OPIC
Office de la propriété intellectuelle du Canada

CIPO
Canadian Intellectual Property Office

(12) (19) (CA) **Brevet-Patent**

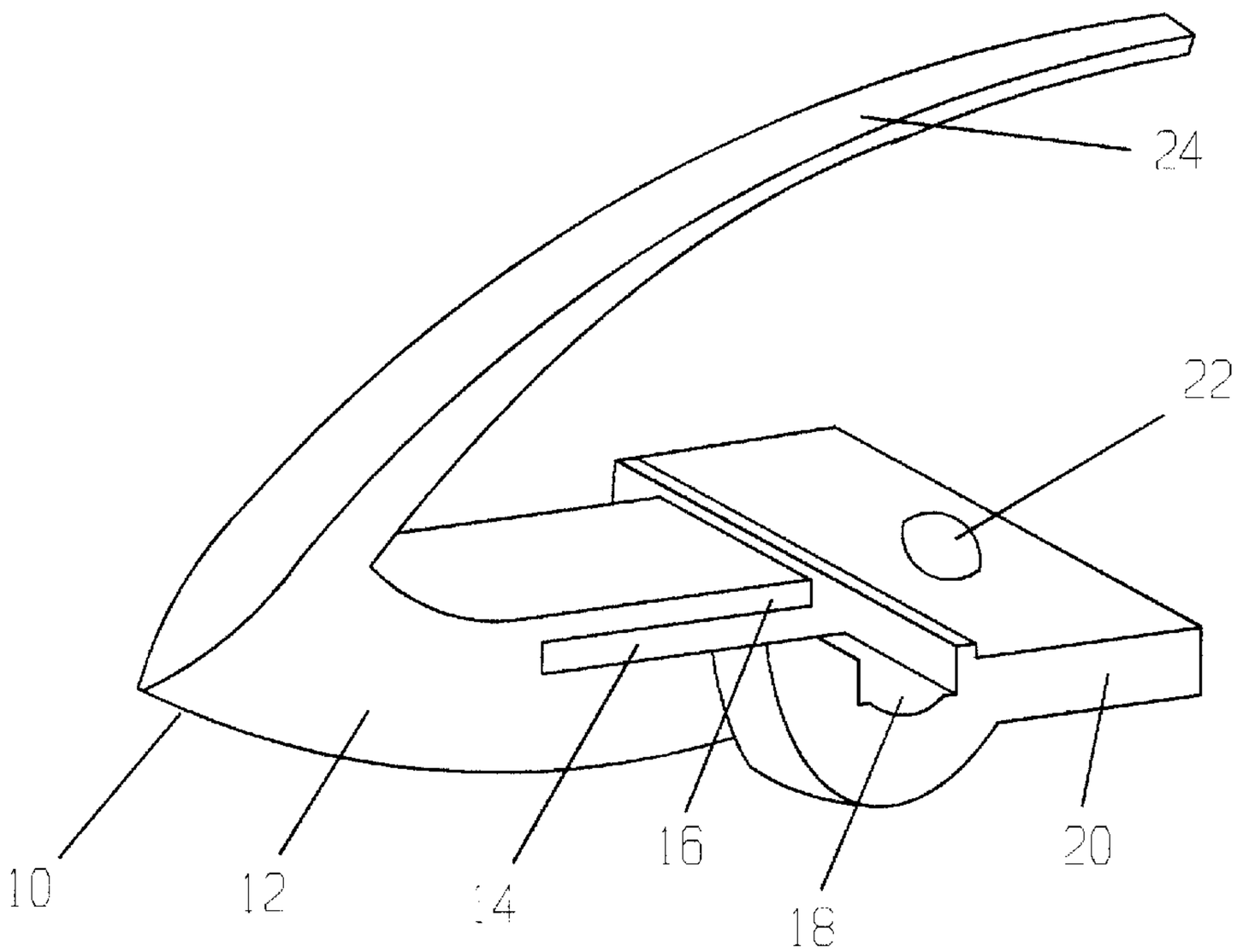
(11) (21) (C) **2,223,617**
(22) 1998/02/17
(43) 1999/08/17
(45) 2001/03/27

(72) FIGLIUZZI, Joseph R., US
(73) FIGLIUZZI, Joseph R., US

(51) Int.Cl.[6] A01D 65/00, A01D 34/18

(54) **DOIGT DE SOULEVEUSE/BARRE DE COUPE**

(54) **LIFTER/CUTTER GUARD**



(57) A crop lifting and cutting device that combines the lifting ability of a lifting guard with the cutting function of a sickle guard. The one-piece construction provides a lifter/cutter with strength to withstand and reduce damage from rocks. A litter tine is engaged with the forward portion of the sickle guard finger and follows an angular upward and rearward direction from that point. The lifter/cutter guard lifts the crop only when the plants are close to the cutter bar, insuring that any shattered grain will fall into the harvester and not on the ground.

ABSTRACT

A crop lifting and cutting device that combines the lifting ability of a lifting guard with the cutting function of a sickle guard. The one-piece construction provides a lifter/cutter with strength to withstand and reduce damage from rocks. A lifter tine is engaged with the forward portion of the sickle guard finger and follows an angular upward and rearward direction from that point. The lifter/cutter guard lifts the crop only when the plants are close to the cutter bar, insuring that any shattered grain will fall into the harvester and not on the ground.

LIFTER/CUTTER GUARD

This invention relates to grain and crop sickle guards and grain lifters for all types of harvesters including combines, swathers, mowers, and the like.

Background – Description of Prior Art

There has long been a need for a crop lifter of simple construction that would enable tangled or fallen grain crops to be retrieved with a minimum of loss. In the past, conventional crop lifting guards have been elongated add-on attachments that have proved inadequate for a variety of reasons. The conventional lifting guards in use today oftentimes cause more grain and crop loss than the problem they were designed to solve. The distance between the front end of most lifting guards and the harvester platform is so great that much of the crop is lost or damaged before the crop reaches the cutter bar. Grain that should be carried into the machine is instead shaken off and falls to the ground before it reaches the sickle knives.

All prior art examined show that conventional lifters are mounted forward of the sickle knife guards which creates many problems including frequent breakage due to the lifters tendency to dig into the ground on uneven terrain. This is the case also even in those crop lifters not intended to ride on the ground. Another problem with lifters which extend considerably forward of the sickle guards is the loss and breakage during turning operations because the forces are greatest on the leading edges of the lifters. The longer the lifters, the greater the force.

Some of these lifters as in the patents issued to M.P. Babcock [U.S. Patl No. 2,960,814], A.D. Braasch et. al. [U.S. Pat. No. 1,815,491], W.A. Reimer [U.S. Pat.No. 2,746,230], are attached to the cutting bar platform itself. Some of the lifters are attached to the sickle guard, as in V.L. Hunter [U.S. Pat. No. 4,702, 064], and E.Beltz [U.S. Pat. No. 2,394,838] and others such as those issued to W.Gaterman, [U.S. Pat. No. 791,022], W.M. Wadleigh [U.S. Pat. No. 1,250,251], W.I. Kenison [U.S. Pat. No 3,163,975], Shumacher, II ET. Al, [U.S. Pat. No. 3,834,139], and Stomacher II et. Al. [Pat. No. 3,742, 690] are attached to both the cutter bar platform as well as the sickle guard.

Objects and advantages

Accordingly, several objects and advantages of the present invention are:

(a) to provide a new lifter/cutter guard that combines the lifting ability of a lifting guard with the cutting action of a sickle guard.

(b) to provide a lifter/cutter guard combination of one-piece construction.

(c) To provide a lifter/cutter guard whose lifting tine is engaged with the point or front of the sickle guard finger and follows an angular rearward direction from that point.

(d) To provide a lifter/cutter guard of reduced length that will pick up fallen crops with the assurance that the device will not run into the ground.

(e) to provide a lifter/cutter guard, which is convenient to use. The lifter/cutter guard is installed on a harvester no differently than a conventional sickle guard.

(f) To provide a lifter/cutter guard that lifts the crop only when the plants are close to the cutter bar, insuring that any shattered grain will fall into the harvesting machine and not on the ground.

(g) to provide a lifter/cutter guard that eliminates shattering due to turning forces or vibration.

(h) to provide a lifter/cutter guard that provides an attachable/detachable option that follows the same concept as the one-piece construction embodiment. This preferred one-piece construction embodiment follows the same concept as the above embodiments. The lifting tine of this embodiment also follows the same rearward angularly direction from the point of contact with the point or front end of the sickle guard.

(i) to provide a lifter/cutter guard which is sturdily built to withstand or reduce damage from rocks.

Drawing Figures

Fig. 1 shows a perspective view of paired finger version of a lifter/cutter guard as one-piece construction.

Fig. 2 shows a perspective view of a paired finger version of a lifter/cutter guard as one-piece construction with lifting tine less elongate than embodiment shown in Fig. 1 above.

Fig. 3 shows a perspective view of a single finger version of a lifter/cutter guard as once piece construction, including a crop holding cleat.

Fig. 3A shows a perspective view of a single finger version of a lifter/cutter guard combination of a partially solid finger tine and a partially flexible attachable/detachable lifting tine. This embodiment also includes a crop holding-cleat.

Fig. 3B shows a perspective view of a double finger or paired version of a lifter/cutter guard described in Fig. 3A above.

Fig. 4 shows a perspective view of a paired finger version of a lifter/cutter guard with flexible lifting tines engaged with forward end of the lifter/cutter guard.

Fig. 5 shows a perspective view of a single finger version of a lifter/cutter guard with a detachable-mountable threaded lifting tine.

Fig. 5a shows a perspective view of a single finger version of a lifter/cutter guard with a detachable-mountable grooved lifting tine and set screw fastener.

Fig. 5b shows a perspective view of a single finger version of a lifter/cutter guard with a detachable-mountable grooved lifting tine and ball bearing-spring-set screw combination fastening means.

Fig. 6 shows a perspective view of a single finger version of a lifter/cutter guard attachment with an attachable/detachable front portion or nose, with a partially rigid and a partially flexible lifting tine, including a cleat or gusset attached between the rigid portion of the lifting tine and the guard body with a set-screw, bolt, or equivalent fastening means.

Fig. 6A shows a perspective view of a single finger version of a lifter/cutter guard attachment with an attachable/detachable front portion or nose, with a partially rigid and a partialaly flexible lifting tine, including a crop holding cleat or gusset attached between the rigid portion of the lifting tine and the guard body with a spring-pin, bolt or equivalent fastening means.

Fig. 6B shows a perspective view of a one-piece construction of a single finger version of a lifter/cutter guard attachment with an attachable/detachable front portion or nose, including a cleat or gusset attached between a portion of the lifting tine and the guard body.

Fig. 7 shows a perspective view of a one-piece construction plate-type lifter/cutter guard integral to one of the paired sickle guards.

Fig. 8 shows a perspective view of a one-piece construction plate type lifter/cutter guard integral to a single finger sickle guard.

Description-Figs. 1 to 8

A typical embodiment of the lifter/cutter guard **10** of the present invention is the paired lifter/cutter guard illustrated in Fig.1. Knife slot **14** is located rearward from lift-guard **12** and is found between upper lip **16** and the lower portion of lifter/cutter guard body **12.** Rearward of upper lip **16** is cutter bar groove **18** which acts as a seat for a sickle knife bar which travels in groove **18** in a back and forth reciprocating action. Rearward of groove **18** is a mounting pad **20** with bolt hole **22** for attaching lifter/cutter guard **10** to the harvester cutting platform. Lifting tine **24** is integral to guard body **12** and beginning with forward end where guard body **12** and lifting tine **24** merge, lifting tine follows a rearward and upward angularly direction from that point.

Fig. 2 shows another embodiment of lifter/cutter guard **30** which has a pair of lifting tines **44** unlike the single tine embodiment shown in Fig. 1. Lifter/cutter **30** still retains the same one-piece construction as the single lifting tine model.

In Fig. 3 shows a preferred embodiment of lifter/cutter guard **50** and is similar to the embodiment of lifter/cutter guard **10** in Fig. 1 except that lifter/cutter guard **50** includes a lifting tine support and crop-holding cleat **66** which performs several functions. It is an additional support for lifting tine **64,** it prevents wrapping or clogging, and it prevents crop loss by holding the crop in place thereby preventing grain from spilling backward or off the front end of the cutter bar.

Fig. 3A shows another embodiment of lifter/cutter guard **61** which includes a combination of a partial rigid tine **79** engaged with a flexible lifting tine **75.** This embodiment also includes the cleat **77** identical to cleat **66** shown previously in Fig.3.

Fig. 3B shows another preferred embodiment of lifter/cutter guard **70** and **70a** which is a double-tined or paired embodiment similar to lifter/cutter guard 61 shown in Fig.3A above. Partial rigid tines **88** and **88a** are engaged with attachable-detachable flexible tines 84 and 84a. In fig. 3 the fastening means is indicated by threaded lifting tines **89** and **89a.** Crop-holding cleats **86** and **86**a are also a part of lifter/cutter guard **70**.and **70a.**

Fig. 4 shows another preferred embodiment of lifter/cutter guard 90 shown in Fig.4 is an embodiment of a paired version of lifter/cutter guard **90** with a flexible lifting tine **104** engaging cutter guard body **92** at forward end of cutter guard body 92 and follows a rearward and upward angularly direction from the point of engagement.

Embodiments of the following lifter/cutter guards **100, 200**, and **300** found in Figs. 5, 5A, and 5B are identical and are all similar to lifter/cutter guard 90 found in Fig. 4 except that lifter/cutter guards **100, 200**, and **300** are single tine versions of the same concept.

The embodiment of lifter/cutter guard **100** shown in Fig.5 shows a single lifter/cutter guard **100** which is not totally one-piece construction in that flexible lifting tine **114** is detachable/mountable to sickle guard finger**102.** Lifting tine **114** further shows a screw thread **116** at the lower end of lifting tine which engages with threaded hole **118** at the forward end of guard finger **102.** The embodiment Fig. 5a shows a lifter/cutter guard **200** which is identical with lifter/cutter guard **100** except for a difference in the fastening means. In this embodiment, lifter/cutter guard **200** uses a groove **220** recessed at the lower end of tine **218** and set-screw **204** is screwed into threaded hole **202** to secure lifting tine **218** into place. Lifter/cutter guard **300** shown in Fig. 5b is also identical to the embodiments in Fig. 5 and Fig. 5a, except that the fastening means in this embodiment include a ball **322,** a spring **318,** and a set screw **320** combination as a fastening means.

The lifter/cutter guard **400** In Fig. 6 follows the same design concept of the lifter/sickle guards described above in that flexible lifting tine **412** is engaged with rigid lifting tine **414** and together follow the same rearward and upward angularly direction away from the nose or forward point. Lifter/sickle guard **400** shows setscrew **404** as the fastener to secure lifter/sickle guard **400** to any conventional sickle guard. Also included in lifter/cutter guard 400 is crop holding gusset **410**.

Fig. 6a shows an embodiment of an attachable/detachable lifter/cutter guard attachment **500** designed to be mounted on the front end of any conventional sickle guard finger. Lifting tine **512** is also attachable/detachable as shown with one end of lifting tine **512** threaded to fit rigid tine **516**. This embodiment also shows crop-holding

gusset **510** to prevent grain or plants from spilling back over the front of a harvester's cutter bar.

Fig. 6b shows an attachable/detachable lifter/sickle guard attachment **600** with an open bottom portion separating expansible side plate **604** and expansible side plate **606**. This embodiment shows at least one threaded fastener **616** that screws into threaded hole **618** to draw side plate **604** an side plate **606** together securely to insure the lifter/sickle guard attachment remains securely in place. This embodiment also shows crop-holding cleat **610** to prevent grain or plants from spilling back over the front of the harvester's cutter bar.

Fig. 7 shows another preferred embodiment of lifter/cutter guard **700** of one-piece construction with lifter plate **702** engaging with and integral to one of the teeth of a paired cutter guard body **704** at the forward end of cutter guard body **704** and follows a rearward and upward angular direction from the point of engagement. Plate **802** performs several functions simultaneously. It lifts the crops, separates the crop, prevents any plants from falling forward, and prevents wrapping of crop.

Fig. 8 shows another preferred embodiment of a lifter/cutter guard **800** of one – piece construction with lifter plate **802** engaging with and integral to a single finger sickle guard **806** at forward end of cutter guard body **806** and follows a rearward and upward angular direction from the point of engagement.

Operation-Figs. 1, 2, 3, 3a, 3b, 4, 5, 5a, 5b, 6, 6a,6b, 7, 8

The one-piece construction lifter/cutter guard **10** merges the lifting finger or tine **24** with sickle guard body **12** in such a manner that the two elements have lost their individual identity. Lifting tine **24** and sickle guard body **12** have become integrated to form a new entity described as lifter/cutter guard **10**.

Installing and using the lifter/cutter guard **10** (Fig.1) to cut various crops is identical to that for conventional sickle cutter guards. Bolt holes **22** (Fig.1) found on pad **20** (Fig.1) receive bolts which are secured to the harvester cutting bar platform. For removal the reverse procedure is followed. One preferred embodiment is of one piece-construction as shown in Figs. **1,2,** and **3** whether of a single or double finger model. However field tests have shown that embodiments shown in Figs. 3a, 4, and 5, have worked equally well. Another preferred embodiment is lifter/cutter guard **70** in Fig. 3b. The user with an abundance of rocks in his fields would probably prefer the sturdier one-piece construction models. Other users with specific needs may prefer the flexible tine models, which offer quicker spacing changes for different crops. In this case the preferred embodiment would be embodiments **90, 100, 200**, and **300** found in Figs. 4, 5, 5a, and 5b. The installation and operation of embodiments found in Figs. **1,2,3,3a,4,5,5a,** and **5b,** are identical to that of a conventional sickle guards with the exception of the embodiment found in Figs. 6 and *6a* which is mounted differently. Lifter/cutter guard **10** also includes a lifting tine **24** which provides a means to easily lift tangled and downed crops without the disadvantages found connected with conventional crop lifters. To adjust the spacing between tines to accommodate specific requirements of different grain crops, the single tooth embodiment of lifter/cutter guard **50** is installed side-by-side as with a conventional sickle guard or alternately with conventional sickle

guards as preferred between each lifter-cutter guard **10**. Any combination of this arrangement will accommodate any spacing requirements desired.

Another preferred embodiment is lifter/sickle guard **70** as shown in Fig. 3A which handles spacing differently. This embodiment allows for removing and installing tine **84** quickly and easily without bolting or unbolting the sickle guards themselves. In this embodiment tine **84** can be installed or removed by various fastening means as shown in Fig. Nos. 5, 5a, and 5b.

Fig.5 shows a tine **104** with screw threads **106** at one end of the tine that mates with threaded hole **108** at the forward end of lifter/cutter guard **90.** Fig. 5a shows lifting tine **320** with a slot at one end which is secured in place with set screw **380** mated with threaded hole **360** located at the front end of lifter/cutter guard **200.** The fastening means in Fig. 5b show a quick-change method of installing and removing lifting tine **520** which consists of a ball **600** - spring **560** - screw **580** - combination.

Fig. 3A shows a lifter/cutter guard **71** which is a combination of two lifting tines including a rigid tine **88** and attachable/detachable flexible lifting tine **84** designed to be replaceable. This embodiment also includes cleat **86** which prevents the cut crop from sliding back off the front of the cutter bar. Cleat **86** holds the cut crop in place while the subsequent cut crop carries into the harvester. This feature is also found in Fig.3 in lifter/sickle guard **50** which includes cleat **66** installed on a rigid lifting tine **64**.

It must be noted that flexible lifting tine **84** in Fig. 3A, lifting tine **84** in Fig. 4, lifting tine **114** in Fig. 5, lifting tine **218** in Fig.5A, and lifting tine **314** in Fig. 5B can all be secured to the various lifter/cutter guards **70, 90, 100, 200**, **300, 400**, and **500** by welding or other means to make these flexible lifting tines integral to the lifter/cutter guard invention and thereby maintain the one-piece construction concept. However, the additional functional convenience added by making these lifting tines attachable and detachable warrants a two piece construction as shown with the embodiments shown in Figs. 3A, 4, 5, 5A, 5B, 6, and 6A.

The embodiment of the lifter/cutter guard **400** shown in Figs. 6 shows the combination lifter/sickle guard body **402**, rigid lifting tine **414,** flexible lifting tine **412**. This embodiment utilizes the same lifter/sickle guard concept described above and it can also be attached to existing conventional sickle guards already installed on harvesters.

Summary, Ramifications, and Scope

Accordingly one can see that by combining the lifting ability of a lifting guard with the cutting ability of a sickle guard, the conventional sickle guard and the conventional lifting guard have merged to become a new entity. Although the embodiments above differ in their construction, the concept is the same with all. The lifting tines are engaged at the forward end of the sickle guard finger and follow an upward and rearward angular direction.

The lifter/cutter guard has many advantages over a conventional crop lifter that is merely a lifting device attachment.

- It reduces crop loss by reducing the length of the lifting tine. Grain normally lost through shattering using conventional lifting tines are saved with the lifter/cutter guard.

- Vibration is eliminated with one-piece construction and turning forces have no effect on the lifter/cutter guard.

- Crop loss is considerably reduced because the tines of the lifter/guard are lean backward from the point of the elongated sickle guard and do not protrude forward of the sickle guard as found in conventional crop lifters.

- Because the lifter tine design is incorporated as a single unit with the sickle guard, running the lifter/guard into the ground is avoided altogether thereby eliminating breakage to sickle guards, sickle, cutters, and the harvester itself.

- It permits installation identical to conventional sickle guards.

- It provides strong and rigid protection against rocks and other obstructions.

Although the description above contains much specificity, these should not be construed as limiting the scope of the invention but merely providing illustrations of some of the presently preferred of this invention. For example, the lifter/cutter guard fastening means can have other ways of fastening the lifting tines other than those described above. The tines themselves can be longer, shorter, broader, higher, angled differently. The tines can be of spring steel, plastic, or any suitable material. The lifter/cutter guard can also be of varying lengths, for example, to suit particular crops.

Thus the scope of the invention should be determined by the appended claims and their legal equivalents, rather than by the examples given.

IN THE CLAIMS:

1. A lifter/cutter guard comprising:

    a) a lifter/cutter guard of one-piece construction, each lifter/cutter guard with at least one finger and at least one upper lip;

b) a lifter/cutter guard having a rearward knife slot within which knife sections can move in a reciprocating manner;

c) a lifter/cutter guard connected to a cutter bar with mounting pads;

d) a lifter tine integral to the lifter/cutter guard body;

e) a lifter tine is joined at the forward end of each finger of each lifter/cutter guard, the trailing end of each lifter tine angling in an upward and rearward direction and elevated above a knife section and a platform cutter bar.

2. The lifter/cutter guard of claim 1 wherein the sickle-guard finger is elongate.

3. The lifter/cutter guard of claim 1 wherein the lifter tine is flexible.

4. The lifter/cutter guard of claim 1 wherein the cutter guard comprises a pair of guard fingers, each guard finger having an upper lip, a rearward slot, and a mounting pad.

5. The lifter/cutter guard of claim 4 wherein the guard fingers are elongate.

6. The lifter/cutter guard of claim 1 further including a crop holding cleat.

7. The lifter/cutter guard of claim 1 wherein the lifter tine is constructed from any metal, plastic, composite, or any material with flexible capabilities.

8. A lifter/cutter guard comprising:

a) lifter/cutter guard of one-piece construction, each lifter/cutter guard with at least one finger and at least one upper lip;

b) a lifter/cutter guard having a rearward knife slot within which knife sections can move in a reciprocating manner;

c) a lifter/cutter guard connected to a cutter bar with mounting pads;

d) a lifter plate integral to the lifter/cutter guard body;

e) a lifter plate is joined at the forward end of each finger of each lifter/cutter guard, the trailing end of each lifter plate angling in an upward and rearward direction and elevated above a knife section and a platform cutter bar.

9. The lifter/cutter guard of claim 8 wherein the sickle-guard finger is elongate.

10. The lifter/cutter guard of claim 8 wherein the lifter plate is elongate.

11. The lifter/ cutter guard of claim 8 wherein the lifter plate is flexible.

12. The lifter/cutter guard of claim 8 wherein the cutter guard comprises a pair of guard fingers, each guard finger having an upper lip and a rearward slot.

13. The lifter/cutter guard of claim 12 wherein the guard fingers are elongate.

14. The lifter/cutter guard of claim 12 wherein the lifter plates are elongate.

15. The lifter/cutter guard of claim 8 wherein the lifter plate is constructed from any metal, plastic, composite, or any material with flexible capabilities.

16. A crop lifter guard comprising:

a) a lifter tine body detachably mountable with means for fastening to the forward end of a cutter guard finger;

b) a lifter tine joined at the forward end of a detachably mountable lifter guard, the trailing end of each lifter tine angling in an upward and rearward

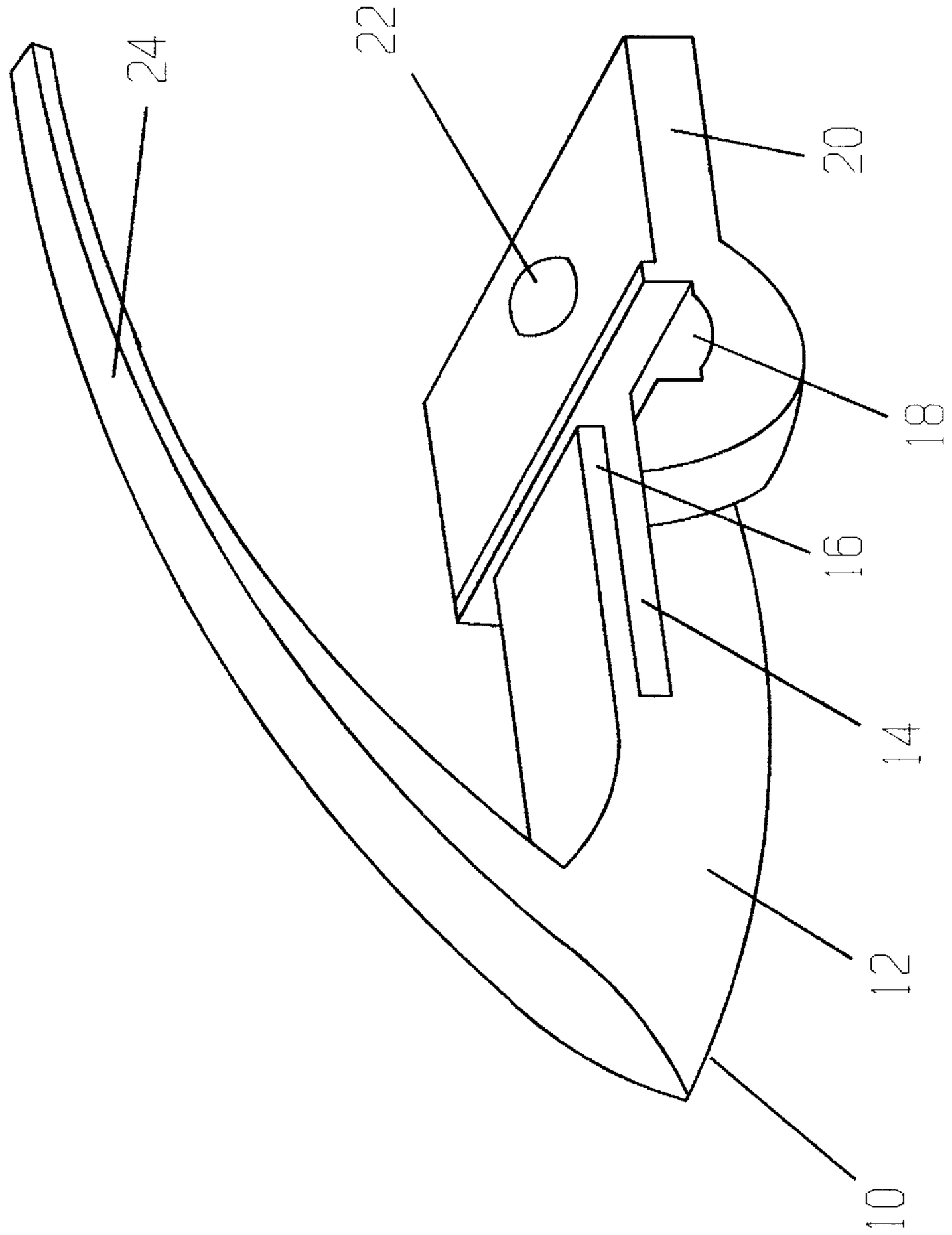


FIG. 1

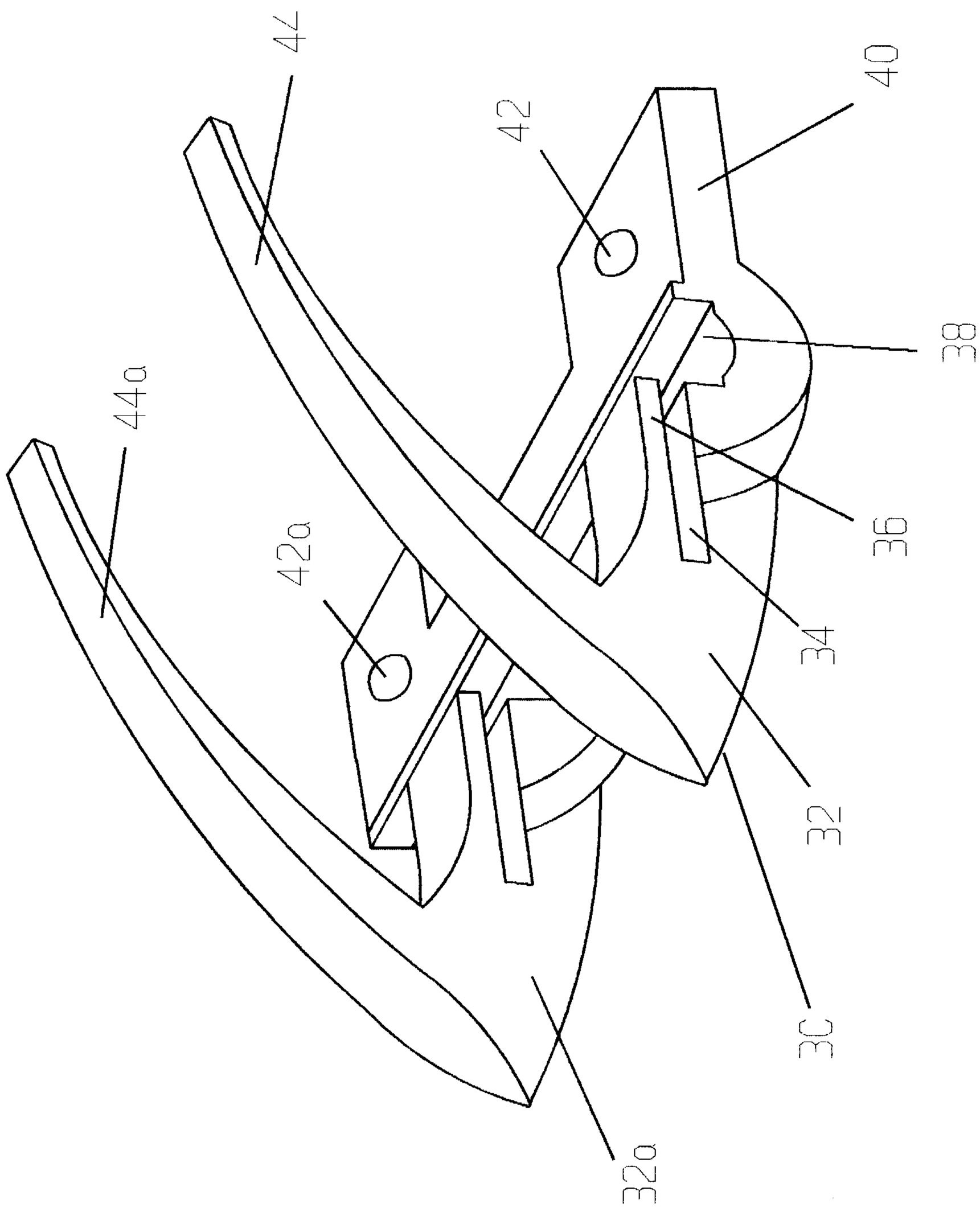


FIG. 2

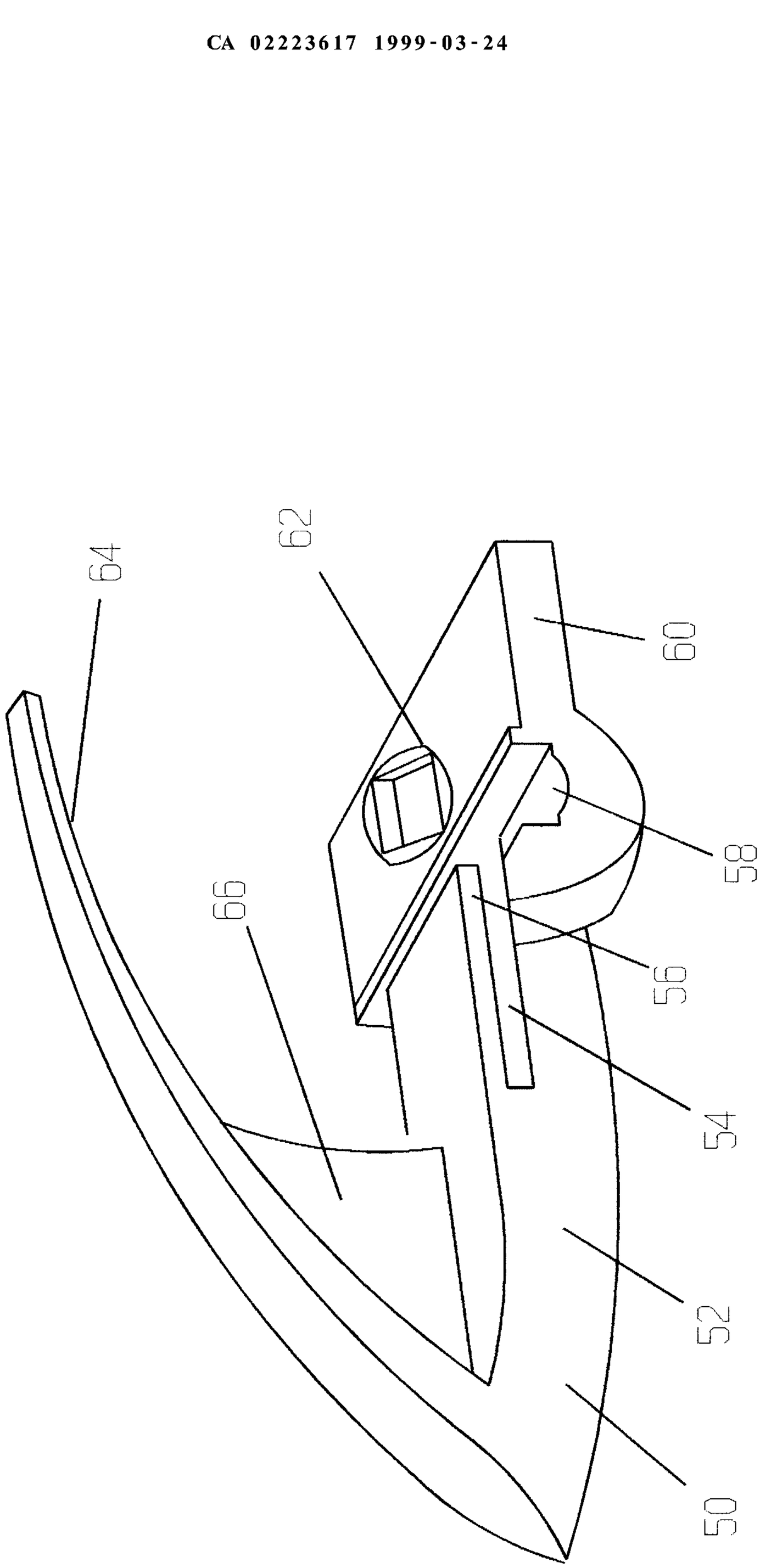


FIG. 3

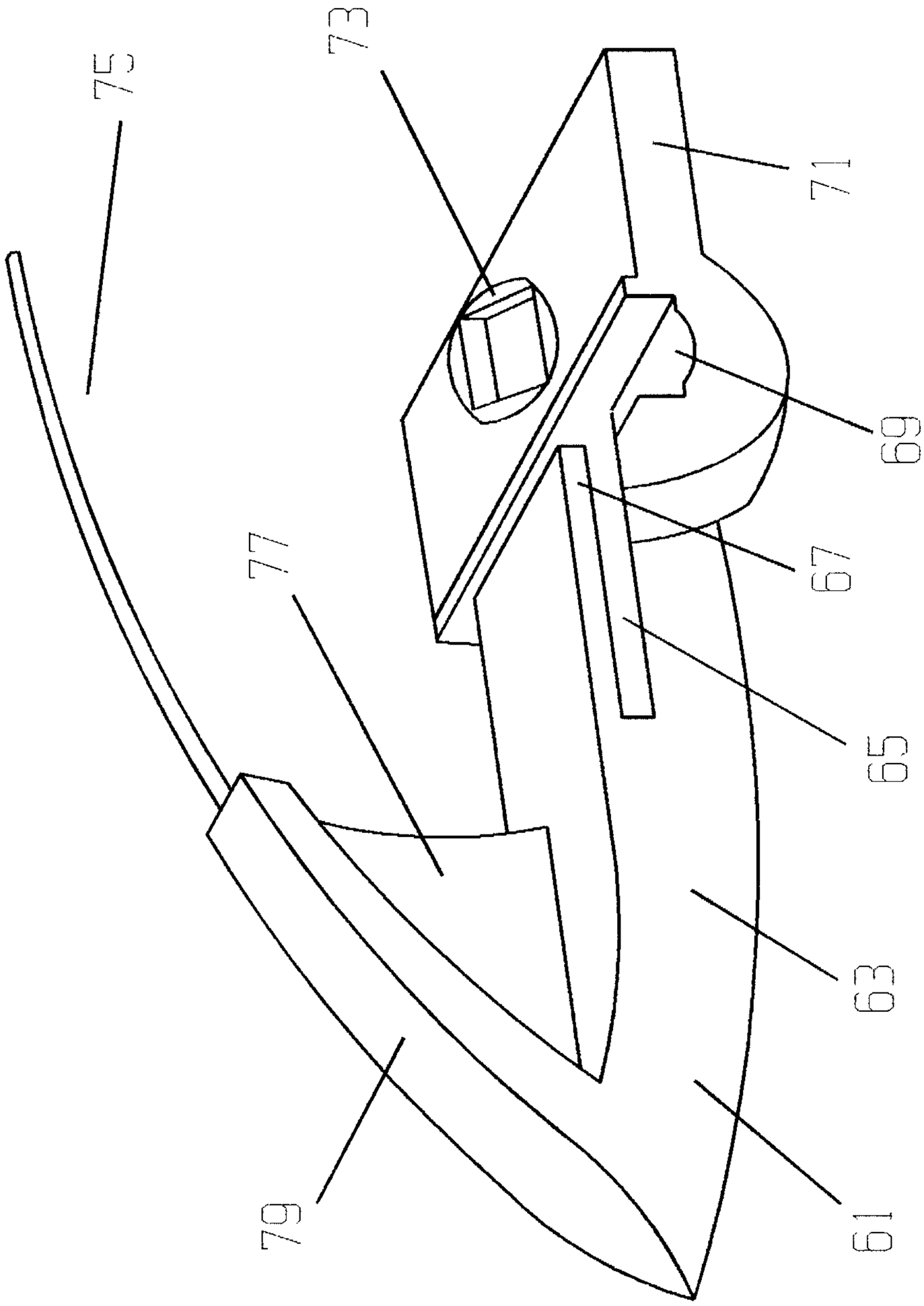


FIG. 3A

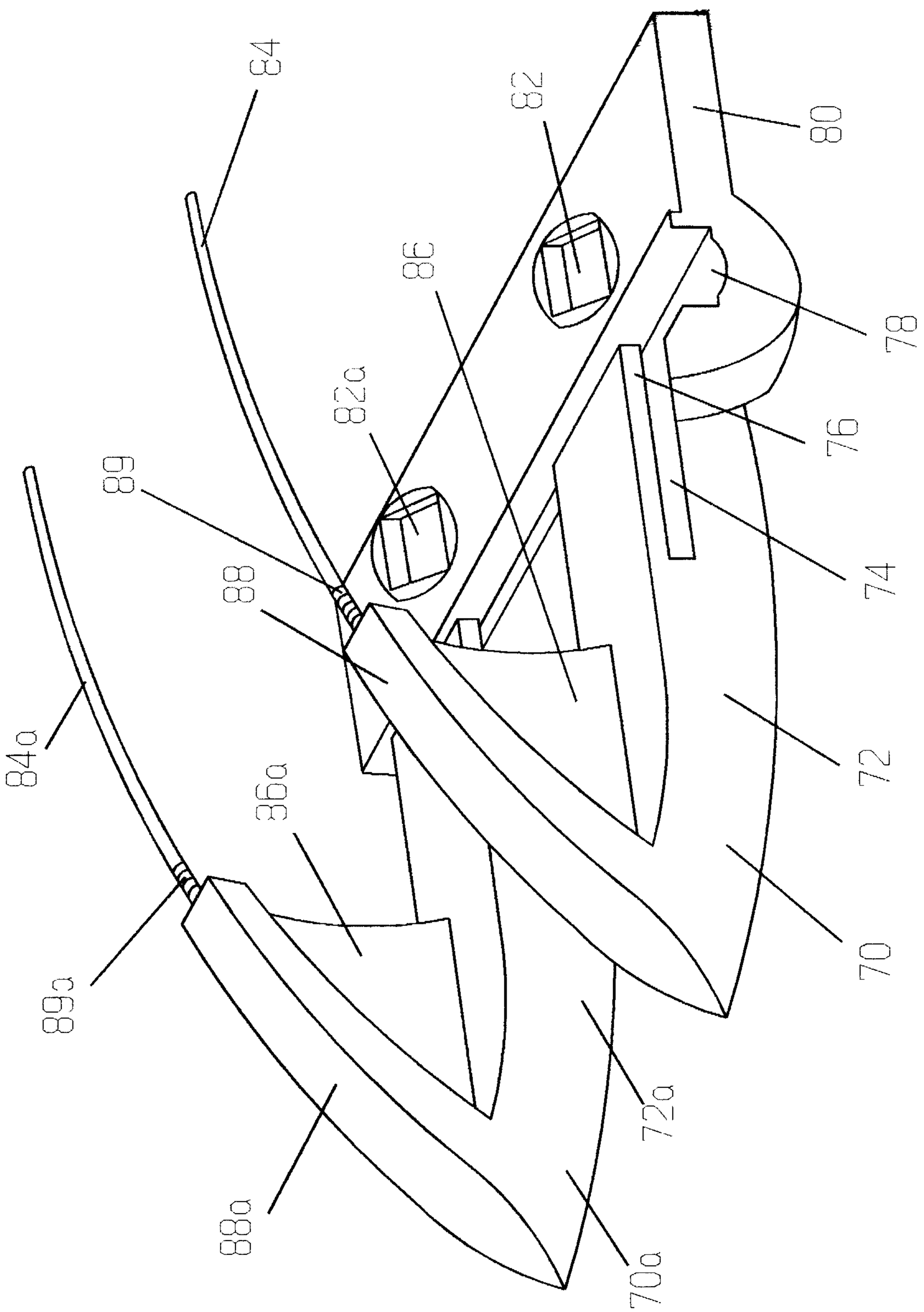


FIG. 3B

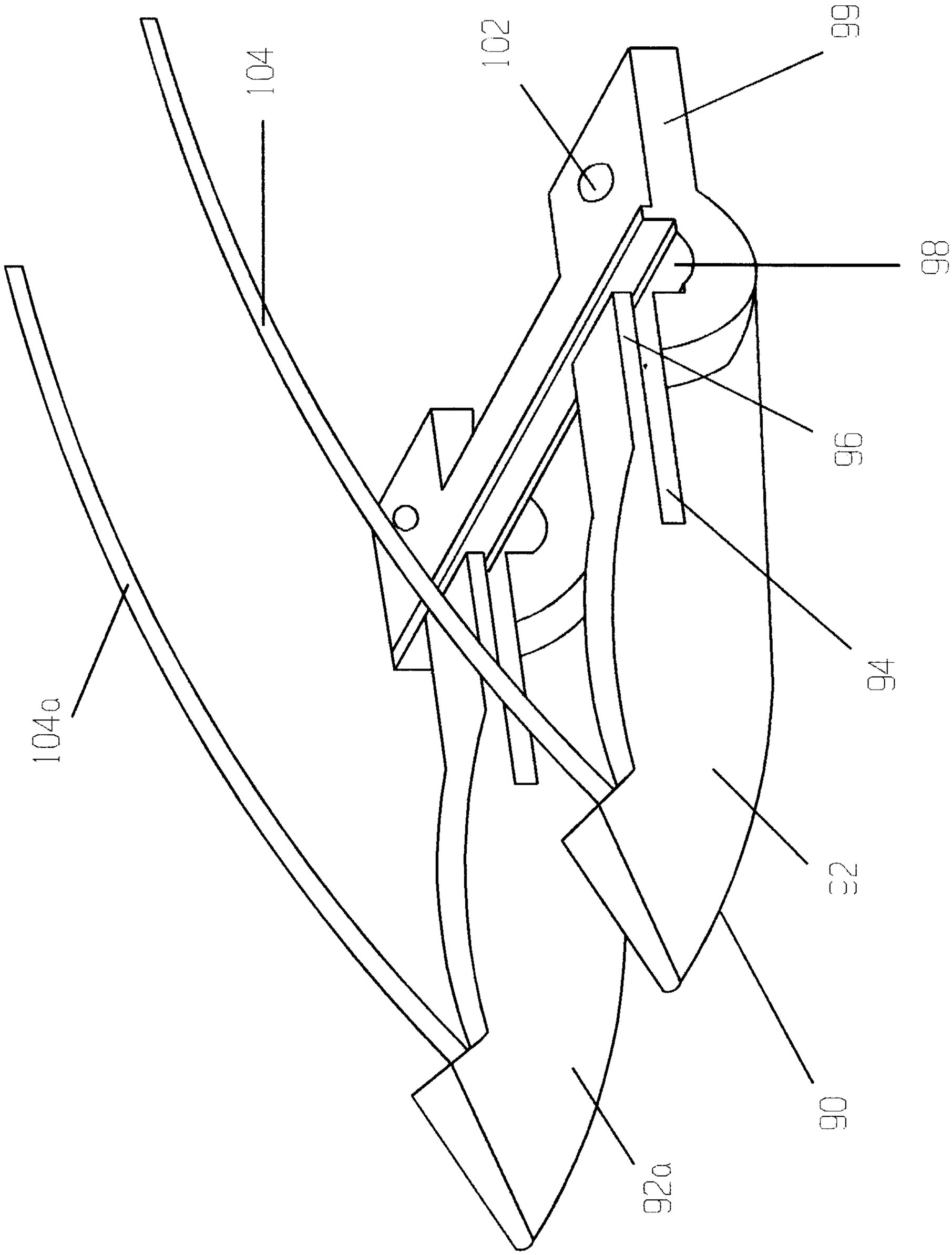


FIG. 4

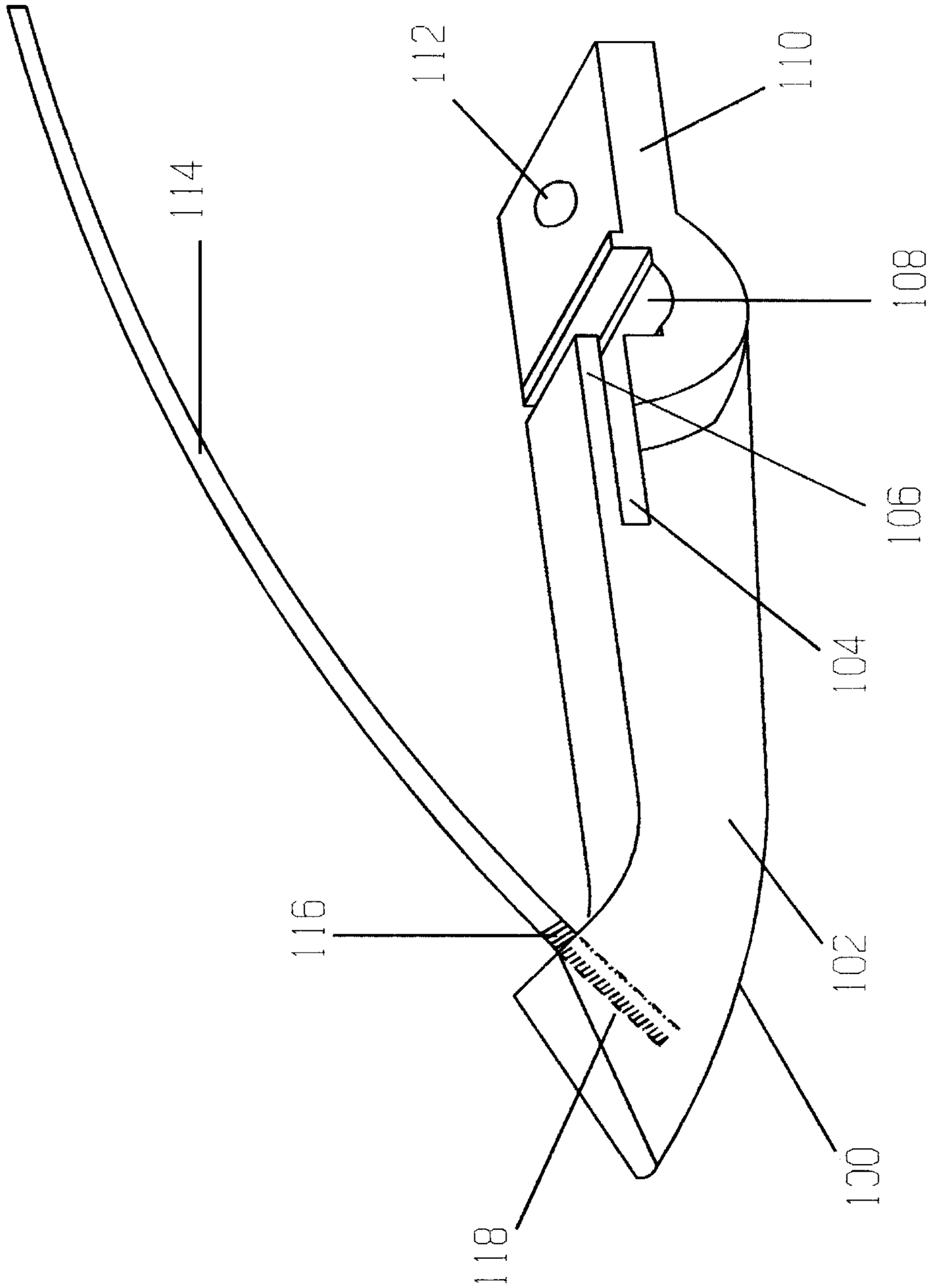


FIG. 5

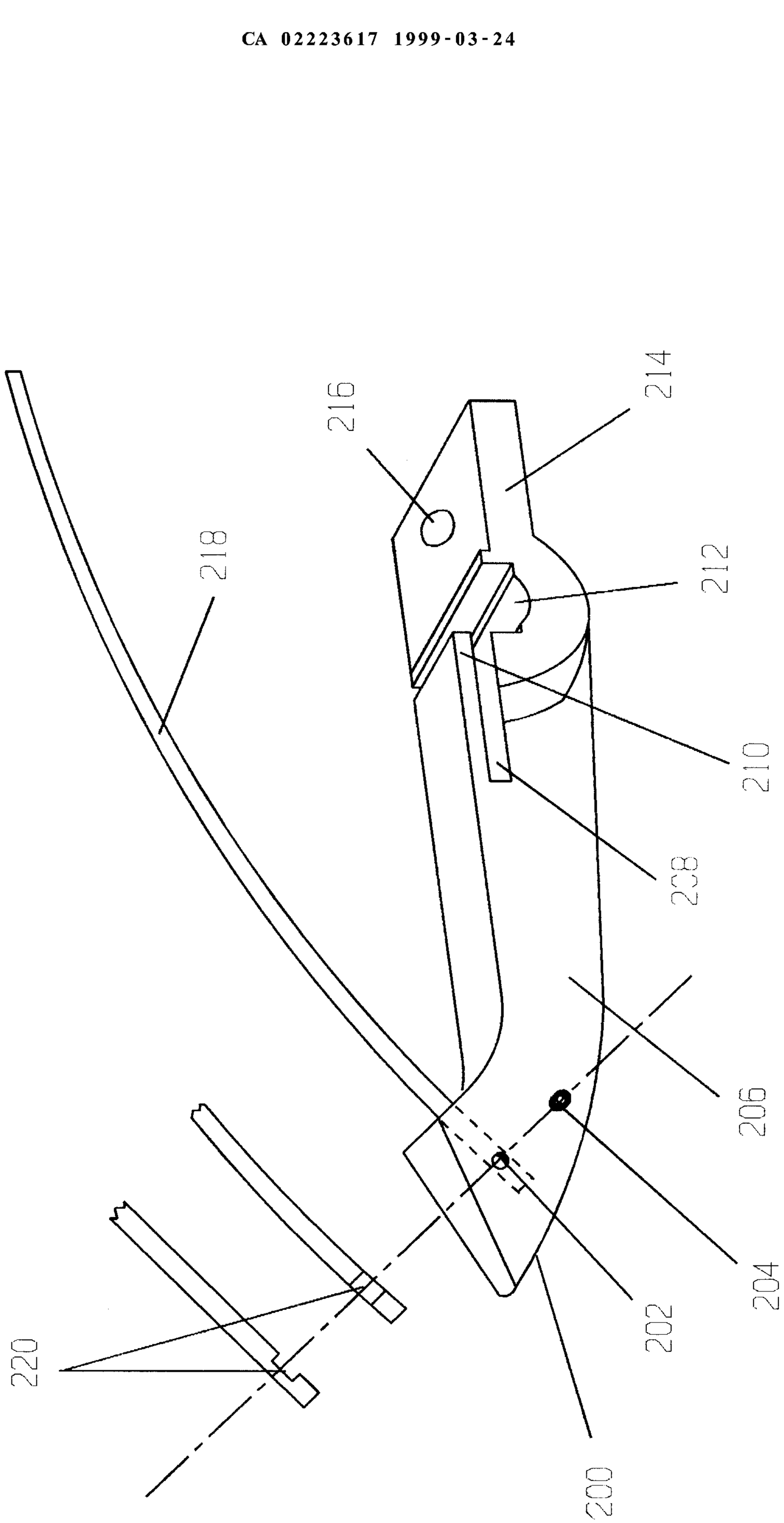


FIG. 5A

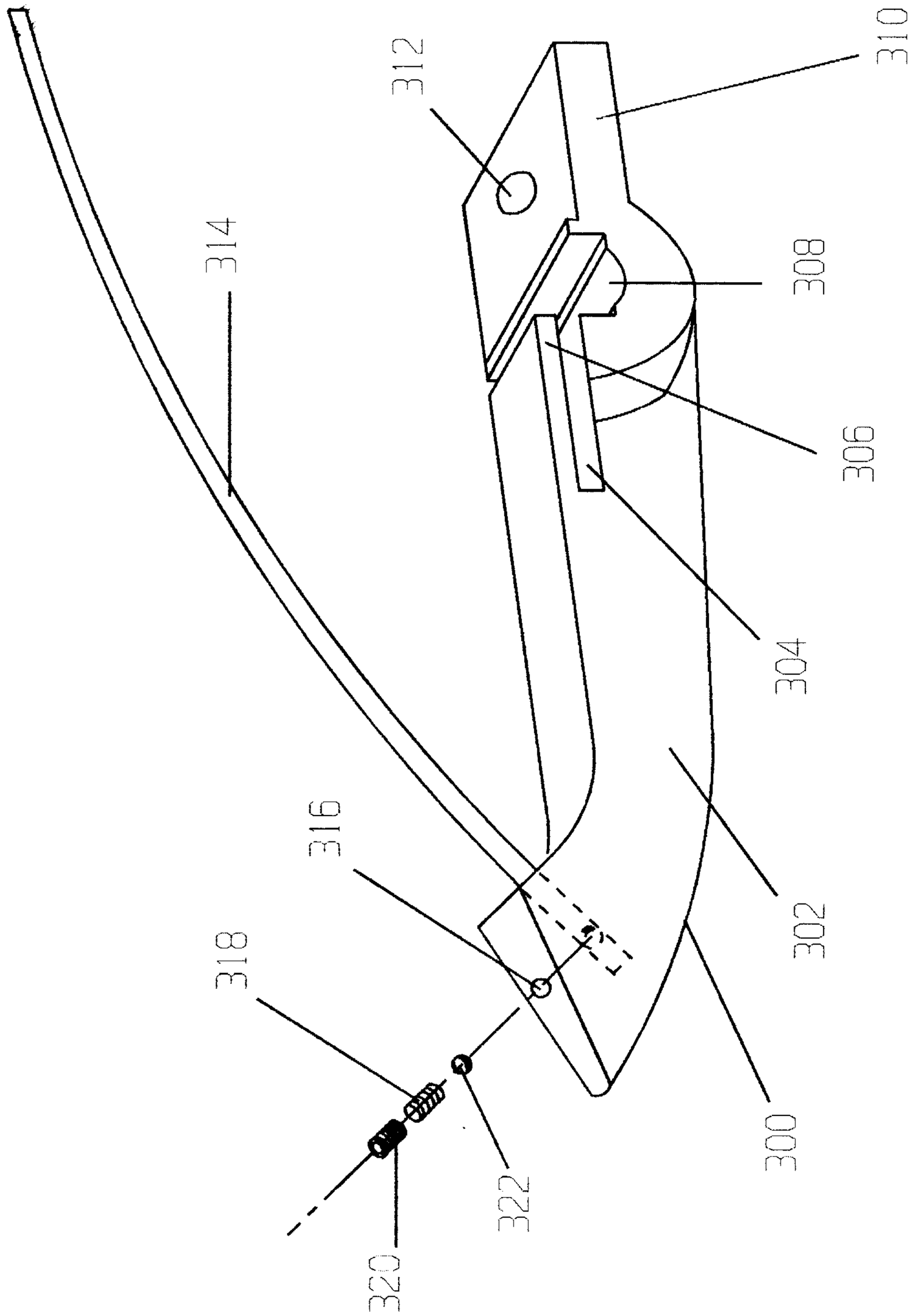


FIG. 5B

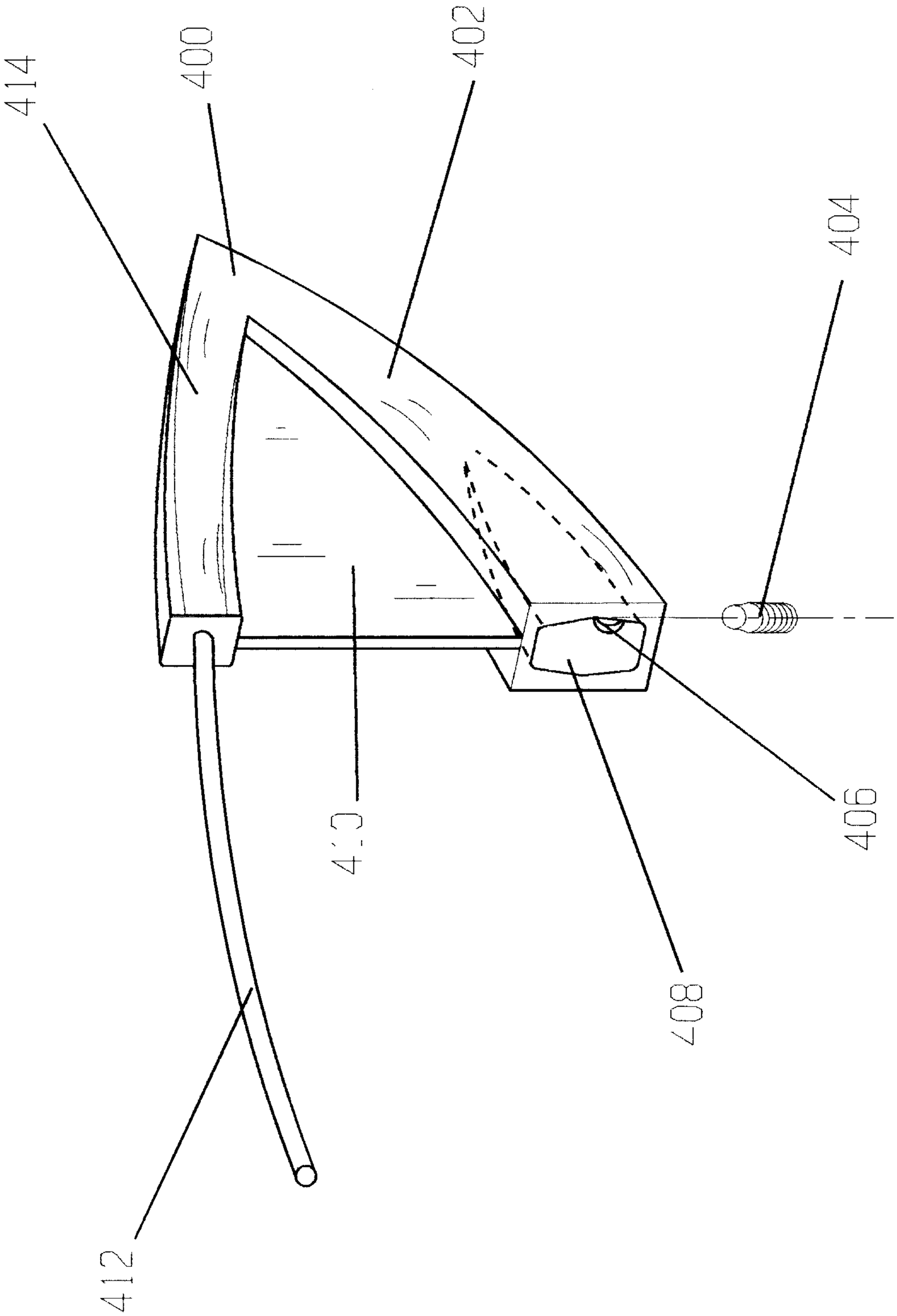


FIG. 6

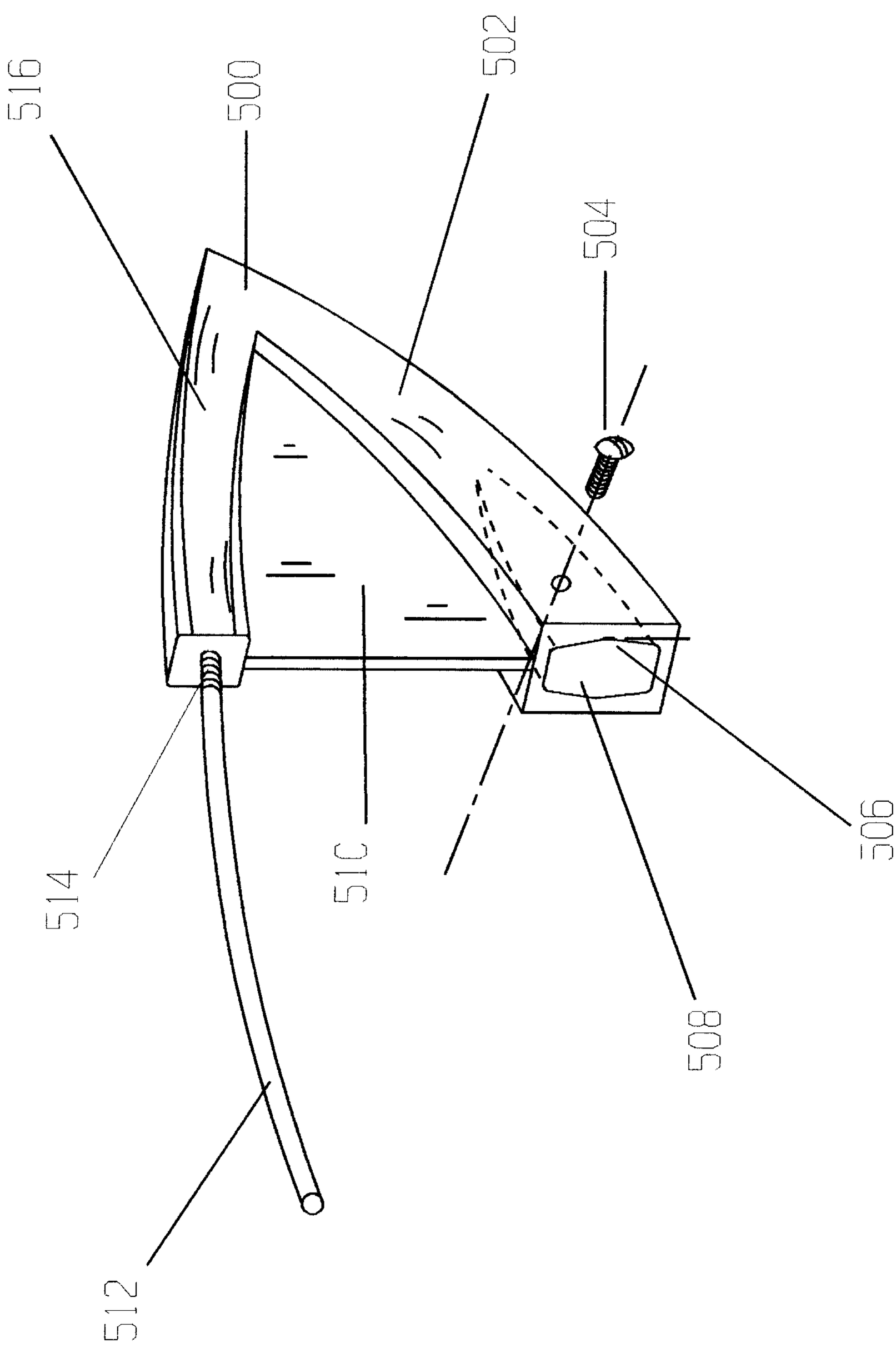


FIG. 6A

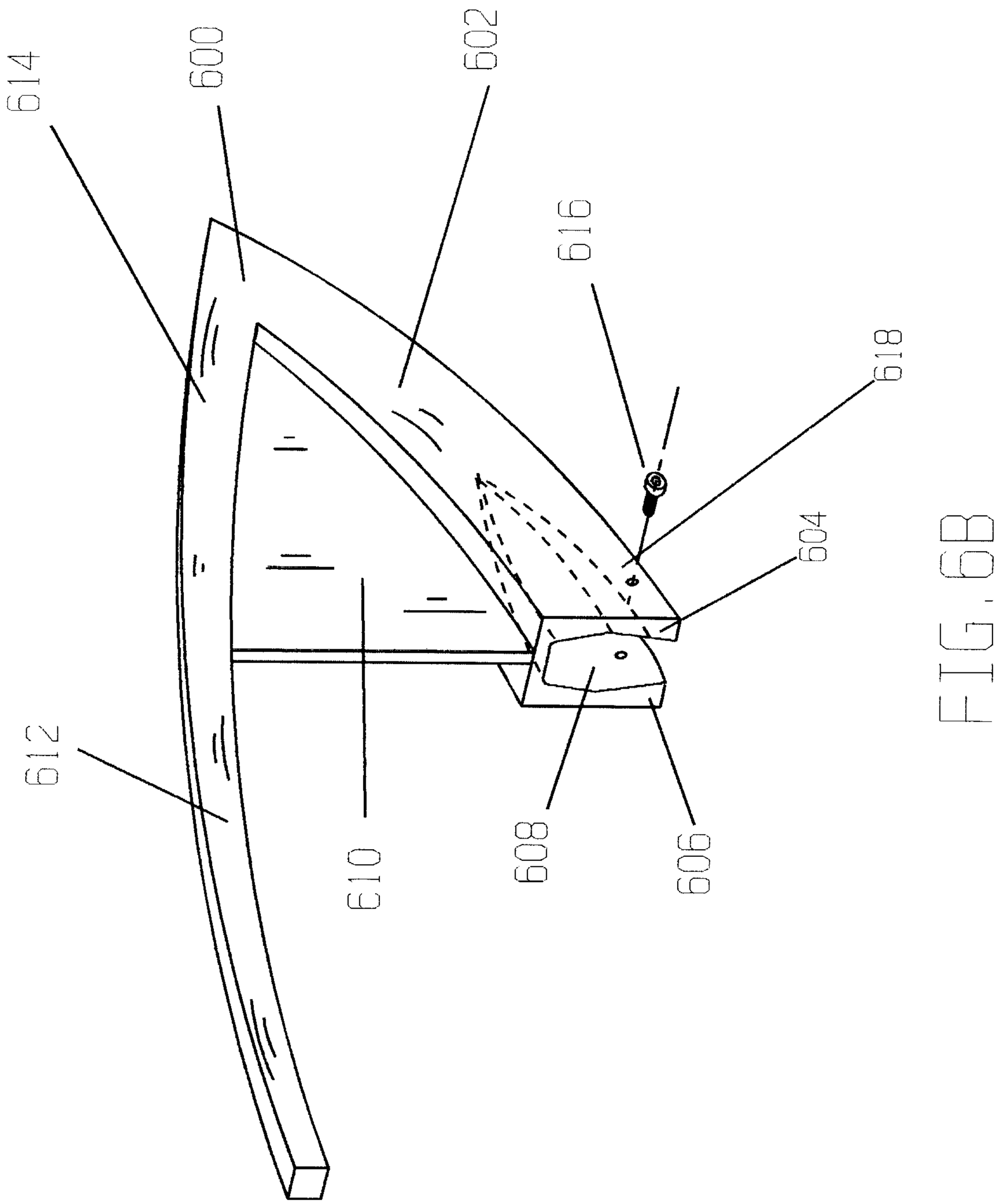


FIG. 6B

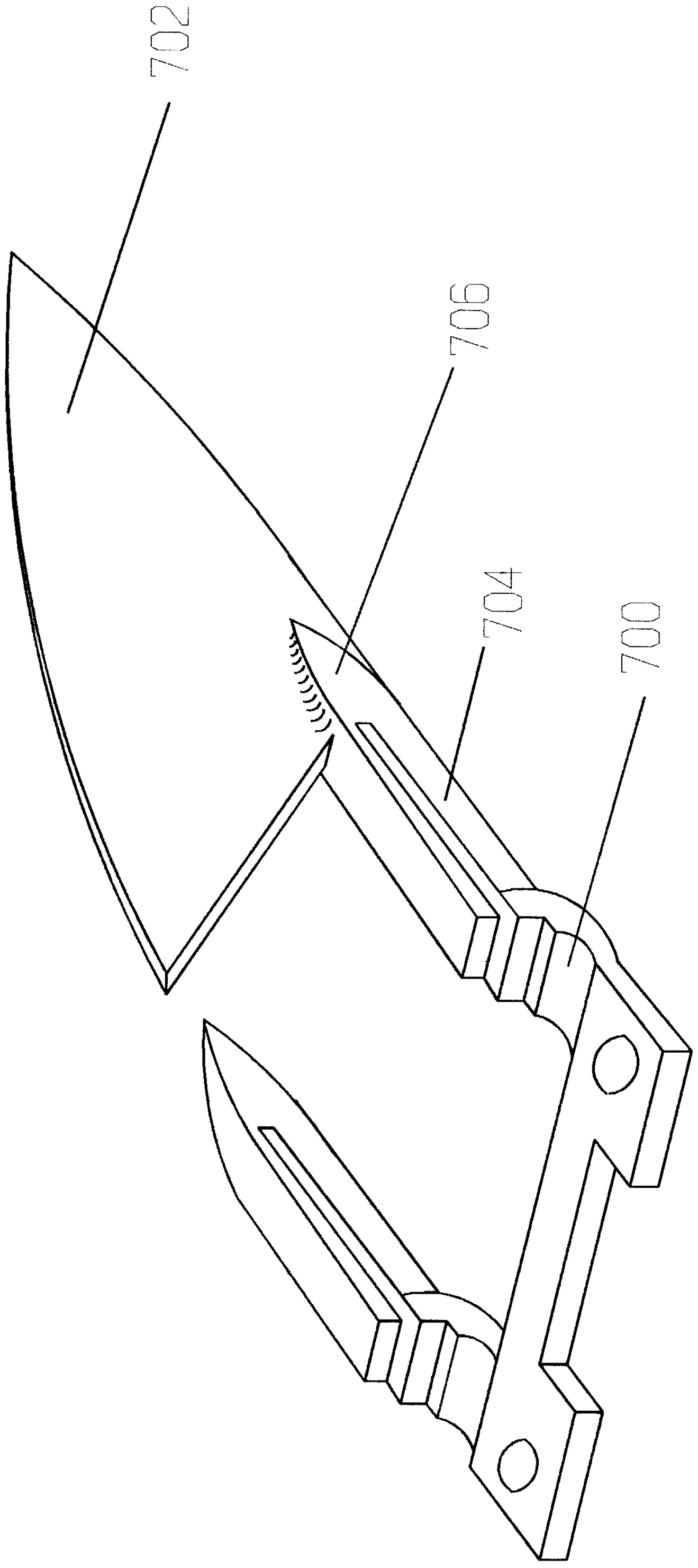


FIG. 7

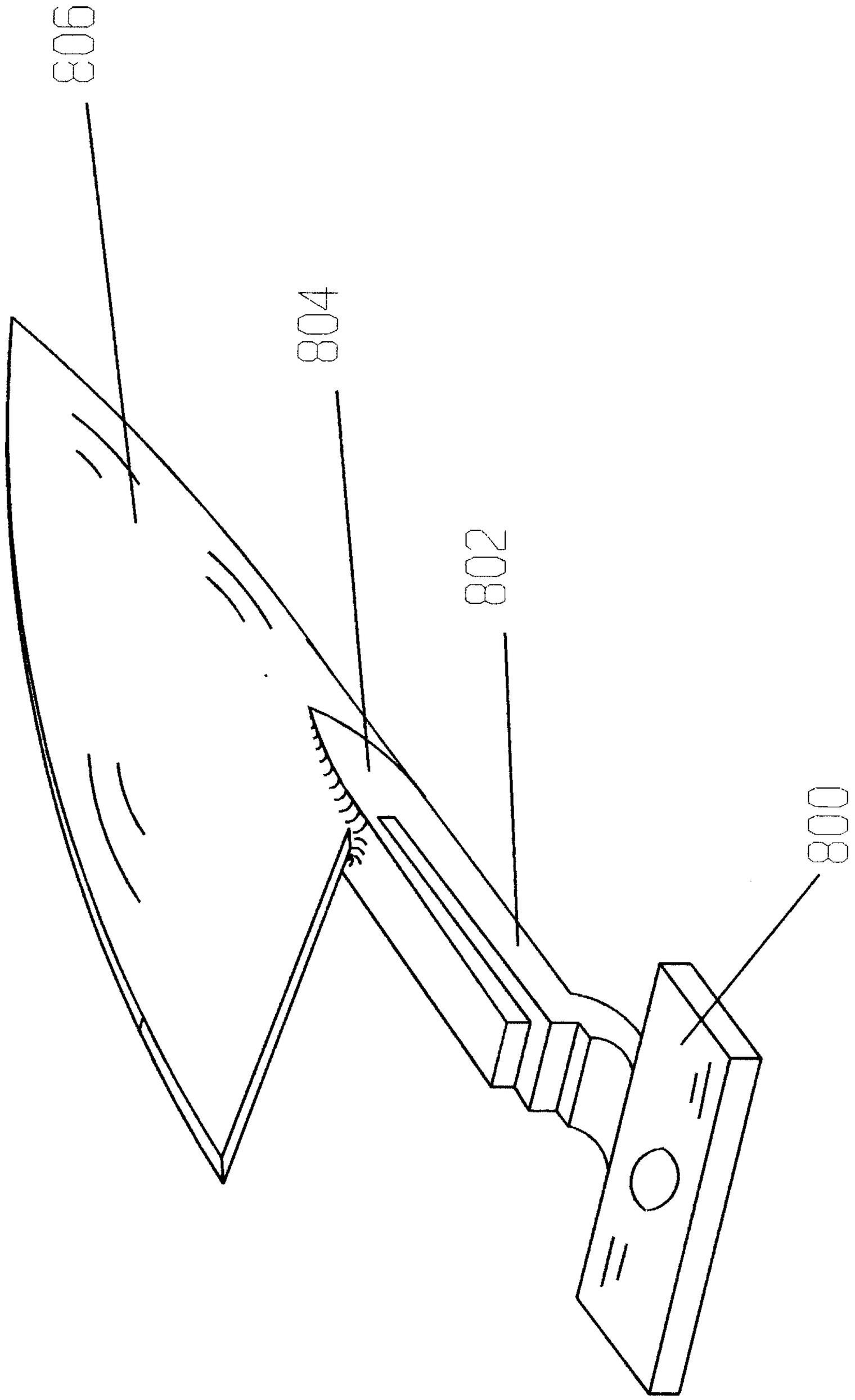
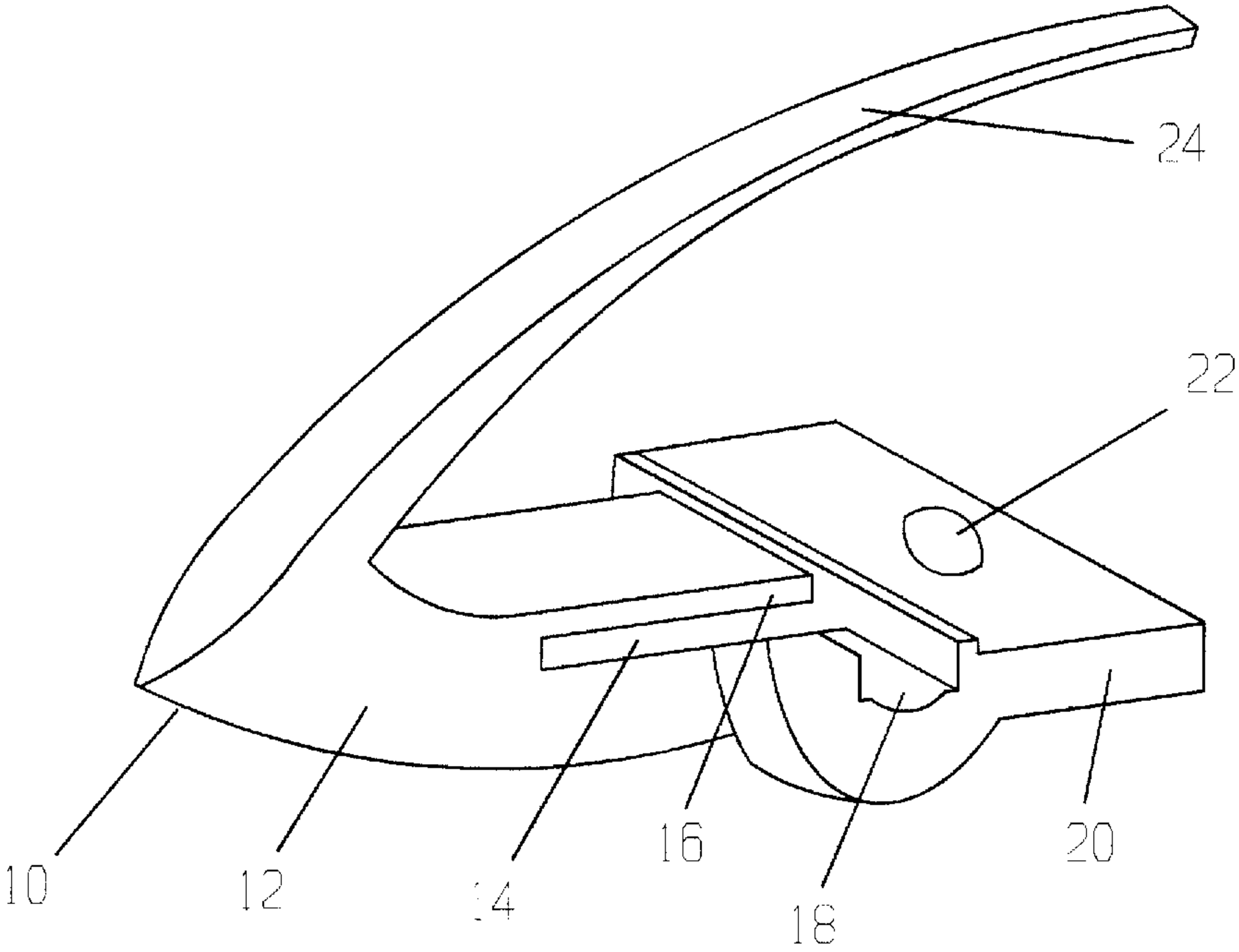


FIG. 8


24
22
10
12
14
16
18
20