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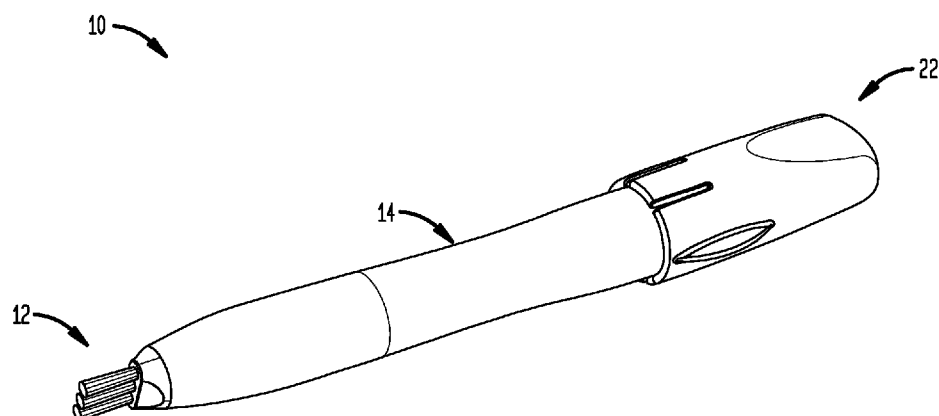
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(54) Title: CHALK LINER WITH CLEANING TOOL

FIG. 1



(57) Abstract: A chalk liner including: (a) an elongate reservoir barrel for receiving powdered chalk; (b) a marking tip mounted on one end of the reservoir barrel and communicating with the interior of the reservoir barrel for receiving powdered chalk therefrom and having a marking wheel rotatably mounted in the marking tip and projecting outwardly therefrom; and (c) a cleaning tool mounted on the other end of the reservoir barrel.



Chalk Liner with Cleaning Tool

Cross Reference to Related Application

This application is based on Provisional United States Patent Application Serial No. 63/340,983, filed 12 May 2022 of the same title, the priority of which is hereby claimed and the disclosure of which is incorporated herein in its entirety.

Technical Field

The present invention is directed to a chalk liner for marking fabrics while making garments. The device is of the class with an elongated reservoir barrel for housing a chalk reservoir of powdered chalk feeding a marking tip with a marking wheel, the improvement comprising a cleaning tool mounted on the reservoir barrel distal to the marking tip for removing chalk from a fabric.

Background

Chalk marking tools are known in the art. In United States Patent No. 10,926,575 there is disclosed a three-way marker for sewing including a shell, a retention sleeve, compression spring, control tab, a reversible disk holder, and a cap. *See, also*, United States Design Patent No. D918,297. Also noted is Clover's white chaco liner model 4712 liner, a "pen type" liner, as is seen at Amazon.com: Clover White Chaco Liner, 1 Count(Pack of 1) : Arts, Crafts & Sewing, downloaded February 23, 2022.

Although chalk liners are widely used, they have the drawback that they leave a chalk residue on the fabric which is quite persistent if not removed promptly, which conventionally requires another tool, such as a brush, sponge, felt or the like. Additional tools are difficult to keep track of on a busy work surface and may not be as effective as desired since chalk powder has an affinity for textile fibers and is oftentimes difficult to dislodge, especially when removal is not accomplished right away.

Summary of Invention

A chalk liner includes: (a) an elongate reservoir barrel for receiving powdered chalk;
(b) a marking tip mounted on one end of the reservoir barrel and communicating with the interior
5 of the reservoir barrel for receiving powdered chalk therefrom and having a marking wheel
rotatably mounted in the marking tip and projecting outwardly therefrom; and (c) a cleaning tool
most preferably in the form of a brush assembly mounted on the other end of the reservoir barrel
with a plurality of brush bristles for removing chalk from a marked surface.

10 Further details and advantages will become apparent from the following description and
appended drawings.

Brief Description of the Drawings

The invention is described in detail below with reference to the drawings, wherein like
15 numerals designate similar parts and wherein:

Figure 1 is a perspective view of the inventive chalk liner with cleaning tool, fully
assembled and including a cap over the marking tip;

20 **Figure 1A** is a perspective view of the inventive chalk liner with cleaning tool, having
the cap removed showing the marking tip and the marking wheel;

Figure 1B is an enlarged perspective view of the assembled marking tip showing the
marking wheel protruding from a gap;

25 **Figure 2** is an exploded perspective view of the chalk liner with cleaning tool of **Figure**
1;

Figure 3 is a perspective view of a brush assembly of the chalk liner with cleaning tool
30 according to the invention;

Figure 4 is a plan view of the brush assembly of **Figure 3**;

Figure 5 is an end view in elevation of the brush assembly of **Figure 3**;

5 **Figure 6** is a side view in elevation of the brush assembly of **Figure 3**;

Figure 7 is a perspective view of the reservoir barrel of the chalk liner of **Figure 1**;

Figure 8 is a side view in elevation of the reservoir barrel of **Figure 7**;

10 **Figure 9** is a perspective view of the upper dispensing tip member of the chalk liner of **Figure 1**;

Figure 10 is a side view in elevation of the upper dispensing tip member of **Figure 9**;

15 **Figure 11** is a plan view of the upper dispensing tip member of **Figure 9**;

Figure 12 is an end view in elevation of the upper dispensing tip member of **Figure 9**;

20 **Figure 13** is a perspective view of the lower dispensing tip member of the chalk liner of **Figure 1**;

Figure 14 is a side view of the lower dispensing tip member of **Figure 13**;

25 **Figure 15** is a plan view of the lower dispensing tip member of **Figure 13**;

Figure 16 is an end view in elevation of the lower dispensing tip member of **Figure 13**;

Figure 17 is a perspective view of the copper regulating spring of the chalk liner of
30 **Figure 1**;

Figure 18 is a plan view of the regulating spring of **Figure 17**;

Figure 19 is an enlarged perspective view of the serrated marking wheel of the chalk liner of **Figure 1**;

5

Figure 20 is a plan view of the marking wheel of **Figure 19**;

Figure 21 is an end view in elevation of the marking wheel of **Figure 19**;

10 **Figure 22** is an enlarged perspective view of the cap of the chalk liner of **Figure 1**;

Figure 23 is a plan view of the cap of **Figure 22**;

Figure 24 is a side view in elevation of the cap of **Figure 22**;

15

Figure 25 is an end view in elevation of the cap of **Figure 22**;

Figure 26 is a perspective view of a cleaning tool assembly of the chalk liner with cleaning tool having a rubber cleaning pad with a plurality of molded in projections according to the invention; and

20

Figure 27 is a perspective view of still another cleaning tool assembly of the chalk liner with cleaning tool in the form of a cleaning pad according to the invention.

25

Detailed Description

Referring to the drawings, there is illustrated a chalk liner with cleaning tool **10** which includes a cleaning tool in the form of a brush assembly **12**, a reservoir barrel **14** for receiving powdered chalk, a dispensing tip **16** formed by upper dispensing tip member **16(a)** and lower dispensing tip member **61(b)**, a regulating spring **18**, a serrated marking wheel **20** and a cap **22**.

30

Figure 1 shows chalk liner with cleaning tool **10** in assembled form. **Figure 1A** shows the chalk liner with cap **22** removed, while **Figure 2** shows the various parts in an exploded view. It will be appreciated that cap **22** fits over dispensing tip **16**. Brush assembly **12** fits into reservoir barrel **14**, sealing an opening **24** of the reservoir barrel.

5

Members **16(a)**, **16(b)** are assembled to each other and grip spring **18** and retain wheel **20** as is shown in **Figures 1A** and **1B**. *Note* that serrated marking wheel **20** protrudes slightly from a gap **26** between assembled dispensing tip **16**, but is free to rotate, limited by regulating spring **18** so that powdered chalk in reservoir barrel **14** does not leak out extensively when the chalk
10 liner is not in use. That is, wheel **20** substantially seals gap **26** and powdered chalk is dispensed when wheel **20** rotates. Spring **18** engages to a plurality of teeth **32** on wheel **20** in order to modulate rotation in a preferred embodiment.

Barrel **14** with brush assembly **12** is secured to tip **16** by way of threads **28** on barrel **14**
15 and threads **30** on dispensing tip **16**. The tip may thus be unscrewed for purposes of refilling the reservoir barrel.

When marking fabrics or garments, fabric is marked by applying chalk powder thereto with the chalk liner. To this end, the chalk liner is held vertically oriented with marking wheel
20 **20** on the fabric and pressure is applied while moving the liner in the desired direction. Spring **18** modulates rotation of the wheel and dispensing of chalk so that excessive dispensing does not occur.

When marking is no longer needed, residual chalk is brushed from the fabric, preferably
25 promptly to avoid staining. Thus, a cleaning tool is conveniently provided that will not be misplaced since it is attached to the chalk liner.

In various embodiments, brush assembly **12** may be made of polypropylene with either polyester or nylon bristles.

30

The bristles of the brush mounted on the chalk liner are suitably project a length of from about 5mm to 15mm from the base member of the brush assembly, preferably a distance of from a base member **34** of from 7.5mm to 12.5mm or 8mm to 11.5 mm in order to provide the desired functionality. The bristles resemble those used in tooth brushes and are arranged in bundles also resembling a tooth brush. The bristles may be made from thermoplastic nylon or thermoplastic polyester and are of suitable stiffness (initial modulus). Typical properties may be:

Material	BRISTLE DIAMETERS
Nylon 6,12	0.127-0.508mm
Polyester	0.127-0.508mm

INITIAL TENSILE MODULUS AT VARIOUS HUMIDITIES (k-psi)

RELATIVE HUMIDITY	0%	50%	100%
Nylon 6,12	570	490	410
Polyester	540	530	515

Initial modulus is determined in accordance with test method ASTM-D3379 or equivalent and may suitably be from about 350 to 700 kpsi at 25°C and 50% relative humidity. Individual bristles may have a fiber diameter of from about 0.075 to about 0.6mm while bristle bundles may have a bundle diameter ranging from 1 to about 3mm, depending on the selected fibers. *See* Monahan Filaments product brochure (downloaded February 20, 2022). Typically, the bundle diameter at the base of the bundle is substantially smaller than at the bundle diameter at the top; for present purposes, the bundle diameter at the bottom of the bundle adjoining the base of the brush assembly is used. *See Figure 4.*

The reservoir barrel is preferably made from clear polystyrene so that contained chalk powder can be readily observed. Cap **22** is made of polypropylene, while dispensing tip **16** is made of acrylonitrile-butadiene-styrene copolymer (ABS) for dimensional stability. Spring **18** and wheel **20** are suitably made of copper, although other metals may be used, if so desired.

Further details on the various components are noted below in connection with **Figures 3** through **25**.

5 Referring to **Figures 3** through **6**, brush assembly **12** includes a base member **34** sized to fit opening **24** of barrel **14** at a cylindrical projection **36**. A plurality of bristle bundles **38** are mounted to base member **34** which also has a transition skirt **40**, having a filleted conical shape to avoid corners and for a more ergonomic design. The skirt has a generally circular shape at its base, which as a diameter, **D**, of about 10 mm. Base member **34** has a length **42** of about 8 $\frac{3}{4}$ mm, while the bristle bundles project from the base member a distance **44** of about 9 $\frac{1}{2}$ mm, such that assembly **12** has an overall length of about 18-1/4 mm.

The individual fibers of the bristle bundles have the properties noted above.

15 Referring to **Figures 7** and **8**, there is shown barrel **14** with opening **24** and threads **28**. The barrel has an overall length **46** of about 95 mm as well as a diameter **48** proximate the threaded end of about 13 $\frac{1}{2}$ mm. The barrel also has a slight concavity **50** about its medial portion **52**, defining a slight decrease in diameter of 1.5 mm or less, which is perceived by users as providing a more comfortable gripping surface.

20 Referring to **Figure 9** through **12**, there is illustrated upper dispensing tip member **16(a)**. Member **16(a)** has a length **54** of about 38 mm and a height **56** of about 7 mm, as well as a width **60** of about 13 $\frac{1}{2}$ mm. Also provided are threads **30** and a plurality of joining features **58** to secure member **16(a)** to **16(b)**. Also provided is a recess **62** for mounting wheel **20**; that is, for receiving a mounting hub **84** of wheel **20** and a mounting post **64** for mounting regulating spring **18**. *Note* that member **16(a)** has a “duck bill” profile **66** as seen in **Figure 10** to transition to the dispensing tip of the device as shown.

30 Lower member **16(b)** is illustrated in **Figures 13** through **16**. It is seen that member **16(b)** is similar to member **16(a)** having a length **54**, a height **56**, a width **60**, threads **30**, joining

feature **58**, recess **62**, mounting post **64** and profile **66** substantially matching those of member **16(a)**.

Figures 17 and 18 illustrate copper regulating spring **18** has a thickness of about 1 mm, a length **68** of slightly over 24 mm, and a width **70** of about 3 mm. Spring **18** is a single piece with a mounting projection **72** for mounting the spring in posts **64** of the dispensing tip, as well as a bow tie shaped spring terminus **74**. When the device is fully assembled, outer edge **76** of spring **18** engage the teeth of marking wheel **20** in order to regulate rotation of the wheel as the chalk liner is dragged across a fabric surface with pressure on the fabric.

Figures 19 through 21 show serrated marking wheel **20**. Wheel **20** has a plurality of teeth **32** about its outer periphery for engaging spring **18** and is circular in shape with a diameter **80** of 8 mm. Teeth **32** project outwardly a distance **82** of about 0.55 mm, suitably from about 0.35 mm to about 0.8 mm. Also provided on wheel **20** is a mounting hub **84** which rotatably mounts wheel **20** in recesses **62** of the dispensing tip when the device is assembled.

When assembled, the teeth of wheel **20** project from dispensing gap **26**, as is seen in **Figures 1A and 1B**, a distance suitably from about 0.4 mm to 0.6 mm in a preferred embodiment.

Figures 22 through 25 show cap **22** in more detail. Cap **22** has a length **88** of about 43 mm, a width **90** of about 19 ½ mm and a height **92** of about 17 mm, such that it frictionally engages tip **16** of chalk liner **10** and is removably coupled thereto. Cap **22** has a duck bill shape at **94** and is shaped to mate with tip **16**, without excessive clearance. Also provided is a tab **96** to facilitate installation and removal of cap **22** from the chalk liner. Width **90** is slightly greater than height **92** due to the presence of tab **96**, but is otherwise round at end **98** as shown in **Figure 25**. It will be appreciated from the foregoing that the marking tip end of the chalk liner is larger than the brush assembly on the opposite end thereof, in terms of cross-section. It is desirable for cap **22** to fit securely over both ends of the chalk liner so that it does not become misplaced when the chalk liner is used, To this end, there is provided two pairs of longitudinal slots **100**, **102** and **104**, **106** which axially extend from the opening at **98** toward a distal end of the cap over a

distance **108** of anywhere from about 20% to 50% of length **88**, preferably about 25% to 35% of length **88**. Slots **100**, **102** and **104**, **106** are separated from each other by an arc **110** of less than 90° and slots **100**, **104** as well as slots **102** and **106** are separated by an arc **112** of greater than 90°. The plurality of slots provide a variable diameter to the cap opening at **98** so that it may be functionally secured to either the marking tip or the brush assembly despite the difference in cross-section. That is, the slotted structure flexes to a larger cross-section when attached to the marking tip and to a smaller cross-section when removed, so that the cap may be securely fitted to the cleaning tool end of the chalk liner.

The inventive chalk liner has been described above in connection with a brush assembly for removing chalk dust from fabric comprising a plurality of bristles resembling those of a tooth brush; however, it will be appreciated that other chalk removal tools or cleaning tools may be provided on the end of the device distal to the marking tip. For example, a molded plastic or rubber cleaning tool with a plurality of elongated outward projections is suitable and for present purposes such a construction would be referred to as a plurality of brush bristles. Other molded cleaning tools could have a variety of constructions with or without outward projections such as that shown in **Figures 26 and 27**.

Referring to **Figure 26**, a cleaning tool assembly **212** for mounting on reservoir barrel **14** includes a base member **234** sized to fit opening **24** of barrel **14** at a cylindrical projection **236**. A rubber pad **235** with plurality of molded in projections **238** are mounted to base member **234** which also has a transition skirt **240**, having a filleted conical shape.

Alternatively, a cleaning tool comprising an absorbent cleaning pad of felt, cloth such as woven terry cloth, sponge material, all of which may be moistened if so desired. In some cases simply a soft plastic or rubber pad made of rubber or polymeric elastomer may be employed. Referring to **Figure 27**, a cleaning tool assembly **312** for mounting on reservoir barrel **14** includes a base member **334** sized to fit opening **24** of barrel **14** at a cylindrical projection **336**. A cleaning pad **335** with a relatively smooth, slightly arched surface, is mounted to base member **334** which also has a transition skirt **340**, having a filleted conical shape. Pad **335** may be arched slightly is so desired and is made of the materials recited above; namely felt, cloth such as woven

terry cloth, sponge material, all of which may be moistened if so desired or a soft plastic or rubber pad made of natural or synthetic rubber or polymeric elastomer.

While the invention has been described in detail, modifications within the spirit and
5 scope of the invention will be readily apparent to those of skill in the art. Such modifications are
also to be considered as part of the present invention. In view of the foregoing discussion,
relevant knowledge in the art and references and the attachment hereto discussed above in
connection with the foregoing description including the Detailed Description and Background of
the Invention, the disclosures of which are all incorporated herein by reference, further
10 description is deemed unnecessary. In addition, it should be understood from the foregoing
discussion that aspects of the invention and portions of various embodiments may be combined
or interchanged either in whole or in part. Furthermore, those of ordinary skill in the art will
appreciate that the foregoing description is by way of example only, and is not intended to limit
the invention.

WHAT IS CLAIMED IS:

1. A chalk liner comprising:

- (a) an elongate reservoir barrel for receiving powdered chalk;
 - (b) a marking tip mounted on one end of the reservoir barrel and communicating with the interior of the reservoir barrel for receiving powdered chalk therefrom and having a marking wheel rotatably mounted in the marking tip and projecting outwardly therefrom; and
 - (c) a cleaning tool mounted on the other end of the reservoir barrel.
2. The chalk liner according to Claim 1, wherein the cleaning tool is selected from a brush assembly, a cleaning pad assembly with or without cleaning pad projections, or combinations thereof.
3. The chalk liner according to Claim 1, wherein the cleaning tool comprises a cleaning pad made of felt, cloth, sponge material or a soft polymeric material.
4. The chalk liner according to Claim 1, wherein the cleaning tool comprises a brush assembly having a base member with a plurality of brush bristles for removing chalk from a marked surface mounted thereon.
5. The chalk liner according to Claim 4, wherein the brush bristles are arranged in a plurality of bristle bundles.

6. The chalk liner according to Claim 5, including 2 to 4 bristle bundles.
7. The chalk liner according to Claim 6, including 3 bristle bundles.
8. The chalk liner according to Claim 5, wherein the bristle bundles have a bundle diameter of from 1 mm to 3 mm.
9. The chalk liner according to Claim 8, wherein the bristle bundles have a bundle diameter of from 1.5 mm to 2.5 mm.
10. The chalk liner according to Claim 4, wherein the bristles project outwardly from the base member a distance of from about 5 mm to 15 mm.
11. The chalk liner according to Claim 10 wherein the bristles project outwardly from the base member a distance of from 7.5 mm to 12.5 mm.
12. The chalk liner according to Claim 4, wherein the bristles have an initial modulus of from 350 kpsi to about 700 kpsi.
13. The chalk liner according to Claim 12, wherein the bristles of the brush assembly have a fiber diameter of from about 0.075 mm to 0.6 mm.
14. The chalk liner according to Claim 4, wherein the base member of the brush assembly includes a cylindrical mounting projection.

15. The chalk liner according to Claim 14, wherein the base member of the brush assembly includes a transition section adjoined the reservoir barrel having a filleted conical shape.
16. The chalk liner according to Claim 1, wherein the marking tip defines a gap through which the rotatable marking wheel projects.
17. The chalk liner according to Claim 16, wherein the rotatable marking wheel projects through the gap a distance of from about 0.4 mm to about 0.6 mm.
18. The chalk liner according to Claim 1, wherein the tip defines a cylindrical internal recess and the marking wheel has an annular hub mounted in the cylindrical recess.
19. The chalk liner according to Claim 1, wherein the marking tip is removably attached to the reservoir barrel.
20. The chalk liner according to Claim 1, wherein the reservoir barrel is generally cylindrical, with concavity about medial portion thereof.
21. The chalk liner according to Claim 1, wherein the marking tip includes a regulating spring for modulating rotation of the marking wheel.
22. The chalk liner according to Claim 1, wherein the marking wheel is serrated, having teeth projecting outwardly from the marking tip a distance of from about 0.4 mm to 0.6 mm.

23. The chalk liner according to Claim 1, wherein the marking tip has a duck-bill shaped profile and further comprising a cap with a duck-bill shaped profile adapted to fit over the marking tip.
24. The chalk liner according to Claim 1, wherein the chalk liner has a cap with an opening and wherein the cap has a plurality of longitudinally extending slots extending from the opening of the cap toward an end of the cap distal to the opening, whereby the opening of the cap is expandible and of variable cross-section.

FIG. 1

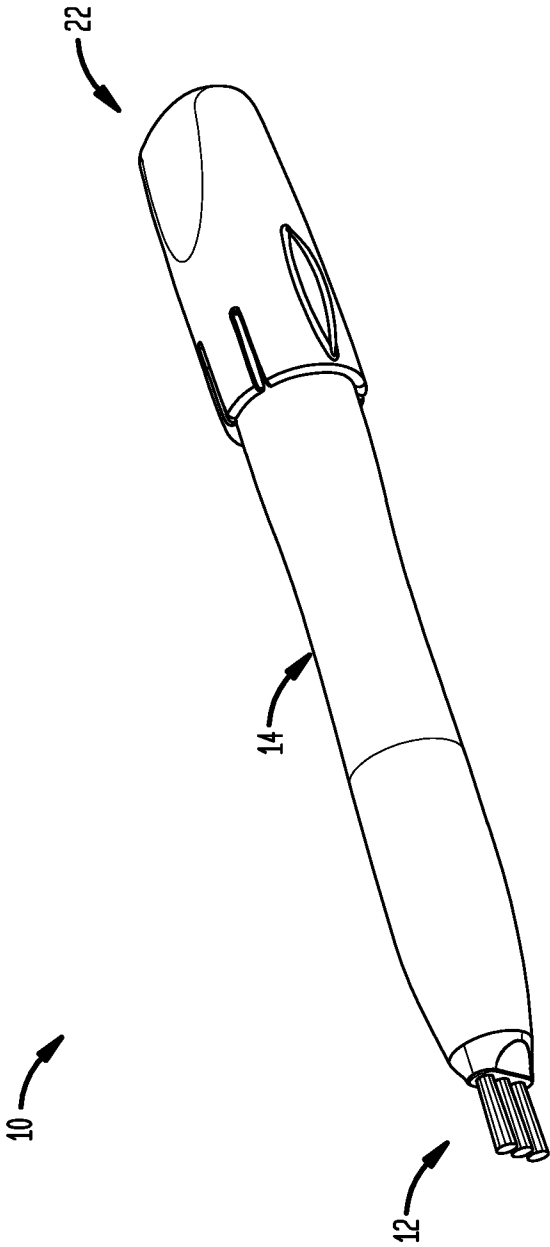


FIG. 1A

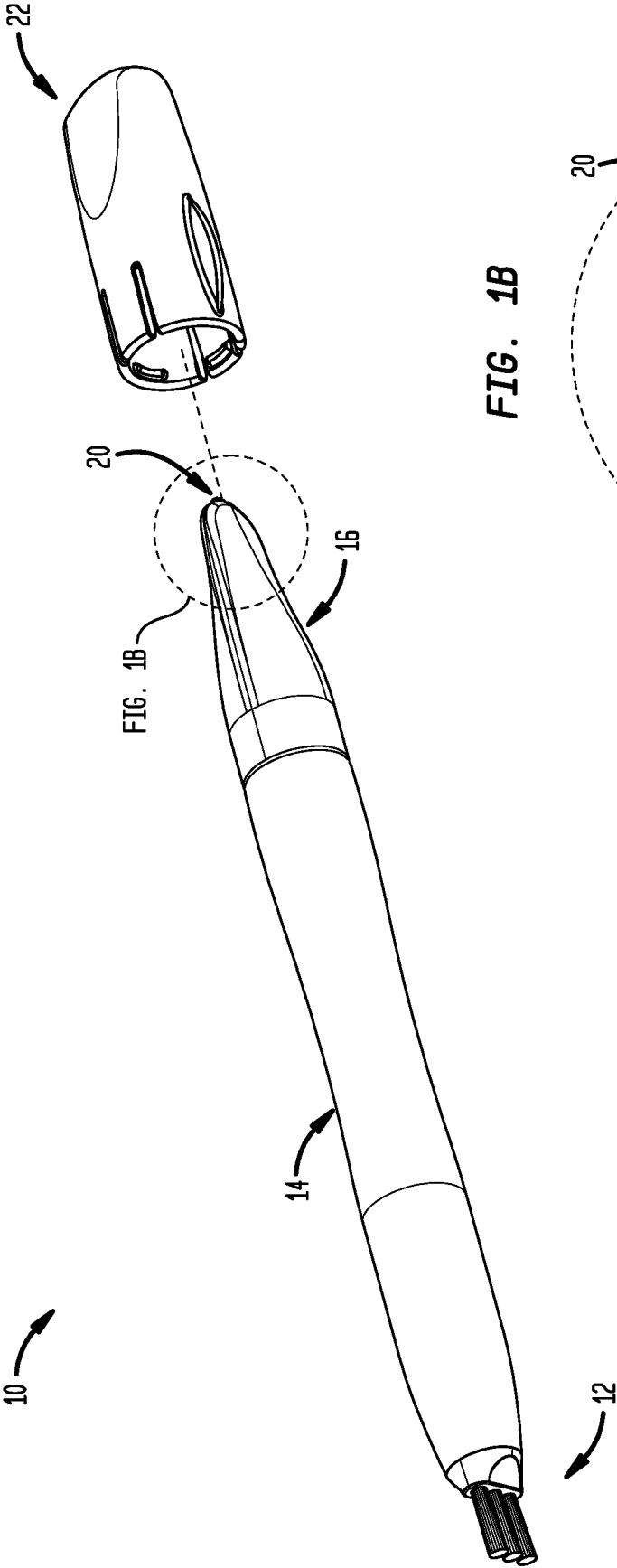


FIG. 1B

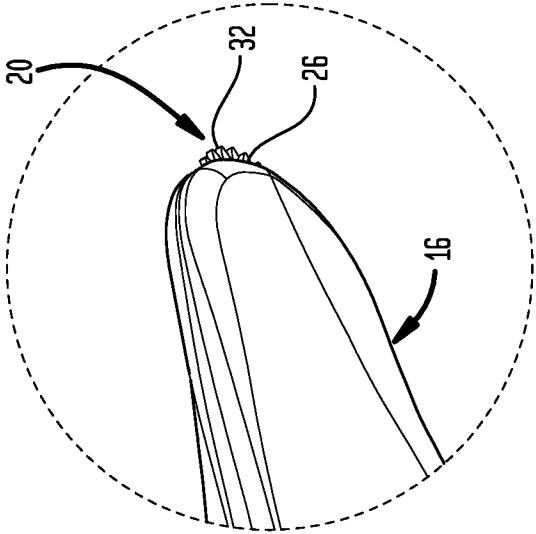
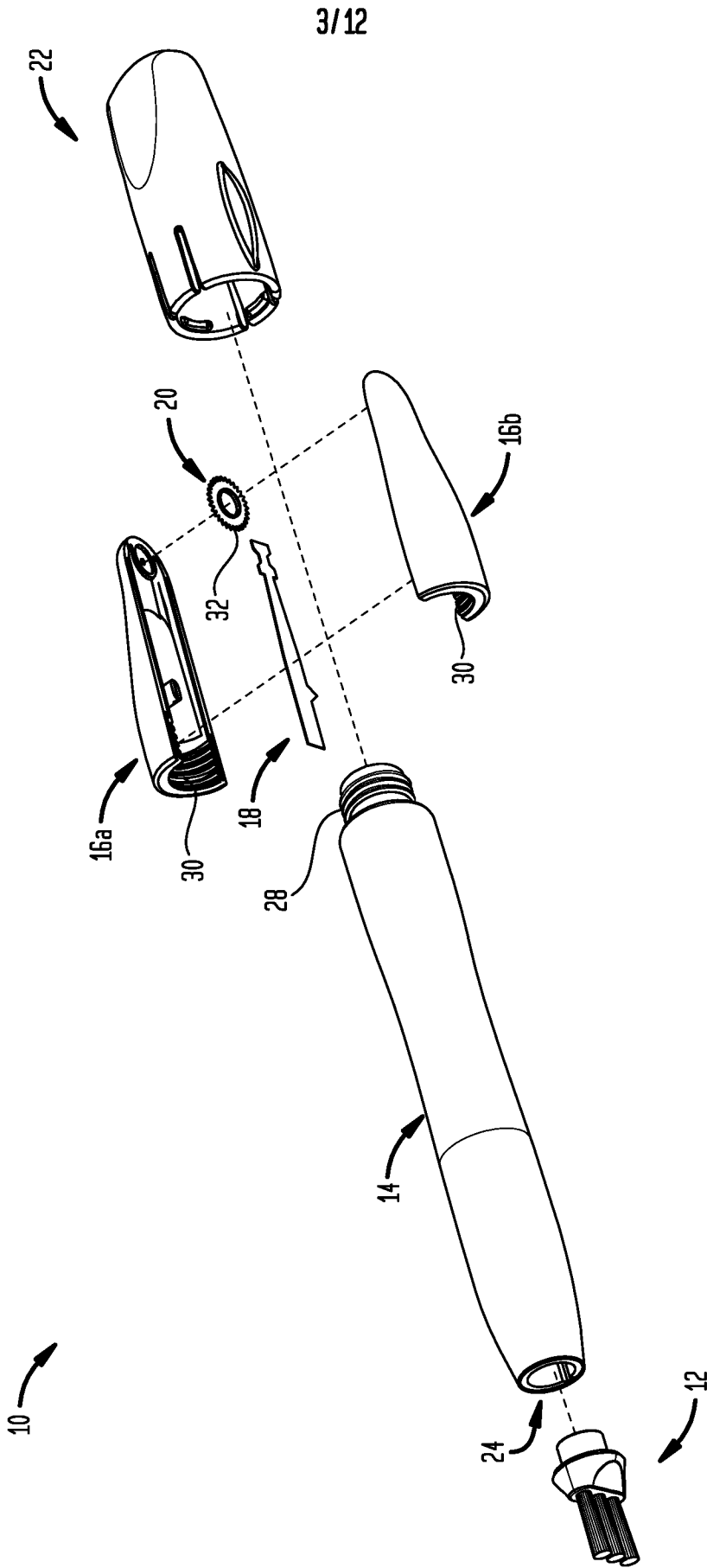


FIG. 2



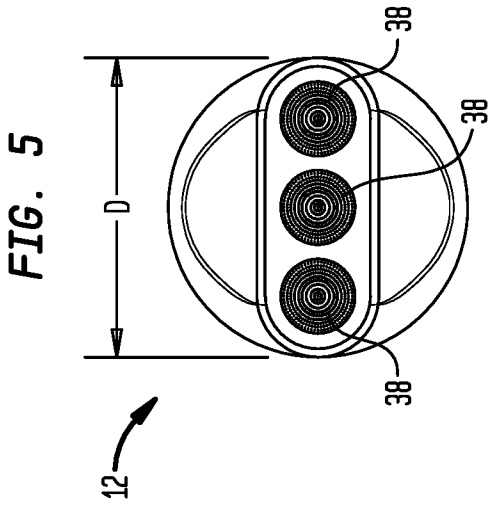
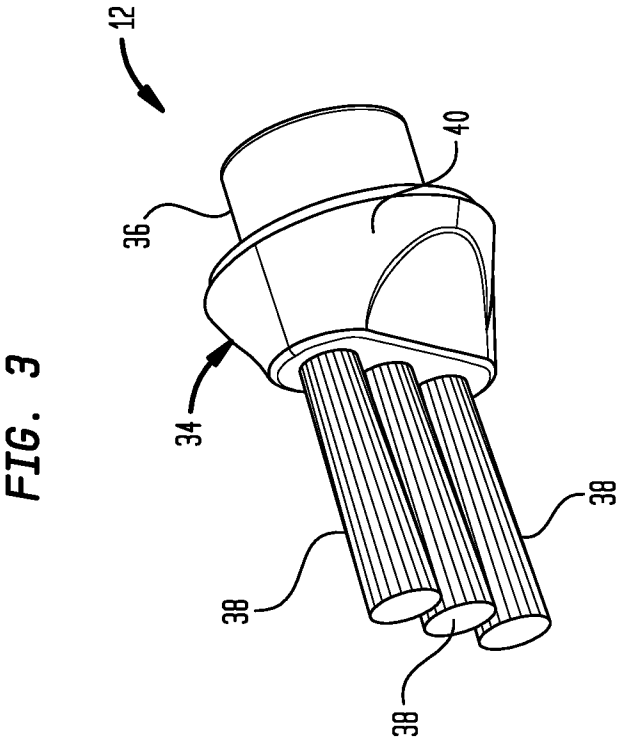
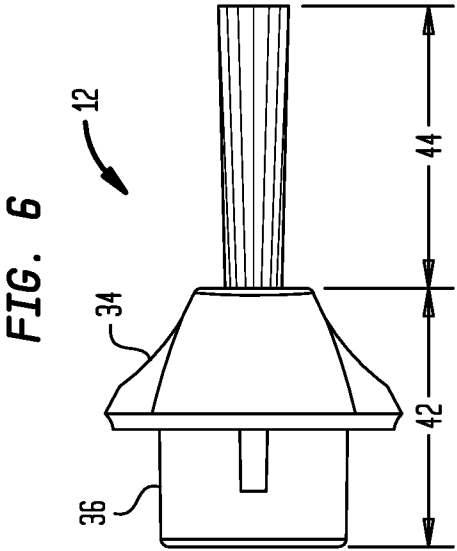
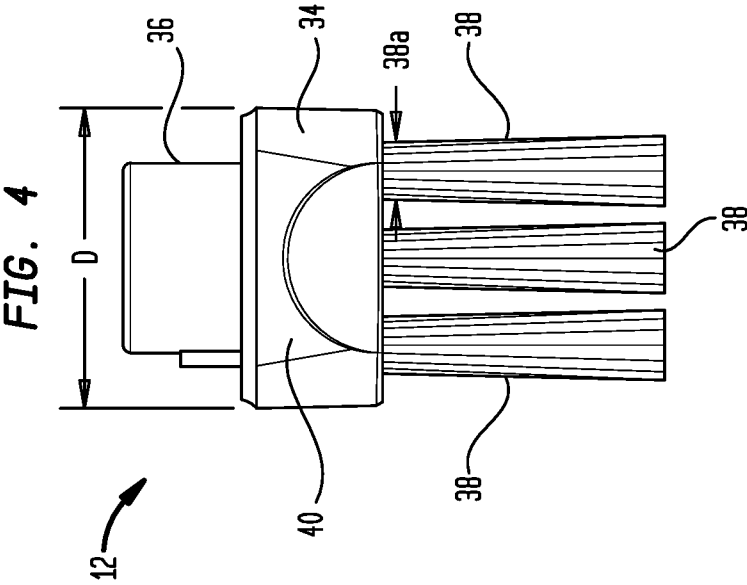


FIG. 7

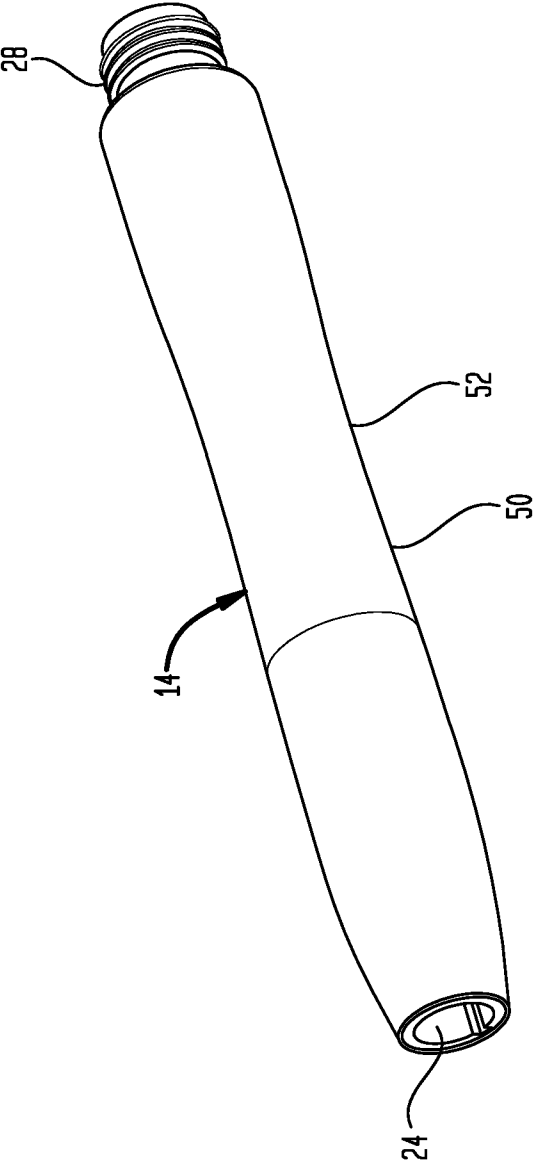


FIG. 8

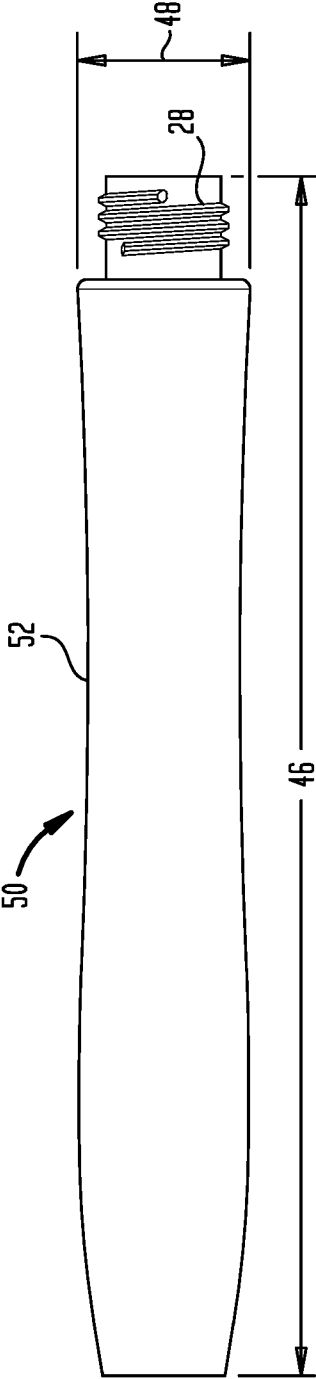


FIG. 10

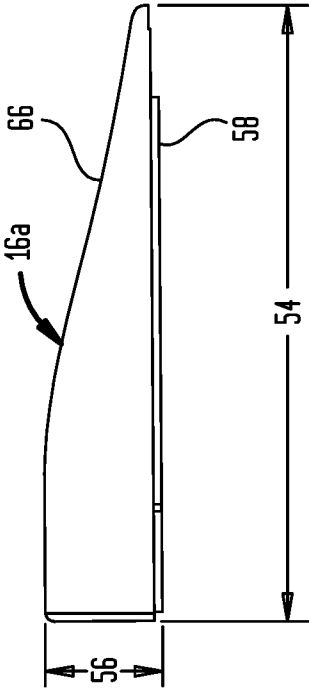


FIG. 12

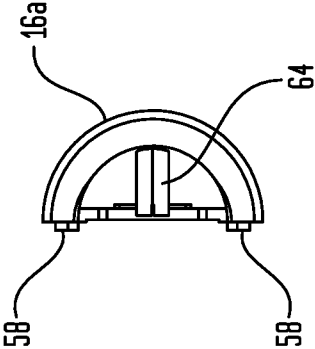


FIG. 9

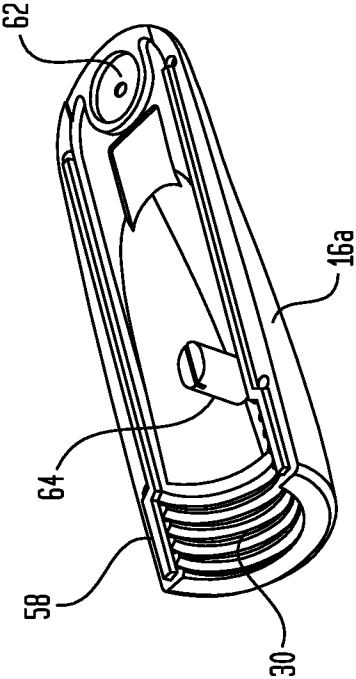


FIG. 11

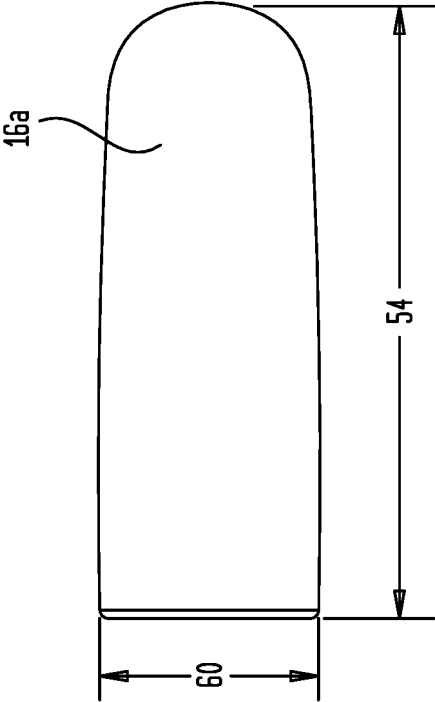


FIG. 13

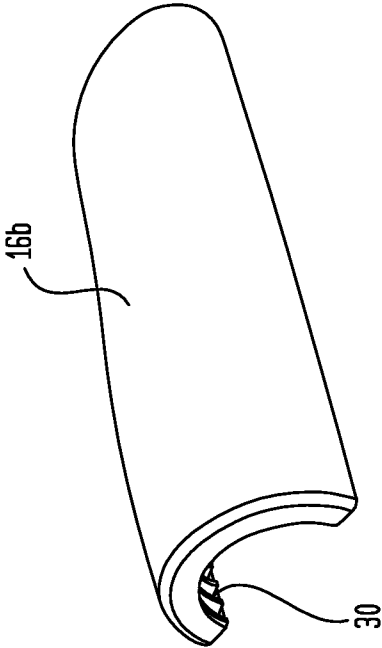


FIG. 14

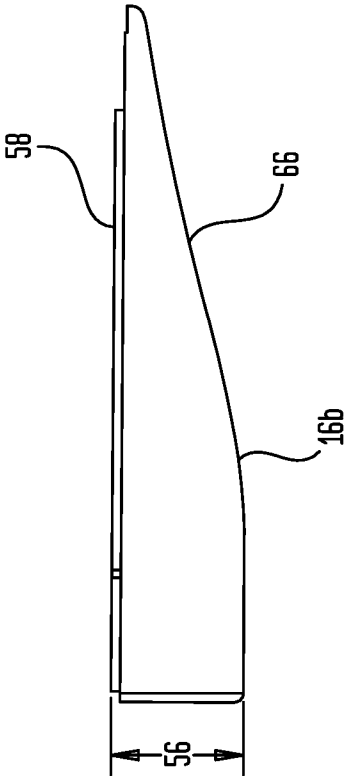


FIG. 15

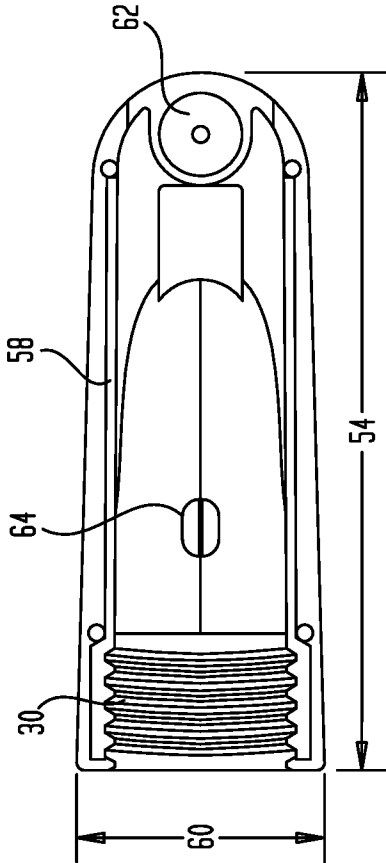


FIG. 16

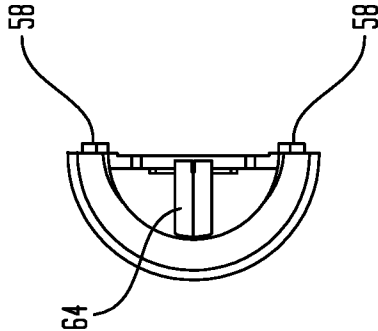


FIG. 17

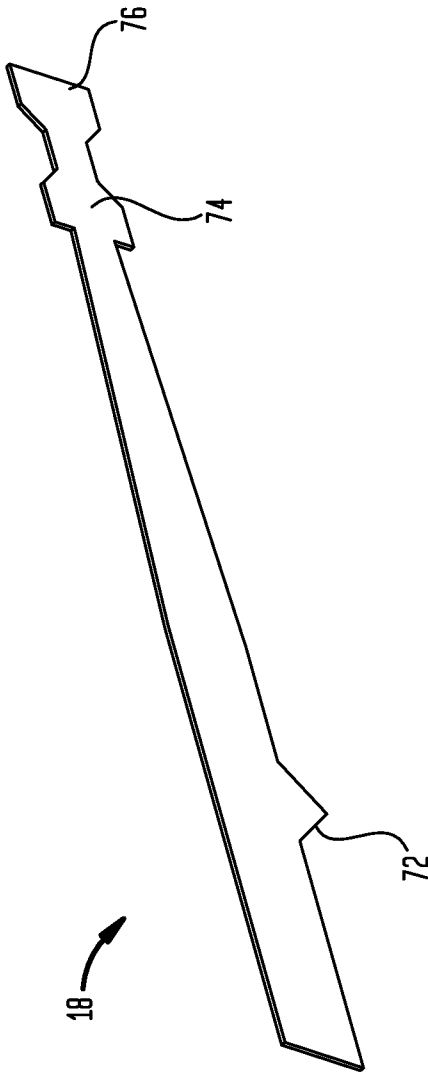


FIG. 18

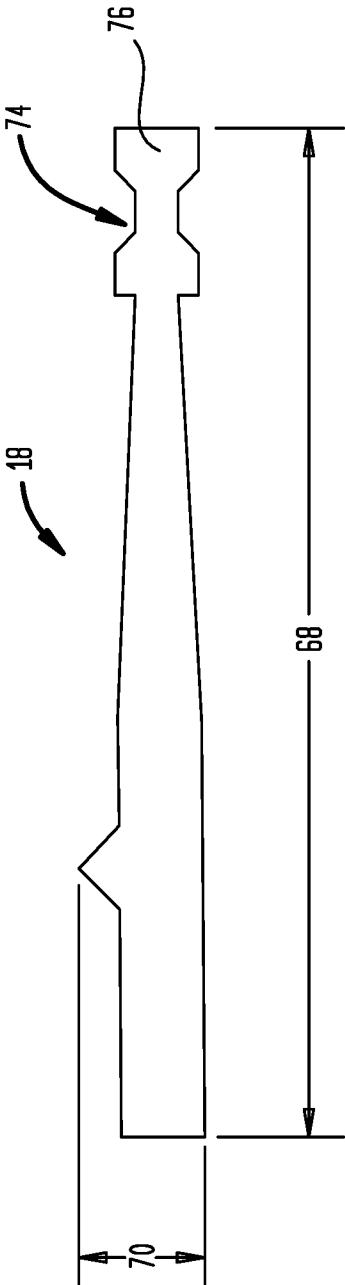


FIG. 19

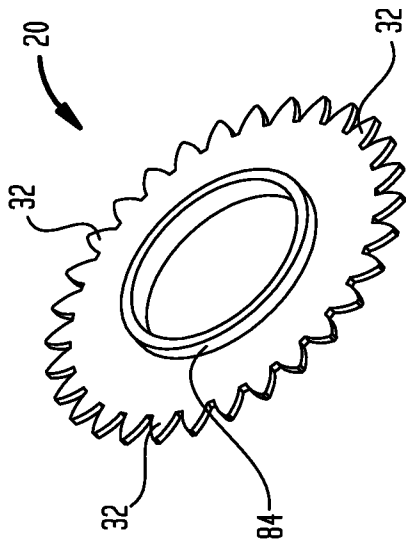


FIG. 20

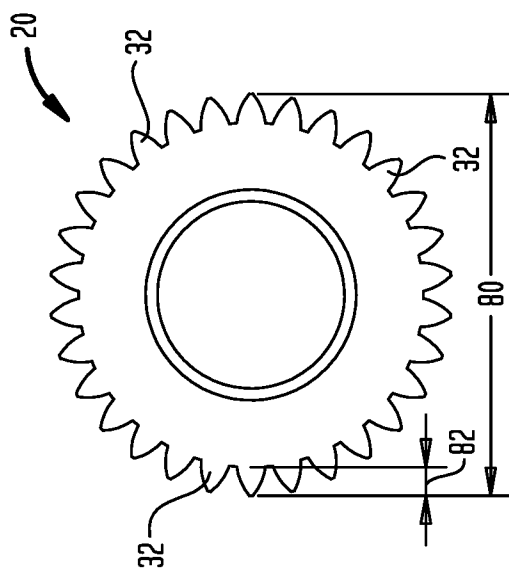


FIG. 21

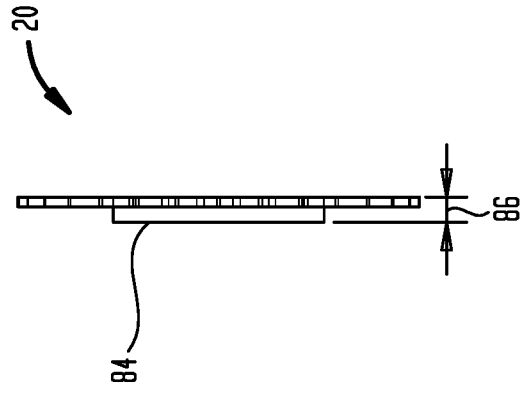


FIG. 22

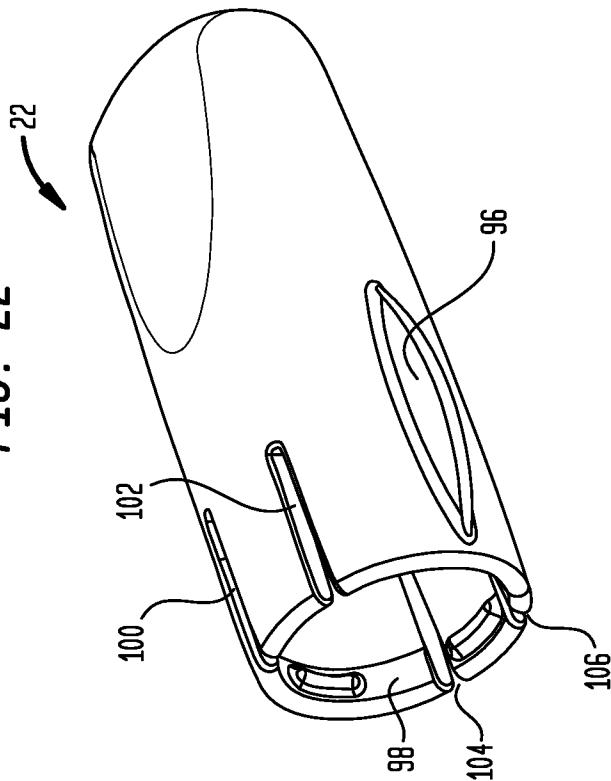


FIG. 23

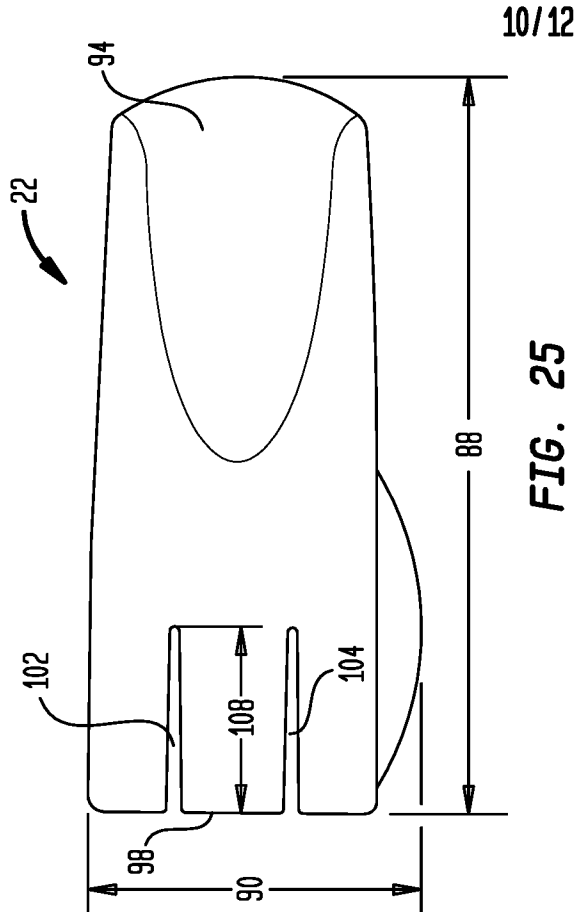


FIG. 24

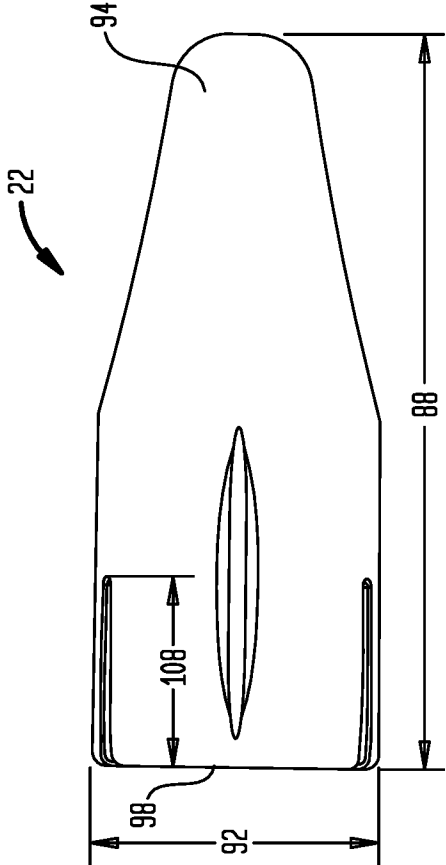


FIG. 25

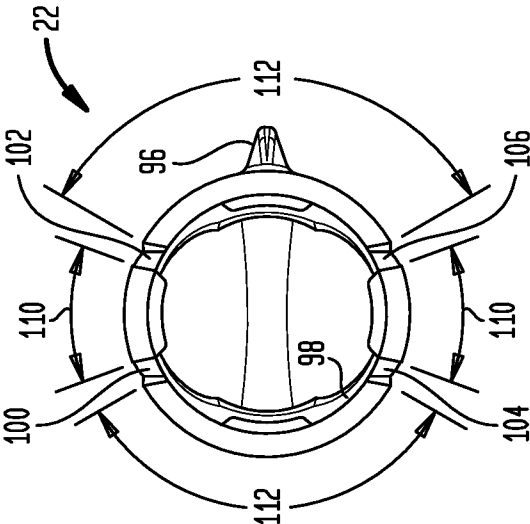


FIG. 26

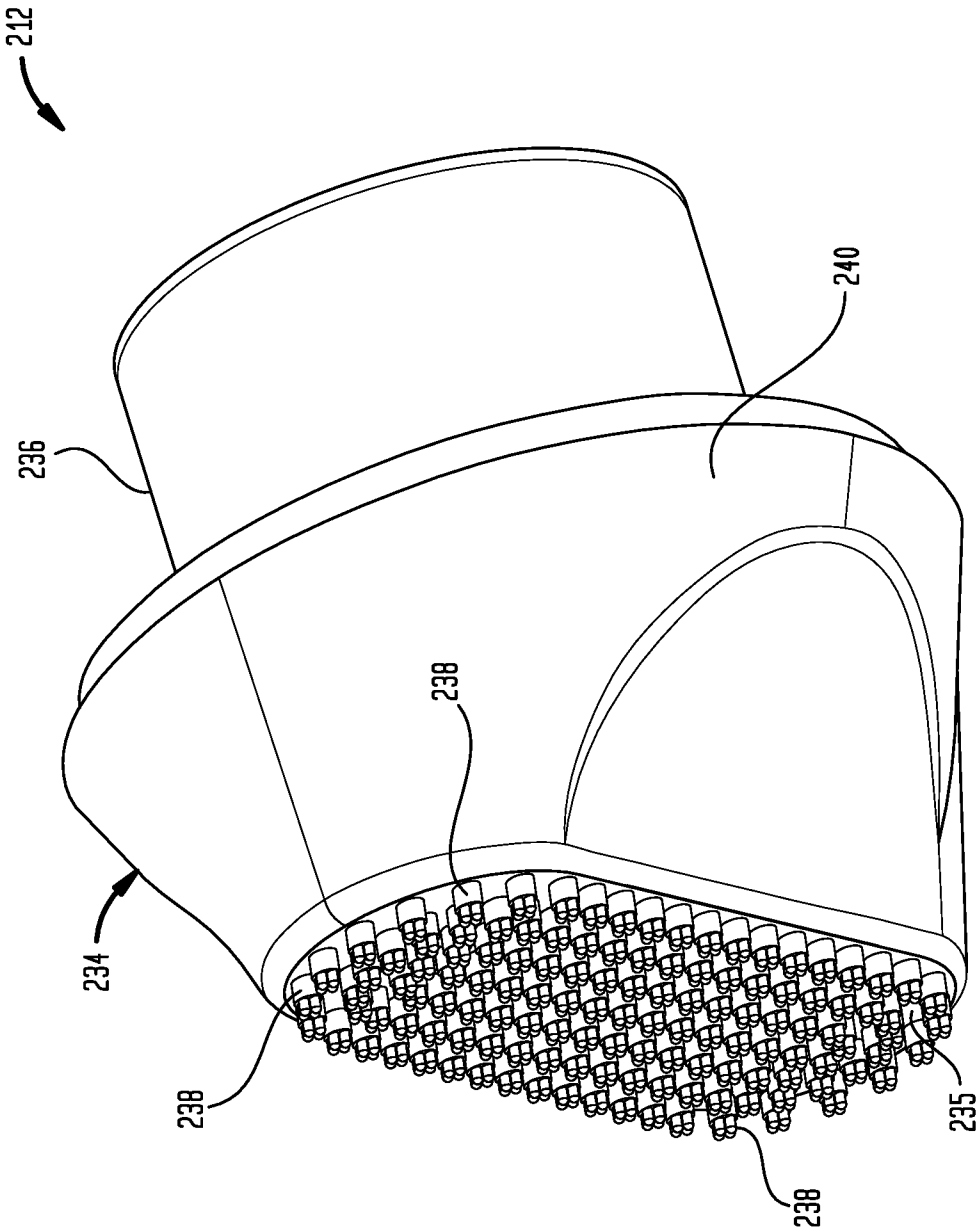
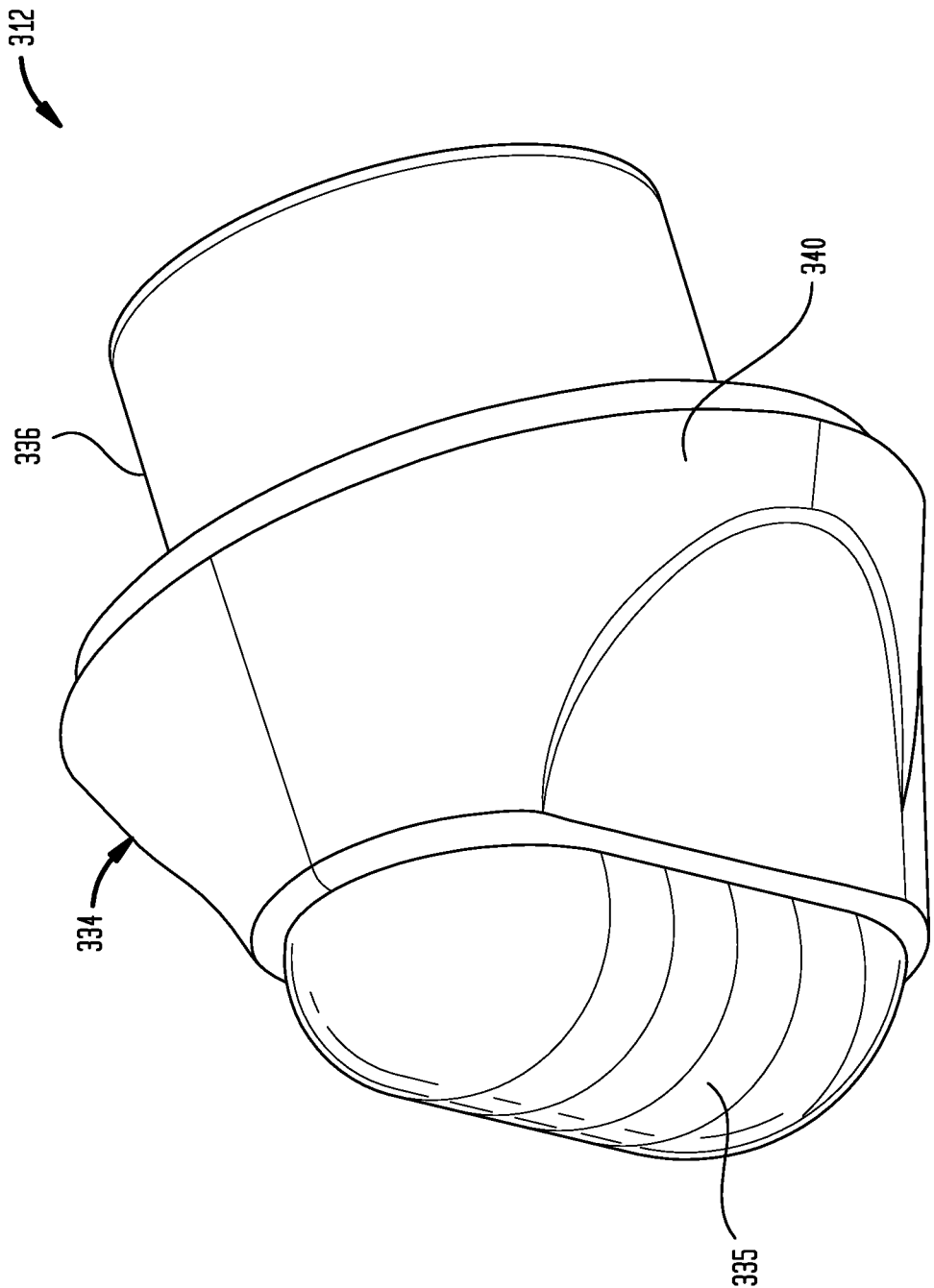


FIG. 27



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 23/11675

A. CLASSIFICATION OF SUBJECT MATTER

IPC - INV. A41H 23/00, B43K 23/016 (2023.01)

ADD. B43K 21/18 (2023.01)

CPC - INV. A41H 23/00, B43K 23/016, B43K 19/003

ADD. B43K 21/18, A63F 9/0641

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)

See Search History document

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

See Search History document

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

See Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y --- A	CN 2872895 Y (Xie) 28 February 2007 (28.02.2007) Entire document especially para [0019] and figs. 1-4	1-14, 16-23 ----- 15, 24
Y --- A	GB 191203922 A (Block et al.) 22 August 1912 (22.08.1912) Entire document especially page 1, ln 41 - page 2, ln 15 and figs. 1-6	1-14, 16-23 ----- 15, 24
Y	CN 201922725 U (Zhao) 10 August 2011 (10.08.2011) Entire document especially para [0016], [0020] and fig. 1	3
D, Y	US D918,297 S (Gupta) 4 May 2021 (04.05.2021) Entire document especially figs. 1-10	20, 23.
A	US 2008/0003051 A1 (Chang) 3 January 2008 (03.01.2008) Entire document especially para [0019]-[0020] and figs. 2A-B	24
A	US 1,751,001 A (Guth) 18 March 1930 (18.03.1930) Entire document	1-24
A	US 2004/0129284 A1 (Abergel) 8 July 2004 (08.07.2004) Entire document	1-24

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

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"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

22 March 2023 (22.03.2023)

Date of mailing of the international search report

APR 14 2023

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