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CA 2632479 A1 2008/12/01

(21) 2 632 479

(12) DEMANDE DE BREVET CANADIEN
CANADIAN PATENT APPLICATION

(13) A1

(22) Date de dépôt/Filing Date: 2008/05/29

(41) Mise à la disp. pub./Open to Public Insp.: 2008/12/01

(30) Priorité/Priority: 2007/06/01 (US60/932,811)

(51) Cl.Int./Int.Cl. *A61B 17/34* (2006.01)

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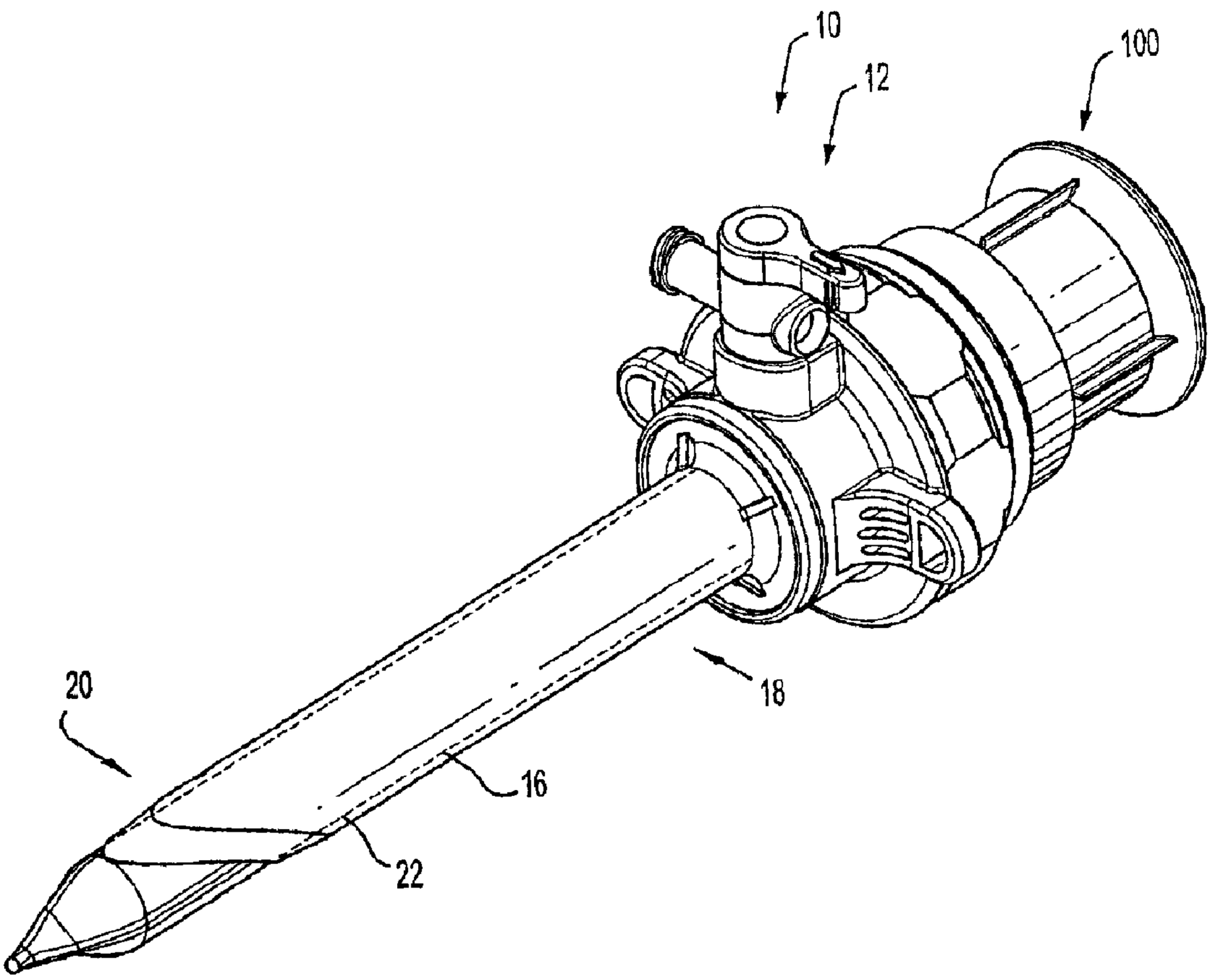
(54) Titre : POINTE D'OBTURATEUR
(54) Title: OBTURATOR TIPS



(57) Abrégé/Abstract:
The present disclosure is directed towards a surgical dilating instrument for use in conjunction with a surgical portal device. The surgical dilating instrument disclosed herein includes an inventive dilating tip with a substantially polygonal cross-section that incorporates one or more raised atraumatic edge members.

ABSTRACT

The present disclosure is directed towards a surgical dilating instrument for use in conjunction with a surgical portal device. The surgical dilating instrument disclosed herein includes an inventive dilating tip with a substantially polygonal cross-section that incorporates one or more raised atraumatic edge members.

OBTURATOR TIPS

BACKGROUND

1. Technical Field

[0001] The present disclosure is directed towards an instrument for use in surgical procedures. More particularly, the present disclosure relates to an obturator or dilating device that includes an inventive dilating tip for use with a surgical portal or access assembly, such as a trocar or cannula assembly, during endoscopic and laparoscopic procedures.

2. Background of Related Art

[0002] Generally, endoscopic and laparoscopic surgical procedures are performed through surgical access devices that include narrow tubular sleeves or cannulas in an insufflated workspace inserted percutaneously into a patient through a small incision, puncture, or access point.

[0003] Initially, the incision or access point created is the tissue is very small so as to minimize both tissue trauma and the invasive nature of the procedure. However, to facilitate the

insertion of the access device into the patient's tissue, it is often necessary to enlarge or dilate the access point using a surgical instrument such as an obturator, stylet, or trocar. Given the design of known surgical instrument tips, substantial force may be required to force the instrument through the access point and thereby dilate the opening, potentially resulting in damage or trauma to the tissue surrounding the access point as well as the internal surgical site. Accordingly, there exists a need in the art for a surgical instrument that includes an improved tip which facilitates the dilation of a percutaneous access point and curtails the risk of tissue damage.

SUMMARY

The present disclosure relates to improvements in accessing body tissue during endoscopic procedures, laparoscopic procedures, and the like. In one embodiment, a surgical instrument for use with a surgical portal apparatus is disclosed that includes a dilating member disposed at a distal end of an elongate shaft that defines a longitudinal axis. The dilating member has an outer surface that includes at least one atraumatic edge member extending outwardly therefrom and proximally from a distal, substantially tip. In one embodiment, that at least one edge member extends at least partially along the elongate shaft of the instrument. In another embodiment, the dilating member has a substantially tapered profile.

The dilating member has a substantially polygonal cross-section that may be substantially triangular in one embodiment. In additional embodiments, the substantially polygonal cross-section includes at least two sides that are in substantially parallel relation, which may include a

first set of sides and at least one additional set of sides, e.g. a second set of sides that define a plurality of vertices. The plurality of vertices may be either substantially angular or substantially rounded in configuration and may include at least one vertex that is less than or equal to 90°.

The elongate shaft of the instrument defines a centerpoint that is either substantially aligned with, or substantially offset from, the tip of the dilating member.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] The accompanying drawings, which are incorporated in, and constitute a part of this specification, illustrate embodiments of the disclosure and, together with a general description of the disclosure given above and the detailed description of the embodiment(s) given below, serve to explain the principles of the disclosure, wherein:

[0005] **FIG. 1** is a side perspective view of a surgical portal system in conjunction with a dilating instrument in accordance with the principles of the present disclosure;

[0006] **FIG. 2** is a side perspective view of the dilating instrument of **FIG. 1**;

[0007] **FIG. 3** is a front view of the dilating instrument of **FIG. 1**;

[0008] **FIG. 4** is a side cross-sectional view of the dilating instrument of **FIG. 1**;

[0009] **FIG. 5** is a side cross-sectional view of a dilating member disposed at a distal end of the dilating instrument of **FIG. 1**;

[0010] **FIG. 6** is a longitudinal cross-sectional view of the dilating member taken along lines **6-6** of **FIG. 5**;

[0011] **FIG. 7** is a front cross-sectional view of the dilating member taken along lines **7-7** of **FIG. 5**;

[0012] **FIG. 8** is a front cross-sectional view of the dilating member taken along lines **8-8** of **FIG. 5**;

[0013] **FIG. 9** is a front cross-sectional view of the dilating member taken along lines **9-9** of **FIG. 5**;

[0014] **FIG. 10** is a front perspective view of the dilating member;

[0015] **FIG. 11** is a side perspective view of an alternate embodiment of the dilating member;

[0016] **FIG. 12** is a side perspective view of the dilating member of **FIG. 11**;

[0017] **FIG. 13** is a side cross-sectional view of the dilating member of **FIG. 11**;

[0018] **FIG. 14** is a front view of the dilating member taken along lines **14-14** of **FIG. 13**;

[0019] **FIG. 15** is a front view of the dilating member taken along lines **15-15** of **FIG. 13**;

[0020] **FIG. 16** is a longitudinal cross-sectional view of the dilating member taken along lines **16-16** of **FIG. 13**;

[0021] **FIG. 17** is a front view of the dilating member of **FIG. 11**;

[0022] **FIG. 18** is a side perspective view of another embodiment of the dilating member;

[0023] **FIG. 19** is a side perspective view of the dilating member of **FIG. 18**;

[0024] **FIG. 20** is a side cross-sectional view of the dilating member of **FIG. 18**;

[0025] **FIG. 21** is a front view of the dilating member taken along lines **21-21** of **FIG. 20**;

[0026] **FIG. 22** is a front view of the dilating member taken along lines **22-22** of **FIG. 20**;

[0027] **FIG. 23** is a longitudinal cross-sectional view of the dilating member taken along lines **23-23** of **FIG. 20**;

[0028] **FIG. 24** is a front view of the dilating member of **FIG. 18**;

[0029] **FIG. 25** is a front perspective view of another embodiment of the dilating member;

[0030] **FIG. 26** is a side perspective view of the dilating member of **FIG. 25**;

[0031] **FIG. 27** is a side cross-sectional view of the dilating member of **FIG. 25**;

[0032] **FIG. 28** is a front view of the dilating member taken along lines **28-28** of **FIG. 27**;

[0033] **FIG. 29** is a front view of the dilating member taken along lines **29-29** of **FIG. 27**;

[0034] **FIG. 30** is a longitudinal cross-sectional view of the dilating member taken along lines **30-30** of **FIG. 27**;

[0035] **FIG. 31** is a front view of the dilating member of **FIG. 25**; and

[0036] **FIG. 32** is a side perspective view of another embodiment of the dilating member incorporating at least one transparent window and defining a lumen therethrough configured and dimensioned for the internal receipt of an endoscope.

DESCRIPTION OF EMBODIMENTS

[0037] Specific embodiments of the presently disclosed apparatus will now be described in detail with reference to the foregoing figures, wherein like reference numerals identify similar or identical elements. In the figures and in the description which follows, the term "proximal", as is traditional will refer to the end of the apparatus or instrument of the present disclosure

which is closest to the clinician, while the term "distal" will refer to the end of the device or instrument which is furthest from the clinician.

[0038] Referring now to the drawings, **FIG. 1** illustrates a surgical portal or access apparatus **10** and a dilating surgical instrument, member, or obturator **100** in accordance with the present disclosure.

[0039] At a proximal end, access apparatus **10** includes a housing **12** configured for the internal receipt of a seal or valve, as is known in the art. Extending distally from housing **12** is a shaft or cannula **16** having respective proximal and distal ends **18**, **20** and defining a lumen **22** therethrough. Housing **12**, distal end **20** of cannula **16**, and the lumen **22** defined therethrough are each dimensioned such that the dilating instrument **100** may pass therethrough.

[0040] As seen in **FIG. 2**, dilating instrument **100** has a proximal end **102**, a distal end **104**, and a shaft **106** disposed therebetween. At proximal end **102**, dilating instrument **100** is coupled to a gripping member **108** that is configured and dimensioned to facilitate gripping by a clinician, operator, or surgeon. In one embodiment, the gripping member may include a cushioning member or portion that is configured to at least partially absorb the force applied to the gripping member by the clinician, as well as the impact of that force upon the clinician's hand, during the distal advancement of the dilating instrument through a patient's tissue. The cushioning member may be formed of any at material that is at least semi-resilient in nature including, but not limited to, polymers.

[0041] The coupling between proximal end **102** and gripping member **108** may be either fixed or movable, e.g. pivotable, and may be either permanent or releasable.

[0042] Shaft **106** of dilating instrument **100** is an elongate member defining a diameter "D_1" and a length "L_1". Diameter "D_1" is of a suitable dimension such that shaft **106** does not significantly deform or buckle under the influence of the force applied to the gripping member by the clinician, as discussed above. "D_1" may be any diameter substantially within the range of approximately **5mm** to approximately **15mm**, as is conventional in the art. Length "L_1" is of any dimension suitable for the intended purpose of accessing a patient's tissue through the cannula of a surgical access apparatus. Disposed at distal end **104** of dilating instrument **100** is a dilating member **110**.

[0043] Referring now to **FIGS. 2-31**, various embodiments of the dilating member **110** will be discussed in detail. With respect to **FIGS. 2-10** in particular, dilating member **110** has a proximal end **112**, a distal end or tip **114**, and an outer surface **116** that extends therebetween. Dilating member **110** may be formed of any suitable biocompatible material, including but not limited to stainless steel, a biocompatible polymeric material all alike, and maybe either a solid member or at least partially hollow.

[0044] Proximal end **112** of dilating member **110** is associated with shaft **106**. In one embodiment, shaft **106** and proximal end **112** of dilating member **110** are integrally formed such that dilating member **110** and shaft **106** are fixedly connected. In this embodiment, shaft **106** and proximal end **112** of dilating member **110** may be connected in any suitable manner including,

but not limited to, the use of adhesives, monolithic formation, or welding. In an alternate embodiment, shaft **106** and proximal end **112** of dilating member **110** may be releasably connected through the use of any suitable structural mechanism, including but not limited to, a screw-type or interference-fit arrangement.

[0045] Outer surface **116** of dilating member **110** includes at least one atraumatic edge member **118** that extends outwardly therefrom. Edge member or members **118** extend proximally from tip **114** to proximal end **112** of dilating member **110** along the contour of outer surface **116**. In one embodiment, edge member or members **118** may extend beyond proximal end **112** of dilating member **110** and at least partially along shaft **106** of dilating instrument **100**. Edge member or members **118** are substantially blunt, smooth protrusions from outer surface **116** that define at least one recessed portion **120** therebetween. Edge member or members **118** serve to lift the surrounding tissue (not shown) away from the at least one recessed portion **120** of the outer surface **116**, thereby decreasing the surface area of the dilating member **110** that is in contact with the patient's tissue (not shown). By decreasing this surface area, any adhesion between the tissue (not shown) and the dilating member **110** that may otherwise occur during the insertion and distal advancement of dilating instrument **100** is substantially minimized.

[0046] In the embodiment shown in **FIGS. 2-10**, dilating member **110** includes three respective edge members **118-118''** that define three respective recessed portions **120-120''**. In additional embodiments, as seen in **FIGS. 11-24**, dilating members **200** and **300** include four edge members **218-218'''** and **318-318'''**, respectively. The present disclosure contemplates

that dilating member **110** may include any number of edge members **118** suitable for the intended purpose of facilitating the distal advancement of the dilating instrument **100** and the dilation of a percutaneous access point.

[0047] Although edge members **118** of dilating member **110** are depicted as substantially blunt, the inclusion of one or more substantially incisive or sharp edge members, either in addition to or in place of the blunt edge members disclose above, are within the scope of the present disclosure.

[0048] In one aspect of the present disclosure, the at least one recessed portion **120** of outer surface **116** of dilating member **110** may include a plurality of indentations, scallops, or the like. These indentations further limit the surface area of the dilating member **110** that may contact the patient's tissue during use, thereby further minimizing any adhesion that may occur during the distal advancement of the dilating instrument **100** through a patient's tissue.

[0049] In one or more embodiments, the dilating member has a transverse cross-section **122** that is substantially polygonal, in that the cross-section incorporates a plurality of sides that may demonstrate a slight curvature. In the embodiment seen in **FIGS. 1-8**, the substantially polygonal cross-section **122** of dilating member **110** is substantially triangular, as cross-section **122** includes three sides **124-124''**. As seen in **FIGS. 6-8**, sides **124-124''** of triangular cross-section **122** defines three vertices **126-126''**. Vertices **126-126''** are substantially angular or pointed in configuration, but vertices that are substantially rounded or curved are within the scope of the present disclosure. By way of example, in one embodiment, as seen in **FIGS. 24-**

25, dilating member **400** has a substantially triangular cross section **422** defining three vertices **426-426''** that have a substantially rounded configuration.

[0050] In the embodiment seen in **FIGS. 11-17**, dilating member **210** may also have a substantially polygonal cross section **222** that includes a plurality of sides **224-224'''** in substantially parallel relation. In particular, dilating member **210** includes a first pair of sides **224a**, which includes substantially parallel sides **224** and **224''**, and a second pair of sides **224b**, which includes substantially parallel sides **224'** and **224'''**. The points at which the first pair of sides **224a** and the second pair of sides **224b** intersect define four vertices **226-226'''**. As seen in **FIGS. 11-12** and **14-17**, vertices **226-226'''** are substantially rounded in configuration. However, an embodiment including four angular or pointed vertices is also within the scope of the present disclosure. Vertices **226-226'''** define four angles α which are each substantially equivalent to 90° such that polygonal cross-section **222** is substantially square in configuration. In an alternate embodiment, as seen in **FIGS. 18-24**, vertices **326-326'''** define a first pair of angles β which are less than 90° and a second pair of angles θ which are greater than 90° such that polygonal cross-section **322** resembles an elongated "diamond".

[0051] In additional embodiments, the dilating member **210** may have a substantially polygonal cross-section **222** that includes any suitable number of sides **224**, including but not limited to five or six. In these additional embodiments, the substantially polygonal cross-section **222** may be substantially pentagonal, hexagonal, etc., in configuration.

[0052] Referring back to the embodiment of **FIGS. 1-8**, dilating member **110** defines a diameter "D_2" and a length "L_2". Diameter "D_2" decreases over length "L_2"such that dilating member **110** exhibits a substantially tapered profile "**P**". Diameter "**D2**" decreases at an intermittent or variable rate over length "**L2**" such that the profile "**P**" of dilating member **110** includes one or more concave portions **128**. In an alternate embodiment, the diameter of dilating member **110** may be constantly or consistently varied over its length such that dilating member **110** may exhibit a substantially conical profile.

[0053] As discussed above, dilating member **110** includes a tip **114**. Tip 114 may be substantially blunt such that dilating instrument **110** substantially minimizes any tissue trauma during the insertion and the distal advancement thereof. An embodiment that incorporates a substantially incisive tip is also within the scope of the present disclosure, however. By incorporating an incisive tip, instrument **100** would obviate the need for an initial incision or puncture in the patient's tissue with a separate implement. As seen in **FIGS. 1-8**, tip **114** is substantially aligned with a centerpoint "**C**" of dilating member **110**. In an alternate embodiment, however, tip **114** may be substantially offset from centerpoint "**C**".

[0054] Referring now to **FIG. 32**, dilating member **510** may include one or more transparent portions **528** such that light is permitted to pass into dilating instrument **500**. Transparent portions **528** may be formed of any suitable biocompatible material that is at least translucent. In this embodiment, dilating instrument **500** defines a lumen or cavity **530** at least partially therethrough that is configured and dimensioned to receive an endoscope or other

suitable viewing instrument **600** such that a clinician may view a patient's tissue (not shown) through endoscope **600** and the transparent portions 528 of dilating instrument **500** during the insertion and distal advancement thereof. Further information regarding the use of optical or transparent materials in surgical access devices may be obtained through reference to commonly assigned U.S. Patent No. **6,685,630** to **Sauer, et al**.

[0055] While the above is a complete description of the embodiments of the present disclosure, various alternatives, modifications and equivalents may be used. Therefore, the above description should not be construed as limiting, but rather as illustrative of the principles of the disclosure made herein. Those skilled in the art will envision other modifications within the scope and spirit of the claims appended hereto.

WHAT IS CLAIMED IS:

1. A surgical instrument for use with a surgical portal apparatus comprising:

an elongate shaft having proximal and distal ends and defining a longitudinal axis; and

a dilating member disposed at the distal end of the elongate shaft, the dilating member having an outer surface that includes at least one atraumatic edge member, the at least one atraumatic edge member extending outwardly from the outer surface and proximally from a tip of the dilating member, wherein the dilating member has a substantially polygonal cross-section.

2. The surgical instrument of claim 1, wherein the substantially polygonal cross-section is substantially triangular.

3. The surgical instrument of claim 1, wherein the substantially polygonal cross-section includes at least two sides that are in substantially parallel relation.

4. The surgical instrument of claim 3, wherein the at least two sides include a first set of sides and at least one additional set of sides.

5. The surgical instrument of claim 4, wherein the first set of sides and the at least one additional set of sides define a plurality of vertices.

6. The surgical instrument of claim 5, wherein the plurality of vertices includes at least one vertex that is less than 90°.

7. The surgical instrument of claim 5, wherein the plurality of vertices includes at least one vertex that is equal to 90°.

8. The surgical instrument of claim 4, wherein the at least one additional set of sides comprises a second set of sides.

9. The surgical instrument of claim 5, wherein the plurality of vertices are substantially angular in configuration.

10. The surgical instrument of claim 5, wherein the plurality of vertices are substantially rounded in configuration.

11. The surgical instrument of claim 1, wherein the elongate shaft defines a centerpoint.

12. The surgical instrument of claim 11, wherein the tip of the dilating member is substantially aligned with the centerpoint.

13. The surgical instrument of claim 11, wherein the tip of the dilating member is substantially offset with respect to the centerpoint.

14. The surgical instrument of claim 1, wherein the at least one edge member extends at least partially along the elongate shaft.

15. The surgical instrument of claim 1, wherein the dilating member has a substantially tapered profile.

16. The surgical instrument of claim 1, wherein the tip of the dilating member is substantially blunt.

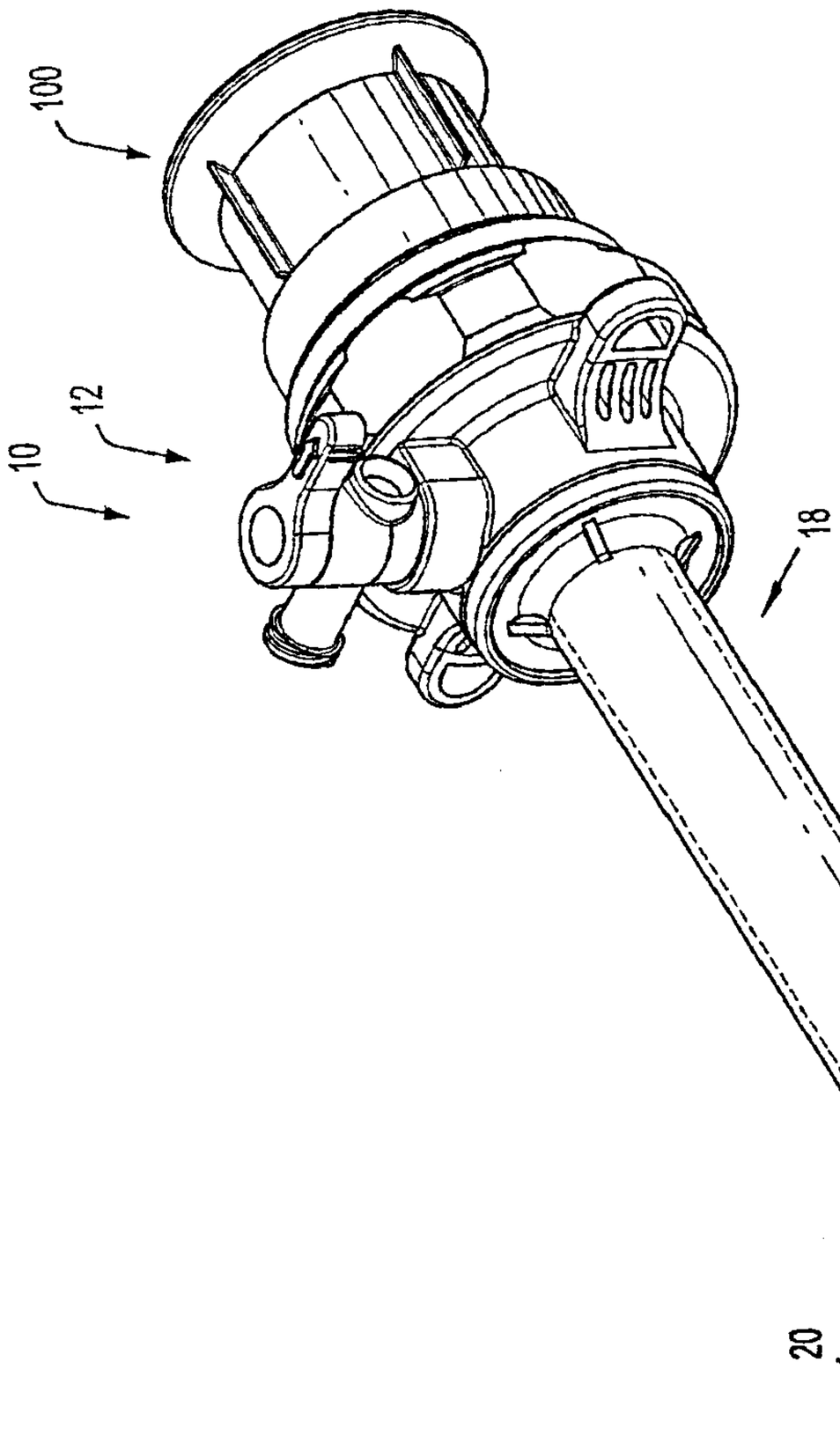


FIG. 1

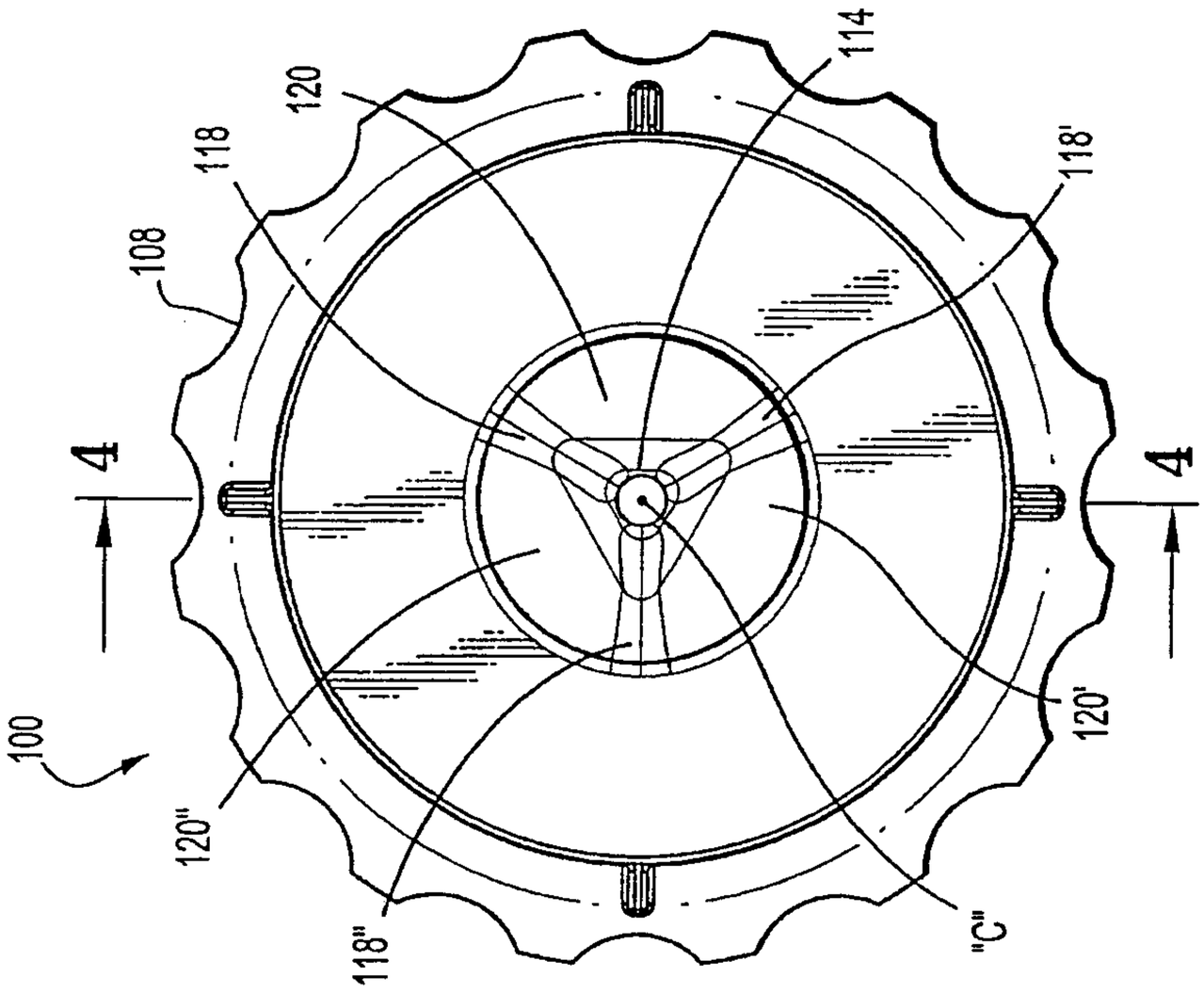


FIG. 2

FIG. 3

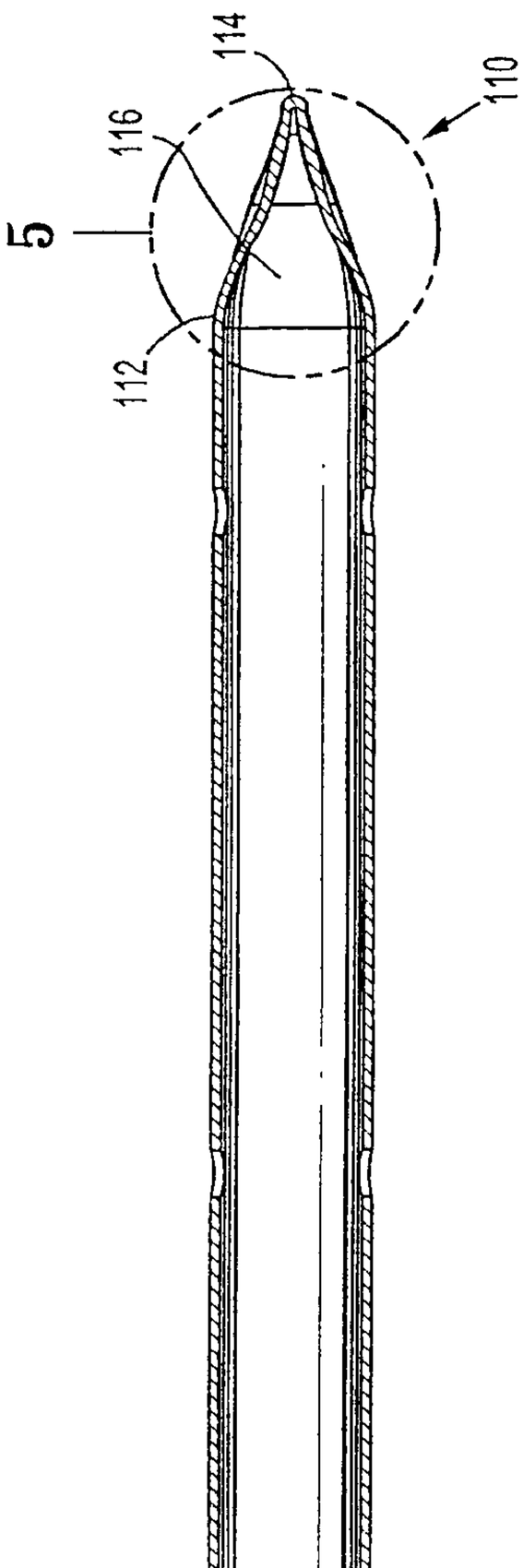


FIG. 4

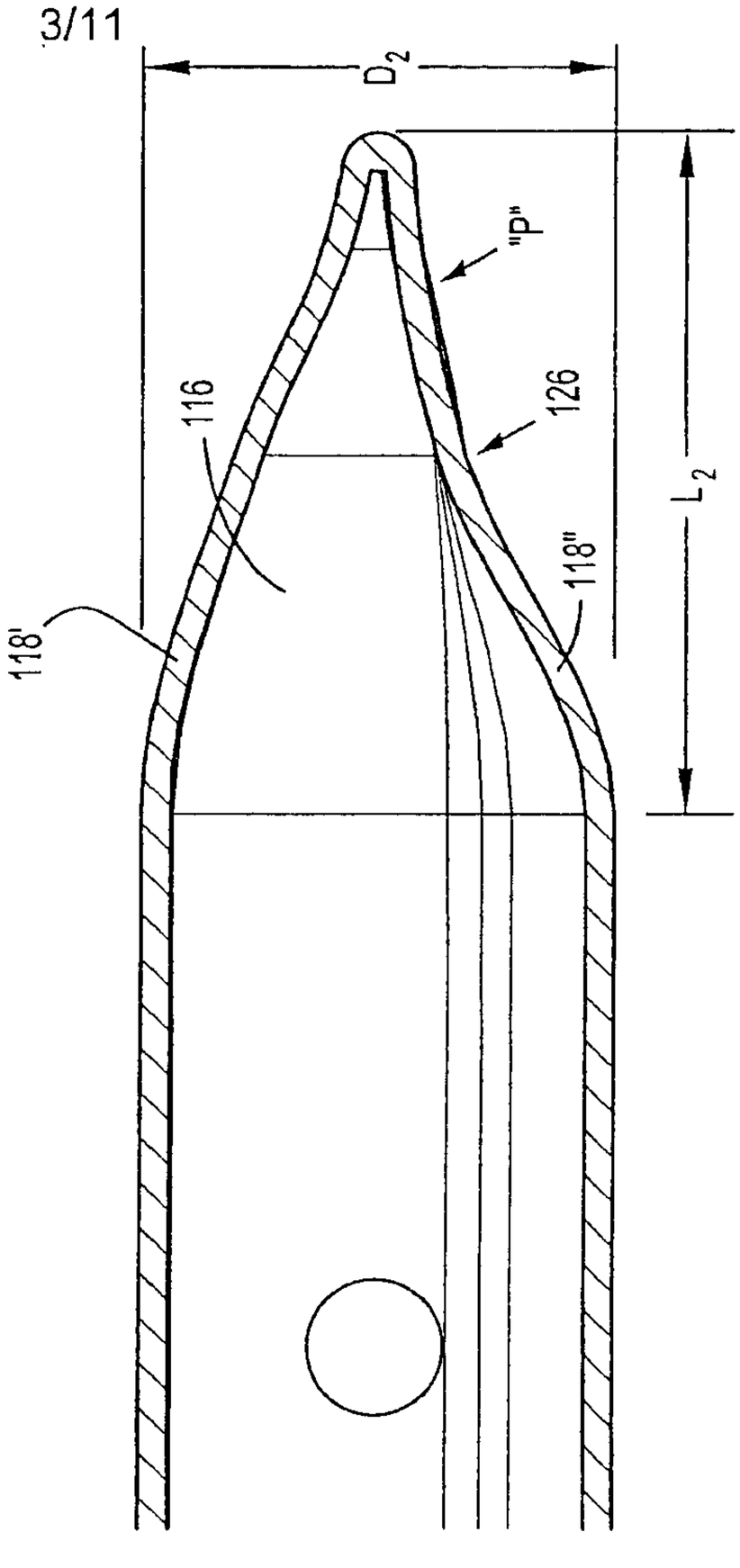


FIG. 6

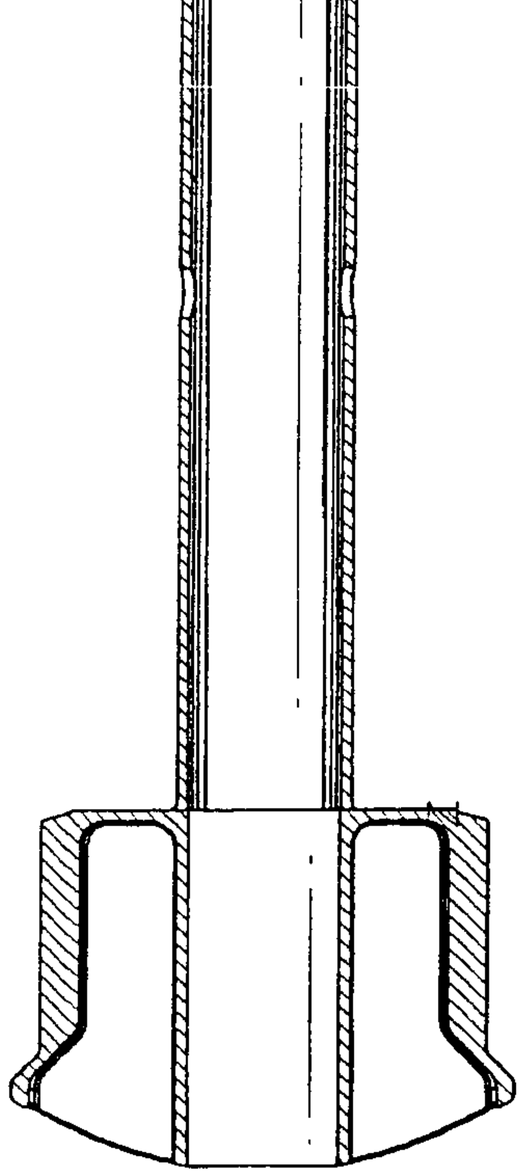


FIG. 5

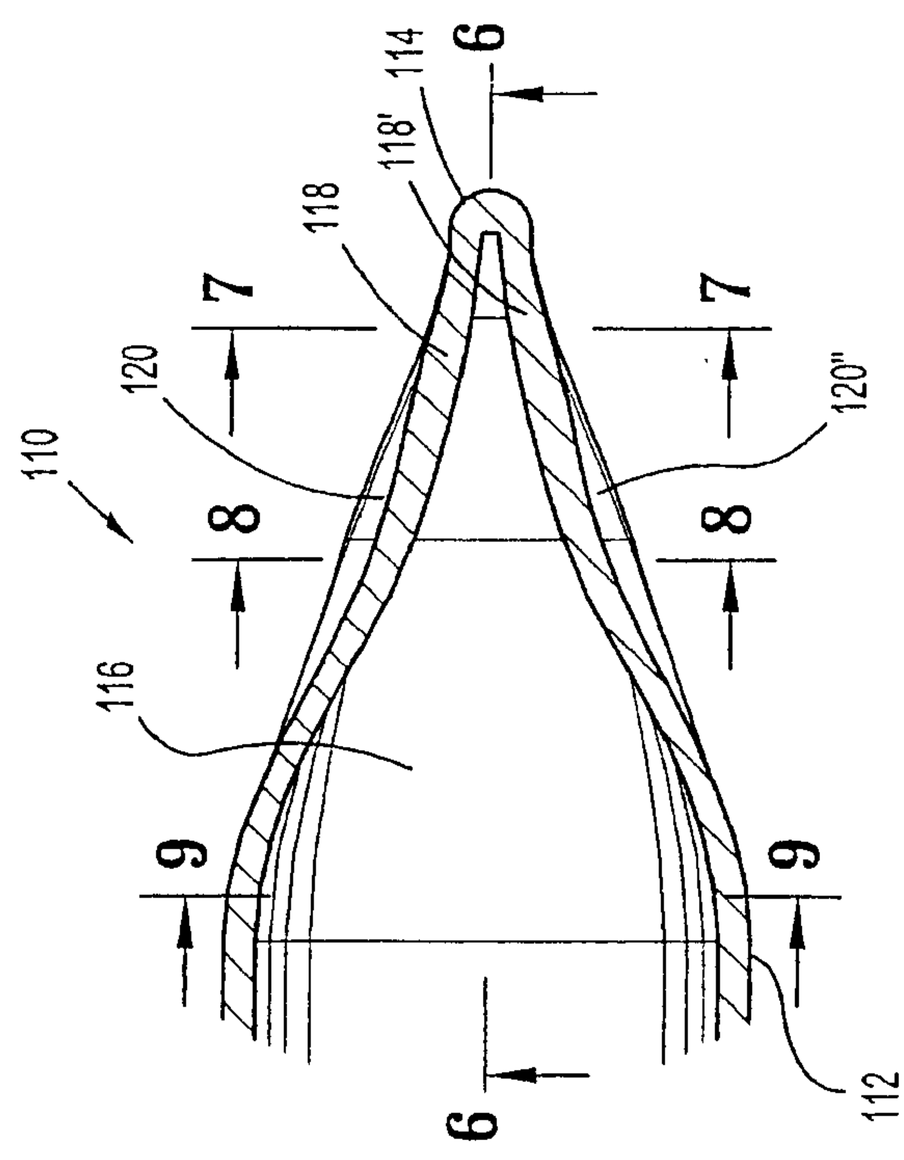


FIG. 5

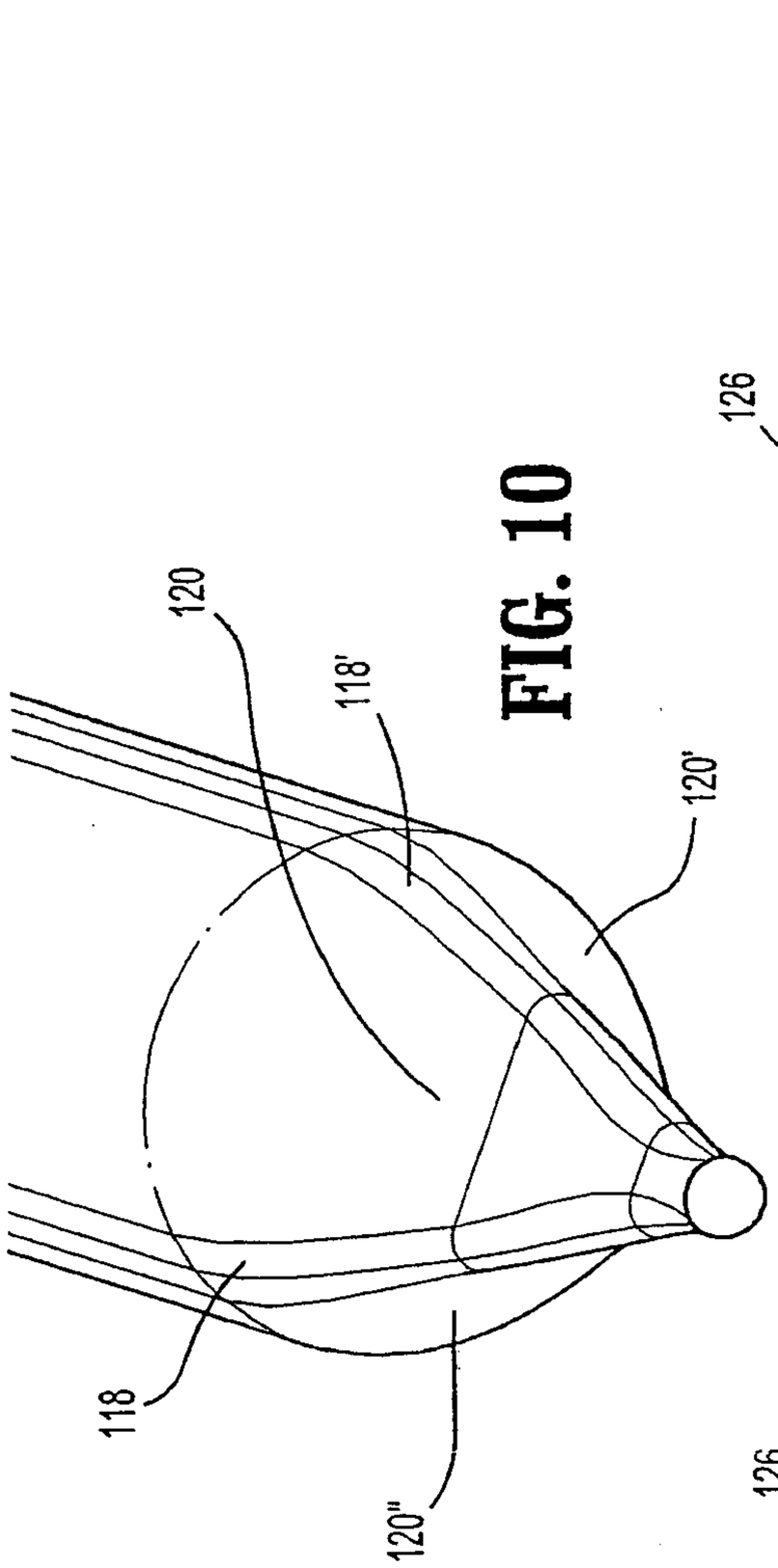


FIG. 10

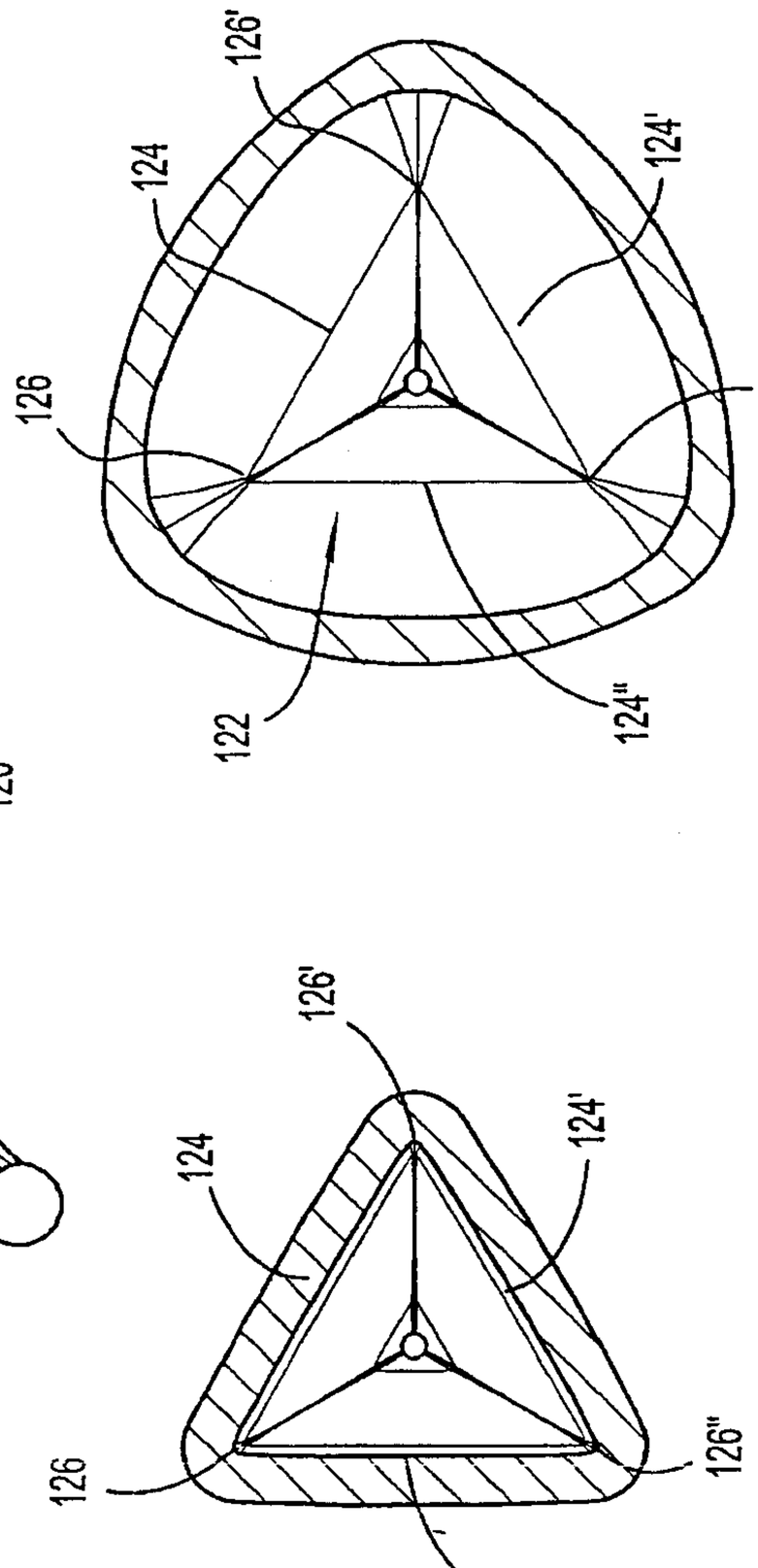


FIG. 9

FIG. 8

FIG. 7

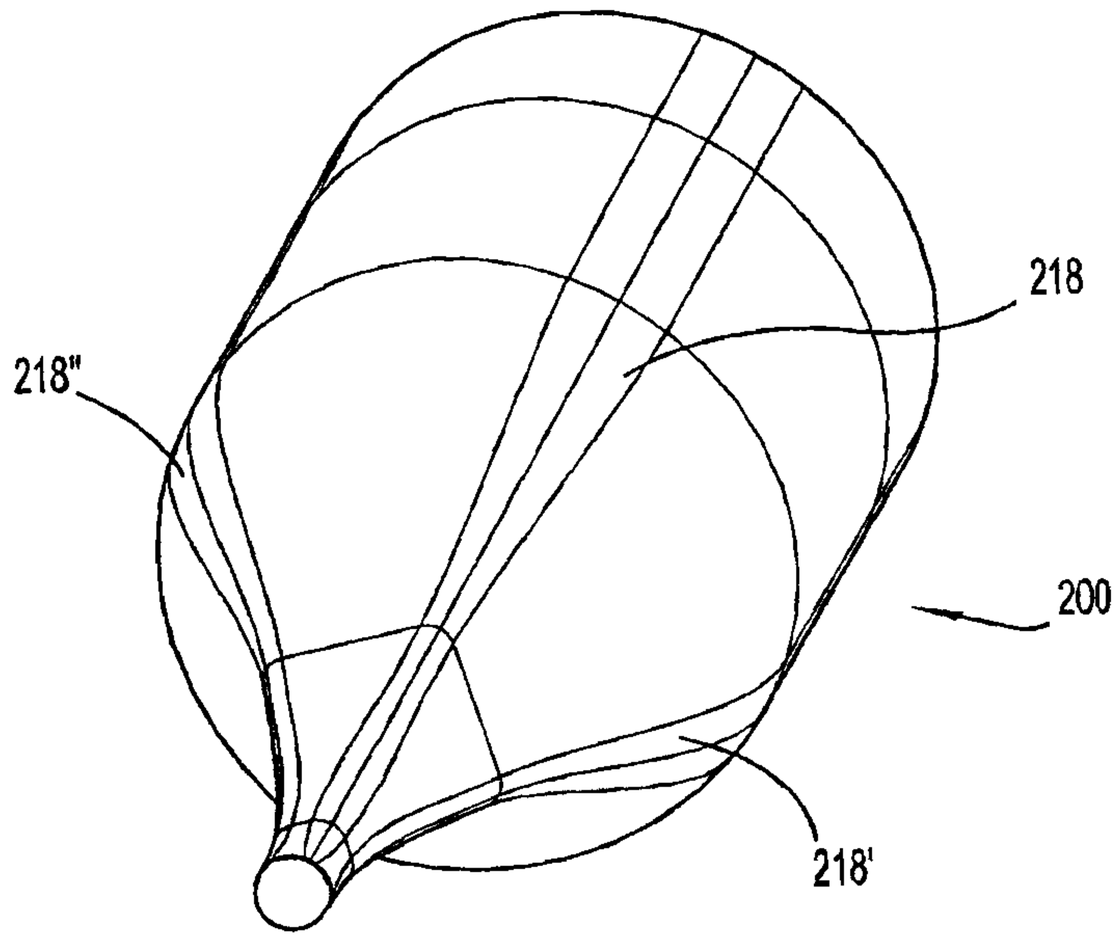


FIG. 11

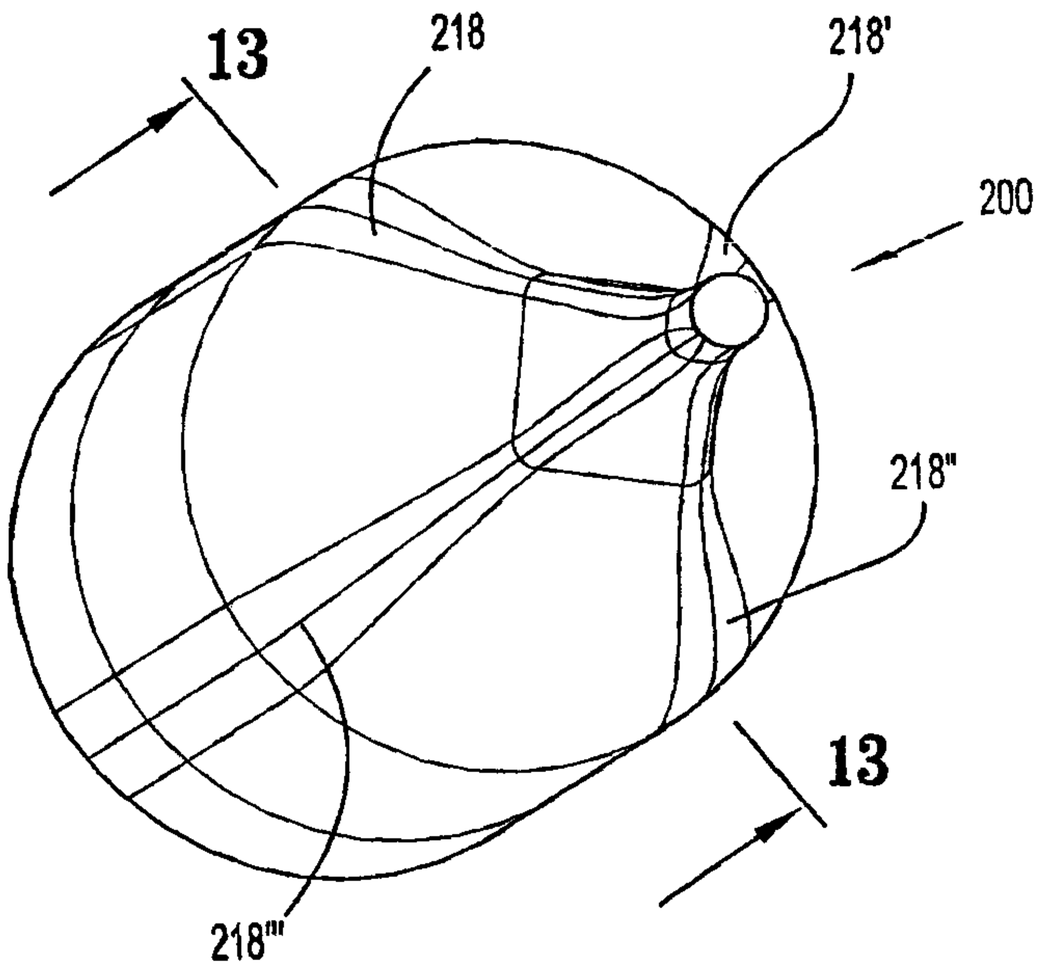


FIG. 12

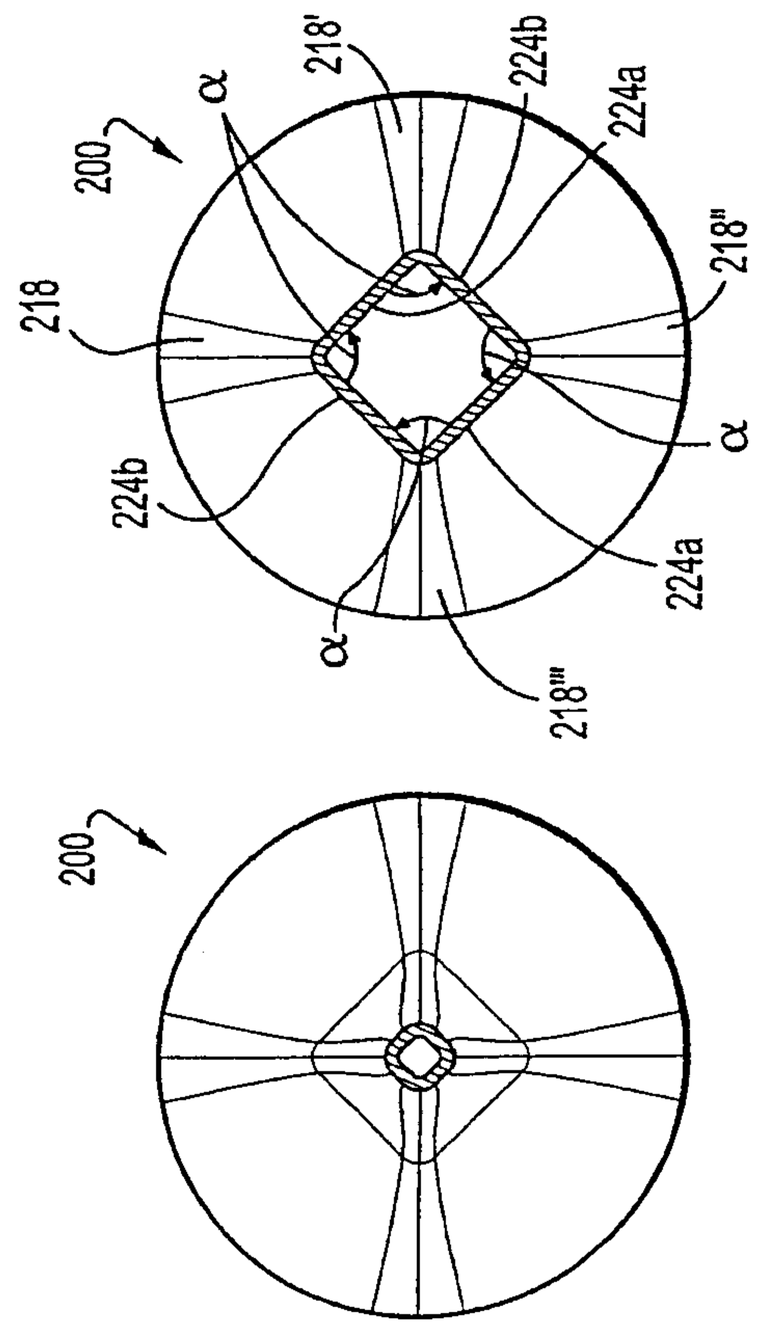


FIG. 15

FIG. 14

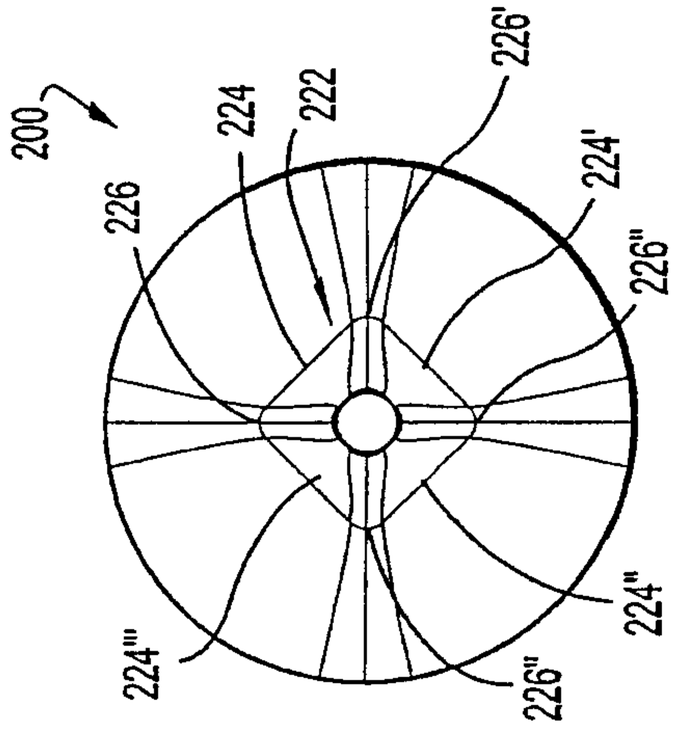


FIG. 17

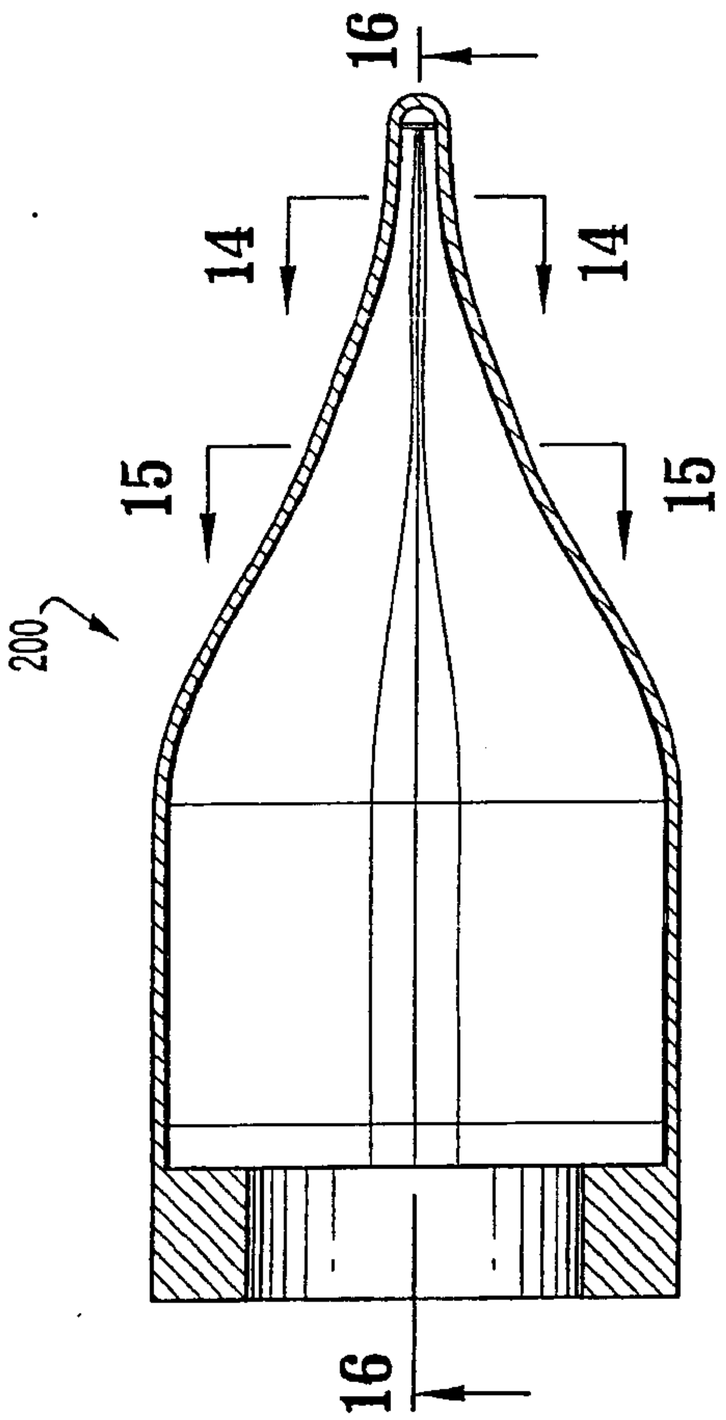


FIG. 13

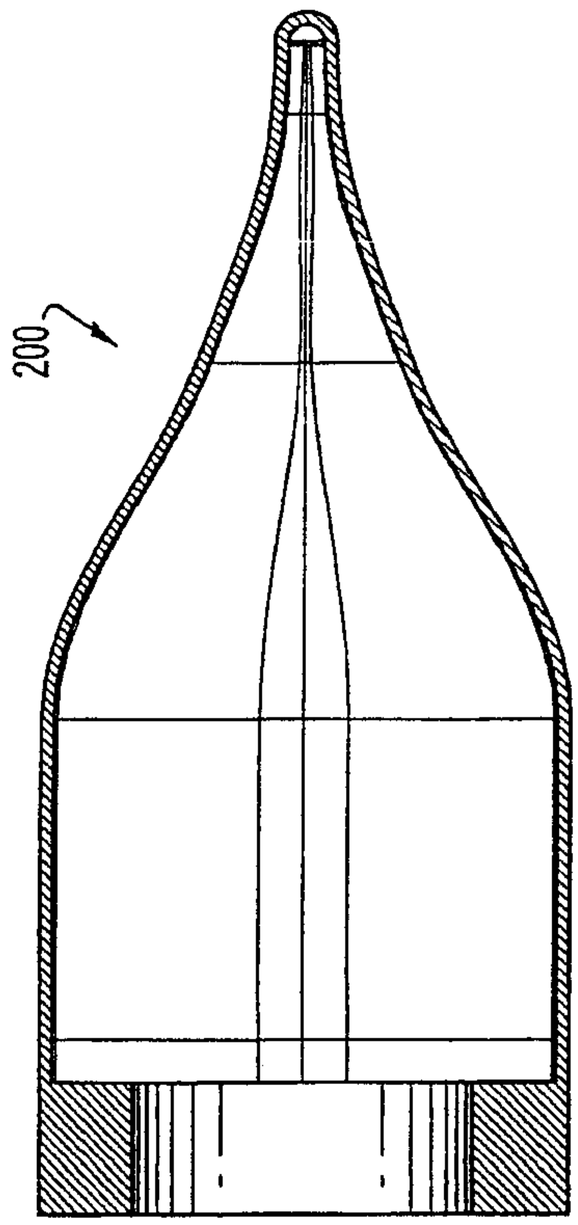


FIG. 16

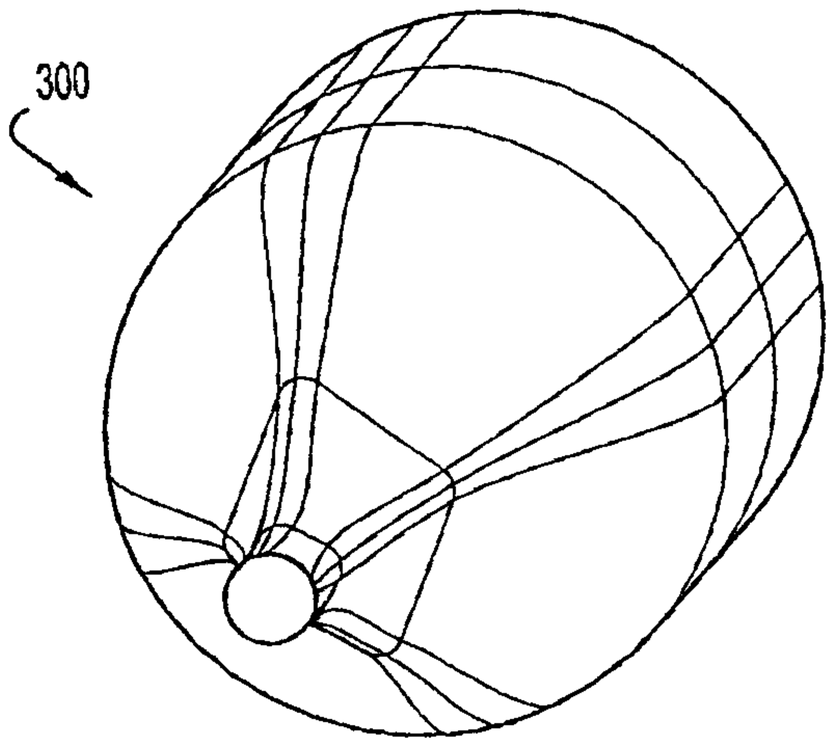


FIG. 18

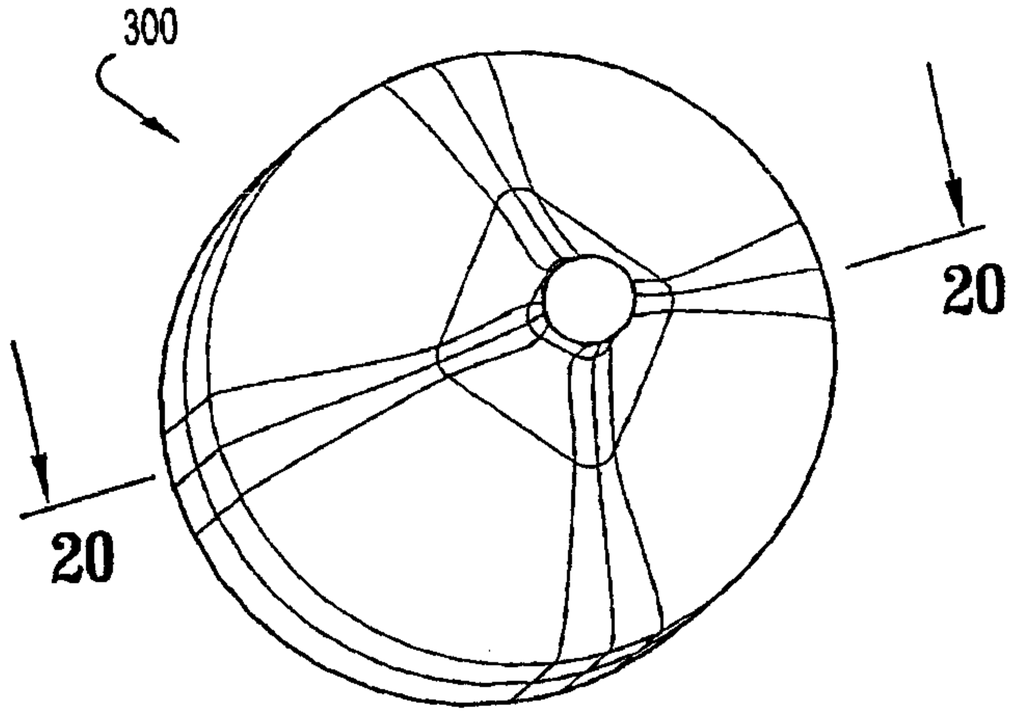


FIG. 19

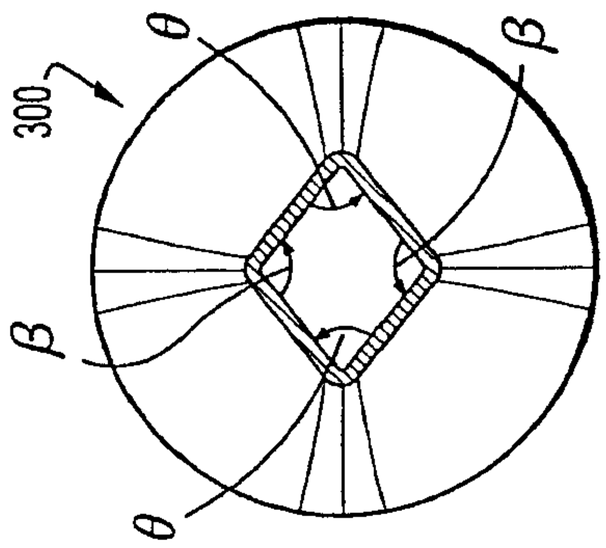


FIG. 22

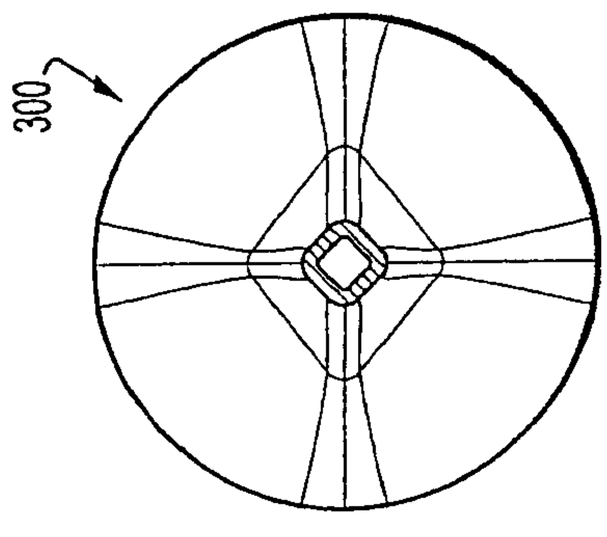


FIG. 21

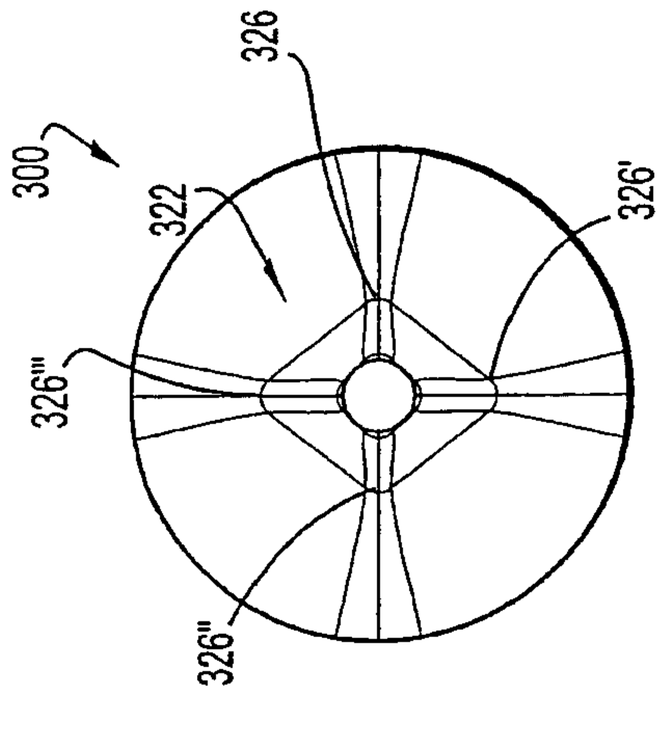


FIG. 24

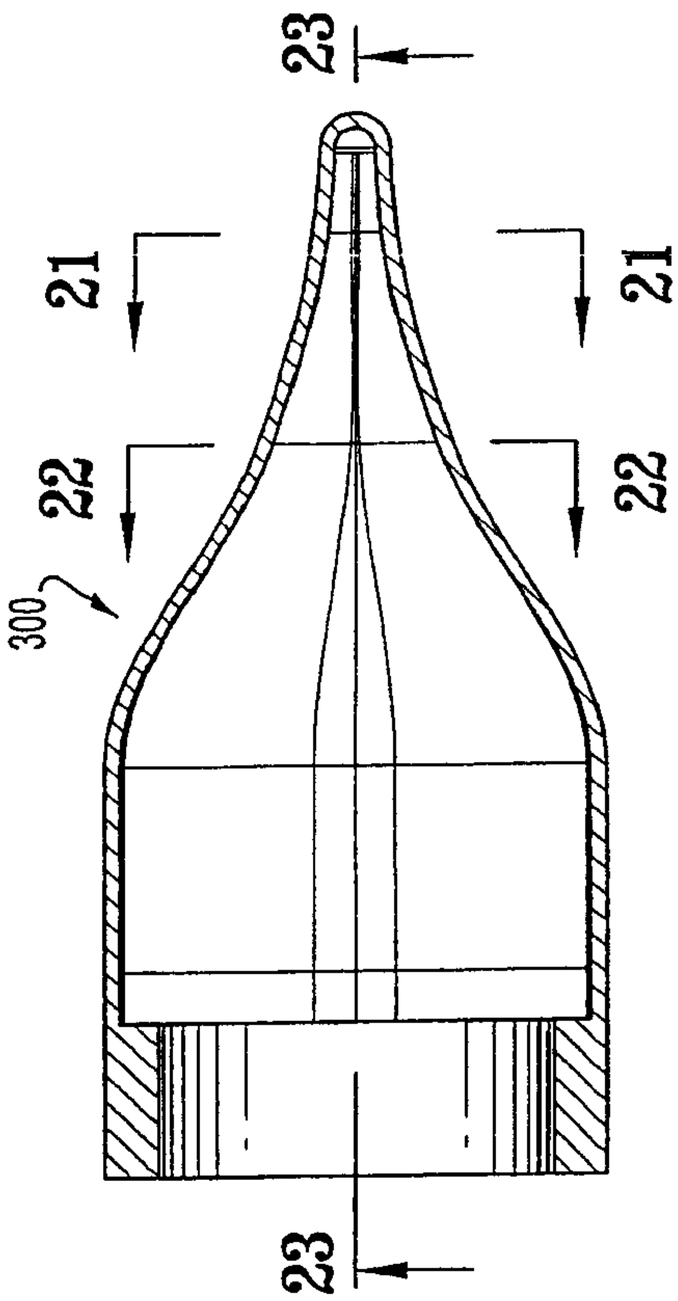


FIG. 20

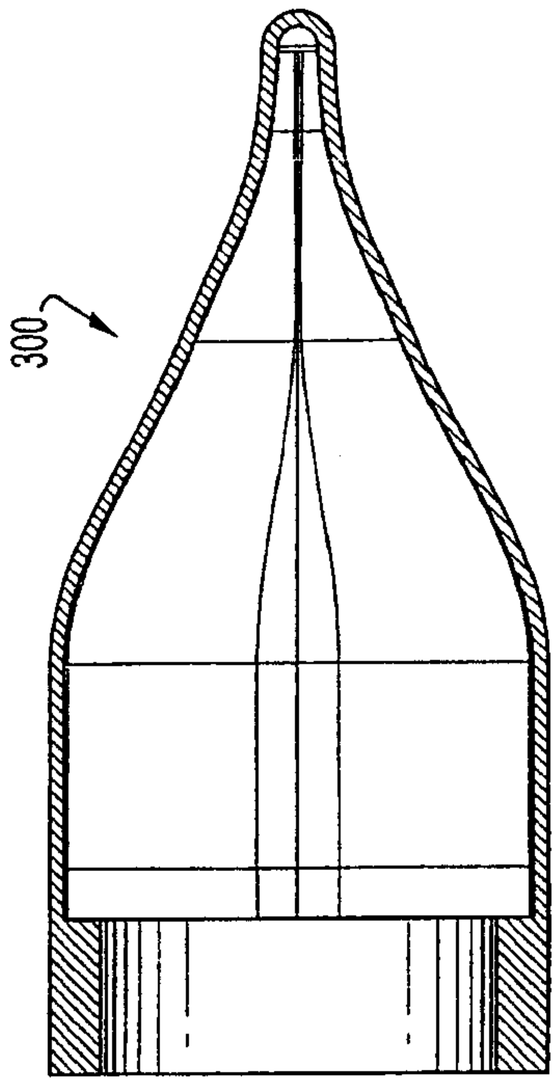


FIG. 23

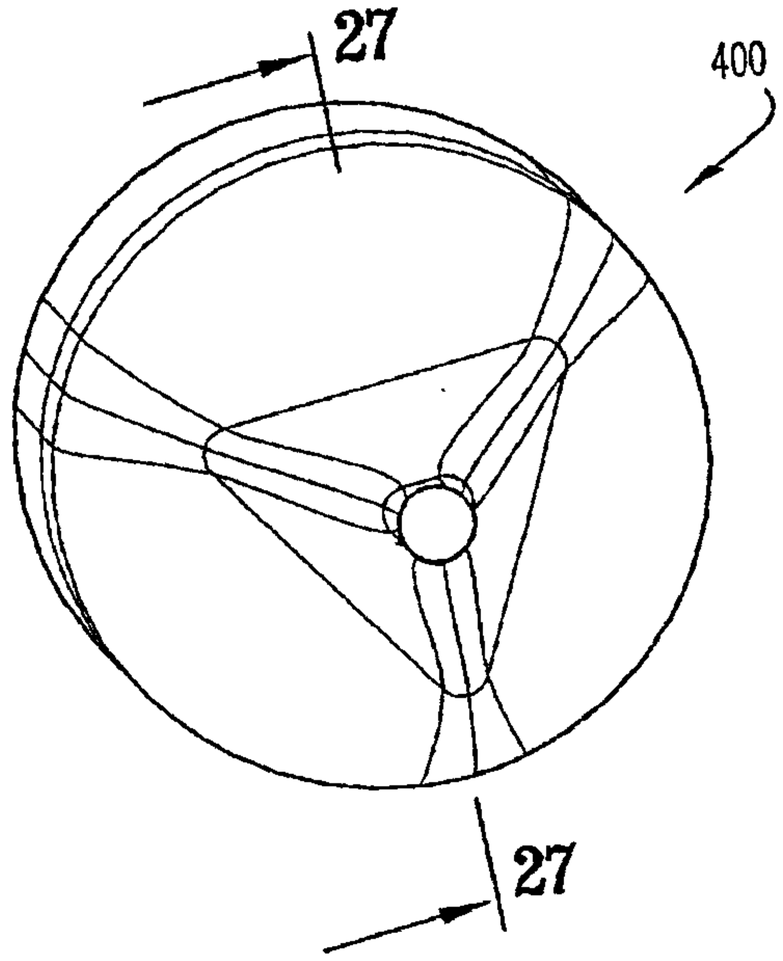


FIG. 25

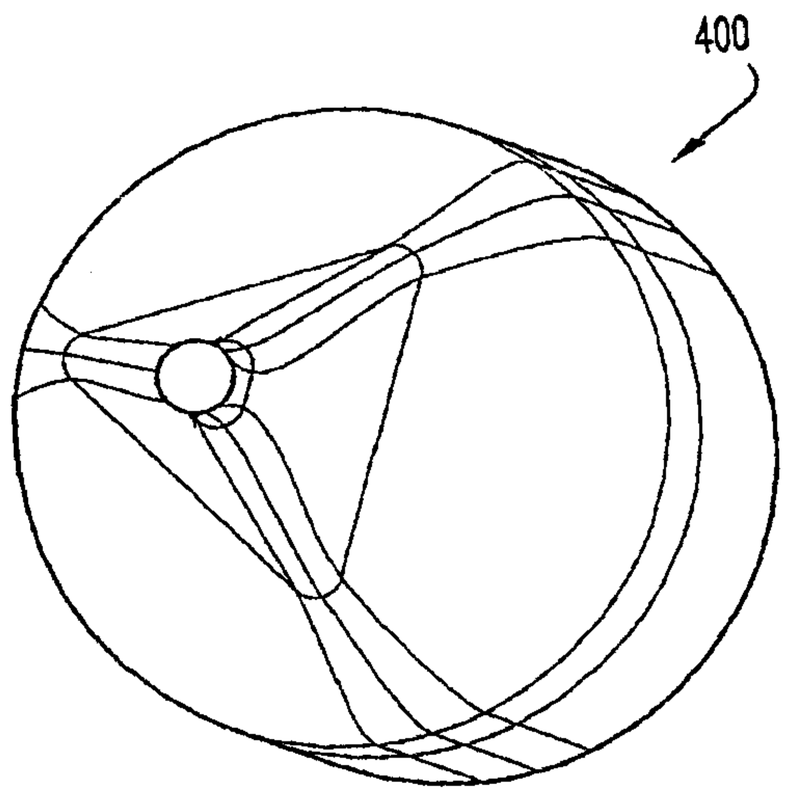


FIG. 26

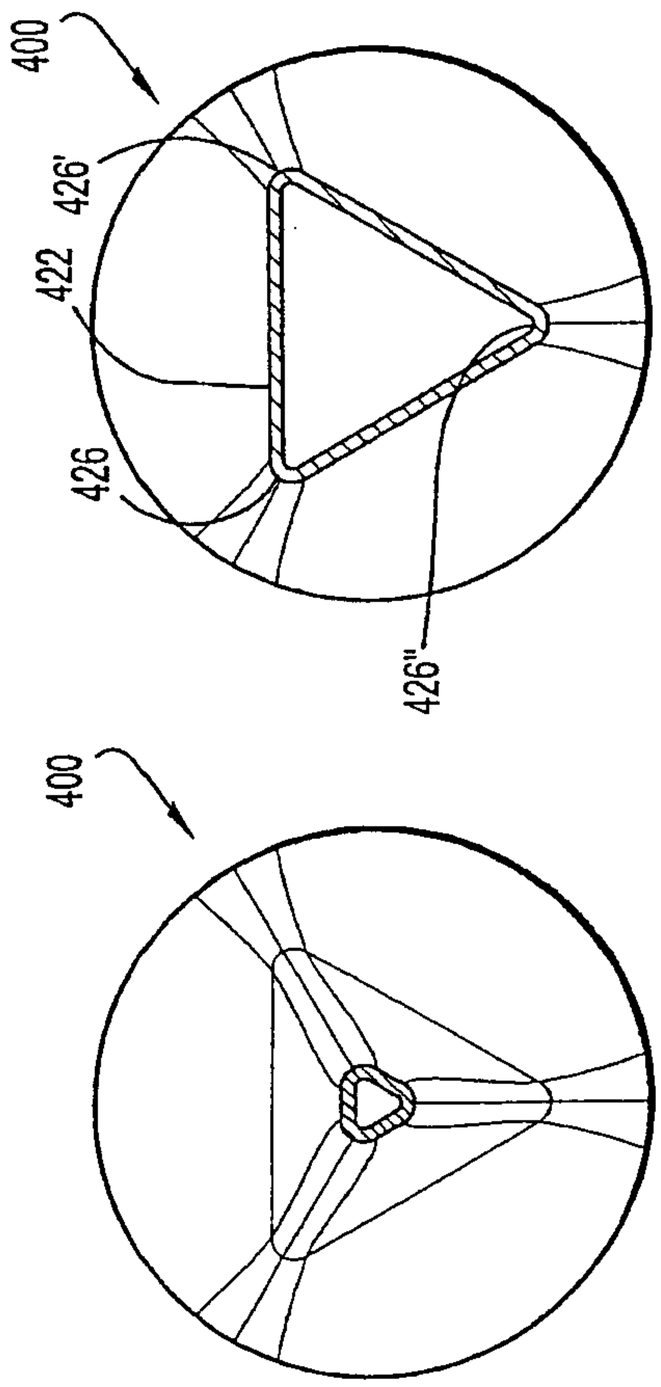


FIG. 29

FIG. 28

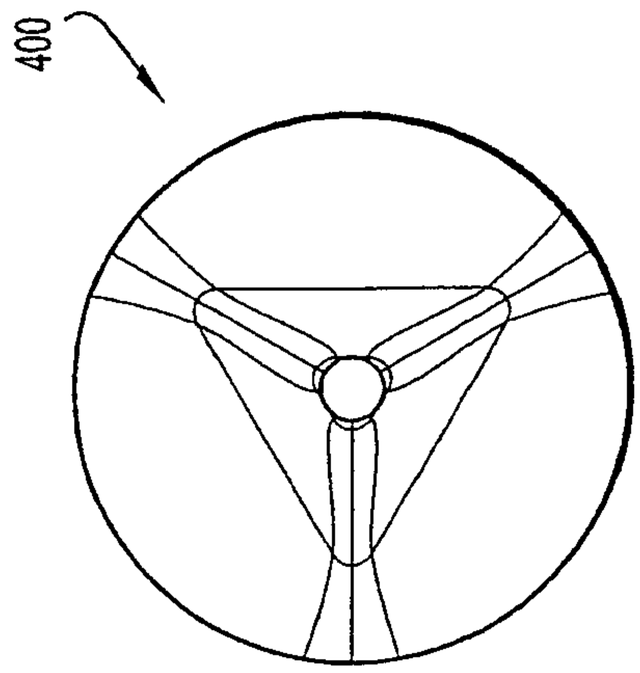


FIG. 31

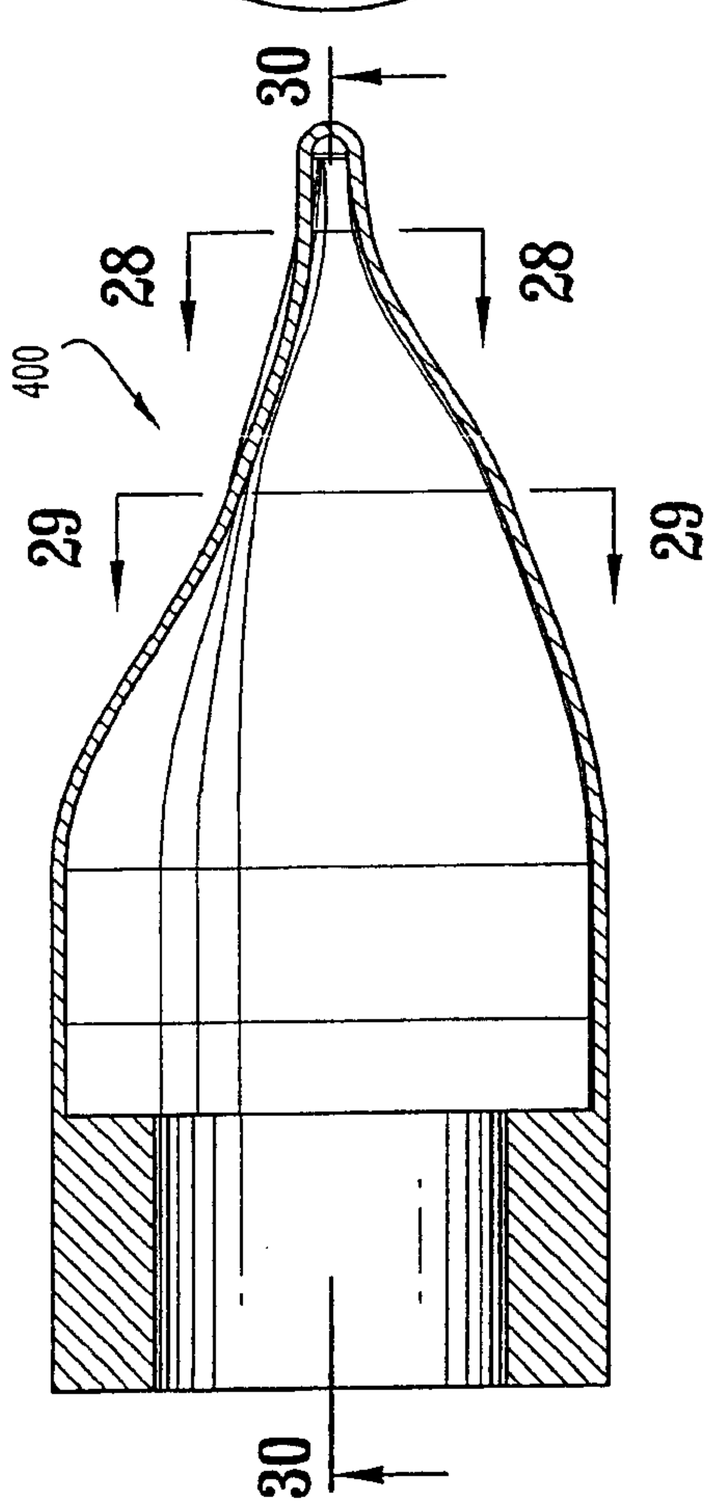


FIG. 27

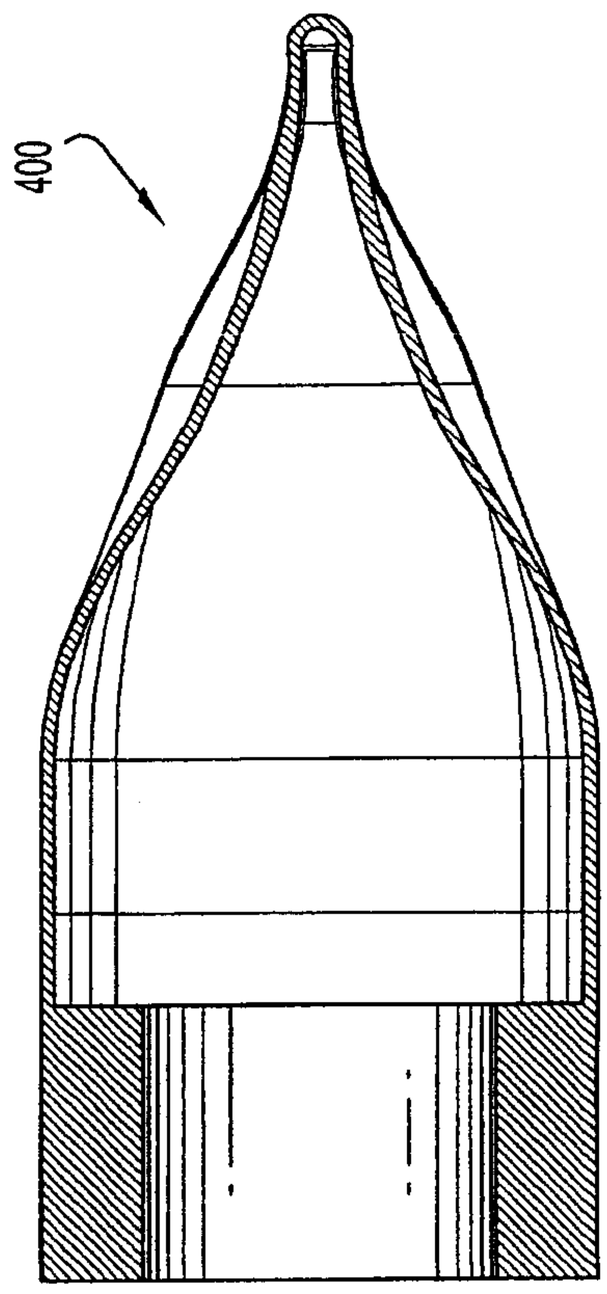


FIG. 30

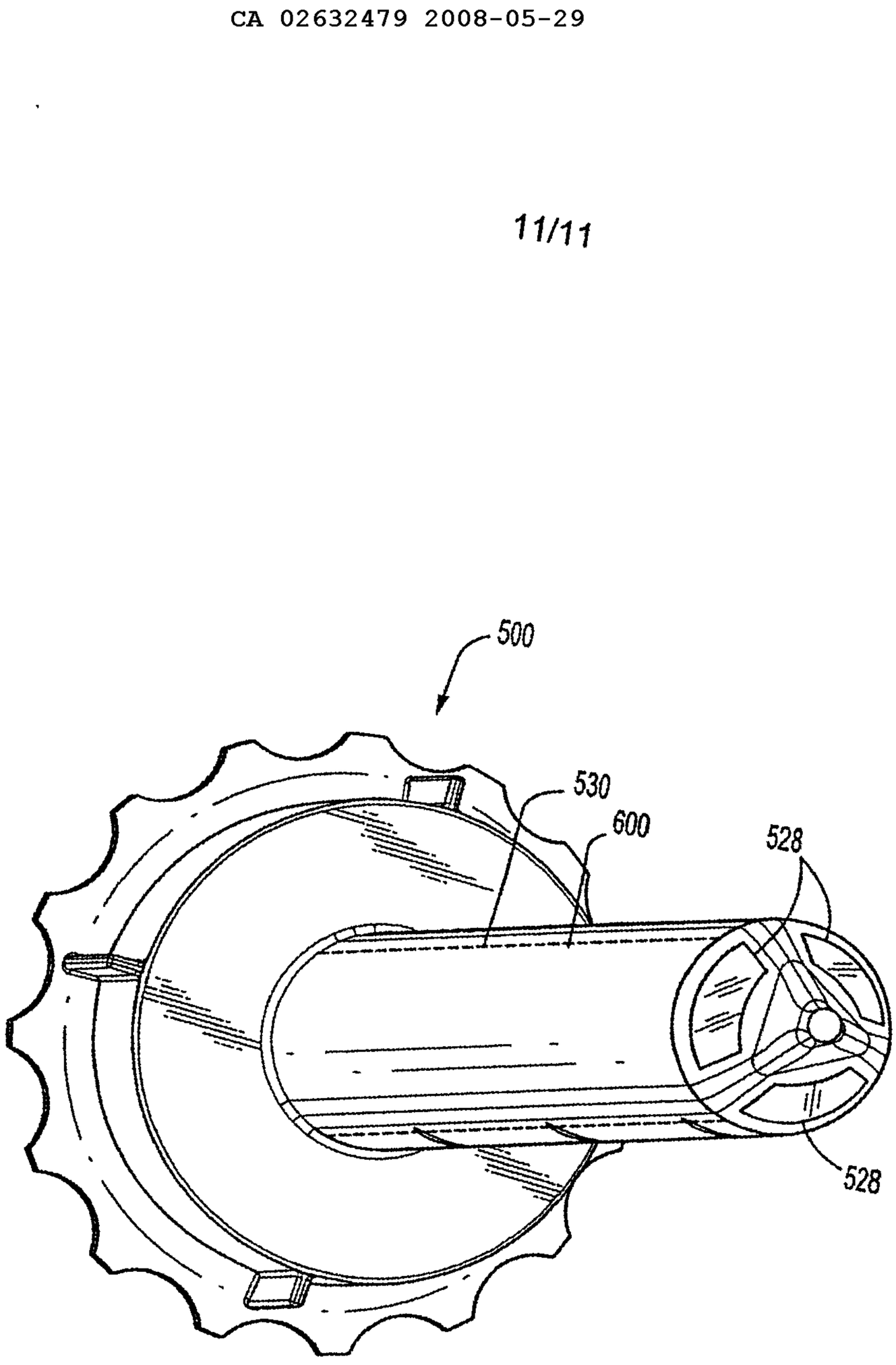
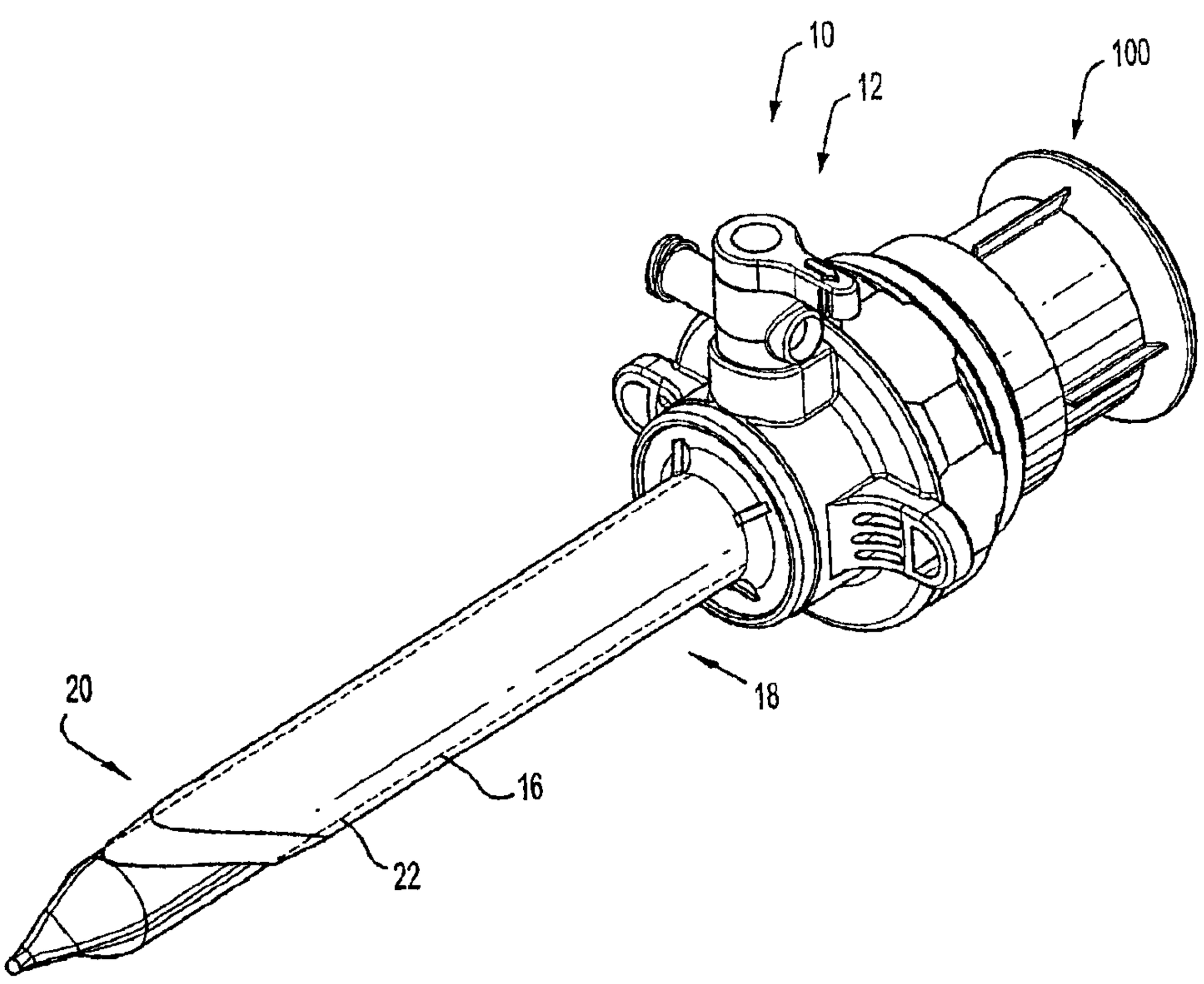


FIG. 32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