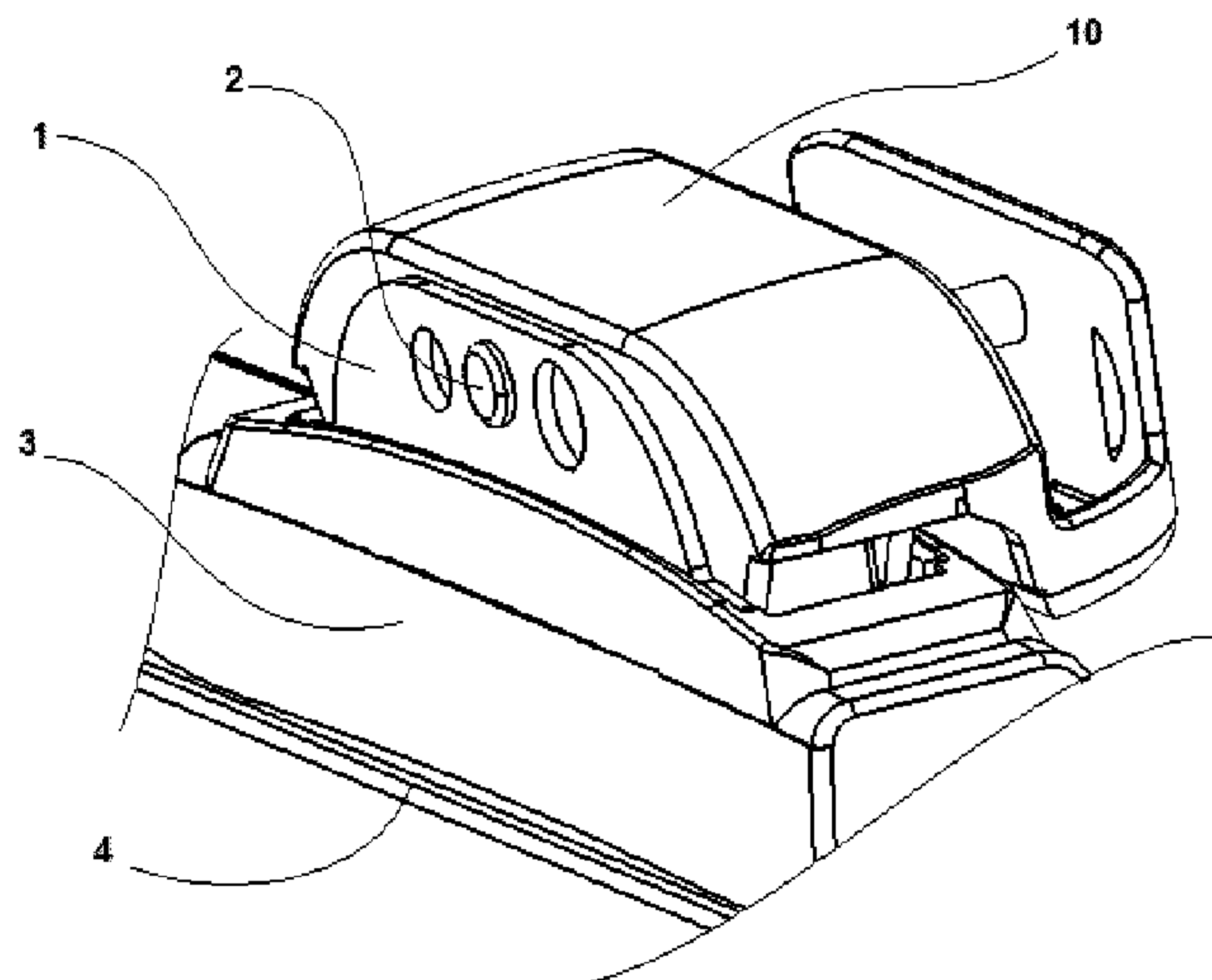




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(57) **Abrégé/Abstract:**

Wiper blade adapter (10) having a mounting portion (20) comprising a wiper blade securing element (23), the wiper securing element (23) being capable of securing a side-saddle portion (30) comprising a connector securing element, the connector securing element being capable of securing a connector (5) that is capable of securing a wiper arm.

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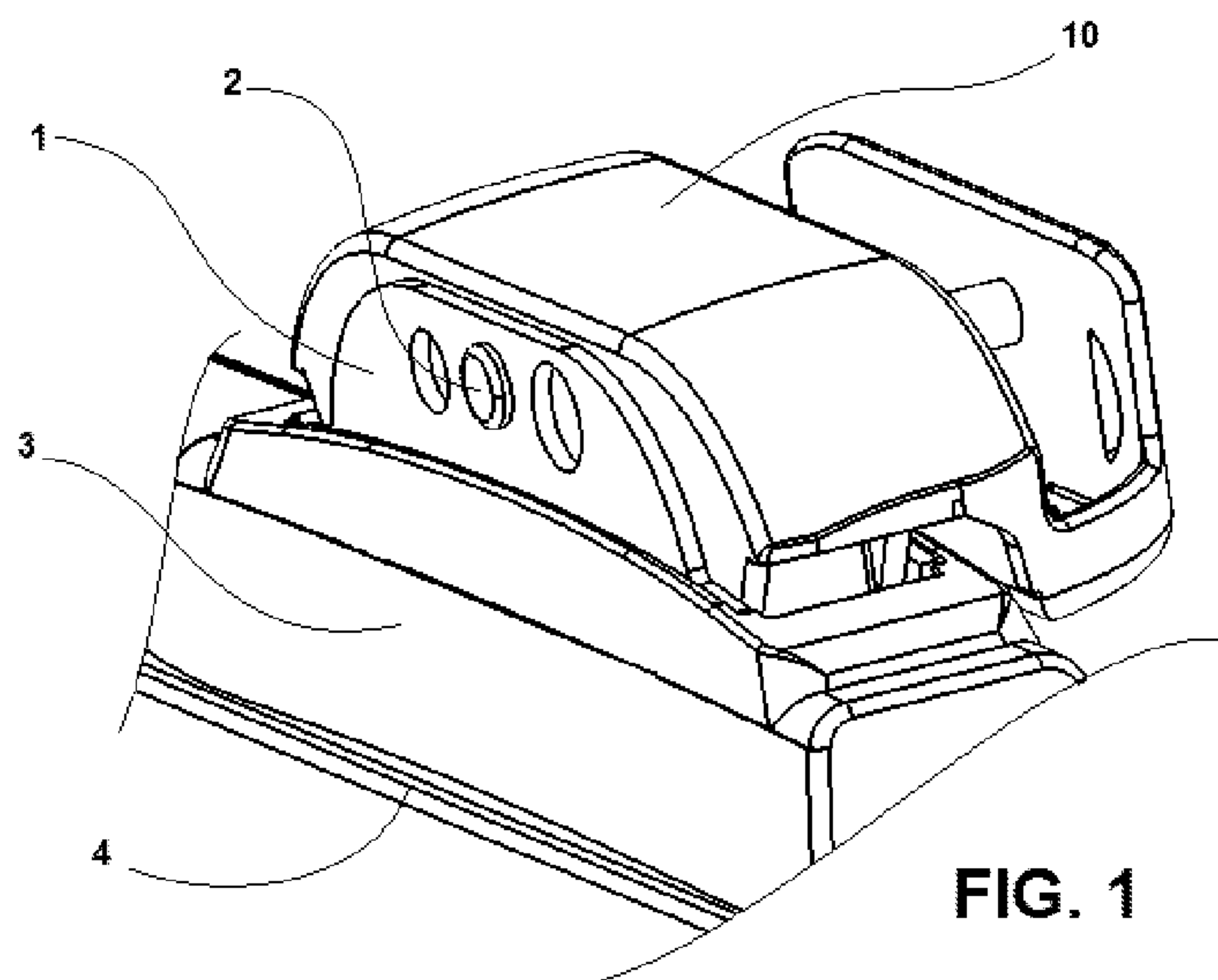
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**FIG. 1**

(57) Abstract: Wiper blade adapter (10) having a mounting portion (20) comprising a wiper blade securing element (23), the wiper blade securing element (23) being capable of securing a side-saddle portion (30) comprising a connector securing element, the connector securing element being capable of securing a connector (5) that is capable of securing a wiper arm.

WINDSHIELD WIPER ADAPTER, CONNECTOR AND ASSEMBLY

5

FIELD AND RELATED ART

This invention relates in general to windshield wipers, and more particularly, to an improved adapter or connector for a windshield wiper that allows the windshield wiper to be attached to multiple types of windshield wiper arm configurations in side saddle position.

10 The invention is also directed to windshield wipers incorporating these novel adapters.

There are a variety of wiper arms on which wiper blades are provided as original equipment. These various wiper arms have hooks, pins, or other configurations which may connect to the wiper blade with or without connectors. These various configurations have created a problem in the replacement market because wiper blade providers are required to have multiple wiper blade configurations to accommodate all of the existing wiper arms. It is therefore advantageous to have attachment structures that can accommodate a host of arms to reduce the complexity and cost associated with plurality of wiper blade arm configuration.

The need to attach replacement windshield wiper blades to multiple arms has been addressed to some degree. For example, windshield wiper blades have been designed to work with various hook-type wiper arms having different sizes. Connectors may also be configured to receive either a pin-type arm, a hook-type arm and a variety of other arms, such as described in U.S. Patent No. 6,640,380.

An adapter may also be used to connect the arm to a windshield wiper. As that term is used herein, an adapter is a separate structure that works together with the connector to allow the windshield wiper to connect to a type of wiper arm. An example adapter is described in U.S. Patent No. 2002/0192017, wherein an adapter is used to allow a large hook to connect to a wiper blade having a connector that accommodates only small hook arms. Although these connectors and adapters may increase the usefulness of a given windshield wiper such that it can be used with different wiper arm types, the connectors are often expensive and have complicated structures that are difficult and time-consuming to manufacture.

Whereas many automobiles on the market have arms that attach to a wiper blade directly over the wiper strip (*i.e.*, hooks that connect inside of, or pin arms where the pin enters into, a mounting base or other connecting device that is above the wiper strip), more recent automobiles contain wiper arms that are designed to attach to the side of a wiper blade.

5 These wiper arms (sometimes referred to herein as “side-saddle wiper arms”) are generally provided on vehicles with a specially designed wiper blade that is designed to connect only to that specific type of arm and require special mounting bases or connectors designed to accommodate such an arm. When the wiper blade must be replaced, the replacement must generally be done at a car dealership and requires the purchase of an expensive replacement
10 part. Moreover, there are several versions of these wiper arms, some of which have varying lengths, locking arms or spacers. Accordingly, an aftermarket provider that offers windshield wipers that are not directed to a specific car must evaluate whether to add a separate connector to accommodate each particular side saddle wiper arm. This leaves consumers with vehicles having the new wiper arms with fewer, usually more expensive, alternatives for
15 replacement windshield wipers.

Thus, there is a need for an inexpensive adapter or connector that is capable of securing a windshield wiper blade to a variety of arms, including side-saddle wiper arms. In particular, it would be desirable to have an adapter or connector that can be attached to a wiper blade and that preferably can be used with at least one connector that will allow the
20 wiper blade to be locked to a wide variety of these side-saddle wiper arms, regardless of their various locking arm mechanisms or whether the arm includes a spacer. It would also be desirable to have a windshield wiper adapter or connector that can be fabricated or molded as a single piece (or with few pieces) at low-cost that can accommodate a wide variety of side-saddle wiper arms. The prior art fails to provide a low-cost windshield wiper adapter or
25 connector capable of attachment to a wide variety of these side-saddle wiper arms, much less for the purpose of reducing the amounts of inventory parts required to supply a vehicle market that uses a wide variety of pin-type windshield wiper arm types.

SUMMARY

The following presents a simplified summary of the invention in order to provide a
30 basic understanding of some aspects of the invention. This summary is not an extensive overview of the invention. Rather than specifically identify key or critical elements of the invention or to delineate the scope of the invention, its purpose, *inter alia*, is to present some

concepts of the invention in a simplified form as a prelude to the more detailed description that is presented later.

5 The invention is generally directed to novel adapters and connectors for windshield wiper blades, including those that accommodate side-saddle wiper arms. More particularly, the invention relates, in part, to a single-piece (or few-piece) windshield wiper adapter or connector that can accommodate multiple pin-type windshield wiper arms having varying pin lengths and locking mechanisms. The invention is also directed to wiper blades incorporating the adapters and connectors described herein.

10 In certain embodiments, the adapter or connector provides a side-to-side aperture to accommodate a retaining pin, and an aperture and an outside edge on its upper surface to accommodate locking arms of varying sizes and configurations that may attach to the connector.

15 The following description and the annexed drawings set forth in detail certain illustrative aspects of the invention. These aspects are indicative, however, of but a few of the various ways in which the principles of the invention may be employed and the present invention is intended to include all such aspects and their equivalents. Other advantages and novel features of the invention will become apparent from the following description of the invention when considered in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

20 The following description and the annexed drawings set forth certain illustrative aspects of the invention. These aspects are indicative of but a few of the various ways in which the principles of the invention may be employed and the present invention is intended to include all such aspects and their equivalents. Other advantages and novel features of the invention will become apparent from the following detailed description of the invention when
25 considered in conjunction with the drawings.

Figure 1 is a perspective view of an embodiment of an adapter of the present invention attached to a wiper blade.

Figure 2 is a perspective view of an embodiment of an adapter of the present invention viewed from above.

30 Figure 3 is a perspective view of an embodiment of an adapter of the present invention viewed from below.

Figure 4 is a side view of an embodiment of an adapter of the present invention showing a side-saddle, or second, portion of the adapter.

Figure 5 is a side view of an embodiment of an adapter of the present invention showing a mounting, or first, portion of the adapter.

5 Figure 6 is an end view of an embodiment of an adapter of the present invention showing an end where the rod of a hook arm may reside when a hook arm is attached.

Figure 7 is an end view of an embodiment of an adapter of the present invention showing an end where the hook of a hook arm may reside when a hook arm is attached.

Figure 8 is a top view of an embodiment of an adapter of the present invention.

10 Figure 9 is a bottom view of an embodiment of an adapter of the present invention.

Figure 10 is a side view of an embodiment of an adapter of the present invention showing a side saddle, or second portion.

Figure 11 is an end view of an embodiment of an adapter of the present invention showing an end where the rod of a hook arm may reside when a hook arm is attached.

15 Figure 12 is a perspective view of an embodiment of an adaptor of the present invention, with a connector of the type described in U.S. Patent No. 6,640,380 attached thereto.

20 Figure 13 is a cross-sectional side view of a side saddle, or second, portion of an embodiment of an adapter of the present invention, from behind an outer side wall of a side saddle portion of the adapter, with a connector of the type described in U.S. Patent No. 6,640,380 attached thereto.

Figure 14 is a cross-sectional side view of a side saddle, or second, portion of an embodiment of a connector of the present invention, from behind an outer side wall of a side-saddle portion of the connector.

25 **DETAILED DESCRIPTION**

The foregoing summary, as well as the following detailed description of certain embodiments of the subject matter set forth herein, will be better understood when read in conjunction with the appended drawings. As used herein, an element or step recited in the singular and proceeded with the word “a” or “an” should be understood as not excluding plural of said elements or steps, unless such exclusion is explicitly stated. Furthermore, references to “one embodiment” are not intended to be interpreted as excluding the existence

of additional embodiments that also incorporate the recited features. Moreover, unless explicitly stated to the contrary, embodiments “comprising” or “having” an element or a plurality of elements having a particular property may include additional such elements not having that property.

5 In the following detailed description, reference is made to the accompanying drawings which form a part hereof, and in which are shown by way of illustration specific embodiments in which the subject matter disclosed herein may be practiced. These embodiments, which are also referred to herein as “examples,” are described in sufficient detail to enable those skilled in the art to practice the subject matter disclosed herein. It is to be understood that the
10 embodiments may be combined or that other embodiments may be utilized, and that structural, logical, and electrical variations may be made without departing from the scope of the subject matter disclosed herein. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the subject matter disclosed herein is defined by the appended claims and their equivalents.

15 In the description that follows, like numerals or reference designators will be used to refer to like parts or elements throughout. In this document, the terms “a” or “an” are used, as is common in patent documents, to include one or more than one. In this document, the term “or” is used to refer to a nonexclusive or, unless otherwise indicated. . Furthermore, references to “one embodiment” are not intended to be interpreted as excluding the existence
20 of additional embodiments that also incorporate the recited features. Moreover, unless explicitly stated to the contrary, embodiments “comprising” or “having” an element or a plurality of elements having a particular property may include additional such elements not having that property. As used herein, an adapter is a separate structure that works together with the connector to allow the windshield wiper to connect to a type of wiper arm.

25 In certain embodiments, a wiper blade adapter may have a mounting portion comprising a wiper blade securing element, the wiper securing element being capable of securing a wiper blade, and a side-saddle portion comprising a connector securing element, the connector securing element being capable of securing a connector that is capable of securing a wiper arm.

30 In some embodiments mounting portion may have a rivet clip. In some such embodiments, the mounting portion may also have a pair of mounting side walls, and wherein the rivet clip is embodied on each of the mounting side walls.

In some embodiments, the wiper blade adapter may have a connector securing element that also has a rivet capable of engaging a rivet clip on the connector in order to secure the connector. In some embodiments the wiper blade adapter's side saddle portion may have at least one reinforcing member. In some embodiments the at least one reinforcing member may include a vertical reinforcing member. In some embodiments the at least one reinforcing member may include a horizontal reinforcing member. In some embodiments, the at least one reinforcing member may include a transverse reinforcing member.

In certain embodiments, a wiper blade assembly may have a wiper blade and an adapter having a mounting portion comprising a wiper securing element, the wiper securing element being capable of securing the adapter to wiper blade and a side-saddle portion comprising a connector securing element, the connector securing element being capable of securing a connector, and the connector being capable of securing a wiper arm.

In some embodiments the wiper blade assembly's mounting portion may have a rivet clip. In some embodiments the mounting portion may also have a pair of mounting side walls, and wherein the rivet clip is embodied on each of the mounting side walls. In some embodiments, the wiper blade assembly's connector securing element may also have a rivet capable of engaging a rivet clip on the connector in order to secure the connector.

In some embodiments the wiper blade assembly's side saddle portion may also have at least one reinforcing member. In some such embodiments the at least one reinforcing member includes a vertical reinforcing member. In some such embodiments, the at least one reinforcing member includes a horizontal reinforcing member. In some such embodiments, the at least one reinforcing member includes a transverse reinforcing member.

In some embodiments, the wiper blade assembly may also have a connector capable of securing to the connector securing element, and further capable of securing a wiper arm.

In certain embodiments a wiper blade connector may have a mounting portion comprising a wiper securing element, the wiper securing element being capable of securing a wiper blade and a side-saddle portion comprising a connector member, the connector member being capable of securing a wiper arm.

In some embodiments the wiper blade connector's mounting portion may have a rivet clip. In some embodiments, the wiper blade connector mounting portion may also have a pair of mounting side walls, wherein the rivet clip is embodied on each of the mounting side walls.

In one aspect, the invention is generally directed to an adapter or a connector for a windshield wiper (or a windshield wiper incorporating same) that allows one windshield wiper to be secured to multiple types of windshield wiper arms, each arm having a different configuration. The adapter may be designed for use with multiple different windshield wiper arms that are secured to a wiper blade in side-saddle fashion, e.g., in a manner whereby the arm attaches to the side of a wiper blade.

In certain embodiments, the adapter is configured to have a first portion and a second portion. In certain preferred embodiments, the first portion is a mounting portion configured to connect to a wiper blade. In certain preferred embodiments, the second portion is a side-saddle portion configured to connect to a wiper arm via the use of a connector.

In certain embodiments, the adapter may be configured such that the orientation of either the windshield wiper or the connector can be reversed based on the particular windshield wiper arm that is being used.

In certain embodiments, the present invention provides a wiper blade adapter comprising a mounting portion comprising a wiper securing element, the wiper securing element being capable of securing a wiper blade; a side-saddle portion comprising a connector securing element, the connector securing element being capable of securing a connector, and the connector being capable of securing a wiper arm.

In certain embodiments, the present invention provides a wiper blade assembly comprising a wiper blade; and an adapter comprising a mounting portion comprising a wiper securing element, the wiper securing element being capable of securing a wiper blade; and a side-saddle portion comprising a connector securing element, the connector securing element being capable of securing a connector, and the connector being capable of securing a wiper arm.

In certain embodiments, the present invention provides a wiper blade connector comprising a mounting portion comprising a wiper securing element, the wiper securing element being capable of securing a wiper blade; and a side-saddle portion comprising a connector member, the connector member being capable of securing a wiper arm.

Figure 1 is a perspective view of an embodiment of the adapter **10** attached to a wiper blade having a mounting base **1** with a rivet **2**, a cover **3** for the base of the mounting base **1**, and a wiper strip **4**. The adapter **10** as shown is attached to the rivet **2** of mounting base **1** of the wiper blade.

Figures 2–9 provide various views of an embodiment of an adapter **10** of the present invention. Figures 2 and 3 are perspective views of adapter **10** from above and below, respectively. Figure 2 shows certain structures that may be present in the side-saddle, or second, portion **30** of the adapter **10**. Figure 3 shows certain structures present in the mounting, or first, portion **20** of the adapter **10**, as well some features on the bottom of the side saddle portion **30**.

The side-saddle, or second, portion **30** of the adapter **10** is configured to receive a connector **5**. Generally speaking, the side-saddle portion **30** includes a connector securing element to which a connector can be secured. In certain embodiments, the connector can be pivotally secured to the connector securing element such that it can move about an axis. In certain embodiments, such as the exemplary embodiment in Figures 2-9, the connector securing element may be a side-saddle rivet **33** which may be used to secure a connector **5** having a rivet passage and clip. The connector **5** may be virtually any connector compatible with the connector securing element and includes, without limitation, the connector **5** described in U.S. Patent No. 6,640,380.

Other connector securing elements for connecting an adapter **10** to a connector **5**, including well-known methods for attaching connectors to wiper blades, are contemplated within the scope of the present invention. These include having pin passages and pin clips which connect to one or more pins in the adapter; having one or more detents in the connector which engage shoulders in apertures or recesses in the adapter; having recesses in the peripheral wall of the connector that can accept and secure a rivet or pin; having deflectable or rigid pins or detents in the connector, which engage corresponding recesses, apertures or shoulders in the adapter; and other form-fitting or friction fitting connections and the like.

In certain embodiments the side saddle portion **20**, has two side-saddle side walls **31**, **32** appropriately spaced apart from one another. The side-saddle portion **20** may also have one or more end walls **34**, **35**. The end walls **34**, **35**, if present, may serve to provide additional structural support for the side-saddle side walls **31**, **32**. The side saddle side walls **31**, **32** and end walls **34**, **35** may define a hook arm passage way, which may have a hook insertion passageway **37a** (*e.g.*, for the hook of a hook arm), and a hook rod passageway **37b** (*e.g.*, for the rod of a hook arm) which accommodate a hook arm when it is secured to a connector **5** on the adapter **10**.

In certain embodiments, the side-saddle side walls **31**, **32** may have wing apertures **36** (or recesses) which may allow the wings of a connector **5** to extend laterally in order to

facilitate the insertion of a hook-type wiper arm. The side saddle portion **30** may also have a floor **39**, which may connect, in whole or in part, the side-saddle side walls **31**, **32** and end walls **34**, **35**. The adapter **10** may have apertures **44** in the floor **39**, as shown, or elsewhere, to reduce the amount of material used, to facilitate molding, or confer additional benefits.

5 The side-saddle portion **30** of the adapter **10** may also have reinforcing members which may impart structural support to the adapter **10**. The reinforcing members may be provided in any location and travel in any direction, including vertical, horizontal or transverse, as illustrated in **38a**, **38b** and **38c**.

10 Generally speaking, the adapter **10** may have various shapes and sizes depending upon the application in question. In certain embodiments, the adapter is configured to accommodate the shape of the wiper blade, including the shape of the wiper blade's mounting base **1**, cover **2**, or both. In certain embodiments, the adapter **10** may have a contoured edge **42**.

15 The mounting, or second, portion **20** of the adapter **10** is configured to connect the adapter to a wiper blade, and has a wiper securing element which secures the adapter to a wiper blade. As shown in the exemplary embodiment in Figure 3, the mounting portion **20** may have spaced apart mounting side walls **21**, **22**, and the wiper securing element may be a rivet clip **23** in each of the mounting side walls **21**, **22**. In this embodiment, connection is made to a wiper blade via the rivet **2** of a wiper blade being positioned in the rivet passages **24** of the mounting side walls **21**, **22** of the mounting portion **20** of the adapter **10**. The adapter **10** may be pushed down onto the wiper such that the rivet **2** passes through the rivet passages **24** and into the rivet clip **23**.

25 Other methods for connecting an adapter **10** to a wiper blade known in the art are contemplated within the scope of the present invention, including having pin passages and pin clips which connect to one or more pins in the wiper blade; having one or more detents in the adapter **10** which engage shoulders in apertures or recesses in the wiper blade; having recesses in the peripheral wall of the connector that can accept and secure a rivet or pin; having deflectable or rigid pins or detents in the adapter **10**, which engage corresponding recesses, apertures or shoulders in the wiper blade; and other form-fitting or friction fitting connections and the like.

30 The mounting portion **20** of the adapter **10** may also have reinforcing walls **25** extending between the mounting side walls **21**, **22** for purposes of structural rigidity,

reinforcement, or other purposes. Alternatively, reinforcing ribs **43**, reinforcing members **38**, or other features may also be used to reinforce the mounting side walls **21**, **22**.

The adapter **10** may optionally feature one or more interim walls **40** between the mounting portion **20** and the side-saddle portion **30**. The interim walls may feature
 5 reinforcing ribs **43** that can be used to provide structural support to the inner side-saddle side wall **32**. Additionally, the interim wall **40** may be joined to the inner mounting side wall **22** to provide additional structural support.

Figure 4 shows a side view of the exemplary embodiment of adapter **10**, showing side-saddle side walls **31**, **32**, each having a wing aperture **36**, end walls **34**, **35**, a hook
 10 insertion passageway **37a** and a hook rod passageway **37b**, and reinforcing members **38a**, **38b** and **38c**.

Figure 5 shows a side view of the exemplary embodiment of adapter **10** showing the outer mounting wall **21**, having a rivet clip **23** and a rivet passage **24**. Through the rivet clip **23**, the interim wall **40** can be seen, together with the reinforcing rib **43** connecting the interim
 15 wall **40** to the inner side-saddle side wall **22**. The contour edges **42** which may be adapted to the shape of the wiper blade are also shown.

Figure 6 shows an end view of the exemplary embodiment of adapter **10**, on the side where the rod of a hook arm may reside when the hook arm is connected. The end wall **35** and side walls **31**, **32** of the side-saddle portion **30** are shown, and form the hook rod
 20 passageway **37b**. The side-saddle rivet **33**, reinforcing members **38a**, **38b** and **38c**, contour edge **42**, and the bottom of the mounting portion **20** with its mounting sidewalls **21**, **22** and reinforcing wall **25** are also shown.

Figure 7 shows the opposite end view of the exemplary embodiment of adapter **10** where the hook of a hook arm may reside when a hook arm is secured to adapter **10**. The
 25 features shown are similar to those depicted in Figure 6, except that Figure 7 shows that the hook insertion passageway **37a** may be made larger than the hook rod passageway **37b** to facilitate the insertion of a hook arm into the adapter **10**.

Figure 8 shows a top view of the exemplary embodiment of adapter **10**, showing side saddle portion **30** and its side-saddle rivet **33**, side-saddle side walls **31**, **32**, end walls **34**, **35**,
 30 floor **39**, and reinforcing members **38a**, **38b**. Also shown are top surface **41** over the mounting portion **20**, and the outer mounting wall **21**.

Figure 9 shows a bottom view of the exemplary embodiment of adapter **10**, which shows the floor **39**, side-saddle side walls **31, 32**, rivet **33**, end walls **34, 35**, and reinforcing members **38a, 38b** and **38c** of side-saddle portion **30**. Also shown are mounting side walls **21, 22**, reinforcing walls **25**, rivet clips **23**, and rivet passages **24** of mounting portion **20**.

5 This embodiment features an interim wall **40** having reinforcing ribs **43** connecting to the inner side saddle wall **32**, and a rivet end recess **27** which accommodates the outer bump of the rivet **2** of a wiper blade (which can be seen in Figure 1). A mounting base wall gap **26** can also be seen, which allows the wall of mounting base **1** to pass through when adapter **10** is connected to a wiper blade. Another optional feature shown in this embodiment is an interim
10 gap **45** between the interim wall **40** and the inner side saddle wall **32**.

Figures 10 and 11 show additional optional features that may be included in an exemplary embodiment of adapter **10**, including pin apertures **46** for accommodating pin-type wiper arms, and an inner longitudinal groove **47** which allows adapter **10** to accommodate connector **5**.

15 Figures 12 and 13 show adapter **10** with a connector **5** of the type described in U.S. Patent No. 6,640,380, which is clipped onto the side-saddle rivet **33**. It will be appreciated that connector **5** is for illustrative purposes, and as such, adapter **10** can be configured to accommodate any type of connector known in the art depending on the particular wiper arm.

Figure 14 shows another embodiment of the invention. In this embodiment, a
20 connector member **50** is used in place of connector **5** to connect to a wiper arm. The connector shown in this embodiment is a single structure that may be attached to a wiper blade to connect it to a side saddle wiper arm. The connector member **50** is preferably able to pivot about the side saddle rivet **33**. Persons of skill in the art will appreciate that various types of connector members **50** can be used to accommodate various types of wiper arms
25 within the teachings of the invention.

Those skilled in the art will recognize that adapter **10** can be fabricated from any suitable material known in the art, including without limitation, rigid or elastic plastics, metals, synthetic and natural rubber compounds, etc. Certain embodiments contemplate materials that can be molded such that connector **10** is fabricated as a single piece. In certain
30 embodiments, more than one piece may be used, whereby each piece may be of the same or different materials. For example, certain embodiments may use a metal side-saddle rivet **33** on an otherwise molded plastic adapter **10**.

In operation, the windshield wiper adapter **10** or connector **50** allows a single windshield wiper to be used in conjunction with windshield wiper arms having a wide variety of configurations. This confers many advantages, including without limitation, facilitating manufacturing, reducing cost, and allowing for easy replacement of windshield wipers.

5 Another embodiment of the invention is a wiper blade provided with an adapter or connector, including adapter **10** or connector **50** described above, or as shown in Figures 1-14. The wiper blade may be of any type suitable for use with the present invention. For example, the wiper blade can be a traditional wiper blade having a plurality of frames which carry a wiper strip, and having a mounting base. Alternatively, the wiper blade may be a beam blade,
10 having one or more spring-elastic beams, a wiper strip, and a mounting base. The wiper blade may also be a hybrid wiper blade, which has a combination of a beam and one or more frames, a wiper strip, and a mounting base.

Regardless of the type of wiper blade, the adapter or connector can be adapted to connect to the wiper blade, for example, via a rivet on the wiper blade (which is commonly
15 located in a mounting base or in the frame of the wiper blade) and a rivet passage **24** and rivet clips **23** on the mounting portion **30** of the adapter or connector. Any other method discussed above or otherwise known in the art would also be suitable, such as having one or more pins, holes, recesses, channels, or other structure in the wiper blade, and having corresponding pin clips, detents or pins or any other structure complimentary to the structure in the adapter or
20 connector.

In certain embodiments, the adapter or connector may be connected to the wiper blade prior to connecting to the wiper arm. In certain embodiments, the adapter or connector may be connected to the wiper arm prior to being connected to the wiper blade. In certain
25 embodiments, the adapter or connector may either be first connected to the wiper arm or to the wiper arm.

Those skilled in the art will recognize that while the invention will most likely be used in conjunction with automobiles, it is suitable for use with any vehicle. For example, in addition to automobiles, trucks, buses, locomotives, aircrafts, or any other vehicle type that uses a windshield wiper can benefit from the present invention.

30 It is to be understood that the above description is intended to be illustrative, and not restrictive. For example, the above-described embodiments (and/or aspects thereof) may be used in combination with each other. In addition, many modifications may be made to adapt

a particular situation or material to the teachings of the subject matter disclosed herein without departing from its scope. The description above of the exemplary embodiments is not intended to be limiting. While specific embodiments have been discussed herein to explain the invention, it will be understood by those of ordinary skill in the art that the descriptions
5 herein are intended as illustrative, and not as limiting, and that variations in the embodiments can be made without departing from the spirit of the invention.

For example, the type of materials, the number, configuration or position of the various features can vary so long as they are capable of performing their intended function as described herein.

10

What is claimed is:

1. A wiper blade adapter comprising:

a side saddle portion including

an outer side saddle wall and an inner side saddle wall together defining an elongate side saddle passage, and

a side saddle rivet provided substantially within the side saddle passage, the side saddle rivet oriented substantially transverse to the side saddle passage, the side saddle rivet dimensioned to be securable within an arcuate rivet clip of a wiper blade connector;

a mounting portion including

an outer mounting wall and an inner mounting wall together defining an elongate mounting passage, the side saddle passage substantially parallel with the mounting passage,

an interim gap between the inner mounting wall and the inner side saddle wall, the interim gap substantially parallel to the mounting passage and the side saddle passage;

an interim wall within the interim gap, the interim wall substantially elongate and oriented substantially parallel to the interim gap, the interim wall provided along at least the majority of the length of the interim gap; and

a rivet end recess provided in the interim wall adjacent to the arcuate rivet clip.

2. The wiper blade adapter of claim 1, the mounting portion further including an arcuate rivet clip defined in each of the first and second side mounting walls, the arcuate rivet clip pivotally connectable with a rivet provided on the wiper blade.

3. The wiper blade adapter of claim 1, wherein the mounting passage includes a plurality of reinforcing walls oriented substantially transverse to the mounting passage.

4. The wiper blade adapter of claim 1 wherein the side saddle portion further comprises at least one reinforcing member.

5. The wiper blade adapter of claim 4 wherein the at least one reinforcing member includes a vertical reinforcing member.
6. The wiper blade adapter of claim 4 wherein the at least one reinforcing member includes a horizontal reinforcing member.
7. The wiper blade adapter of claim 4 wherein the at least one reinforcing member includes a transverse reinforcing member.
8. The wiper blade adapter of claim 1, further comprising a plurality of reinforcing ribs provided within the interim gap and oriented substantially transverse to the interim gap.
9. A wiper blade adapter having opposed elongate ends, a top end and a bottom end spaced from and opposed to the top end, the adapter comprising:
 - a side saddle portion including
 - an elongate outer side saddle wall including an uppermost edge,
 - an elongate inner side saddle wall opposed to the outer side saddle wall,
 - a floor provided at the bottom end of the adapter between the outer side saddle wall and the inner side saddle wall, the inner and outer side saddle walls together with the floor thereby defining an elongate side saddle passage, and
 - a side saddle rivet provided substantially within the side saddle passage, the side saddle rivet oriented substantially transverse to the side saddle passage, the side saddle rivet dimensioned to be securable within an arcuate rivet clip of a wiper blade connector; and
 - a mounting portion including
 - an elongate outer mounting wall,
 - a top surface provided at the top end of the adapter, above the uppermost edge, and extending from the outer mounting wall and terminating at the inner side saddle wall, and

an elongate inner mounting wall projecting from the top surface and oriented opposed to the outer mounting wall, the inner and outer mounting walls together with the top surface defining an elongate mounting passage,

wherein the mounting passage and the side saddle passage are substantially parallel with one another.

10. The adapter of claim 9, further comprising an interim gap between the inner mounting wall and the inner side saddle wall, and the interim gap further defined by the top surface.

11. The adapter of claim 10 further comprising an interim wall projecting from the top surface into the interim gap, the interim wall substantially elongate and oriented substantially parallel to the interim gap, the interim wall provided along at least a majority of the length of the interim gap.

12. The adapter of claim 11 further comprising:

an arcuate rivet clip defined in each of the inner and outer mounting walls, the arcuate rivet clip pivotally connectable with a rivet provided on a wiper blade; and

a rivet end recess provided in the interim wall adjacent to the arcuate rivet clip.

13. The wiper blade adapter of claim 11 further comprising a plurality of reinforcing ribs provided within the interim gap and oriented substantially transverse to the interim gap.

14. The adapter of claim 9, wherein the mounting passage is open at the bottom end of the adapter and the side saddle passage is open at the top end of the adapter.

15. The wiper blade adapter of claim 9 wherein the side saddle portion further comprises at least one reinforcing member.

16. The wiper blade adapter of claim 15 wherein the at least one reinforcing member includes a vertical reinforcing member.

17. The wiper blade adapter of claim 15 wherein the at least one reinforcing member includes a horizontal reinforcing member.

18. The wiper blade adapter of claim 15 wherein the at least one reinforcing member includes a transverse reinforcing member.

19. A wiper blade adapter having opposed elongate ends as well as a top end and a bottom end, the top end spaced from and opposed to the bottom end, the adapter comprising:

a side saddle portion including

an elongate outer side saddle wall,

an elongate inner side saddle wall opposed to the outer side saddle wall,

a floor provided at the bottom end of the adapter between the outer side saddle wall and the inner side saddle wall, the inner and outer side saddle walls together with the floor thereby defining an elongate side saddle passage, and

a side saddle rivet provided substantially within the side saddle passage, the side saddle rivet oriented substantially transverse to the side saddle passage, the side saddle rivet dimensioned to be securable within an arcuate rivet clip of a wiper blade connector;

a mounting portion including

an elongate outer mounting wall,

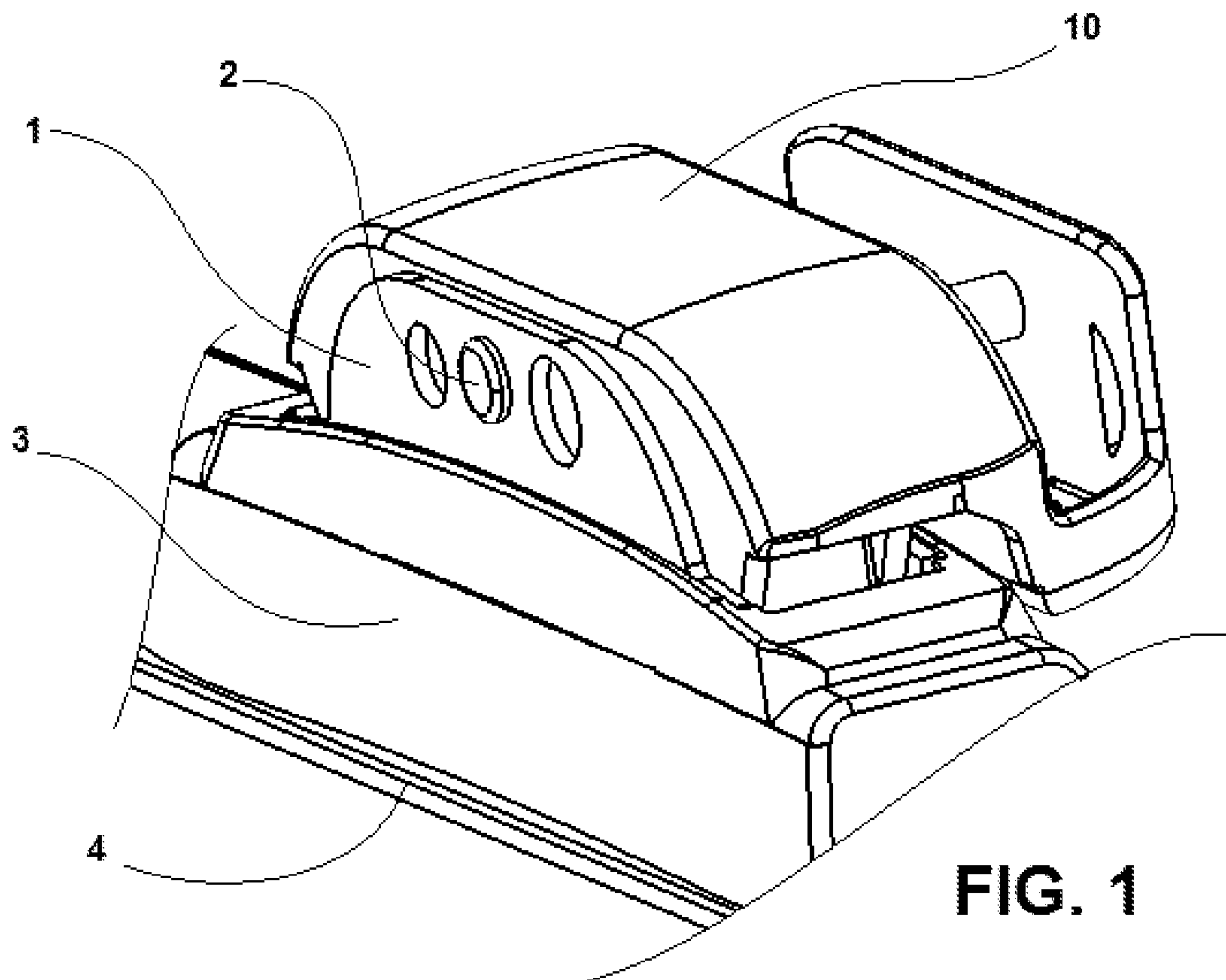
an elongate inner mounting wall opposed to the outer mounting wall,

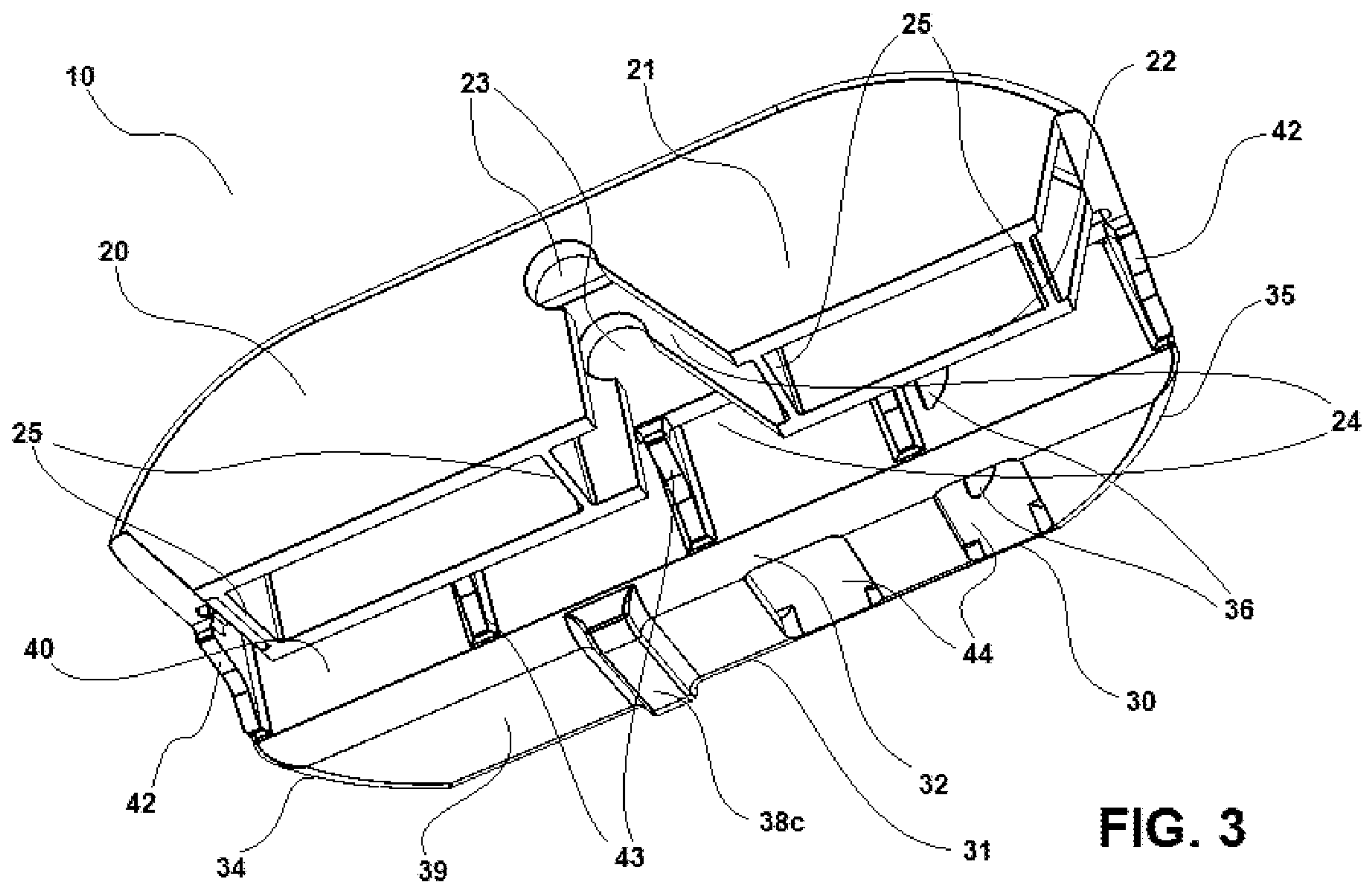
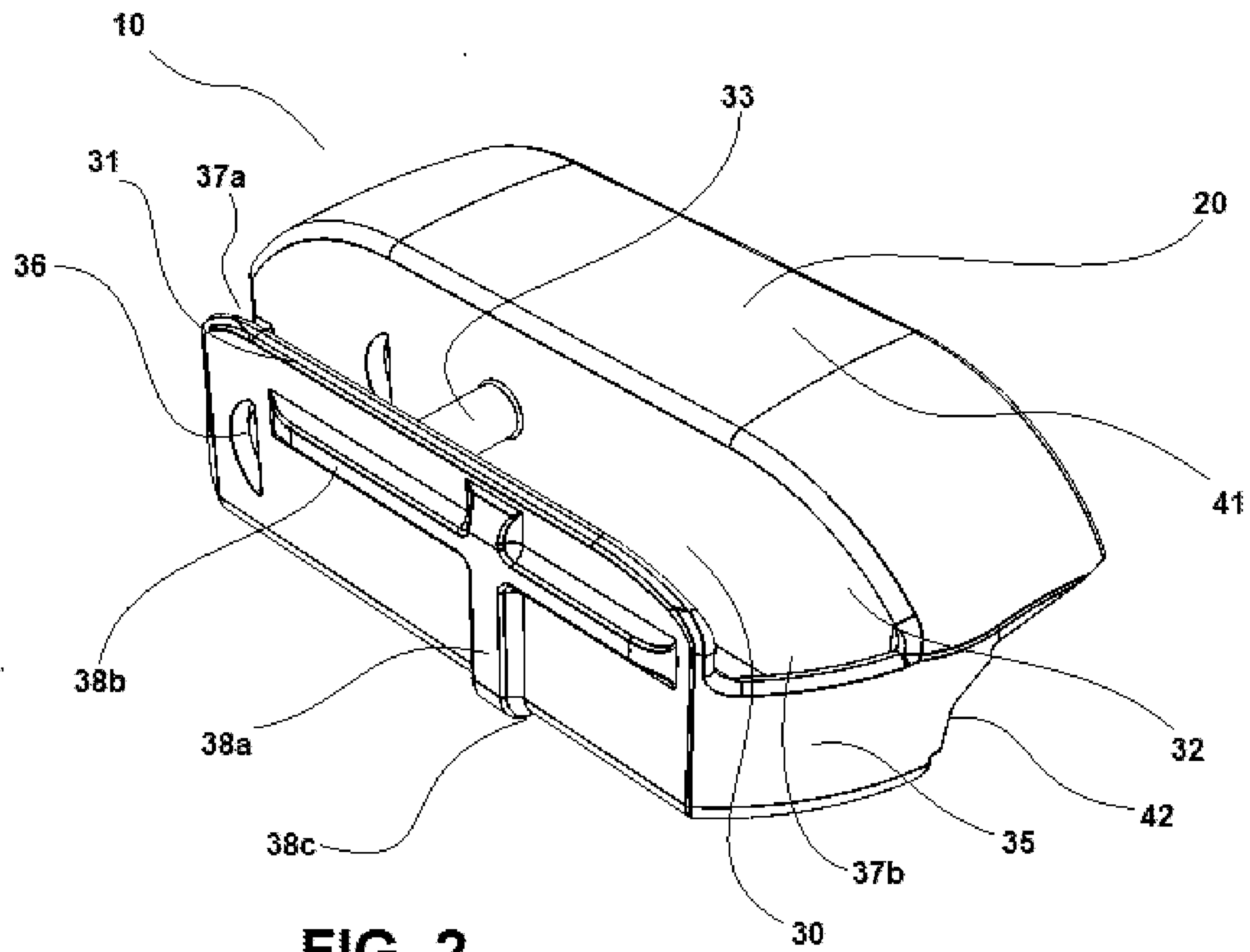
top surface provided at the top end of the adapter between the outer mounting wall and the inner mounting wall, the inner and outer mounting walls together with the top surface defining an elongate mounting passage,

wherein the mounting passage and the side saddle passage are substantially parallel with one another, and

wherein the mounting passage is open at the bottom end of the adapter and the side saddle passage is open at the top end of the adapter, and wherein an arcuate rivet clip is defined in each of the inner and outer mounting walls.

20. The adapter of claim 19, wherein the top surface extends between the outer mounting wall and terminates at the inner side saddle wall, and the inner mounting wall projects from the top surface.
21. The adapter of claim 19 wherein an interim gap exists between the inner mounting wall and the inner side saddle wall.
22. The adapter of claim 21, further comprising a plurality of reinforcing ribs provided within the interim gap and oriented substantially transverse to the interim gap.
23. The adapter of claim 21, further comprising an interim wall projecting from the top surface into the interim gap, the interim wall substantially elongate and oriented substantially parallel to the interim gap, the interim wall provided along at least a majority of the length of the interim gap.
24. The adapter of claim 23, further comprising:
- an arcuate rivet clip defined in each of the inner and outer mounting walls, the arcuate rivet clip connectable with a rivet provided on a wiper blade; and
 - a rivet end recess provided in the interim wall adjacent to the arcuate rivet clip.
25. The wiper blade adapter of claim 19 wherein the side saddle portion further comprises at least one reinforcing member.
26. The wiper blade adapter of claim 25 wherein the at least one reinforcing member includes a vertical reinforcing member.
27. The wiper blade adapter of claim 25 wherein the at least one reinforcing member includes a horizontal reinforcing member.
28. The wiper blade adapter of claim 25 wherein the at least one reinforcing member includes a transverse reinforcing member.
29. A wiper blade assembly comprising:
- a wiper blade; and
 - a wiper blade adapter as defined in any one of claims 1 to 28.





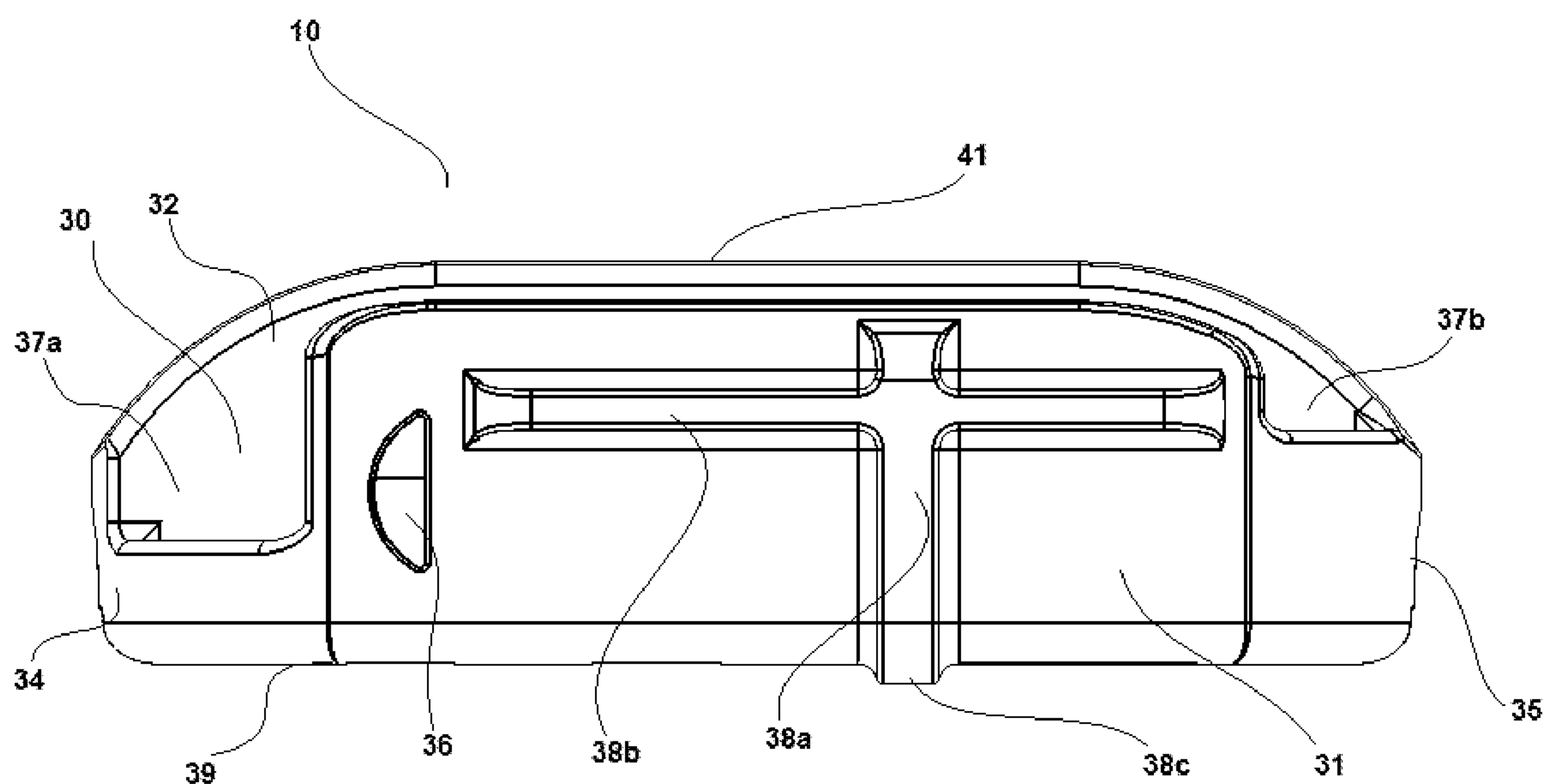


FIG. 4

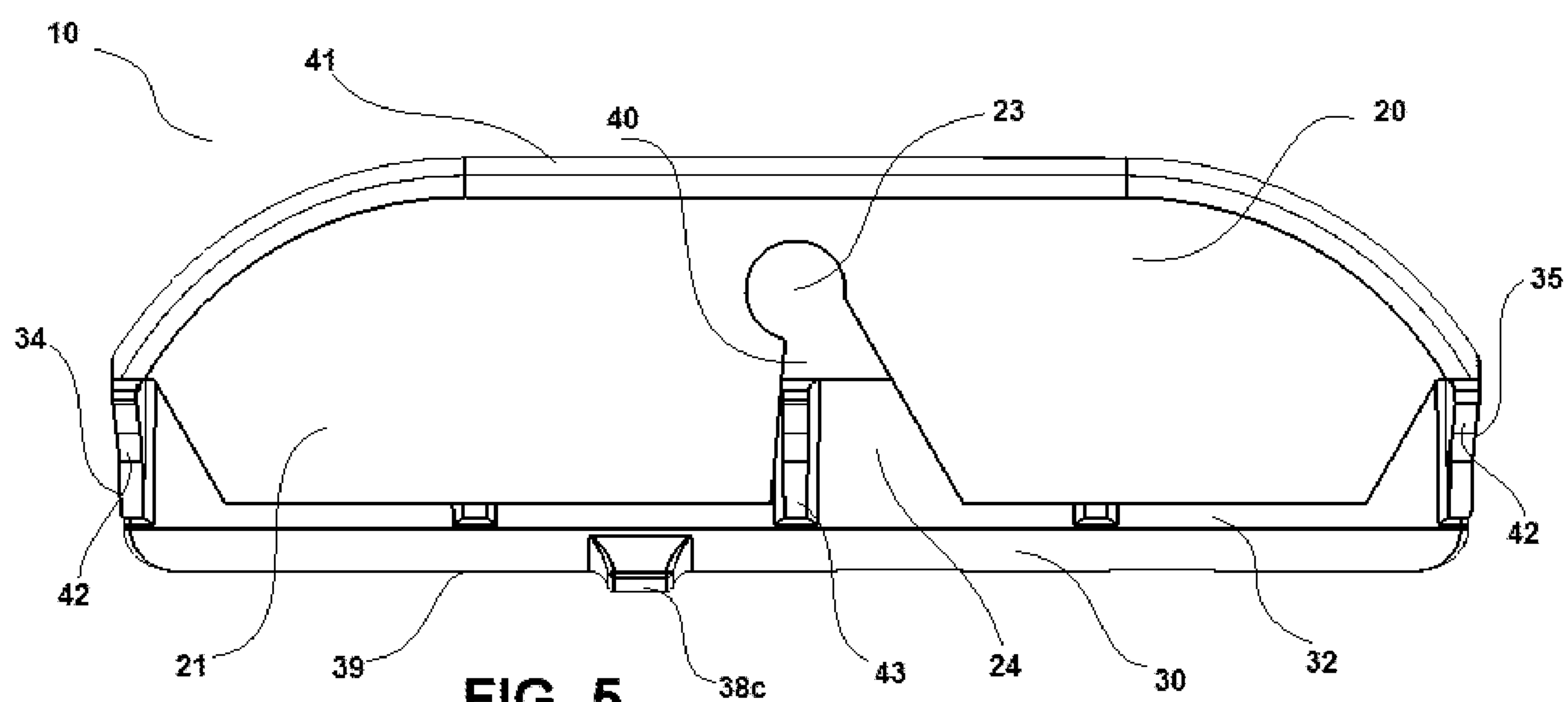


FIG. 5

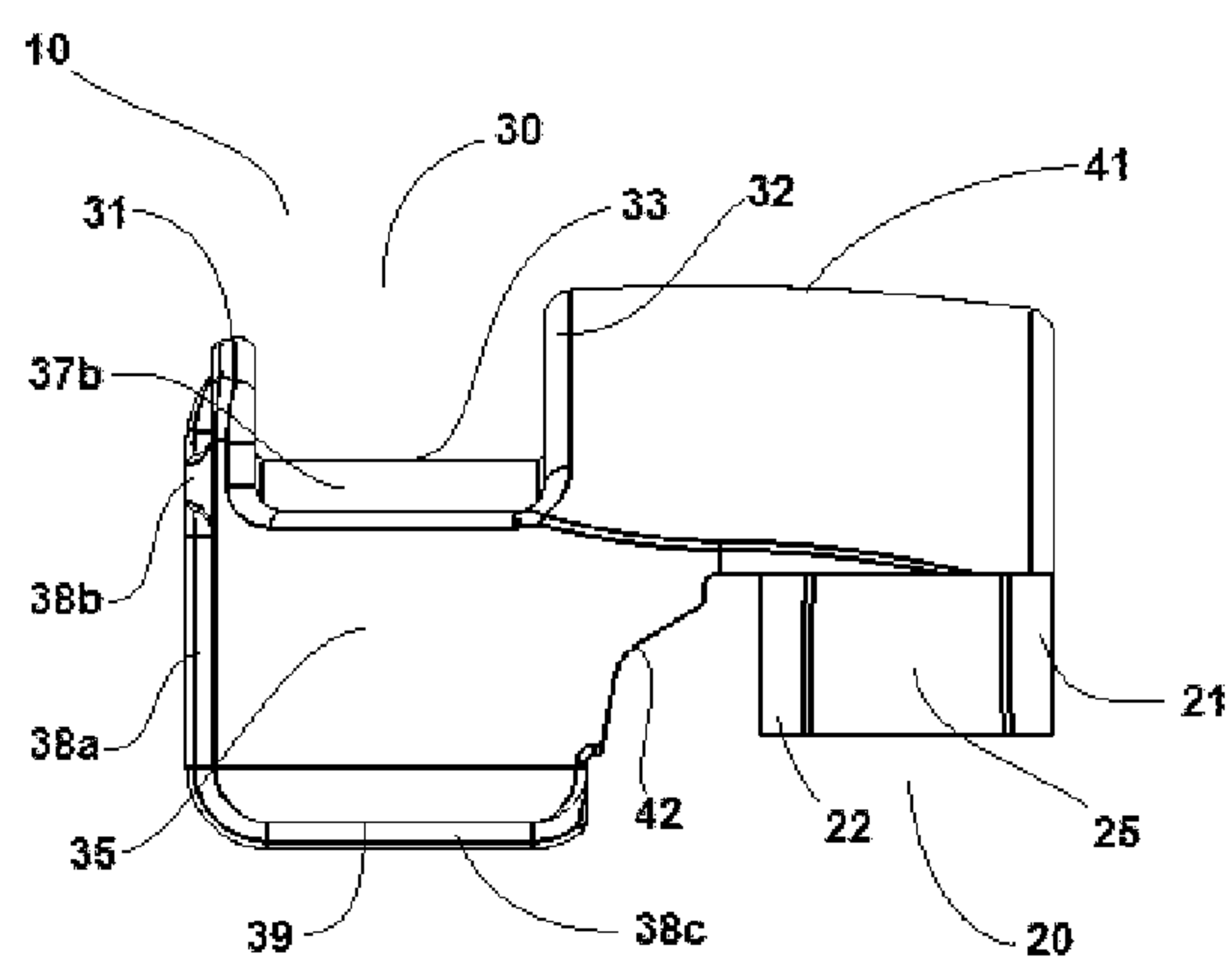


FIG. 6

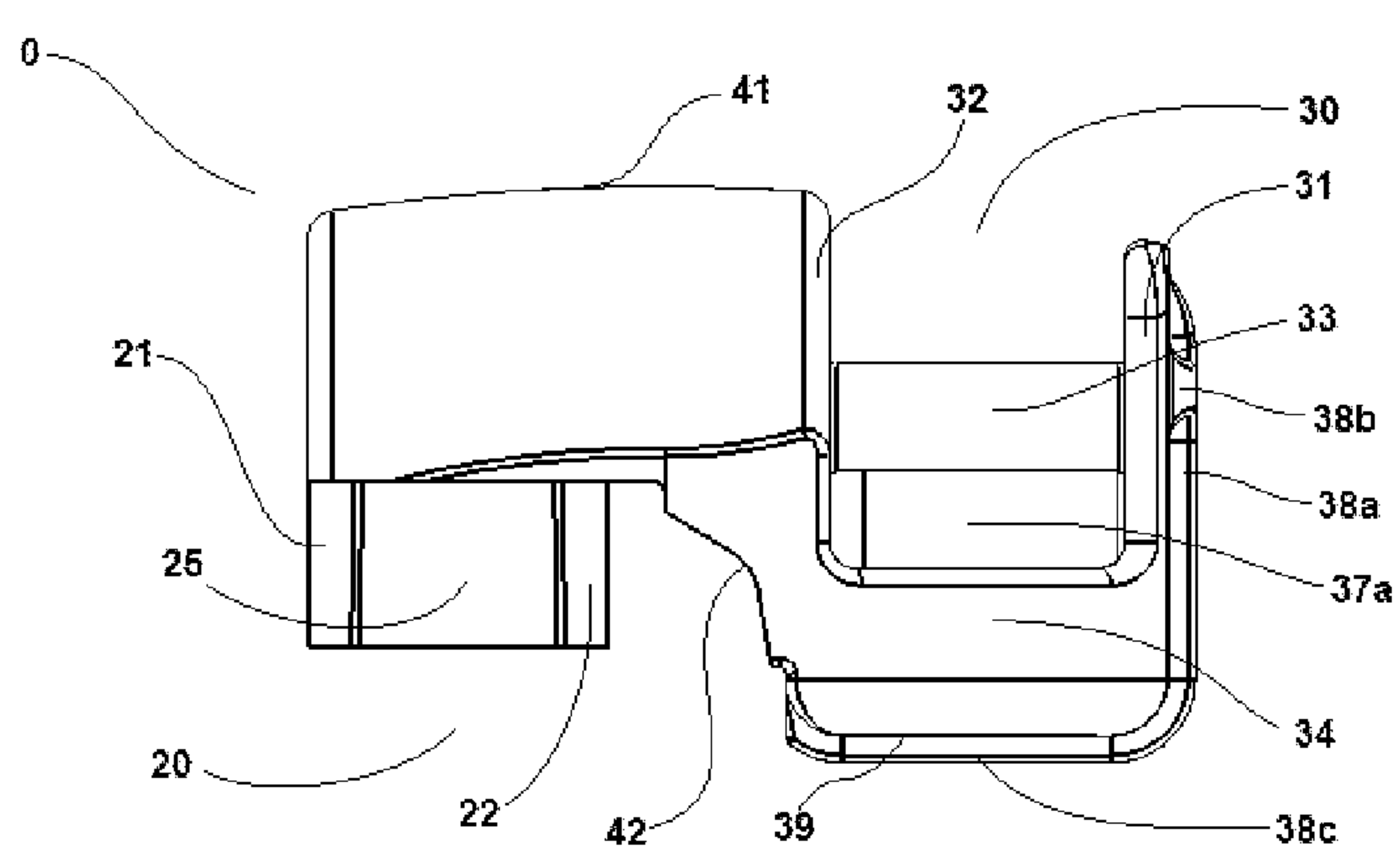


FIG. 7

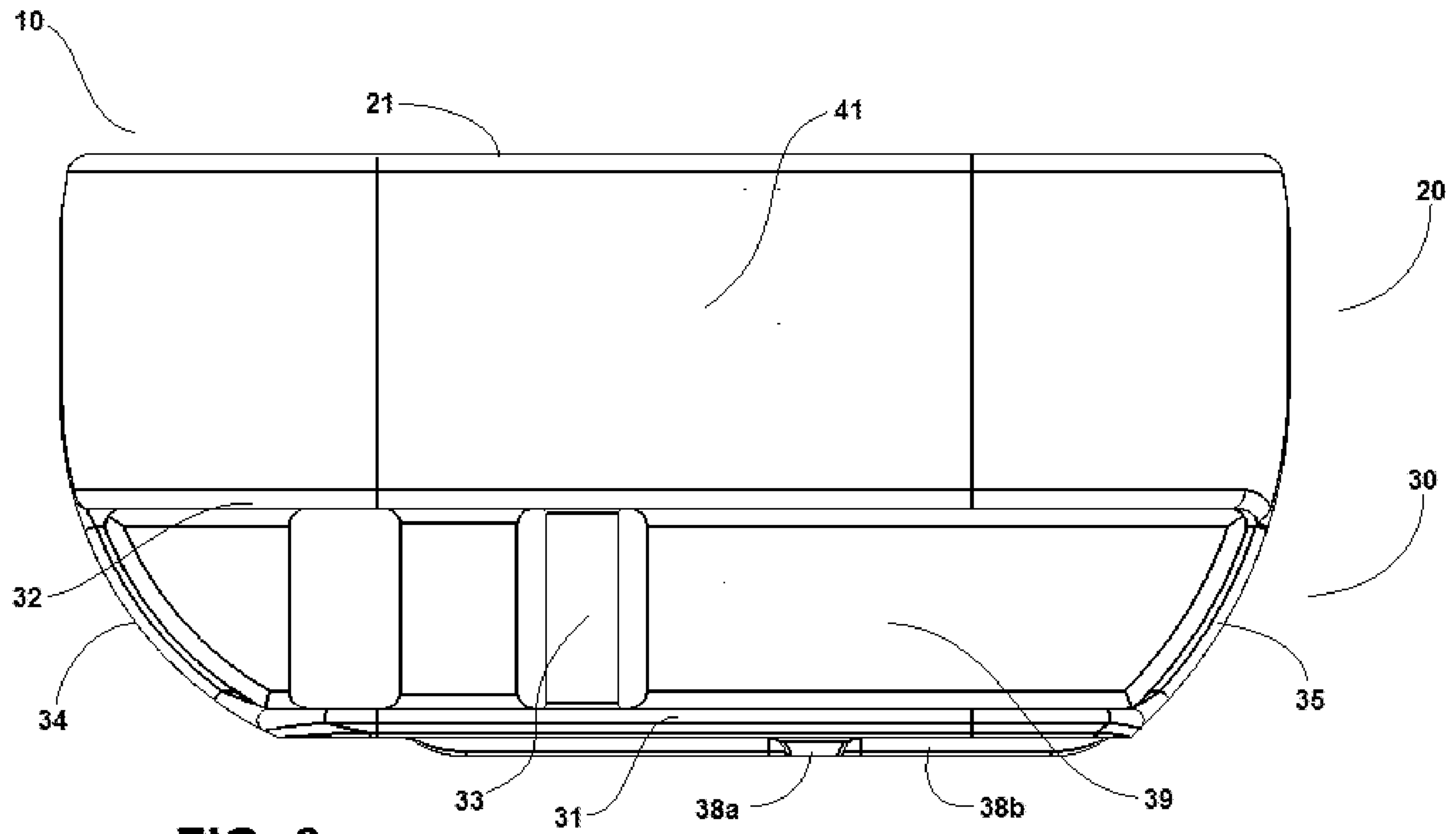


FIG. 8

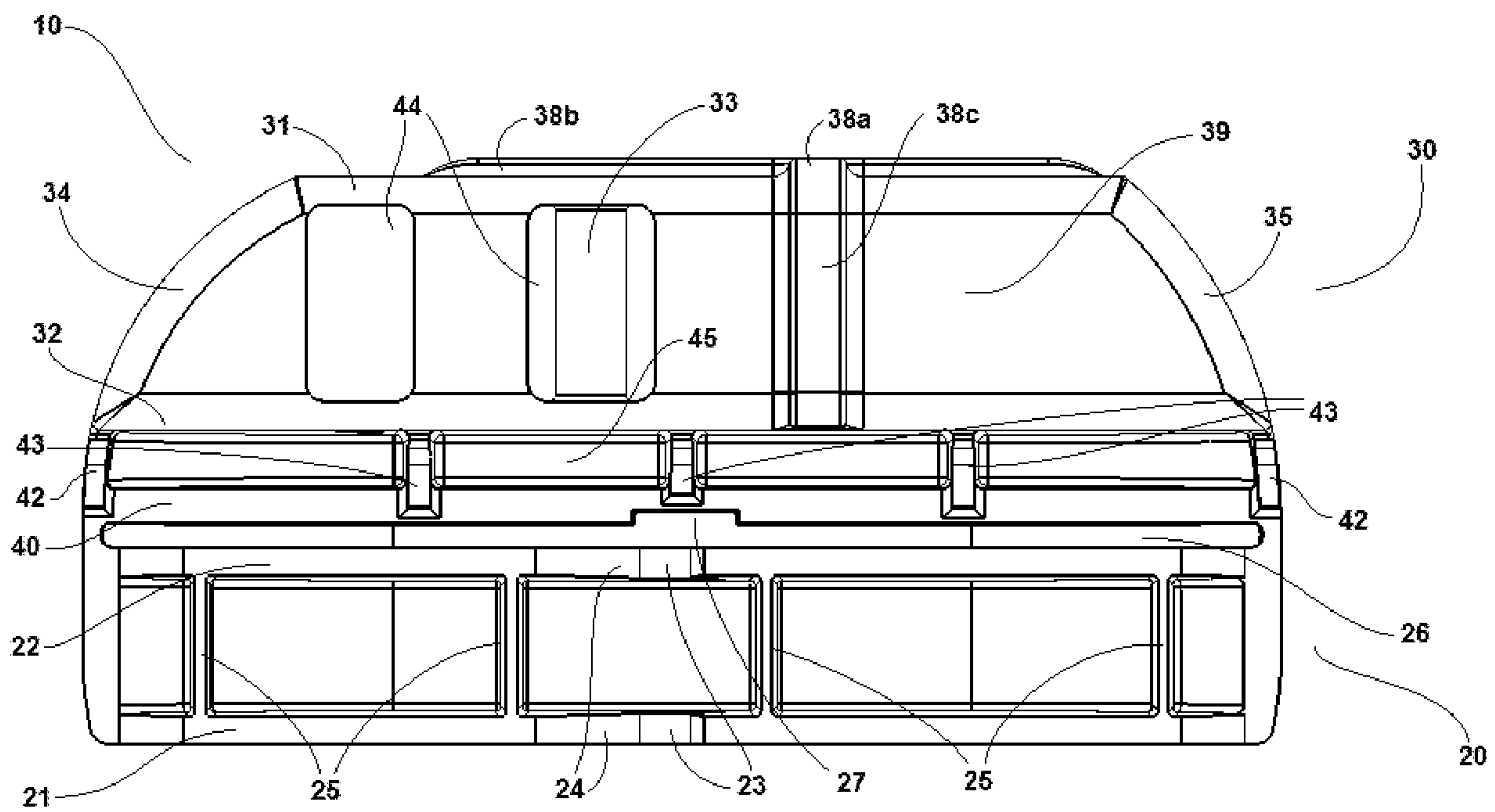


FIG. 9

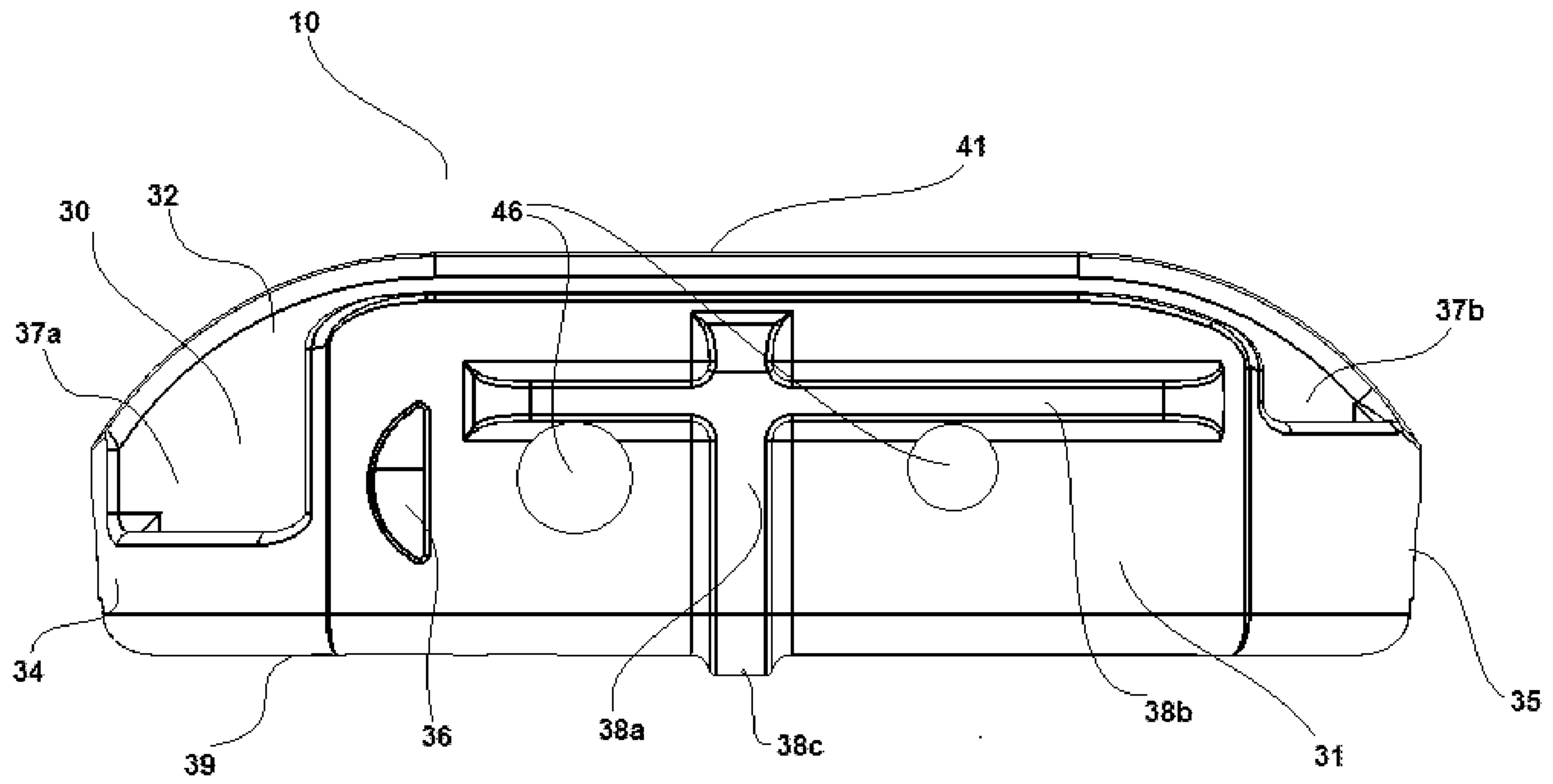


FIG. 10

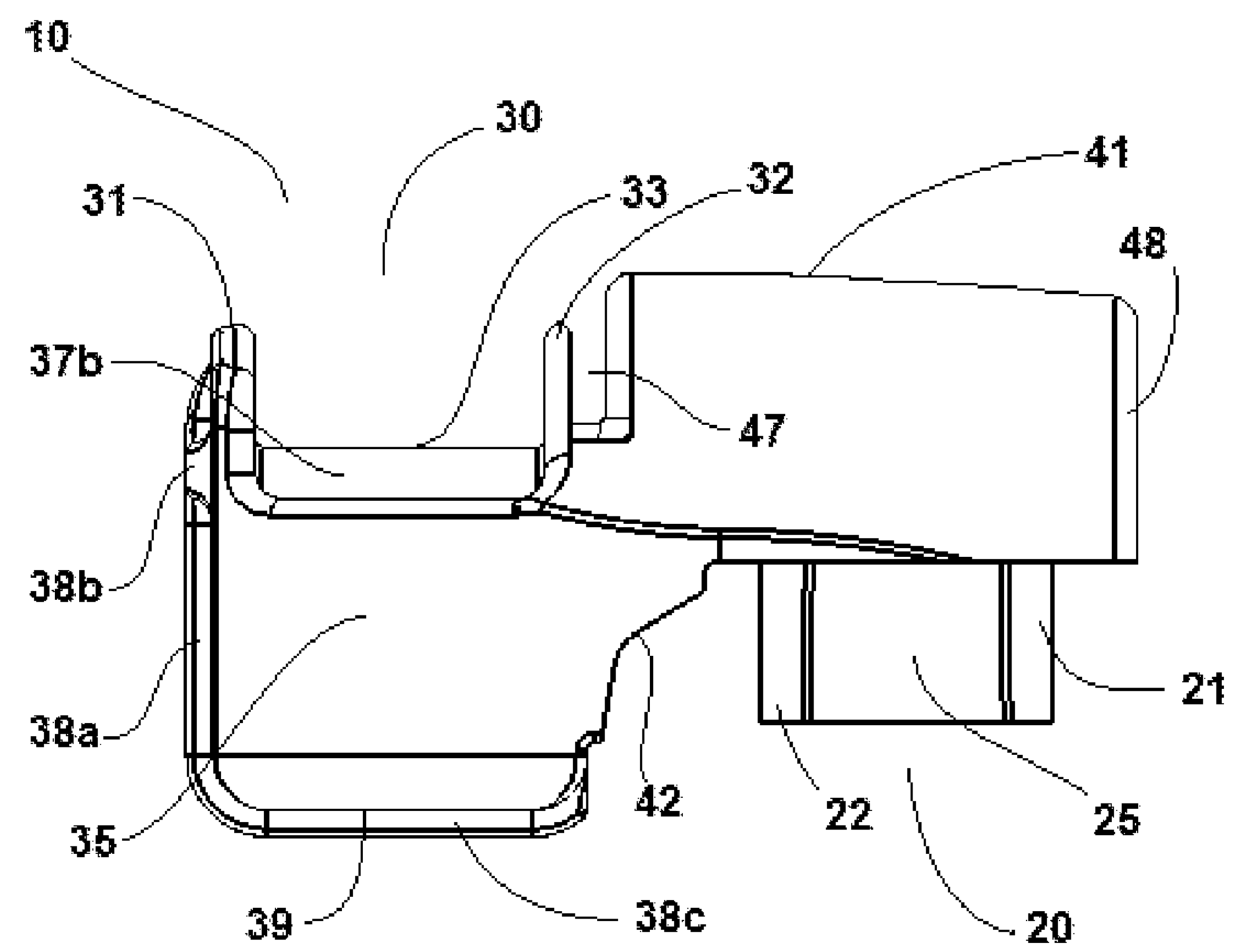
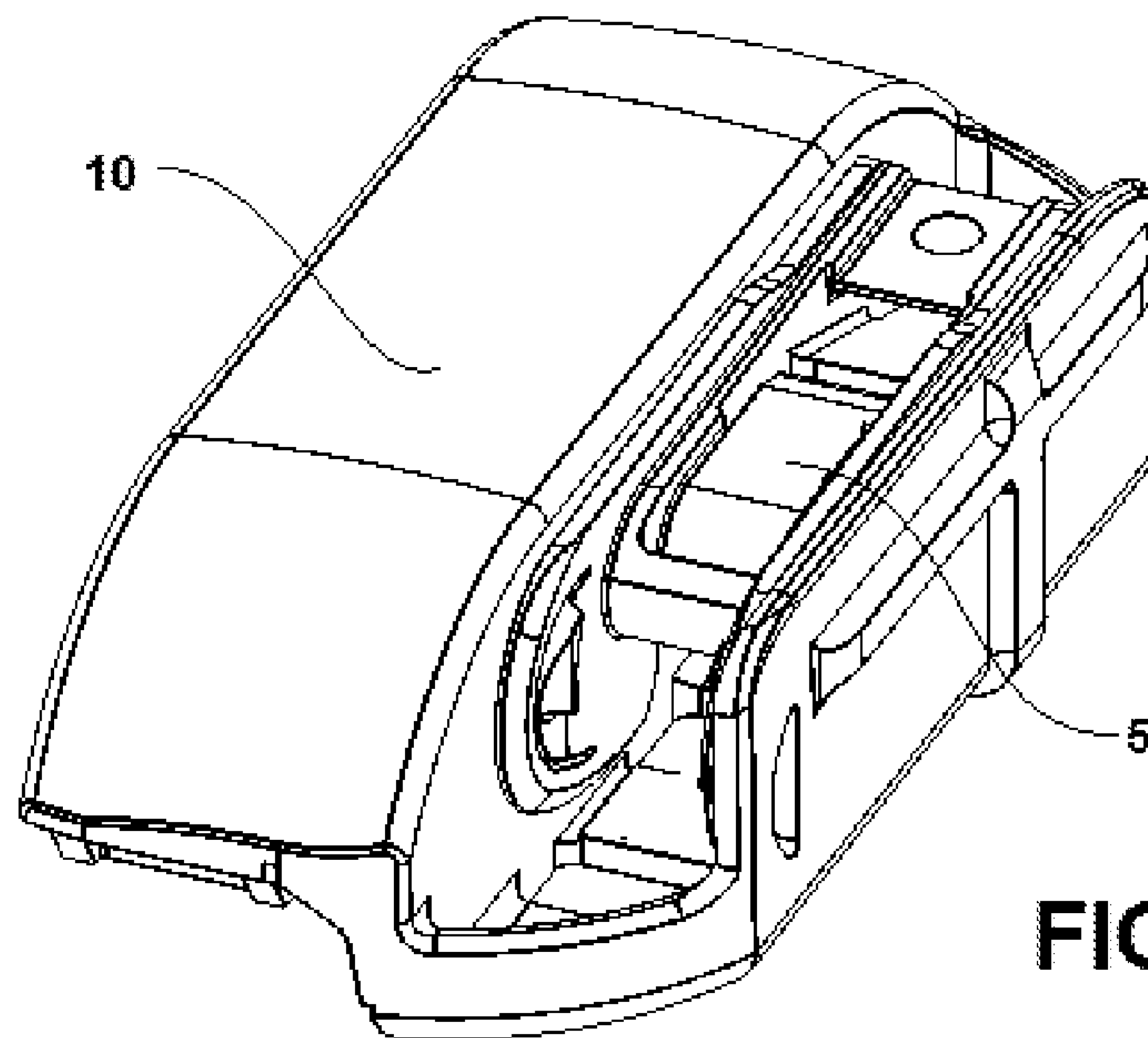
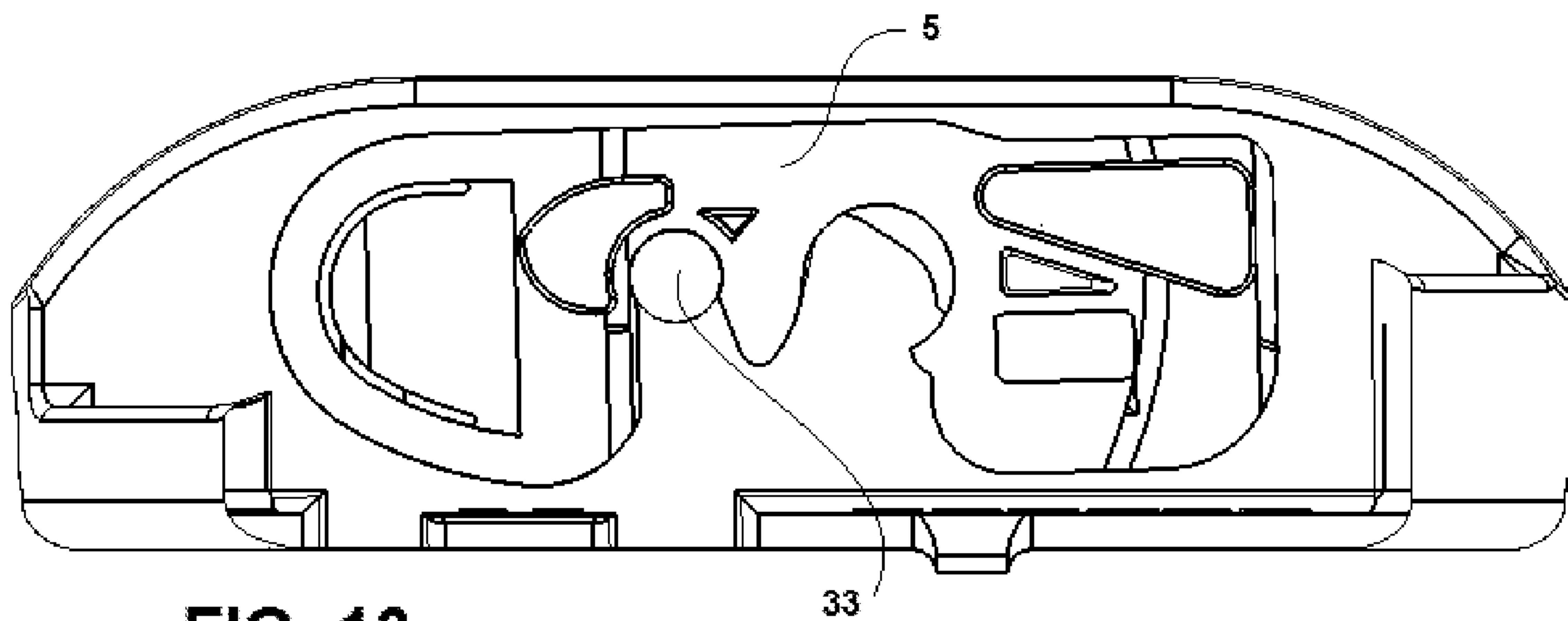
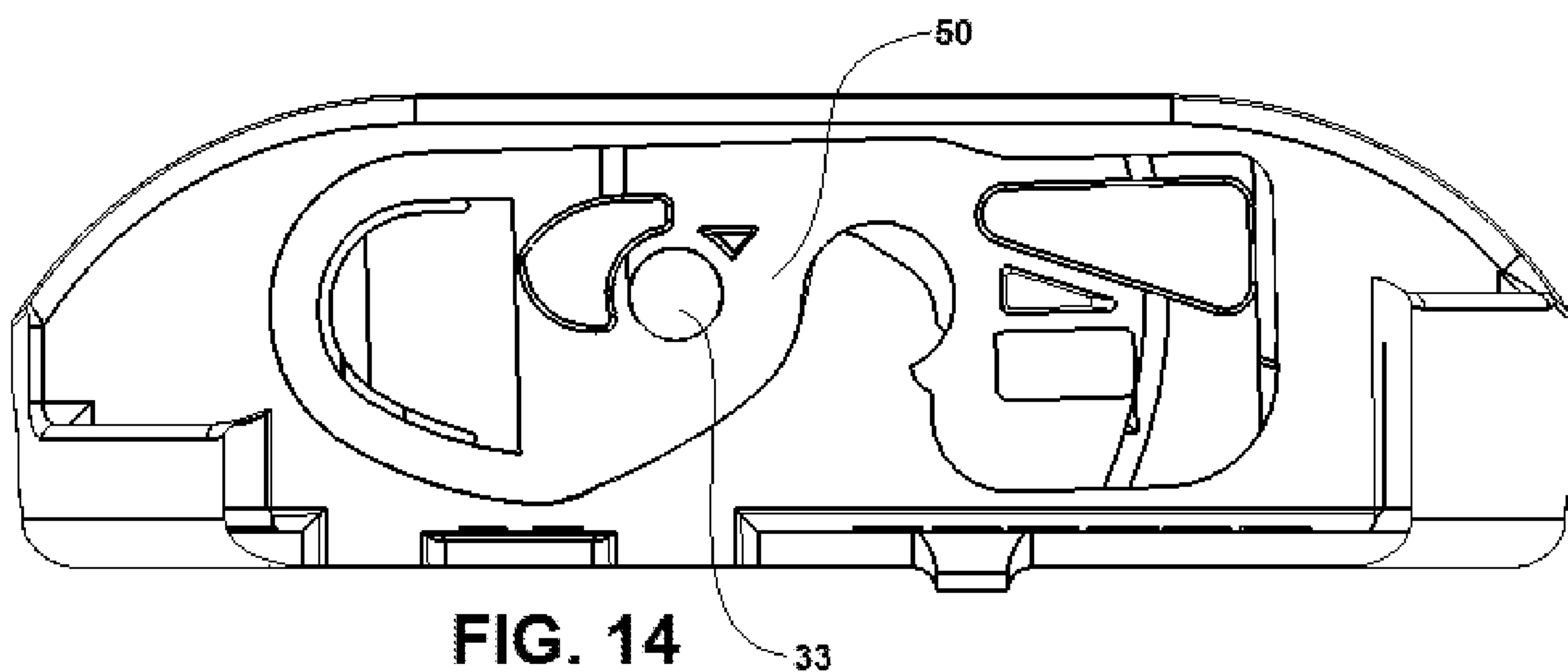


FIG. 11

**FIG. 12****FIG. 13****FIG. 14**

