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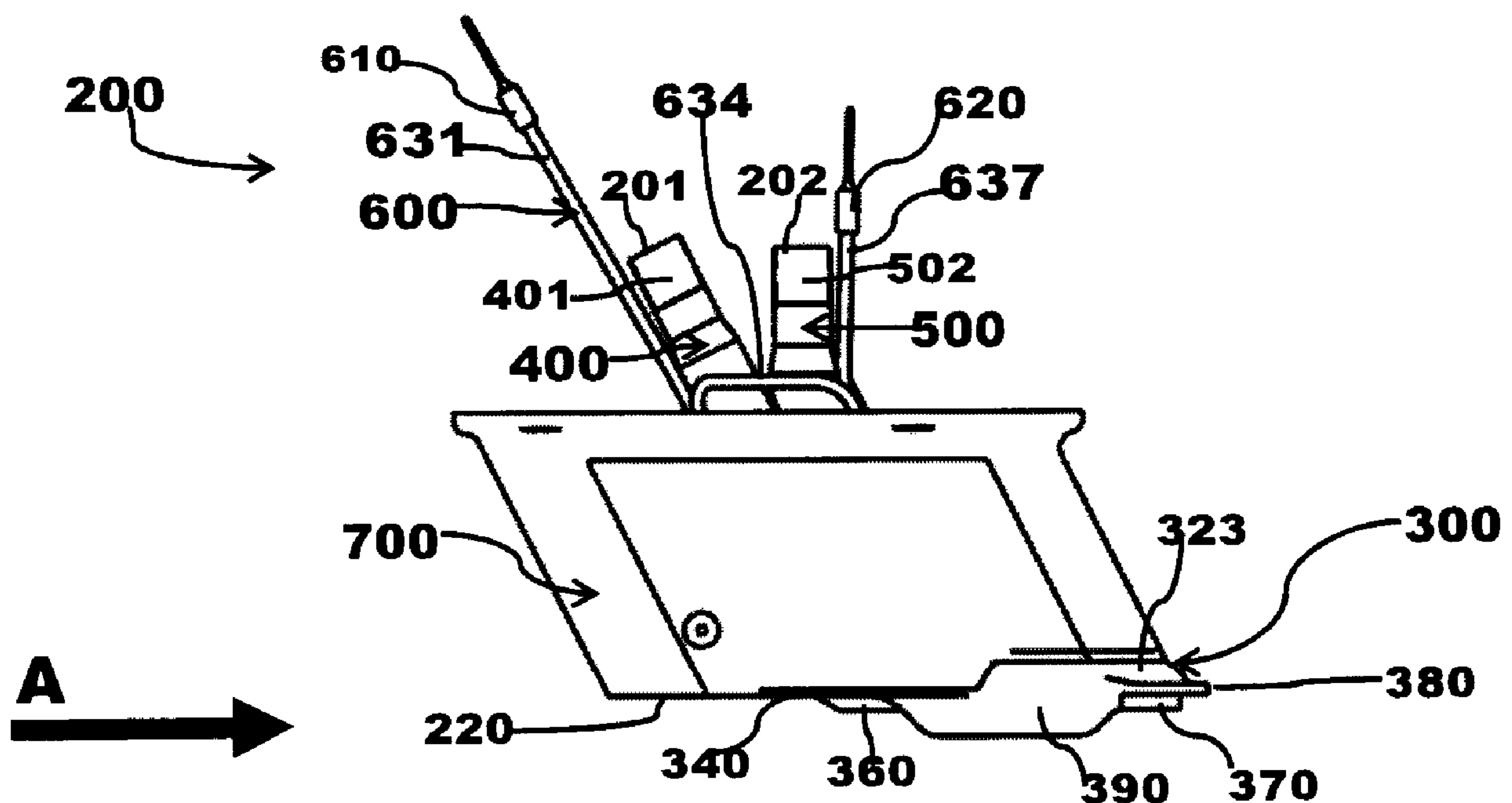
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(57) Abrégé/Abstract:

A drainmast (200) comprises an exit-defining foot (300), entrance-defining draitubes (400, 500), a heater (600), and a fairing (700). The heater (600) heats the draitubes (400, 500) to prevent water from freezing therein and heats the foot (300) to prevent ice from accumulating thereon. The foot (300) incorporates fluid-steering features to efficiently and effectively discharge drain water into the airstream.



ABSTRACT

5 A drainmast (200) comprises an exit-defining foot (300), entrance-defining draintubes (400, 500), a heater (600), and a fairing (700). The heater (600) heats the draintubes (400,500) to prevent water from freezing therein and heats the foot (300) to prevent ice from accumulating thereon. The foot (300) incorporates fluid-steering features to efficiently and effectively discharge drain water into the airstream.

DRAINMAST

BACKGROUND

5 A drainmast can be installed on an aircraft to discharge water
into the ensuing airstream. A drainmast can comprise a water-
discharging exit communicating with the airstream, a draintube
defining a water entrance into the drainmast, a heater for heating the
draintube (to prevent water from freezing therein) and a fairing
encircling internal regions of the draintube and the heater. If the
10 drainmast also includes an exit-defining foot, it must usually also be
heated to avoid ice from accumulating thereon.

SUMMARY

15 A drainmast design is provided with water-steering features that
effectively and efficiently discharge water into the airstream. If the
drainmast includes an exit-defining foot, some or all of these features
can be incorporated thereinto. The water-steering features allow a
drainmast and/or foot construction with smaller size, lighter weight,
lower heating-power requirements, and/or decreased drag.

20

DRAWINGS

Figure 1 shows an aircraft 100 with a drainmast 200 installed
thereon.

25 Figures 2A-2H show various views of the drainmast 200, and
Figures 2I-2W schematically show the drainmast's water-steering
features.

Figures 3A-3G show various views of a foot 300 of the drainmast
and Figures 3H-3K show various views of the foot with a pedestal
installed therein.

Figures 4A-4F show various views of a fore draitube 400 mounted on the foot.

Figures 5A-5F show various views of an aft draitube 500 mounted on the foot and Figures 5G-5L show various views of both
5 draitubes mounted to the foot.

Figures 6A-6F show various views of a heater 600 and Figure 6G-6I show various views of the heater assembled with the foot and the draitubes.

Figures 7A-7Q show various views of a fairing 700 and parts
10 thereof.

DESCRIPTION

Referring now to the drawings, and initially to Figure 1, an aircraft 100 is shown with a drainmast 200 installed thereon. The
15 drainmast 200 is designed to discharge liquid into airstream A traveling in a fore-to-aft direction. The liquid can comprise, for example, potable water and/or gray water from the aircraft's plumbing system.

As shown in Figures 2A-2G, the drainmast 200 has drain water
20 entrances 201-202 and drain water exits 211-212. When the drainmast 200 is installed on the aircraft 100, the entrances 201-202 are connected to its internal drain lines. For example, the fore entrance 201 can be connected to a potable water drain line and the aft entrance 202 can be connected to a gray water drain line. The exits
25 211-212 are located on an underside 220 of the drainmast 200 and they communicate with the airstream A.

The illustrated drainmast 200 comprises a foot 300, a draitube 400, another draitube 500, a heater 600, and a fairing 700. The foot 300 defines the exits 211-212 and the draitubes 400 and 500 define

the entrances 201-202. The heater 600 heats the draitubes 400 and 500 to prevent water from freezing therein, and also heats the foot 300 to prevent ice from accumulating thereon. The fairing encircles internal regions of the draitube 400, the draitube 500, and the heater 600.

Fluid-steering features are provided on the drainmast underside 220 to efficiently and effectively introduce exiting drain water into the airstream A. While the illustrated drainmast 200 includes two exits 211 and 212, this need not be the case. The fluid-steering and other features of the drainmast 200 can be used in the same or similar manner with single-exit and/or more-exits drainmast designs.

As shown schematically in Figures 2I-2W, the fluid-steering features can include a post-exit platform 250, a water-spraying step 260, a water-kicking barrier 270, and a water-escorting plank 280. The platform 250 is situated aft of the exit area and vertically offset upward therefrom by the water-spraying step 260. The water-kicking barrier 270 extends downward from the platform's aft end and the water-escorting plank 280 is cantilevered therefrom. Side rails 290 may extend downward from the lateral edges of the platform 250.

Referring first to Figures 2I-2L (wherein only one exit 212 is shown), drain water leaving the exit 212 is positioned downward of the platform 250. Assuming the airstream A has a vector substantially parallel with the platform level, the drain water is swept in a path below the platform 250 beyond the drainmast, as it passes over or off of the fore and aft corners of step 260. (Figure 2I.)

Should some water creep upwards and engage the platform 250, it quickly contacts the step 260. The step-contacting water will migrate to the step's aft corner and will be carried off by the airstream A. (Figure 2J.)

If some platform-engaging water is not removed, this residual water is funneled downstream on the platform 250 and hits the barrier 270. The barrier 270 kicks the water outward from the platform 250 so that it can be swept away by the airstream A. (Figure 2K.) While the barrier 270 can have a straight step-like construction, providing it with a V-shaped (with a pointed apex at its aft end) will also funnel water as it migrates aft so as to concentrate it centrally for efficient discharge at a single location.

And if any water climbs over the barrier 270, it encounters the plank 280. The plank 280 projects beyond the rest of the drainmast 200 and it has shape that aerodynamically encourages the airstream A to flow substantially evenly therearound. Thus, any water encountering the plank 280 is immediately escorted aft by the airstream traveling therearound. (Figure 2L.)

As shown in Figures 2M-2P, the same series of fluid-steering events will occur with two exits 211 and 212.

The drainmast 200 can incorporate each of the above-discussed fluid-steering features as they tend to complement each other in progression. However, depending upon the drainmast design, less than all of these features can be employed. For example, as shown in Figures 2Q-2T, the step 260, the barrier 270, and the plank 280 can be used individually. And as shown in Figures 2U-2W, the step 260 can be used with the barrier 270 without the plank 280 (Figure 2U), the step 260 can be used with the plank 280 without the barrier 270 (Figure 2V), and/or the barrier 270 can be used with plank 280 without the step 260 (Figure 2W).

Referring now to Figures 3A-3G, as was indicated above, the foot 300 defines the drainmast exits 211-212. In the illustrated embodiment, the foot 300 includes passages 311-312, the lower ends

of which delineate the exits 211-212. And as is explained in more detail below, the foot 300 also incorporates the fluid-steering features 250, 260, 270, and 280 of the drainmast 200 (in the form of a deck 350, a pulpit 360, a bannister 370, and a lip 380, introduced below).

5 The foot 300 can comprise a ceiling 320 through which the passages 311 and 321 transverse. The topside of the ceiling 320 can host components adapted for fairing-connecting, heating, tube-holding and/or other purposes. For example, a fairing-connection tab 321 can be attached to the ceiling's fore edge, a heat-transfer island 322 can
10 stand on an aft region, and a curved crest 323 can extend along its upper stern. Other components (such as the tube-holding pedestal 330 introduced below) can be connected or otherwise integrated into the foot ceiling 320.

 The underside of the ceiling 320 forms a prelude deck 340 fore
15 of the exits 211-212 and a finale deck 350 aft of the exits 211-212. A pulpit 360 is situated between the decks 340 and 350 and extends downward from ceiling 320. The passages 311 and 321 extend transversely through the pulpit 360 whereby the exits 211 and 212 are located on the pulpit's bottom face 361. At the fore end of the pulpit
20 360, a ramp 362 forms a gradual transition between its bottom face 361 and the prelude deck 340. At the aft end of the pulpit 360, a wall 363 forms a sharp stepped transition between its bottom face 361 and the finale deck 350. If, for example, the pulpit's bottom face 361 is parallel with the decks 340 and 350, the wall 363 can extend
25 perpendicularly therebetween

 A bannister 370 extends downward along an aft edge of the deck 350 and it can have a height approximately the same as that of the pulpit 360. The bannister 370 can span across the deck's aft edge in

straight path, but a more funnel-like form may enhance the efficiency of this fluid-steering feature.

In the illustrated embodiment, for example, the bannister 370 includes side sections 371 which angle inward and meet at an aft apex section 372 making a V-shape. This and other funnel-like forms will focus water towards the deck center to prevent lateral migration away from the deck 350. And small water drips along the deck 350 will be collected and concentrated towards the apex section 372, for efficient shedding from the foot 300.

A converging lip 380 cantilevers outward from the aft edges of the finale deck 350 and thus extends beyond the crest 323 and the bannister 370. As is best seen by referring briefly back to Figures 2A-2B, the lip 380 also extends aft beyond the fairing 700. The lip 380 has shape causing the airstream A to flow substantially evenly therearound. For example, the lip 380 can have a duckbill shape with smooth upper and lower surfaces that taper towards each other and smooth lateral edges that converge towards each other in the fore-aft direction.

Rails 390 can extend downward from lateral edges of the ceiling 320 to form side fences around the post-exit deck 350. The rails 390 can also surround some or all of the prelude deck 340 and/or the pulpit 360. The rails' height can be slightly taller than that of the pulpit 360 and/or the bannister 370.

As was alluded to above, the illustrated foot 300 incorporates the fluid-steering features 250, 260, 270, and 280 of the drainmast 200. Specifically, the deck 350 creates the post-exit platform 250, the pulpit 360 causes the exit-platform vertical offset, the pulpit's rear wall 363 forms the spray-producing step 260, the bannister 370 builds the water-kicking barrier 270, and the lip 380 produces the water-

escorting plank 290. The rails 390 can function as the optional rails 290 of the drainmast 200.

5 The foot 300 can be made any suitable metal (*e.g.*, aluminum, stainless steel, titanium, alloys thereof), although copper and copper alloys may be preferred because of their heat-conducting and/or wear-enduring characteristics. The foot 300 can be formed in one piece by an appropriate manufacturing technique (*e.g.*, casting and machining). That being said, non-metal foot materials (*e.g.*, fiber-reinforced plastic) and/or plural-piece foot constructions are possible and
10 contemplated.

The incorporation of efficient and effective fluid-steering features into the drainmast 200 allows a foot construction with smaller size, lighter weight, lower heating-power requirements, and/or decreased drag. For example, as is best seen by referring briefly back to Figure
15 2A-2C and 2H, the foot 300 does not span the entire length (*i.e.*, fore-to-aft dimension) of the drainmast 200, but instead only occupies non-fore regions.

The fore region of the drainmast underside 220 is formed by the fairing 700 (and particularly a bottom nose panel 731 introduced
20 below). In the mid region of the drainmast 200, only the very thin side edges of the prelude deck 340 and the walls of the pulpit 360 are laterally exposed. In the aft region of the drainmast, exterior surfaces of the crest 232 and bannister 370 are unsheltered by the fairing 700. The lip 380 also extends beyond the fairing 700, as this may be
25 necessary to its water-escorting purpose.

Side rails 290/390 may still be necessary in many drainmast designs to prevent heavy discharge plumes from wrapping around the foot 300 and contacting the fairing 700. However, the rails 290/390

may be made shorter in length (*i.e.*, fore-aft dimension) and/or shorter in height (*i.e.*, the up-down dimension).

Referring now to Figures 3H – 3K, a pedestal 330 can be attached to the foot 300. The pedestal 330 can comprise a stand 331 and a heat-transfer block 332 attached to the stand 331. In the illustrated pedestal 330, the stand 331 is mounted on the foot's ceiling 320 just fore of the passage 321 and extends upward therefrom at a tilt in the fore direction. The stand's fore side 333 can be flat and the heat-transfer block 332 can be appended thereto. The aft side 334 of the stand 300 can be curved to cradle the draitube 400.

The pedestal 330 can be made of the same or different material as the foot 300, but preferably has strong heat-conducting characteristics. The stand 331 can be attached to the foot 300 by welding, brazing, or other suitable attachment technique. A pedestal 330 formed in one piece with the foot 300 (or a part of a multi-piece foot) is further feasible and foreseeable.

As shown in Figures 4A-4F, the draitube 400 has an inlet adapter 401 at its top end which defines the the drainmast's entrance 201. The draitube's outlet 411 extends through the fore passage 311 in the foot 300 and communicates with the drainmast exit 211. The draitube 400 can lean tightly against the pedestal 330, as the stand's aft side 334 conforms to its curved contour.

As shown in Figures 5A-5F, the draitube 500 has an inlet adapter 502 at its top end which defines the drainmast entrance 202. The outlet 512 of the draitube 500 extends through the fore foot passage 312 whereby it communicates with the drainmast exit 212. A posing bracket 530, with a circular aperture 531, can be attached to the draitube 500 and project outwardly therefrom in the aft direction.

As shown in Figures 5G-5L, when both the draitube 400 and the draitube 500 are mounted on the foot 300, the drainmast entrance 201 communicates with the drainmast exit 211 and the drainmast entrance 202 communicates with the drainmast exit 212.

5 The inlet adapter 401 of the fore draitube 400 is attached to an aircraft drain line (e.g., a potable water drain line) and the inlet adapter 502 of the aft draitube 500 is attached to another aircraft drain line (e.g., a gray water drain line). And as is best seen by referring briefly back to Figures 2A-2B, the adaptors 401 and 502
10 project above the fairing 700 so that they may extend into the aircraft fuselage for connection to the appropriate drain lines.

The draitubes 400 and 500 can be made of the same or different materials. But again, certain metals (e.g., aluminum, stainless steel, copper, titanium, alloys thereof) may be preferred
15 because of their heat-conducting and/or wear-enduring attributes. They can be fixed to the foot 300 by welding, brazing, or any other appropriate affixing procedure. Draitubes 400/500 formed individually in one piece, in one piece with each other, in one piece with the pedestal 330, in one piece with the bracket 530, and/or in
20 one piece with the foot 300 are achievable and acceptable.

The bracket 530 can be made of any suitable material and joined to the draitube 500 in any suitable manner. However, because the bracket 530 is primarily a posing part, high heat-conducting characteristics may not be necessary and could even be undesirable.
25 Instead, a material encouraging heat to remain with the draitube 500 may be more advantageous.

As shown in Figures 6A-6F, the heater 600 comprises a supply connector 610, a return connector 620, and a conduit 630 extending therebetween. The conduit 630 contains a resistance-type heating

element which is often best known under the General Electric tradename Calrod™. While other types of heaters may be used, a conduit-type heater can include continuous sections which are bent, wrapped, coiled, or otherwise shaped to closely conform with the to-be-heated components. The illustrated conduit 630 includes, for example, sections 631-637.

As is shown in Figures 6G-6I, section 631 extends down from the supply connector 610 to the pedestal 330. Section 632 wraps around the heat-transfer block 332 of the pedestal 330. Section 633 extends upward from the pedestal 330 along the fore draitube 400. Section 634 bridges across the draitubes 400 and 500. Section 635 extends downward along the aft draitube 500 to the foot 300 along one side of the posing bracket 530. Section 636 coils around the island 332 in the foot 300. And section 637 extends up from the foot 300 to the return connector 620 along the other side of the posing bracket 530.

The connectors 610 and 620 are electrically connected to a power source onboard the aircraft 100 to thereby form an electrical path through the heating element in the conduit 630. As is best seen by referring briefly back to Figures 2A-2B, the connectors 610 and 620, and the sections 631 and 637, project above the fairing 700 so that they may extend into the aircraft fuselage for connection to onboard electrical lines.

As was indicated above, the fluid-steering features of the drainmast 200 allows for reduced heating-power requirements. As such, a separate heater for the foot 300 is not necessary. The pedestal's block 332 (which heater section 632 is wrapped around) and the foot's island 322 (which heater section 636 is coiled around) serve as heat sinks and sufficiently transfer heat to the otherwise ice-prone areas of the foot 300.

It may be further noted that, except for the tube-bridging section 634, heater sections do not reside on lateral surfaces of the draitubes 400 and 500. Specifically, for example, the section 631 and section 633 extend along the fore surface of the draitube 400 and section 635 and 637 extend along the aft surface of the draitube 500. And is best seen by referring briefly back to Figures 2A-2B, the tube-bridging section 634 is situated above the fairing 700. As such, the heater 600 does not widen the fairing-encircled span of the drainmast 200. This contributes to a thinner profile, resulting in lower weight and decreased drag.

Referring now to Figures 7A-7Q, the fairing 700 comprises a mounting flange 710 and a mast 720. The flange 710 can include openings 711 for fastener receipt when mounting the fairing 700 to the aircraft 100. A central slot 712 can be provided in the flange 710 for the draitube adapters 401/502 and the heater connectors 610/620 to extend therethrough.

The mast 720 extends downward from the flange 710 and forms a hollow 721 encircling the rest of the draitubes 400/500 and the heater 600. Posing components can be strategically situated within the hollow 721 for properly positioning of the foot 300, the draitubes 400/500, and the heater 600 relative to each other and/or the fairing 700. Specifically, for example, a slot 722 and/or a knob 723 can be posed within the fairing hollow 721.

The fore region of the mast 720 forms its nose 730 and a rear region forms its tail 740. A bottom panel 731 spans the nose 730 to form a fore region of the drainmast underside 220. And as is best seen by referring briefly back to Figures 2D and 2H, the remainder of the drainmast underside 220 is formed by the foot 300.

The tail 740 includes a foot-accommodating profile, with cutouts 741, an awning 742, and a thin groove 743. The cutouts 741 fit over the foot's crest 323 and the awnings 742 canopy over the crest 323. The groove 743 receives fore and mid regions of the floor 320.

5 The illustrated mast 720 comprises a main body 750 and a door 760. The main body 750 has a window 751 which is situated on either its port or starboard side and which looks into the hollow 721. In the illustrated fairing 700, the window 751 has an open edge extending along the bottom of the body 750. The door 760 closes the window
10 751 and sits flush with the main body 750. Fasteners 770, received in apertures 771, are used to secure the door 760 to the main body 750.

 On the windowless side of the mast 720, the main body 750 forms the cutout 741, the awning 742, and the groove 743. On the windowed side of the mast 720, the cutout 741 and the awning 742
15 are formed together by main body 750 and the door 760, and the door 760 forms the groove 743.

 The door 760 can also include posing components on its inner surface. For example, the illustrated stub 761 works with the slot 722 to properly position the tab 321 of the foot 300 relative to the fairing
20 700. And the illustrated knob 762 coordinates with the knob 723 on the main body 750 to sandwich the draintube bracket 530 therebetween.

 The fairing 700, the main body 750, and/or or the door 760, are constructed from a fitting medium, such one containing plastic, metal,
25 and/or fiberglass. For example, they can be made from a fiber reinforced plastic by compression molding, resin transfer molding, and/or filament winding. Preferably, the main body 750 and the door 760 are each made in one piece.

With a one-piece fairing, there is no seam line between parts and thus no inherent weakness tempting mechanical failure. However, it is difficult to inspect interior components of the drainmast assembly after they are inserted into the hollow of a one-piece fairing. A two-
5 piece fairing provides the advantage of after-insertion inspection, but this has traditionally come at the price of a seam line on the mounting flange. The doored design of the fairing 700 allows inspection of the interior components during assembly, without the compromising of a one-piece fairing 710.

10 One may now appreciate that a drainmast design is provided with water-steering features that effectively and efficiently discharge water into the airstream. While the aircraft 100, the drainmast 200, the foot 300, the draintube 400, the draintube 500, the heater 600, and/or the fairing 700 have been shown and described with respect to
15 a certain embodiment or embodiments, other equivalent alterations and modifications will occur to others skilled in the art upon the reading and understanding of this disclosure.

REFERENCE NUMBERS

100	=	aircraft	500	=	aft draintube
200	=	drainmast	502	=	inlet adapter
201	=	fore entrance	512	=	outlet
202	=	aft entrance	530	=	posing bracket
211	=	fore exit	531	=	bracket aperture
212	=	aft exit	600	=	heater
220	=	underside	610	=	heater supply connector
250	=	post-exit platform	620	=	heater return connector
260	=	water-spraying step	630	=	heating-element conduit
270	=	water-kicking barrier	631	=	from-supply section
280	=	water-escorting plank	632	=	block-wrapping section
290	=	water-guiding rails	633	=	up-to-bridge section
300	=	foot	634	=	tube-bridging section
311	=	fore passage	635	=	down-to-foot section
312	=	aft passage	636	=	island-coiling section
320	=	ceiling	637	=	to-return section
321	=	fairing-connection tab	700	=	fairing
322	=	heat-sink island	710	=	mounting flange
323	=	stern crest	711	=	fastener openings
330	=	pedestal	712	=	central slot
331	=	pedestal stand	720	=	mast
332	=	pedestal heat-sink block	721	=	fairing hollow
333	=	stand fore side	722	=	foot-tab-situating slot
334	=	stands aft side	723	=	bracket-sandwiching knob
340	=	prelude deck	730	=	nose
350	=	finale deck	731	=	bottom nose panel
360	=	pulpit	740	=	tail
361	=	pulpit bottom face	741	=	foot-crest cutouts
362	=	pulpit ramp	742	=	foot-crest awning
363	=	pulpit aft wall	743	=	foot-floor groove
370	=	bannister	750	=	main body
371	=	bannister side sections	751	=	window
372	=	bannister apex section	760	=	door
380	=	side rails	761	=	foot-tab-situating stub
390	=	cantilevering lip	762	=	bracket-sandwiching knob
400	=	fore draintube	771	=	fairing fasteners
401	=	inlet adapter	772	=	fastener apertures
411	=	outlet			

CLAIMS

1. A drainmast which releases water into an airstream traveling in a fore-aft direction, comprising:

5 a water-discharging exit on its underside for communicating with the airstream, and

a post-exit platform on its underside situated aft of the exit;

wherein the exit is vertically offset downward from the post-exit platform.

10 2. A drainmast as set forth in claim 1, comprising a water-spraying wall situated between the exit and the post-exit platform.

15 3. A drainmast as set forth in either claim 1 or claim 2, comprising a water-kicking barrier extending downward from an aft end of the post-exit platform.

20 4. A drainmast as set forth in any of claims 1-3, comprising a water-escorting plank cantilevered from an aft end of the post-exit platform.

25 5. A drainmast as set forth in any of claims 1-4, further comprising rails extending downward from lateral edges of the post-exit platform.

6. A drainmast which releases water into an airstream traveling in a fore-aft direction, comprising:
a water-discharging exit on its underside for communicating with the airstream,

a post-exit platform on its underside situated aft of the exit; and
a water-spraying wall situated between the exit and the post-exit platform.

5 7. A drainmast as set forth in claim 6, comprising a water-kicking barrier extending downward from an aft end of the post-exit platform.

10 8. A drainmast as set forth in either claim 6 or claim 7, comprising a water-escorting plank cantilevered from an aft end of the post-exit platform.

15 9. A drainmast as set forth in any of claims 6-8, further comprising rails extending downward from lateral edges of the post-exit platform.

 10. A drainmast which releases water into an airstream traveling in a fore-aft direction, comprising:
 a water-discharging exit on its underside for communicating with
20 the airstream,
 a post-exit platform on its underside situated aft of the exit; and
 a water-kicking barrier extending downward from an aft end of the post-exit platform.

25 11. A drainmast as set forth in claim 10, comprising a water-escorting plank cantilevered from an aft end of the post-exit platform.

12. A drainmast as set forth in either claim 10 or claim 11, further comprising rails extending downward from lateral edges of the post-exit platform.

5 13. A drainmast which releases water into an airstream traveling in a fore-aft direction, comprising:
a water-discharging exit on its underside for communicating with the airstream,
a post-exit platform on its underside situated aft of the exit; and
10 a water-escorting plank cantilevered from an aft end of the post-exit platform.

14. A drainmast as set forth in claim 13, further comprising rails extending downward from lateral edges of the post-exit platform.

15 15. A drainmast as set forth in any of claims 1-14, comprising two water-discharging exits and wherein the post-exit platform is situated aft of both exits.

20 16. A drainmast as set forth in claim 15, wherein one exit is a fore exit and the other exit is an aft exit located aft of the fore exit.

17. A drainmast as set forth in any of claims 1-16, wherein the underside is formed at least partially by a foot.

25 18. A drainmast as set forth in claim 17, wherein the underside is formed only partially by the foot.

19. A drainmast as set forth in either claim 17 or claim 18, wherein the foot defines each water-discharging exit and the platform.

5 20. A drainmast as set forth in claim 19, wherein the foot comprises a passage defining each water-discharging exit.

10 21. A drainmast as set forth in any of claims 17-20, wherein the foot comprises a pulpit and wherein each water-discharging exit is situated on the pulpit's bottom face.

22. A drainmast as set forth in any of claims 17-21, wherein the foot is formed in one piece.

15 23. A drainmast as set forth in any of claims 17-22, wherein the foot vertically offsets the post-exit platform upward from the exit(s).

20 24. A drainmast as set forth in any of claims 17-23, wherein the foot forms a/the water-spraying wall situated between the exit and the post-exit platform.

25 25. A drainmast as set forth in any of claims 17-24, wherein the foot forms a/the water-kicking barrier extending downward from the aft end of the post-exit platform.

26. A drainmast as set forth in any of claims 17-25, wherein the foot forms a/the water-escorting plank cantilevered from the aft end of the post-exit platform.

27. A drainmast as set forth in any of claims 1-26, comprising a draitube including an inlet adapter defining an entrance and an outlet communicating with the water-discharging exit.

5 28. A drainmast as set forth in claim 27, comprising two draitubes, each including an inlet adapter defining an entrance and an outlet communicating with respective water-discharging exits

10 29. A drainmast as set forth in claim 28, wherein one draitube is situated fore of the other draitube.

30. A drainmast as set forth in any of claims 1-29, comprising a heater which heats ice-susceptible regions of the underside.

15 31. A drainmast as set forth in claim 30, wherein the heater also heats a/the draitube.

20 32. A drainmast as set forth in claim 31, wherein the heater also heats a/the pair of draitubes.

33. A drainmast as set forth in any of claims 30-32, wherein the heater heats a heat sink which transfers heat to an aft region of the underside.

25 34. A drainmast as set forth in any of claims 30-33, wherein the heater heats a heat sink which transfers heat to a mid region of the underside.

35. A drainmast as set forth in any of claims 30-34, wherein the heater comprises a supply connector, a return connector, and a conduit forming an electrical path between the connectors.

5 36. A drainmast as set forth in any of claims 30-35, wherein the conduit includes tube-heating sections which do not widen the drainmast span.

10 37. A drainmast as set forth in either of claim 35 or claim 36, wherein the conduit includes at least one sink-heating section that wraps around a heat sink.

15 38. A drainmast as set forth in any of claims 35-37, wherein the conduit includes a tube-bridging section that is elevated relative to other sections.

 39. A drainmast as set forth in any of claims 1-38, comprising a fairing.

20 40. A drainmast as set forth in claim 39, wherein the fairing comprises a mounting flange, mast projecting downward from the mounting flange, and a hollow within the mast for housing interior drainmast components.

25 41. A drainmast as set forth in claim 40, wherein the mounting flange is a seamless mounting flange.

 42. A drainmast as set forth in claim 41, wherein the fairing has a two-piece construction.

43. A drainmast as set forth in any of claims 39-42, wherein the fairing comprises a main body including a window and a door fastened to the main body to close the window.

5

44. A drainmast as set forth in claim 43, wherein the window looks into the hollow.

10

45. A drainmast as set forth any of claims 39-44, wherein the fairing comprises a bottom panel forming a fore region of the underside.

15

46. An aircraft comprising the drainmast set forth in any of claims 1-45, mounted to its fuselage, wherein an aircraft water line communicates with the drainmast's water-discharging exit.

47. An aircraft as set forth in claim 46, wherein a potable water line communicates with the drainmast's water-discharging exit.

20

48. An aircraft as set forth in either claim 46 or claim 47, wherein a gray water line communicates with the drainmast's water-discharging exit.

25

49. An aircraft as set forth in any of claims 46-48, wherein electrical connectors of a/the heater of the drainmast are electrically connected to an onboard power supply.

50. An aircraft as set forth in any of claims 46-49, wherein a/the fairing mounting flange of the drainmast is mounted to the fuselage.

5 51. A foot for drainmast which releases water into an airstream traveling in a fore-aft direction, said foot comprising:
a passage which defines a water-discharging exit on its underside for communicating with the airstream, and
a deck on its underside forming a post-exit platform situated aft
10 of the exit;
wherein the deck is vertically offset upward from the exit.

52. A foot as set forth in claim 51, comprising a pulpit through which the passages traverse and wherein the exits are located the
15 pulpit's bottom face.

53. A foot as set forth in claim 52, wherein the pulpit's bottom face is parallel with the deck.

20 54. A foot as set forth in any of claims 51-53, wherein a/the pulpit has an aft wall forming a water-spraying wall situated between the exit and the deck.

25 55. A foot as set forth in claim 54, wherein the aft wall extends perpendicularly between the deck and a/the bottom face of the pulpit.

56. A foot as set forth in any of claims 51-55, comprising a banister extending downward from an aft end of the deck to form a water-kicking barrier.

5 57. A foot as set forth in claim 56, wherein the bannister includes side sections which funnel towards each other.

58. A foot as set forth in claim 57, wherein the bannister side sections meet at an apex.

10

59. A foot as set forth in any of claims 51-58, comprising a lip cantilevered from an aft end of the deck to form a water-escorting plank.

15 60. A foot as set forth in claim 59, wherein the lip has a duckbill shape causing the airstream to flow substantially evenly therearound.

20 61. A foot as set forth in any of claims 51-60, further comprising rails extending downward from lateral edges of the deck.

62. A foot for a drainmast which releases water into an airstream traveling in a fore-aft direction, said foot comprising:

25 a passage which defines a water-discharging exit on its underside for communicating with the airstream,

a deck on its underside forming a post-exit platform situated aft of the exit, and

a pulpit having an aft wall forming a water-spraying wall situated between the exit and the deck.

63. A foot as set forth in claim 62, wherein the aft wall extends perpendicularly between the deck and the bottom face of the pulpit.

5 64. A foot as set forth in either claim 62 or claim 63, comprising a banister extending downward from an aft end of the deck to form a water-kicking barrier.

10 65. A foot as set forth in claim 64, wherein the bannister includes side sections which funnel towards each other.

66. A foot as set forth in claim 65, wherein the bannister side sections meet at an apex.

15 67. A foot as set forth in any of claims 62-66, comprising a lip cantilevered from an aft end of the deck to form a water-escorting plank.

20 68. A foot as set forth in claim 67, wherein the lip has a duckbill shape causing the airstream to flow substantially evenly therearound.

25 69. A foot as set forth in any of claims 62-68, further comprising rails extending downward from lateral edges of the deck.

70. A foot for a drainmast which releases water into an airstream traveling in a fore-aft direction, said foot comprising:
a passage which defines a water-discharging exit on its underside for communicating with the airstream,

a deck on its underside forming a post-exit platform situated aft of the exit, and

a banister extending downward from an aft end of the deck to form a water-kicking barrier.

5

71. A foot as set forth in claim 70, wherein the bannister includes side sections which funnel towards each other.

10

72. A foot as set forth in claim 71, wherein the bannister side sections meet at an apex.

15

73. A foot as set forth in any of claims 70-72, comprising a lip cantilevered from an aft end of the deck to form a water-escorting plank.

74. A foot as set forth in claim 73, wherein the lip has a duckbill shape causing the airstream to flow substantially evenly therearound.

20

75. A foot as set forth in any of claims 70-74, further comprising rails extending downward from lateral edges of the deck.

25

76. A foot for a drainmast which releases water into an airstream traveling in a fore-aft direction, said foot comprising:

a passage which defines a water-discharging exit on its underside for communicating with the airstream, and

a deck on its underside forming a post-exit platform situated aft of the exit,

a lip cantilevered from an aft end of the deck to form a water-escorting plank.

5 77. A foot as set forth in claim 76, wherein the lip has a duckbill shape causing the airstream to flow substantially evenly therearound.

10 78. A foot as set forth in either claim 76 or claim 77, further comprising rails extending downward from lateral edges of the deck.

 79. A foot as set forth in any of claims 51-78, comprising two passages defining two water-discharging exits and wherein the deck is situated aft of both exits.

15 80. A foot as set forth in claim 79, wherein one exit is a fore exit and the other exit is an aft exit located aft of the fore exit.

20 81. A foot as set forth in any of claims 51-80, formed in one piece.

 82. A foot as set forth in any of claims 51-81, made of a metal.

25 83. A drainmast which releases water into an airstream traveling in a fore-aft direction, comprising the foot set forth in any of claims 51-82.

 84. A drainmast as set forth in claim 83, wherein the foot does not span the entire drainmast length.

85. A drainmast as set forth in either claim 83 or claim 84, further comprising a fairing to which the foot is connected.

5 86. A drainmast as set forth in claim 85, having an underside formed by the foot and a bottom panel of the fairing.

10 87. A drainmast as set forth in claim 86, having a mid region wherein laterally exposed portions of the foot consist of side edges of a prelude deck and side walls of a/the pulpit.

88. An aircraft comprising the drainmast set forth in any of claims 83-87.

15 89. A heater for a drainmast which releases water into an airstream traveling in a fore-aft direction, said heater comprising:
a supply connector,
a return connector, and
a conduit forming an electrical path between the connectors;
20 wherein the conduit includes tube-heating sections which do not widen the drainmast span.

90. A heater as set forth in claim 89, wherein the conduit has a section for heating an aft-situated sink.
25

91. A heater as set forth in either claim 89 or claim 90, wherein the conduit has a section for heating a fore-situated sink.

92. A heater as set forth in any of claims 89-91, wherein the conduit includes a tube-bridging section that is elevated relative to the tube-heating sections.

5 93. A drainmast for releasing water into an airstream traveling in a fore-aft direction, said drainmast comprising:

a water-discharging exit on its underside for communicating with the airstream, and

10 the heater set forth in any of claims 88-90 situated to heat the underside.

94. A drainmast as set forth in claim 93, comprising a draintube defining an entrance and an outlet communicating with the water-discharging exit, and wherein the tube-heating sections of the
15 heater heat this draintube.

95. A drainmast as set forth in claim 94, comprising two draintubes, each defining an entrance and an outlet communicating with respective water-discharging exits, and wherein the tube-heating
20 sections of the heater heat these draintubes.

96. A drainmast as set forth in claim 95, wherein one draintube is situated fore of the other draintube.

25 97. A drainmast as set forth in any of claims 93-96, further comprising a foot which at least partially defines the underside and defines the water-discharging exit(s), and wherein the heater also heats the foot.

98. A drainmast as set forth in claim 97, wherein the foot has a heat sink attached thereto and wherein the heater has a section wrapped around this heat sink.

5 99. A drainmast as set forth in claim 98, wherein the heat sink is part of a tube-holding pedestal attached to the foot.

10 100. A drainmast as set forth in any of claims 97-99, wherein the foot has an aft heat sink and wherein the heater has a section coiled therearound.

101. A drainmast as set forth in claim 100, wherein the aft heat sink is formed in one piece with the foot.

15 102. A drainmast as set forth in any of the claims 93-101, further comprising a fairing and wherein the connectors are positioned above the fairing.

20 103. A drainmast as set forth in claim 102, wherein the heater includes a tube-bridging section positioned above the fairing.

25 104. An aircraft comprising the drainmast set forth in claim 103, wherein the supply connector and the return connector of the heater are connected to an onboard power source.

105. A fairing for a drainmast which releases water into an airstream traveling in a fore-aft direction, said fairing comprising:
a seamless mounting flange for mounting the drainmast to a mounting surface,

a mast projecting downward from the mounting flange and having an aerodynamically advantageous profile, and

a hollow within the mast for housing interior drainmast components;

5 wherein the fairing has a two-piece construction comprising:

a main body including a window on one of its lateral sides looking into the hollow and forming the seamless mounting flange; and

10 a door fastened to the main body to close the window.

106. A fairing as set forth in claim 105, comprising a bottom panel forming a fore region of the underside.

15 107. A fairing as set forth in either claim 105 or claim 106, wherein the main body is formed in one piece

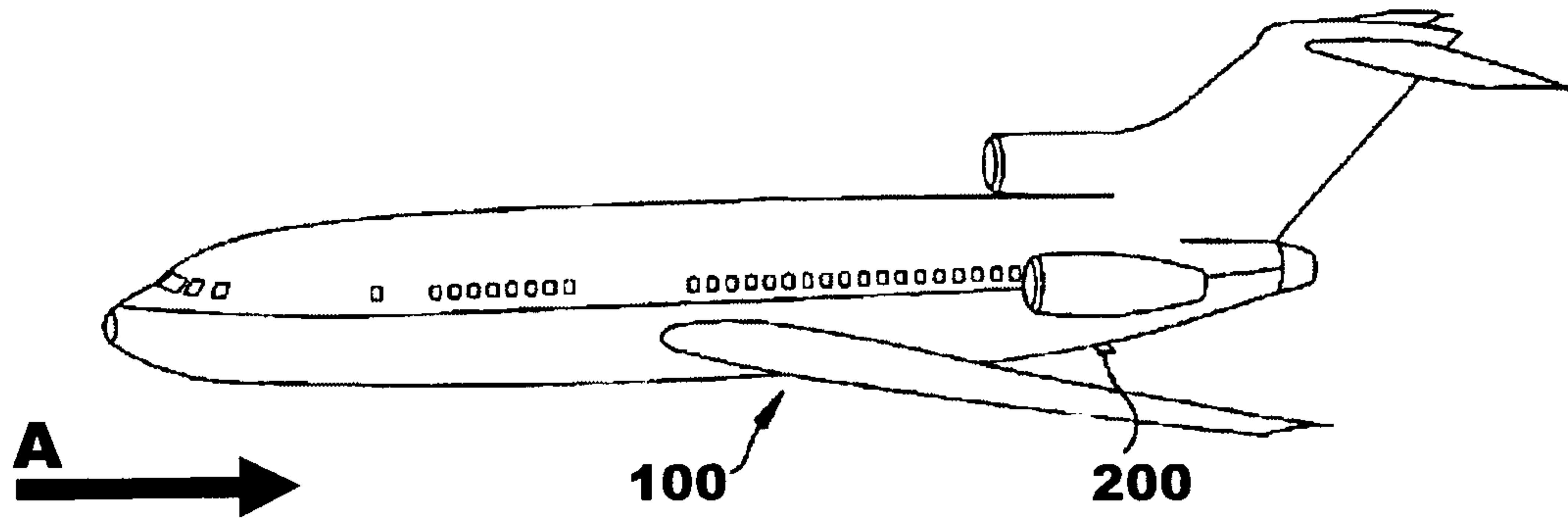
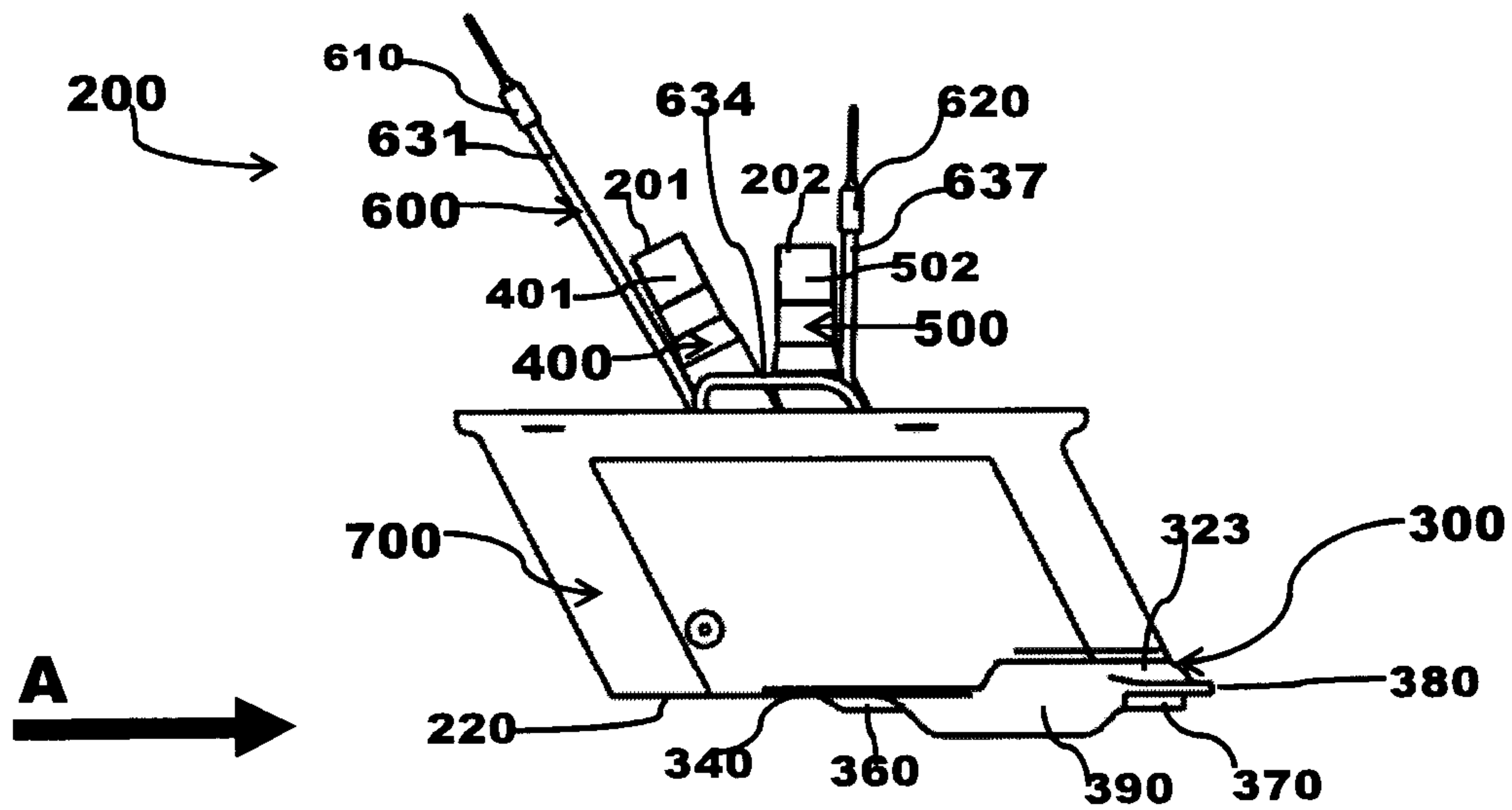
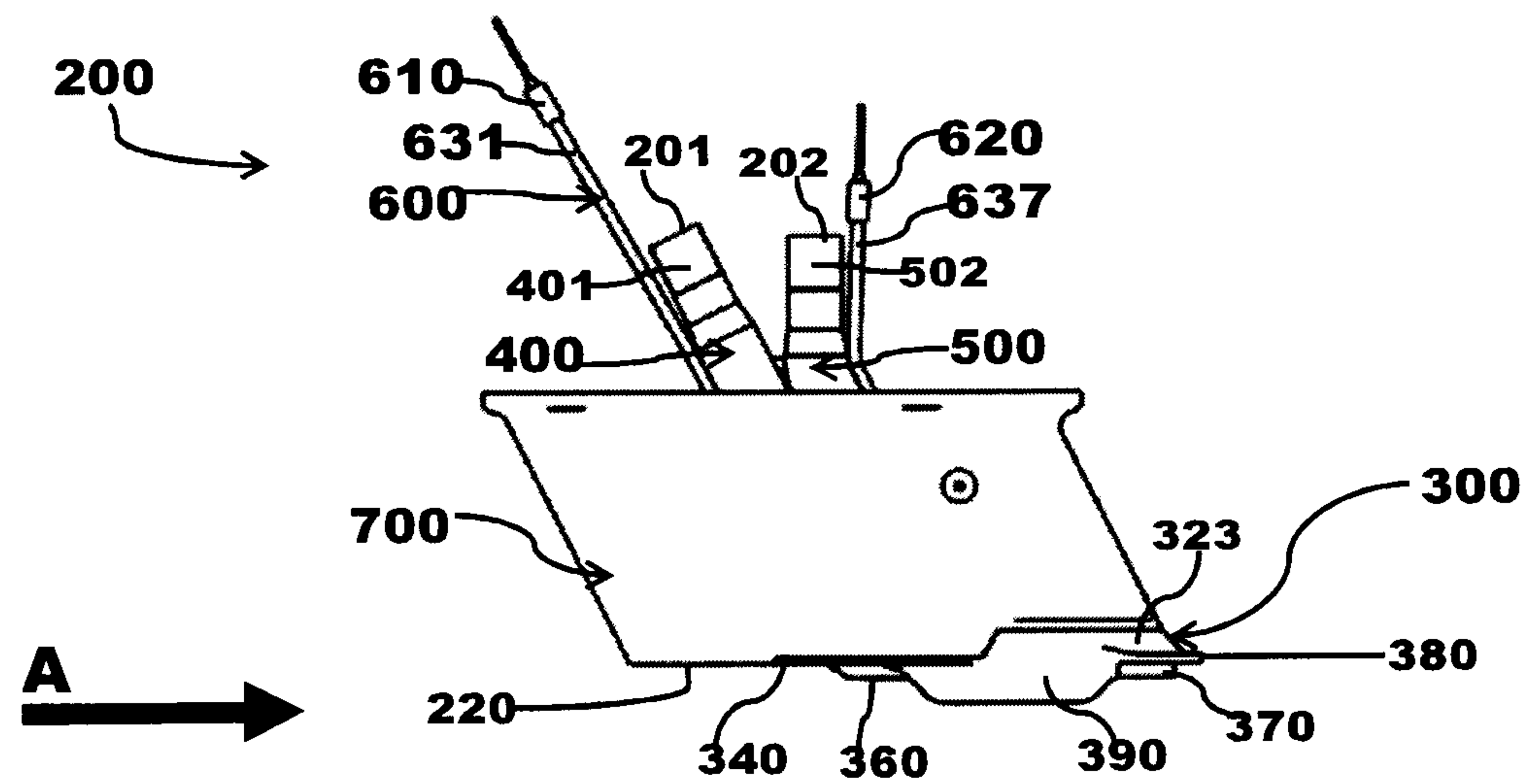
108. A fairing as set forth in any of claims 105-107, wherein the door is formed in one piece.

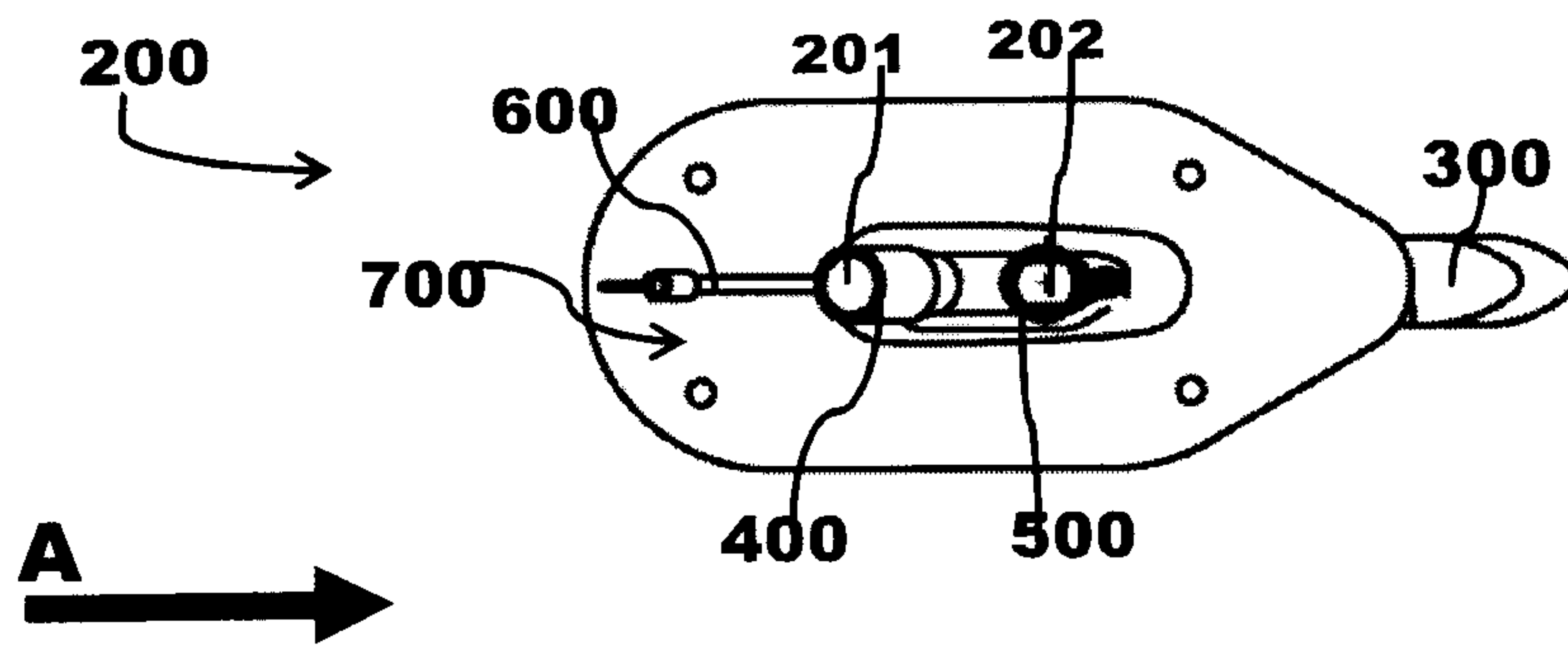
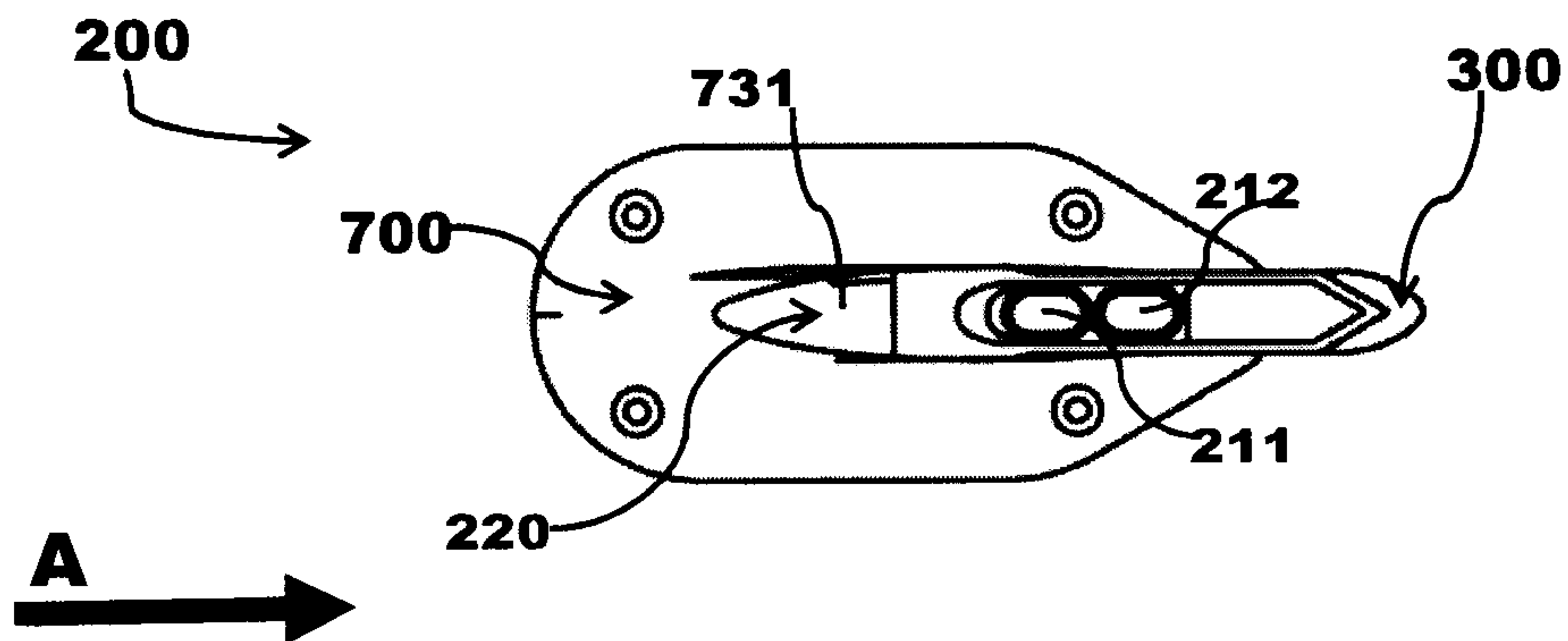
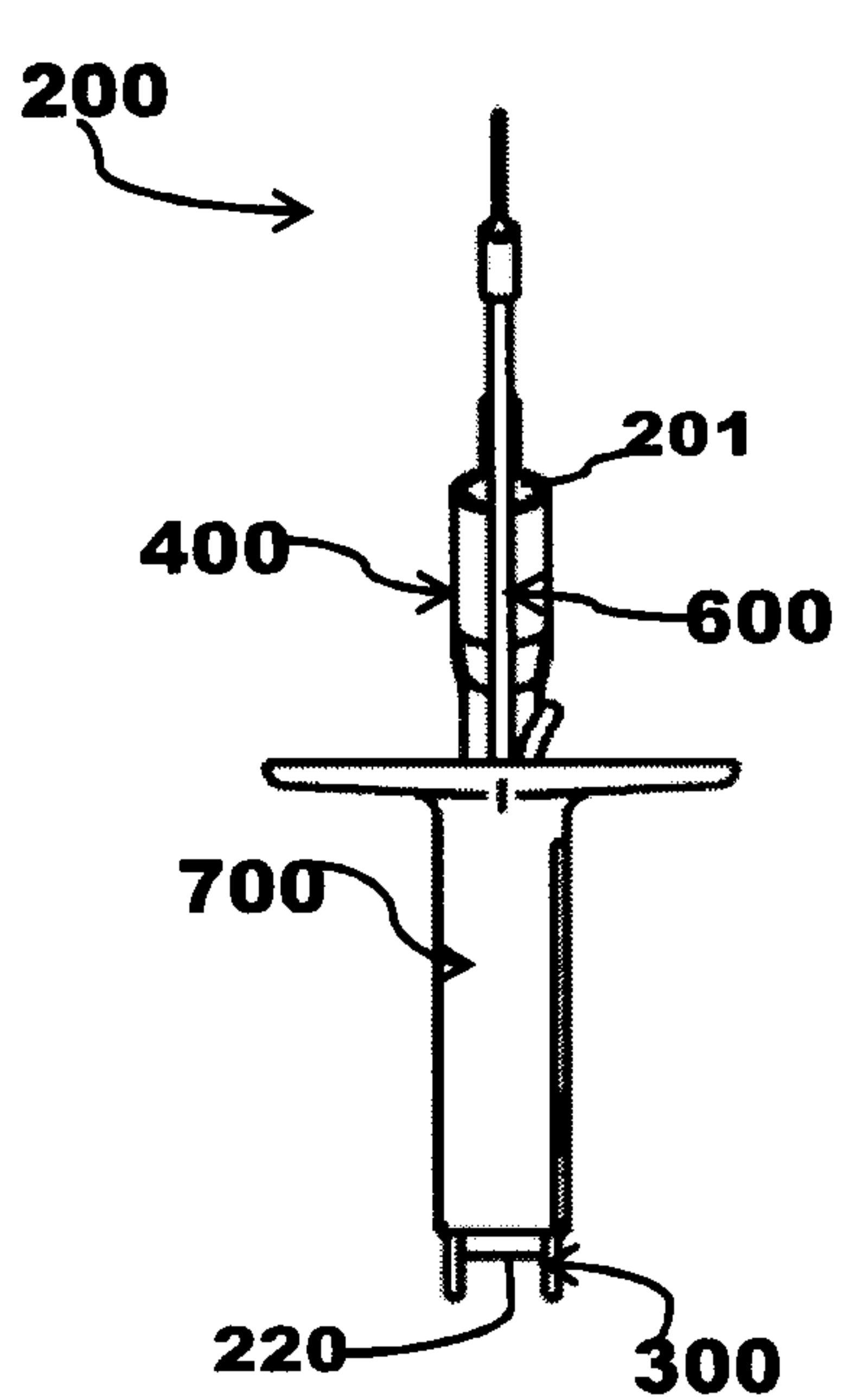
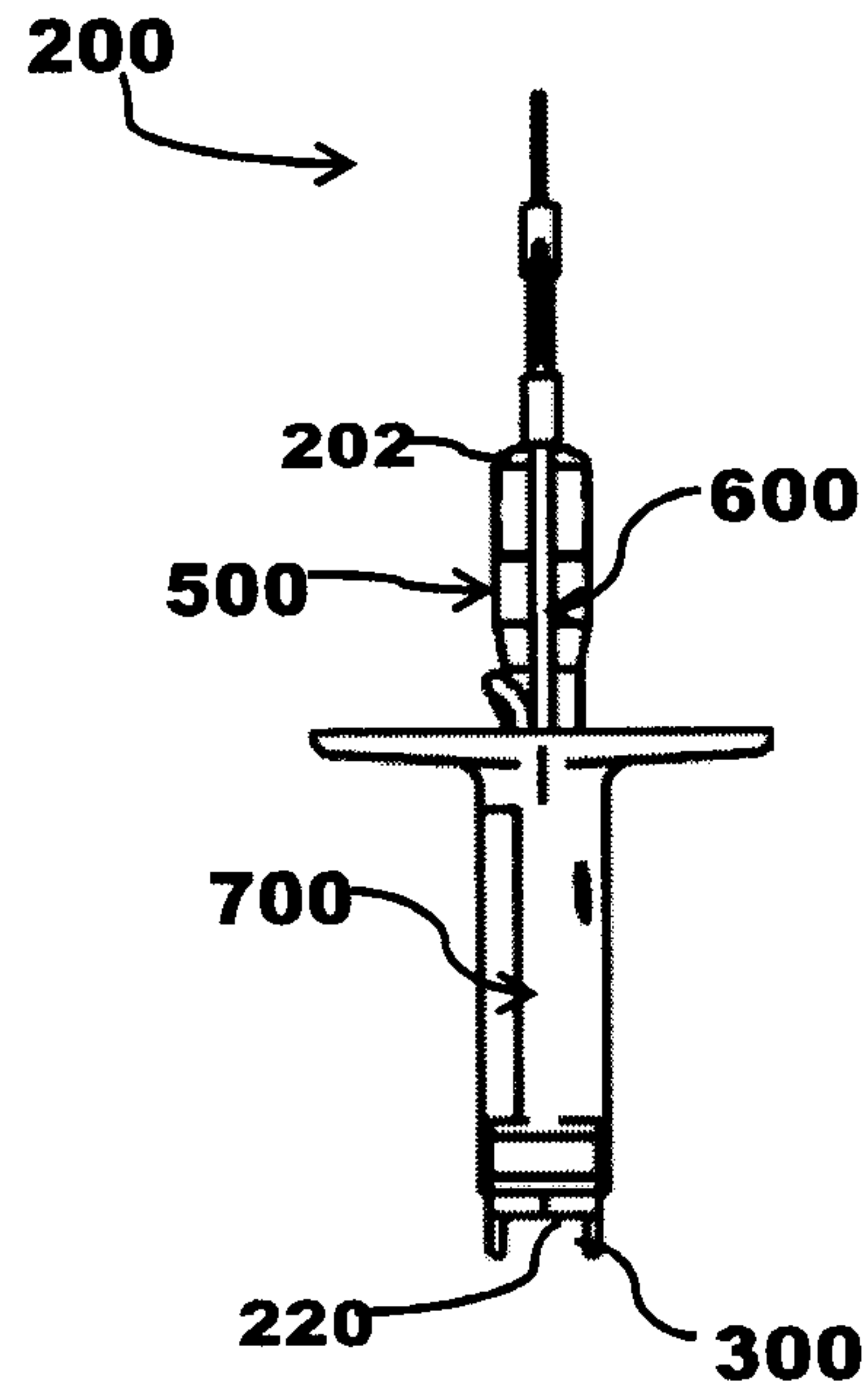
20

109. A fairing as set forth in any of claims 105-108, wherein the main body and/or the door are made from a fiber reinforced plastic.

25 110. A drainmast which releases water into an airstream traveling in a fore-aft direction, comprising the fairing set forth in any claims 105-109.

111. An aircraft comprising the drainmast set forth in claim 110, wherein the fairing's mounting flange is mounted to its fuselage.

**FIGURE 1****FIGURE 2A****FIGURE 2B**

**FIGURE 2C****FIGURE 2D****FIGURE 2E****FIGURE 2F**

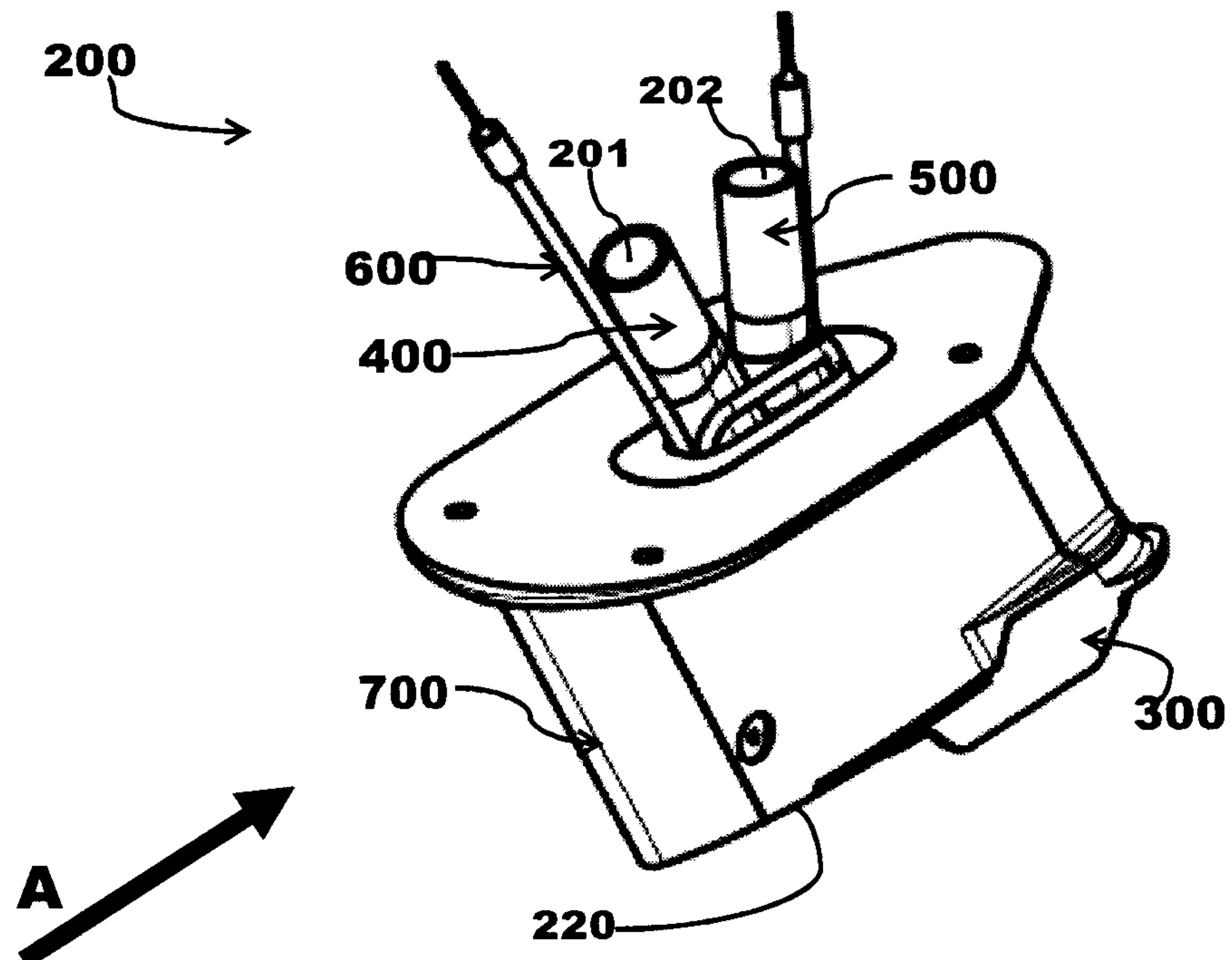


FIGURE 2G

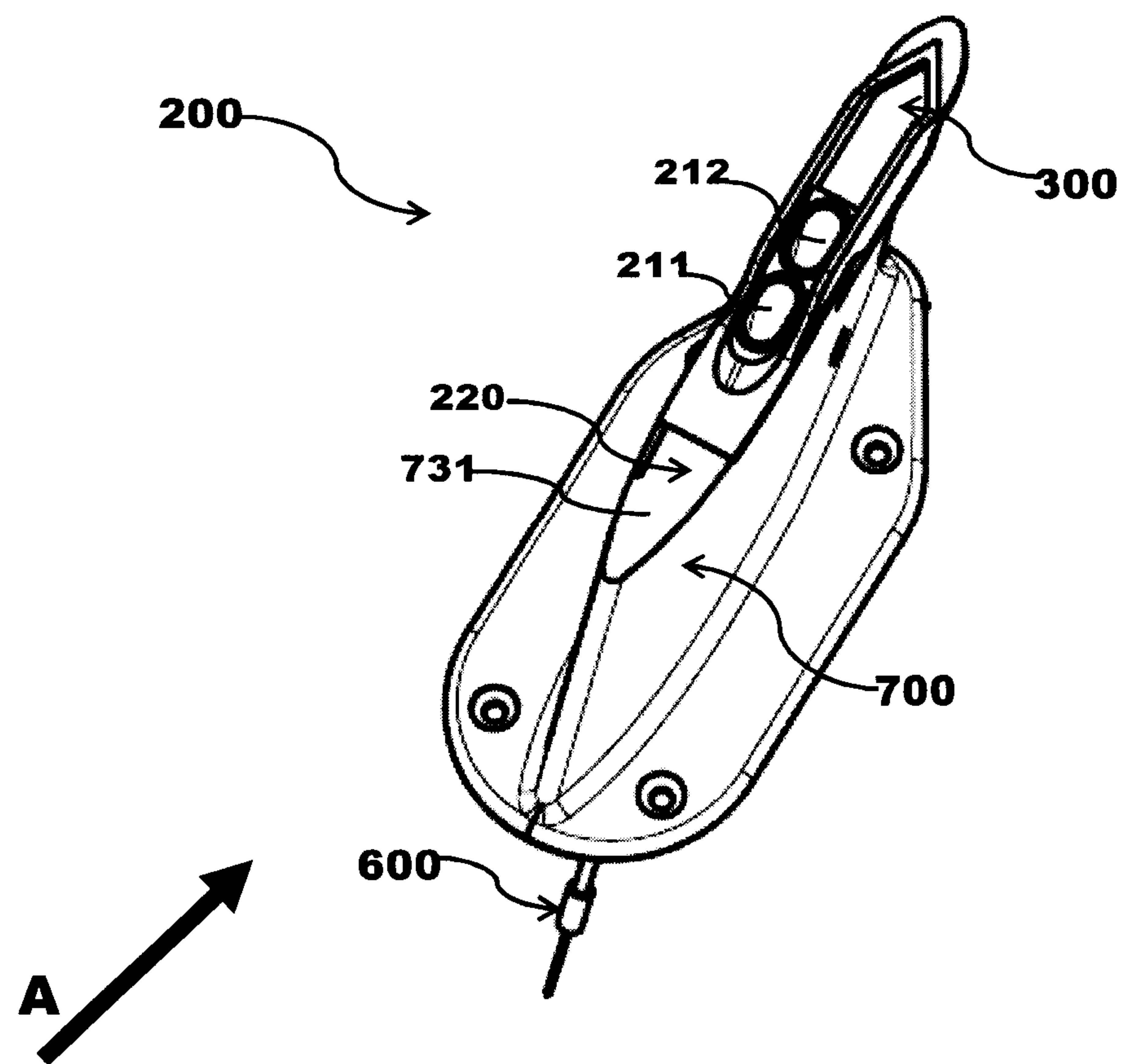
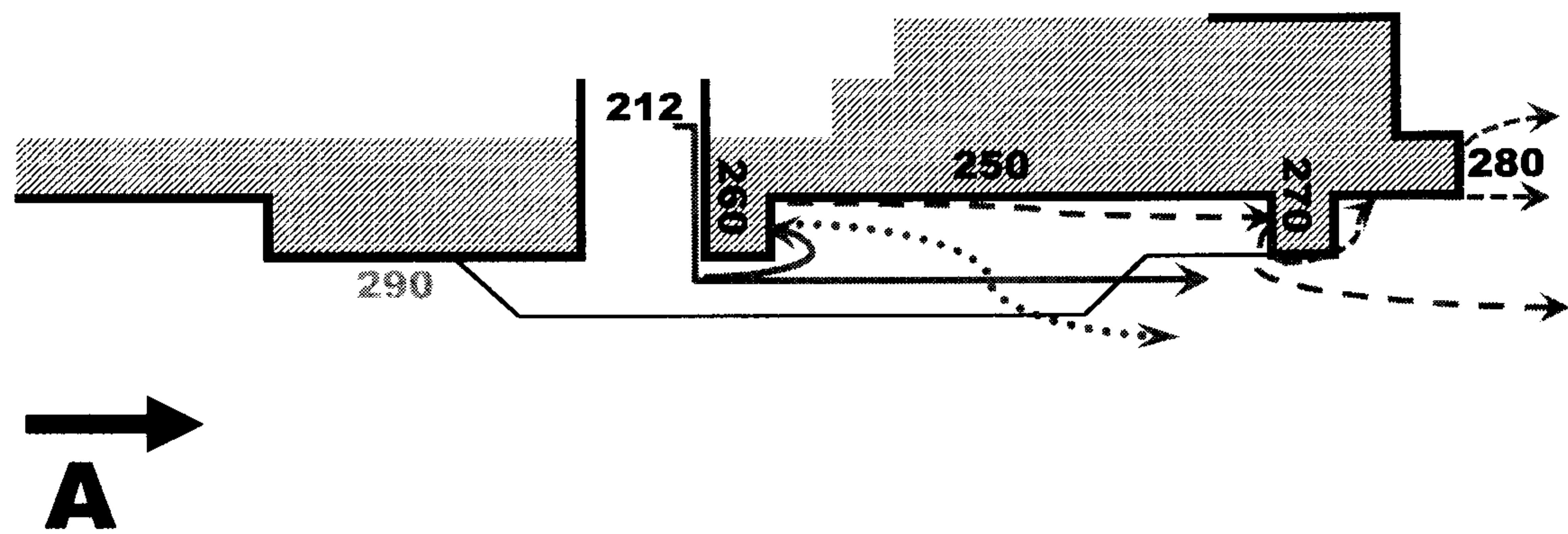
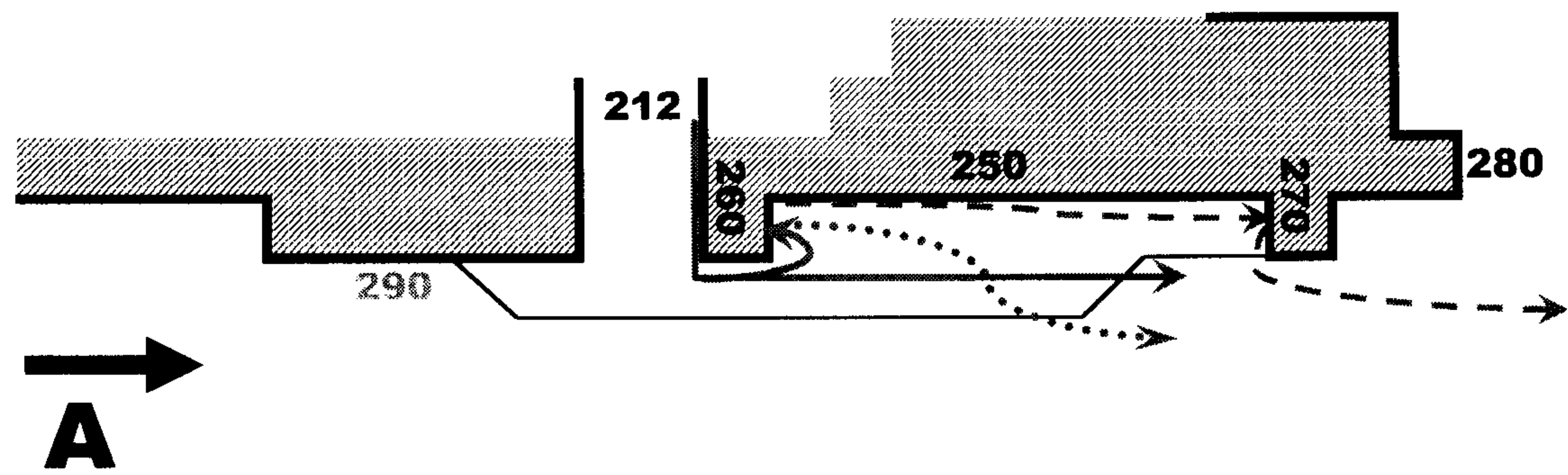
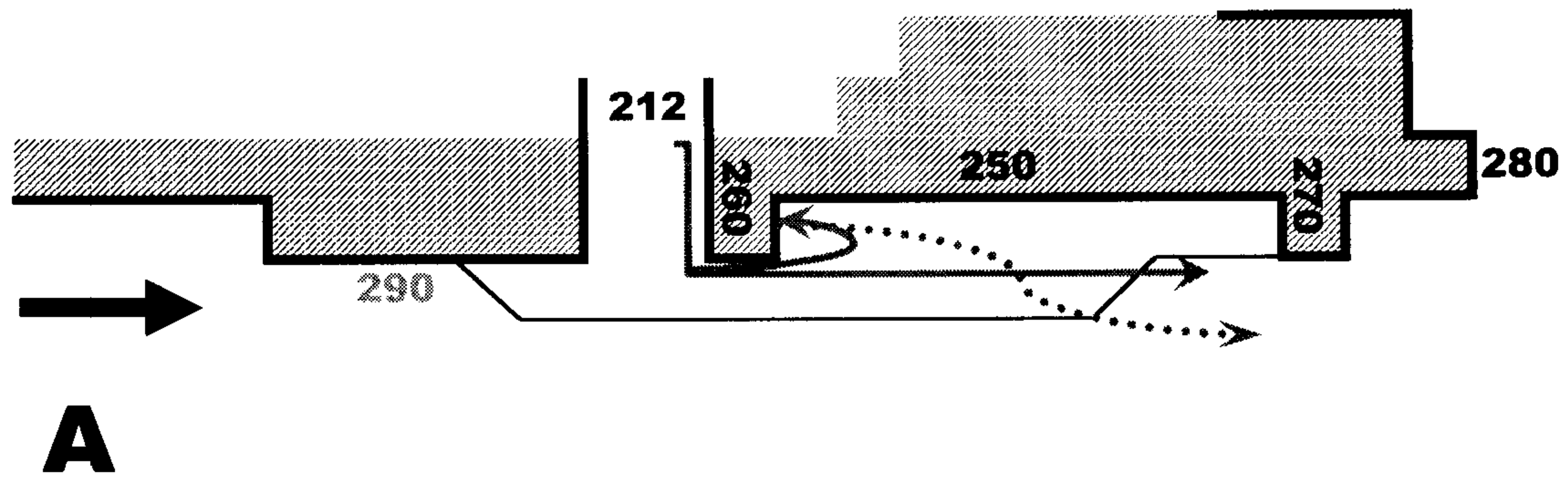
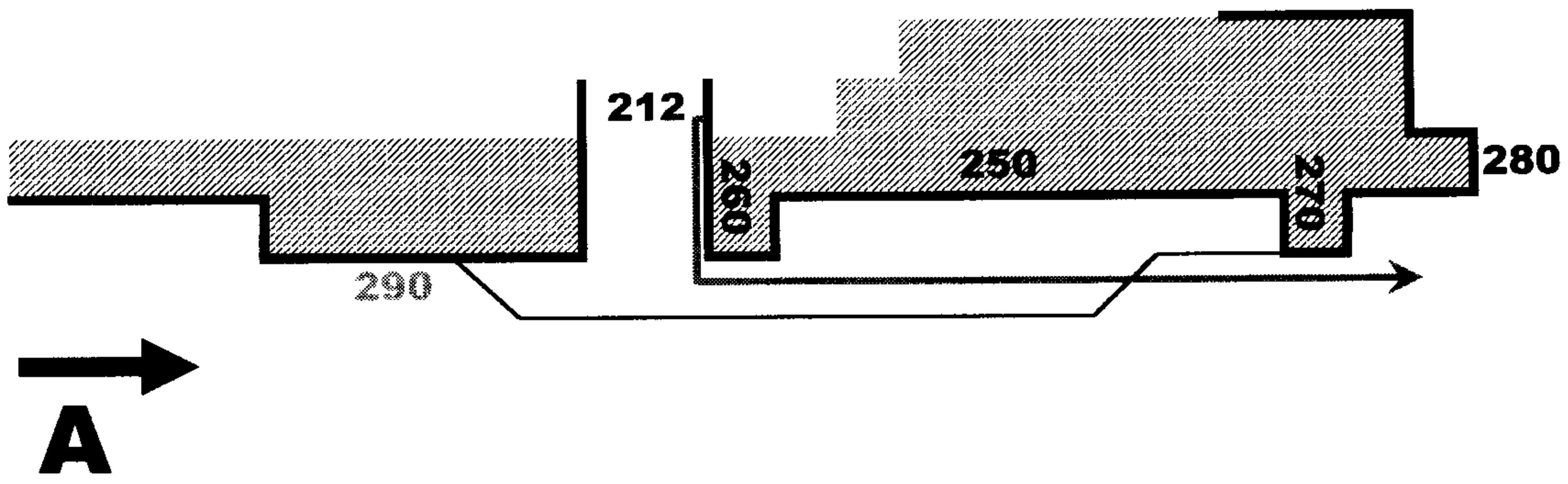
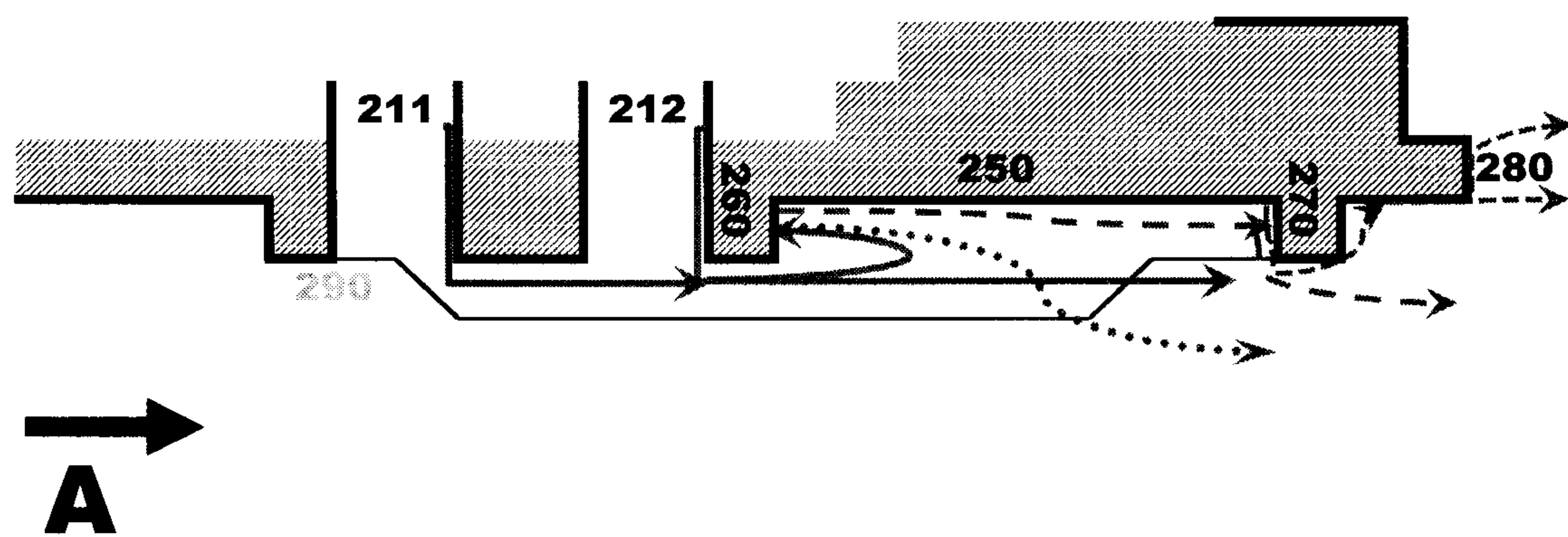
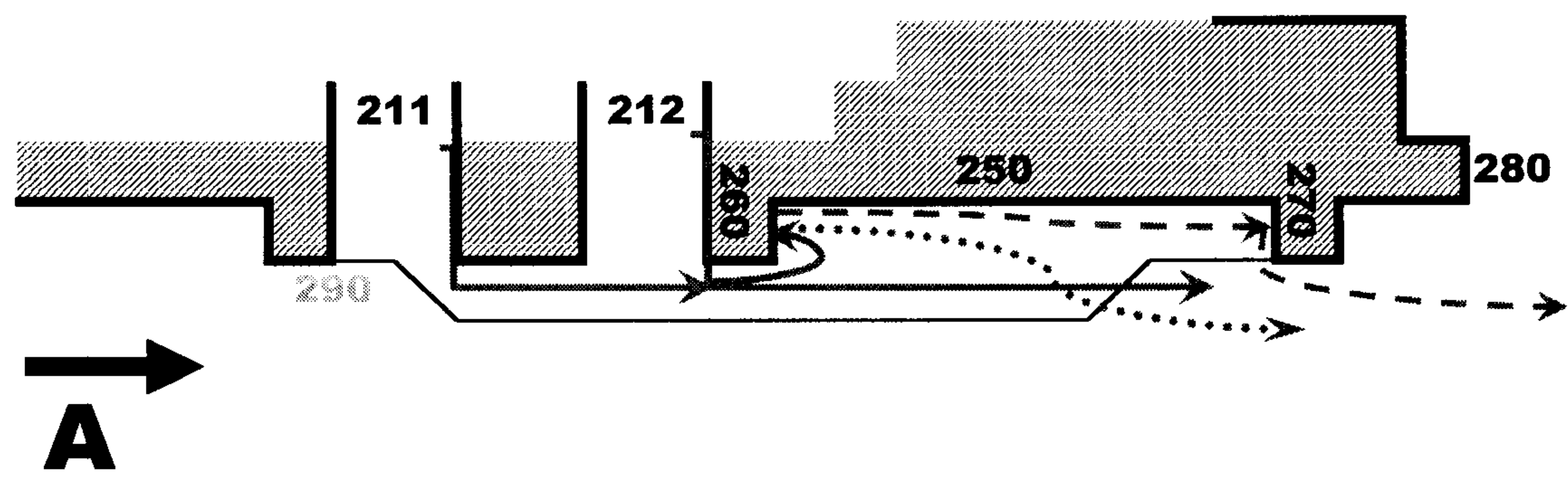
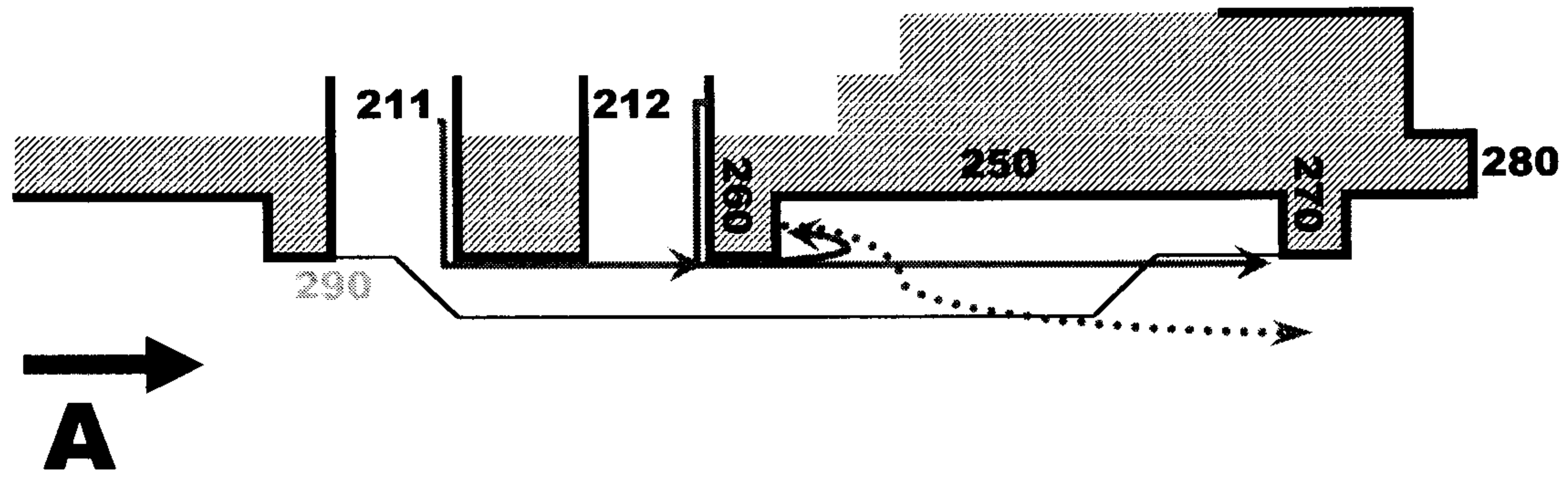
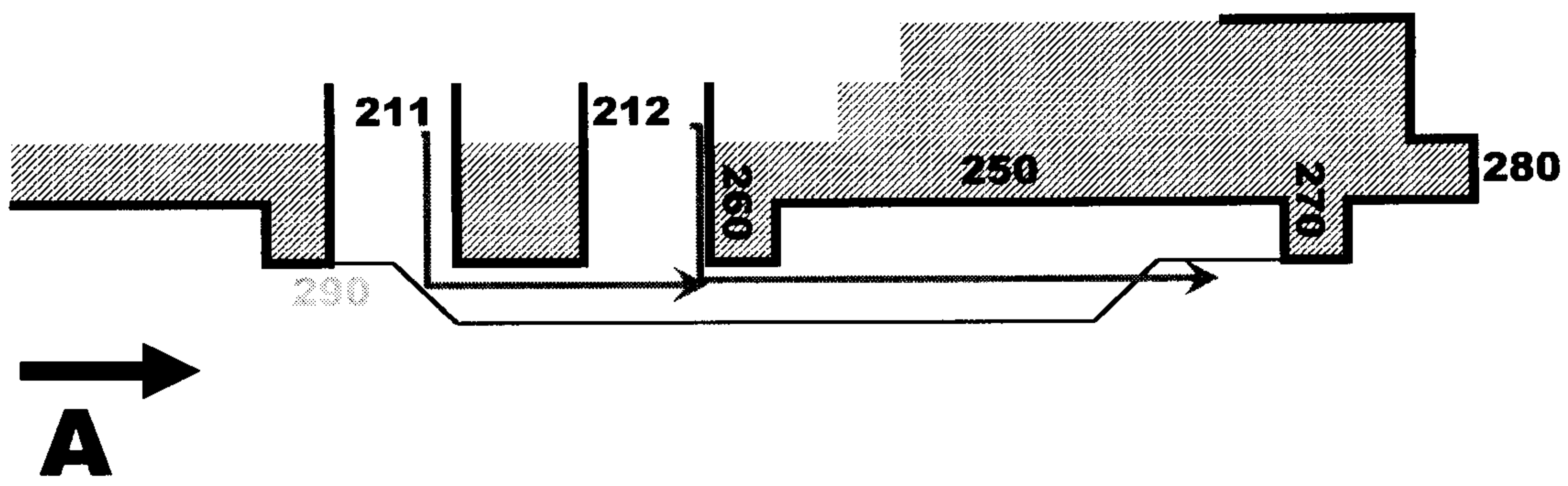
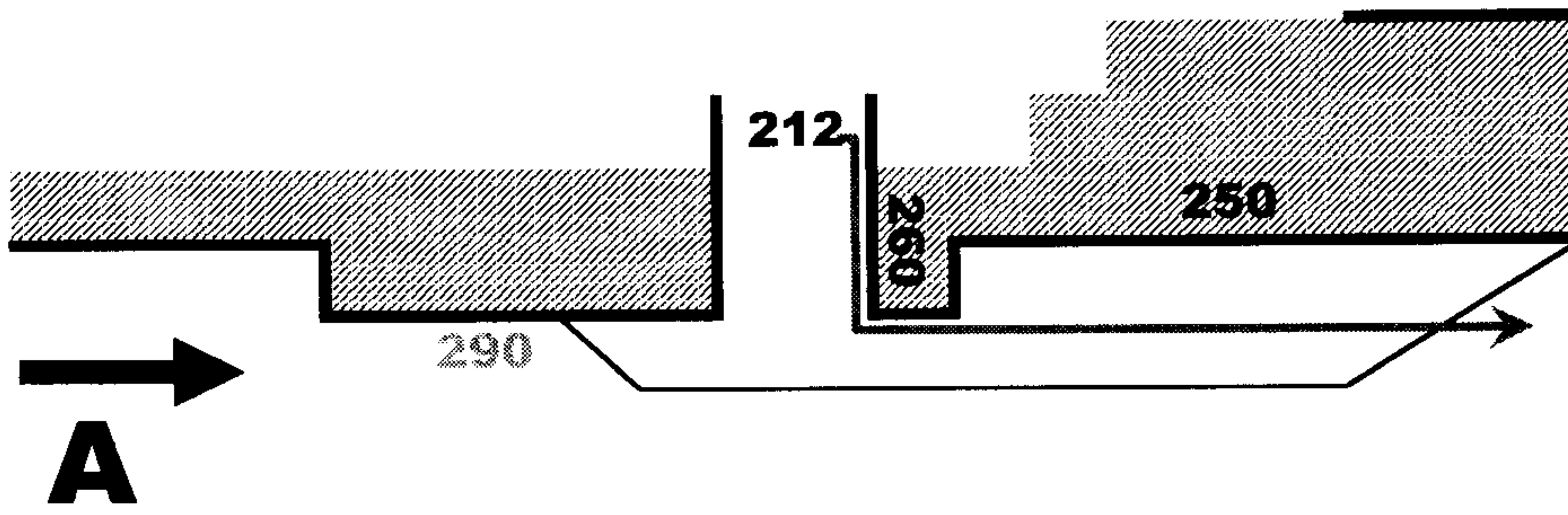
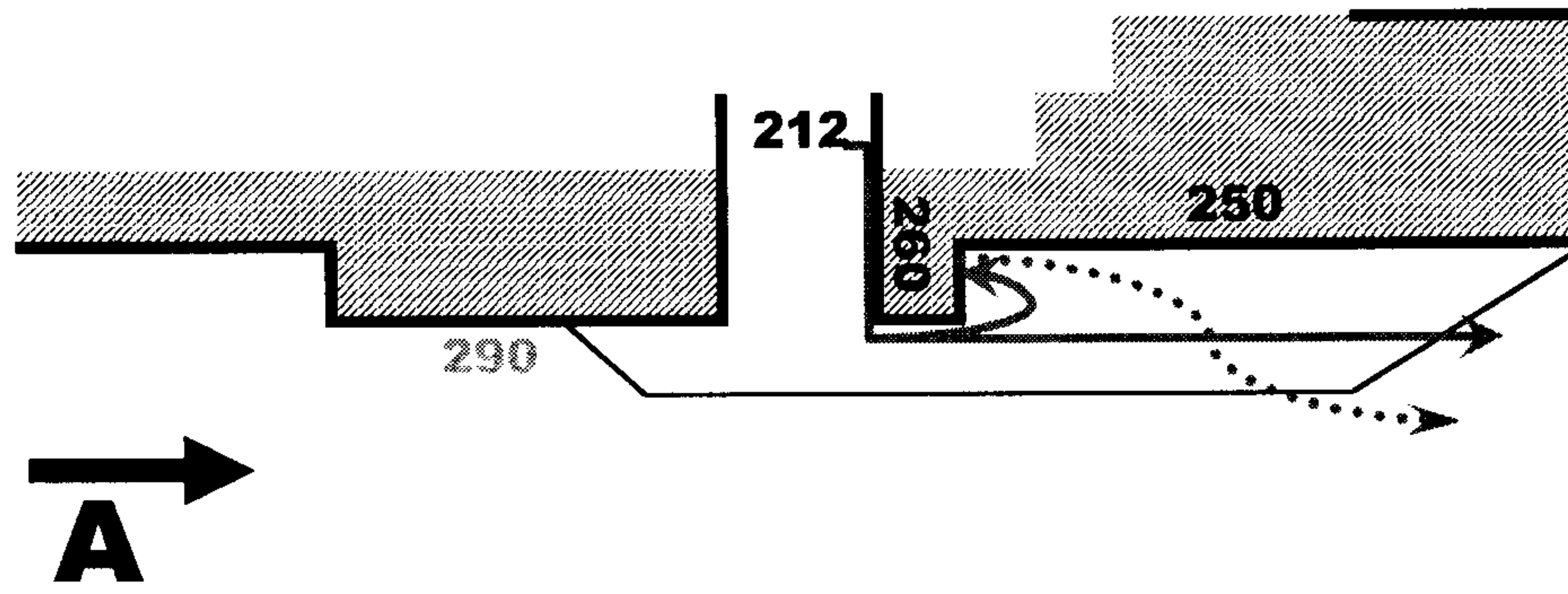
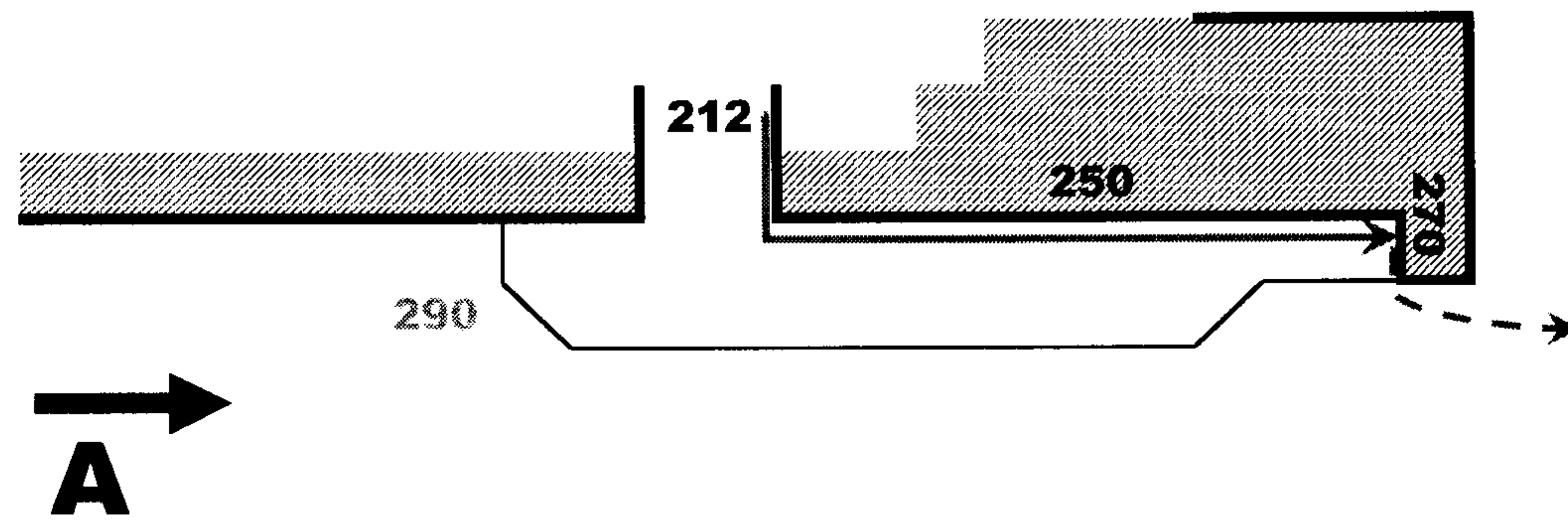
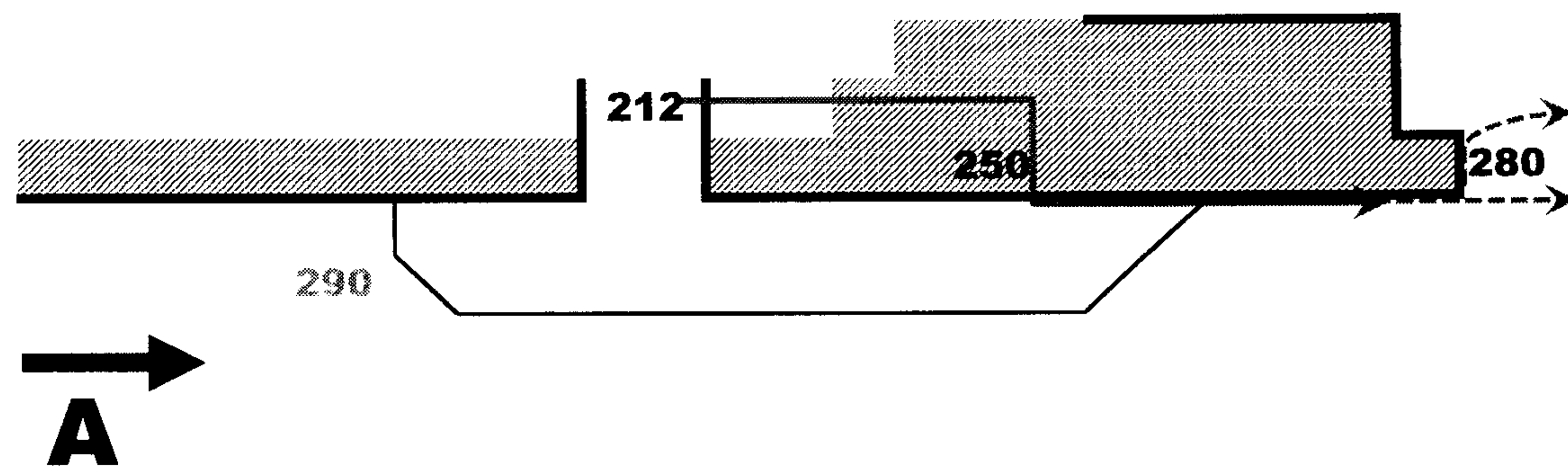
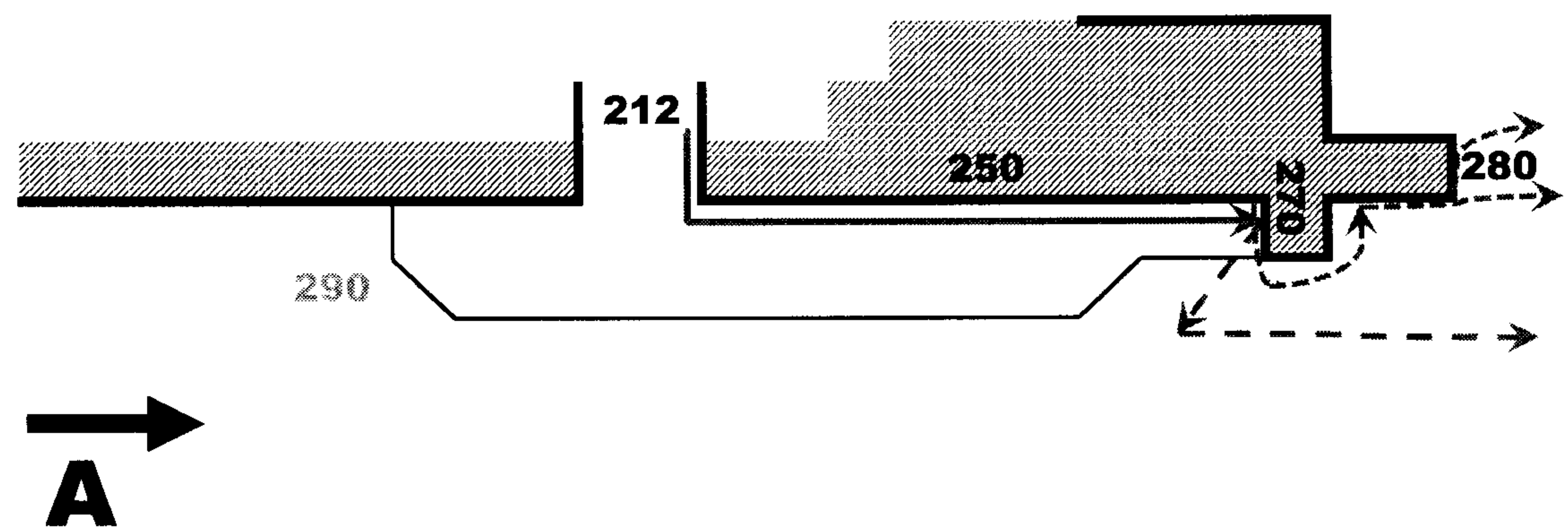
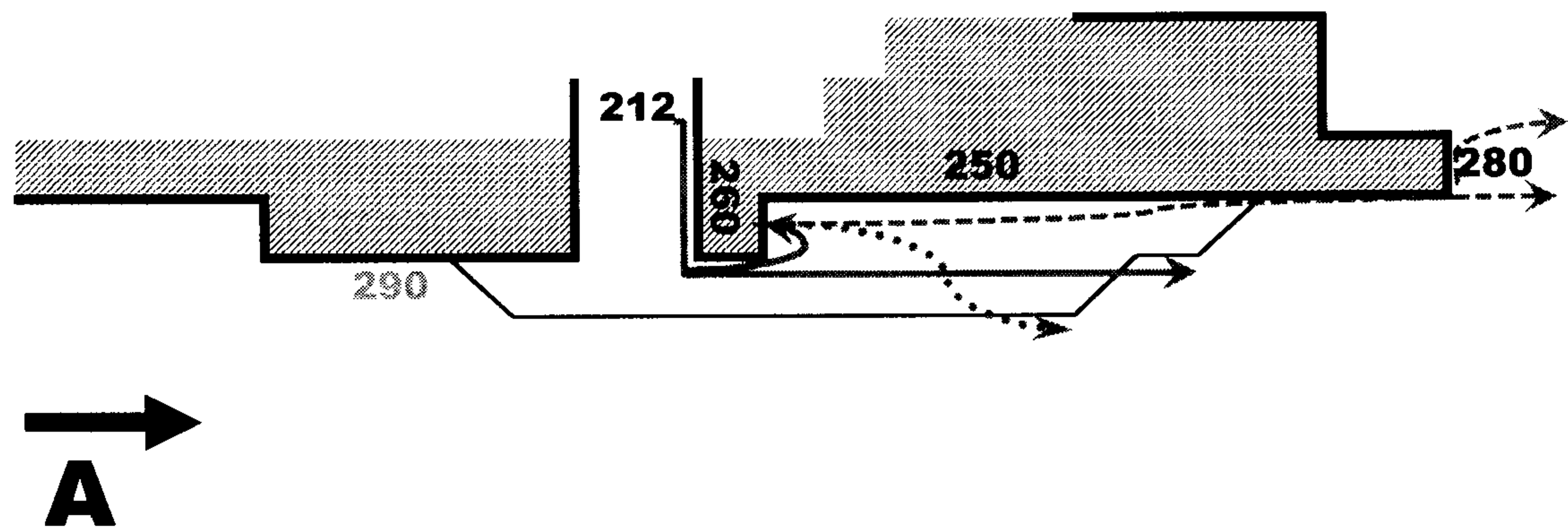
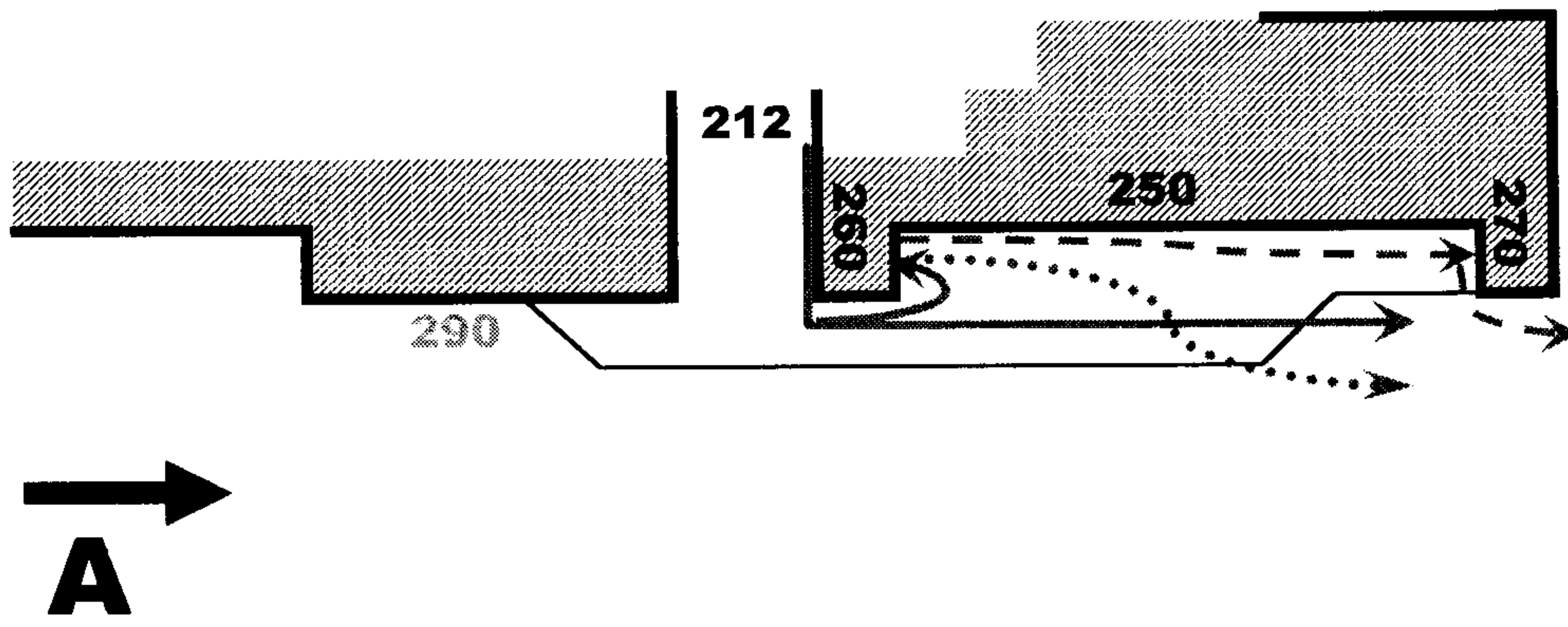


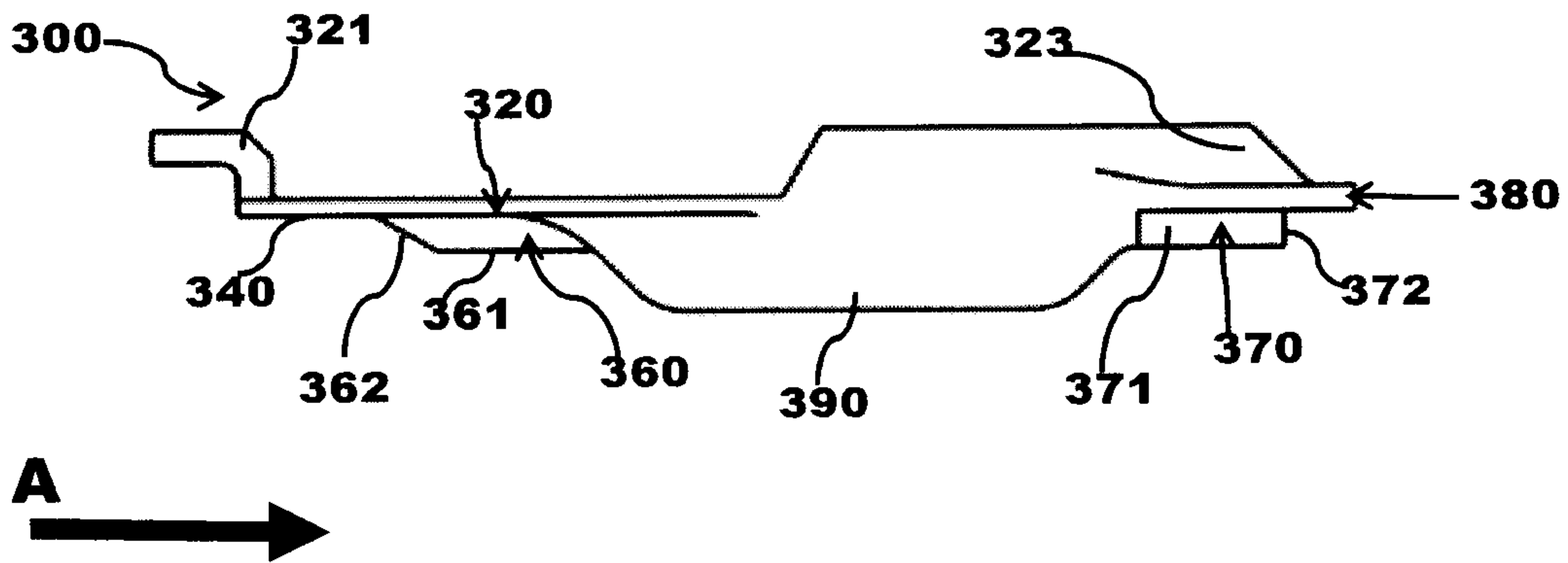
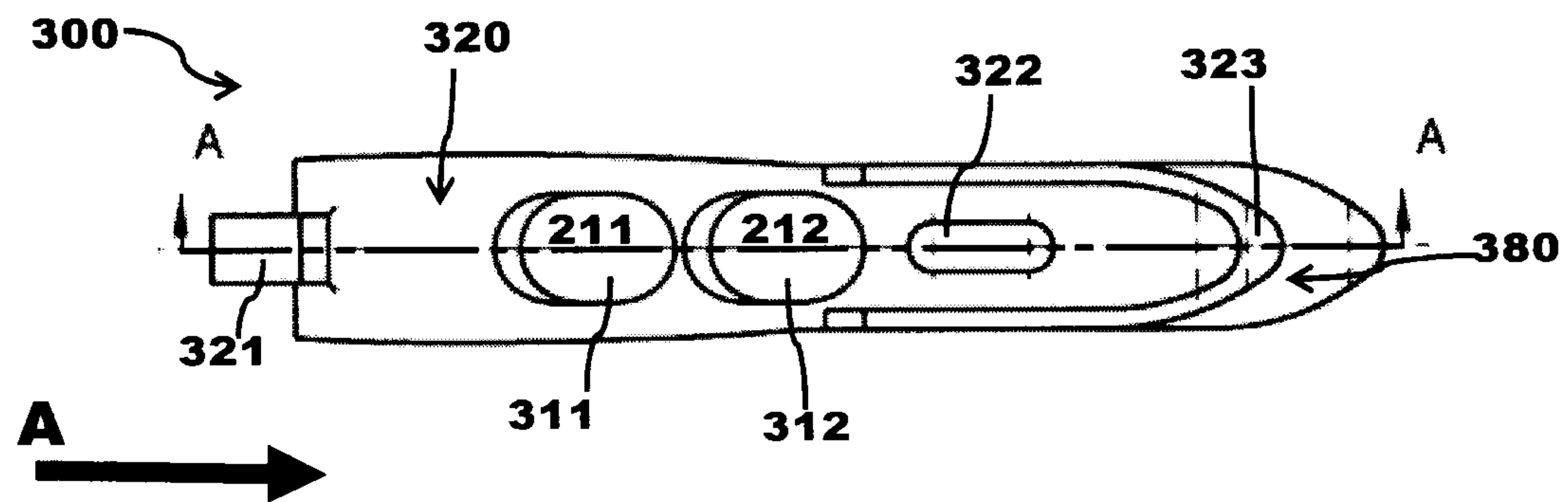
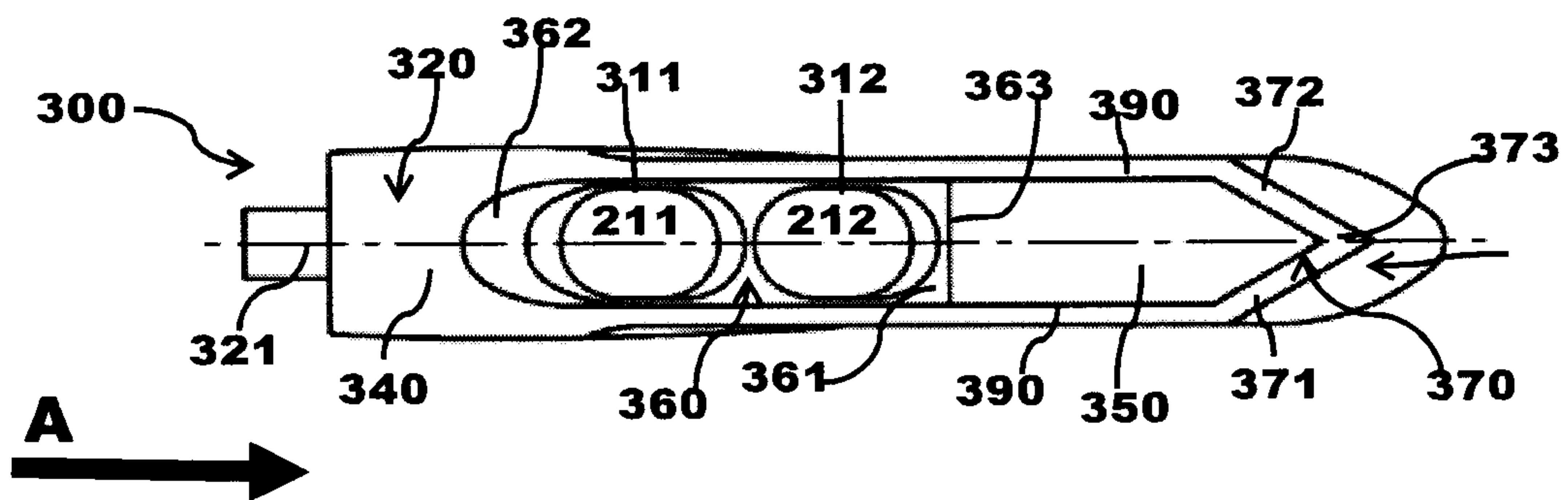
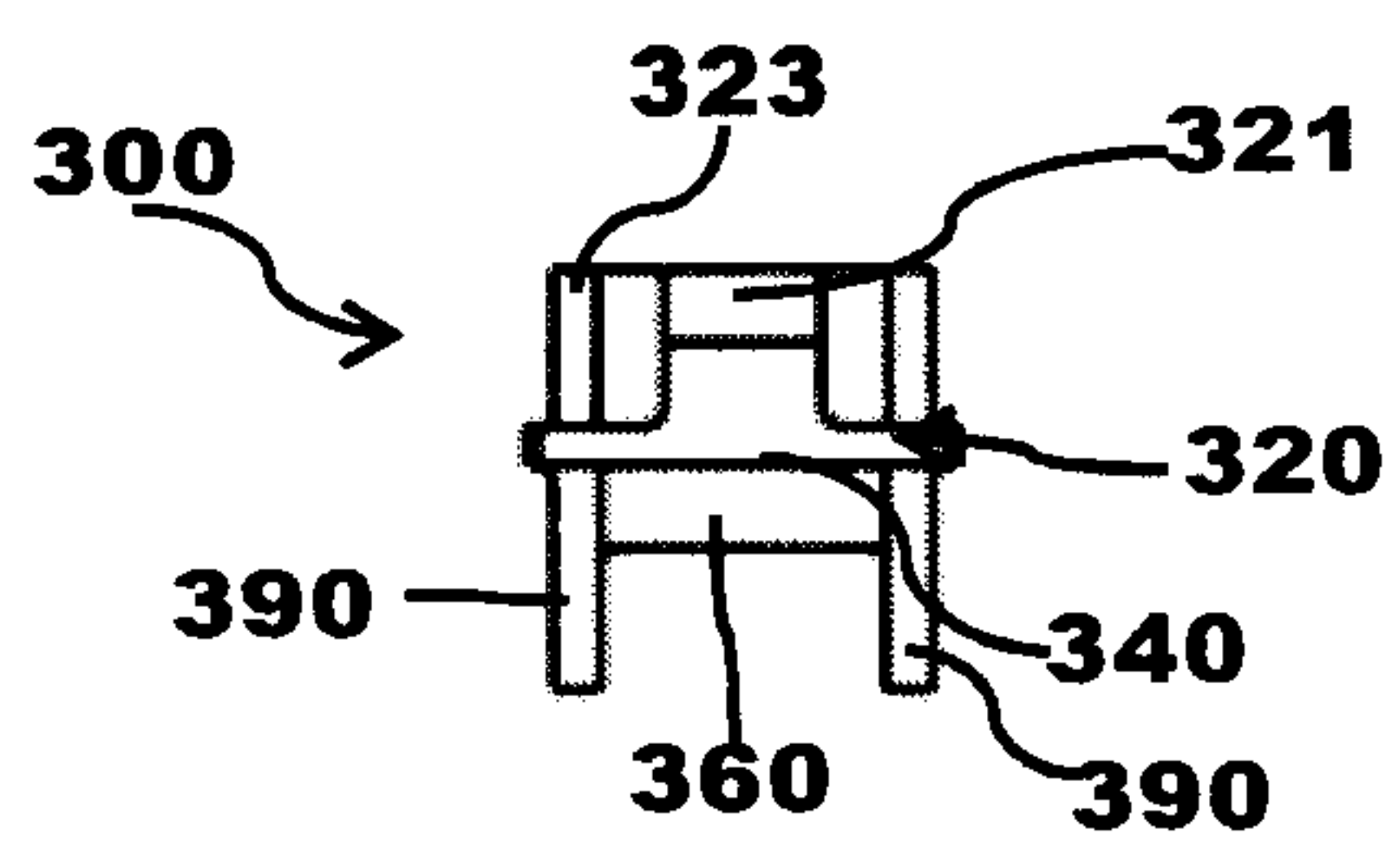
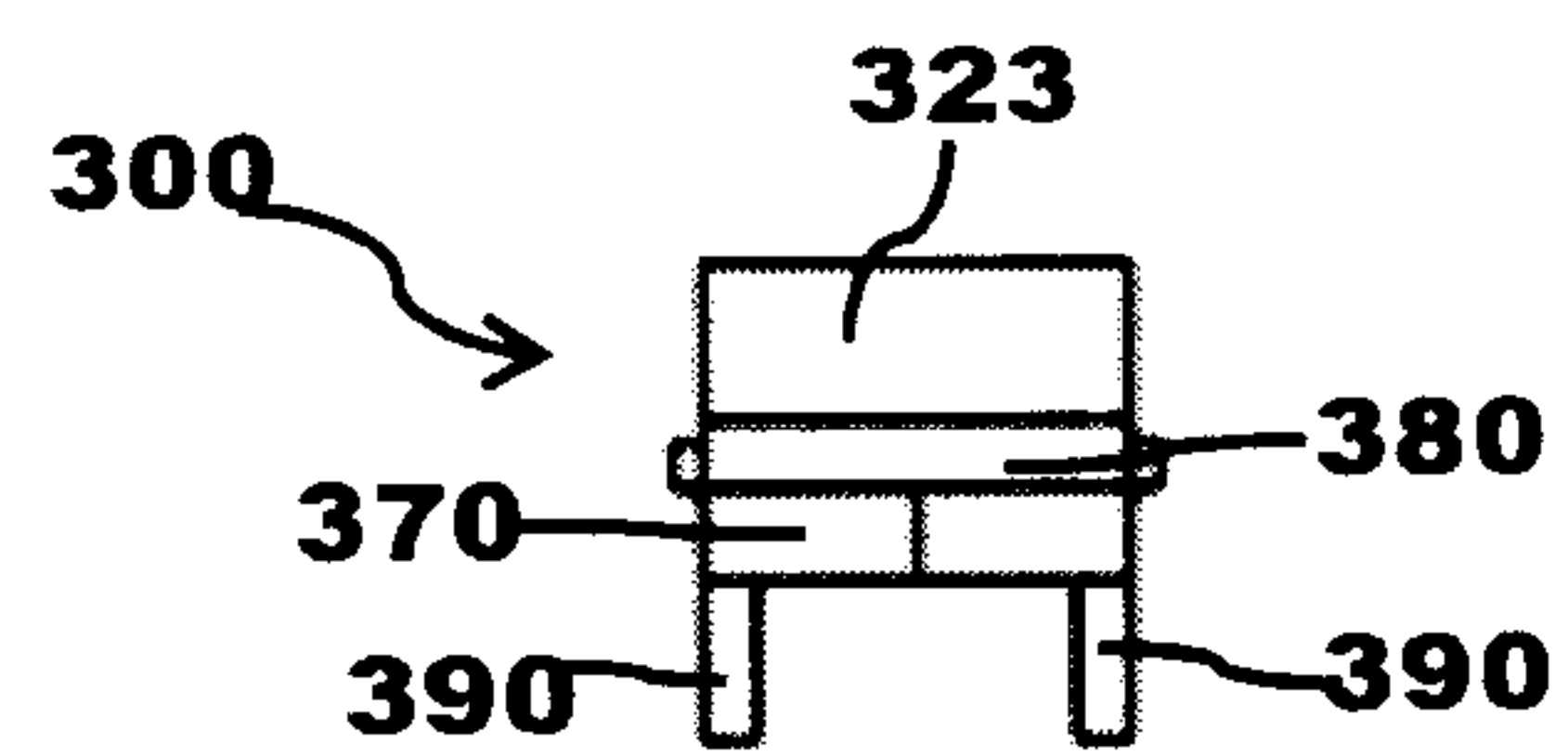
FIGURE 2H

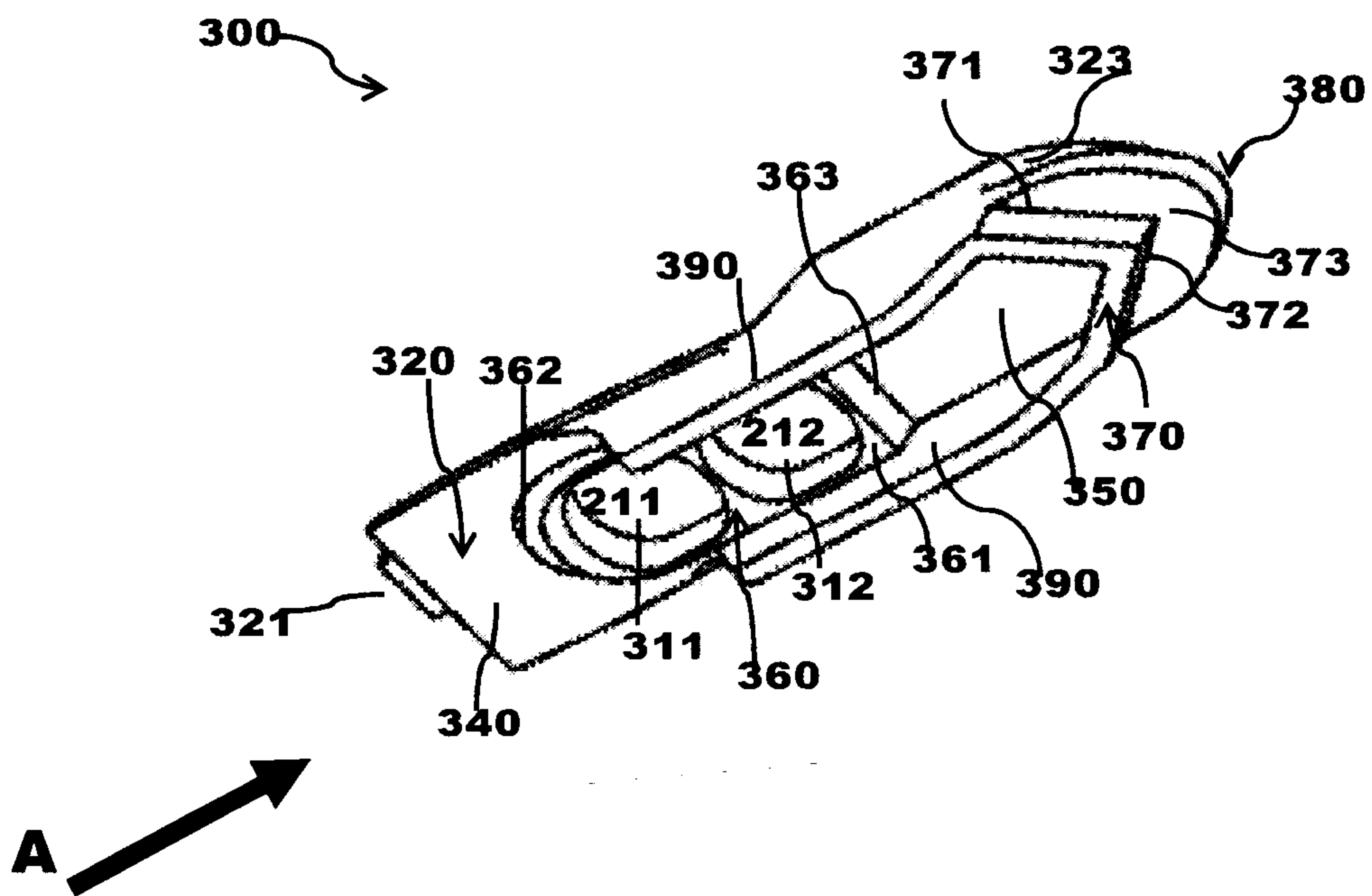
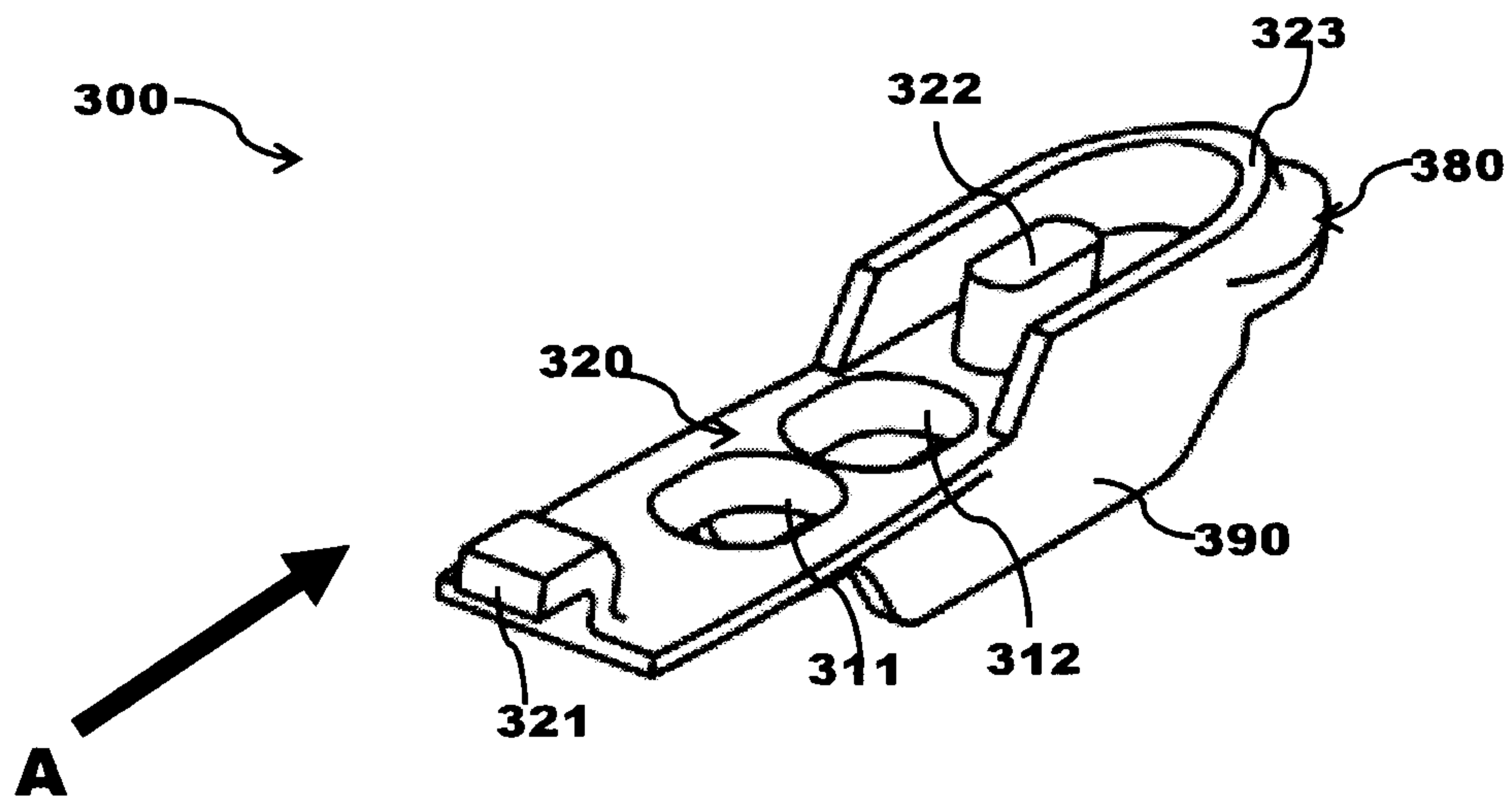


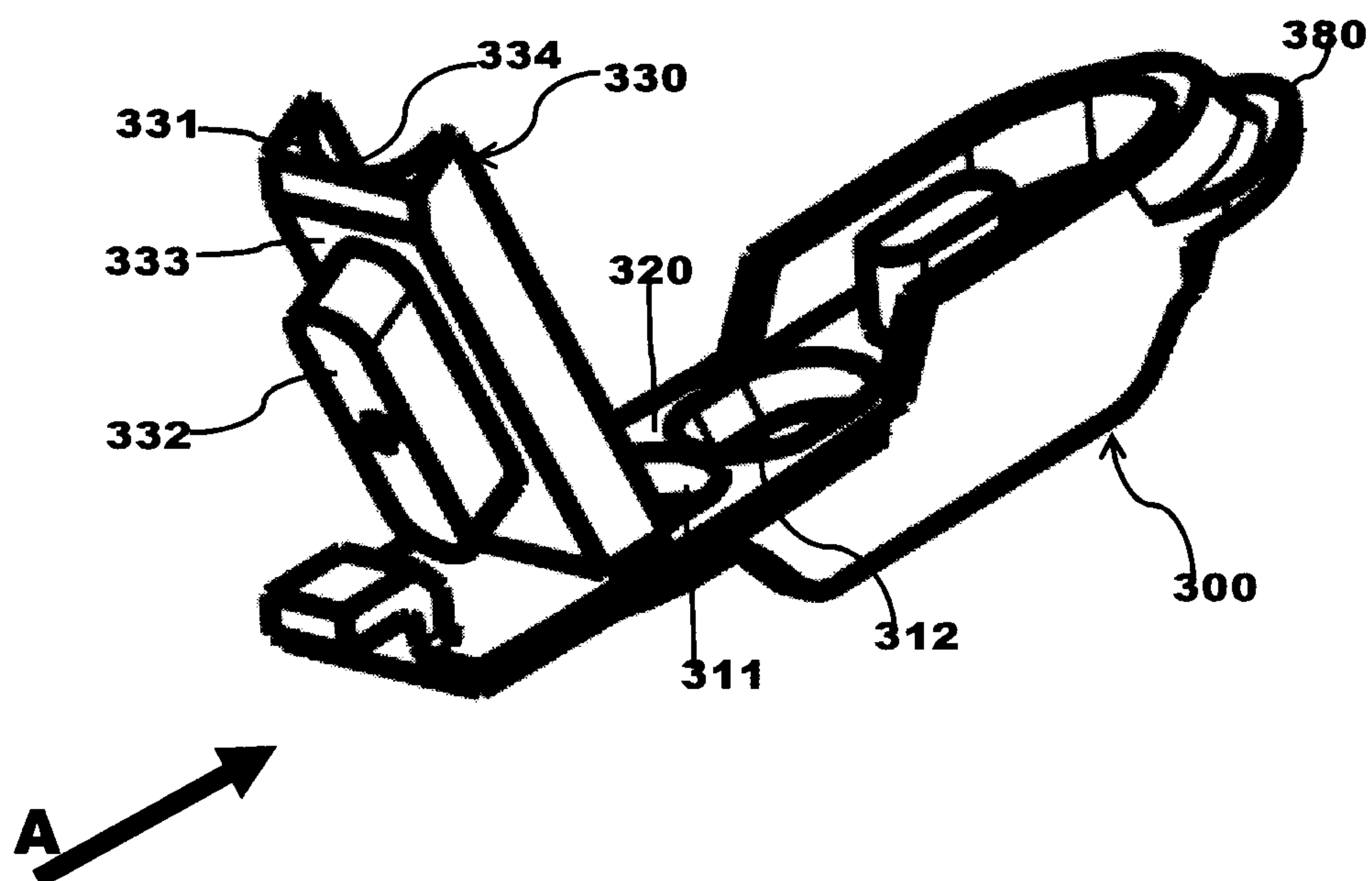
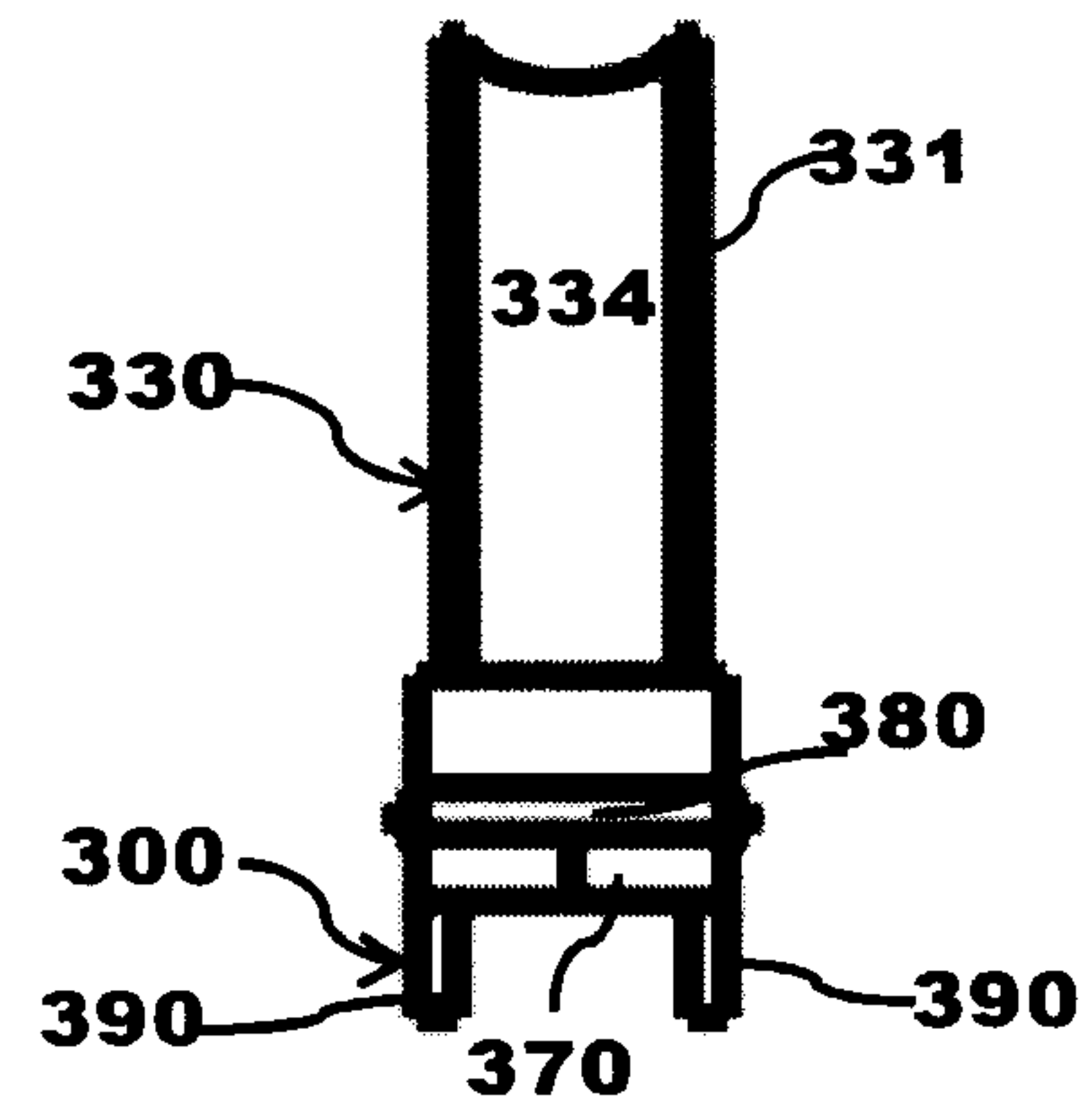
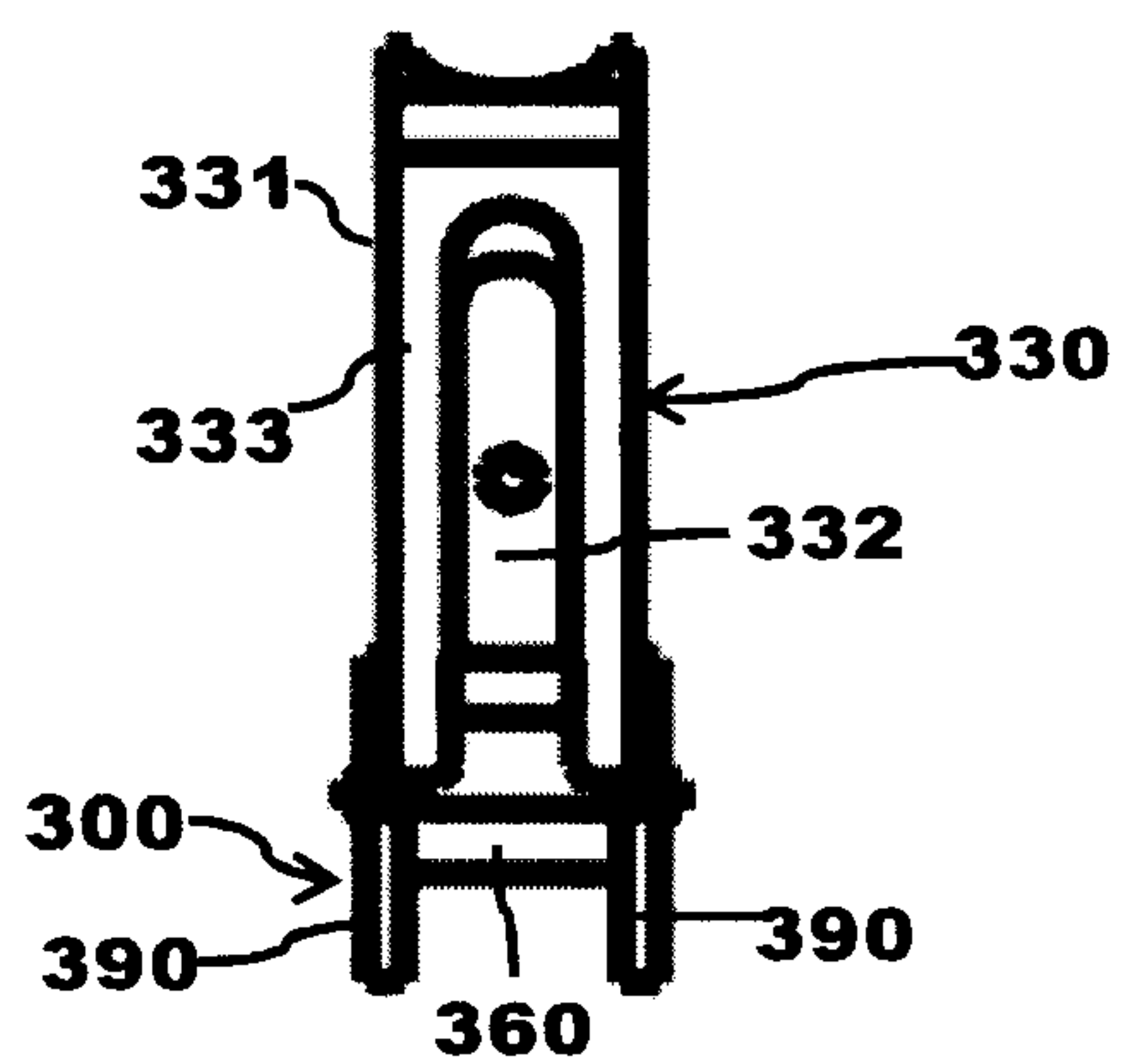
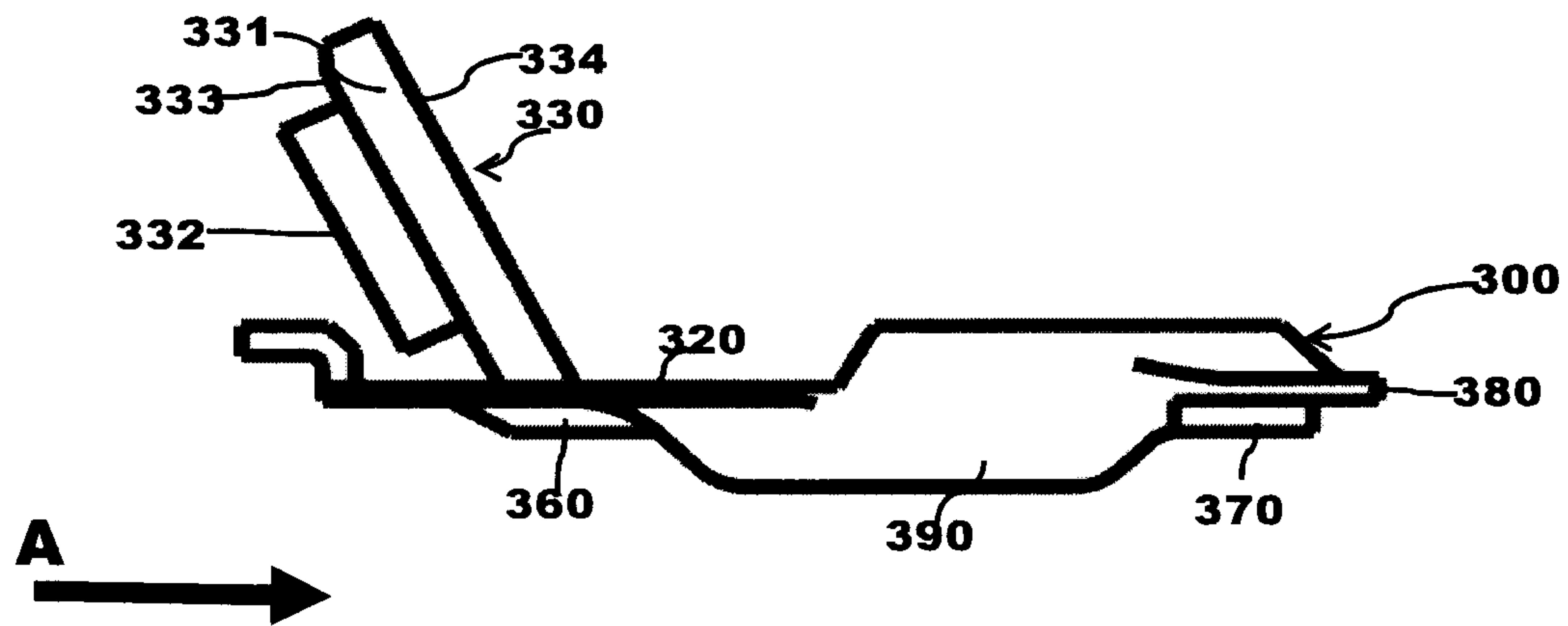


**FIGURE 2Q****FIGURE 2R****FIGURE 2S****FIGURE 2T**



**FIGURE 3A****FIGURE 3B****FIGURE 3C****FIGURE 3D****FIGURE 3E**





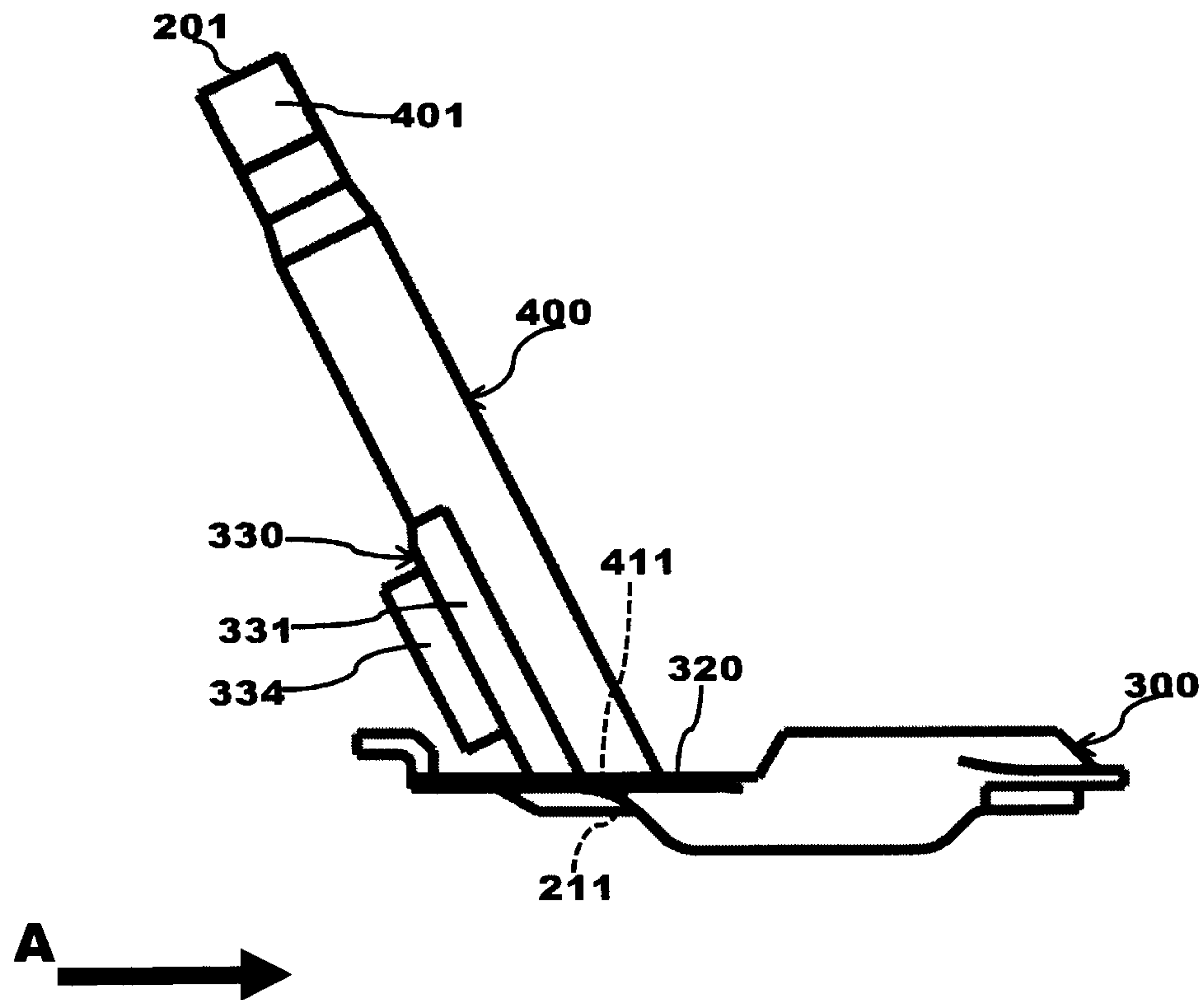


FIGURE 4A

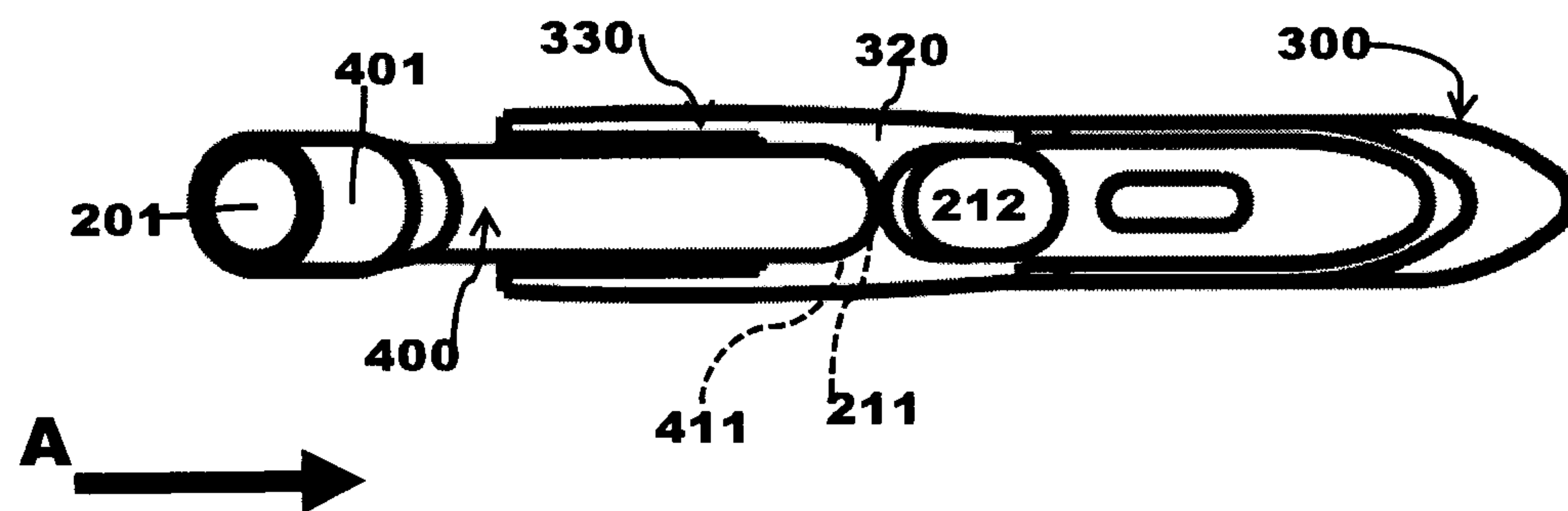


FIGURE 4C

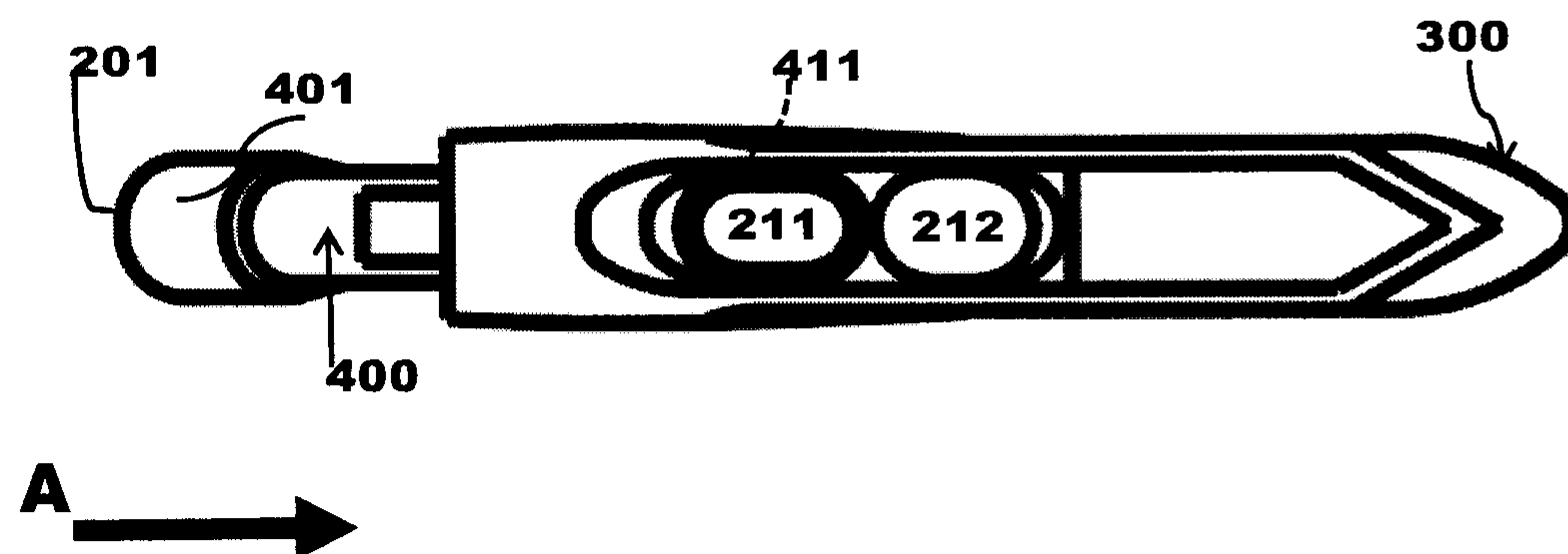
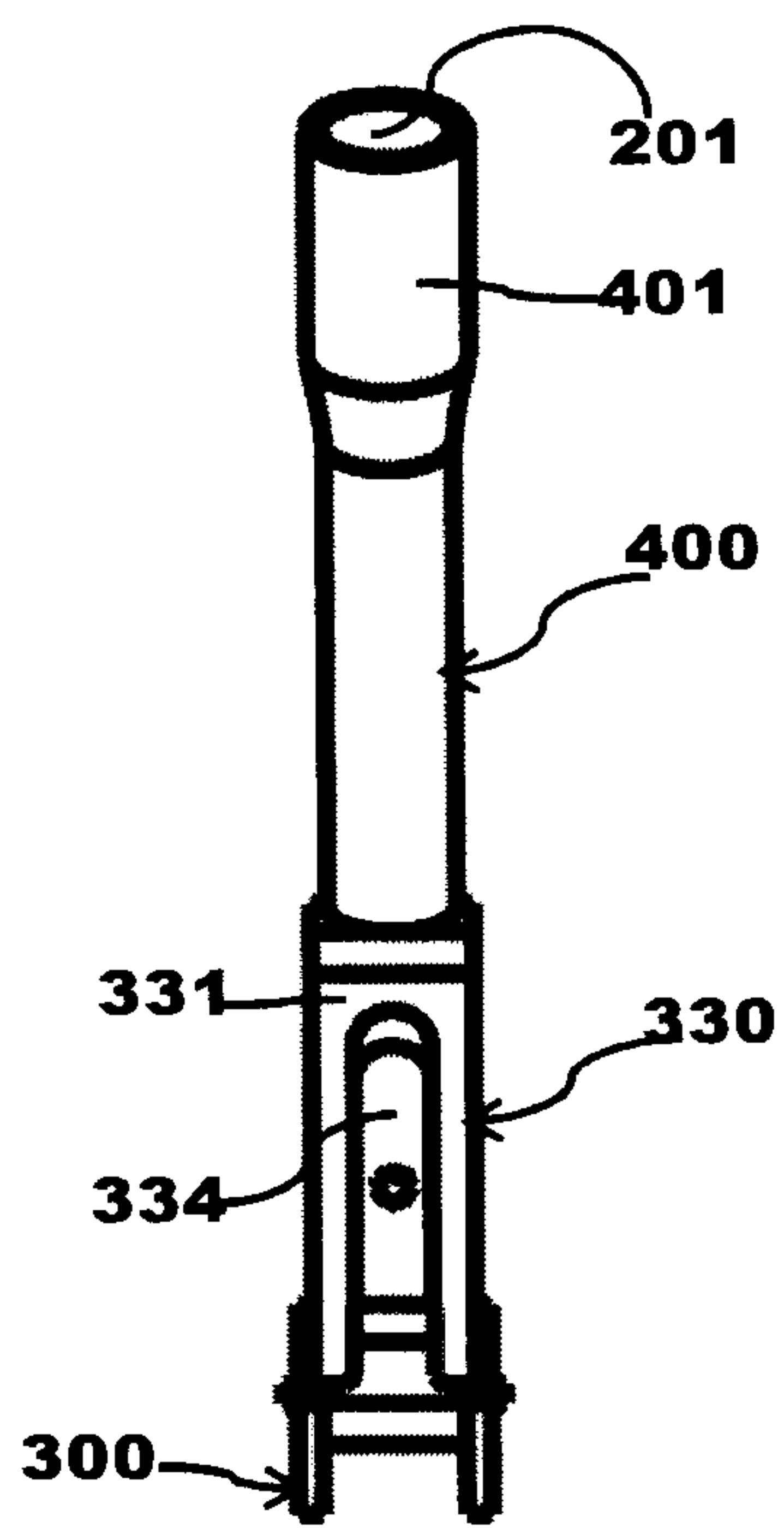
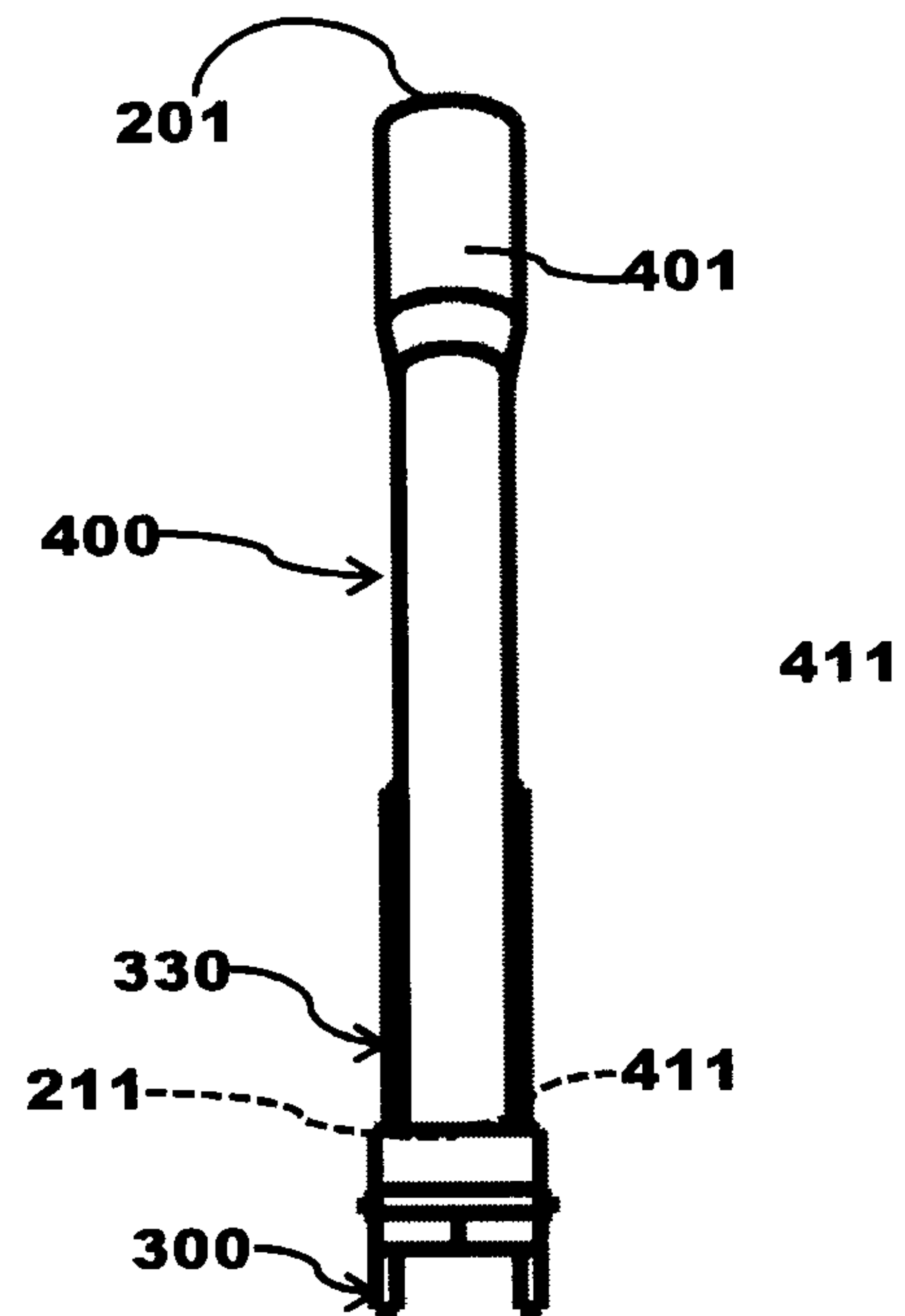
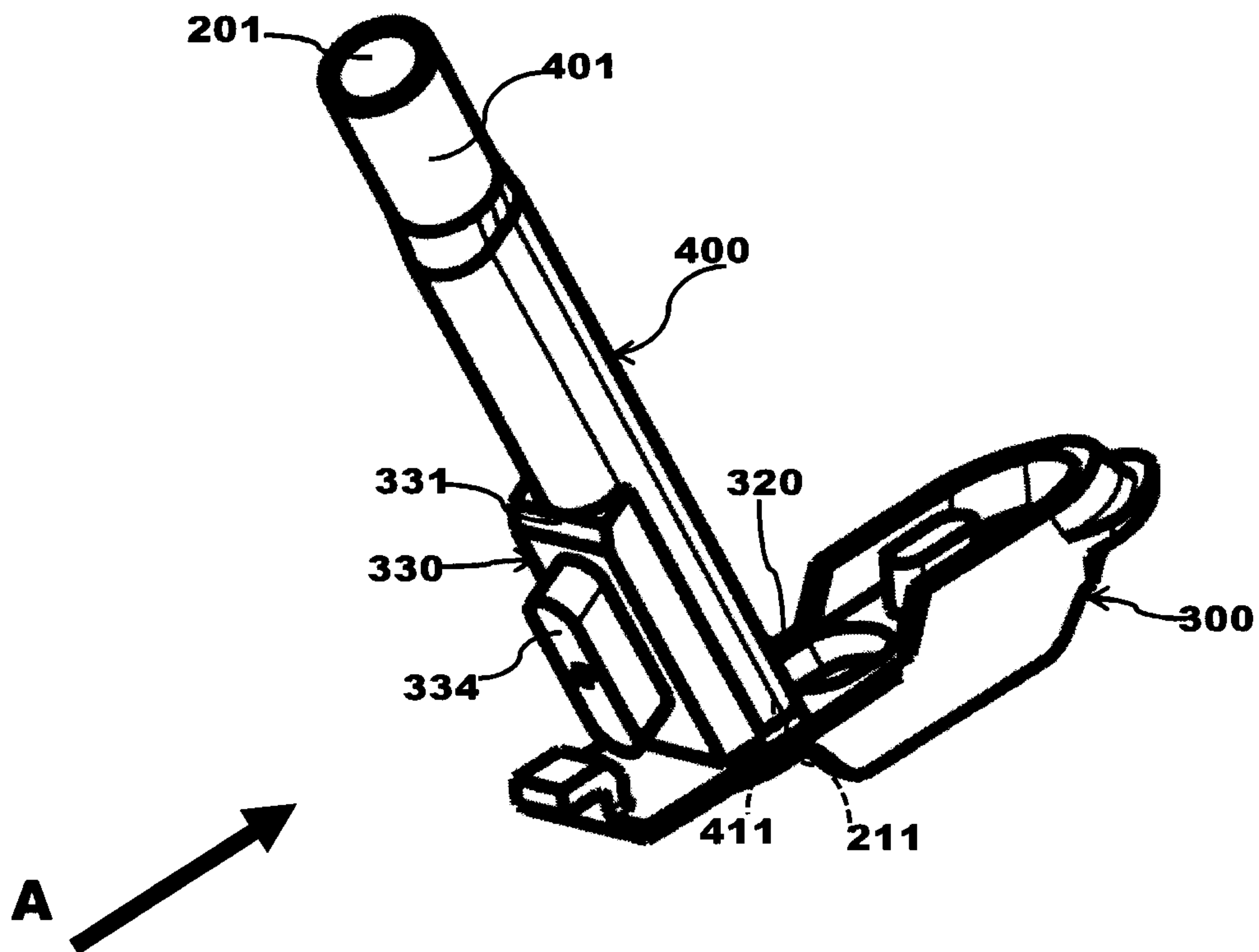
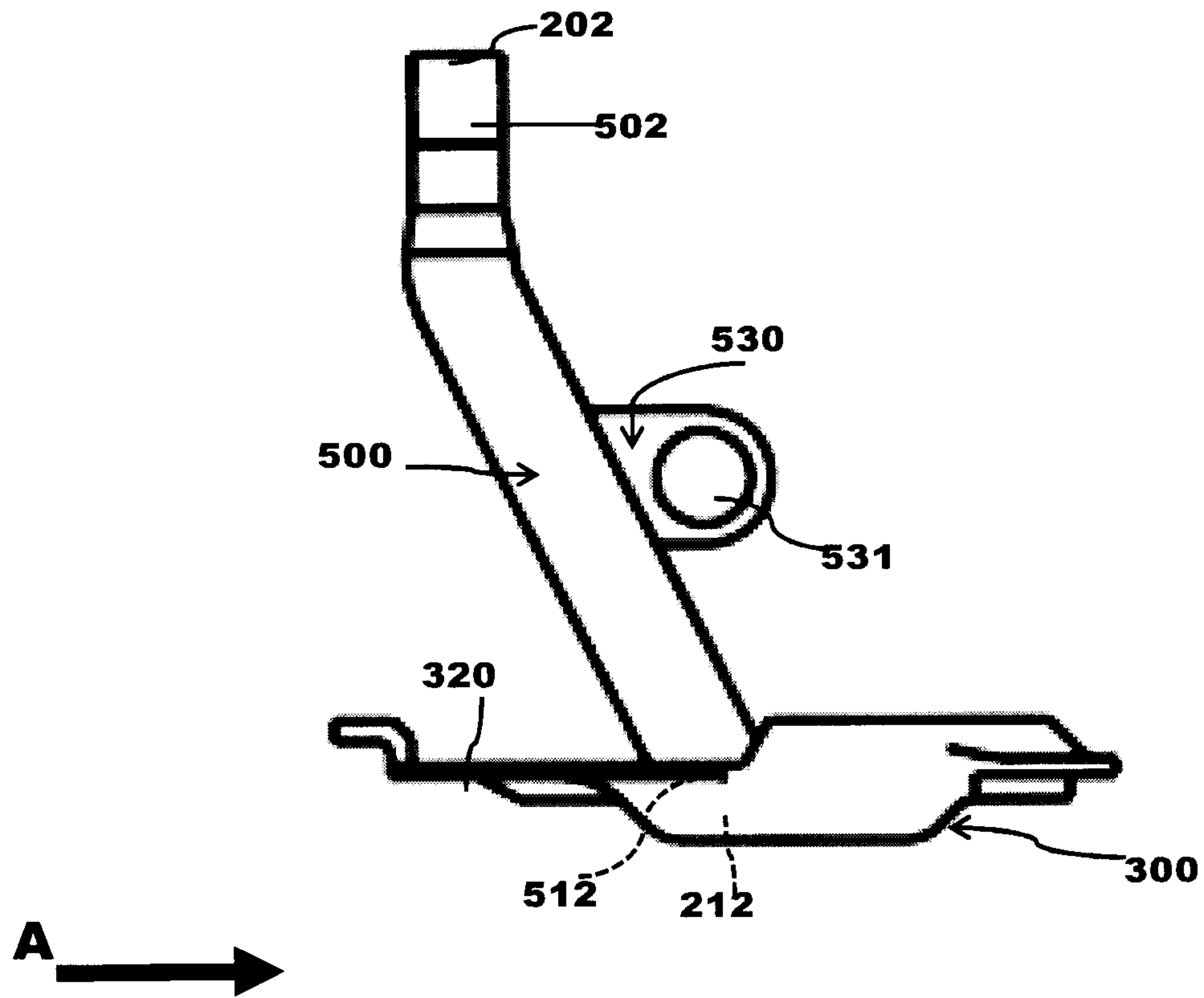
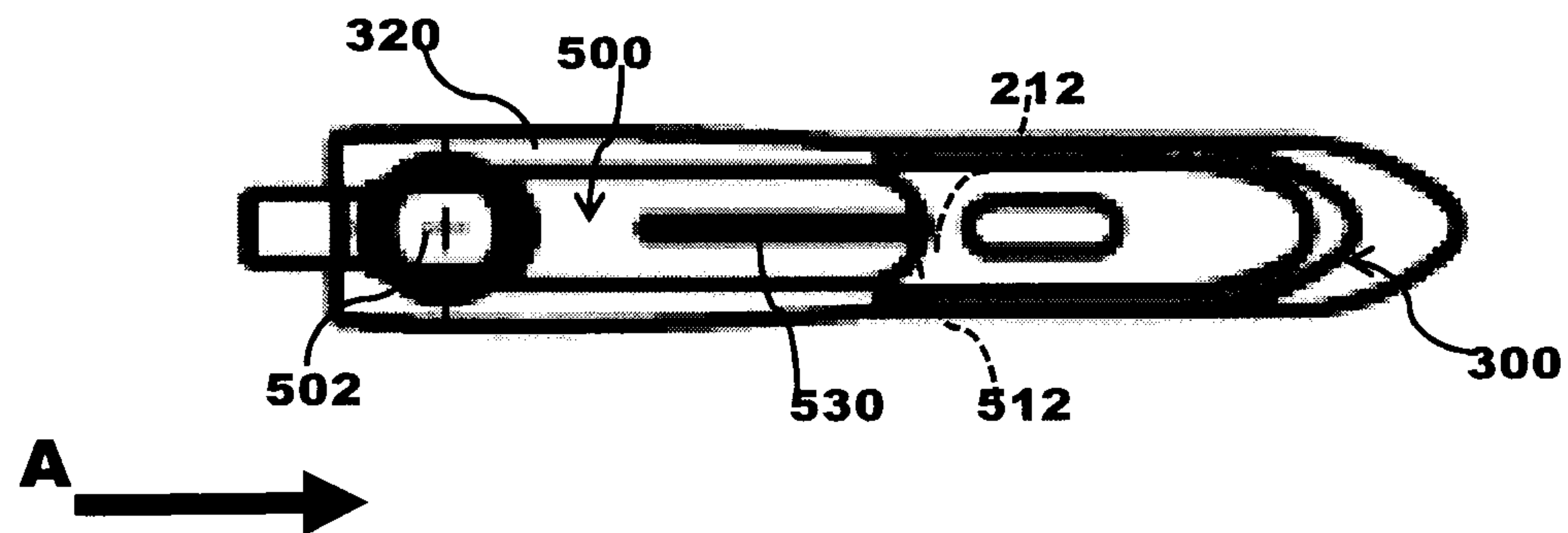
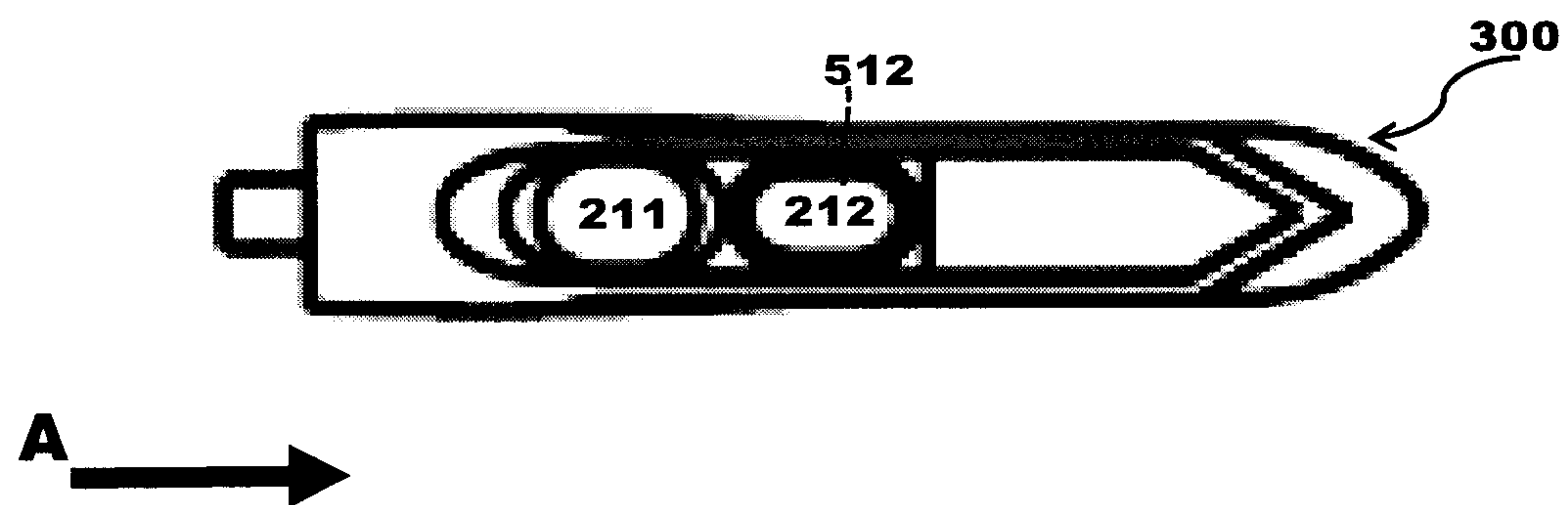
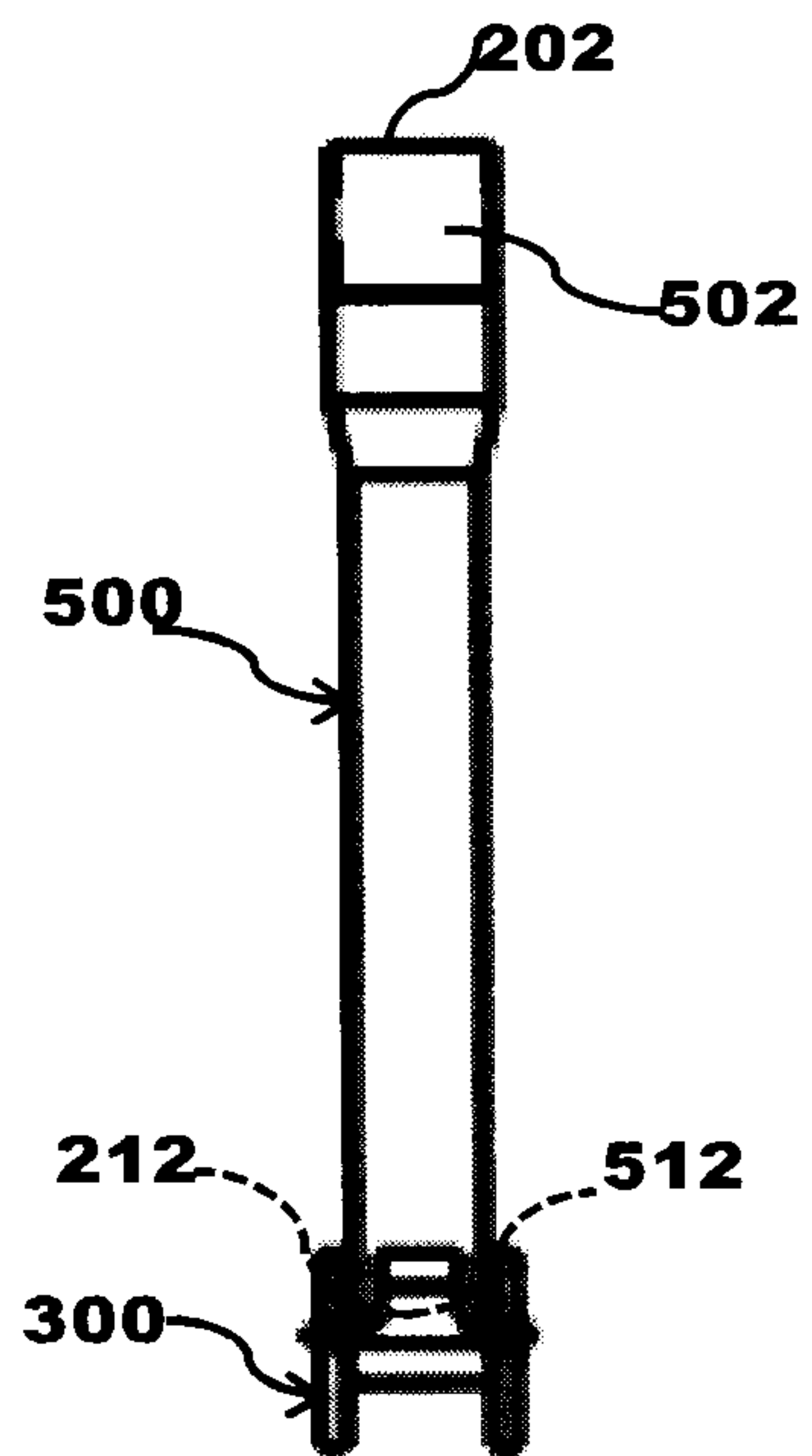
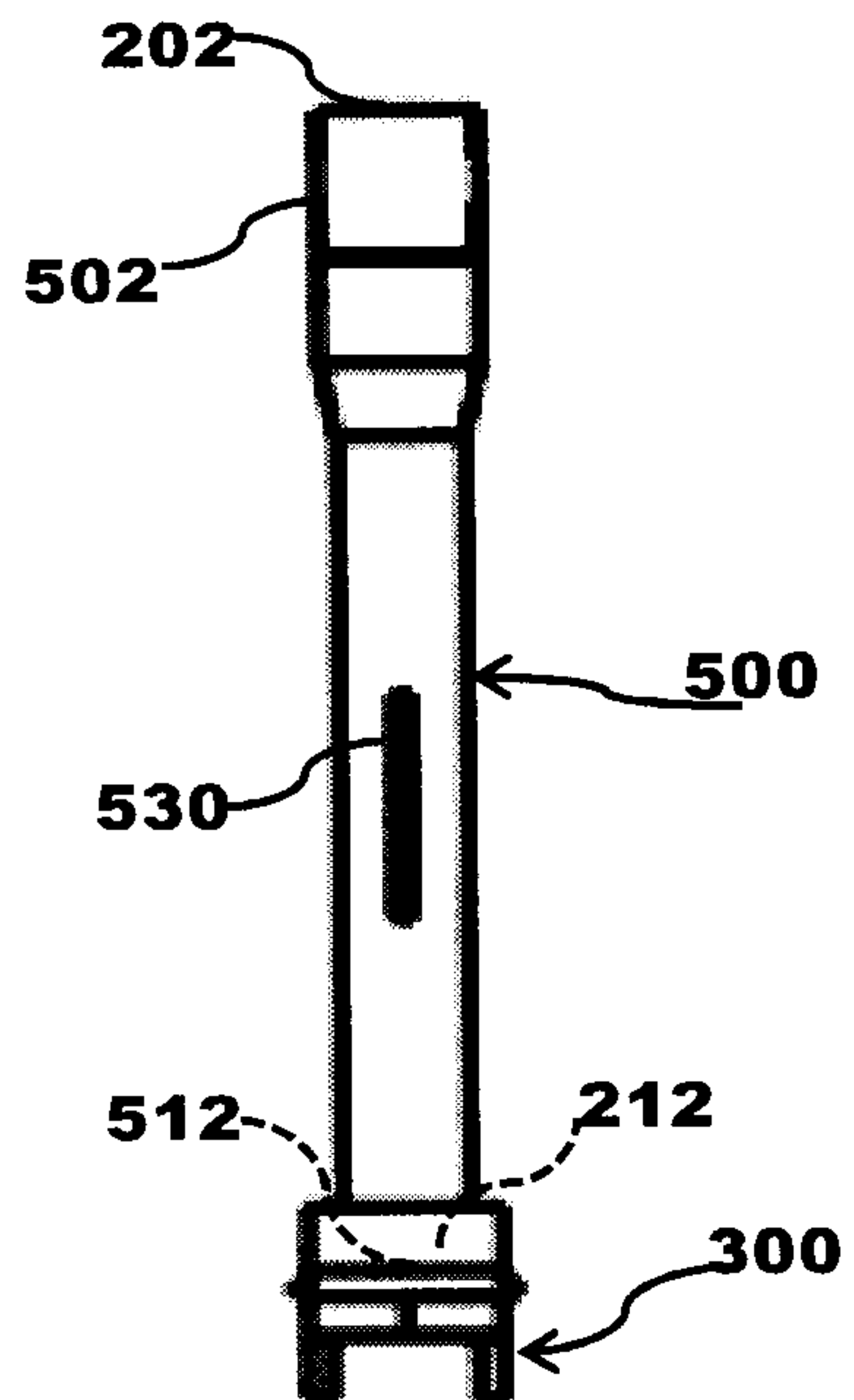
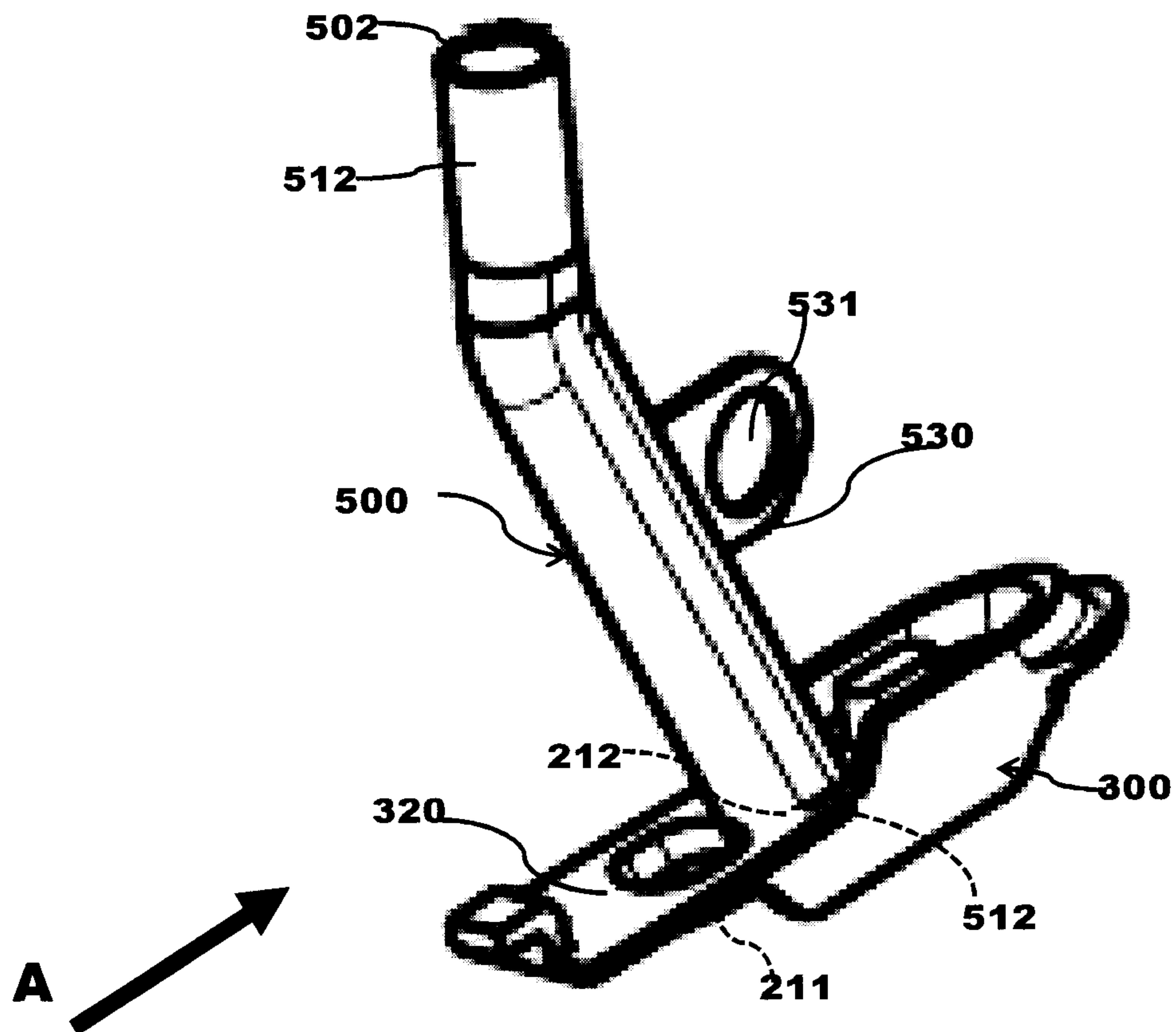
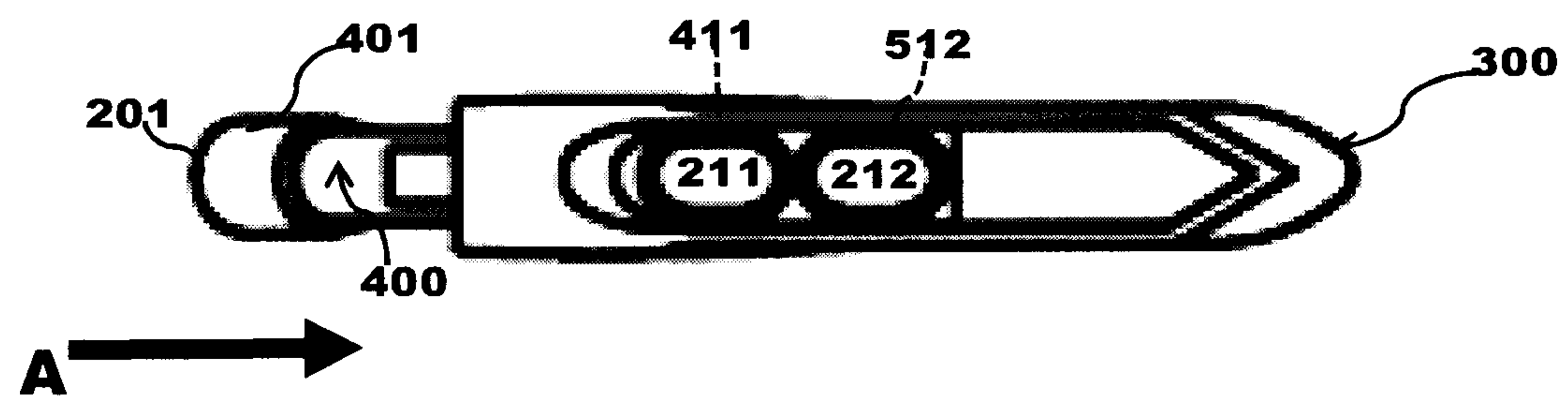
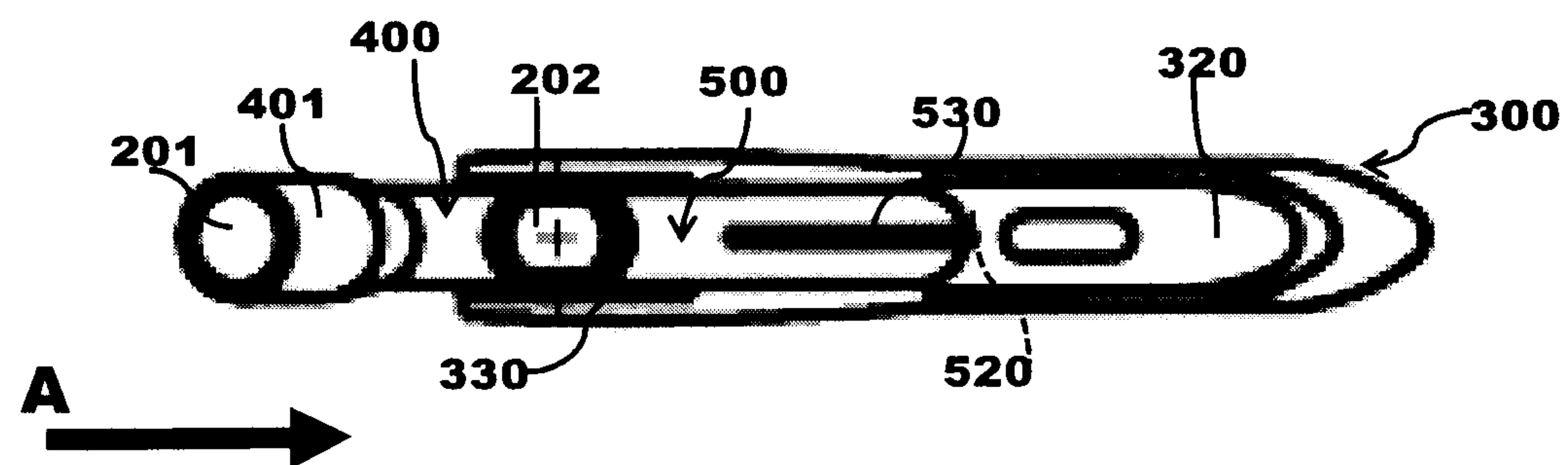
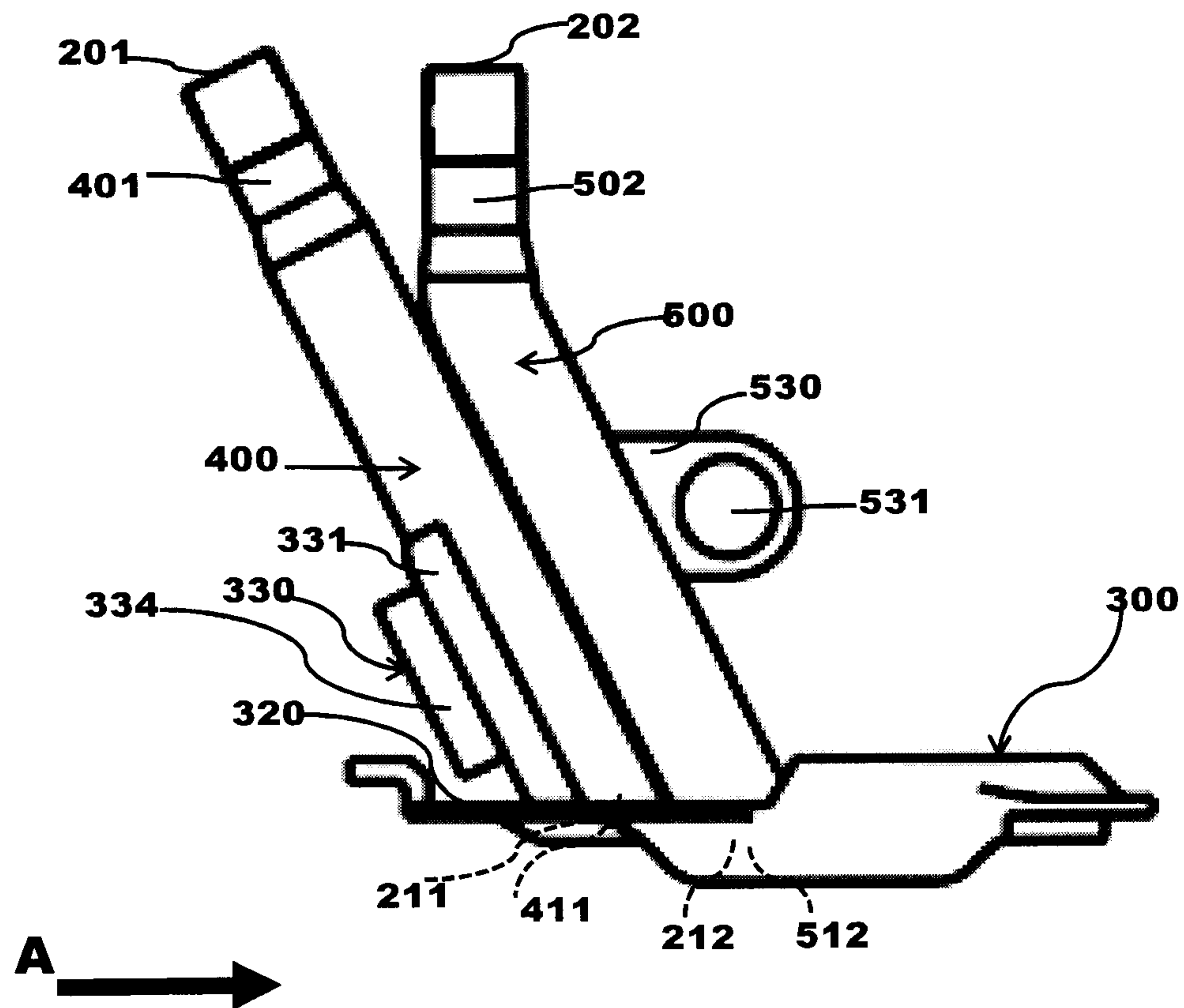


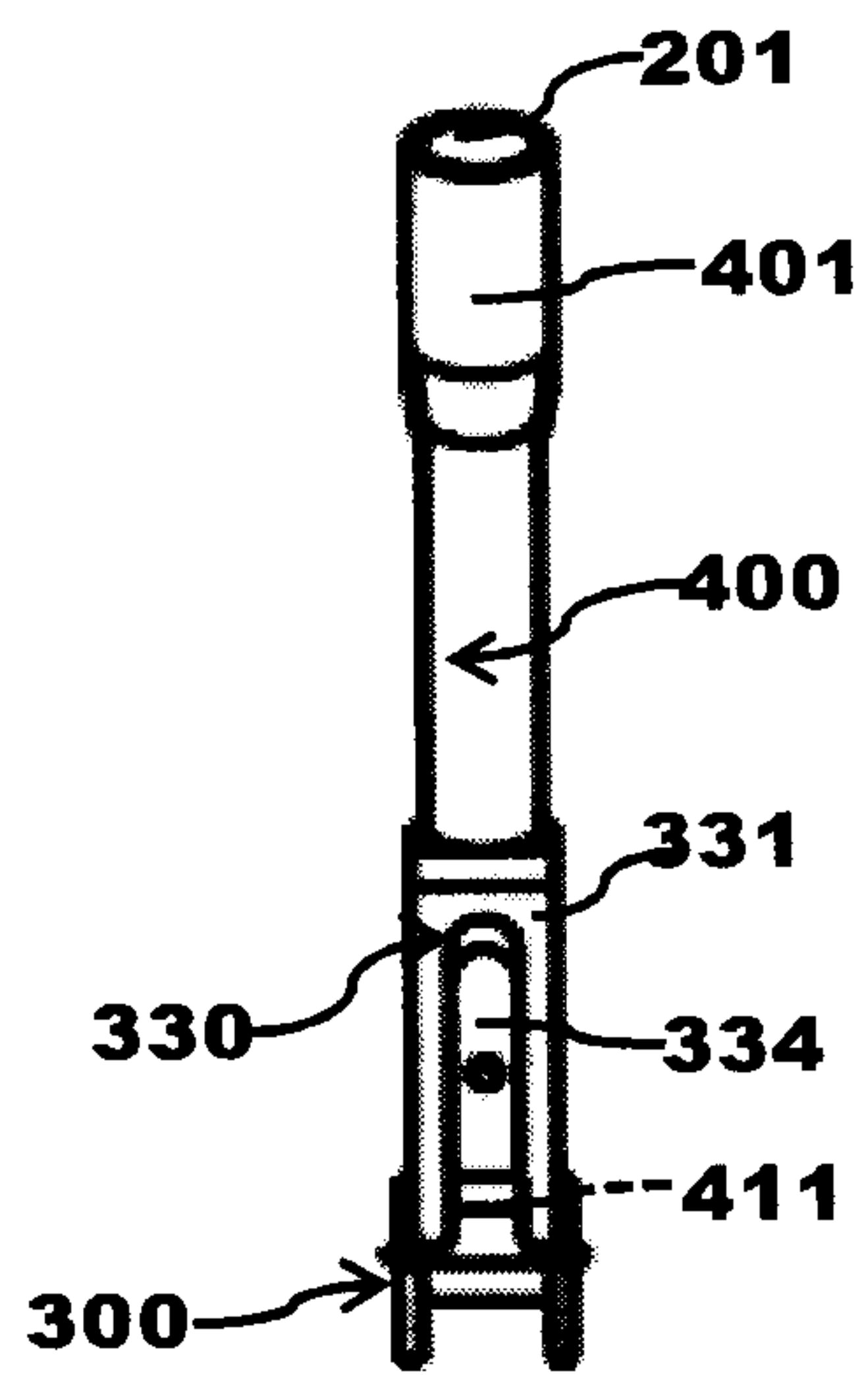
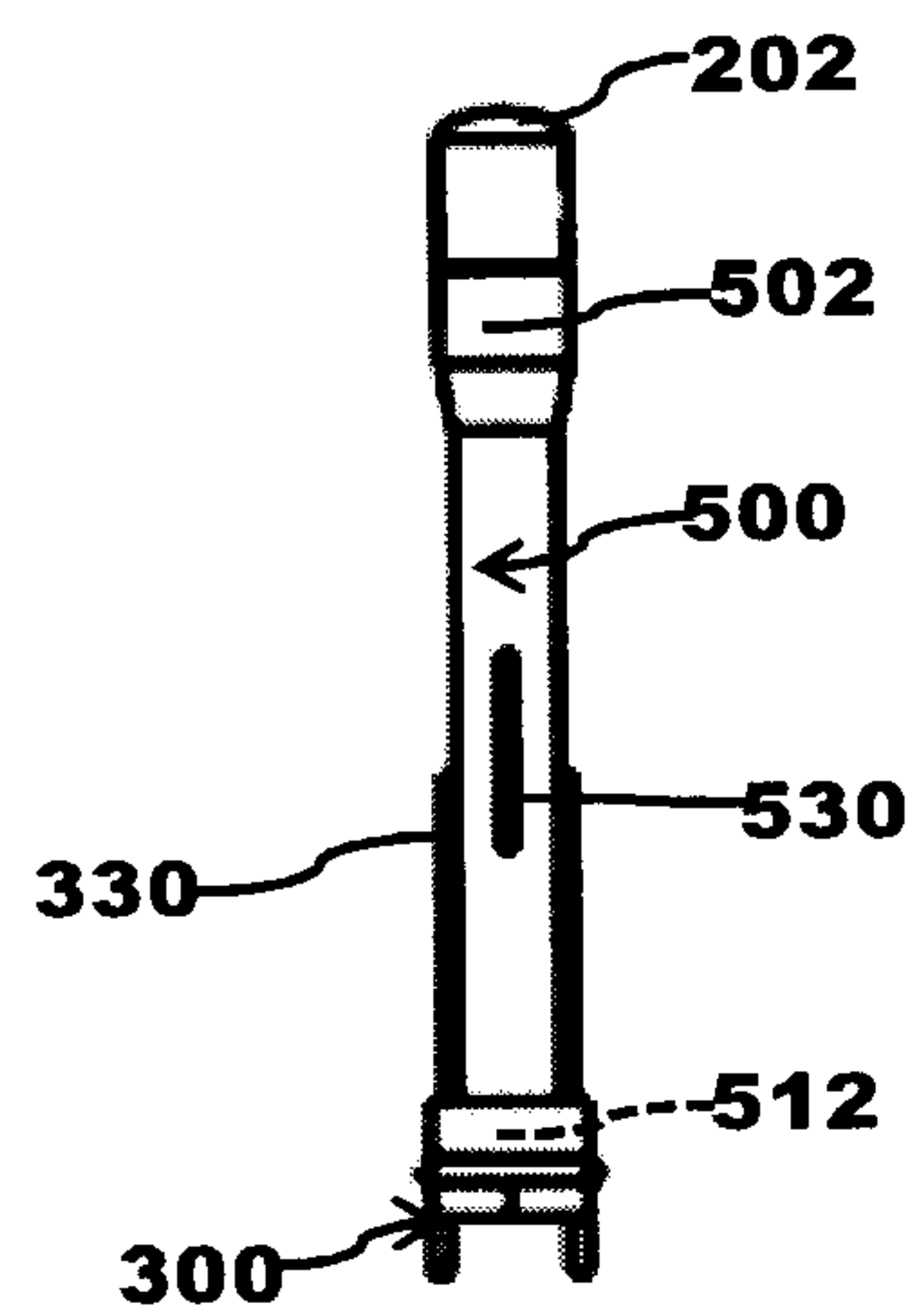
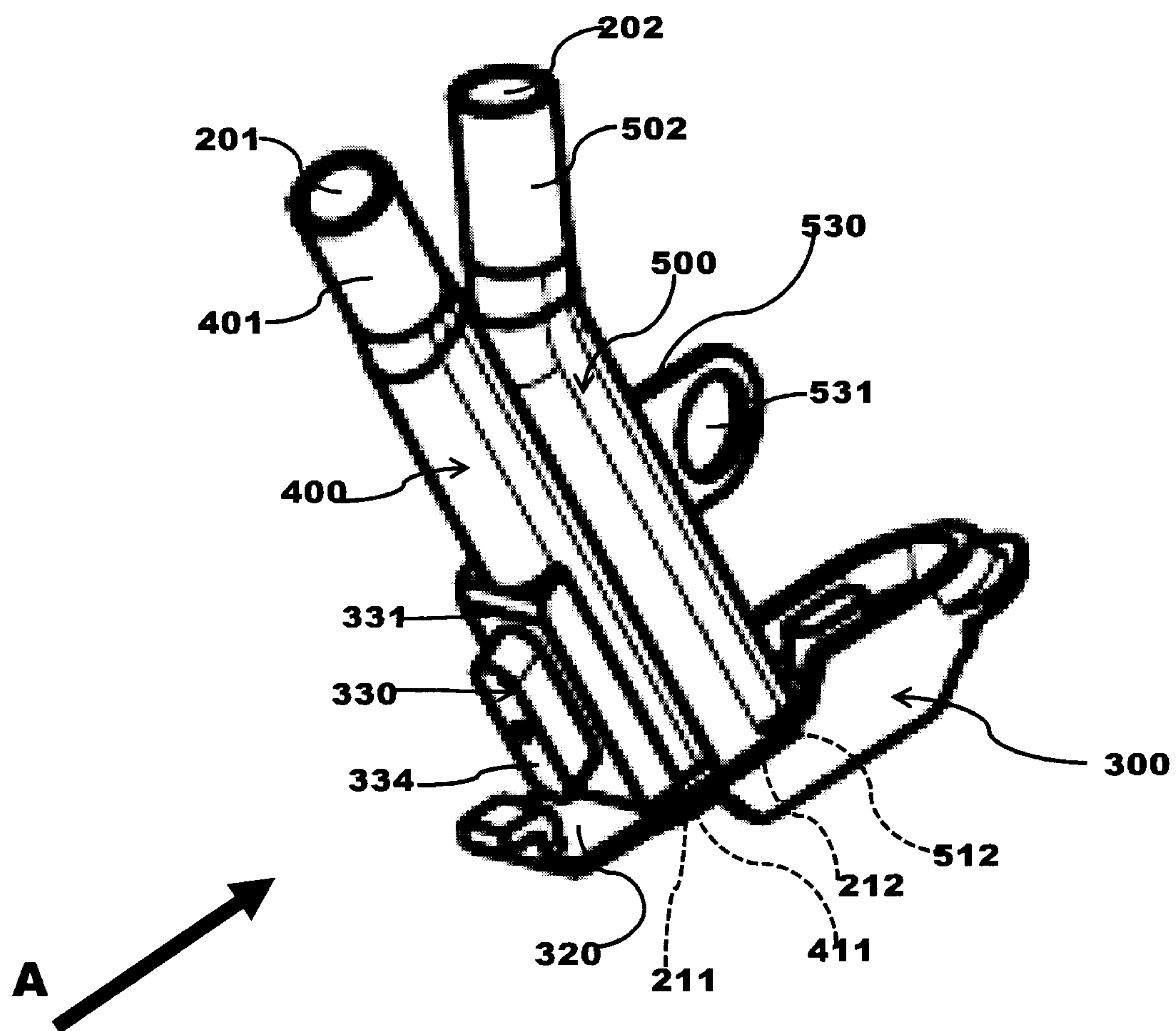
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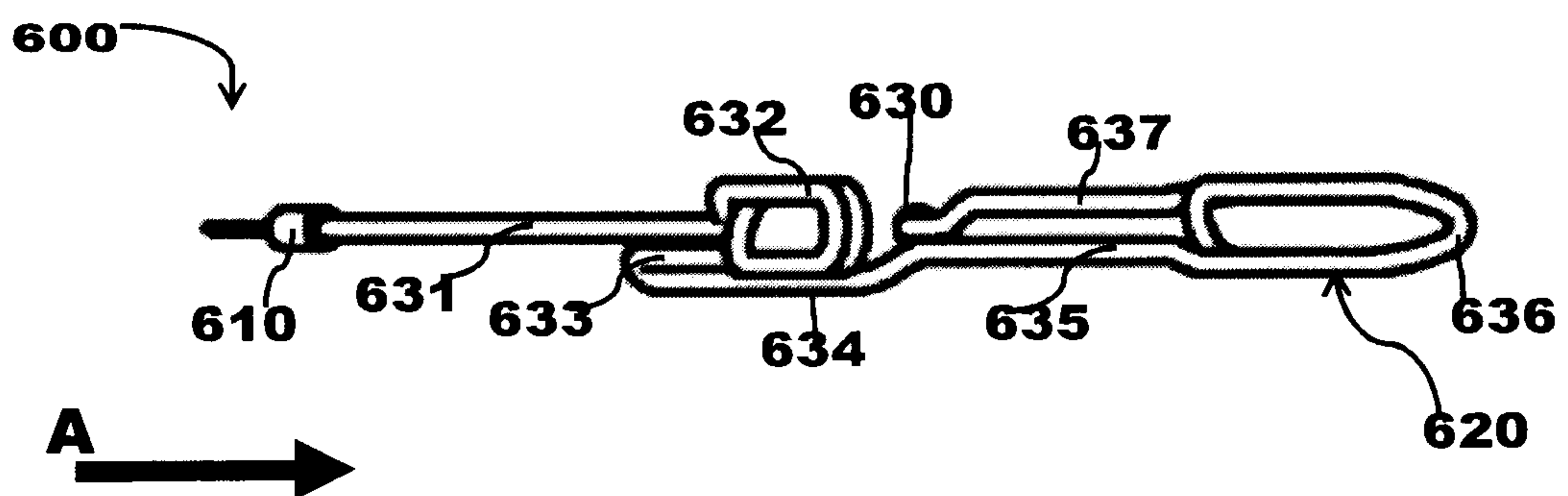
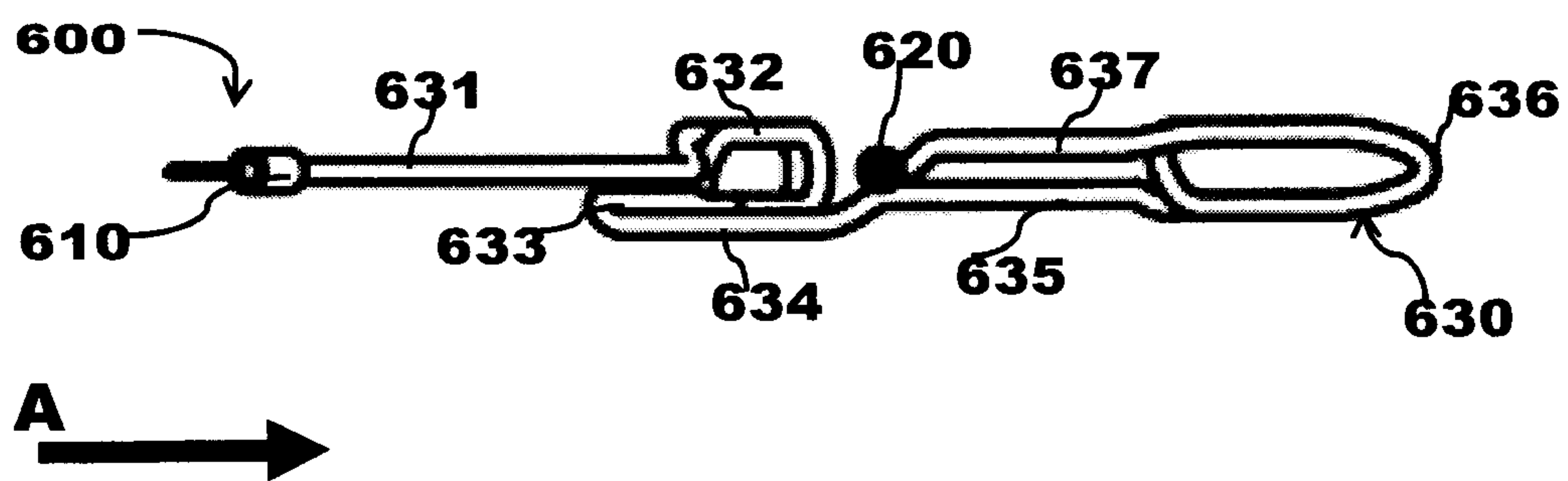
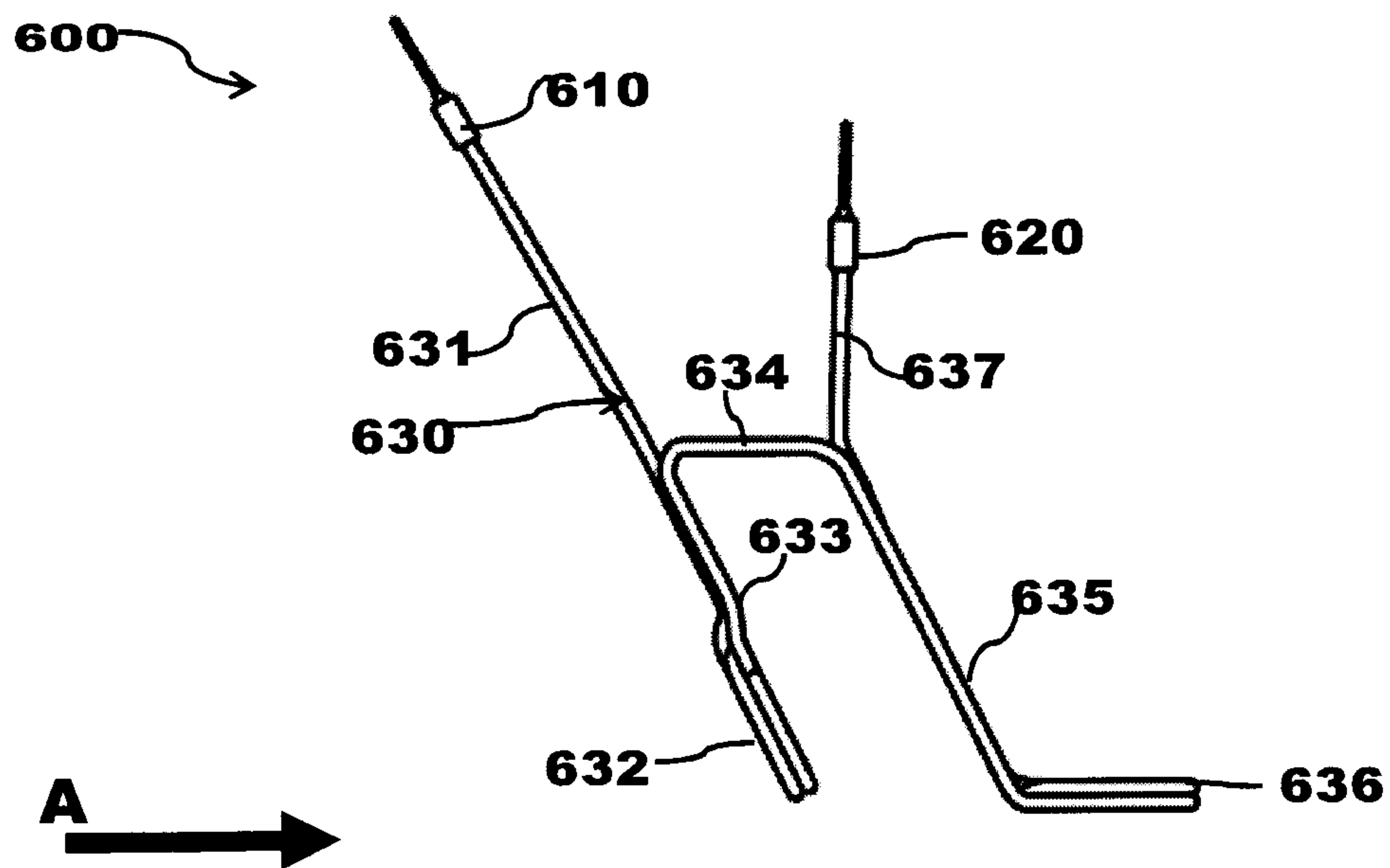
**FIGURE 4D****FIGURE 4E****FIGURE 4F**

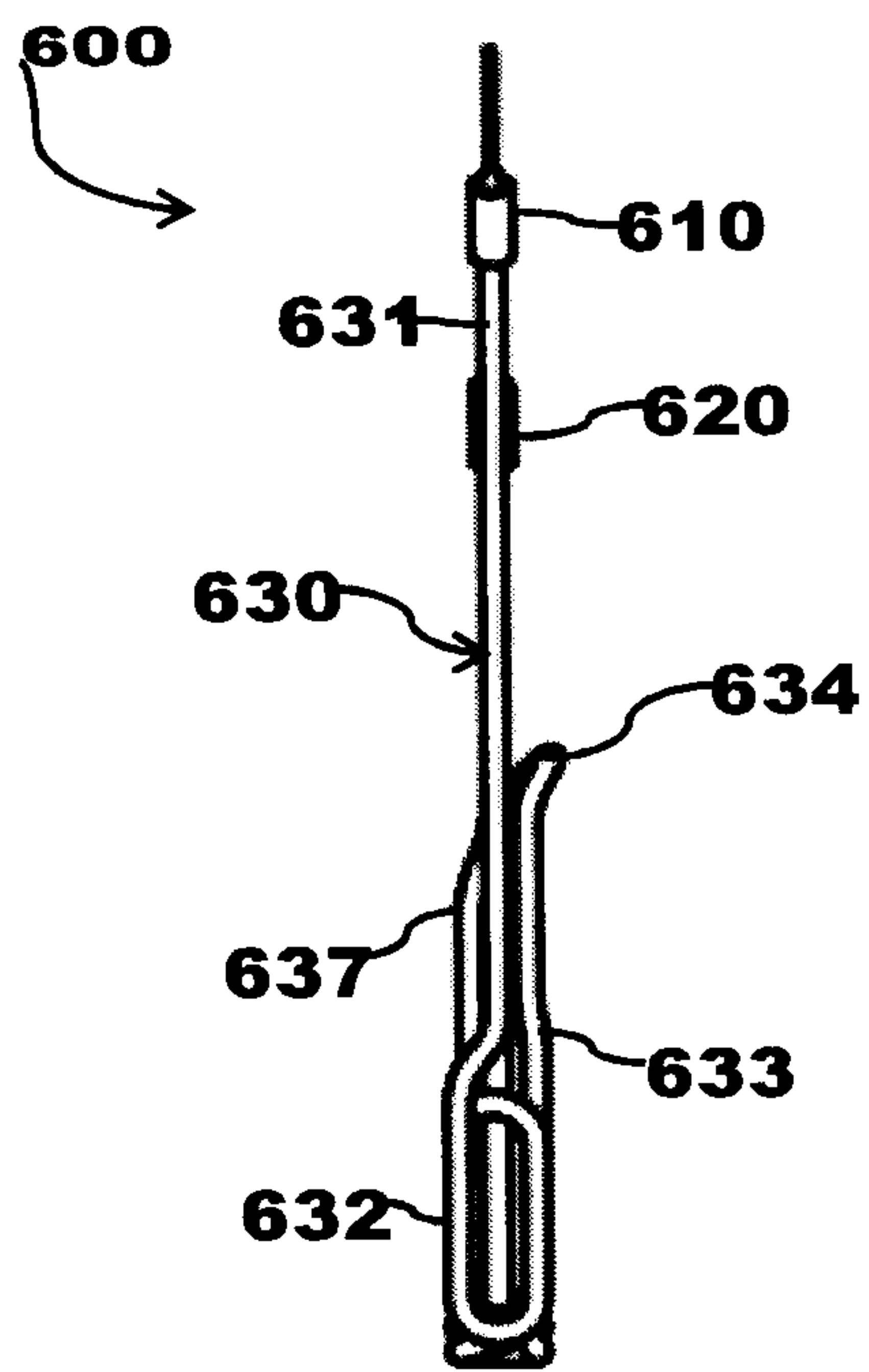
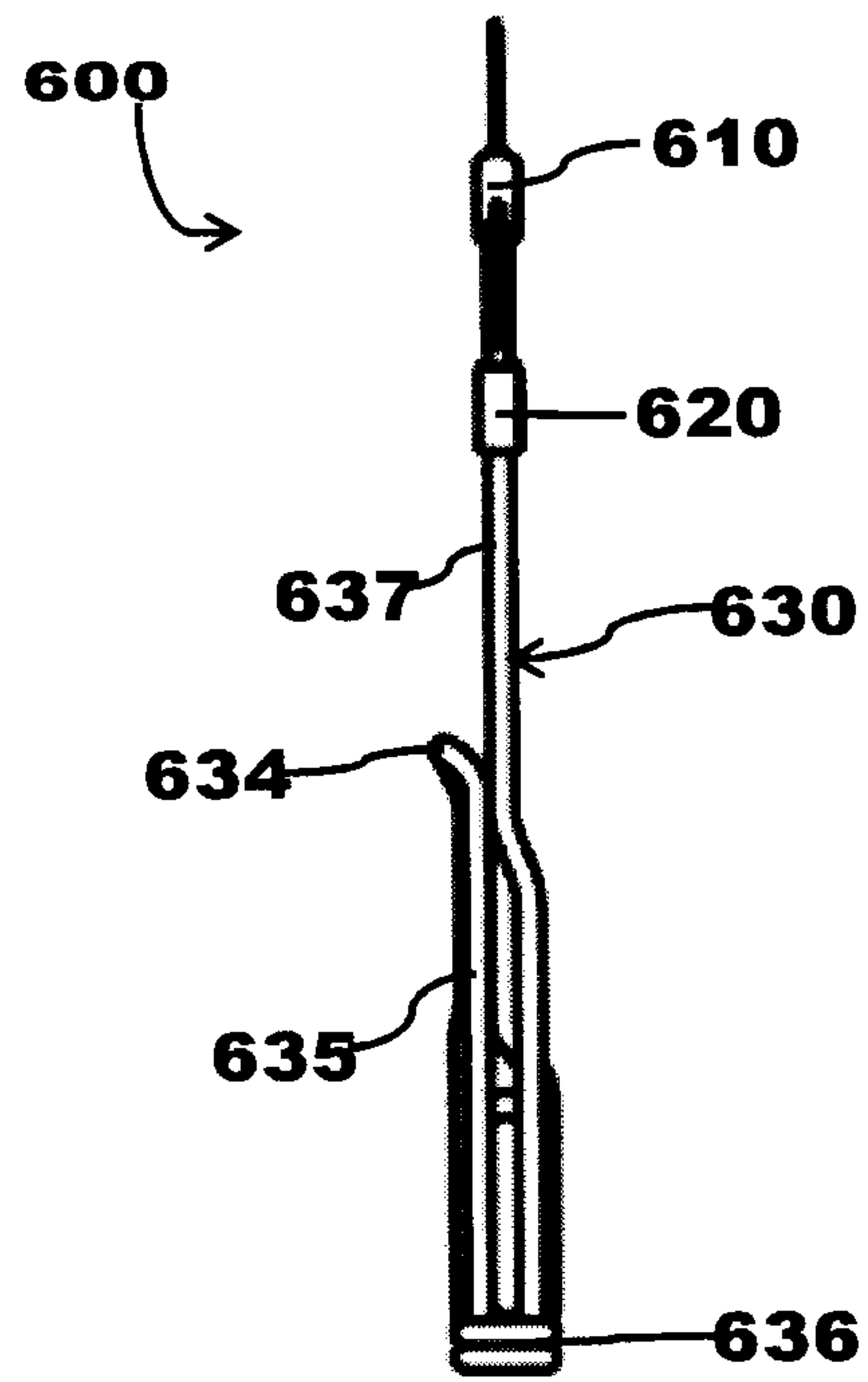
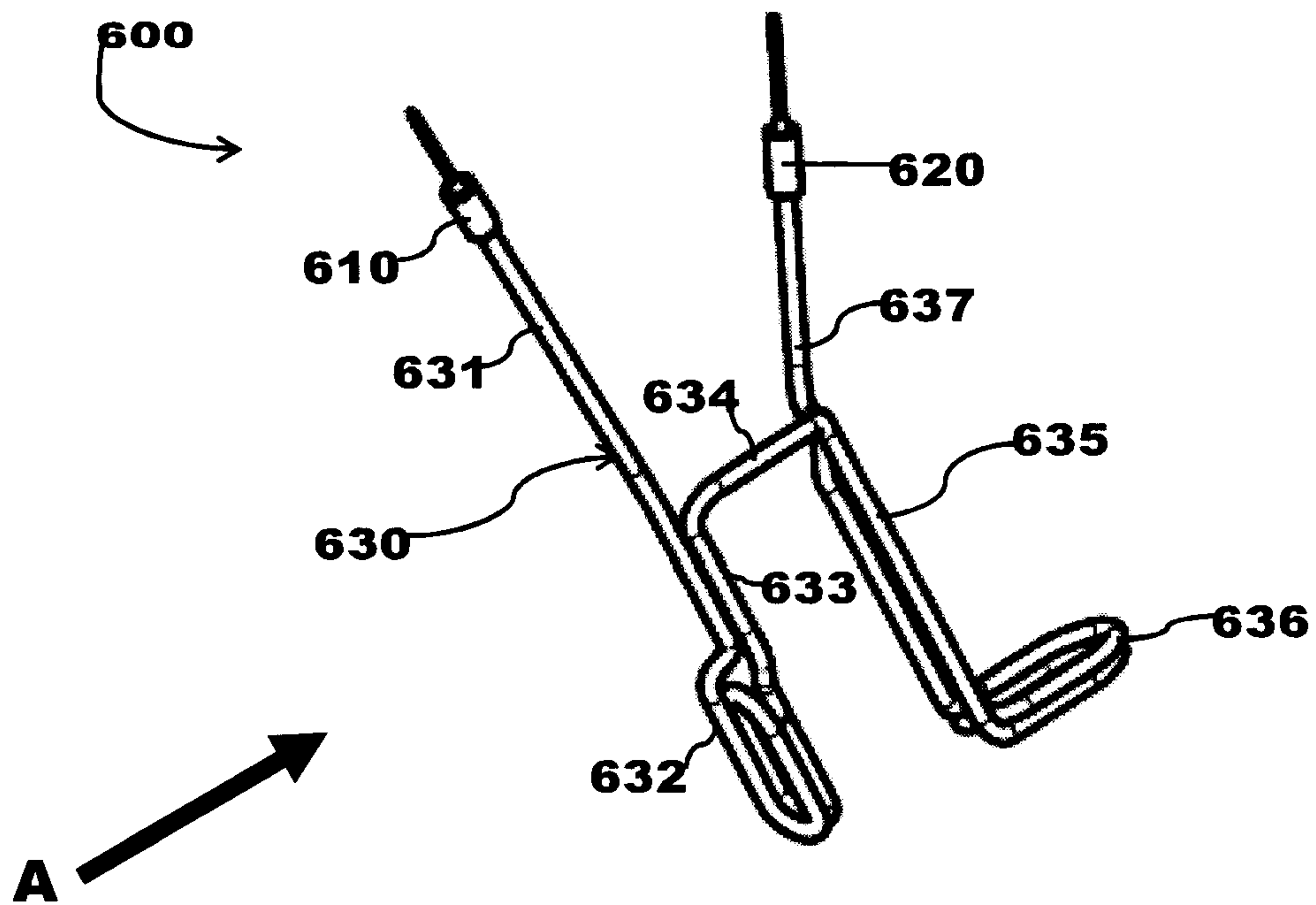
**FIGURE 5A****FIGURE 5B****FIGURE 5C**

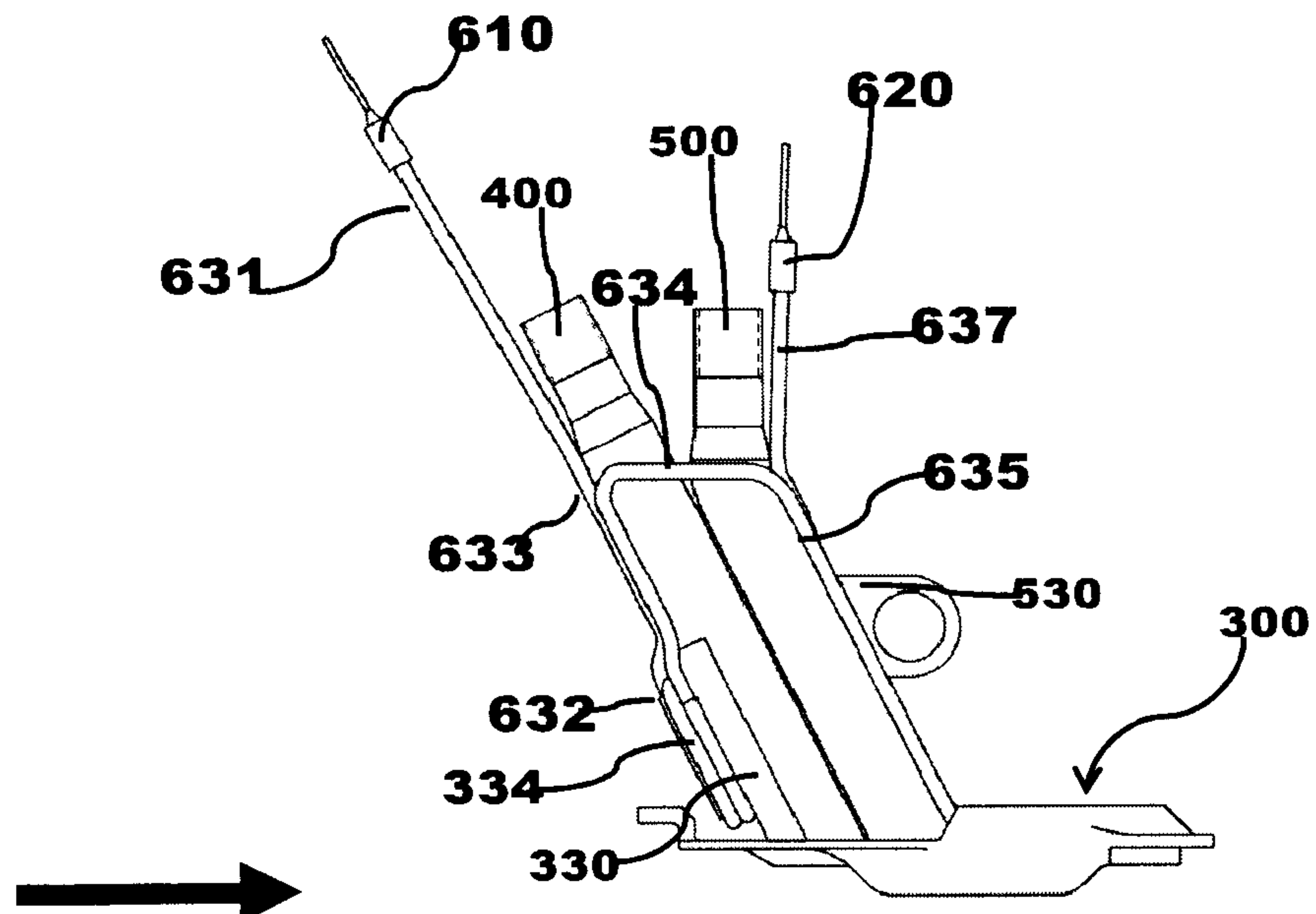
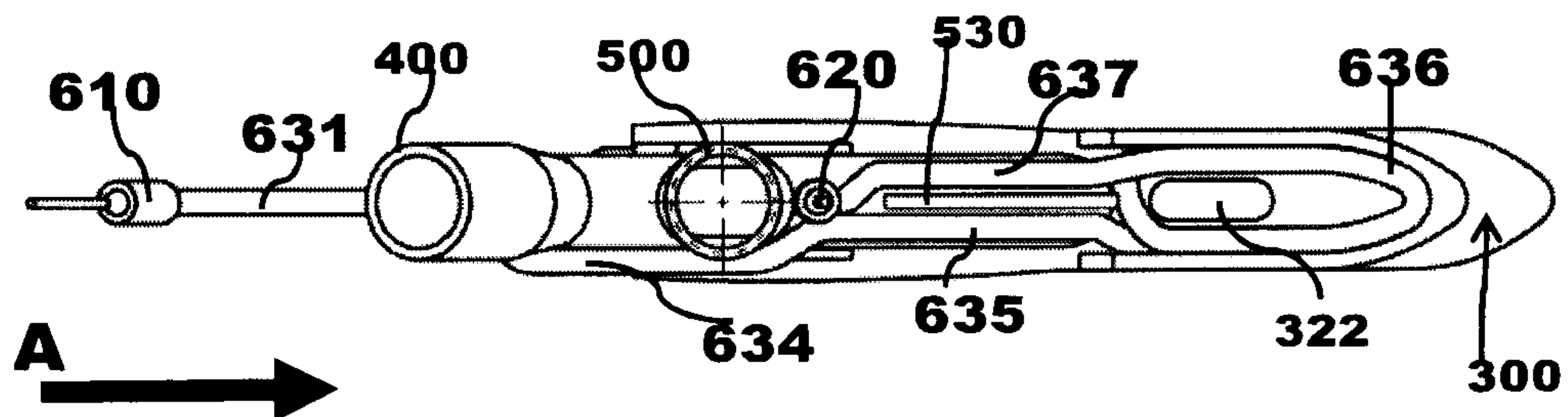
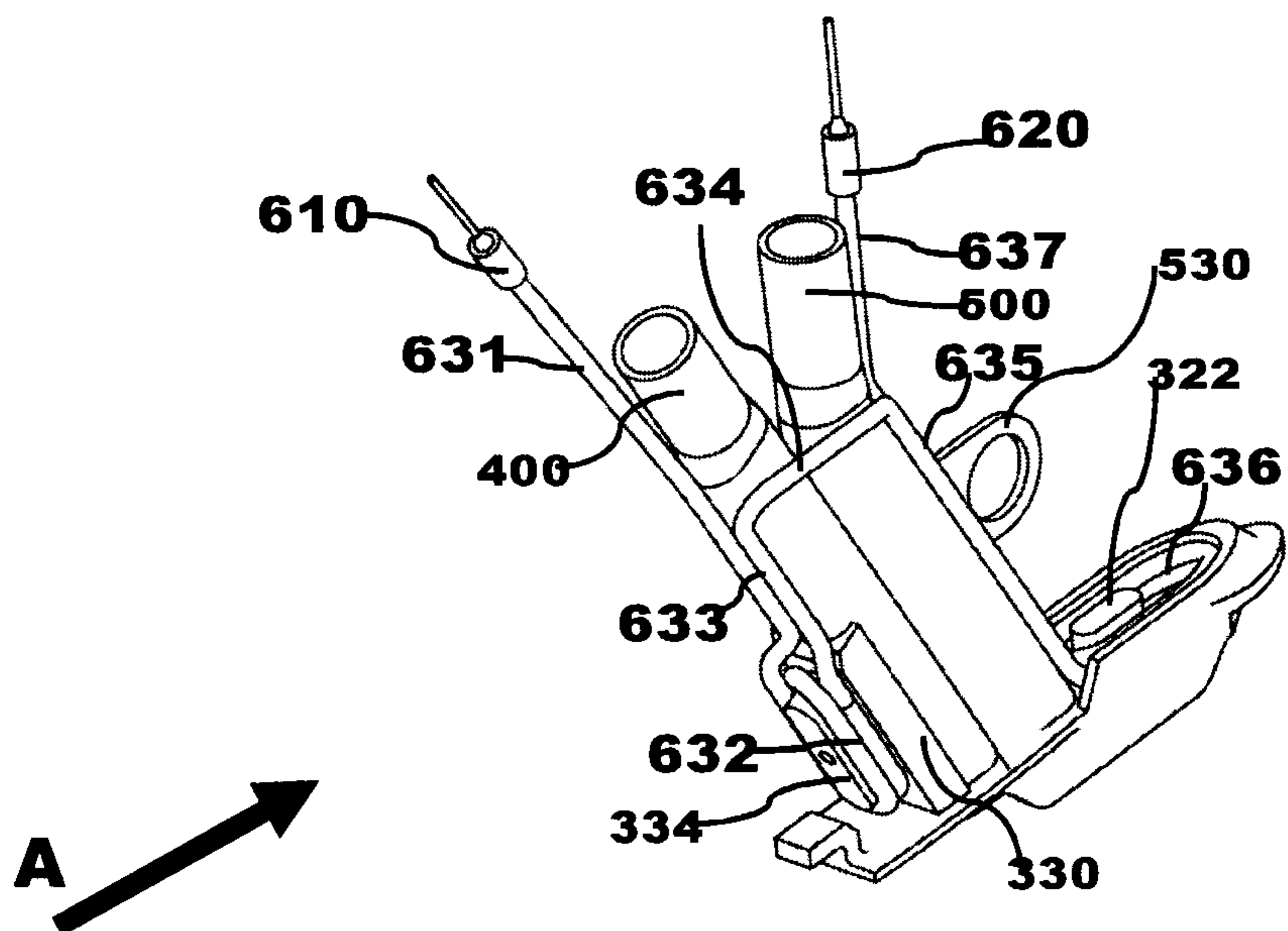
**FIGURE 5D****FIGURE 5E****FIGURE 5F**

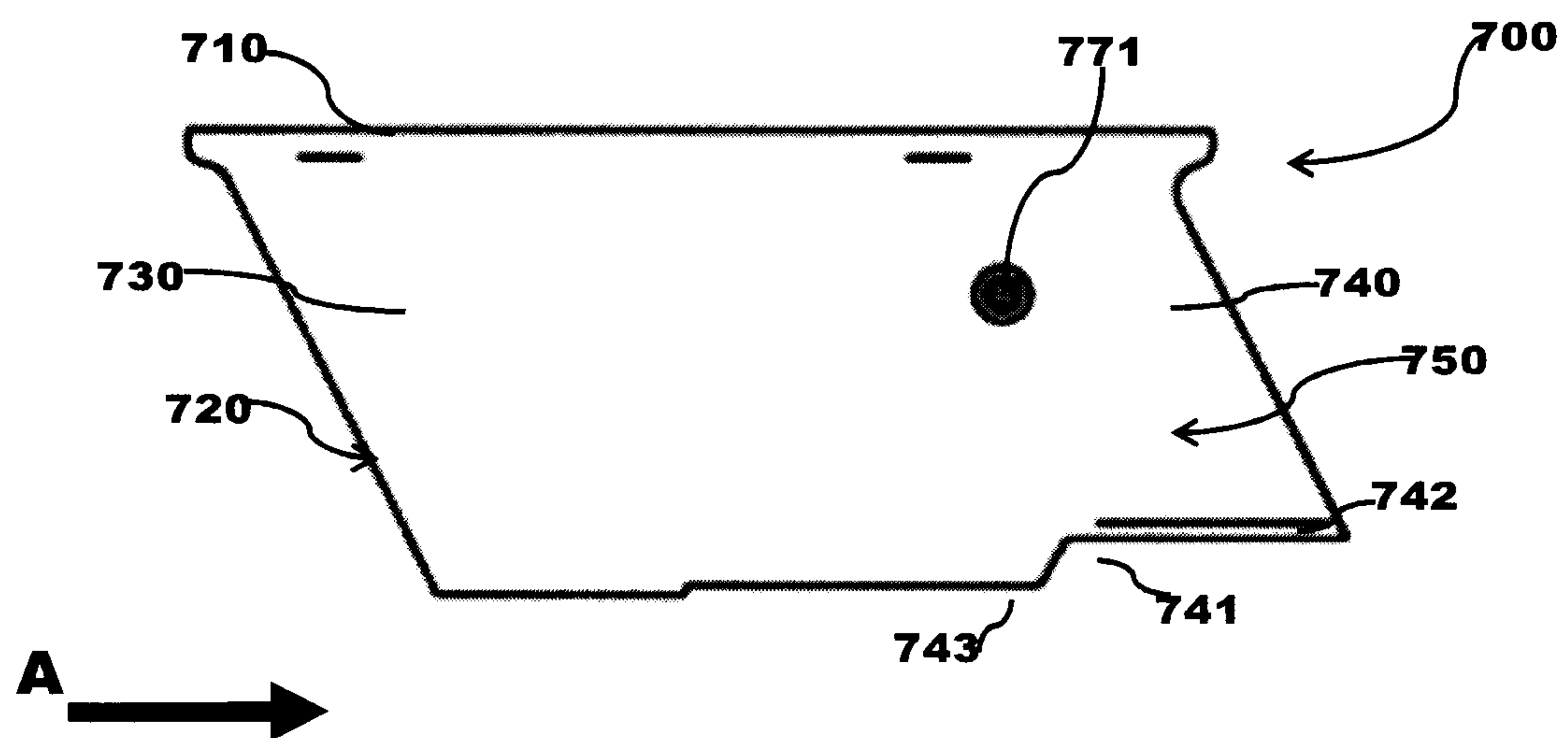
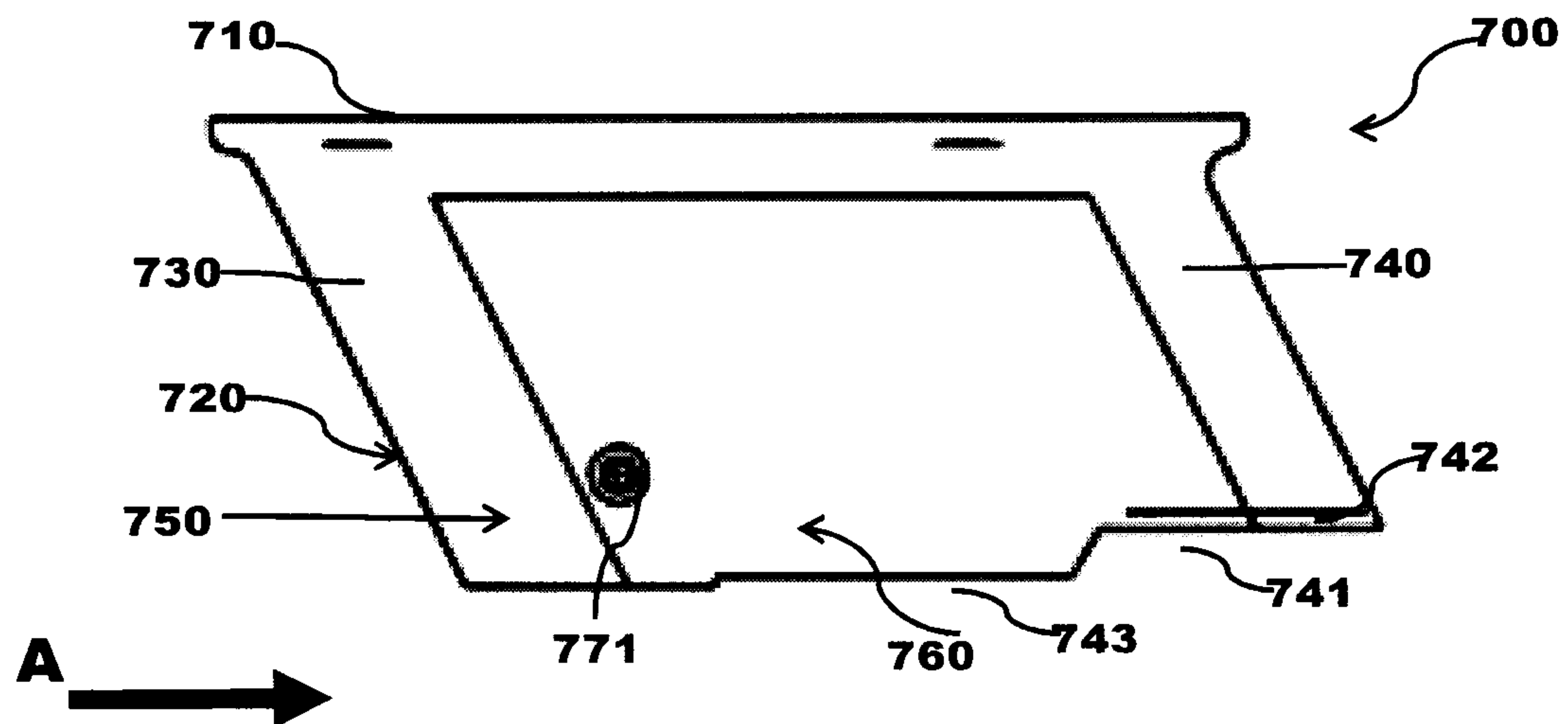


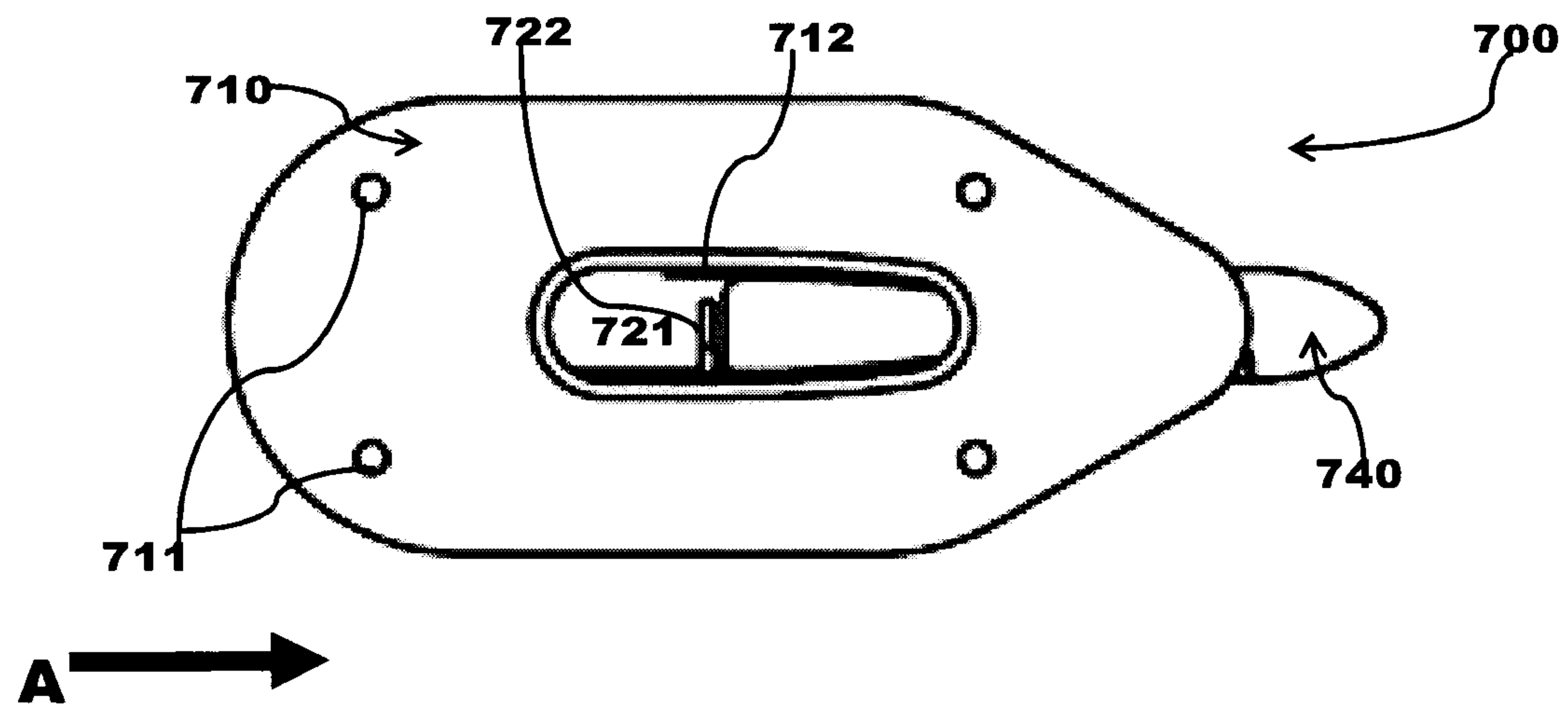
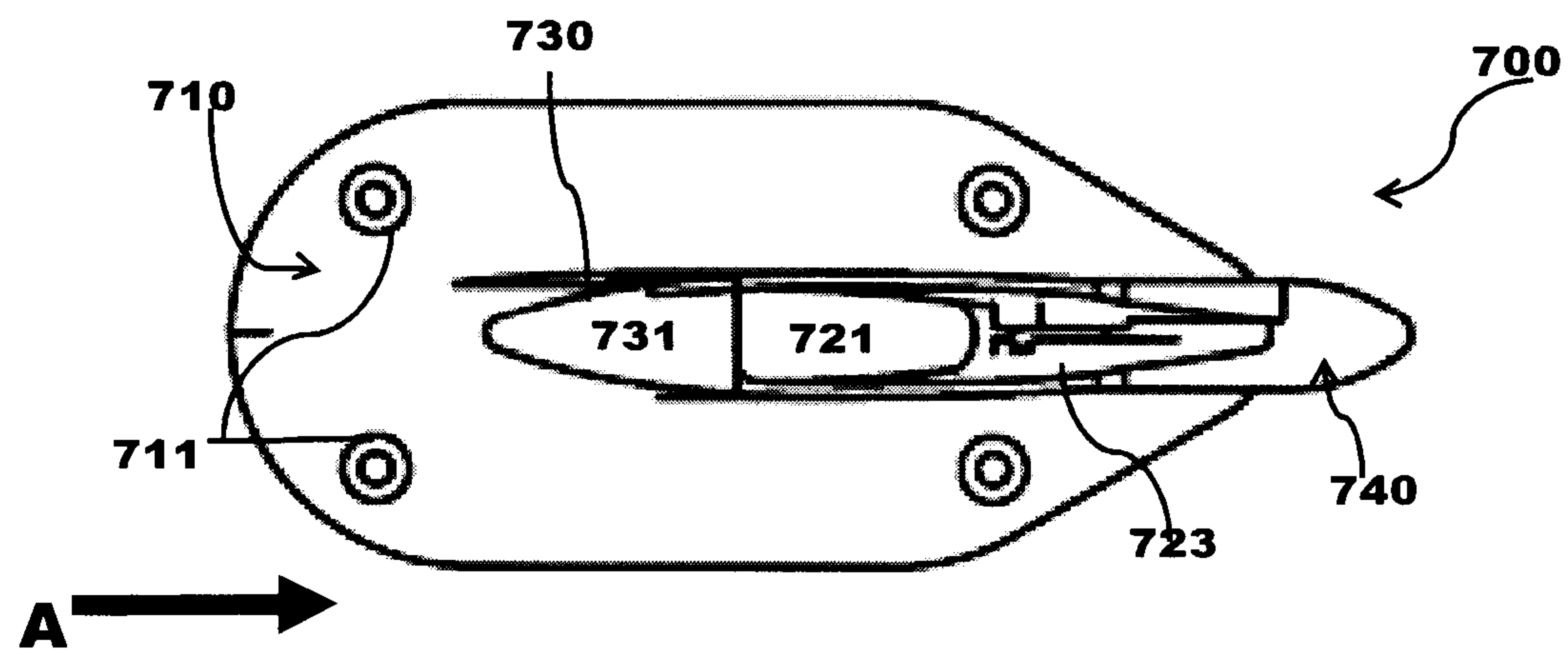
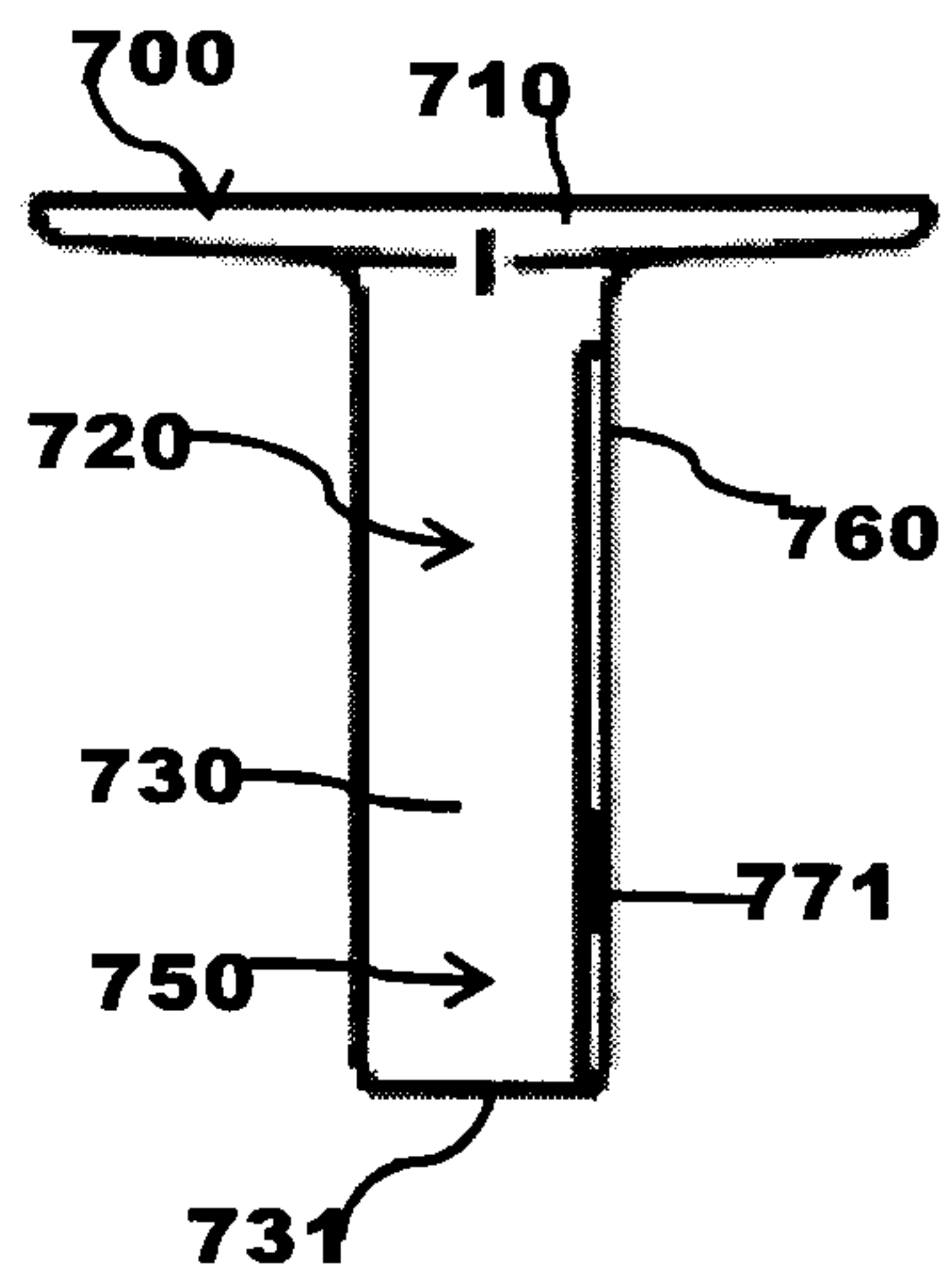
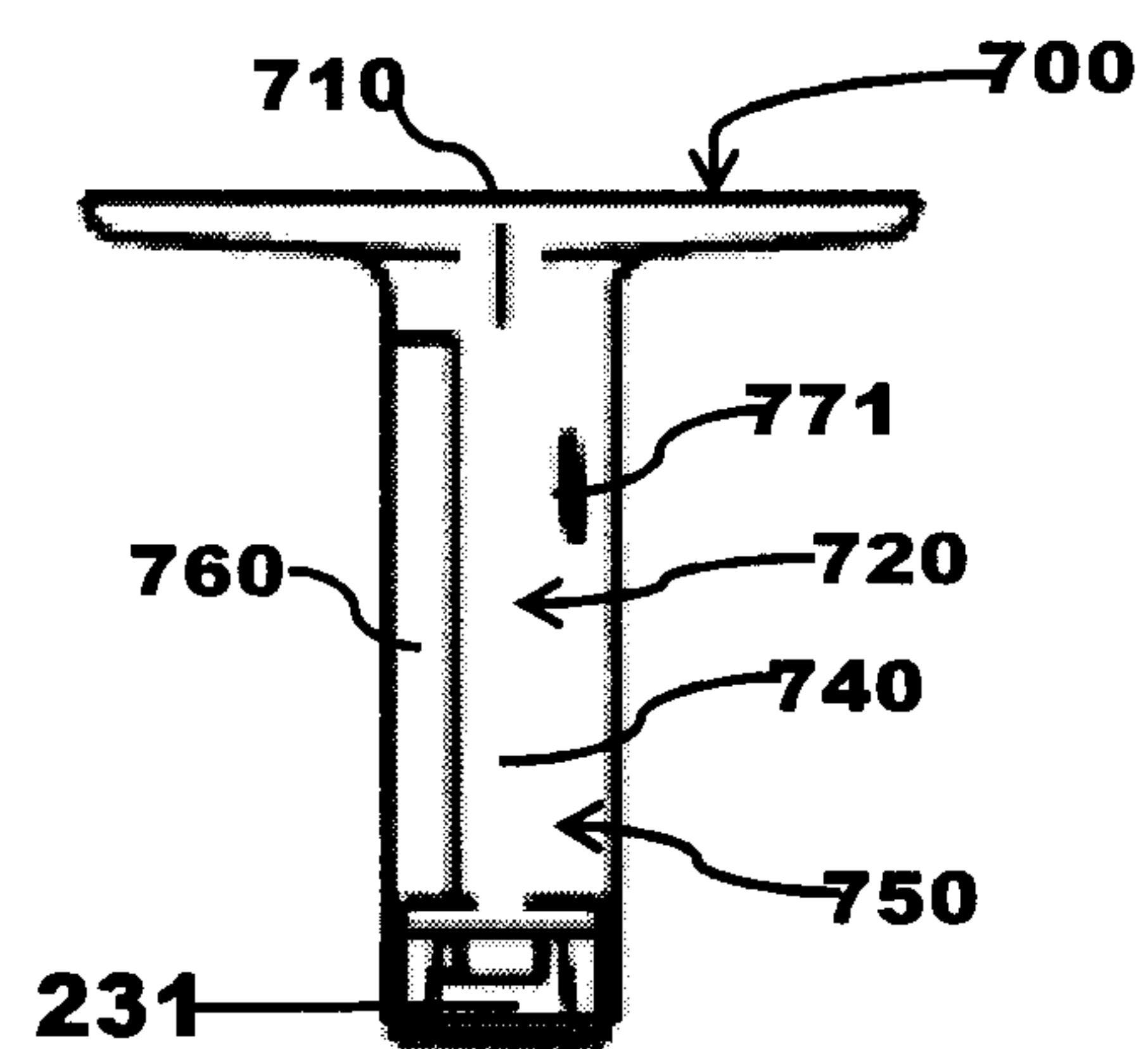
**FIGURE 5J****FIGURE 5K****FIGURE 5L**



**FIGURE 6D****FIGURE 6E****FIGURE 6F**

**FIGURE 6G****FIGURE 6H****FIGURE 6I**



**FIGURE 2C****FIGURE 7D****FIGURE 7E****FIGURE 7F**

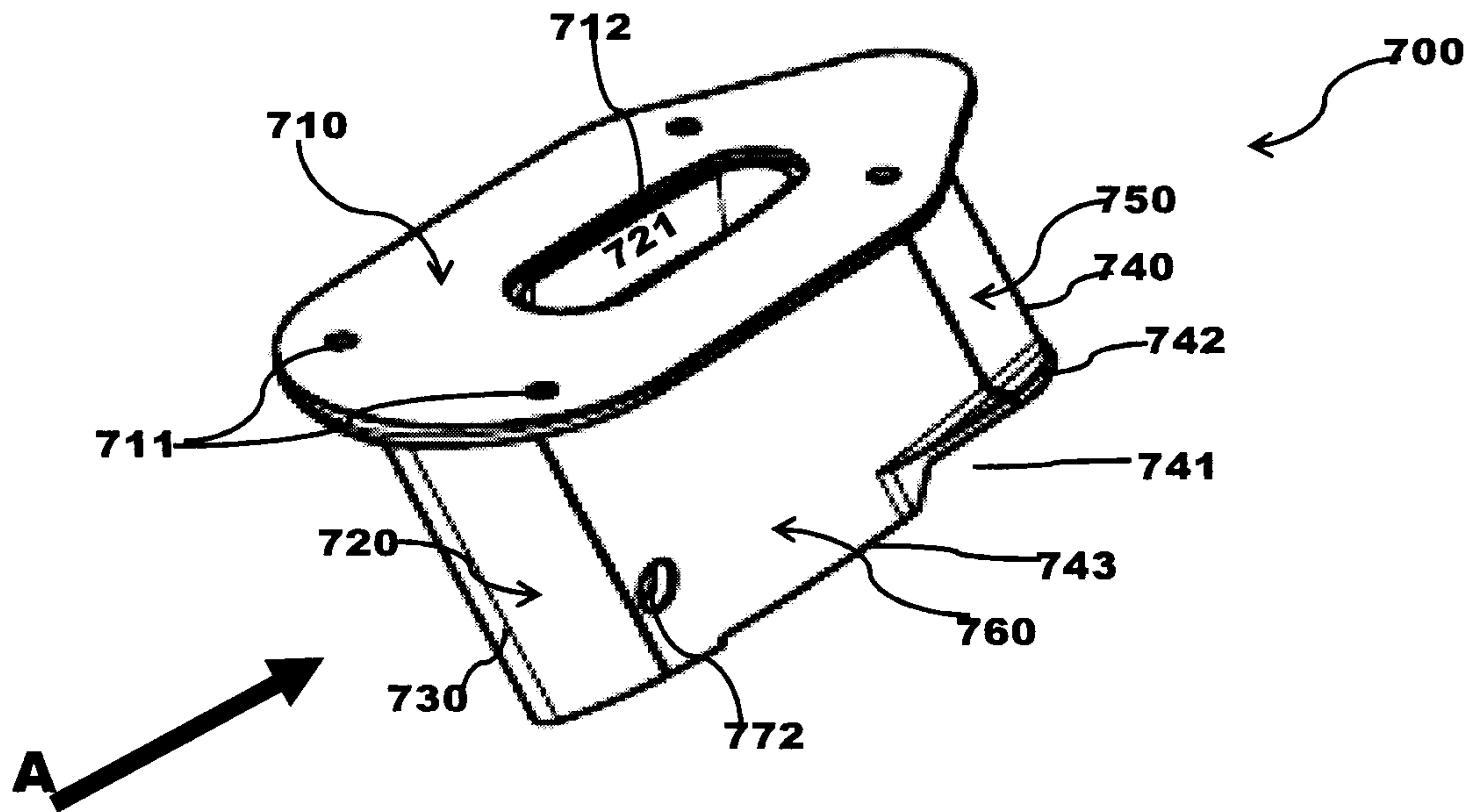


FIGURE 7G

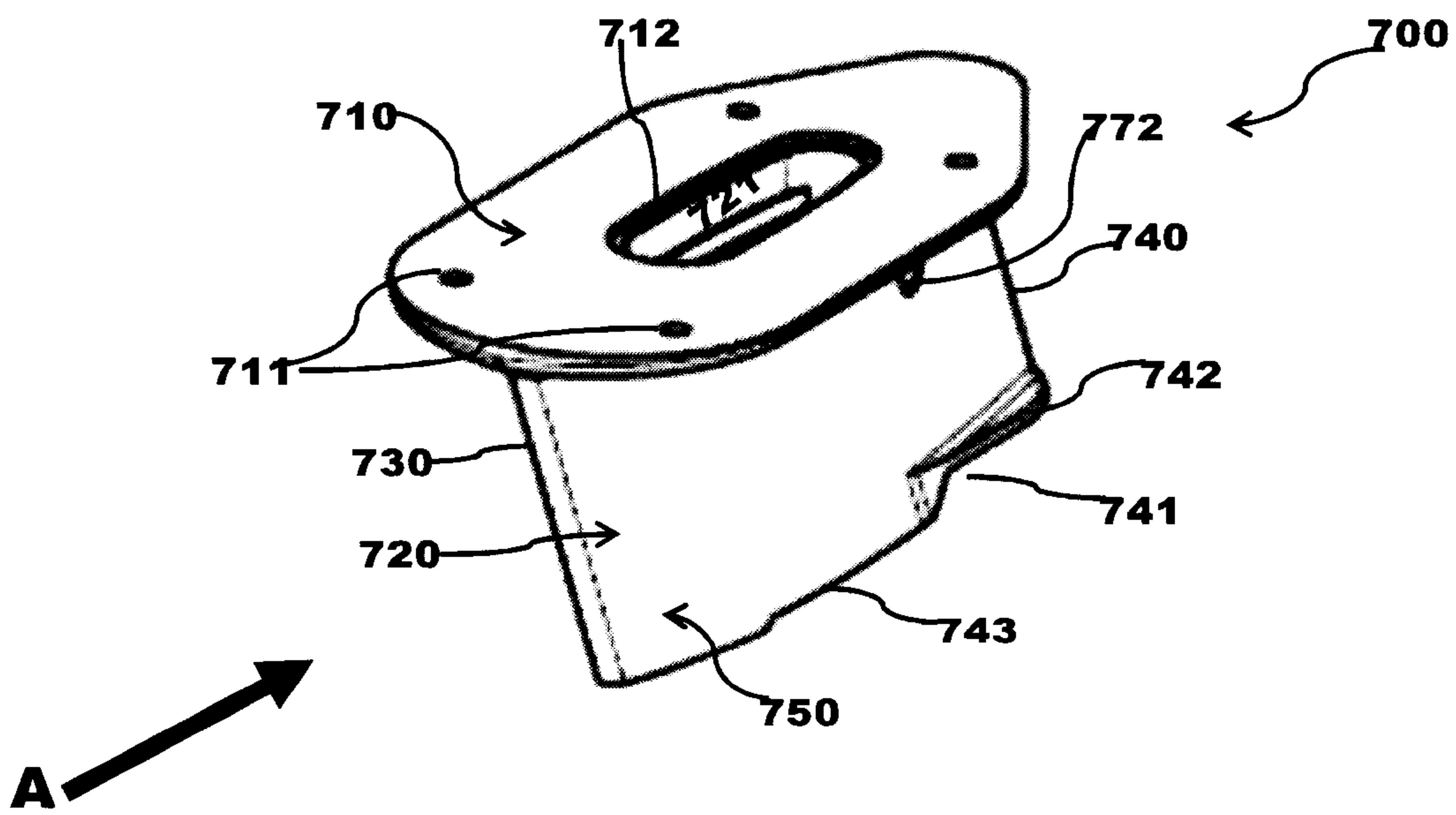
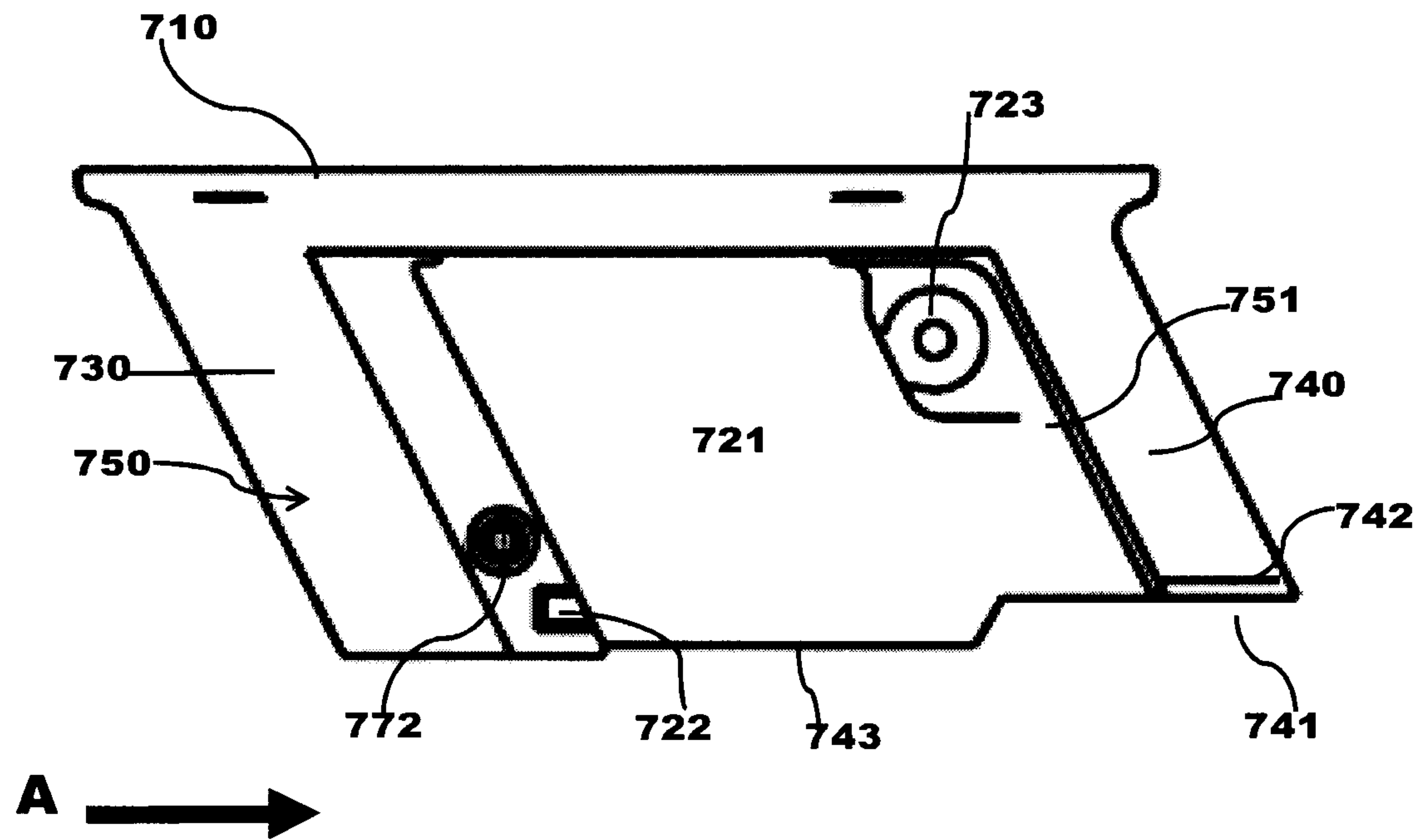
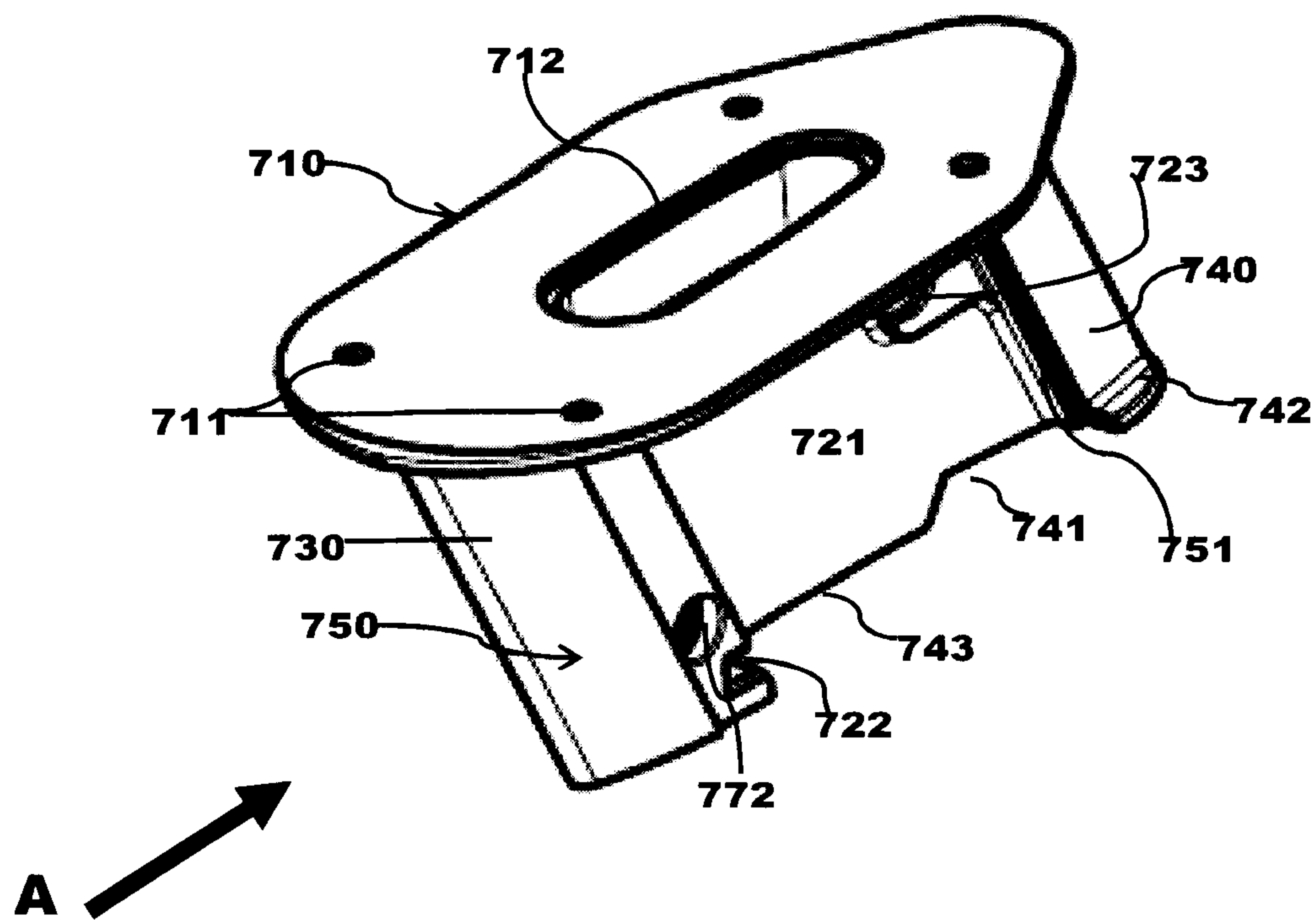
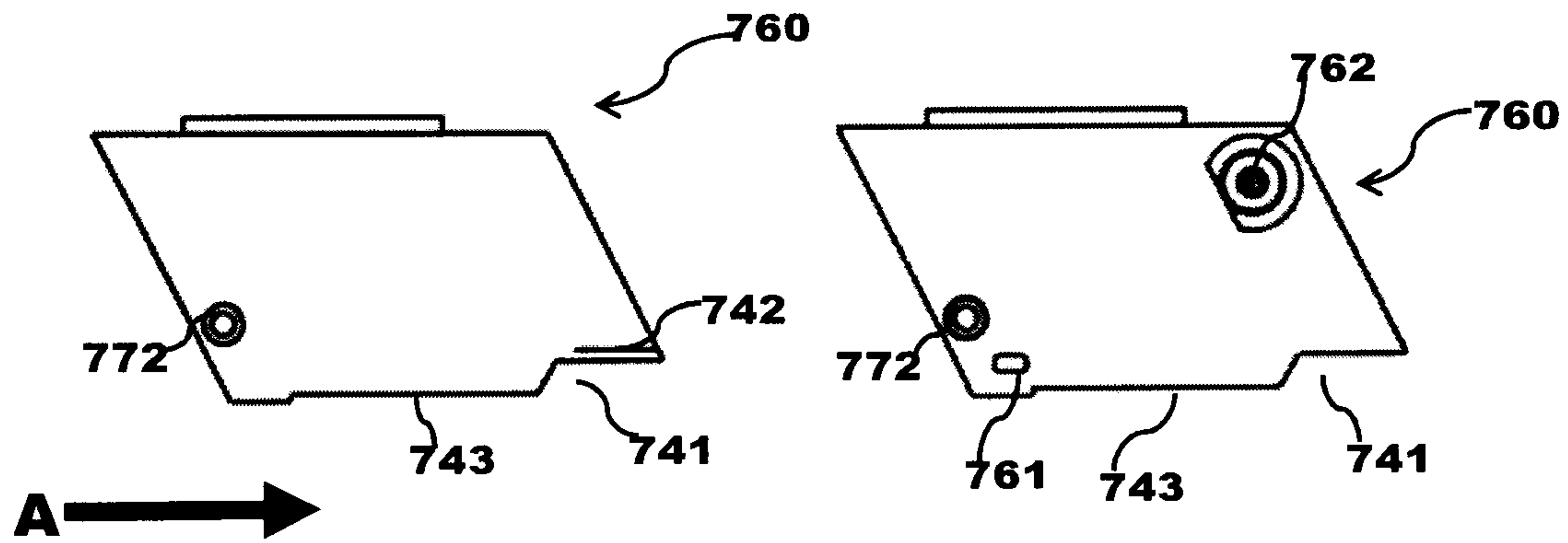
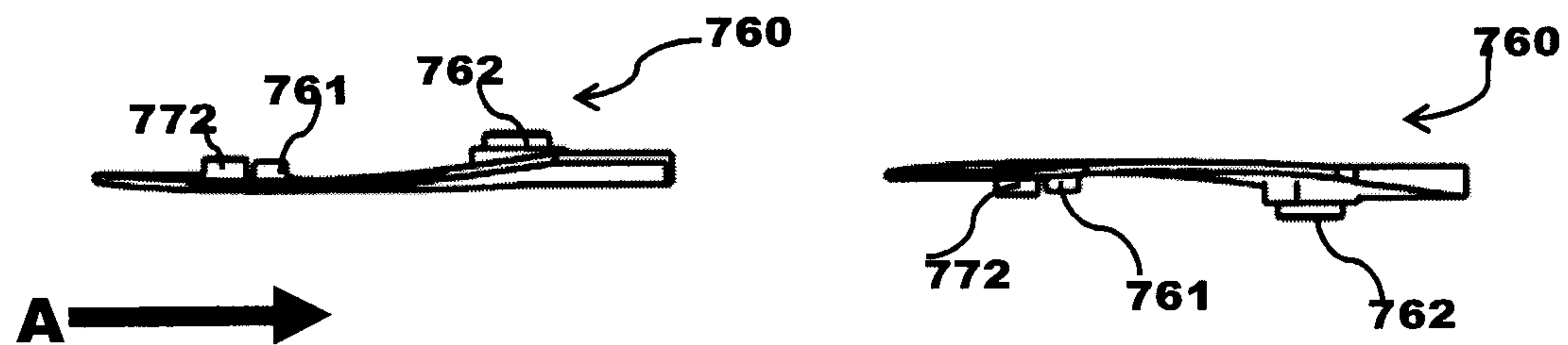
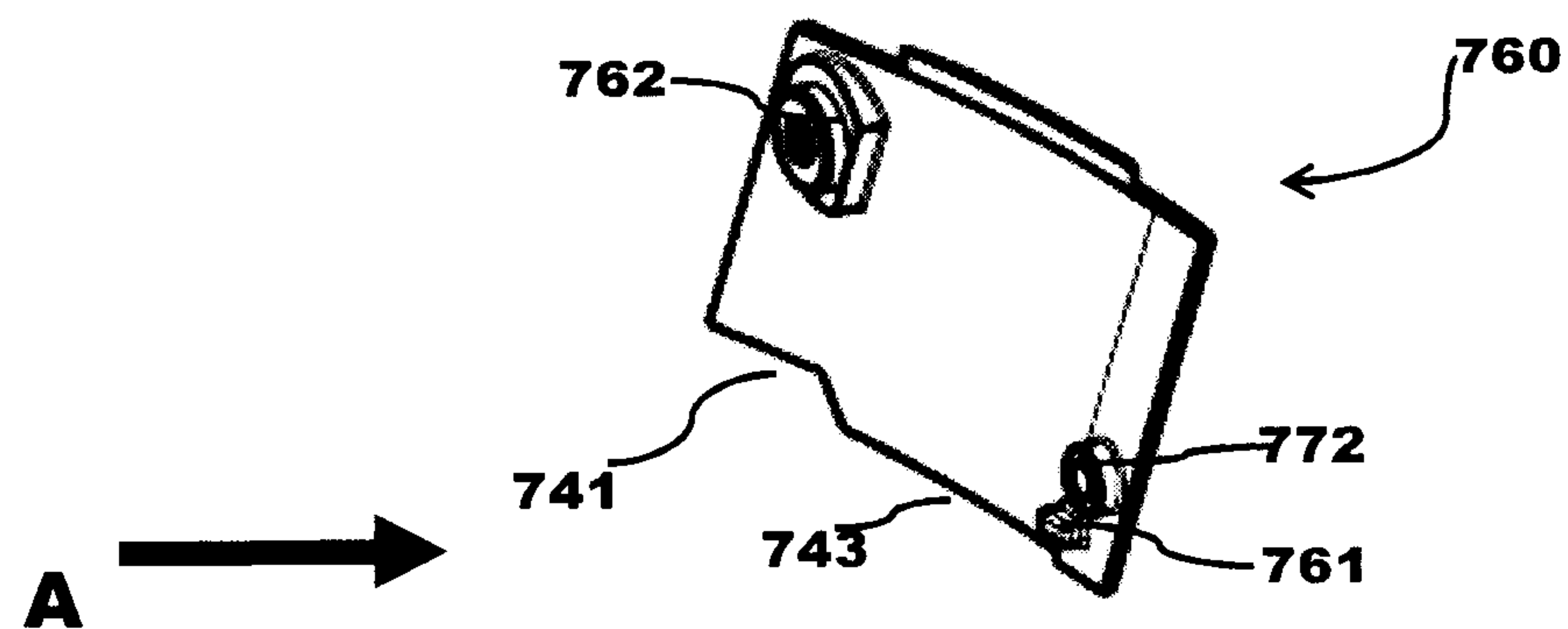


FIGURE 7H

**FIGURE 7I****FIGURE 7J**

**FIGURE 7K****FIGURE 7L****FIGURE 7M****FIGURE 7N****FIGURE 7O****FIGURE 7P****FIGURE 7Q**

