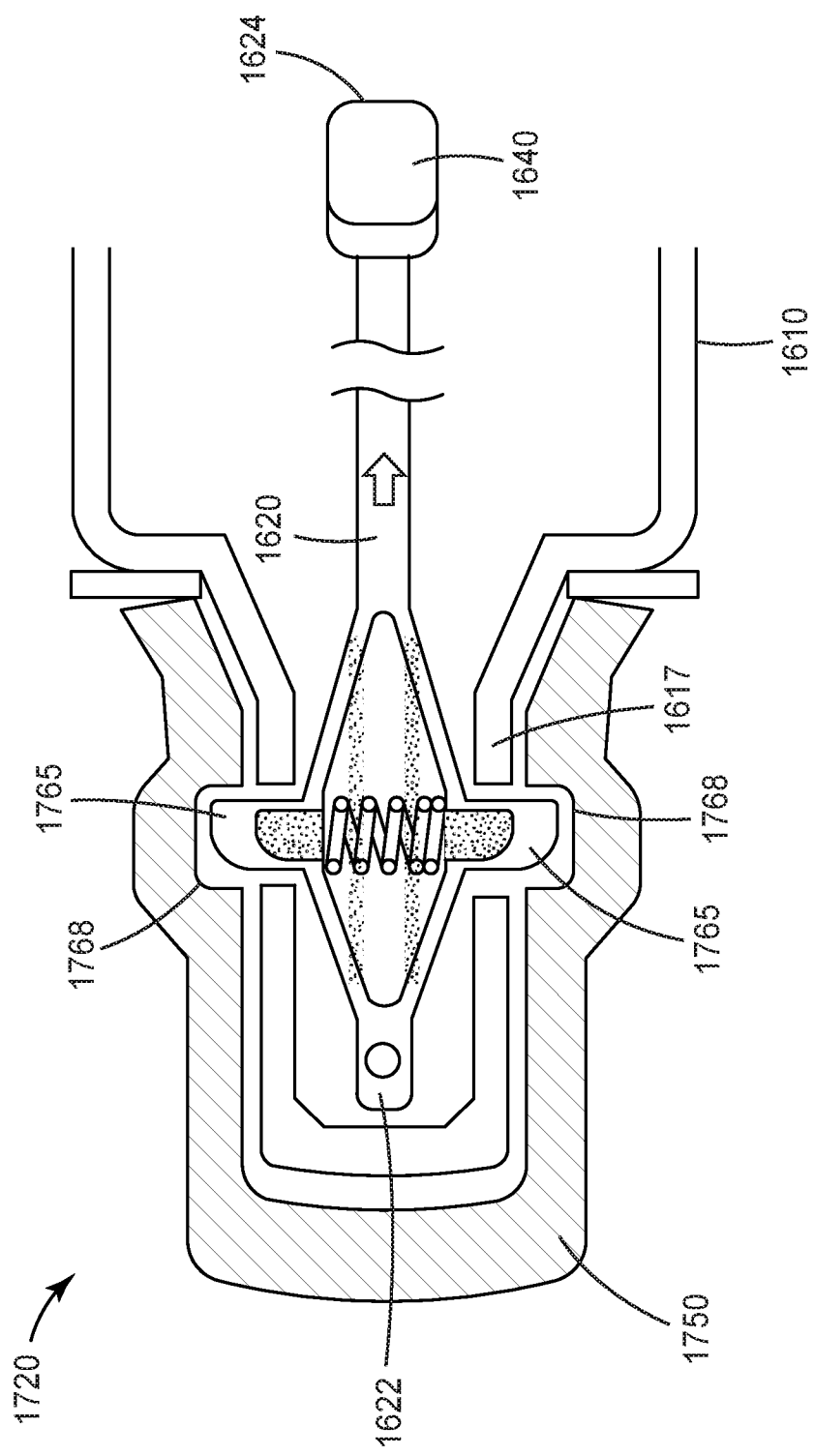
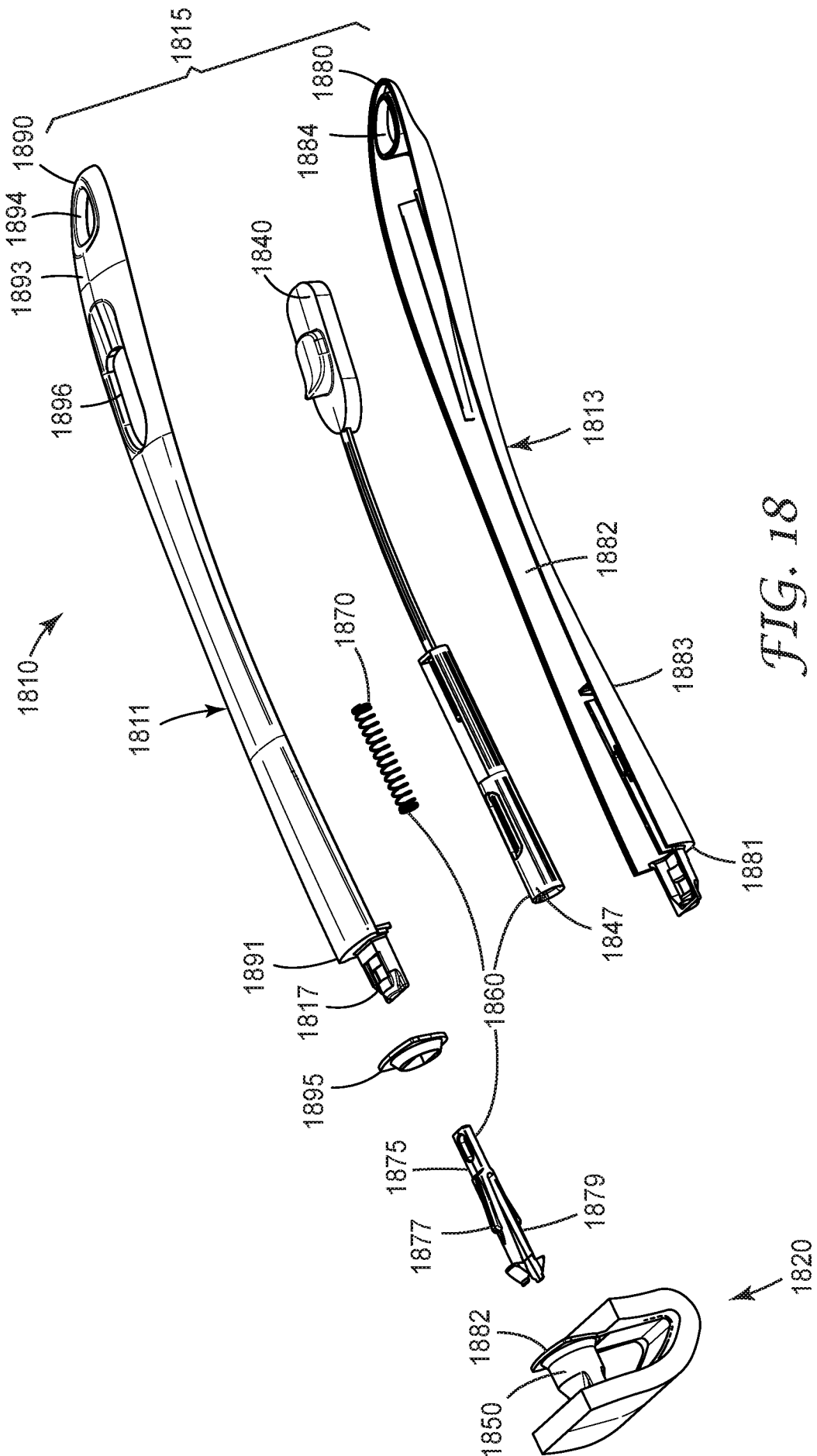
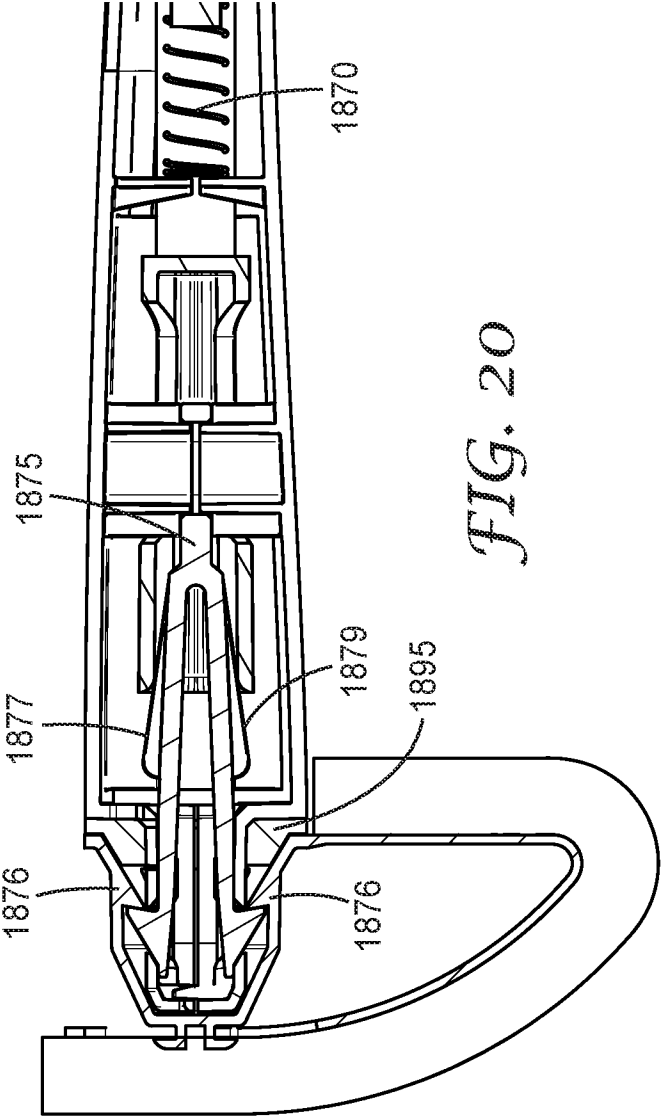
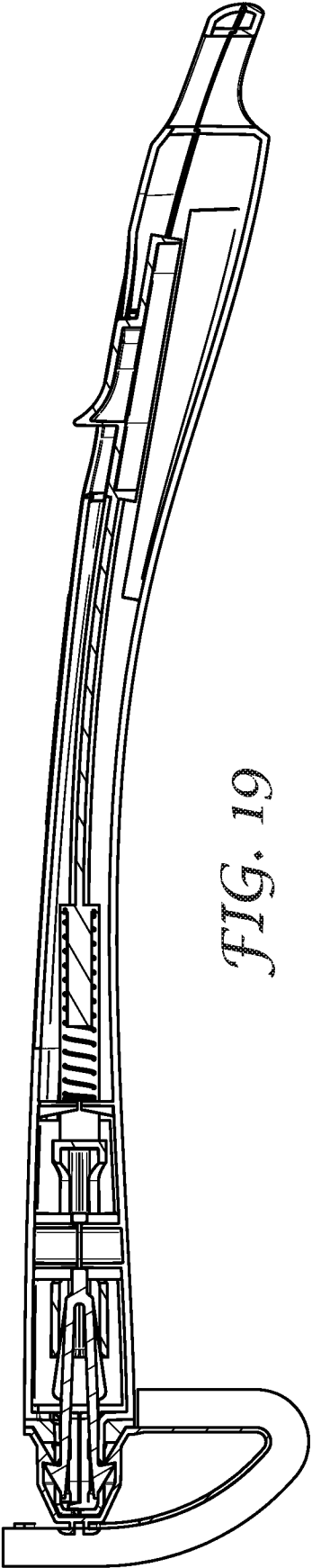


FIG. 17





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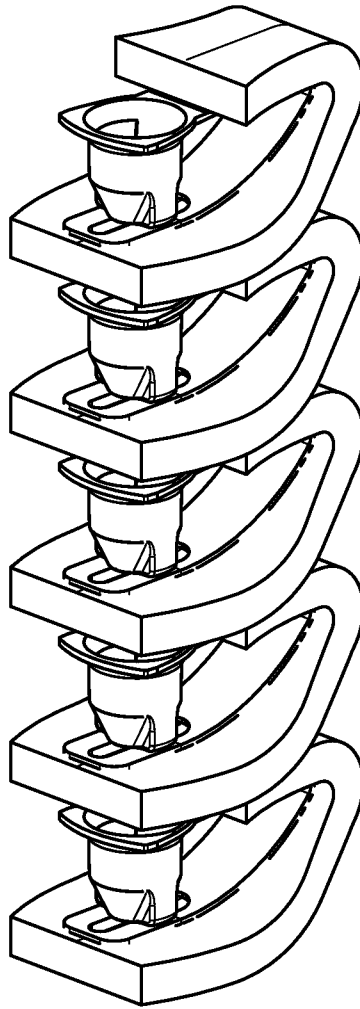


FIG. 21

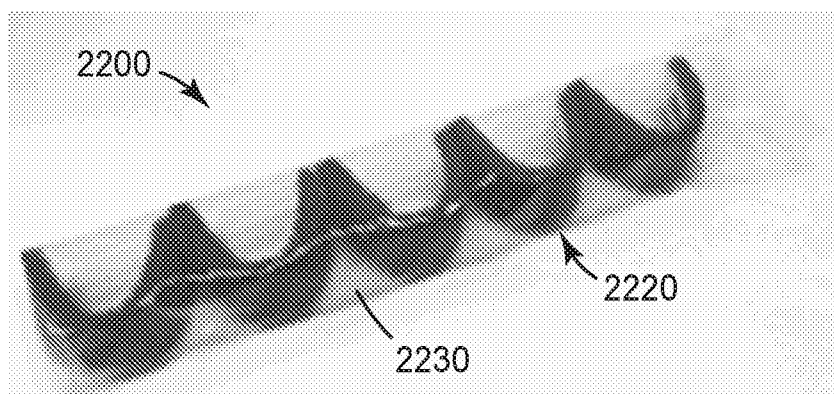


FIG. 22

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2016/038667

A. CLASSIFICATION OF SUBJECT MATTER

INV. A47K11/10
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A47K A47L

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2014/013527 A1 (MOLINET MICHAEL C [US] ET AL) 16 January 2014 (2014-01-16) paragraph [0014] - paragraph [0027]; figures	1-20
X	----- US 5 592 713 A (RONES JAMES M [US]) 14 January 1997 (1997-01-14) cited in the application	1,2,4, 11,15,18
A	column 2, line 14 - column 3, line 17; figures	3,5-10, 12-14, 16,17, 19,20
A	----- WO 2015/006090 A1 (3M INNOVATIVE PROPERTIES CO [US]) 15 January 2015 (2015-01-15) page 2, line 18 - page 3, line 29; figures	11-14, 18,20



Further documents are listed in the continuation of Box C.



See patent family annex.

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

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search

31 August 2016

Date of mailing of the international search report

06/09/2016

Name and mailing address of the ISA/

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

Authorized officer

van de Beek-Duijker

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2016/038667

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		EP 2872023 A1	20-05-2015
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		WO 2014011630 A1	16-01-2014

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		EP 3019064 A1	18-05-2016
		KR 20150007141 A	20-01-2015
		US 2016106274 A1	21-04-2016
		WO 2015006090 A1	15-01-2015
