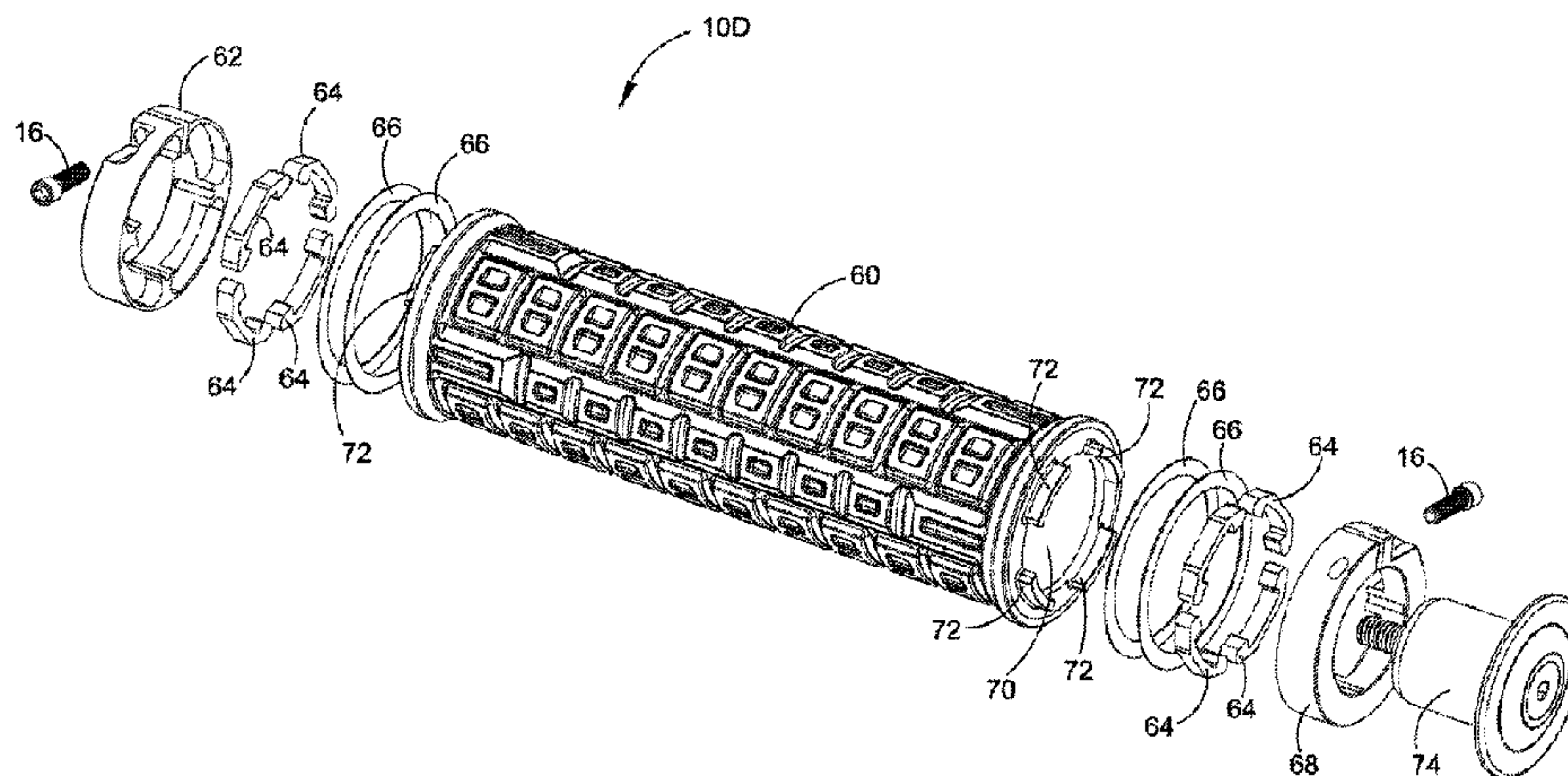




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(54) Title: SHOCK ABSORBING GRIP ASSEMBLY



(57) **Abrégé/Abstract:**

The present invention is directed to a shock absorbing grip assembly that has been designed to give a controlled floating action to the grip that can be adjusted by varying the different cushioning isolator mechanisms within the grip, or by varying the number of tuning washers. The shock absorbing grip assembly is comprised of one or more grip end clamps; one or more cavities in said grip end clamps; a grip sleeve having one or more protruding engagement members integral to an inner grip sleeve; and optionally one or more elastomeric isolator inserts housed within each of said one or more cavities in said grip end clamps, wherein said one or more protruding engagement members mates within said grip end clamp cavities optionally housing said elastomeric isolator inserts; and an outer elastomer grip; whereby said inner grip sleeve is suspended and has torsional, rotational, linear and axial shock absorbing capacity.

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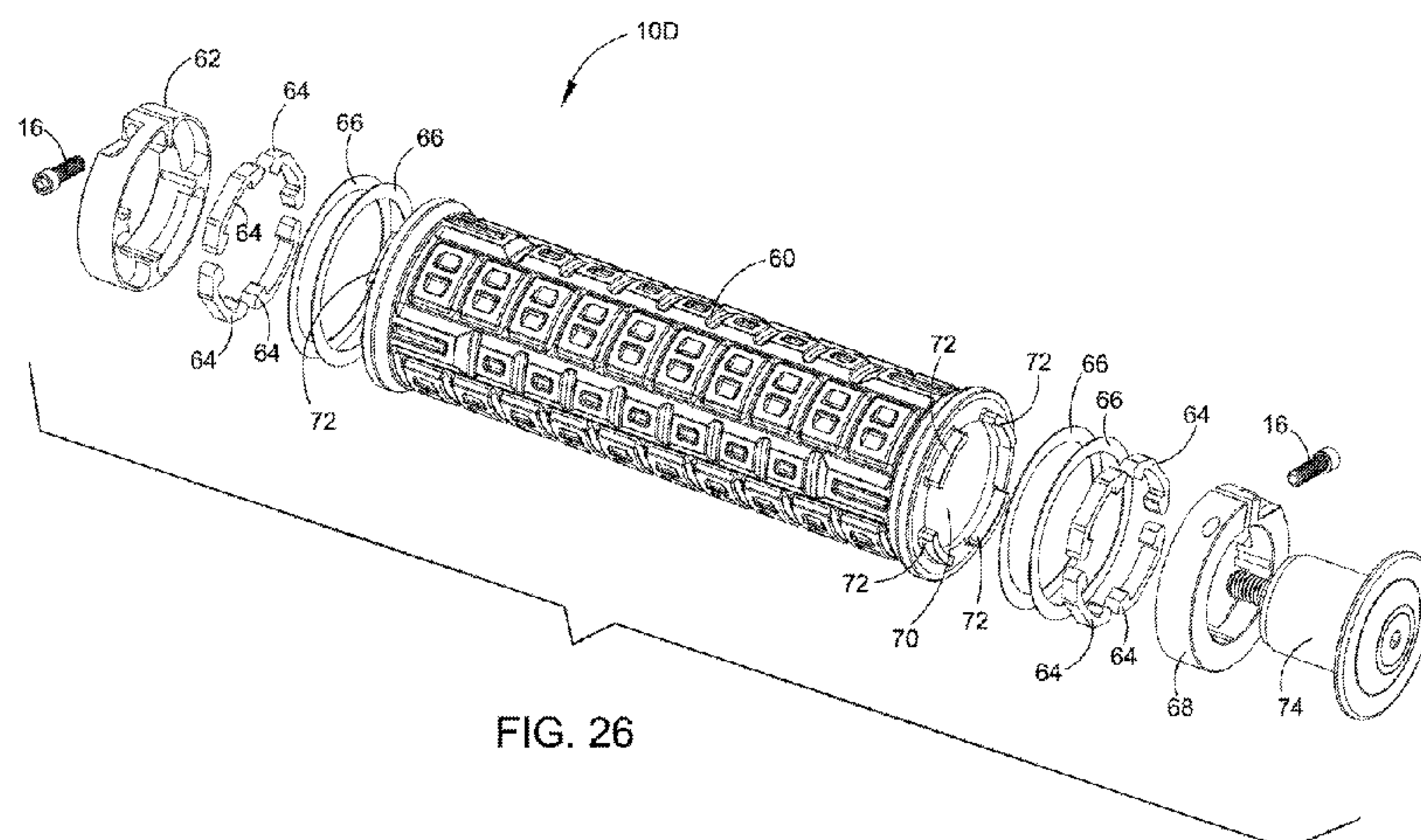


FIG. 26

(57) Abstract: The present invention is directed to a shock absorbing grip assembly that has been designed to give a controlled floating action to the grip that can be adjusted by varying the different cushioning isolator mechanisms within the grip, or by varying the number of tuning washers. The shock absorbing grip assembly is comprised of one or more grip end clamps; one or more cavities in said grip end clamps; a grip sleeve having one or more protruding engagement members integral to an inner grip sleeve; and optionally one or more elastomeric isolator inserts housed within each of said one or more cavities in said grip end clamps, wherein said one or more protruding engagement members mates within said grip end clamp cavities optionally housing said elastomeric isolator inserts; and an outer elastomer grip; whereby said inner grip sleeve is suspended and has torsional, rotational, linear and axial shock absorbing capacity.

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SHOCK ABSORBING GRIP ASSEMBLY

FIELD OF THE INVENTION

[0001] This application relates to shock absorbing and impact-attenuating hand grips. More specifically, the invention relates to hand grips particularly suited for use with devices that tend to transmit shocks to the arms, shoulders and back of the operator, such as the handle bars of motorcycles, off-road mountain bikes, all-terrain vehicles, snow mobiles and the like as well as power tools, hand tools, sporting goods such as golf clubs and baseball bats, and various other mounted and mountable grips.

BACKGROUND OF THE INVENTION

[0002] Handlebar grips have been utilized on the ends of handlebars for decades. These grips are typically made of a soft polymer that both improves a users' ability to grasp the handlebars and cushions the hand against the effect of vibrations and sudden impacts.

[0003] The handlebar grips are preferably made of anti-skid, relatively elastic and low durometer polymer such as rubber or urethane to enhance the cushioning effects. In off-road cycling, whether self-propelled, as in mountain biking, or powered by an internal combustion engine, as in a motorcycle, or riding an all-terrain vehicle (ATV), the rider tends to grip the handle bars tightly for balance and control. Under competitive conditions, the rider may need to enhance his/her grip for prolonged periods of time while traversing difficult terrain. Such tight gripping by the rider tends to cause shocks to be transferred to the rider's hands, wrists, forearms and related extremities. Over a period of time, these various forces can induce fatigue, and fatigue can compromise riding enjoyment and competitive results in racing.

[0004] By creating a torsional, rotational, linear and axial cushioning effect on the handlebar the Shock Absorbing Grip Assembly insure that the riders' hands, wrists, forearms and related extremities are relieved from the shocks incurred during prolonged activity.

[0005] Although attempts have been made to provide handle-bar grips that are comfortable to use, ones that are too-soft do not provide adequate motion control. Those that provide good motion control tend to be too-stiff to be comfortable. Thus, there is a need for a handle bar grip that is comfortable to use, that provides precise motion control, that has good endurance, and that can be readily retro-fitted on existing handle bars.

[0006] Numerous innovations for the handlebar grip have been provided in the prior art that are described as follows. Even though these innovations may be suitable for the specific individual purposes to which they address, they differ from the present design as hereinafter contrasted. The following is a summary of those prior art patents most relevant to this application at hand, as well as a description outlining the difference between the features of the Shock Absorbing Grip Assembly and the prior art.

[0007] Patent No. 7,013,533 of Wayne R. Lumpkin describes a grip for a cycle that includes a cylindrical liner extending along a liner axis between a first and a second end. The cylindrical liner has at least two elongate slots extending axially along a lengthwise portion of the cylindrical liner, each elongate slot overlapping a lengthwise part of another elongate slot, the overlapping elongate slots being radially offset. An over molding overlies a lengthwise of the cylindrical liner. The elongate slots are preferably disposed in a first set of at least two elongate slots extending along a first

axial line in the liner and a second set of at least two elongate slots extending along a second axial line in the liner. The first and second axial lines are radially offset and the first set of elongate slots overlaps the second set of elongate slots. A first elongate slot may intercept a first end of the cylindrical liner. A compression member is provided in operative association with a circumference of an axial segment of the cylindrical liner. The axial segment includes at least a lengthwise portion of the first elongate slot. The compression member is operable between a relaxed state not compressing the axial segment and a compression segment compressing the axial segment about its circumference. The axial segment is preferably proximate the first end of the cylindrical liner.

[0008] This patent describes a grip with a cylindrical liner that has at least two elongate slots extending axially along a lengthwise portion of the cylindrical liner, each elongate slot overlapping a lengthwise part of another elongate slot, the overlapping elongate slots being radially offset. This patent does not use the elastomeric isolator members to isolate the grip portion from the handle bar giving the secure but floating sensation.

[0009] Patent No. 8,484,806 of Gregory S. Rarick describes an ergonomic hand grip assembly. The assembly includes an outer resilient cover having an open proximal end surrounded by an annular flange. The cover is preferably molded of elastomeric material, such as rubber, that provides a satisfactory co-efficient of friction with respect to the palm of a human hand when gripped adjacent the cover flange. The elastomeric material is of conventional rubber-like composition known in art for use on outdoor equipment having a handle bar control member. The control member has a free end portion which is moveable by a user's hand to provide control motion inputs to a vehicle and to assist the vehicle rider in maintaining balance while riding the

vehicle.

[0010] This patent describes an ergonomic hand grip assembly but does not use the elastomeric isolator members to isolate the grip portion from the handle bar giving the secure but floating sensation.

[0011] None of these previous efforts, however, provides the benefits attendant with the Shock Absorbing Grip Assembly. The present design achieves its intended purposes, objects and advantages over the prior art devices through a new, useful and unobvious combination of method steps and component elements, with the use of a minimum number of functioning parts, at a reasonable cost to manufacture, and by employing readily available materials.

[0012] In this respect, before explaining at least one embodiment of the Shock Absorbing Grip Assembly in detail, it is to be understood that the design is not limited in its application to the details of construction and to the arrangement of the components set forth in the following description or illustrated in the drawings.

SUMMARY OF THE INVENTION

[0013] The principle advantage of the Shock Absorbing Grip Assembly is to absorb the shock to the hands, wrists, arms, back and shoulders when holding the grip on a wide variety of vehicles, motorcycles, off-road mountain bikes, all-terrain vehicles, snow mobiles and the like as well as power tools, hand tools, sporting goods such as golf clubs and baseball bats, and various other mounted and mountable grips as well as landscape equipment.

[0014] Another advantage of the Shock Absorbing Grip Assembly is that it is a shock absorbing, suspension grip that when mounted is suspended and isolated from handlebar movement, and can easily be installed or removed from a handlebar.

[0015] Another advantage of the Shock Absorbing Grip Assembly is that it has a firm but floating sensation when holding the grip, and isolates hand and grip from the shock and vibration of the handlebar.

[0016] Another advantage of the Shock Absorbing Grip Assembly is that it can be used by a wide variety of bicycles, creating a hand grip movement that is essentially free-floating and independent of the handlebar.

[0017] Another advantage of the Shock Absorbing Grip Assembly is that it can be used by a wide variety of motorized vehicles, and facilitates reducing hand and arm fatigue, reducing arm pump, and reducing joint stress and impact.

[0018] Another advantage of the Shock Absorbing Grip Assembly is that it can be used by a wide variety of tools such as power tools, hand tools, gardening equipment like tillers and mowers, and sporting goods such as golf clubs and baseball bats.

[0019] The Shock Absorbing Grip Assembly has been designed to give a controlled free-floating action to the grip that can be adjusted by varying the different cushioning elastomeric isolator mechanisms within the grip, including varying the durometer of the material used to create the elastomeric isolator inserts.

[0020] The Shock Absorbing Grip Assembly is comprised of a slotted grip end clamp to be attached to a handlebar by the means of a screw restricting the diameter against the handlebar. One or more (preferably three or four) elastomeric or spring equipped isolator members are inserted into three or four cavities in the slotted grip end clamp and two O-rings are slid over the handle bar to be centrally located within the grip. The O-rings control and limit some of the flexibility of the grip sleeve with an elastomer grip and they are an optional part of the assembly.

[0021] A grip sleeve with an elastomer grip bonded to it is slid over the O-rings on the handlebar. The grip sleeve has three or four recesses on either end, creating protruding engagement members to fit within the spaces between the three or four elastomeric isolator members inserted in the cavities in the slotted grip end clamp. One or more (preferably three or four) elastomeric or spring equipped isolator members are located on the distal end of the grip sleeve with an elastomer grip, and fit into cavities within the second slotted grip end clamp to be attached to the handlebar by the means of a screw restricting the diameter against the handlebar. The Shock Absorbing Grip Assembly is firmly attached to the handlebar by the slotted clamp fasteners on both ends.

[0022] A handlebar end cap is affixed to the second slotted grip end clamp to be secured by the means of one or more screws. A variety of different elastomeric isolator members having different shapes and durometers are used for adjusting the flexibility of the grip.

[0023] Alternate embodiments will include a different shape of elastomeric isolator members and the addition of leaf springs against the ear sections of the grip sleeve between each of the elastomeric isolator members and one having the leaf springs with coil compression springs replacing the elastomeric isolator members.

[0024] Additional alternate embodiments include varying the durometer of the elastomeric isolator inserts to fine tune the feel of the cushion for the grip, as well as the addition of tuning washers to increase or decrease the distance the protruding engagement members into the clamp cavities, to again vary the cushion of the grip.

[0025] The foregoing has outlined rather broadly the more pertinent and important features of the present Shock Absorbing Grip Assembly in order that the detailed description of the application that follows may be better understood so that the

present contribution to the art may be more fully appreciated. Additional features of the design will be described hereinafter which form the subject of the claims of this disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] The accompanying drawings, which are incorporated in and form a part of this specification illustrate embodiments of the Shock Absorbing Grip Assembly and together with the description, serve to explain the principles of this application.

[0027] **FIG. 1** depicts a perspective view of a typical bicycle handle bar with two of the preferred embodiments of the Shock Absorbing Grip Assemblies.

[0028] **FIG. 2** depicts an exploded view of the preferred embodiment of the Shock Absorbing Grip Assembly.

[0029] **FIG. 3** depicts a side view of the preferred embodiment of the Shock Absorbing Grip Assembly.

[0030] **FIG. 4** depicts an end view of the preferred embodiment of the Shock Absorbing Grip Assembly.

[0031] **FIG. 5** depicts a cross section of the preferred embodiment of the Shock Absorbing Grip Assembly with the preferred embodiment of the elastomeric isolator members in place between the protruding engagement members of the grip sleeves.

[0032] **FIG. 6** depicts an enlarged cross section through the slotted grip end clamp and the preferred embodiment of the elastomeric isolator members.

[0033] **FIG. 7** depicts a full cross section through the preferred embodiment of the Shock Absorbing Grip Assembly.

[0034] **FIG. 8** depicts a side view of the preferred embodiment of the Shock Absorbing Grip Assembly.

[0035] FIG. 9 depicts a perspective view of the slotted grip end clamp.

[0036] FIG. 10 depicts a side view of the slotted grip end clamp.

[0037] FIG. 11 depicts a front view of the slotted grip end clamp.

[0038] FIG. 12 depicts a perspective view of the slotted grip end clamp with the three preferred embodiments of the elastomeric isolator members inserted.

[0039] FIG. 13 depicts a perspective view of one of the preferred embodiment of the Shock Absorbing Grip Assembly illustrating the grip sleeve with the elastomer grip bonded to it and the grip sleeve having three recesses creating protruding engagement members to fit within the spaces between the three preferred embodiments of the elastomeric isolator members.

[0040] FIG. 14 depicts a side view of the first alternate embodiment of the Shock Absorbing Grip Assembly using spring inserts.

[0041] FIG. 15 depicts a cross section view of the first alternate embodiment of the Shock Absorbing Grip Assembly with leaf spring inserts.

[0042] FIG. 16 depicts a cross section view of the second alternate embodiment of the Shock Absorbing Grip Assembly with leaf and coil compression spring inserts.

[0043] FIG. 17 depicts a perspective view of the preferred embodiment of the elastomeric isolator member.

[0044] FIG. 18 depicts a front view of preferred embodiment of the elastomeric isolator member.

[0045] FIG. 19 depicts a front view of alternate embodiment of the elastomeric isolator member.

[0046] FIG. 20 depicts a perspective view of the grip sleeve.

[0047] FIG. 21 depicts a side view of the grip sleeve.

[0048] FIG. 22 depicts an end view of the grip sleeve.

[0049] FIG. 23 depicts a perspective view of the elastomer grip.

[0050] FIG. 24 depicts a side view of the elastomer grip.

[0051] FIG. 25 depicts an end view of the elastomer grip.

[0052] FIG. 26 depicts an exploded view of the third alternate embodiment of the Shock Absorbing Grip Assembly.

[0053] FIG. 27A depicts a side view of the elastomer grip with the four protruding engagement members on each end.

[0054] FIG. 27B depicts a typical end view of the elastomer grip.

[0055] FIG. 28A depicts a perspective view of the inner clamp with the clamp screw and one of the elastomeric isolator members exploded away.

[0056] FIG. 28B depicts a front view of the inner clamp with the elastomeric isolator members in place.

[0057] FIG. 28C depicts a front view of the inner clamp with the elastomeric isolator members removed.

[0058] FIG. 28D depicts a front view of four elastomeric isolator members.

[0059] FIG. 29A depicts a perspective view of the inner clamp with a one-piece elastomeric isolator member in place.

[0060] FIG. 29B depicts a front view of the inner clamp with a one-piece elastomeric isolator member.

[0061] FIG. 29C depicts a perspective view of the inner clamp with a one-piece elastomeric isolator member removed exposing the four alignment posts.

[0062] FIG. 29D depicts a front view of the inner clamp with a one piece elastomeric isolators removed exposing the four alignment posts.

[0063] FIG. 29E depicts a perspective view of the one-piece elastomeric isolator member.

[0064] FIG. 29F depicts a front view of the one-piece elastomeric isolator member.

[0065] FIG. 30A depicts a cross section side view of a portion of the elastomer grip with grip sleeve having a plurality of nubs on inner surface.

[0066] FIG. 30B depicts an end view of the elastomer grip with the four protruding engagement members.

[0067] FIG. 30C depicts a perspective view of a portion of the elastomer grip with the four protruding engagement members.

[0068] FIG. 31A depicts a cross section side view of a portion of the elastomer grip with the grip sleeve having a matrix of horizontal and vertical ribs on inner surface.

[0069] FIG. 31B depicts an end view of the elastomer grip with the four protruding engagement members.

[0070] FIG. 31C depicts a perspective view of a portion of the end of the elastomer grip with the four protruding engagement members.

[0071] FIG. 32A depicts a side view of a portion of the elastomer grip with eight tear shaped engagement members.

[0072] FIG. 32B depicts an end view of the elastomer grip with the eight protruding tear shaped engagement members.

[0073] FIG. 33A depicts a perspective view of the inner clamp with one of the elastomeric isolator members exploded away.

[0074] FIG. 33B depicts an end view of the inner clamp with the elastomeric isolator members in position.

[0075] FIG. 34A depicts a perspective view of the inner clamp with a one of the elastomeric isolator members exploded away.

[0076] FIG. 34B depicts an end view of the inner clamp with the elastomeric isolator members in position.

[0077] FIG. 35A depicts a side view of a portion of the end of the elastomer grip with eight protruding engagement posts.

[0078] FIG. 35B depicts an end view of the end of the elastomer grip with eight protruding engagement posts.

[0079] FIG. 35C depicts a perspective view of the inner clamp with a one of the O-ring elastomeric isolators exploded away.

[0080] FIG. 35D depicts an end view of the inner clamp with the O-ring elastomeric isolator members in position.

[0081] FIG. 36A depicts a side view of a portion of the end of the elastomer grip with two protruding engagement members.

[0082] FIG. 36B depicts an end view of the elastomer grip with two protruding engagement members.

[0083] FIG. 36C depicts a perspective view of the inner clamp with a one of the elastomeric isolator member exploded away.

[0084] FIG. 36D depicts an end view of the inner clamp with the two elastomeric isolator members in position.

[0085] FIG. 37A depicts a side view of a portion of the end of the elastomer grip with three protruding engagement members.

[0086] FIG. 37B depicts an end view of the elastomer grip with three protruding engagement members.

[0087] FIG. 37C depicts a perspective view of the inner clamp with a one of the elastomeric isolator members exploded away.

[0088] FIG. 37D depicts an end view of the inner clamp with the elastomeric isolator members in position.

[0089] FIG. 38A depicts a perspective view of the inner clamp with the single elastomeric isolator member exploded away.

[0090] FIG. 38B depicts an end view of the inner clamp with the single elastomeric isolator member in position.

[0091] FIG. 39A depicts a side view of a portion of the end of the elastomer grip with three configured protruding engagement members.

[0092] FIG. 39B depicts an end view of the elastomer grip with three configured protruding engagement members.

[0093] FIG. 39C depicts a perspective view of the inner clamp with one of the elastomeric isolator members exploded away.

[0094] FIG. 39D depicts an end view of the inner clamp with the elastomeric isolator members in position.

[0095] FIG. 40A depicts a perspective view of the inner clamp with the elastomeric isolator member and compression disk in position.

[0096] FIG. 40B depicts an end view of the inner clamp with the single elastomeric isolator member and compression disk in position.

[0097] FIG. 40C depicts a front view of the single elastomeric isolator member.

[0098] FIG. 40D depicts a perspective view of the single elastomeric isolator member.

[0099] FIG. 40E depicts a rear view of the single elastomeric isolator member.

[0100] FIG. 41 depicts an exploded perspective view of the Shock Absorbing Grip Assembly configured to be mounted to a throttle on a handle or handlebar.

[0101] FIG. 42 depicts end view of the outer grip end clamp for mounting on a throttle assembly with cavities to accept four elastomeric isolator members.

[0102] FIG. 43A depicts a side view of the assembled Shock Absorbing Grip Assembly configured to be mounted to a throttle on a handle or handlebar.

[0103] FIG. 43B depicts an enlarged cut-away side view of the assembled Shock Absorbing Grip Assembly 300 configured to be mounted to a throttle on a handle or handlebar, showing the inner grip sleeve and integral protrusion engagement members.

[0104] FIG. 44A and 44B depict an exploded side view of the Shock Absorbing Grip Assembly configured to be mounted to a throttle on a handle or handlebar, illustrating a two-piece and a one-piece coupler, respectively.

[0105] FIG. 44C depicts an end view of a one-piece coupler affixed to a throttle sleeve, illustrating the mating slots located in the one-piece coupler.

[0106] FIG. 45 depicts a side view of an elastomer grip and inner grip sleeve configured to have protrusion members which directly mate into cavities within the end clamp.

[0107] FIG. 46 depicts an end view of the elastomer grip and inner grip sleeve which includes protrusion members to be used directly without the use of elastomeric inserts.

[0108] FIG. 47 depicts an end view of the grip end clamp used without elastomeric inserts, having four oval shaped cavities.

[0109] FIG. 48 depicts an end perspective view of the grip end clamp used without elastomeric inserts, having four oval shaped cavities.

[0110] FIG. 49 depicts a perspective and side view of an elastomer grip and inner grip sleeve configured to have protrusion members which directly mate into cavities within the end clamp.

[0111] FIG. 50 depicts an end view of an alternate grip end clamp used without elastomeric inserts, having four rectangular shaped cavities.

[0112] FIG. 51 depicts an end perspective view of an alternate grip end clamp used without elastomeric inserts, having four rectangular shaped cavities.

[0113] FIG. 52 depicts a perspective and side view of an elastomer grip and inner grip sleeve configured to have protrusion members which directly mate into cavities within the end clamp.

[0114] For a fuller understanding of the nature and advantages of the Shock Absorbing Grip Assembly, reference should be had to the following detailed description taken in conjunction with the accompanying drawings which are incorporated in and form a part of this specification, illustrate embodiments of the design and together with the description, serve to explain the principles of this application.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0115] Referring now to the drawings, wherein similar parts of the Shock Absorbing Grip Assembly 10A, 10B, 10C and 10D are identified by like reference numerals, there is seen in FIG. 1 a perspective view of a typical bicycle handle bar 12 with two of the preferred embodiment Shock Absorbing Grip Assembly's 10A attached at either end.

[0116] FIG. 2 depicts an exploded view of the preferred embodiment of the Shock Absorbing Grip Assembly 10A illustrating the handlebar 12 with two optional O-

rings 14. The first slotted grip end clamp 16 will be locked in place on the handlebar by the means of the screw 18. The three cavities 20 in the slotted grip end cap 16 will house the three elastomeric isolator members 22A at assembly. The protruding engagement members 24 created by the three recesses 26 on both ends of the grip sleeve 28 connect between the depressions 30 on either side of each elastomeric isolator members 22A. A cover plate 32 is attached to the outer slotted grip end 16 by the means of three screws 34. The elastomer grip 36 that will cover the grip sleeve 28 is set aside for clarity.

[0117] FIG. 3 depicts a side view of the preferred embodiment of the Shock Absorbing Grip Assembly 10A including the handlebar 12. The first slotted grip end clamp 16 and the grip sleeve 28 with the elastomer grip 36 outer covering are shown next to the second slotted grip end clamp 16 with the cover plate 32 attached.

[0118] FIG.4 depicts an end view of the preferred embodiment of the Shock Absorbing Grip Assembly 10A illustrating the cover plate 32 and the location of the three attaching screws 34 (shown in FIG. 2).

[0119] FIG. 5 depicts a cross section of the preferred embodiment of the Shock Absorbing Grip Assembly 10A through the preferred embodiment of the elastomeric isolator members 22A illustrating how the protruding engagement members 24 on the grip sleeve 28 fit within the depressions 30 on either side of each elastomeric isolator members 22A. The elastomeric isolator members 22A are shown inset within the three cavities 20 of the slotted grip end clamp 16.

[0120] FIG. 6 depicts an enlarged cross section through the handle bar 12 and slotted grip end clamp 16 with the elastomeric isolator members 22A showing how the protruding engagement members 24 on the grip sleeve 28 fit within the depressions 30 of the elastomeric isolator members 22A.

[0121] FIG. 7 depicts a full cross section through the preferred embodiment of the Shock Absorbing Grip Assembly 10A.

[0122] FIG. 8 depicts a side view of the handle bar 12 and the preferred embodiment of the Shock Absorbing Grip Assembly 10A illustrating the location of the screws 18 that clamp the slotted grip end clamps 16 to the handle bar 12.

[0123] FIG. 9 depicts a perspective view of the slotted grip end clamp 16 with the three cavities 20 on the side surface.

[0124] FIG. 10 depicts a side view of the slotted grip end clamp 16.

[0125] FIG. 11 depicts a front view of the slotted grip end clamp 16 with the three cavities 20 on the front surface.

[0126] FIG. 12 depicts a perspective view of the slotted grip end clamp 16 with the three elastomeric isolator members 22A inserted.

[0127] FIG. 13 depicts a perspective view of one end of the preferred embodiment of the Shock Absorbing Grip Assembly 10A illustrating the grip sleeve 28 with the elastomer grip 36 bonded to it and the grip sleeve 28 having three recesses 26 creating protruding engagement members 24 to fit within the spaces between the three elastomeric isolator members 22A.

[0128] FIG. 14 depicts a side view of the first alternate embodiment of the Shock Absorbing Grip Assembly 10B using spring inserts.

[0129] FIG. 15 depicts a cross section view of the first alternate embodiment of the Shock Absorbing Grip Assembly 10B with leaf spring inserts 42 between the inner surface of the slotted grip end clamp 16 and the protruding engagement members 24 on the grip sleeve 28. The first alternate embodiment of the elastomeric isolator members 22B is used in this application.

[0130] FIG. 16 depicts a cross section view of the second alternate embodiment of the Shock Absorbing Grip Assembly 10C with leaf spring inserts 42 and coil compression spring 44 replacing the elastomeric isolator members 22B.

[0131] FIG. 17 depicts a perspective view of the preferred embodiment of the elastomeric isolator member 22A illustrating the location of the depressions 30 on either end.

[0132] FIG. 18 depicts a front view of the preferred embodiment of the elastomeric isolator member 22A.

[0133] FIG. 19 depicts a front view of the second alternate embodiment of the elastomeric isolator member 22C with a recessed flat surface 46 on each side.

[0134] FIG. 20 depicts a perspective view of the grip sleeve 28 depicting the locations of the protruding engagement members 24 on the grip sleeve 28 on both ends.

[0135] FIG. 21 depicts a side view of the grip sleeve 28.

[0136] FIG. 22 depicts an end view of the grip sleeve 28.

[0137] FIG. 23 depicts a perspective view of the elastomer grip 36.

[0138] FIG. 24 depicts a side view of the elastomer grip 36.

[0139] FIG. 25 depicts an end view of the elastomer grip 36.

[0140] FIG. 26 depicts an exploded view of the third alternate embodiment of the Shock Absorbing Grip Assembly 10D illustrating the inner clamp 62 with the screw 16 with the four elastomeric isolator members 64. A variety of different durometers are available in fabricating all the elastomeric isolator members 64 and tuning washers 66 described giving a harder or softer compression to the parts. One or more tuning washers 66 are shown at each end of the elastomer grip 60 with the elastomeric isolator members 64 and outer clamp 68. The grip sleeve 70 of the elastomer grip 60

is shown with four protruding engagement members 72 on each end. The handle bar 12 end cap 74 is additionally shown. Additional alternate embodiments include varying the durometer of the elastomeric isolator inserts to fine tune the feel of the cushion for the grip, as well as the addition of tuning washers to increase or decrease the distance the protruding engagement members into the clamp cavities, to again vary the cushion of the grip.

[0141] FIG. 27A depicts a side view of the elastomer grip 60 with the grip sleeve 70 having the four protruding engagement members 72 on each end.

[0142] FIG. 27B depicts an end view of the elastomer grip 60 with the grip sleeve 70 having the four protruding engagement members 72.

[0143] FIG. 28A depicts a perspective view of the inner clamp 62 with the clamp screw 16 and one of the elastomeric isolator members 64 exploded away. One of the isolator cavities 76 is shown within the inner clamp 62 along with the compression grooves 78.

[0144] FIG. 28B depicts a front view of the inner clamp 62 with the elastomeric isolator members 64 in place.

[0145] FIG. 28C depicts a front view of the inner clamp 62 with the elastomeric isolator members 64 removed.

[0146] FIG. 28D depicts a front view of four elastomeric isolator members 64.

[0147] FIG. 29A depicts a perspective view of the inner clamp 82 with a one-piece elastomeric isolator member 84 in place illustrating the engagement member cavities 86 and the four alignment posts 90 positioned in the four locator post orifices 88.

[0148] FIG. 29B depicts a front view of the inner clamp 82 with a one-piece elastomeric isolator member 84 in place indicating the locations of the engagement

member cavities 86 and the four alignment posts 90 positioned in the four locator post orifices 88.

[0149] FIG. 29C depicts a perspective view of the inner clamp 82 with a one-piece elastomeric isolator member 84 removed exposing the four alignment posts 90.

[0150] FIG. 29D depicts a front view of the inner clamp 82 with a one-piece elastomeric isolator member 84 removed exposing the four alignment posts 90.

[0151] FIG. 29E depicts a perspective view of the one-piece elastomeric isolator member 84 indicating the locations of the engagement member cavities 86 and the locator pin orifices 88.

[0152] FIG. 29F depicts a front view of the one-piece elastomeric isolator member 84 indicating the locations of the engagement member cavities 86 and the locator pin orifices 88.

[0153] FIG. 30A depicts a cross section side view of a portion of the elastomer grip 94 with grip sleeve 96 having a plurality of nubs 98 and four protruding engagement members 100.

[0154] FIG. 30B depicts an end view of the elastomer grip 94 with the four protruding engagement members 100 and a plurality of nubs 98.

[0155] FIG. 30C depicts a perspective view of a portion of the elastomer grip 94 with the four protruding engagement members 100 and a plurality of nubs 98 on the grip sleeve 96.

[0156] FIG. 31A depicts a cross section side view of a portion of the elastomer grip 104 with the grip sleeve 106 having a matrix of horizontal ribs 108 and vertical ribs 110 on inner surface 112 and four protruding engagement members 114.

[0157] FIG. 31B depicts an end view of the elastomer grip 104 with the four protruding engagement members 114.

[0158] FIG. 31C depicts a perspective view of a portion of the end of the elastomer grip 104 with a matrix of horizontal ribs 108 and vertical ribs 110 on grip sleeve 106 and four protruding engagement members 114.

[0159] FIG. 32A depicts a side view of a portion of the elastomer grip 116 with eight tear shaped engagement members 118 on the grip sleeve 120.

[0160] FIG. 32B depicts an end view of the elastomer grip 116 with the eight protruding tear shaped engagement members 118 on the grip sleeve 120.

[0161] FIG. 33A depicts a perspective view of the inner clamp 122 with one of the elastomeric isolator member 124 having the engagement member cavities 125 exploded away from the isolator cavity 126

[0162] FIG. 33B depicts a front view of the inner clamp 122 with the elastomeric isolator members 124 having the engagement member cavities 125 in position.

[0163] FIG. 34A depicts a perspective view of the inner clamp 130 with a one of the elastomeric isolator member 132 having the engagement member cavities 133 exploded away from the isolator cavity 134.

[0164] FIG. 34B depicts a front view of the inner clamp 130 with the elastomeric isolator member 132 having the engagement member cavities 133 in position.

[0165] FIG. 35A depicts a side view of a portion of the end of the elastomer grip 138 with eight protruding engagement posts 140 on the grip sleeve 142.

[0166] FIG. 35B depicts a front view of the end of the elastomer grip 138 with eight protruding engagement posts 140 on the grip sleeve 142.

[0167] FIG. 35C depicts a perspective view of the inner clamp 146 with a one of the O-ring elastomeric isolators 148 exploded away from the isolator cavity 150.

[0168] FIG. 35D depicts a front view of the inner clamp 146 with the O-ring elastomeric isolators 148 in position.

[0169] FIG. 36A depicts a side view of a portion of the end of the elastomer grip 154 with two protruding engagement members 156 on the grip sleeve 158.

[0170] FIG. 36B depicts an end view of the end of the elastomer grip 154 with two protruding engagement members 156 on the grip sleeve 158.

[0171] FIG. 36C depicts a perspective view of the inner clamp 162 with a one of the elastomeric isolator member 164 with engagement member cavities 165 exploded away from the isolator cavity 166.

[0172] FIG. 36D depicts a front view of the inner clamp 162 with the two elastomeric isolator members 164 in position.

[0173] FIG. 37A depicts a side view of a portion of the end of the elastomer grip 170 with three protruding engagement members 172 on the grip sleeve 174.

[0174] FIG. 37B depicts an end view of the elastomer grip 170 with three protruding engagement members 172 on the grip sleeve 174.

[0175] FIG. 37C depicts a perspective view of the inner clamp 178 with one of the elastomeric isolator member 180 having engagement member cavities 181 exploded away from the isolator cavity 182.

[0176] FIG. 37D depicts a front view of the inner clamp 178 with the elastomeric isolator members 180 having engagement member cavities 181 in position.

[0177] FIG. 38A depicts a perspective view of the inner clamp 186 having three indexing and anti-rotation members 188 in the isolator cavity 190 with the single elastomeric isolator member 192 with engagement member cavities 194, indexing depressions 196 and scalloped shock absorbing inner surface 198 exploded away.

[0178] FIG. 38B depicts a front view of the inner clamp 186 having the single elastomeric isolator member 192 with engagement member cavities 194, indexing depressions 196 and scalloped shock absorbing inner surface 198 in position.

[0179] FIG. 39A depicts a side view of a portion of the end of the elastomer grip 202 with three configured protruding engagement members 204 on the grip sleeve 206.

[0180] FIG. 39B depicts an end view of the elastomer grip 202 with three configured protruding engagement members 204 on the grip sleeve 206.

[0181] FIG. 39C depicts a perspective view of the inner clamp 210 with the elastomeric isolator member 212 exploded away from the isolator cavity 214.

[0182] FIG. 39D depicts a front view of the inner clamp 210 with the elastomeric isolator members 212 in position within the isolator cavity 214.

[0183] FIG. 40A depicts a perspective view of the inner clamp 218 with the elastomeric isolator member 220 in position behind the compression disk 222 with three engagement slots 224 and three sets of compression disk absorbing cavities 216.

[0184] FIG. 40B depicts a front view of the inner clamp 218 with the single elastomeric isolator member 220 behind the compression disk 222 having three engagement slots 224 and three sets of compression disk absorbing cavities 216.

[0185] FIG. 40C depicts a front view of the compression disk 222 having three engagement slots 224 and three sets of compression disk absorbing cavities 226.

[0186] FIG. 40D depicts a perspective view of the single elastomeric isolator member 220 with three engagement member cavities 228.

[0187] FIG. 40E depicts a rear view of the single elastomeric isolator member 220.

[0188] FIG. 41 depicts an exploded perspective view of the Shock Absorbing Grip Assembly 300 configured to be mounted to a twist throttle on a handle or handlebar.

The outer elastomer grip 302 includes a grip flange 304 and surrounds an inner grip sleeve 306. The inner grip sleeve 306 has integral protruding engagement members 308 and 310 thereon. Inner grip sleeve 306 protrusion engagement members 308 mate within cavities in grip end clamp 316 which may include shock absorbing inserts

312. Grip end clamp **316** is secured using screw **317**, as well as handlebar end cap **318** and end cap screw **320**. The inner grip sleeve **306** also contains engagement member **310** which mates with slots **324** in coupler **322** and when slid up the twist throttle sleeve **330** then mates with coupler adapter **328** on the inner end of twist throttle sleeve **330** before reaching the twist throttle cam **332**. In this way, inner grip sleeve **306** is able to engage and rotate twist throttle sleeve **330** to allow the user to throttle up (rotate the twist throttle inward) and throttle down (rotate outward) while maintaining the shock absorbing capacity of the shock absorbing grip assembly **300**.

[0189] FIG. 42 depicts end view of the outer grip end clamp **316** for mounting on a twist throttle assembly with cavities to accept four elastomeric isolator members, which includes four cavities **319** able to accept the protruding engagement members **308** on grip sleeve **306**, with or without shock absorbing inserts **312**.

[0190] FIG. 43A depicts a side view of the assembled Shock Absorbing Grip Assembly **300** configured to be mounted to a twist throttle on a handle or handlebar. As shown here, the elastomer grip **302** (and inner grip sleeve **306**, not shown) has been slid up the throttle sleeve **330** until it nearly reaches the throttle cam **332**. The outer end clamp **316** is mounted against inner grip sleeve **306**, secured to throttle sleeve **330** by screw **317** and bar end cap **318**.

[0191] FIG. 43B depicts an enlarged cut-away side view of the assembled Shock Absorbing Grip Assembly **300** configured to be mounted to a twist throttle on a handle or handlebar. As shown here, the protrusion engagement members **308**, which are integral to the inner grip sleeve **306** mate with the cavities within end clamp **316**.

[0192] FIG. 44A depicts an exploded side view of the Shock Absorbing Grip Assembly **300** configured to be mounted to a twist throttle on a handle or handlebar. This side view clearly shows protrusion engagement members **310** on inner grip

sleeve 306 near the flange 304, as well as opposing protrusion engagement members 308. The protrusion engagement members 310 on inner grip sleeve 306 near the flange 304 mate with slots 324 (shown in FIG. 41) within coupler 322 before coupler 322 mates with protrusions on coupler adapter 328 to enable throttle operation while maintaining the shock absorbing capacity of the grip assembly 300.

[0193] FIG. 44B depicts an exploded side view of the Shock Absorbing Grip Assembly 300 configured to be mounted to a twist throttle on a handle or handlebar. This side view clearly shows the coupler 334 optionally constructed as a one-piece coupler unit affixed to throttle sleeve 330.

[0194] FIG. 44C depicts an end view of the Shock Absorbing Grip Assembly 300 shown in FIG. 44B, configured to be mounted to a twist throttle on a handle or handlebar. This side view again shows the one-piece coupler 334 affixed to throttle sleeve 330. The coupler 334 shown has four cavities 336 for the purpose of mating with the protrusion engagement members located on the grip sleeve.

[0195] FIG. 45 depicts a side view of a first alternate elastomer grip 402 configured to have protrusion members, integral to an inner grip sleeve 404 (not shown), in this case four total, which directly mate into cavities within the end clamp. The protrusion engagement members 410 and 408 are integral to inner grip sleeve 404 (not shown).

[0196] FIG. 46 depicts an end view of the elastomer grip 402 which includes protrusion members 408 integral to inner grip sleeve 404, to be used directly without the use of elastomeric inserts placed within the end clamp accepting cavities.

[0197] FIG. 47 depicts an end view of the grip end clamp 416 to be used without elastomeric inserts, having four oval shaped cavities 418 for accepting protrusion engagement members integral to the inner grip sleeve 404.

[0198] FIG. 48 depicts an end perspective view of the grip end clamp 416 to be used without elastomeric inserts, having four oval shaped cavities 418 and partially showing securing screw 417.

[0199] FIG. 49 depicts a perspective and side view of the elastomer grip 402 shown in FIG. 45, configured to have protrusion members 410 integral to grip sleeve 404 which directly mate into cavities 418 within the end clamp 416 shown in FIG. 48.

[0200] FIG. 50 depicts an end view of an alternate grip end clamp 456 used without elastomeric inserts, having four rectangular shaped cavities 458, and partially showing securing screw 457.

[0201] FIG. 51 depicts an end perspective view of an alternate grip end clamp 456 used without elastomeric inserts, having four rectangular shaped cavities 458 and partially showing securing screw 457.

[0202] FIG. 52 depicts a perspective and side view of an alternate elastomer grip 442 configured to have protrusion members 450 integral to grip sleeve end 444, which directly mate into cavities 458 within the end clamp 456.

[0203] Alternatively, the elastomeric inserts may be omitted altogether in place of protrusions on the sleeve that have shock absorbing characteristics. The “protrusions, attachment members,” or the like are made of a material that allows the grip to move independent of the handlebar without the need for separate inserts. This design may or may not be used with elastomeric inserts. Essentially, the clamp cavities would mate with the protrusions on the grip tube assembly directly and without the “buffer” of the inserts, while still providing a free-floating feel and independent cushioning of the grip.

[0204] Another alternate design is the inverse of the represented design whereas the grip end clamp has protruding engagement members and the grip sleeve contains one

or more cavities that mates with said protruding engagement members. The inverse design can be used with or without elastomeric inserts just as the prior described Shock Absorbing Grip Assembly invention as described herein demonstrates.

[0205] The Shock Absorbing Grip Assembly 10A, 10B and 10C shown in the drawings and described in detail herein disclose arrangements of elements of particular construction and configuration for illustrating preferred embodiments of structure and method of operation of the present application. It is to be understood, however, that elements of different construction and configuration and other arrangements thereof, other than those illustrated and described may be employed for providing a Shock Absorbing Grip Assembly 10A, 10B and 10C in accordance with the spirit of this disclosure, and such changes, alternations and modifications as would occur to those skilled in the art are considered to be within the scope of this design as broadly defined in the appended claims.

WHAT IS CLAIMED IS:

1. A shock absorbing grip assembly comprising:

a) one or more slotted grip end clamps;

b) one or more cavities in said one or more slotted grip end clamps;

c) a grip sleeve, wherein said grip sleeve includes one or more protruding engagement members, wherein said grip sleeve is constructed of material that allows for independent movement from a handle or handlebar when mounted thereto, and wherein said one or more protruding engagement members mate within said one or more cavities in said one or more slotted grip end clamps; and

d) an outer grip;

wherein said one or more slotted grip end clamps suspend said grip sleeve from contact with the handle or the handlebar, whereby said grip sleeve has torsional, rotational, linear and axial shock absorbing capacity when mounted to the handle or the handlebar.

2. The shock absorbing grip assembly according to claim 1, including one or more elastomer isolator inserts housed within the one or more cavities of said one or more slotted grip end

clamps, the one or more elastomer isolator inserts suspending said grip sleeve apart from the handle or the handlebar when said one or more slotted grip end clamps are mounted.

3. The shock absorbing grip assembly according to any one of claims 1 to 2, further including one or more tuning washers positioned between said grip sleeve and said one or more slotted grip end clamps.
4. The shock absorbing grip assembly according to claim 1, further including a plurality of tuning washers selectively positionable between said grip sleeve and said one or more slotted grip end clamps, decreasing a distance said one or more protruding engagement members travel into said one or more cavities and thereby adjusting a shock absorbing capacity of the shock absorbing grip assembly.
5. The shock absorbing grip assembly according to claim 2, further including a plurality of tuning washers selectively positionable between said grip sleeve and said one or more slotted grip end clamps, decreasing a distance said one or more protruding engagement members travel into said one or more cavities housing said one or more elastomer isolator inserts and thereby adjusting a shock absorbing capacity of the shock absorbing grip assembly.
6. The shock absorbing grip assembly according to claim 2, wherein said one or more slotted grip end clamps comprise a first slotted grip end clamp and a second slotted grip end clamp, and wherein said one or more elastomer isolator inserts housed within each of said one or

more cavities in said first slotted grip end clamp and the second slotted grip end clamp are constructed of varying durometer elastomer material, thereby adjusting a shock absorbing capacity of the shock absorbing grip assembly.

7. The shock absorbing grip assembly according to claim 2, wherein said one or more cavities comprise four cavities, wherein said one or more elastomer isolator inserts comprise four inserts, and wherein said one or more protruding engagement members comprise four protruding engagement members.
8. The shock absorbing grip assembly according to claim 2, wherein said one or more cavities comprises one cavity, wherein said one or more elastomer isolator inserts comprises one insert, and wherein said one or more protruding engagement members comprises one protruding engagement member.
9. The shock absorbing grip assembly according to claim 7, further including one or more alignment posts located within said one cavity, and wherein said one insert is secured within said one cavity by said one or more alignment posts.
10. The shock absorbing grip assembly according to claim 2, wherein said one or more cavities comprise four cavities, wherein said one or more elastomer isolator inserts comprise four inserts, and wherein said one or more protruding engagement members comprise eight protruding engagement members.

11. The shock absorbing grip assembly according to claim 2, wherein said one or more cavities comprise eight cavities, wherein said one or more elastomer isolator inserts comprise eight inserts with each being an O-ring, and wherein said one or more protruding engagement members comprise eight protruding engagement members.
12. The shock absorbing grip assembly according to claim 1, wherein each said one or more slotted grip clamps is secured to the handle or the handlebar using a screw.
13. The shock absorbing grip assembly according to claim 12, wherein each said one or more slotted grip clamps includes anti-rotation and lateral movement compression grooves to secure each said one or more slotted grip clamps to the handle or the handlebars when each said one or more slotted grip clamps is mounted and said screw is tightened.
14. The shock absorbing grip assembly according to claim 1, further including a coupler having coupler slots, and a coupler adapter having engagement protrusions, wherein said one or more protrusion engagement members integral to said grip sleeve mate with said coupler slots and wherein said engagement protrusions in said coupler adapter mate with said coupler slots to enable the shock absorbing grip assembly to be mounted on a twist throttle.
15. The shock absorbing grip assembly according to claim 1, further including a coupler constructed as a one-piece unit affixed to a throttle sleeve to enable the shock absorbing grip assembly to be mounted on a twist throttle.

16. A method of making a shock absorbing grip assembly, the method comprising:
- a) providing one or more slotted grip end clamps;
 - b) providing one or more cavities in said one or more slotted grip end clamps;
 - c) providing a grip sleeve comprising one or more protruding engagement members that mate within said one or more cavities in said one or more slotted grip end clamps, including constructing said grip sleeve of material that allows for independent movement from a handle or handlebar when mounted thereto; and
 - d) providing an outer grip; and
 - e) suspending said grip sleeve from contact with the handle or the handlebar via said one or more grip end clamps, said grip sleeve having torsional, rotational, linear and axial shock absorbing capacity when mounted to the handle or the handlebar thereby.
17. The method according to claim 16, further including within the suspending step: suspending said grip sleeve apart from the handle or the handlebar via one or more one or more elastomer isolator inserts housed within the one or more cavities of said one or more slotted grip end clamps.
18. The method according to any one of claims 16 to 17, further including:

providing one or more tuning washers; and

positioning said one or more tuning washers between said grip sleeve and said one or more slotted grip end clamps.

19. The method according to claim 16, further including:

providing one or more tuning washers; and

decreasing a distance said one or more protruding engagement members travel into said one or more cavities by selectively inserting said one or more tuning washers between said grip sleeve and said one or more slotted grip end clamps, thereby adjusting a shock absorbing capacity of the shock absorbing grip assembly.

20. The method according to claim 17, further including:

providing one or more tuning washers; and

decreasing a distance said one or more protruding engagement members travel into said one or more cavities housing said one or more elastomer isolator inserts by selectively inserting said one or more tuning washers between said grip sleeve and said one or more

slotted grip end clamps, thereby adjusting a shock absorbing capacity of the shock absorbing grip assembly.

21. The method according to claim 17, further including: constructing said one or more elastomer isolator inserts of varying durometer elastomer material, and thereby adjusting a shock absorbing capacity of the shock absorbing grip assembly.
22. The method according to claim 17, further including: providing four said cavities; providing four said inserts; and providing four said protruding engagement members.
23. The method according to claim 17, further including: providing one said cavity; providing one said insert; and providing one said protruding engagement member.
24. The method according to claim 23, further including: securing the one said insert within the one said cavity by one or more alignment posts located within the one said cavity.
25. The method according to claim 17, further including: providing four said cavities; providing four said inserts; and providing eight said protruding engagement members.
26. The method according to claim 17, further including: providing eight said cavities; providing eight said inserts with each being an O-ring; and providing eight said protruding engagement members.

27. The method according to claim 16, further including: securing said one or more slotted grip clamps to the handle or the handlebar using one or more screws.
28. The method according to claim 27, further including: providing said one or more slotted grip clamps with anti-rotation and lateral movement compression grooves; and securing said one or more slotted grip clamps to the handle or the handlebar via the anti-rotation and lateral movement compression grooves when said one or more slotted grip clamps are mounted and said one or more screws are tightened.
29. The method according to claim 16, further including:
- providing a coupler having coupler slots;
- providing a coupler adapter having engagement protrusions; and
- mating said one or more protrusion engagement members with said coupler slots and mating said engagement protrusions in said coupler adapter with said coupler slots to enable the shock absorbing grip assembly to be mounted on a twist throttle.
30. The method according to claim 16, further including: providing a coupler constructed as a one-piece unit affixed to a throttle sleeve to enable the shock absorbing grip assembly to be mounted on a twist throttle.

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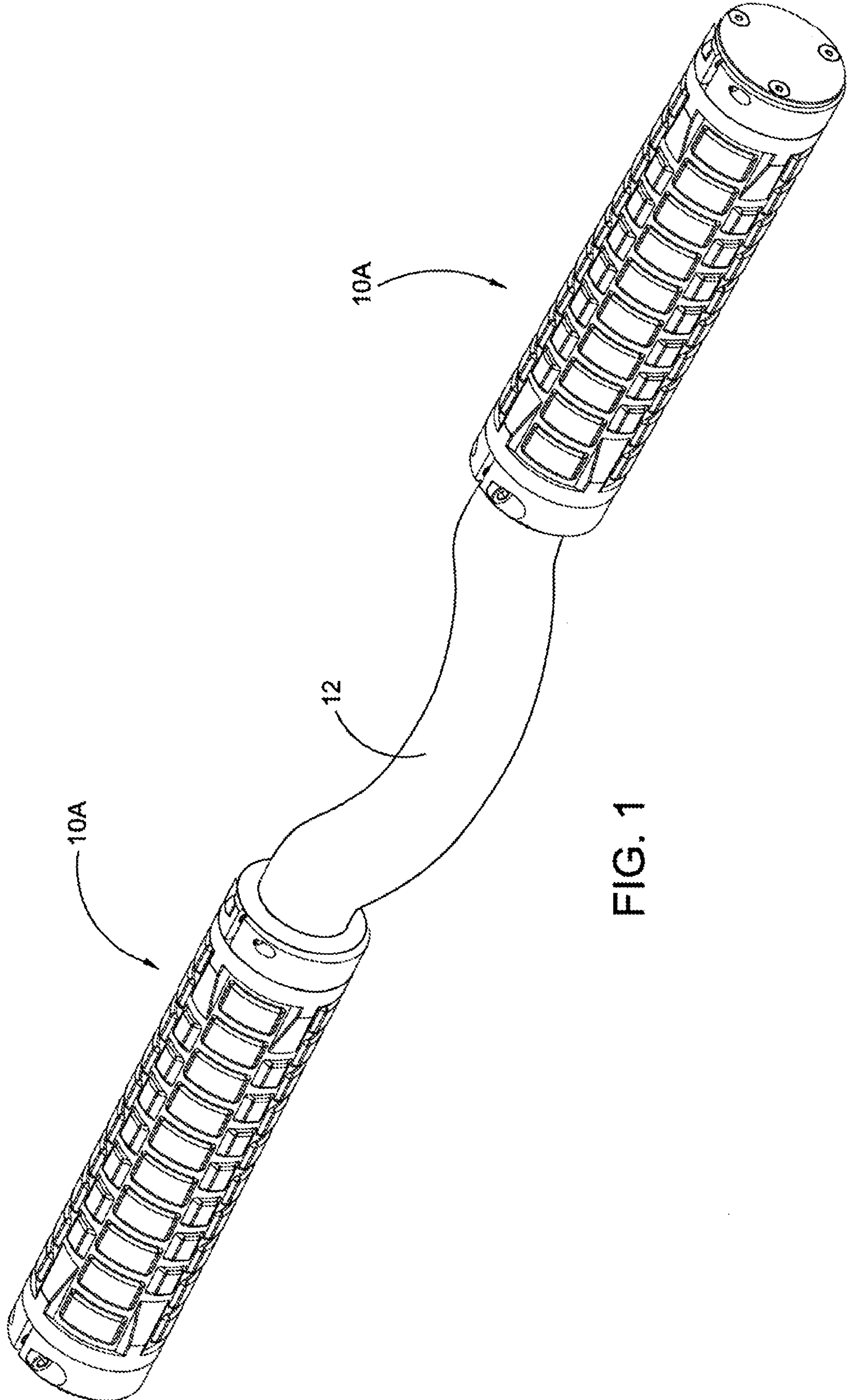
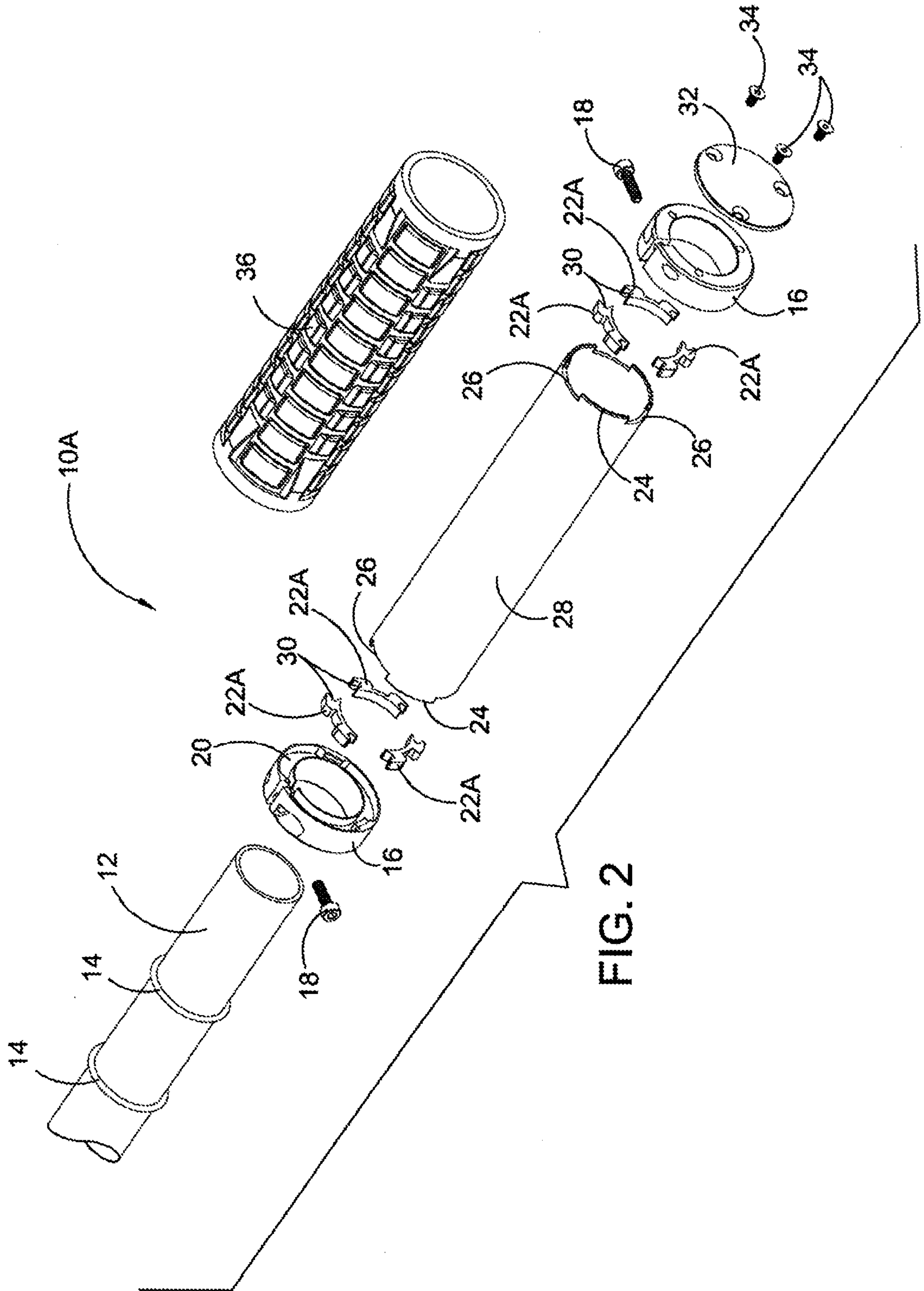


FIG. 1

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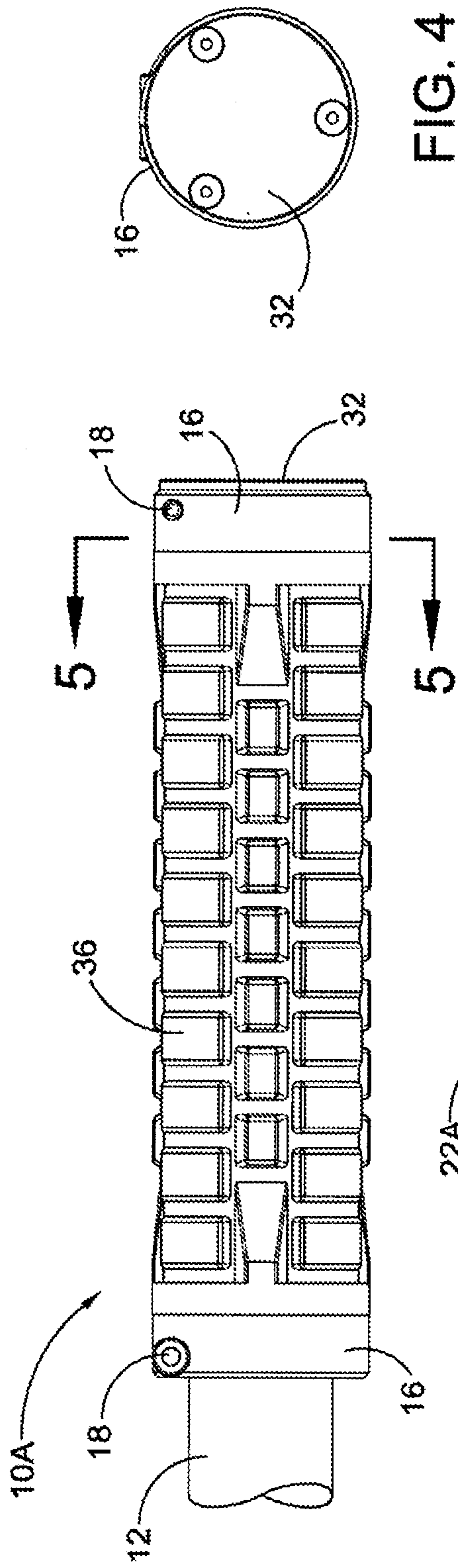


FIG. 3

FIG. 4

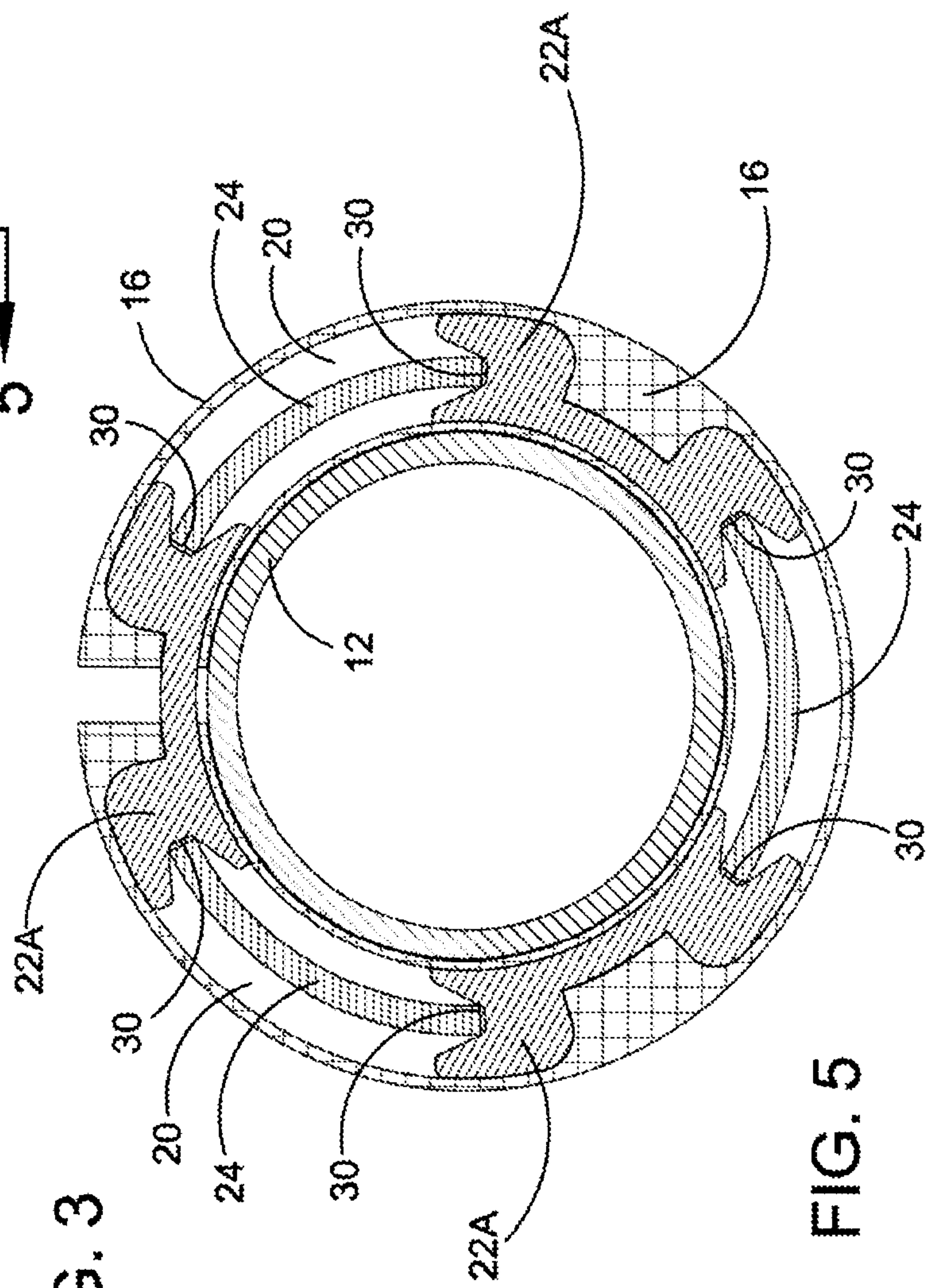
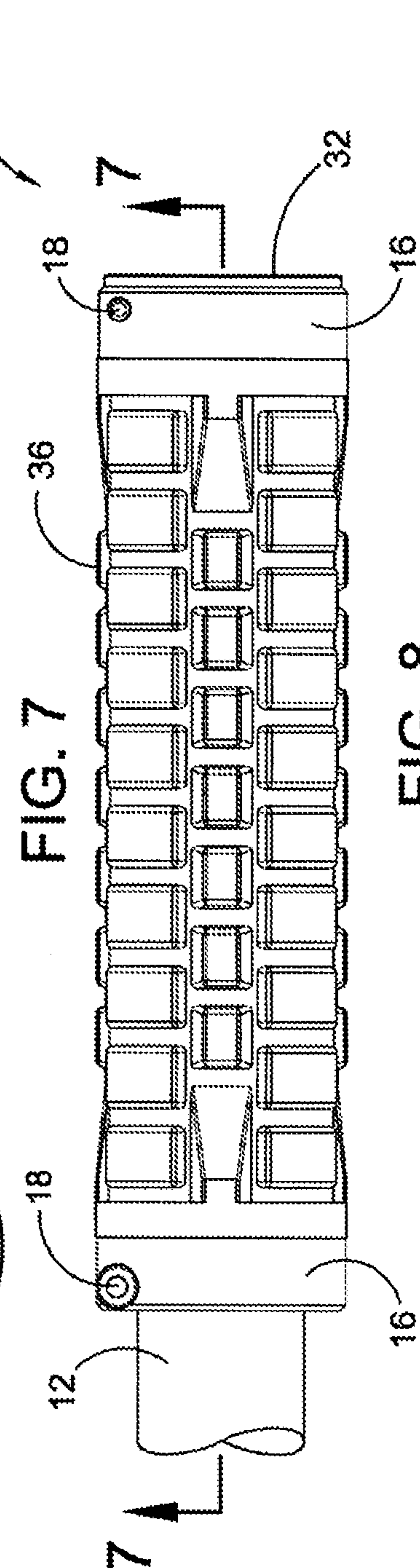
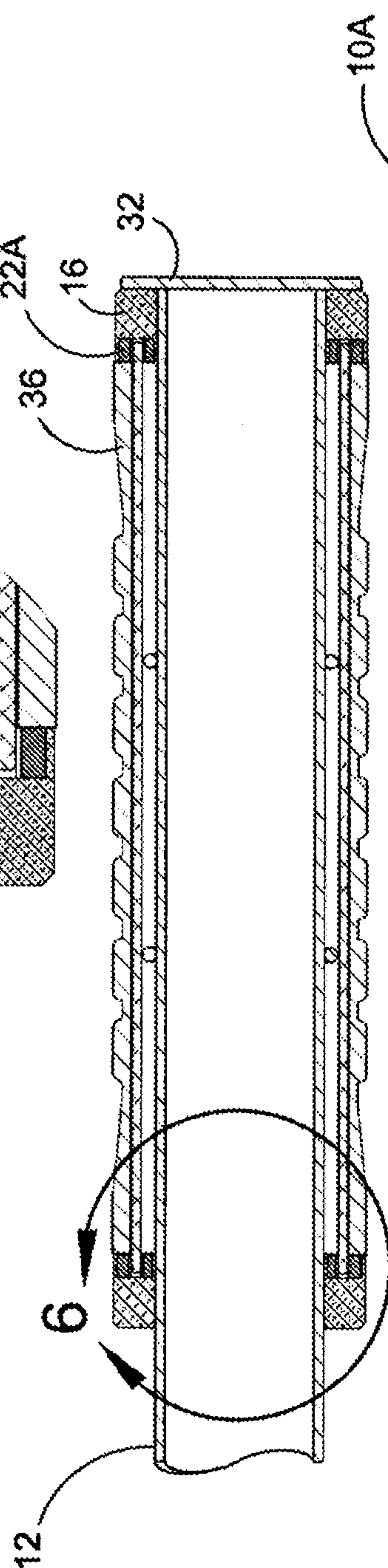
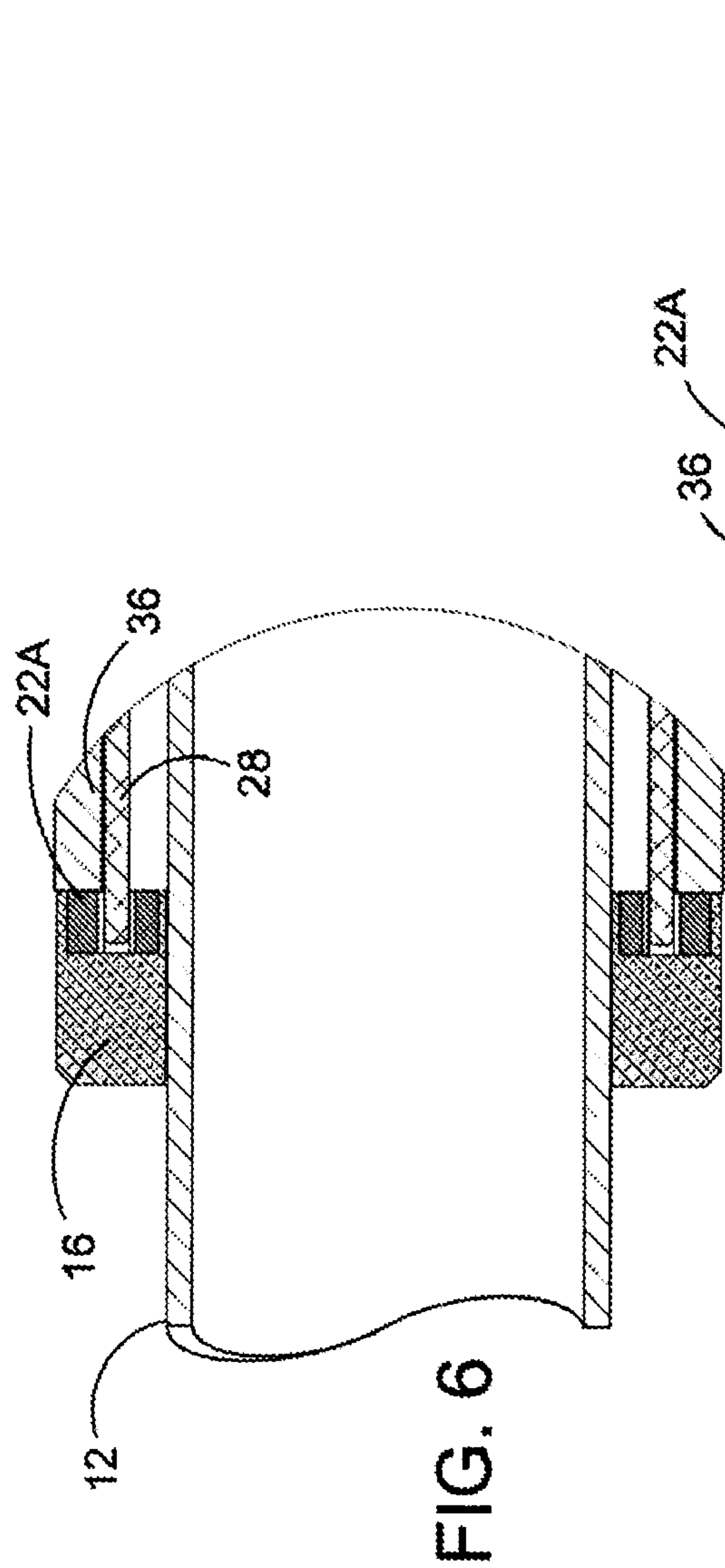


FIG. 5



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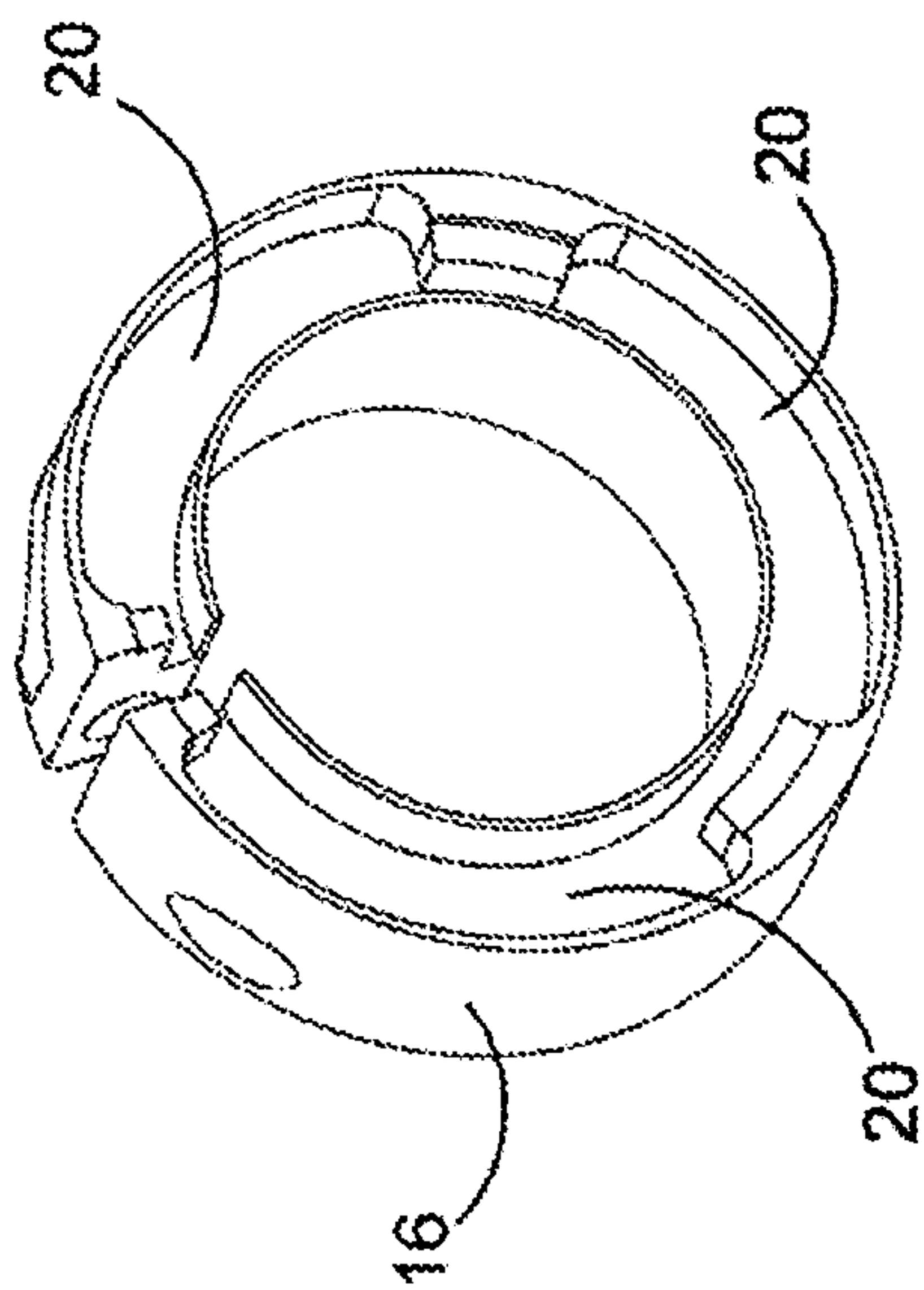


FIG. 9

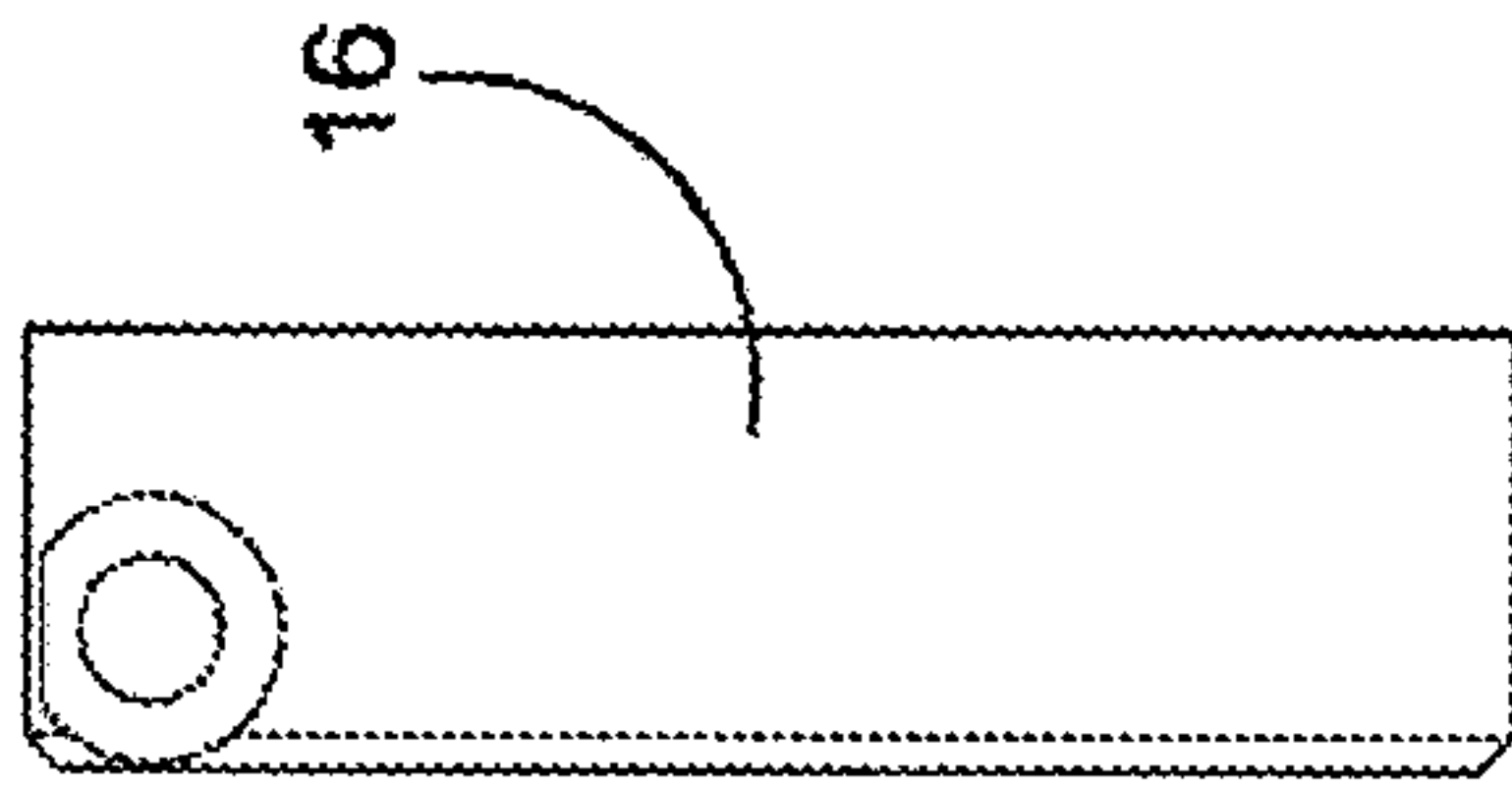


FIG. 10

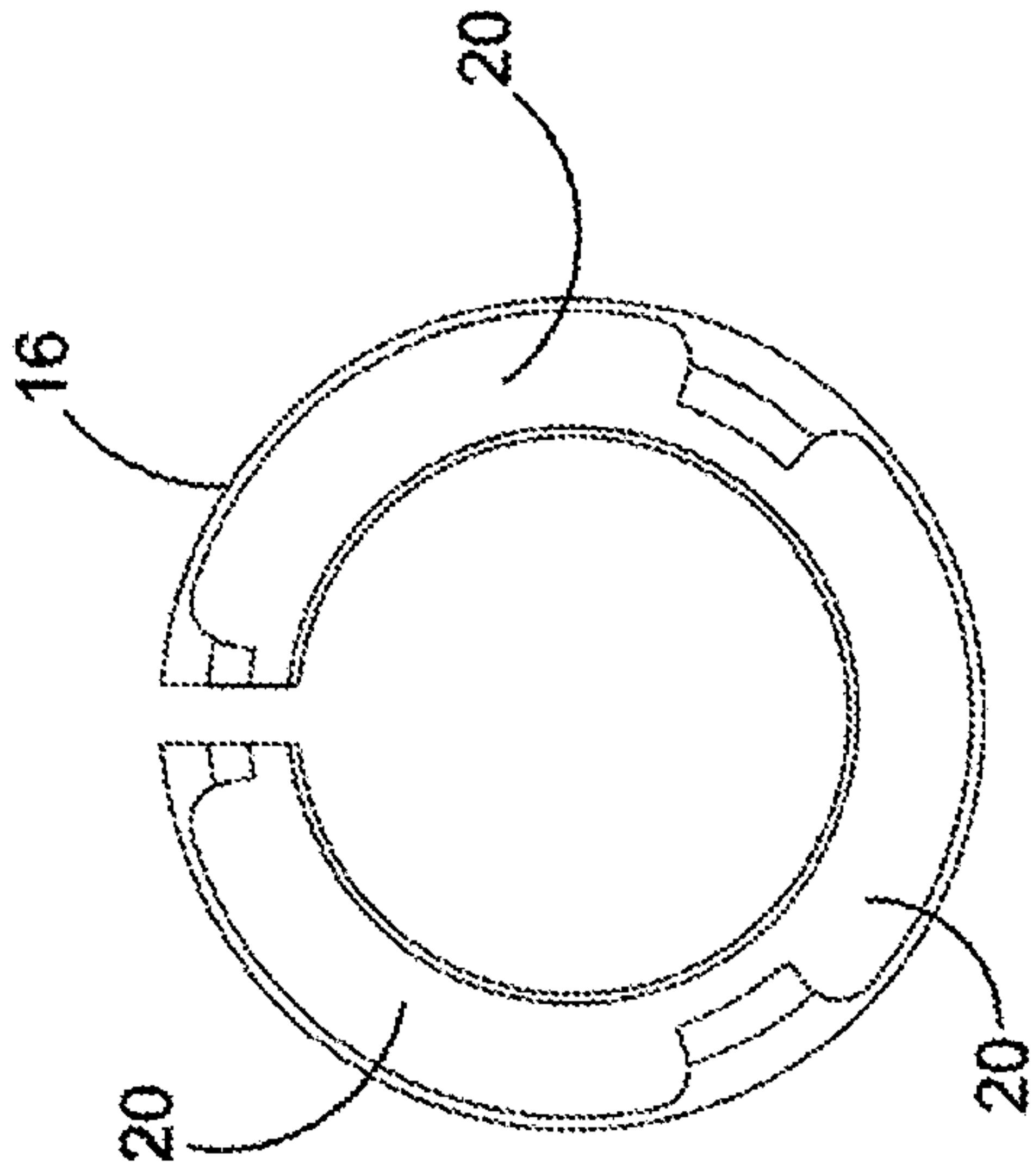


FIG. 11

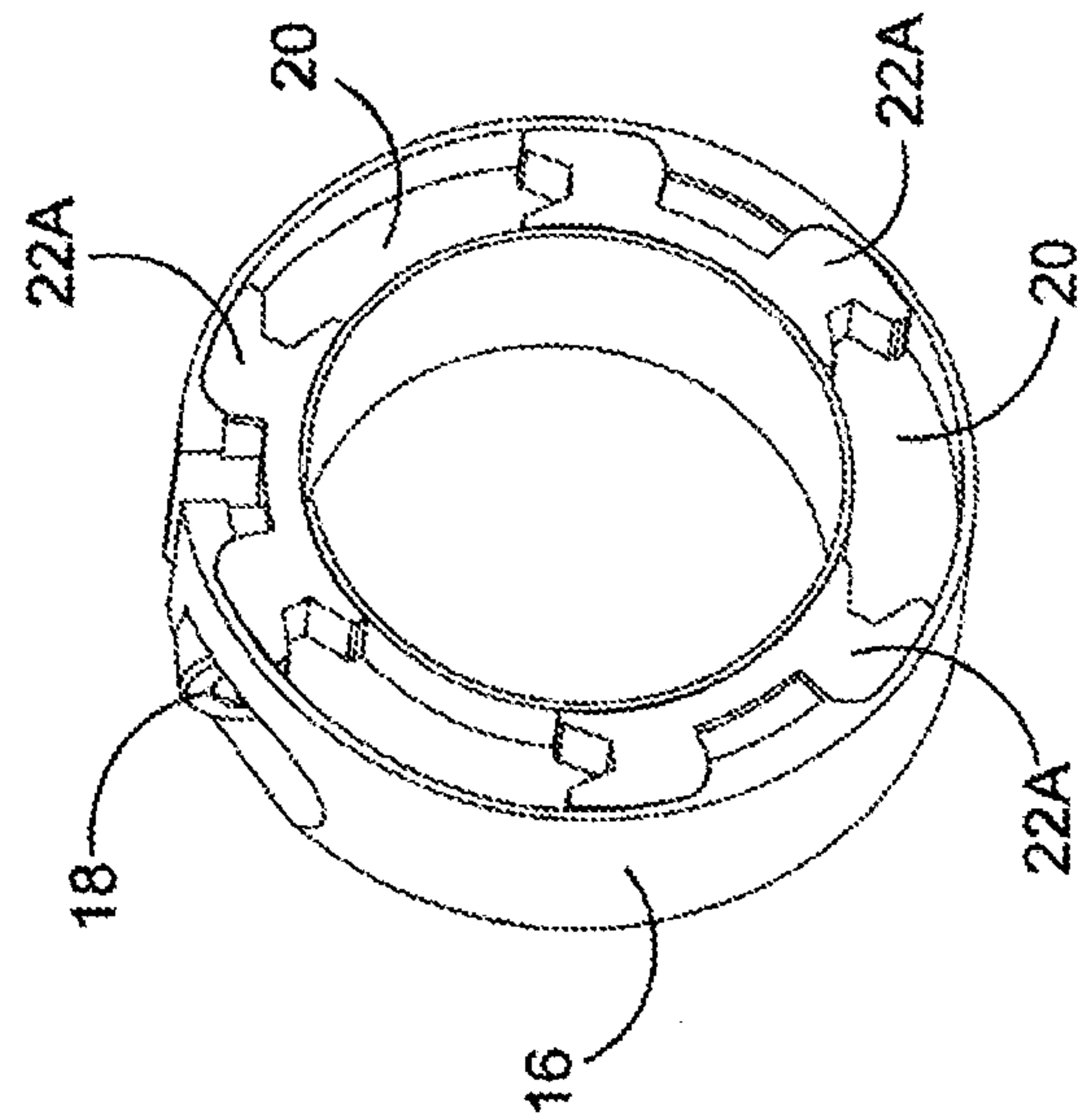


FIG. 12

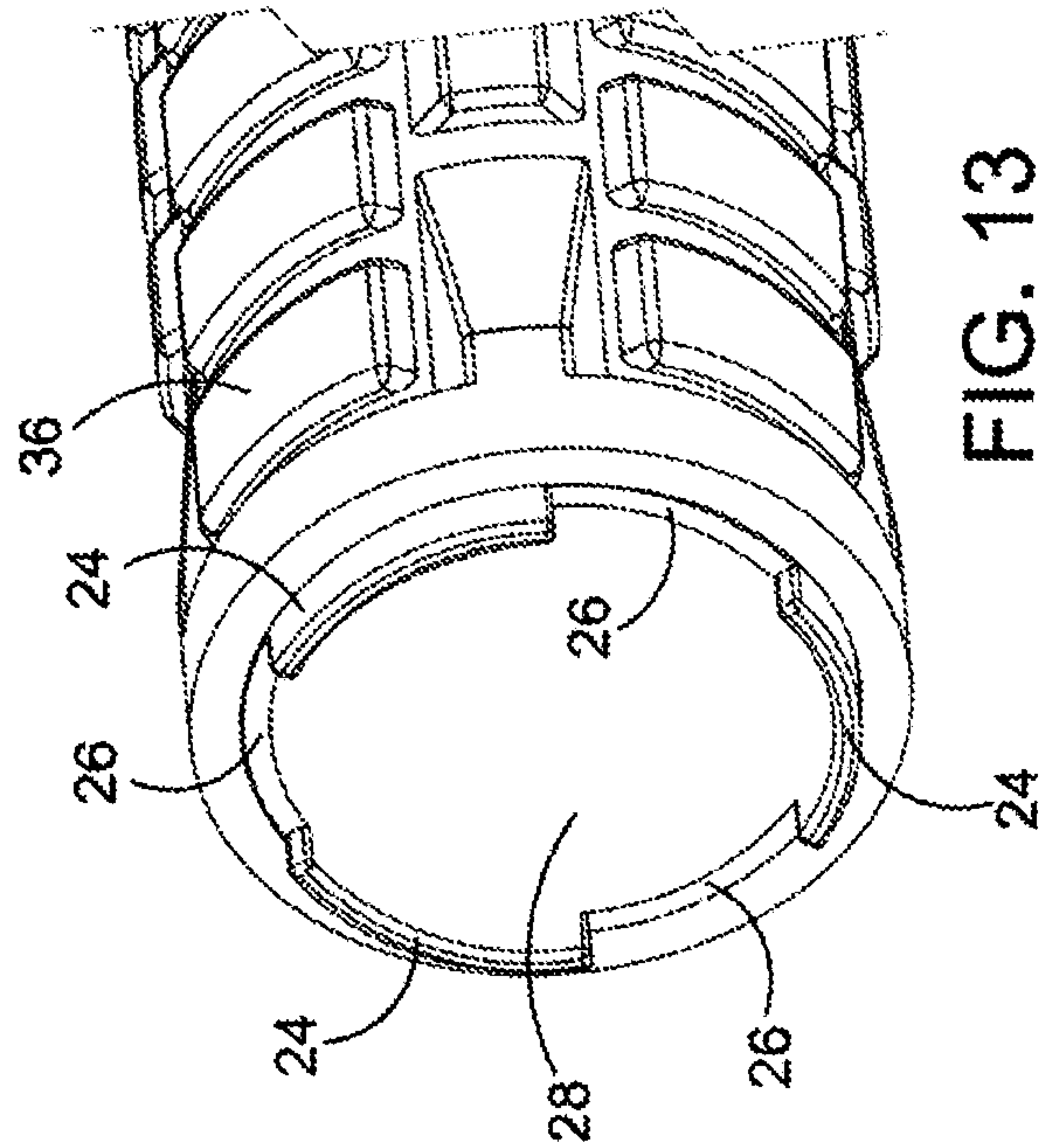


FIG. 13

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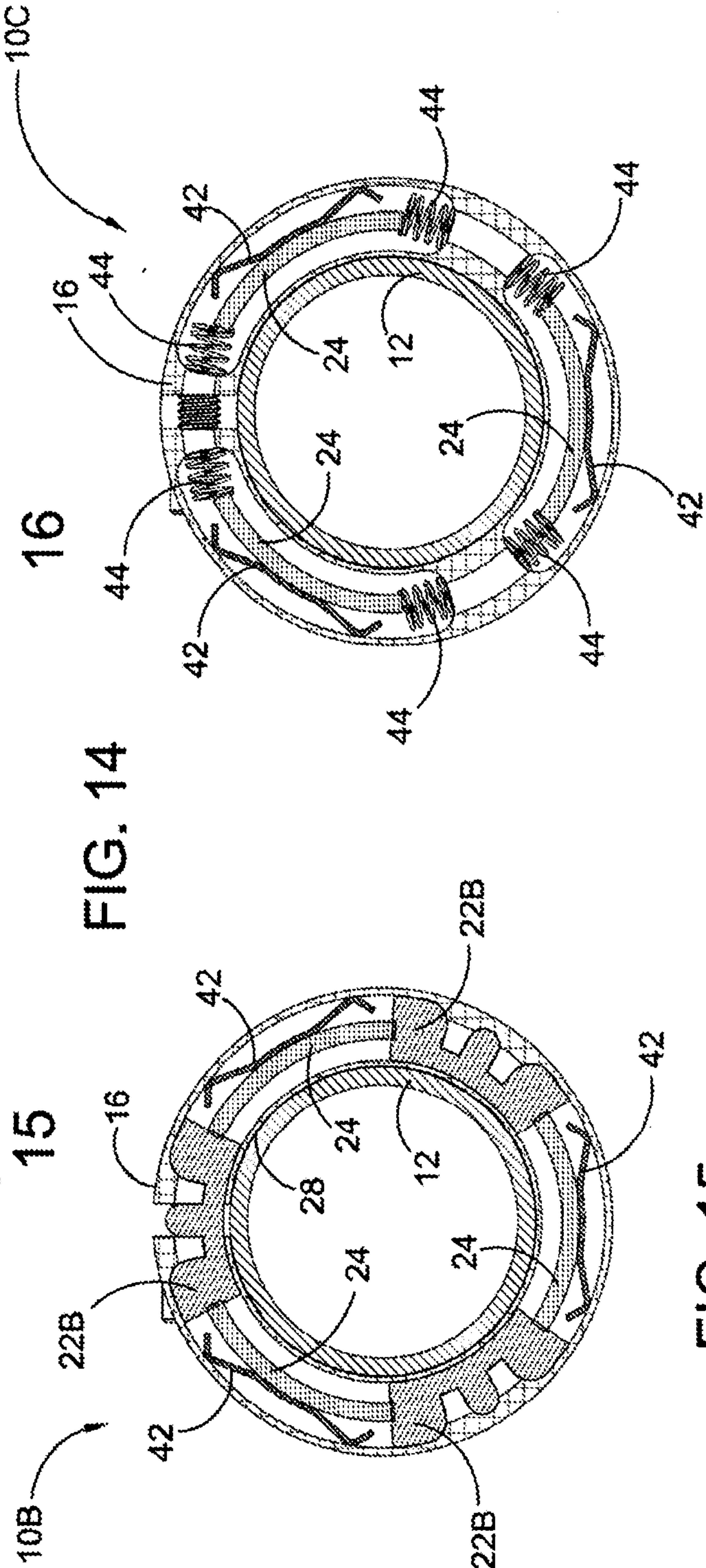
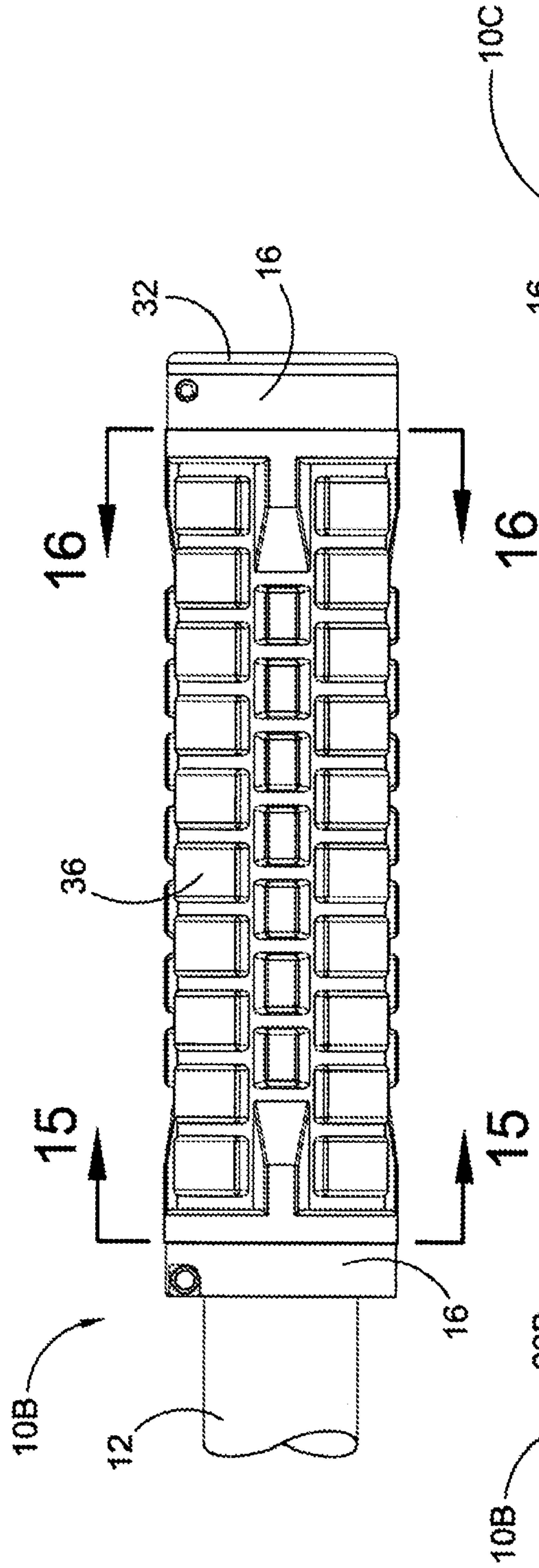


FIG. 16

FIG. 15

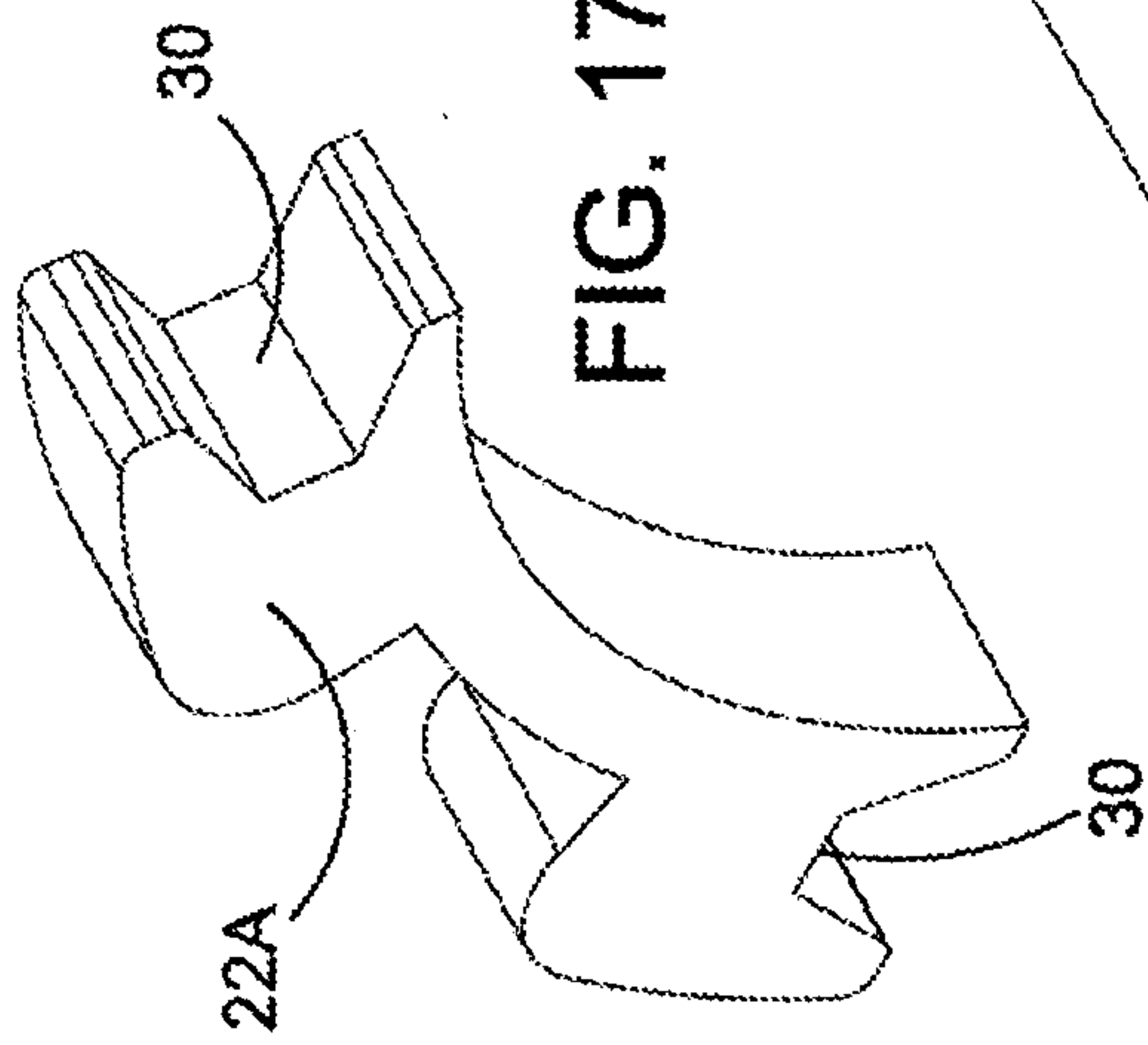


FIG. 17

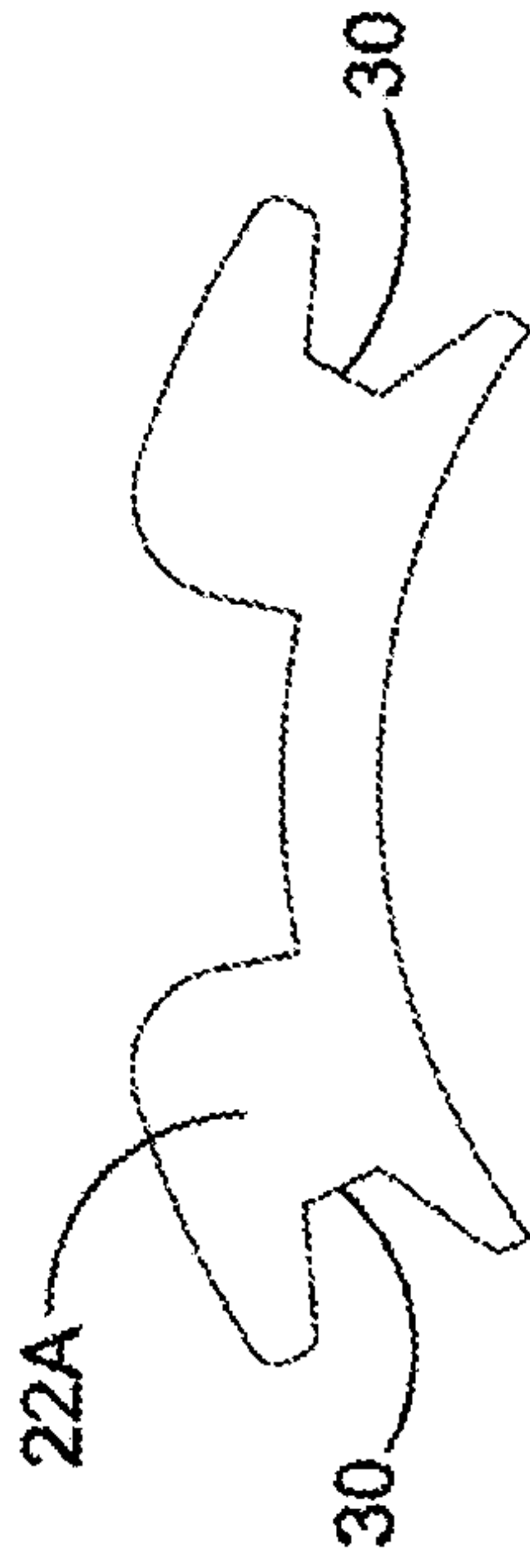


FIG. 18



FIG. 19

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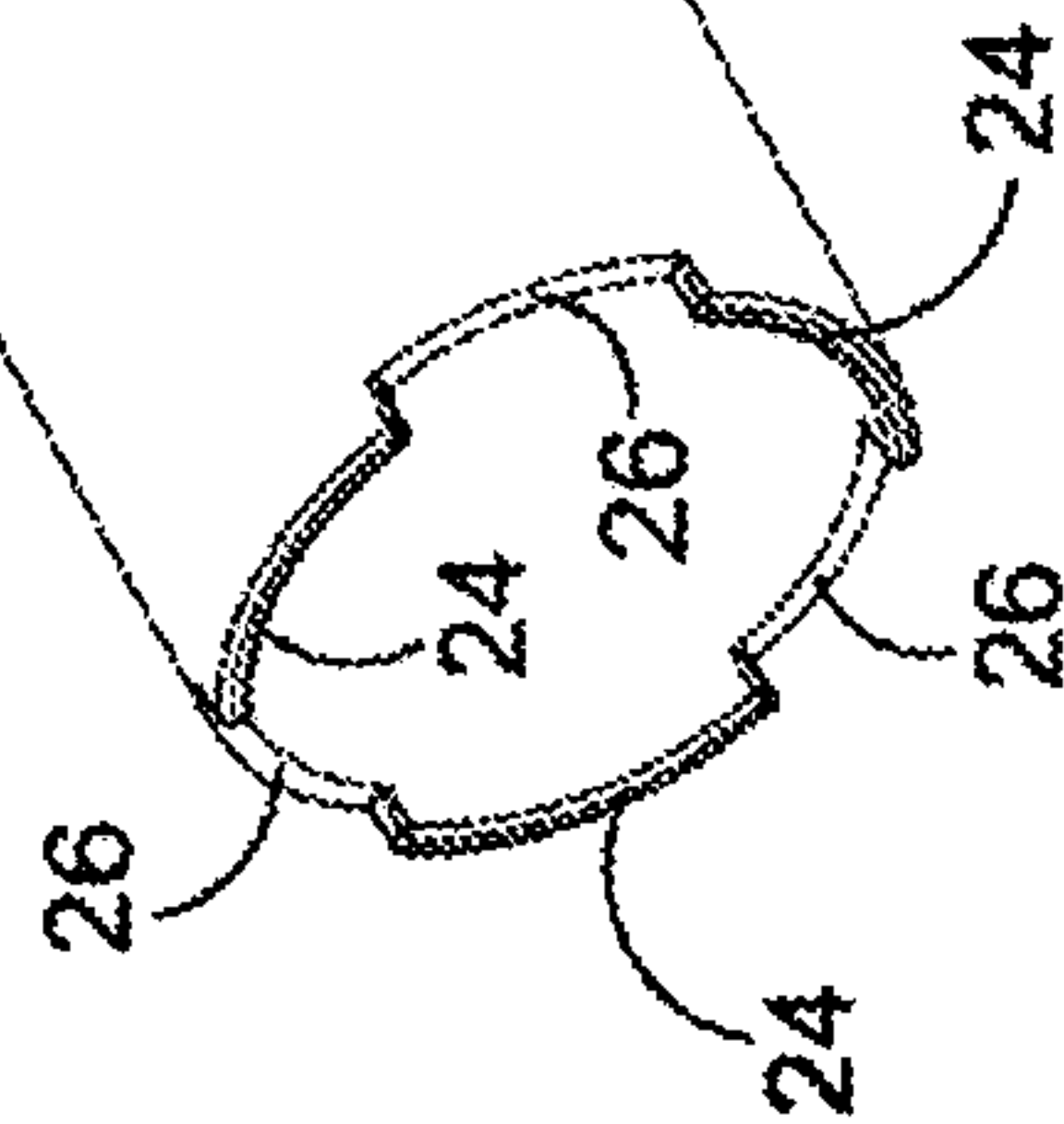


FIG. 20

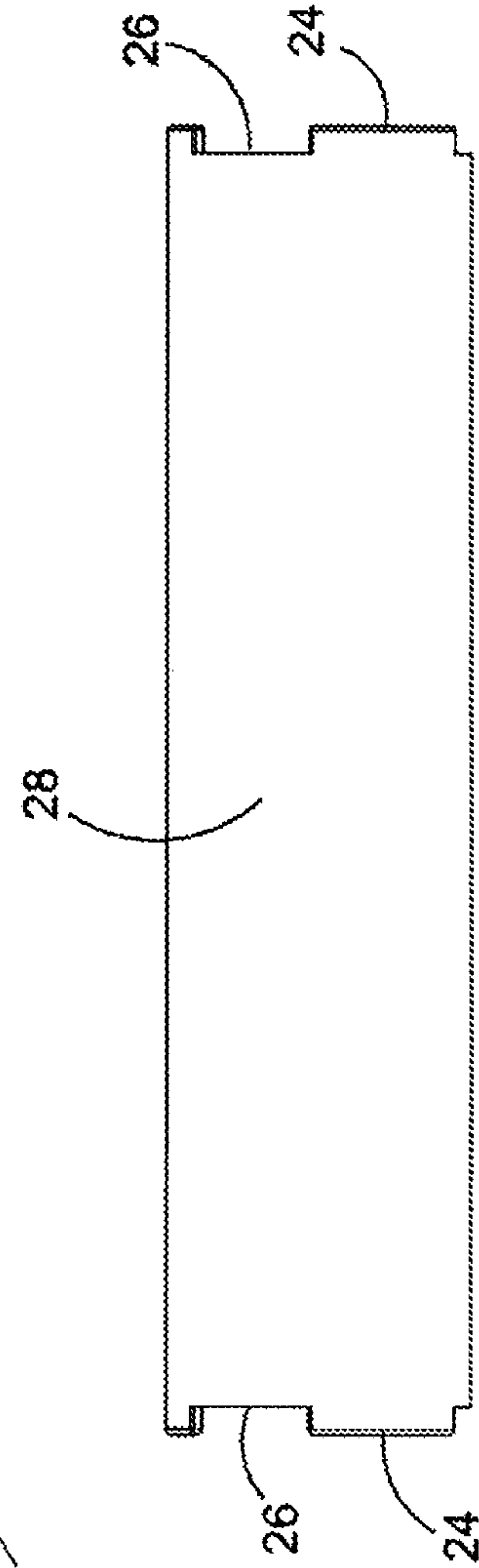


FIG. 21

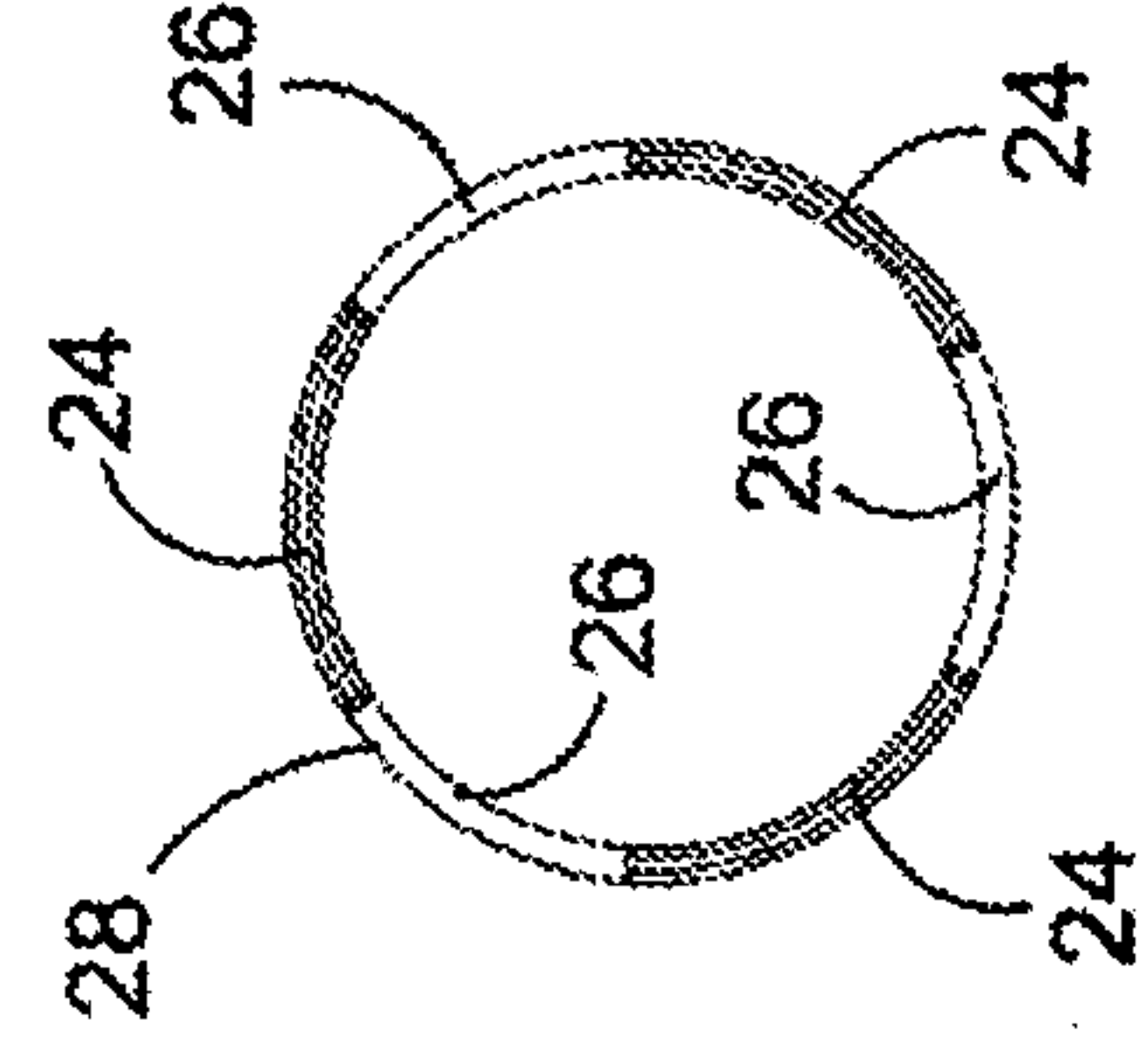


FIG. 22

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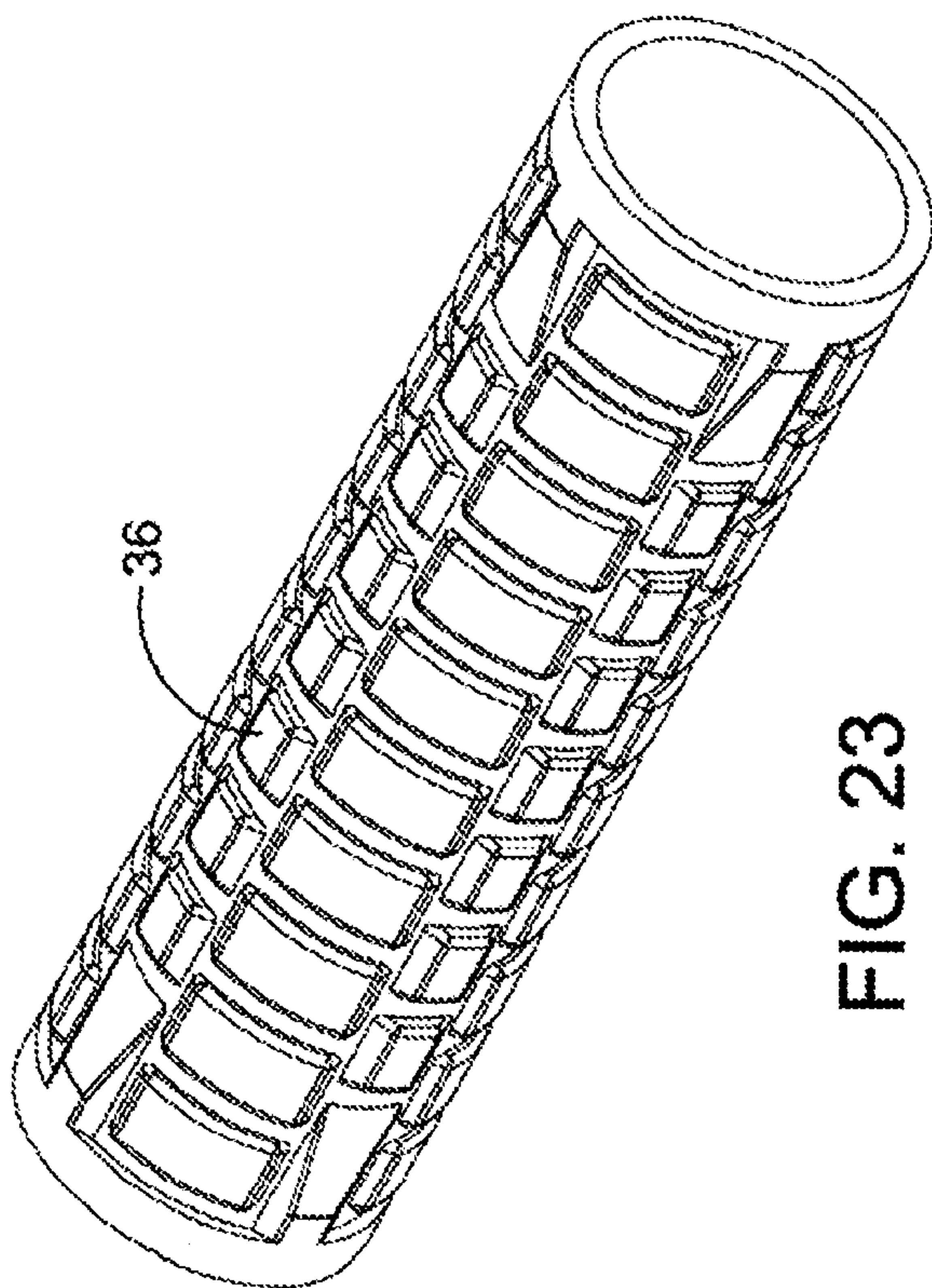


FIG. 23

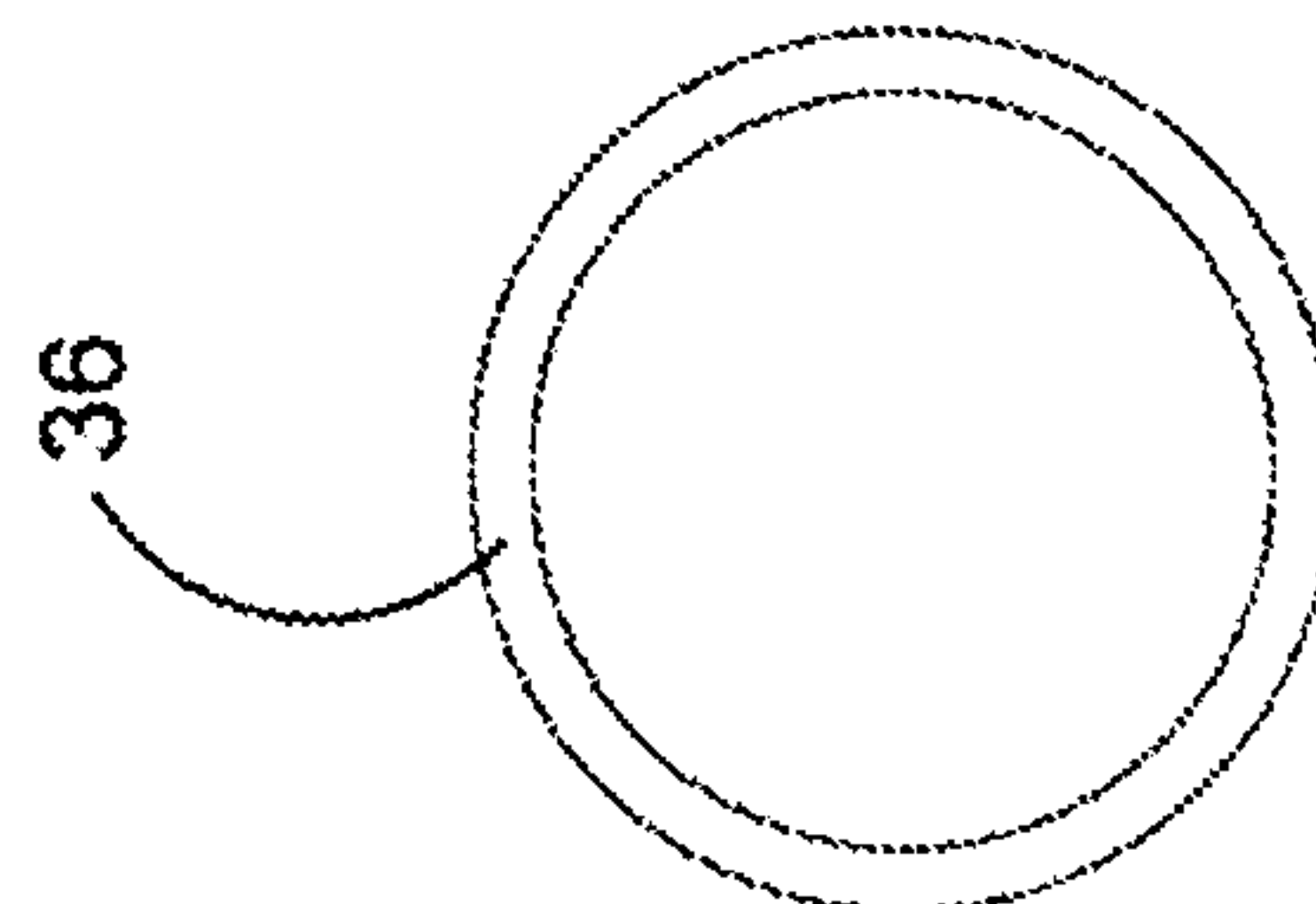


FIG. 25

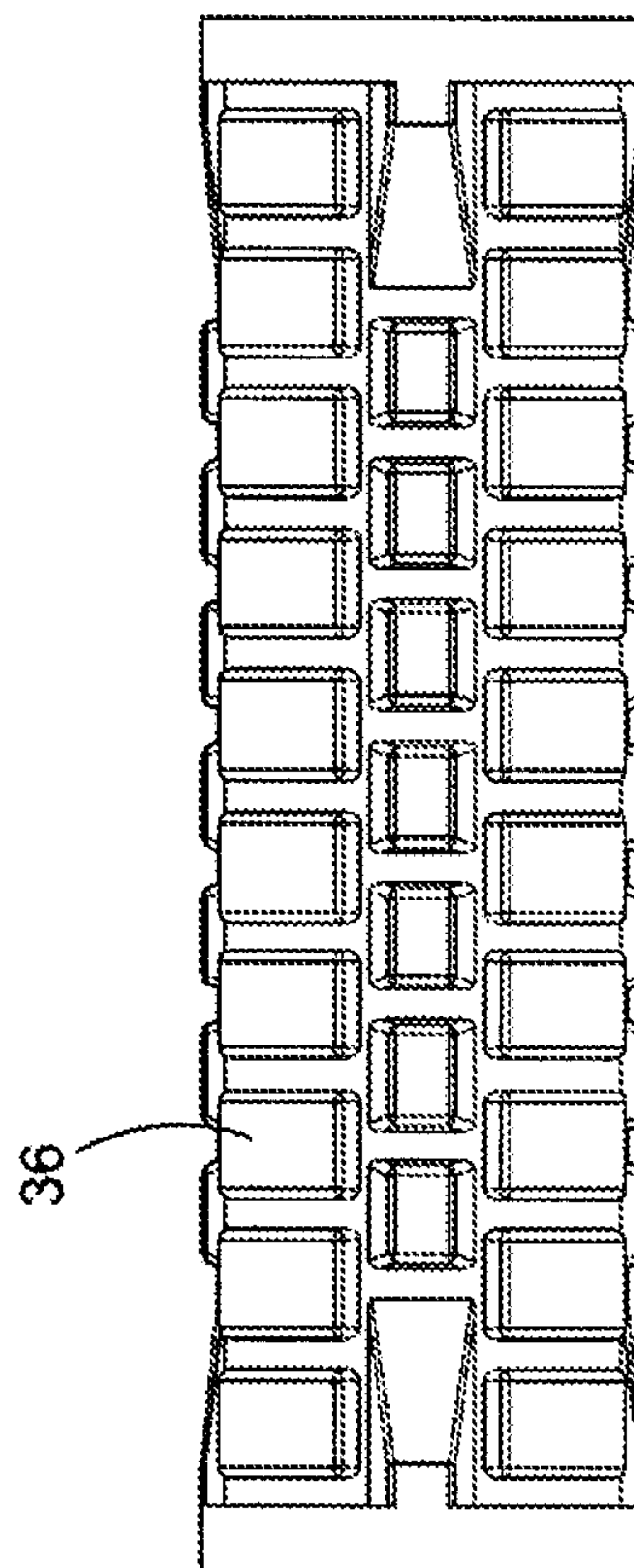


FIG. 24

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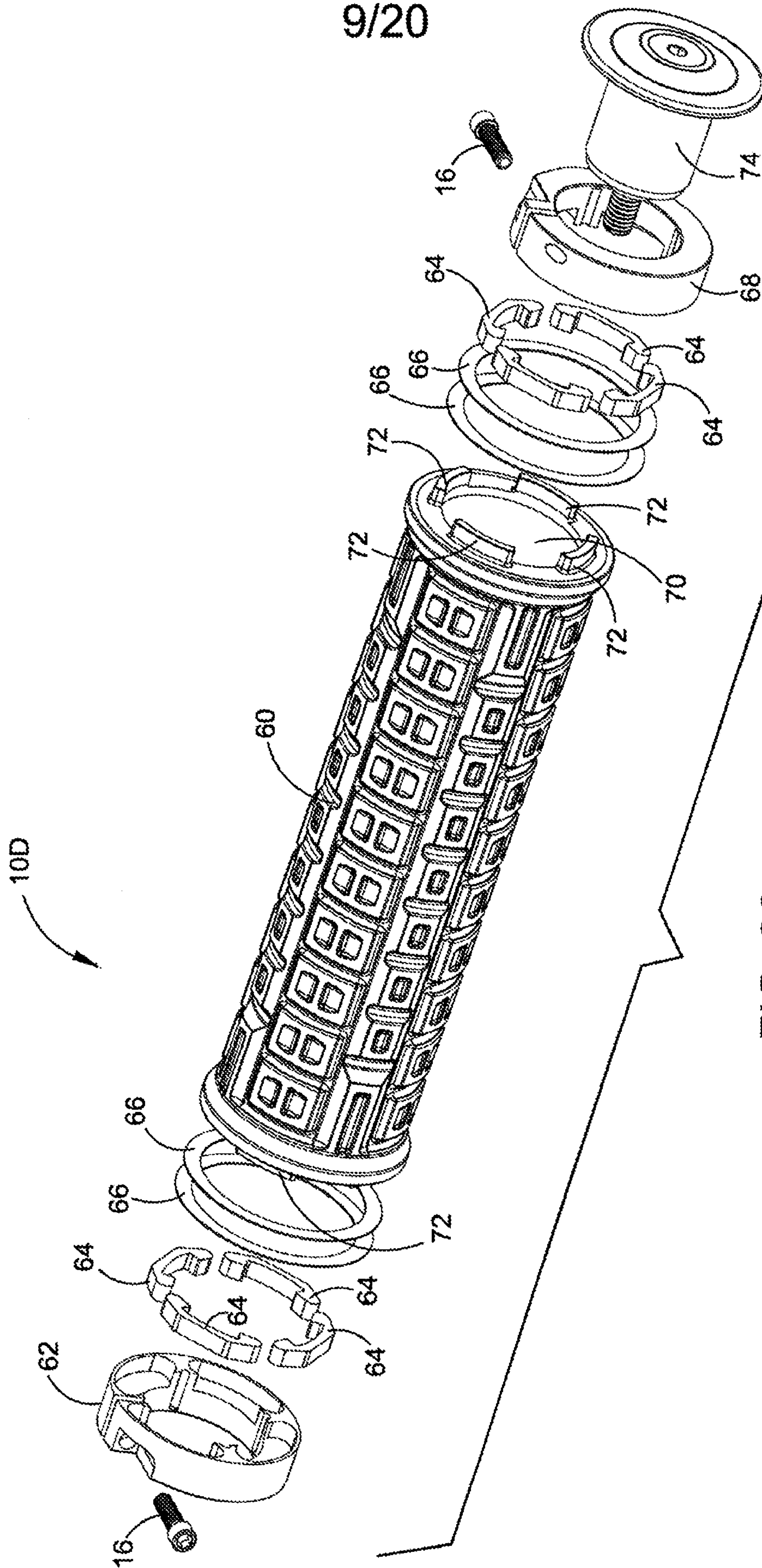


FIG. 26

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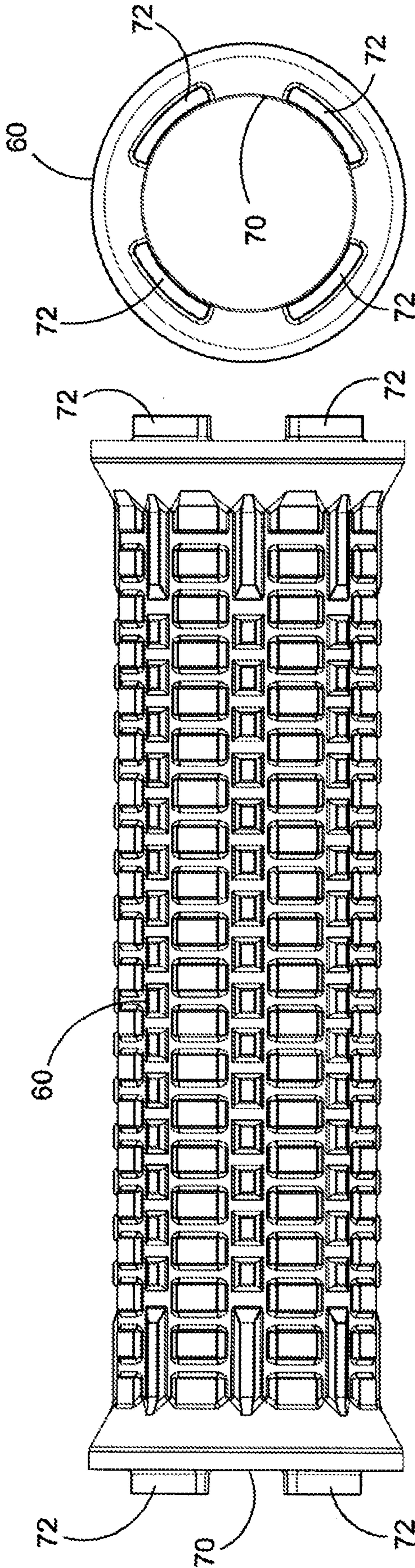


FIG. 27A

FIG. 27B

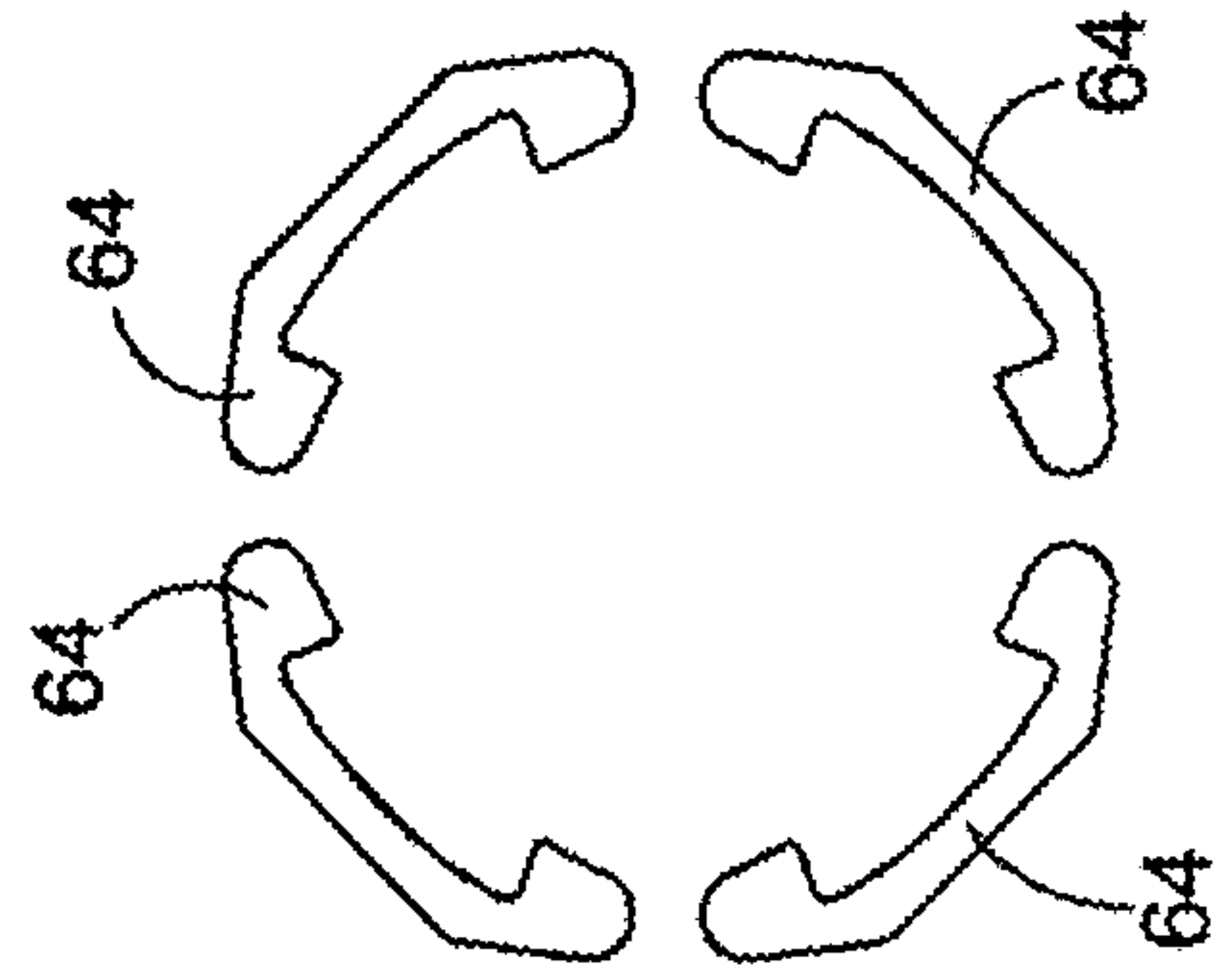


FIG. 28D

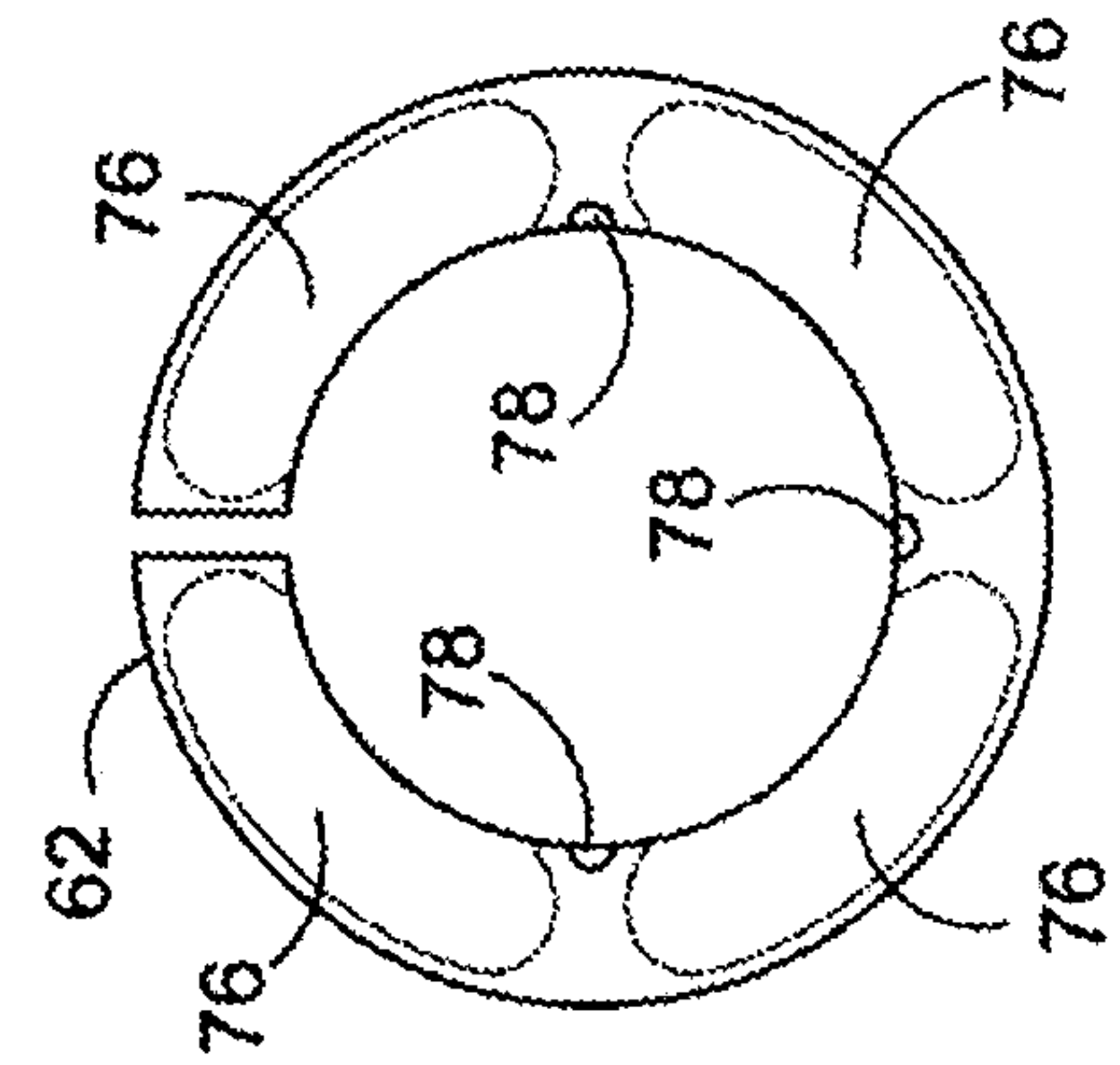


FIG. 28C

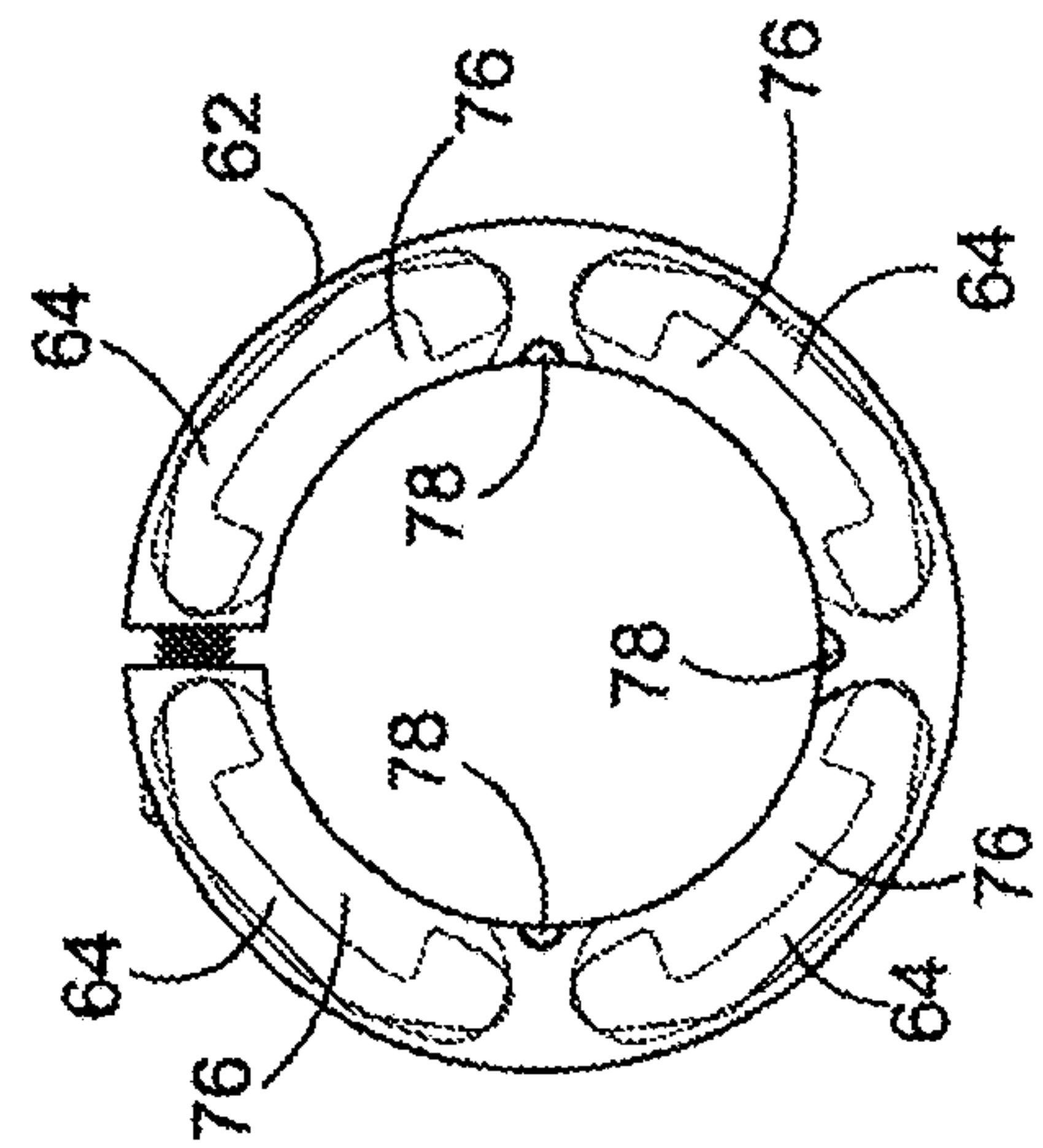


FIG. 28B

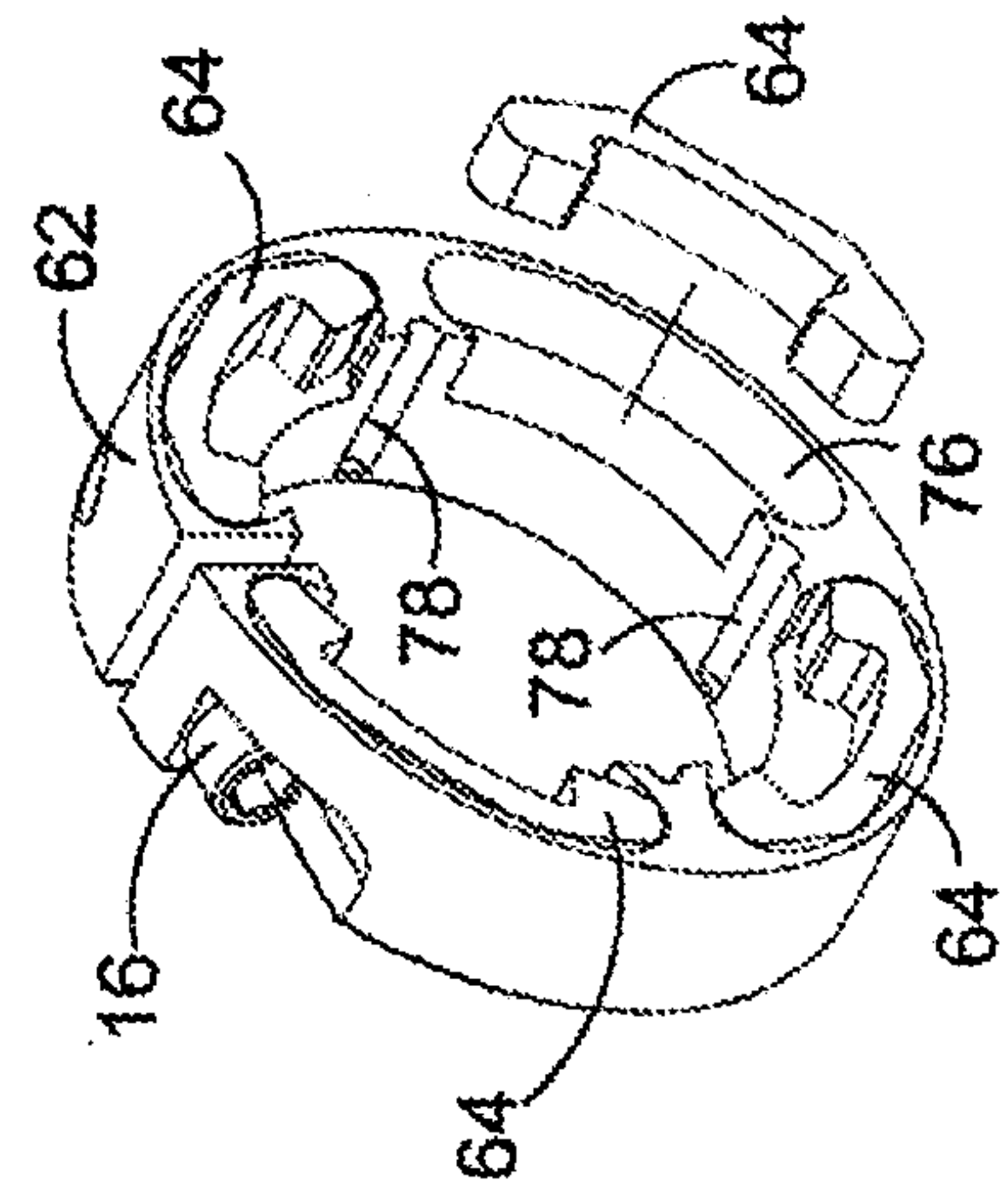


FIG. 28A

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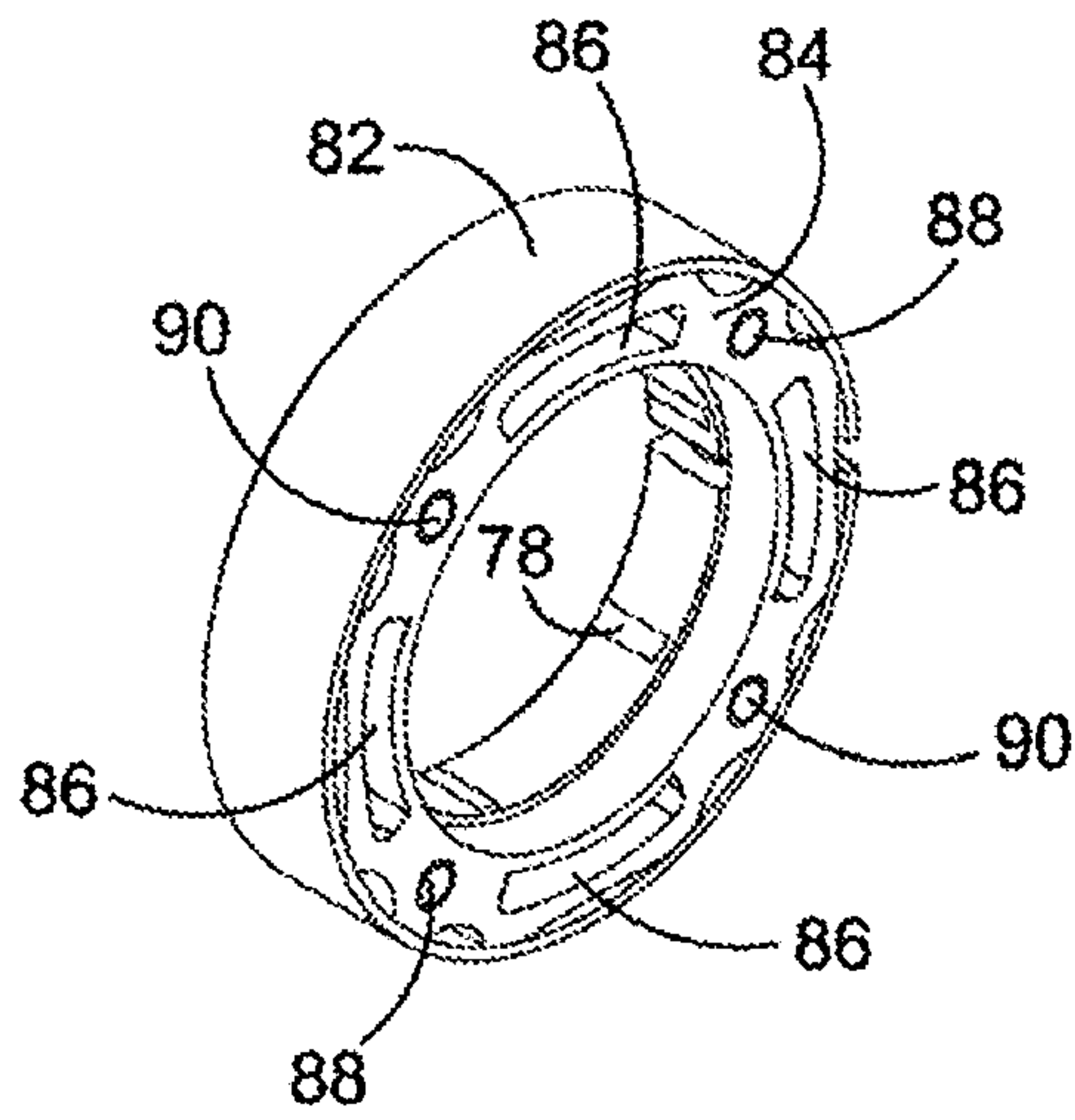


FIG. 29A

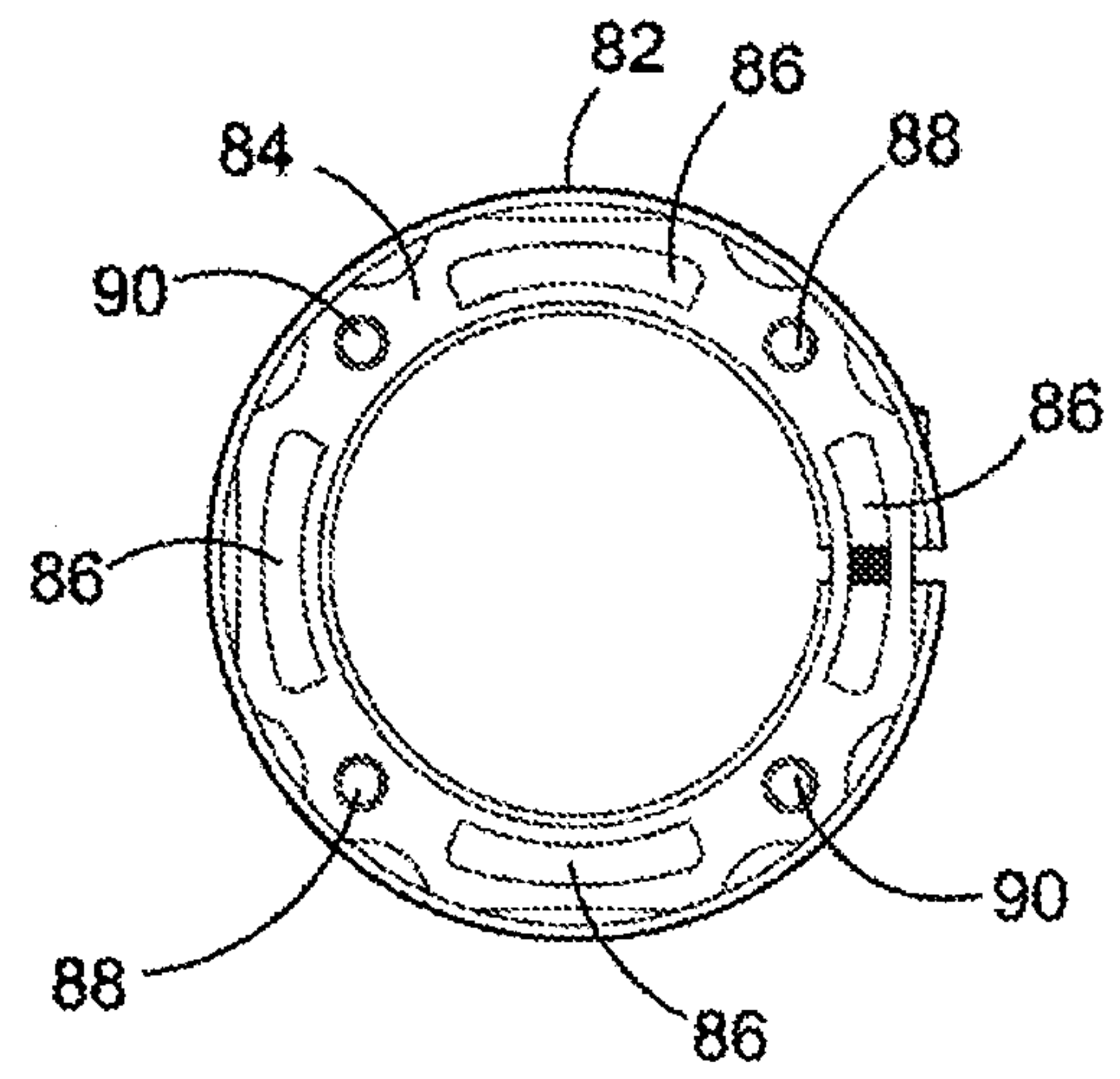


FIG. 29B

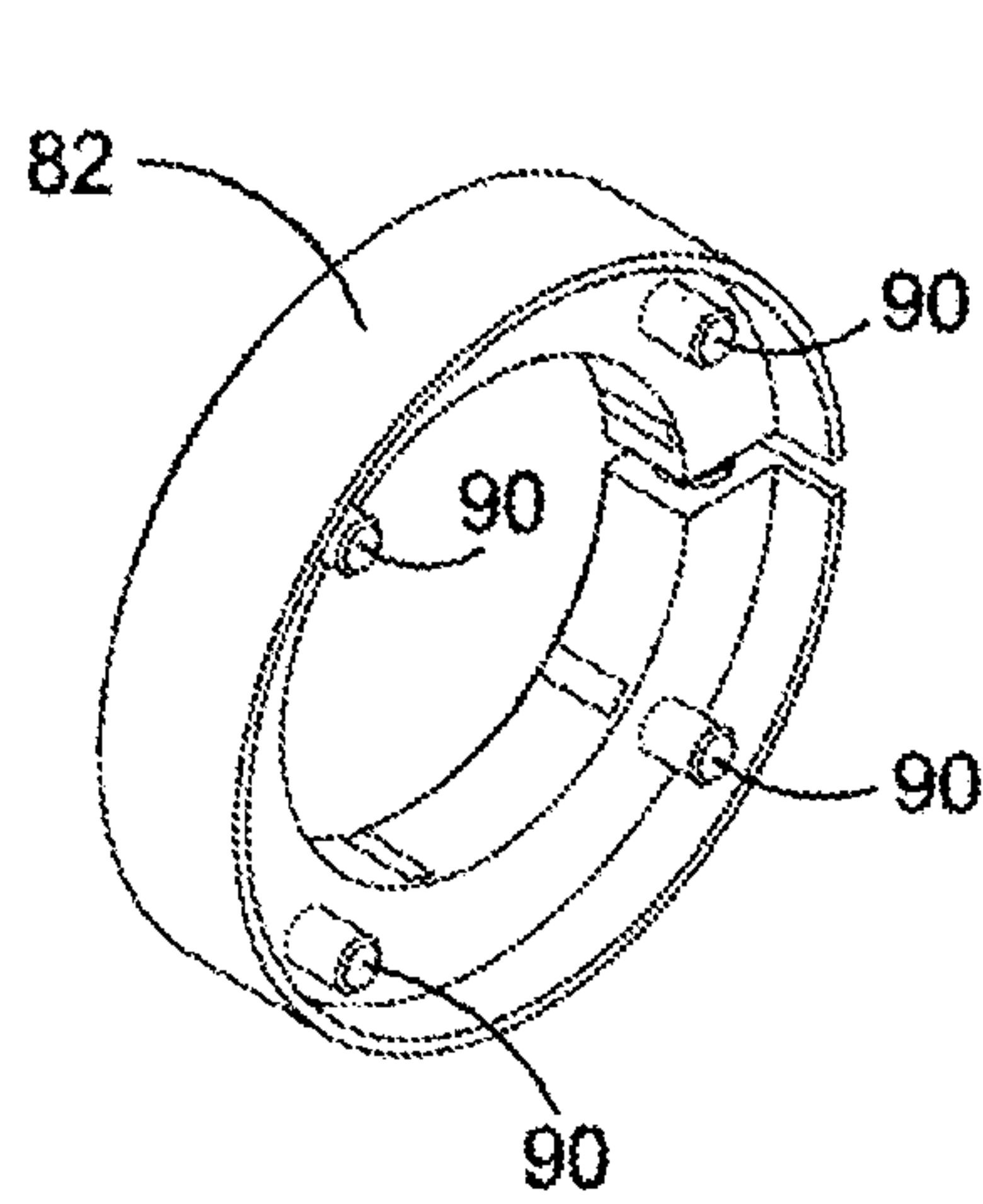


FIG. 29C

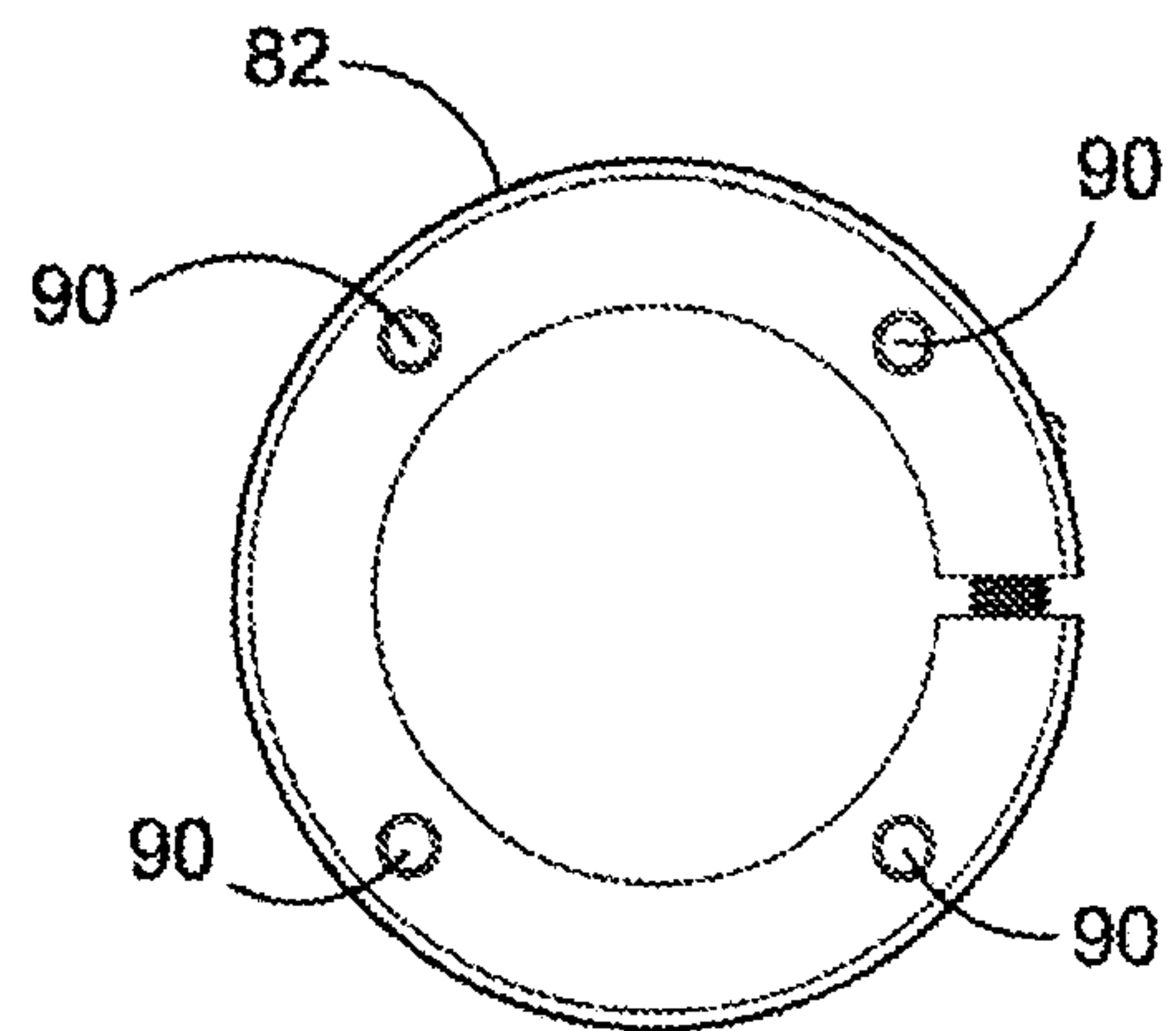


FIG. 29D

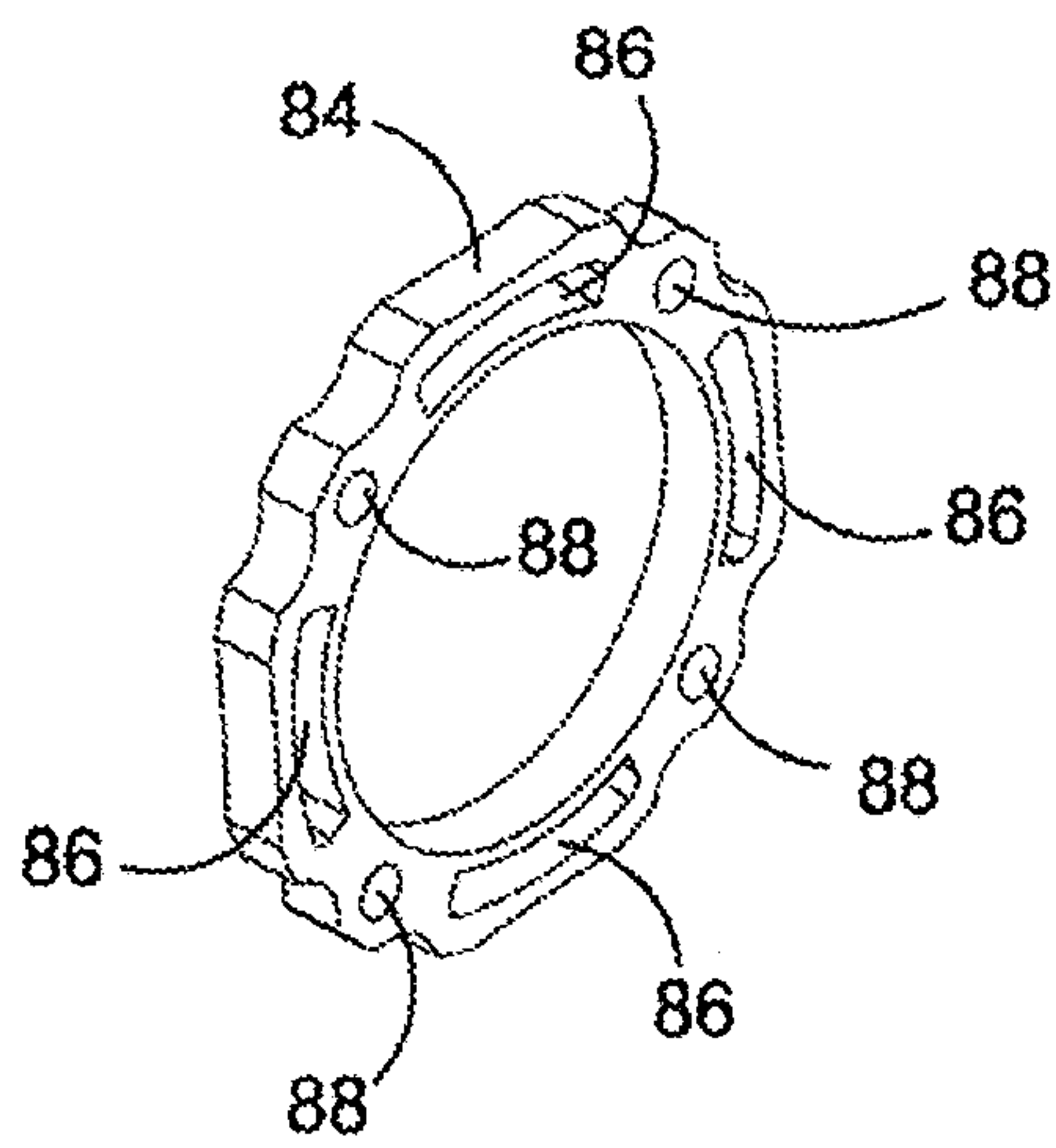


FIG. 29E

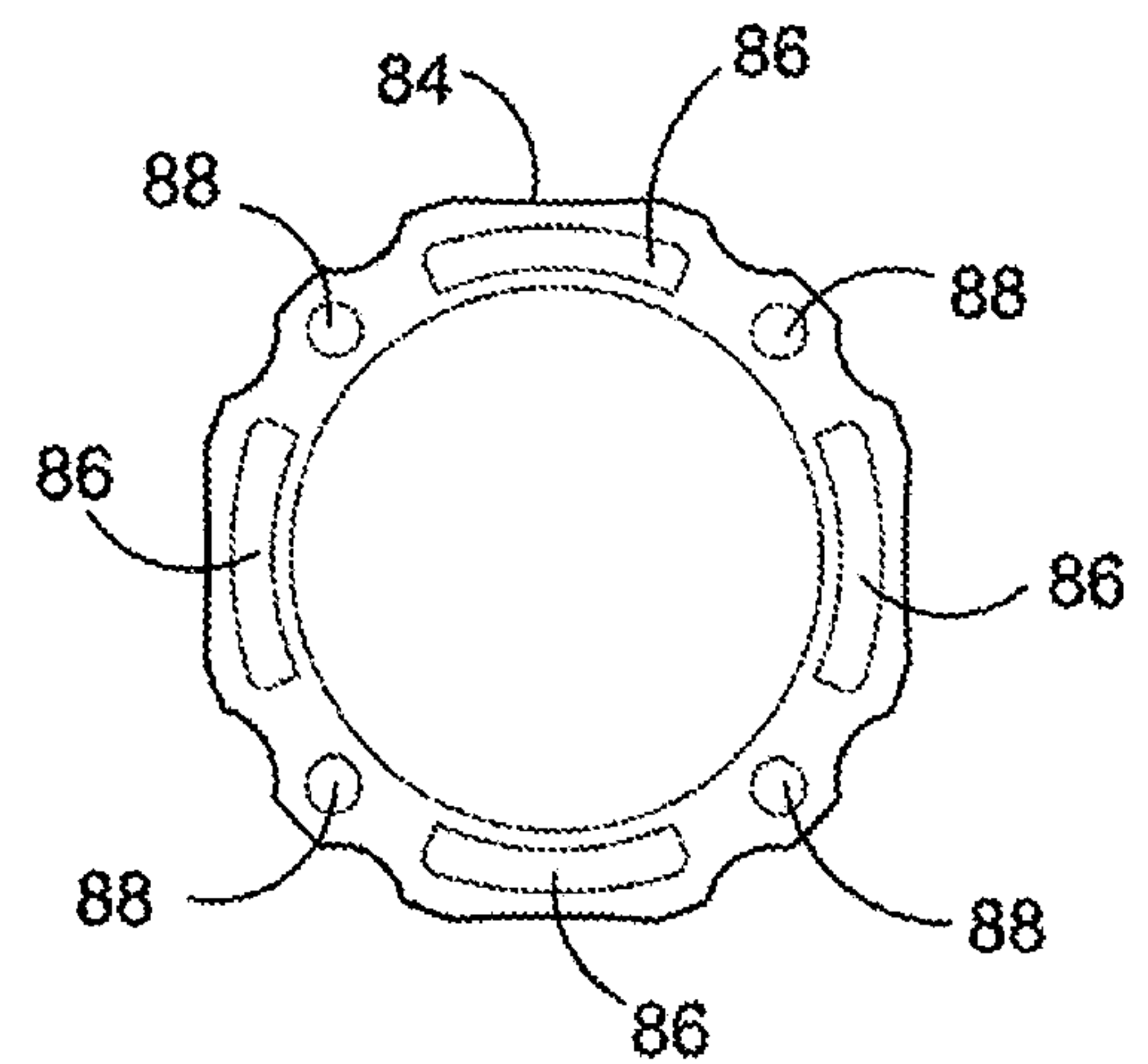
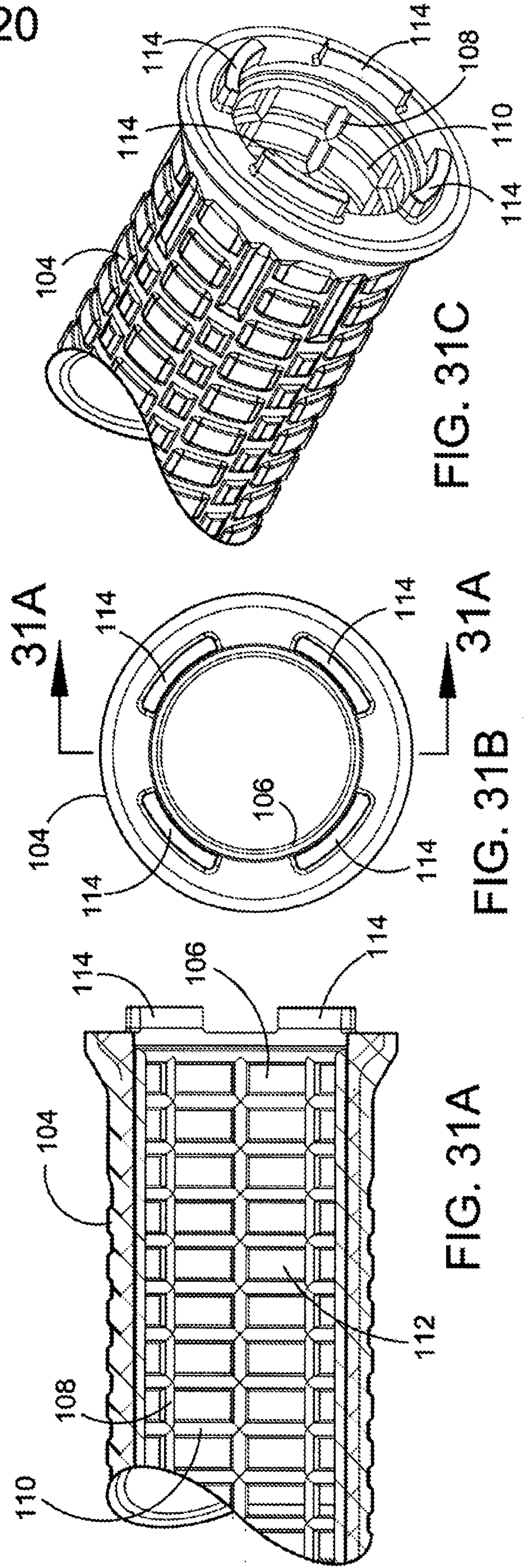
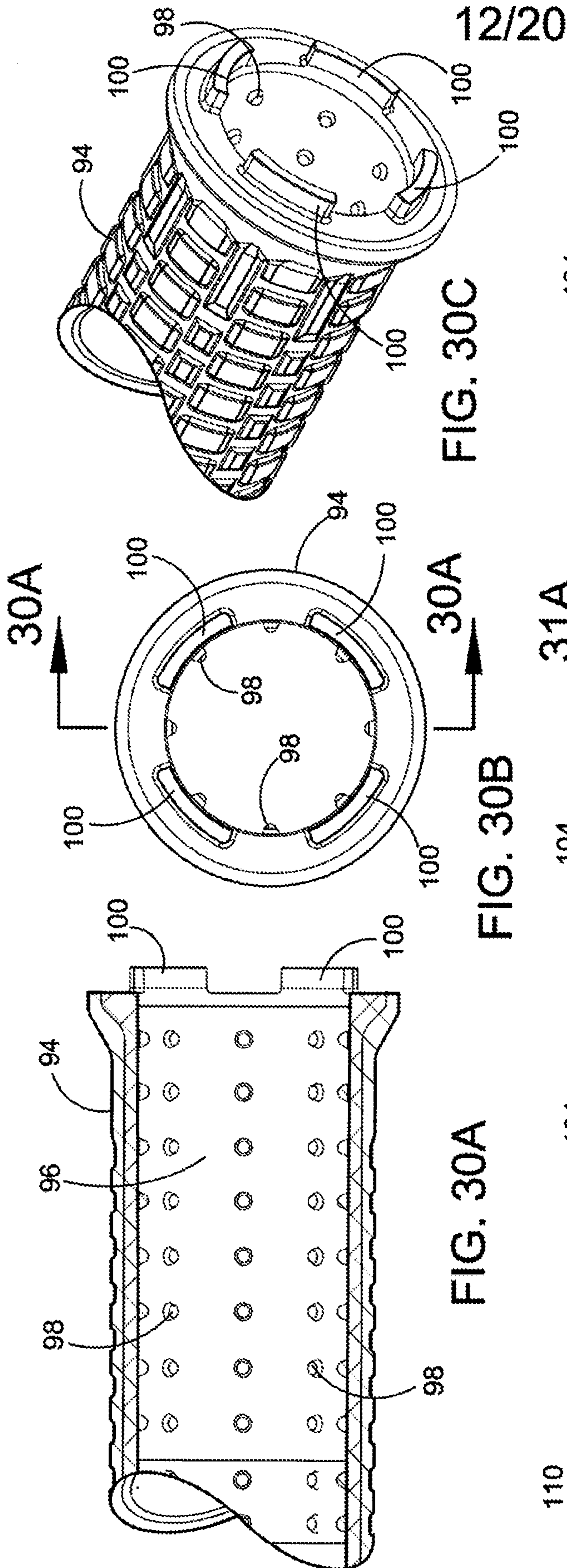
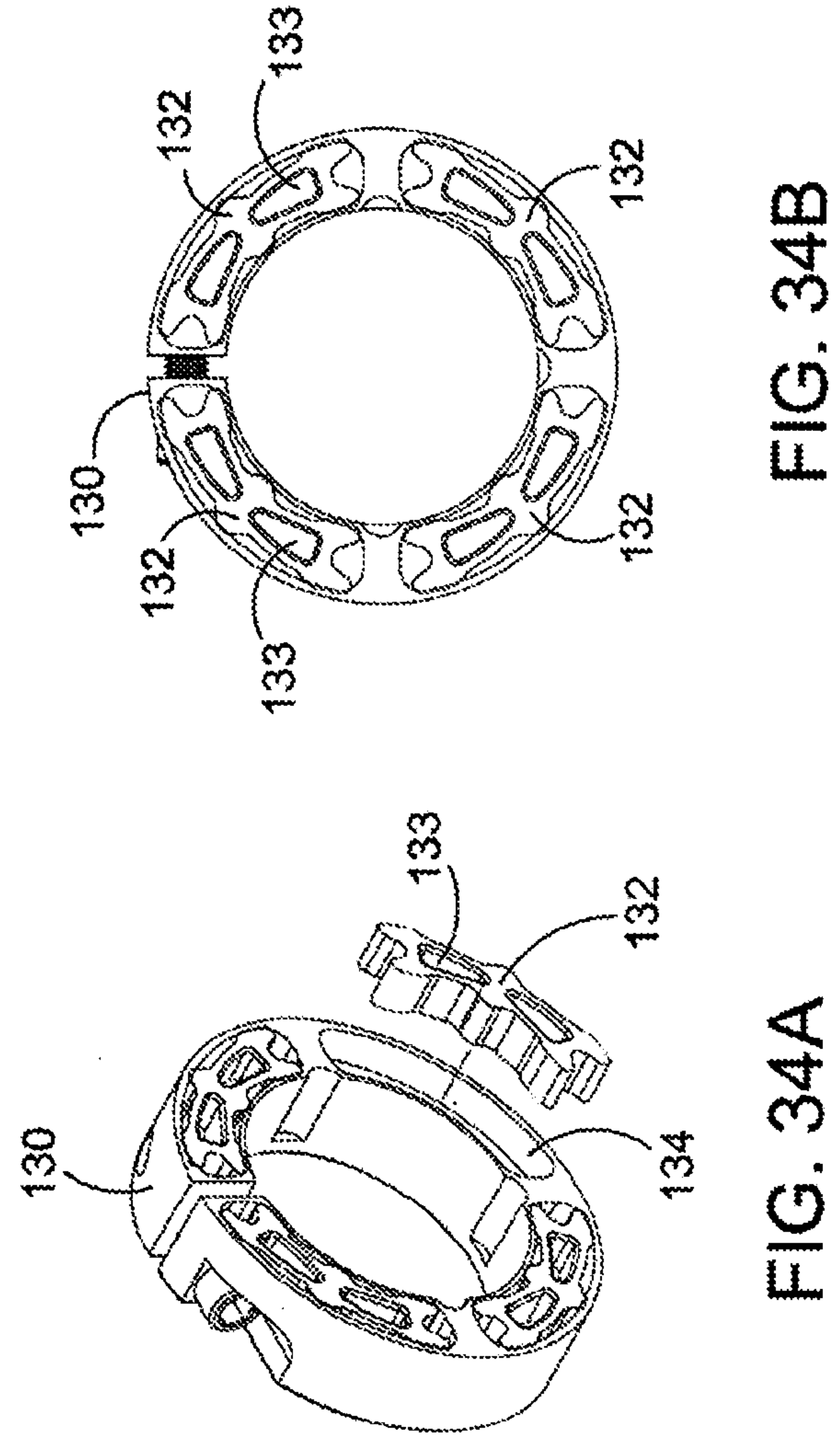
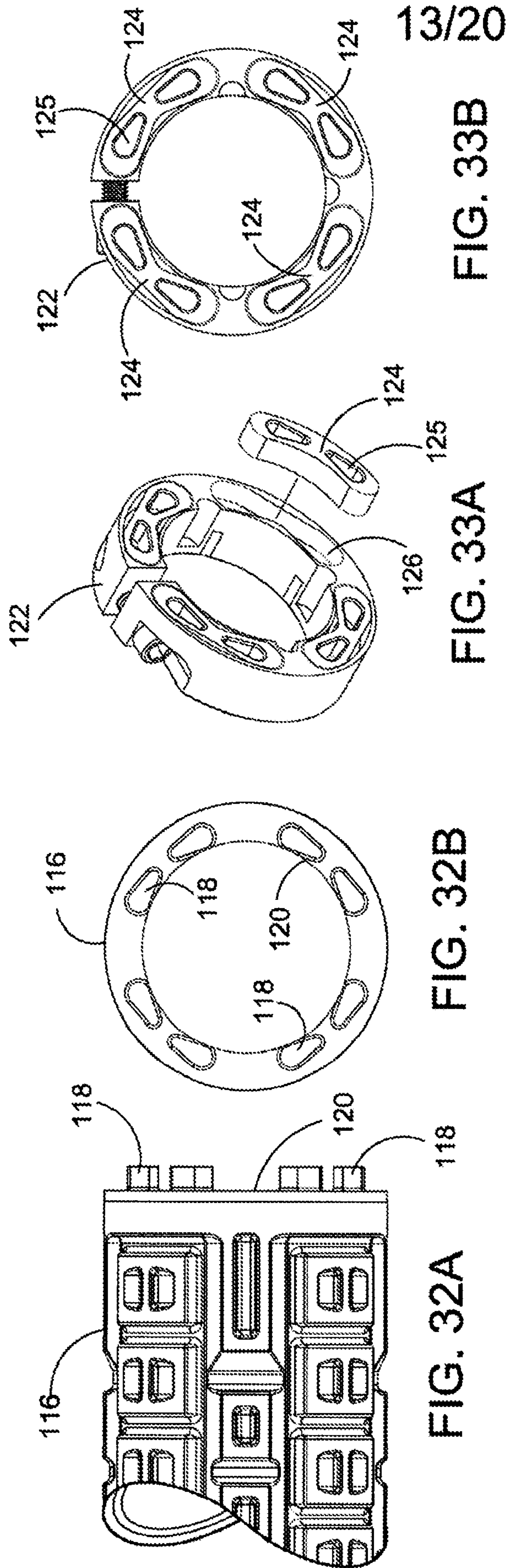


FIG. 29F





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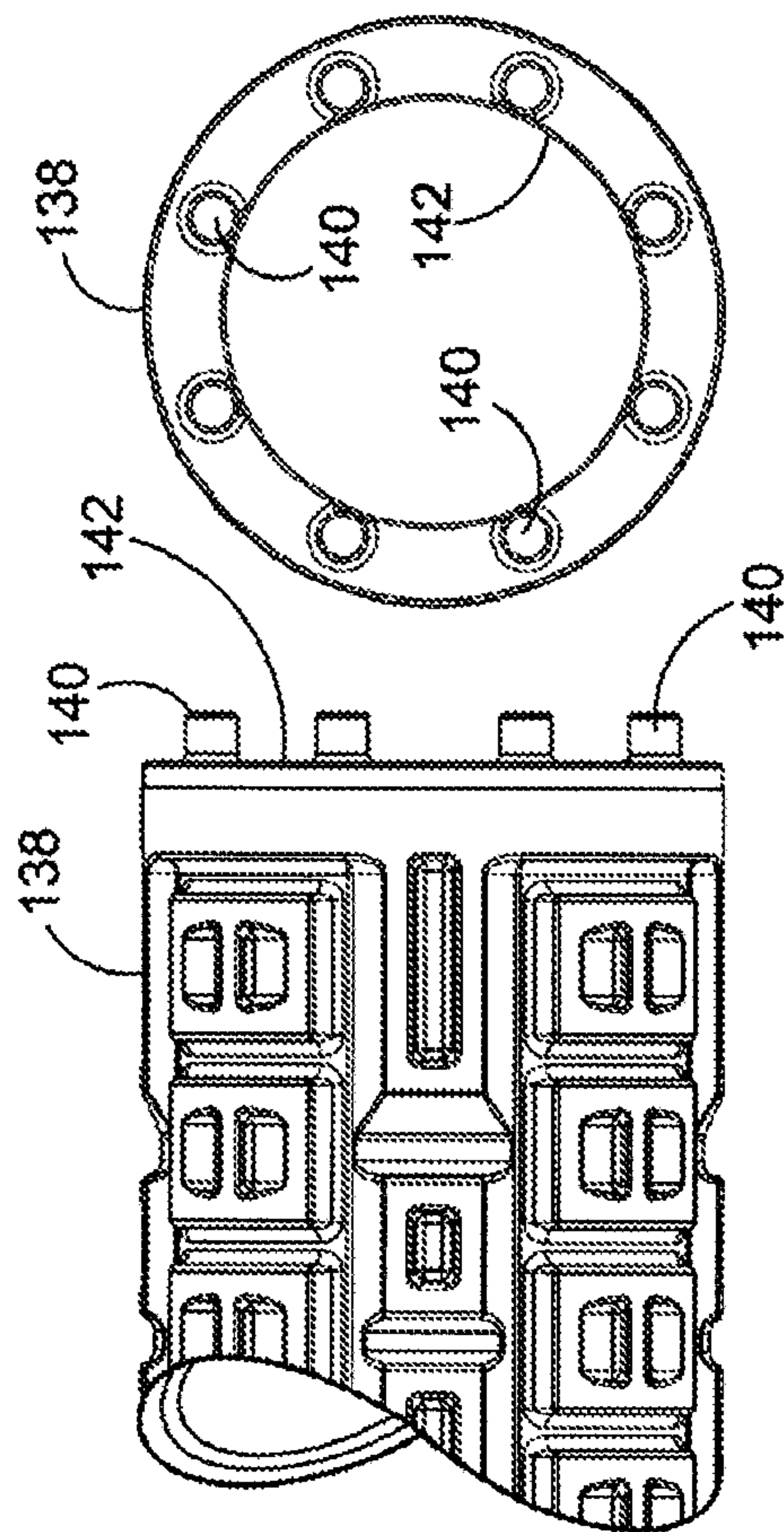


FIG. 35A

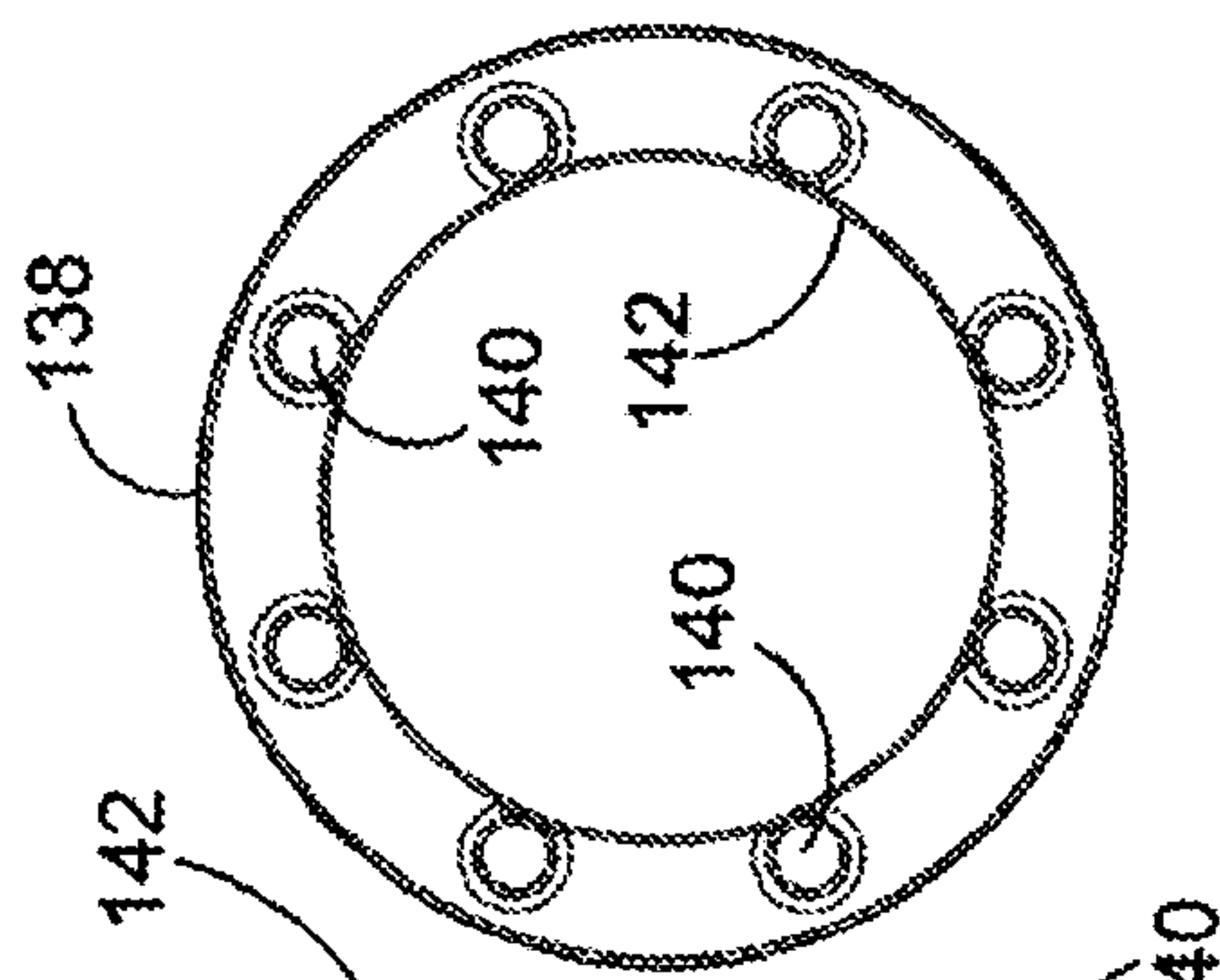


FIG. 35B

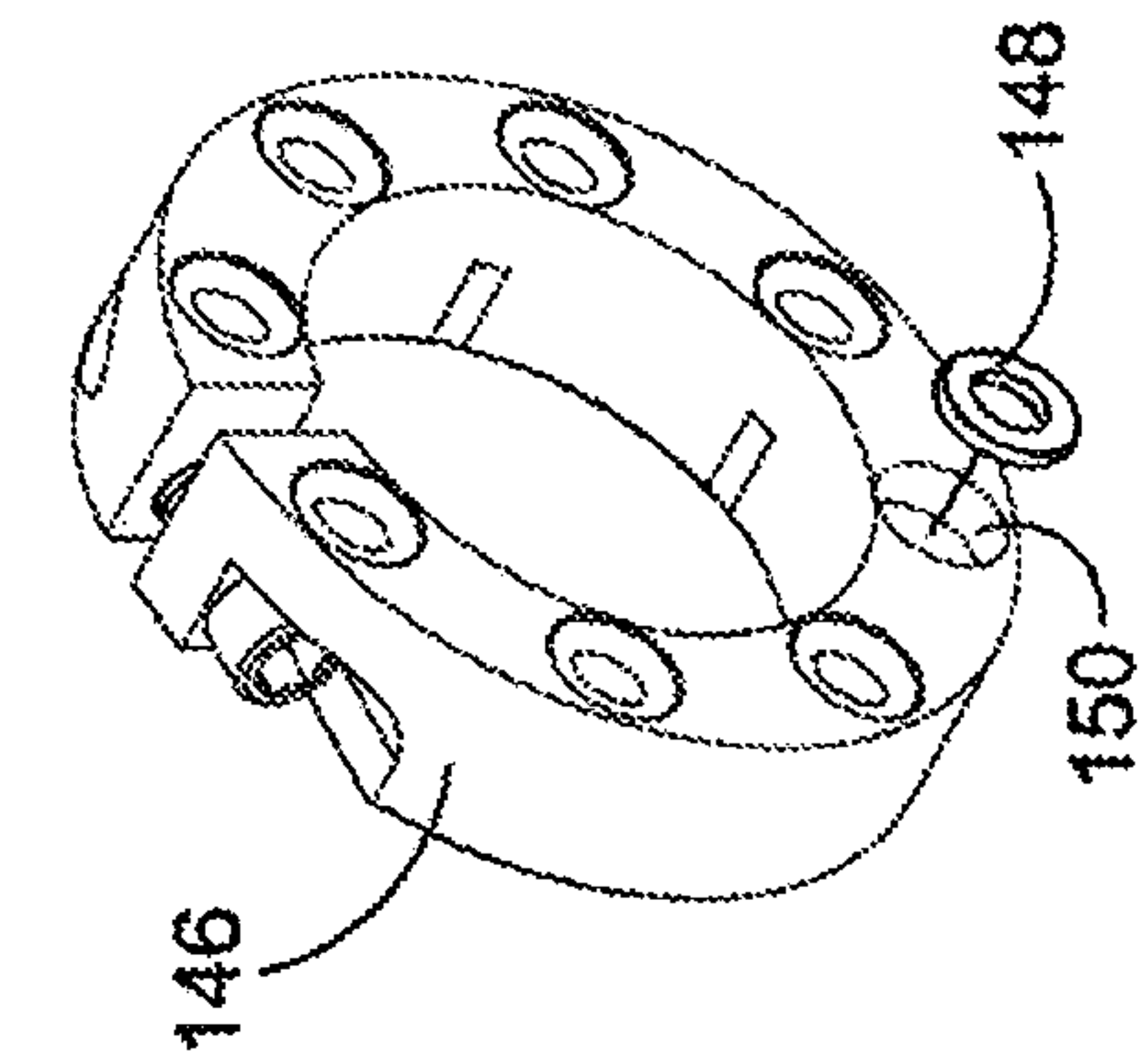


FIG. 35C

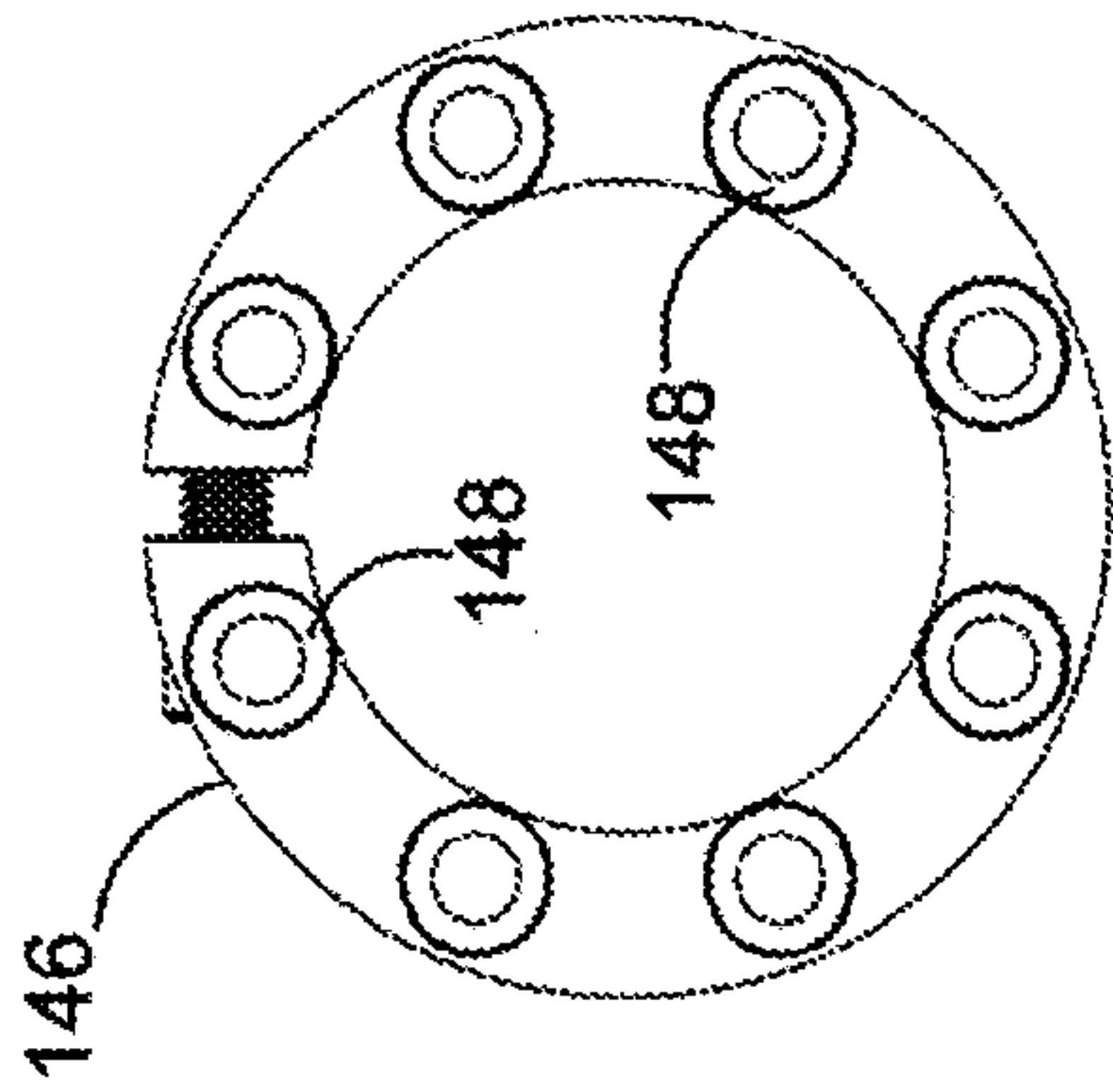


FIG. 35D

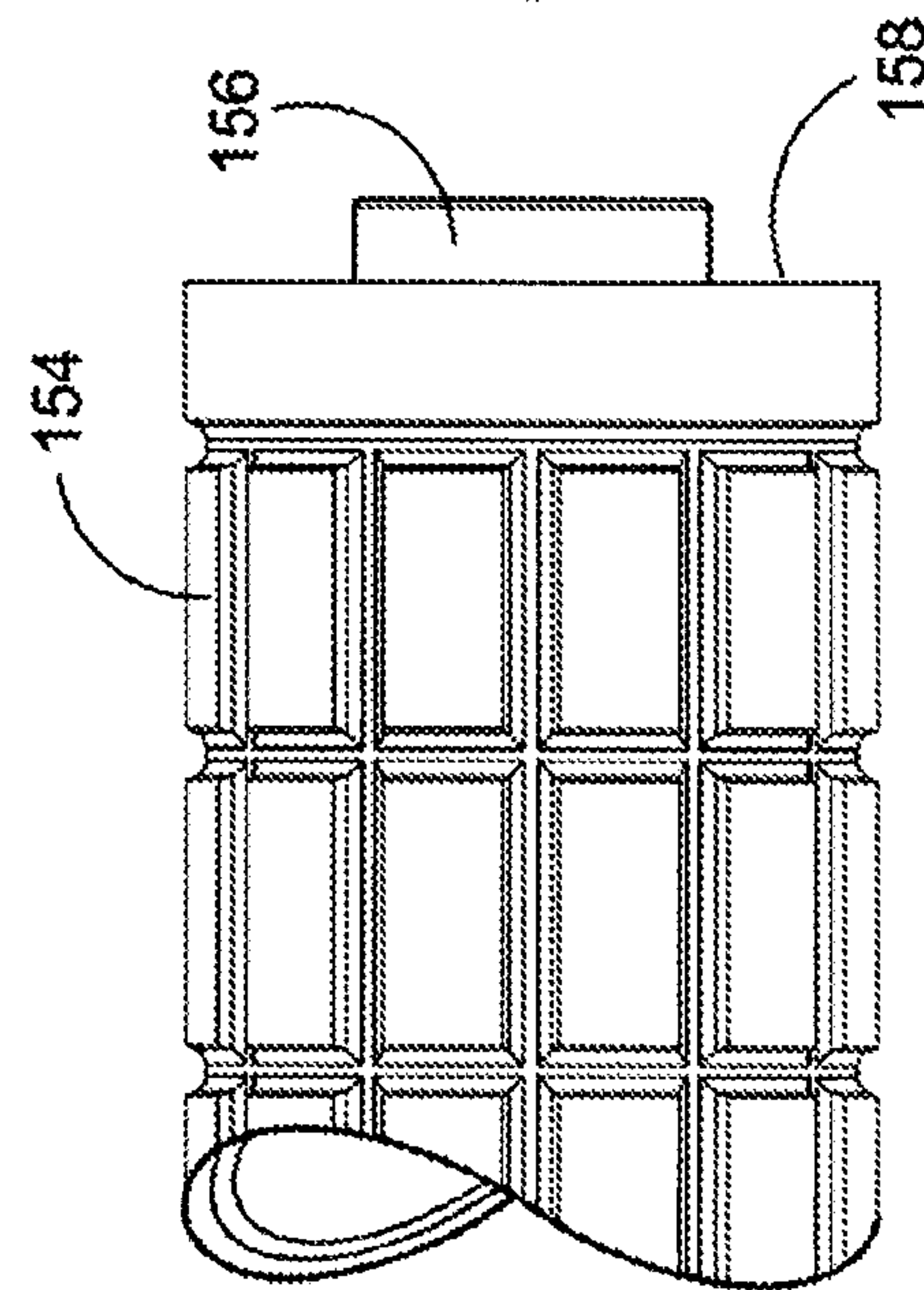


FIG. 36A

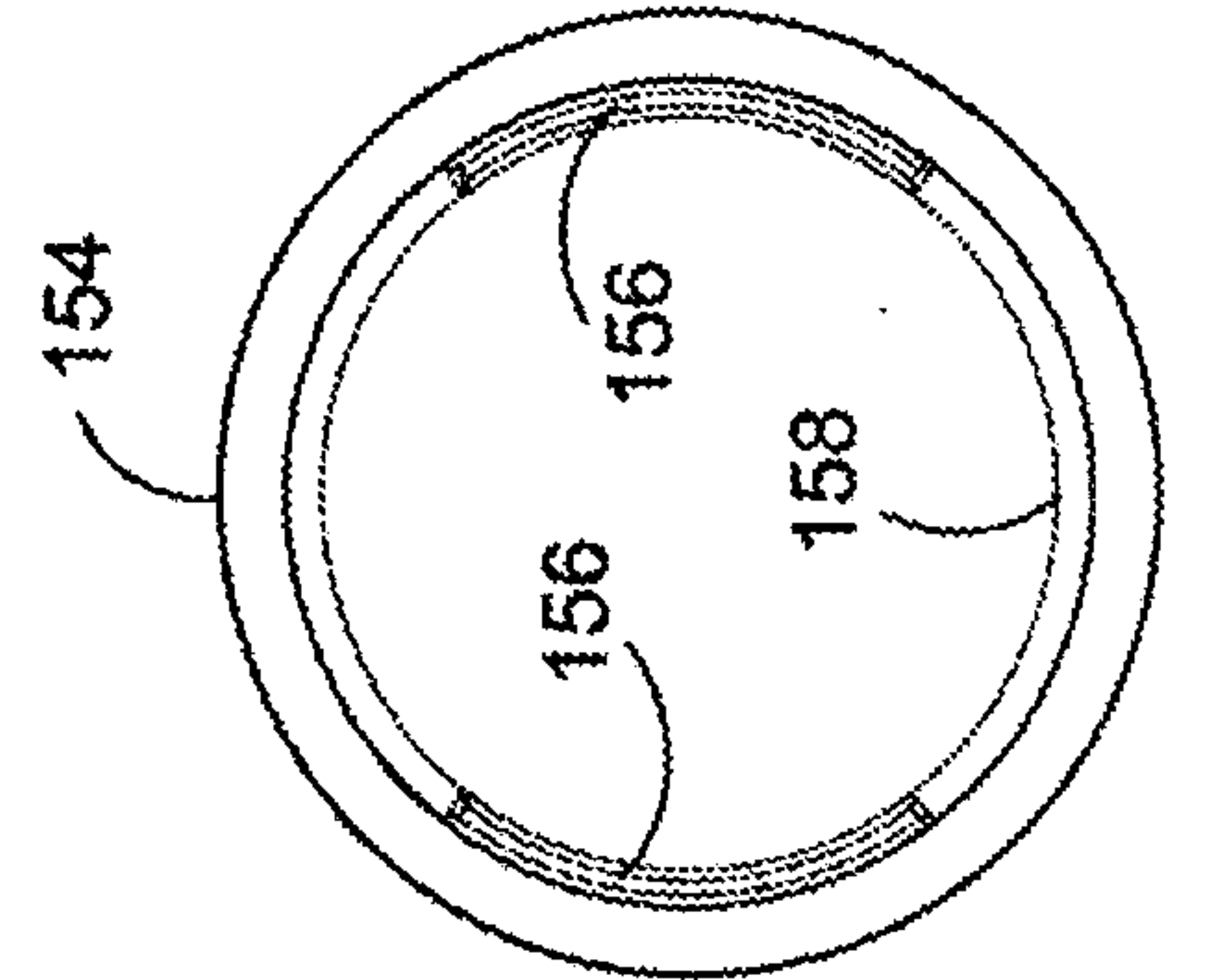


FIG. 36B

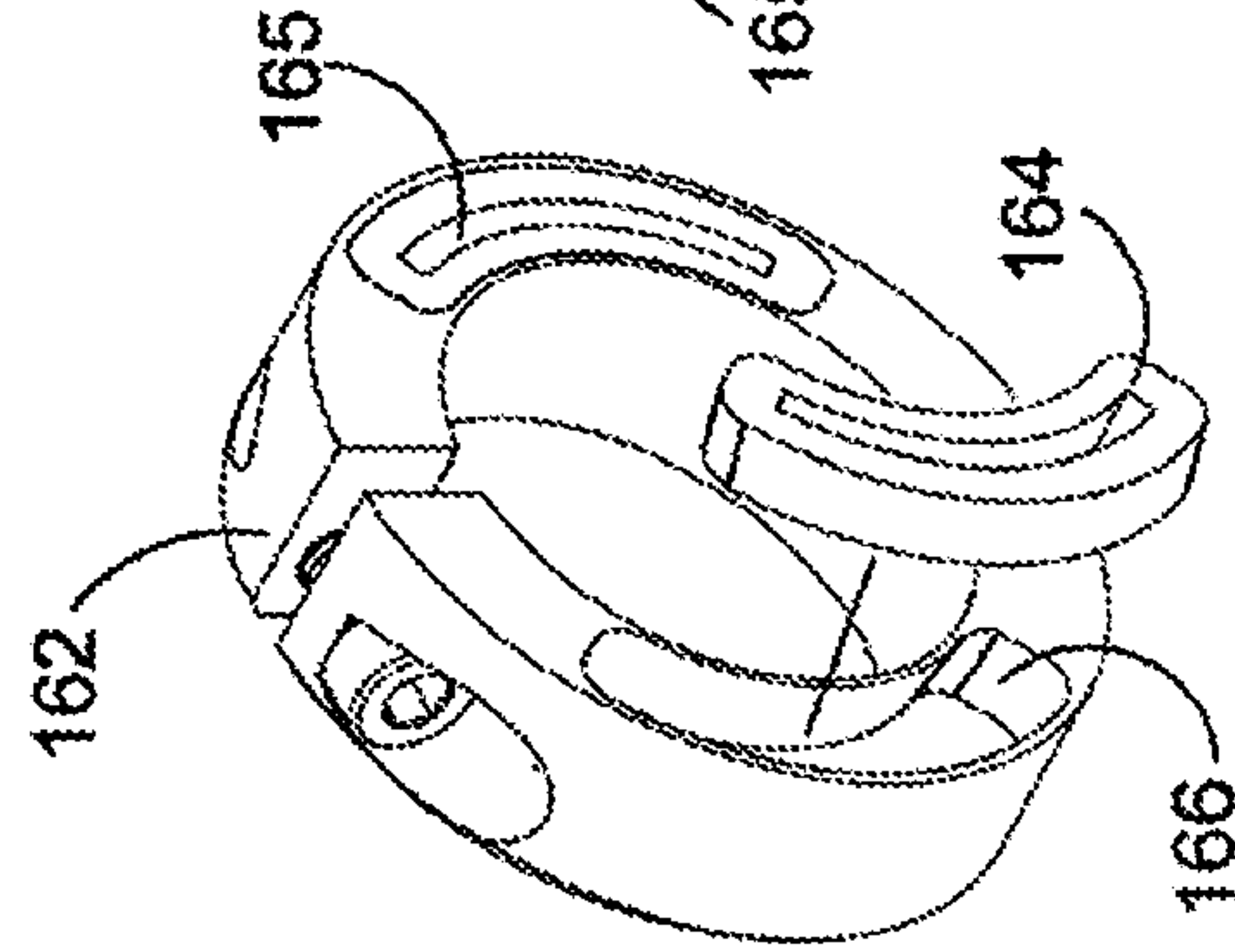


FIG. 36C

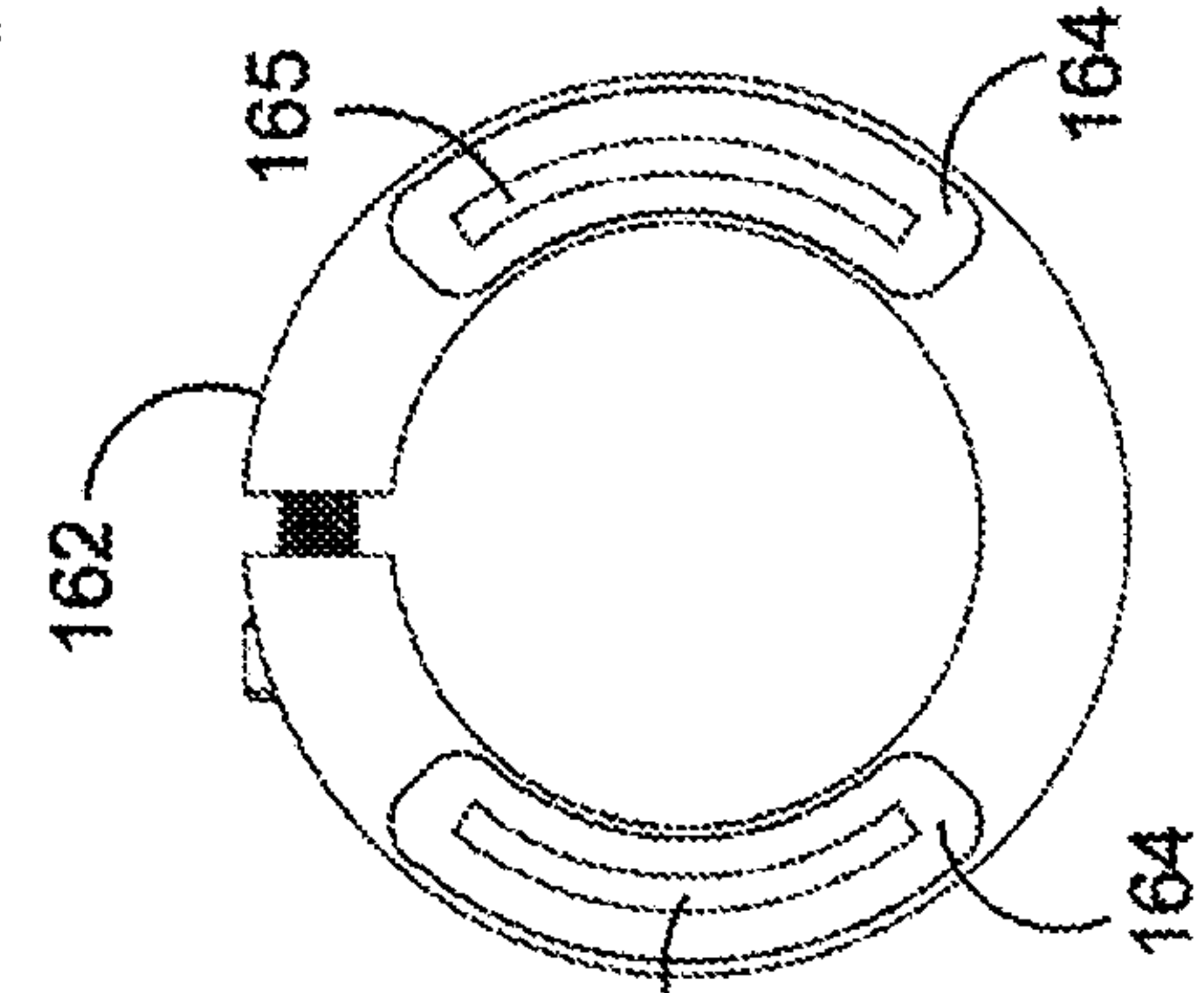


FIG. 36D

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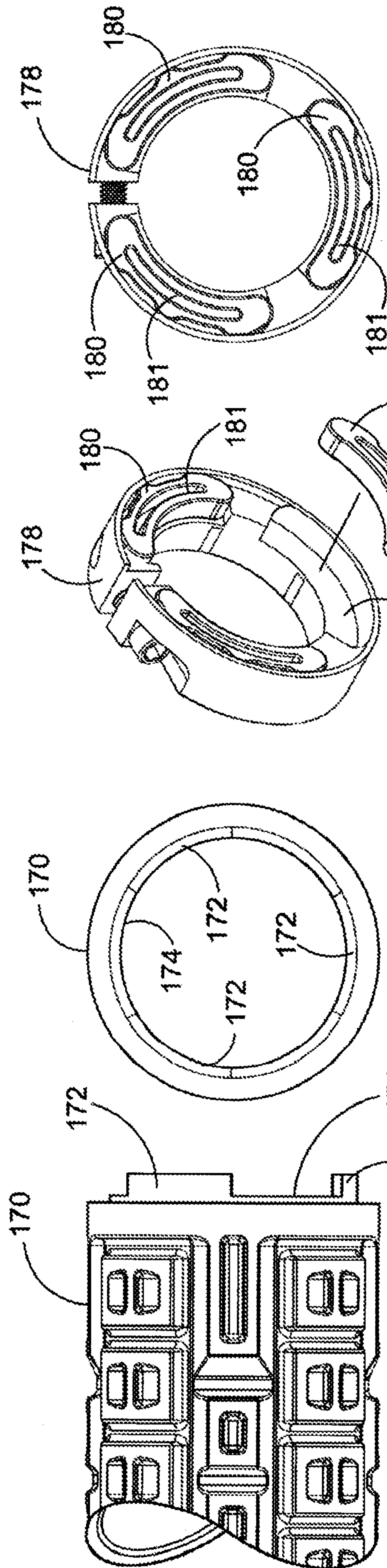


FIG. 37A

FIG. 37B

FIG. 37C

FIG. 37D

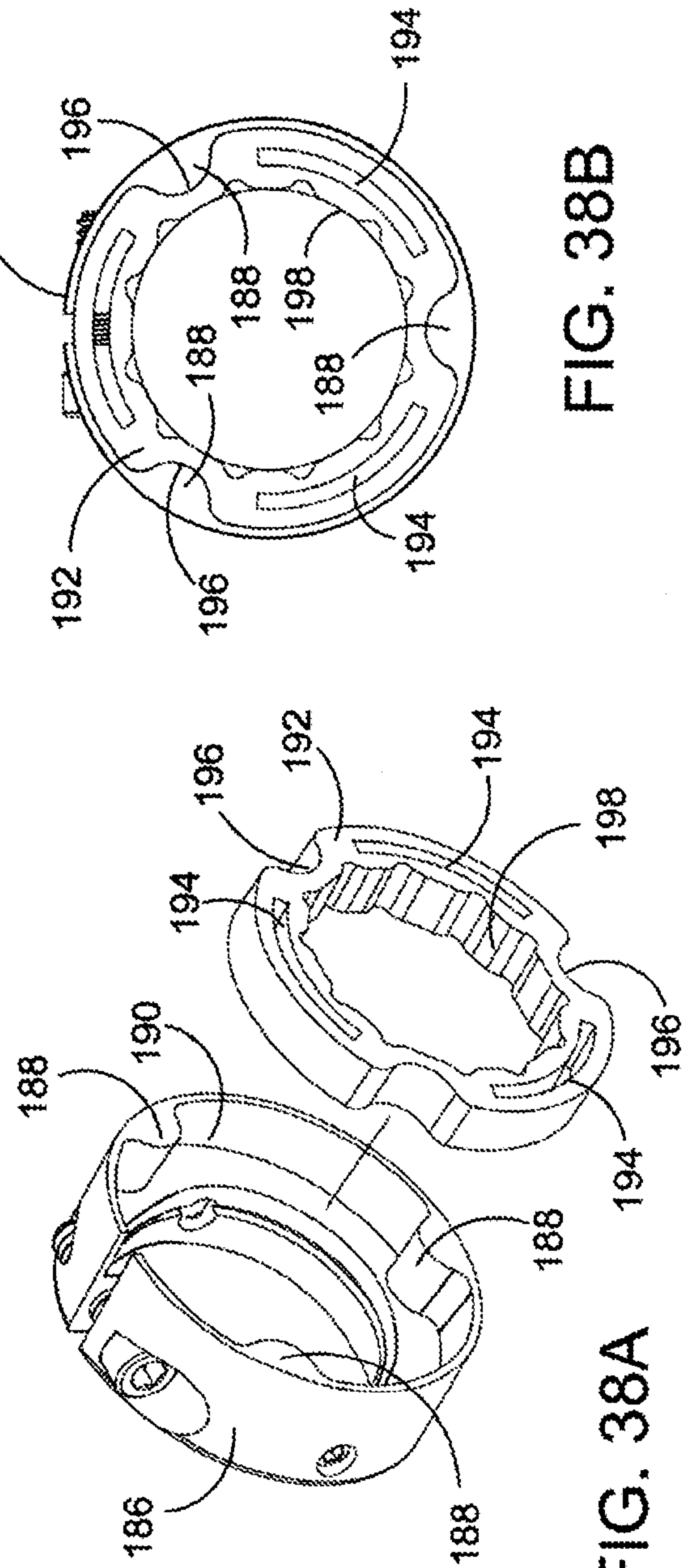


FIG. 38A

FIG. 38B

FIG. 38C

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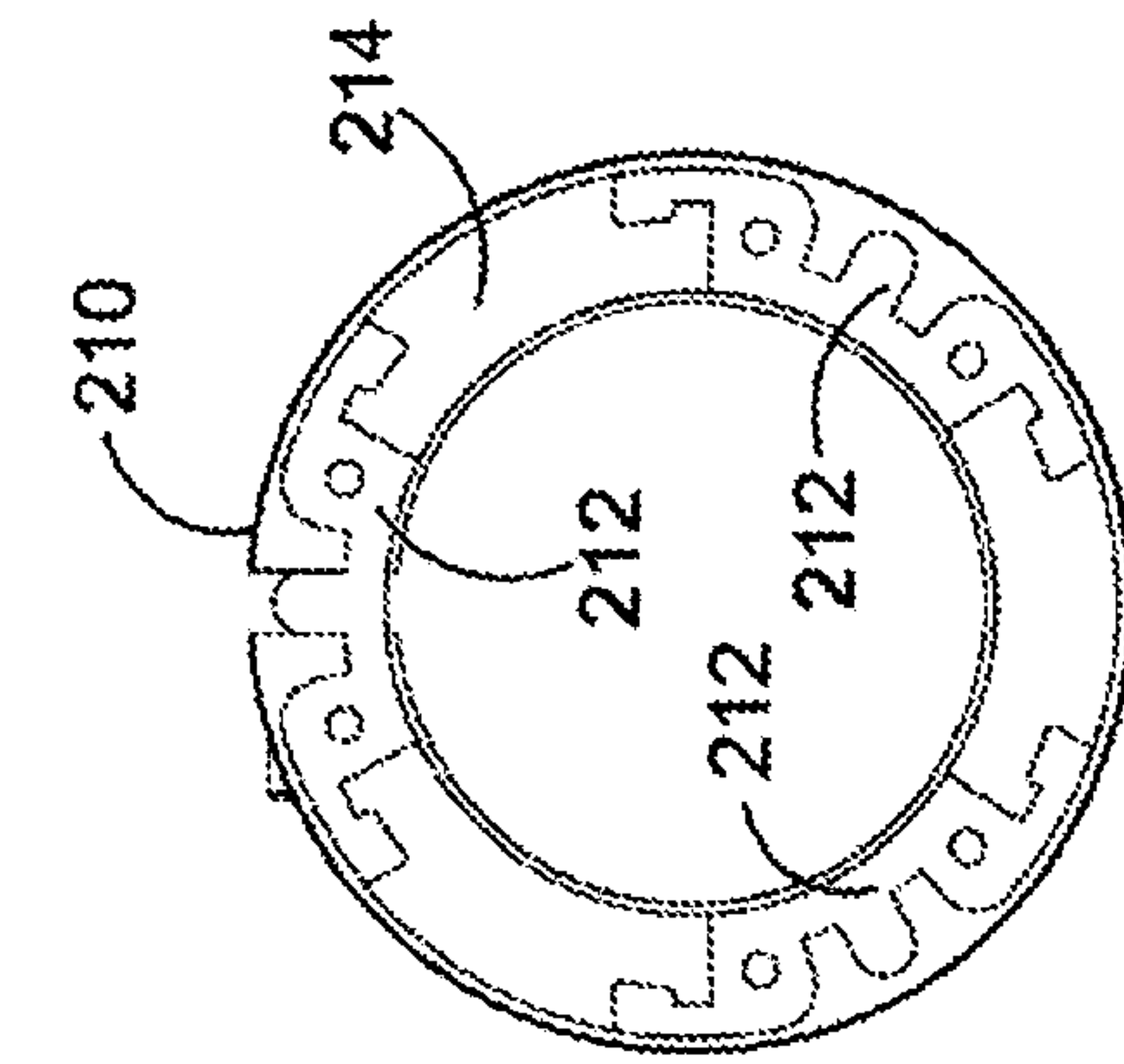


FIG. 39D

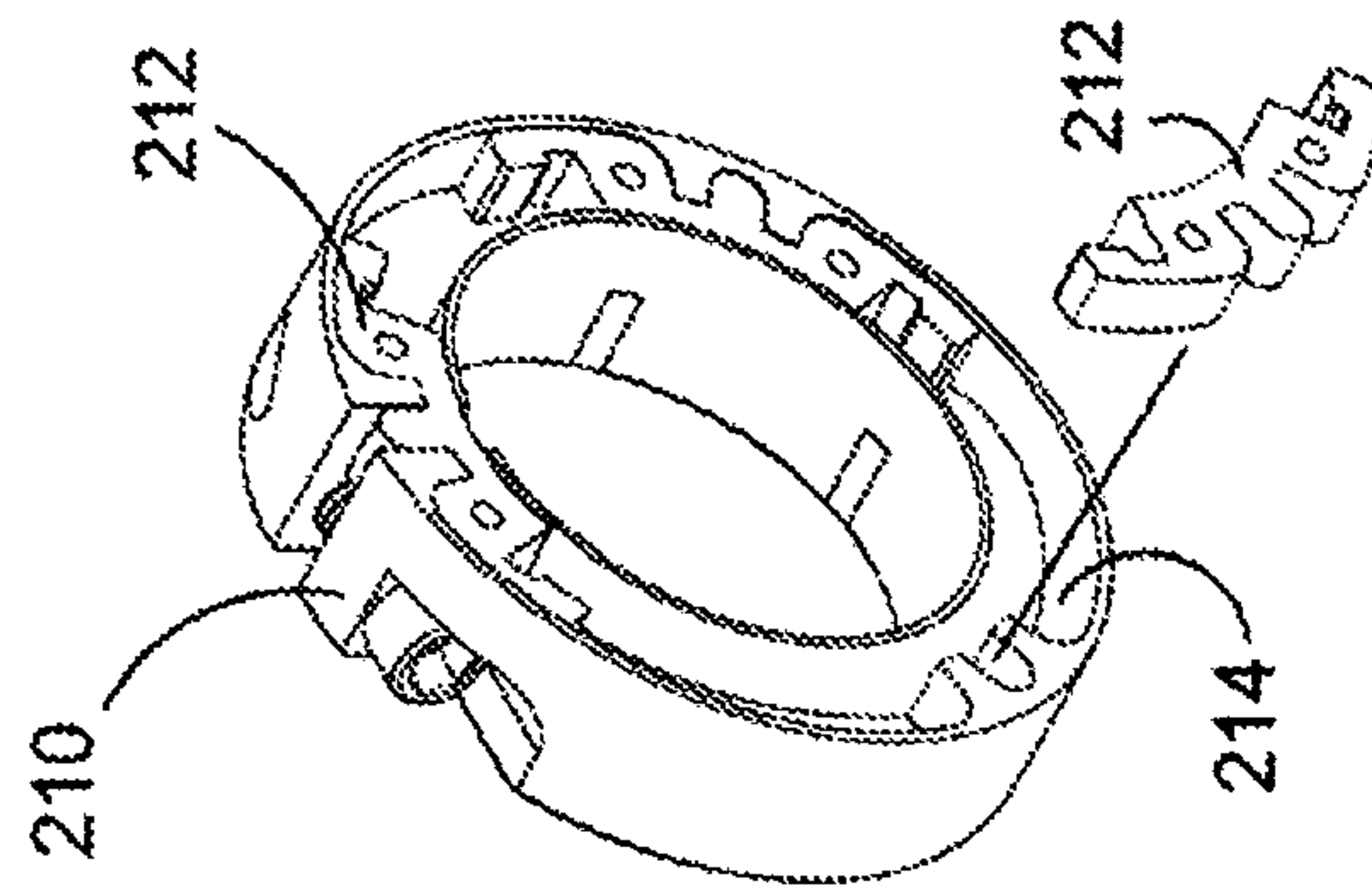


FIG. 39C

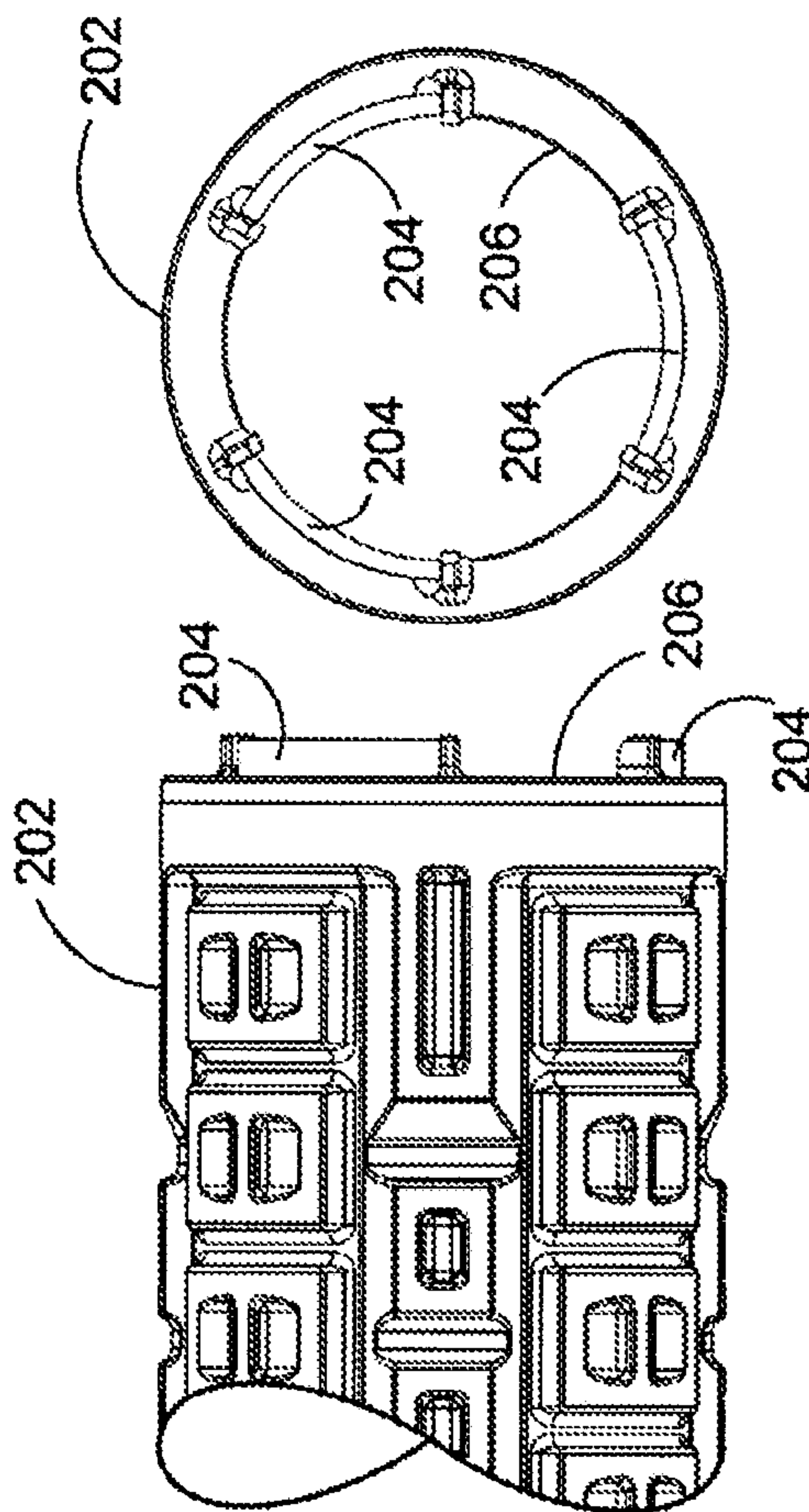


FIG. 39B

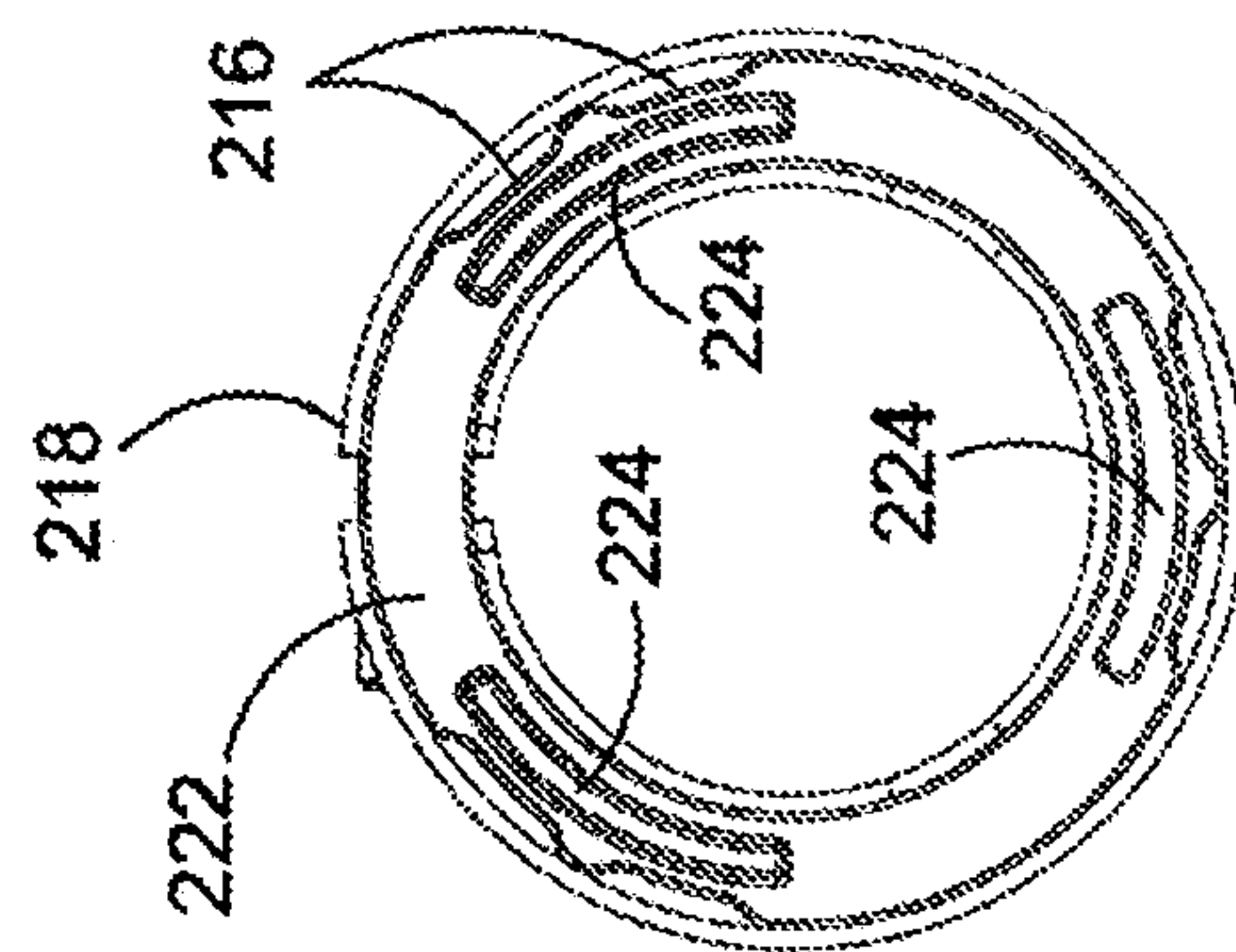


FIG. 40B

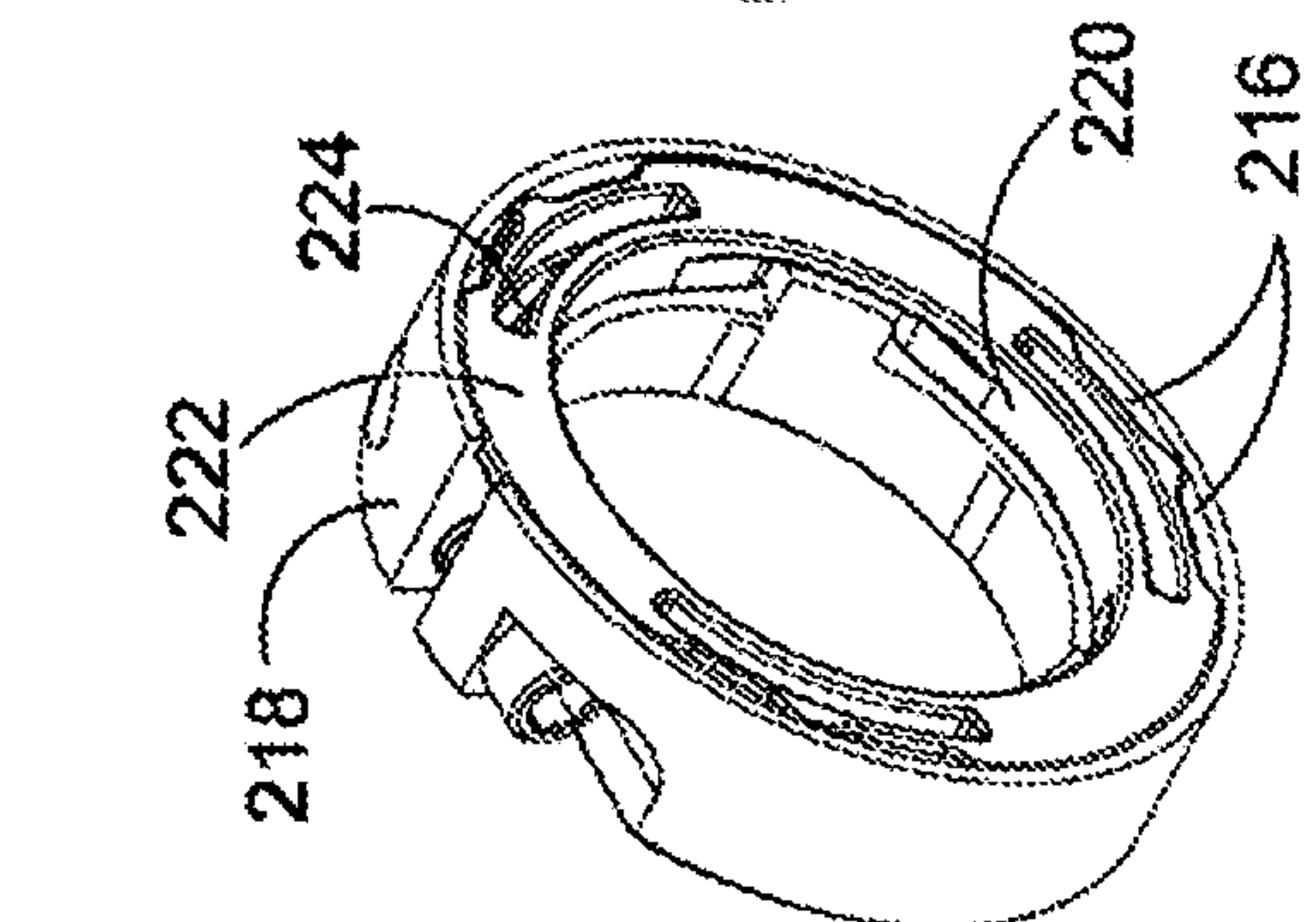


FIG. 40A

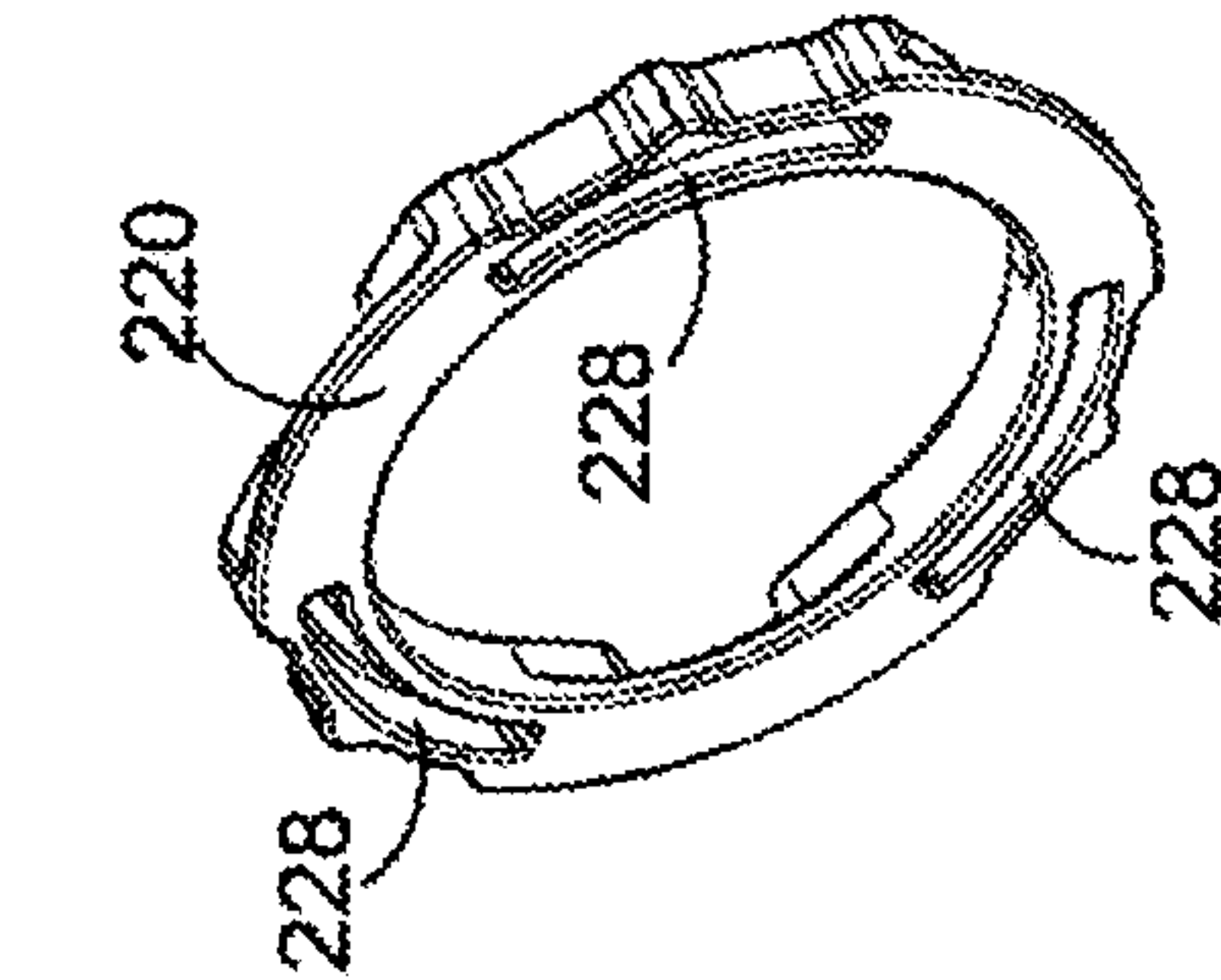


FIG. 40D

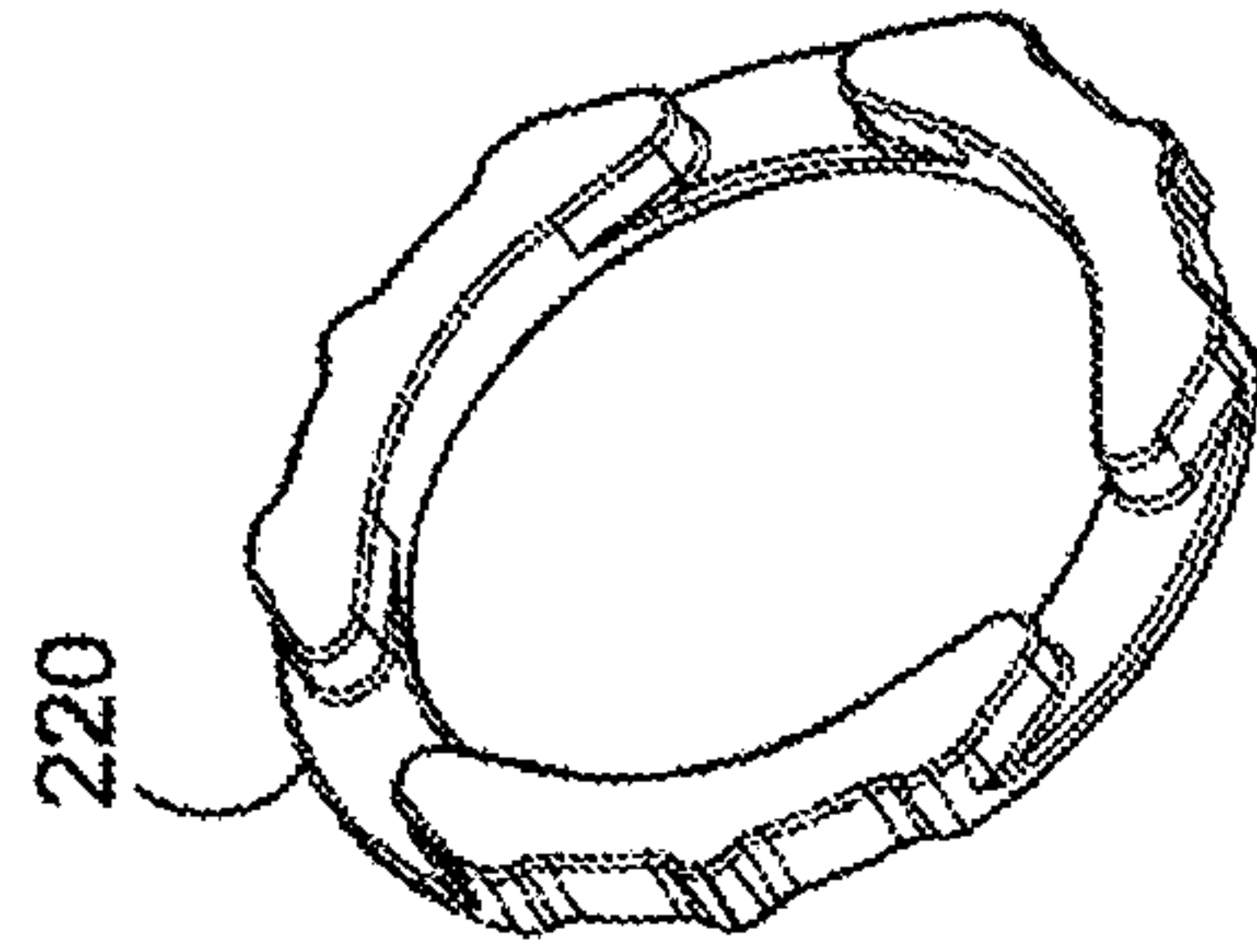
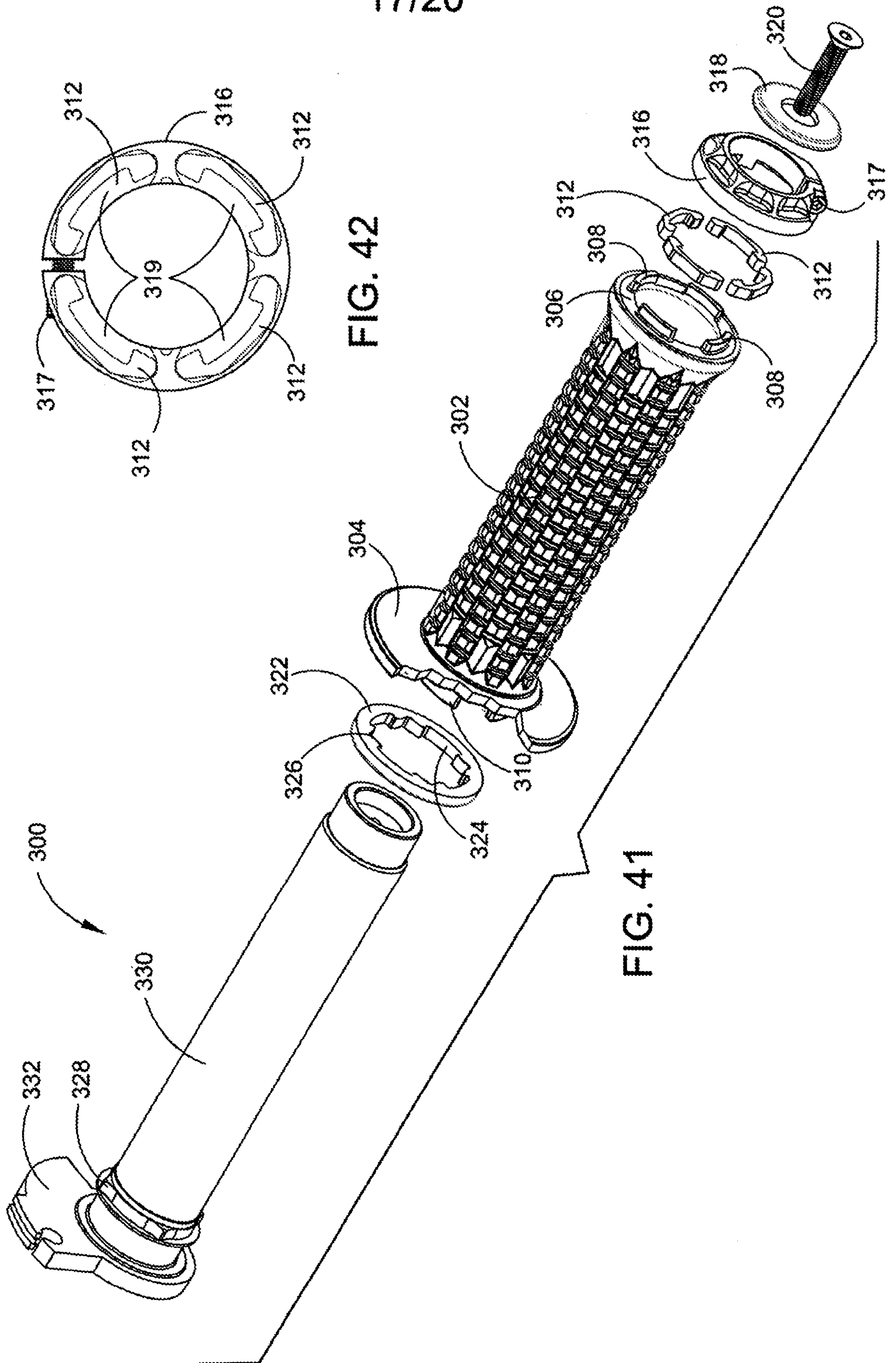


FIG. 40E

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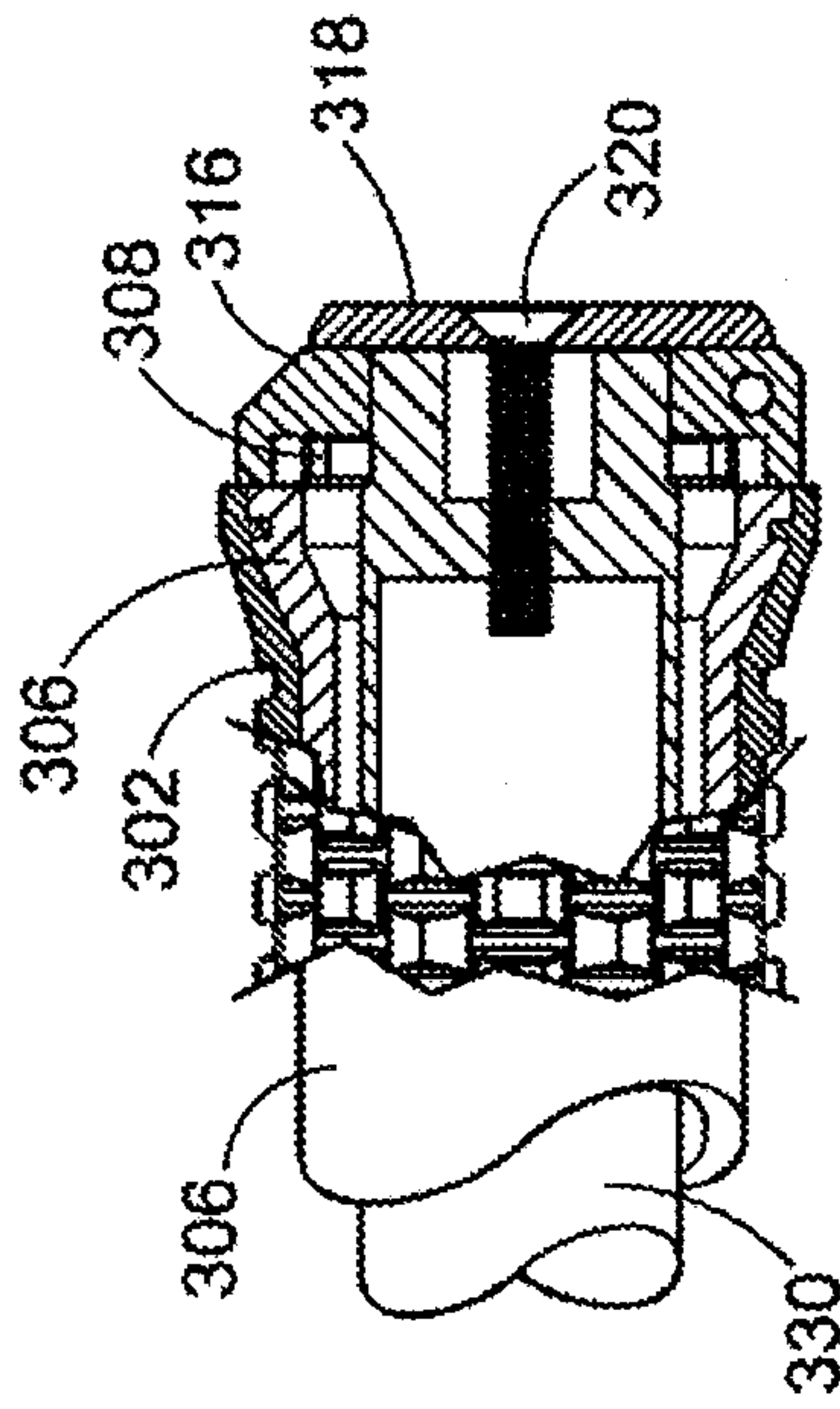


FIG. 43B

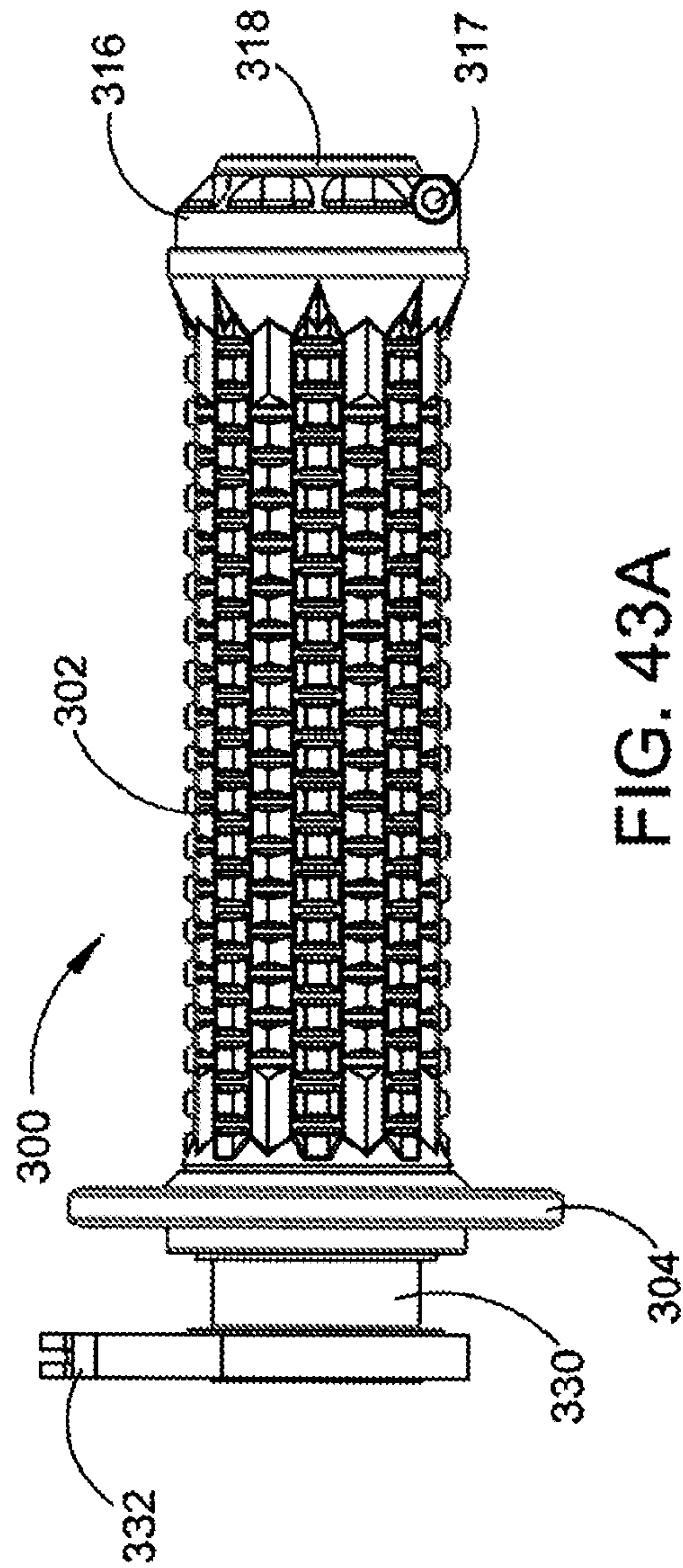


FIG. 43A

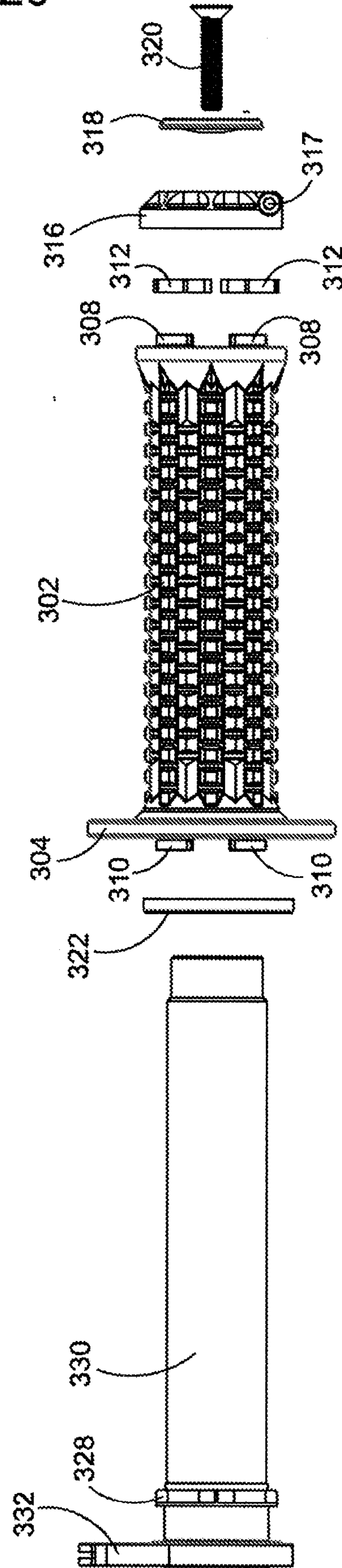
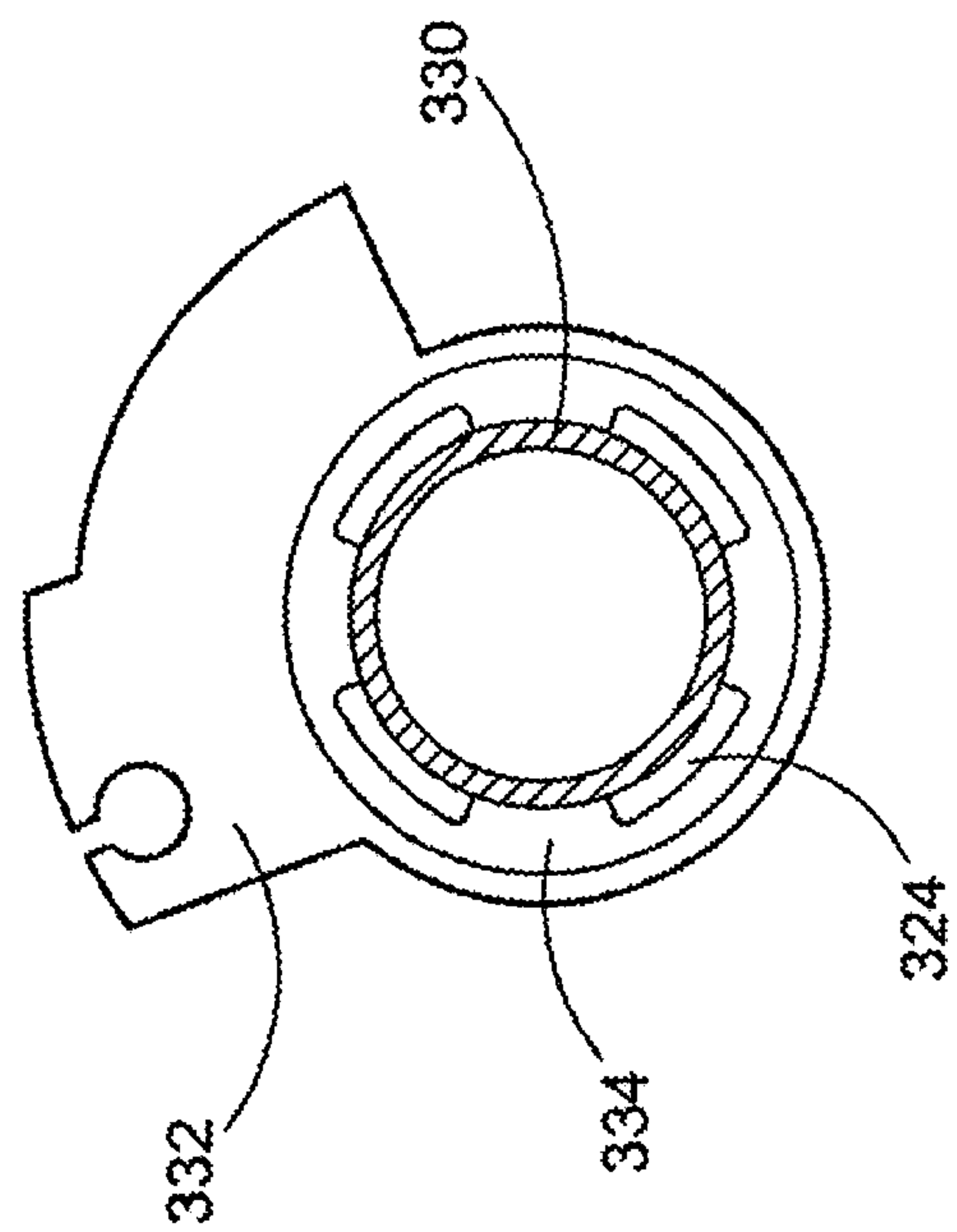
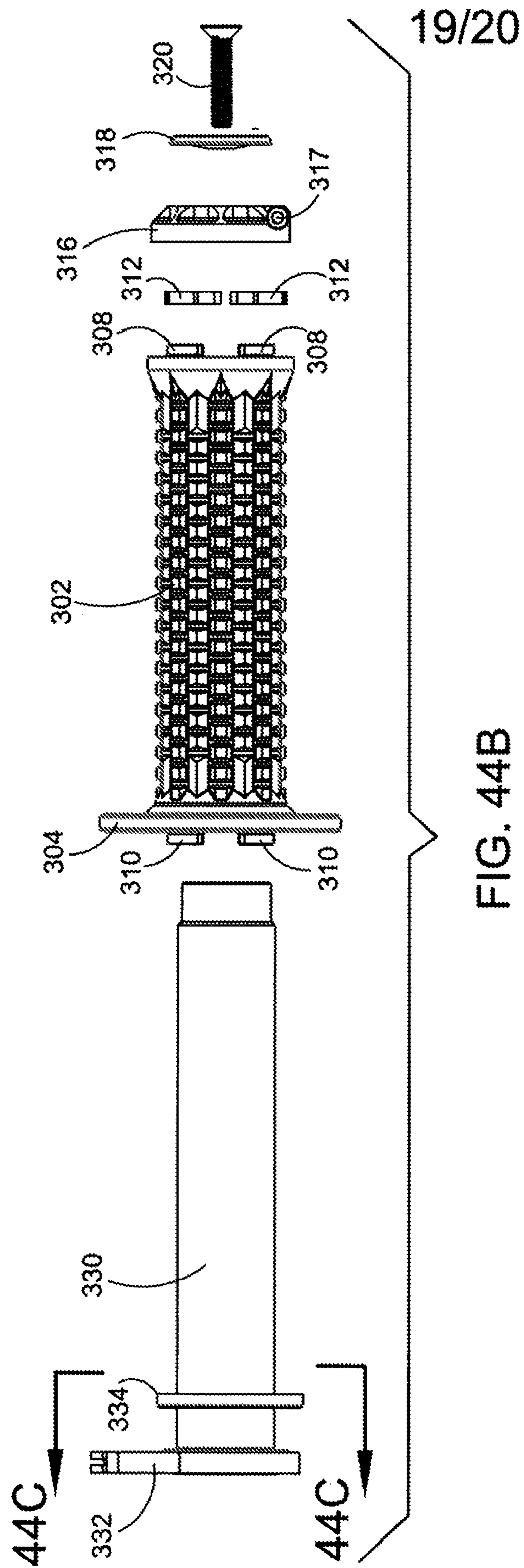


FIG. 44A



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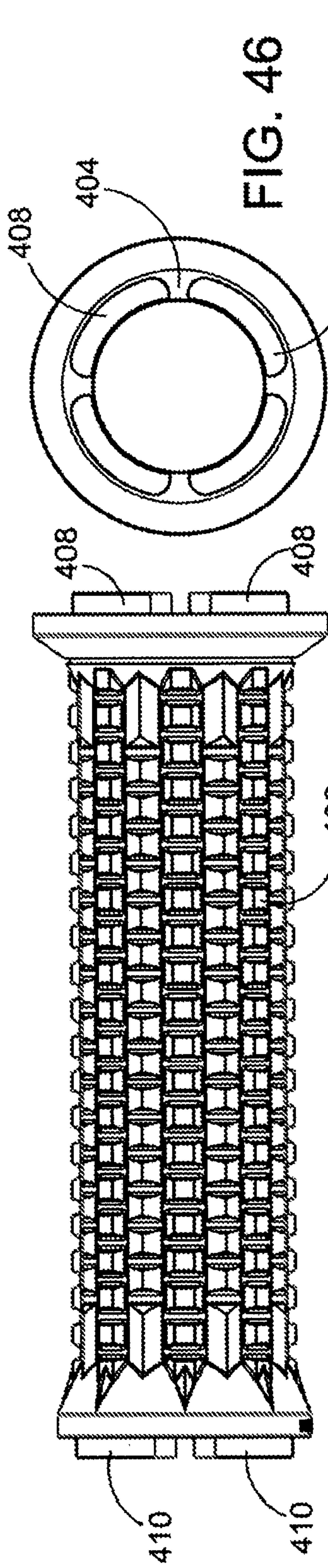


FIG. 45

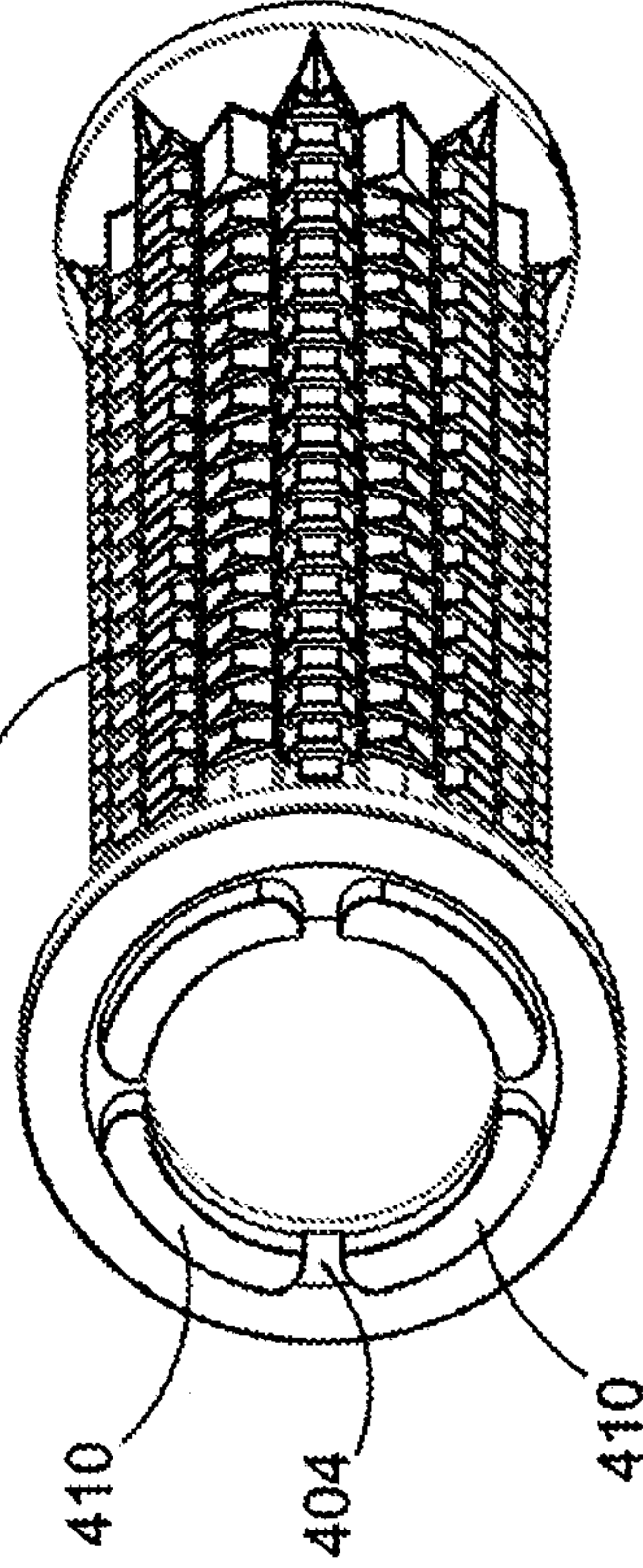


FIG. 46

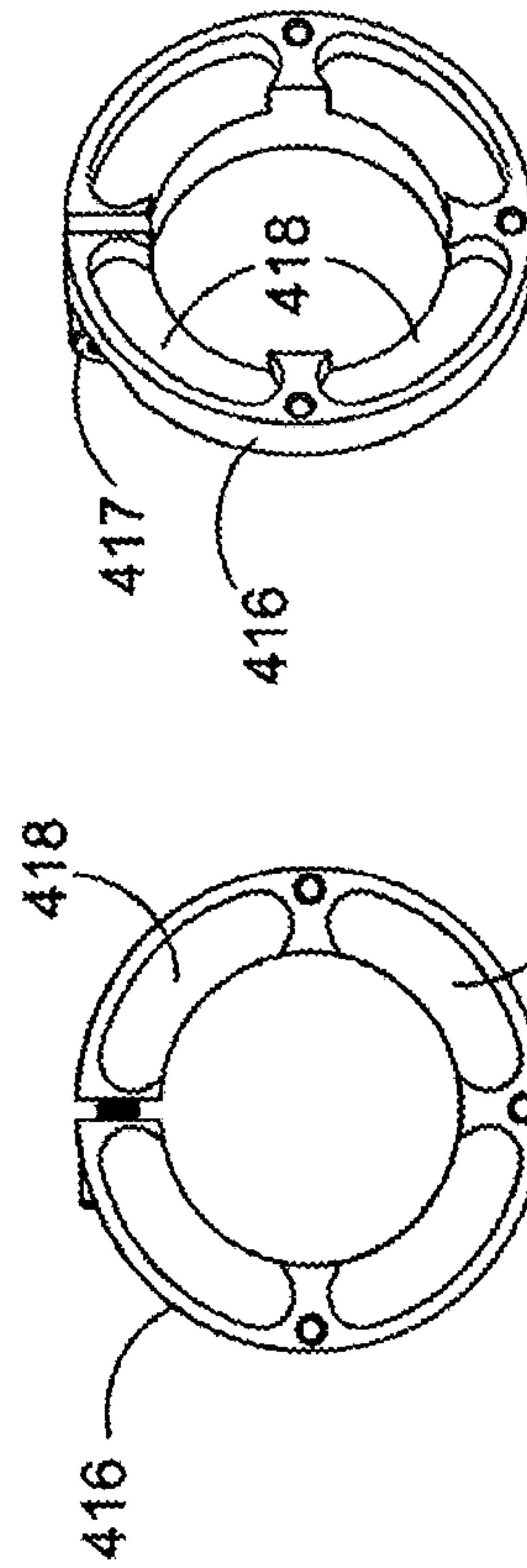


FIG. 47

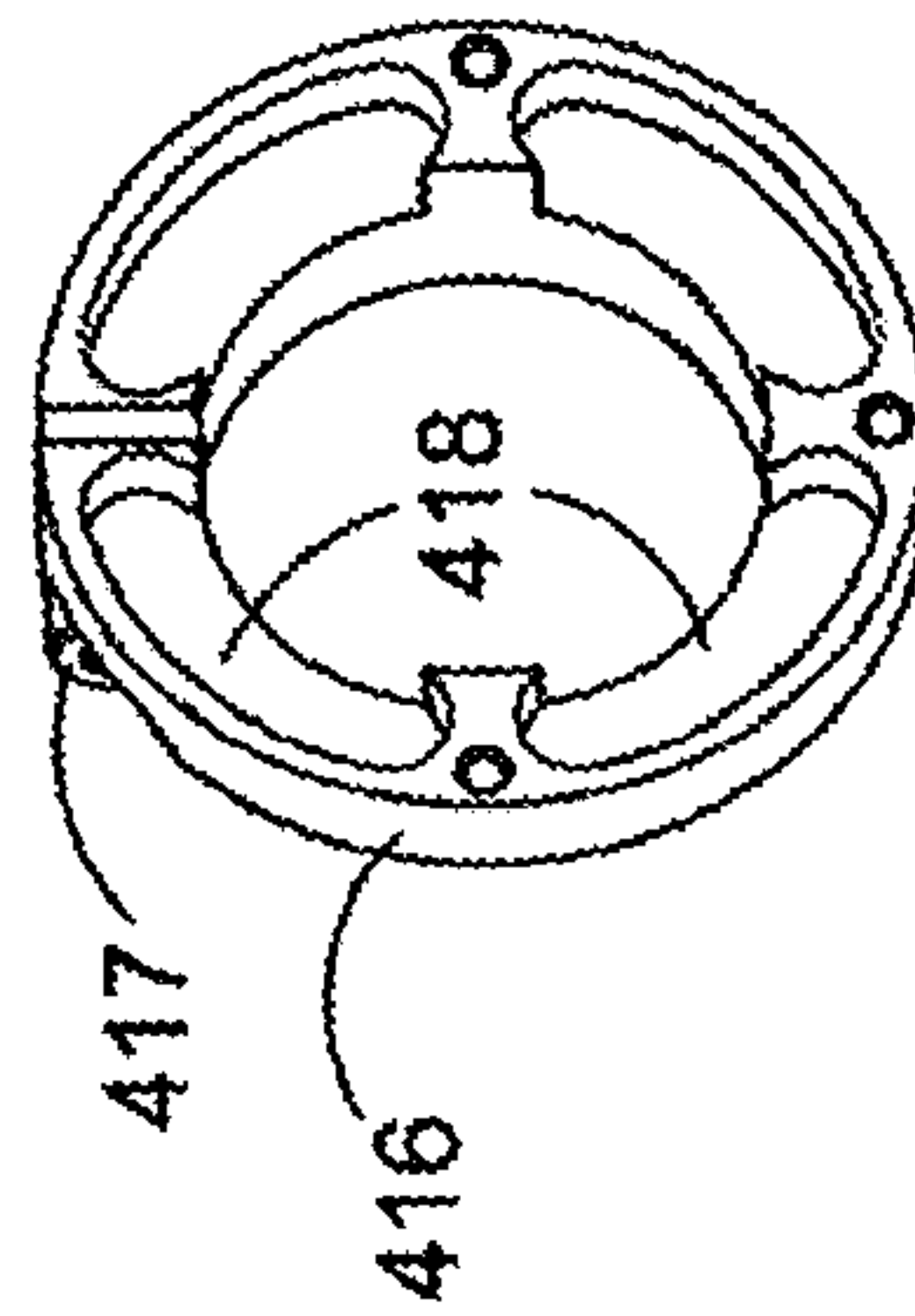


FIG. 48

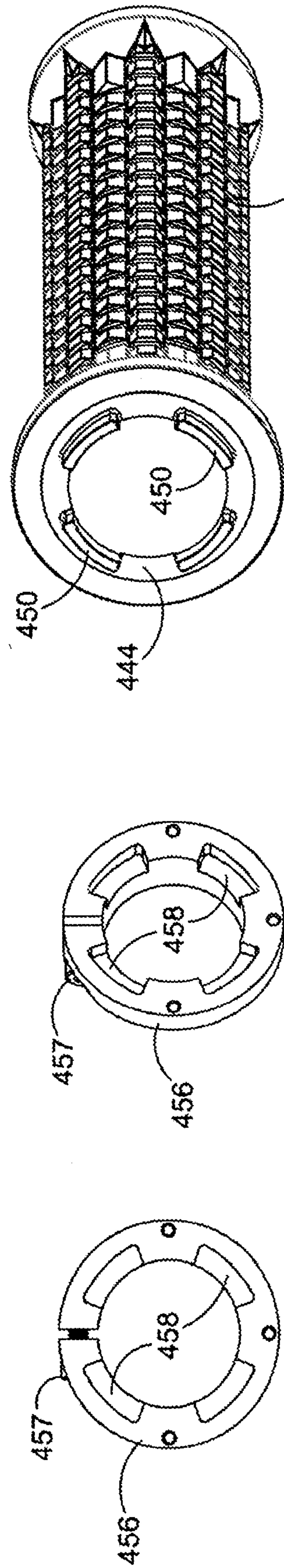


FIG. 49

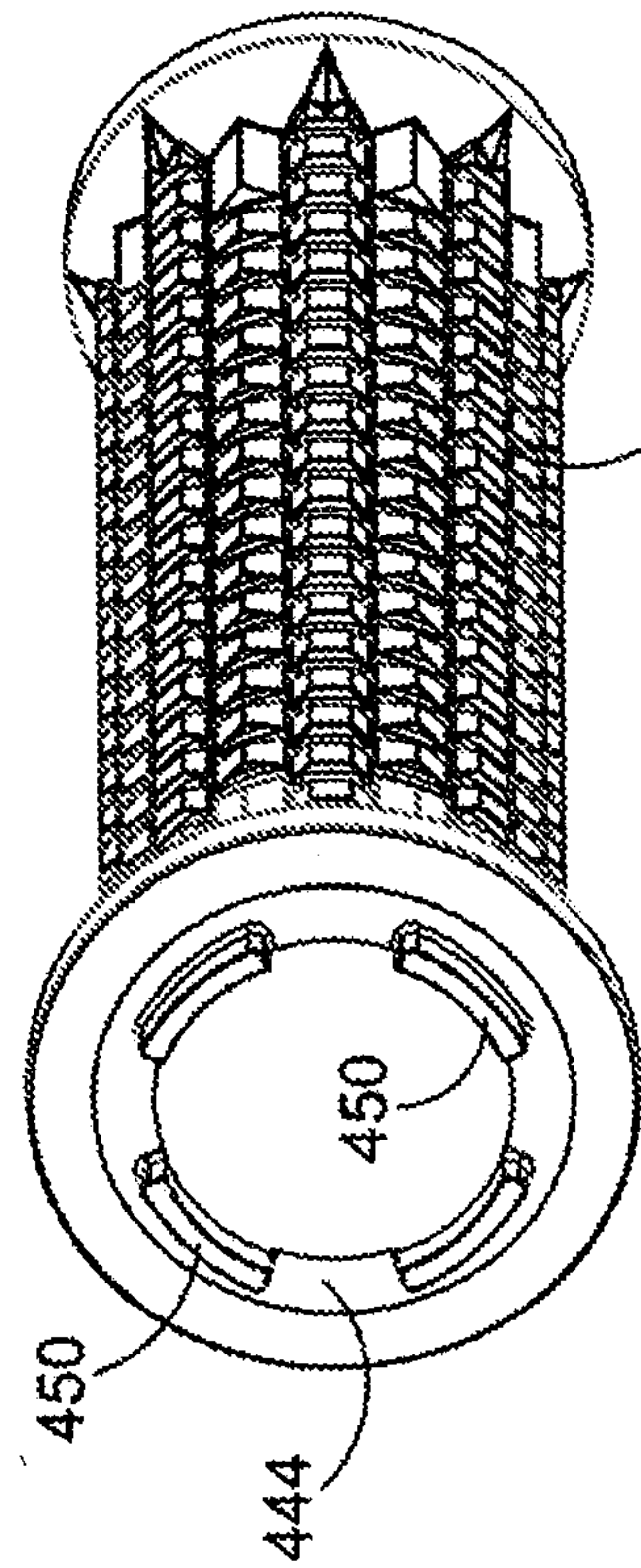


FIG. 50

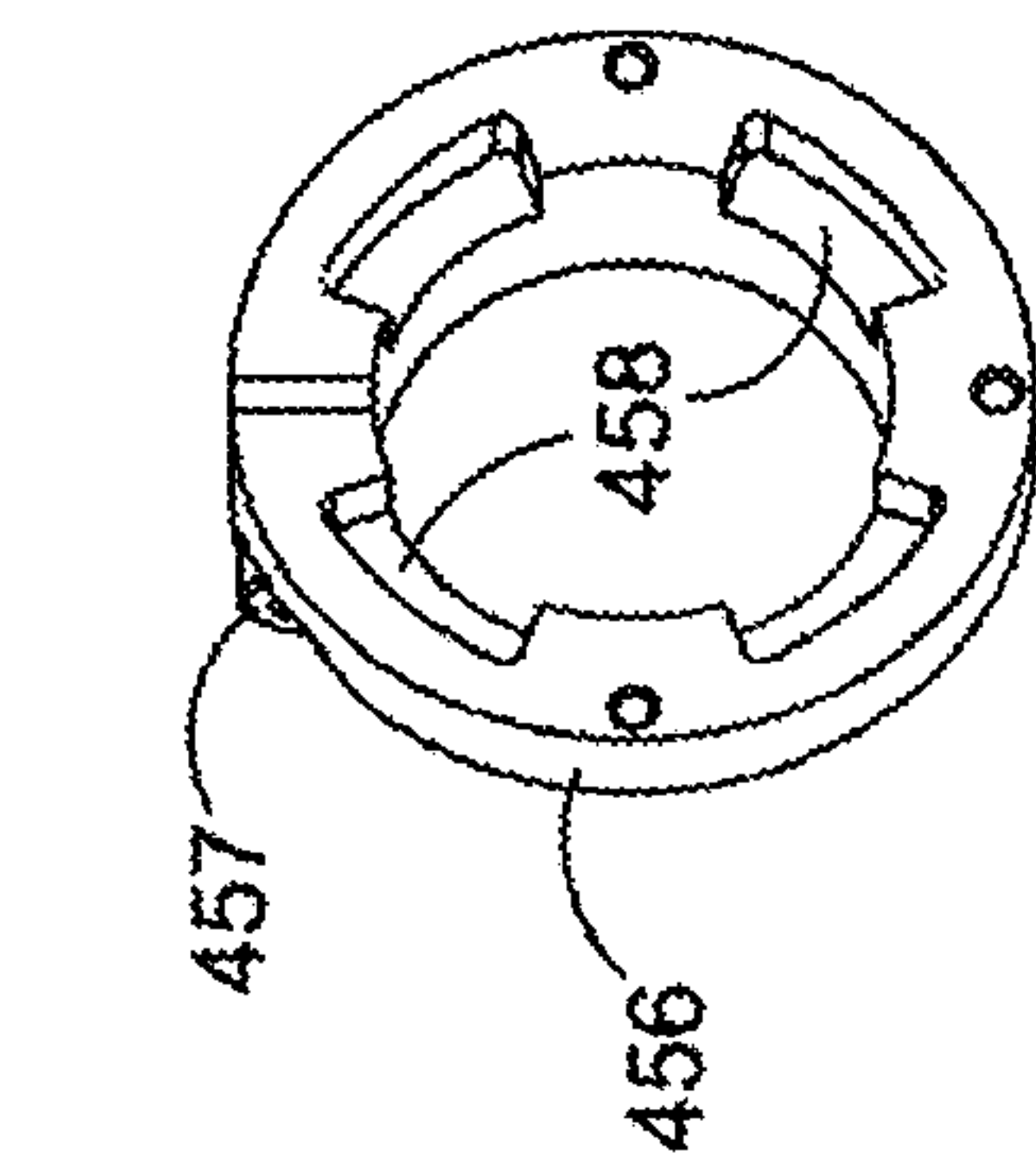


FIG. 51

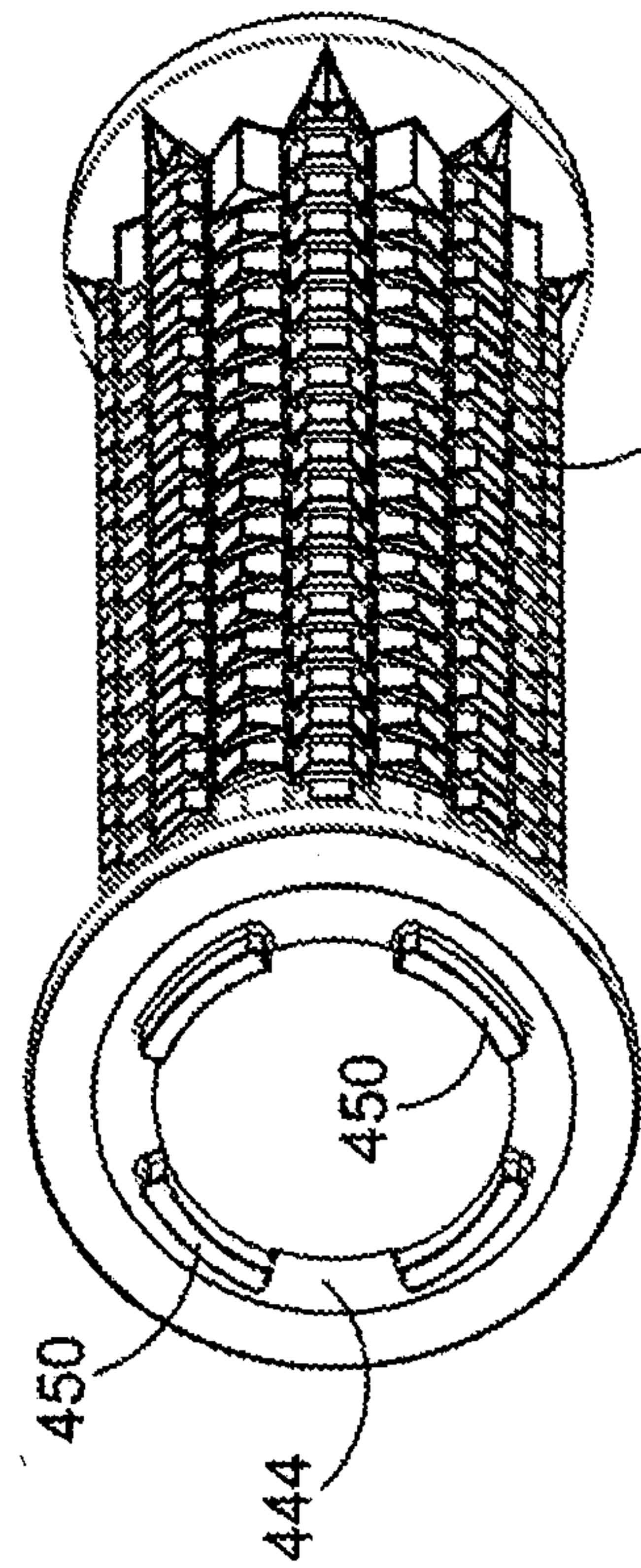


FIG. 52

