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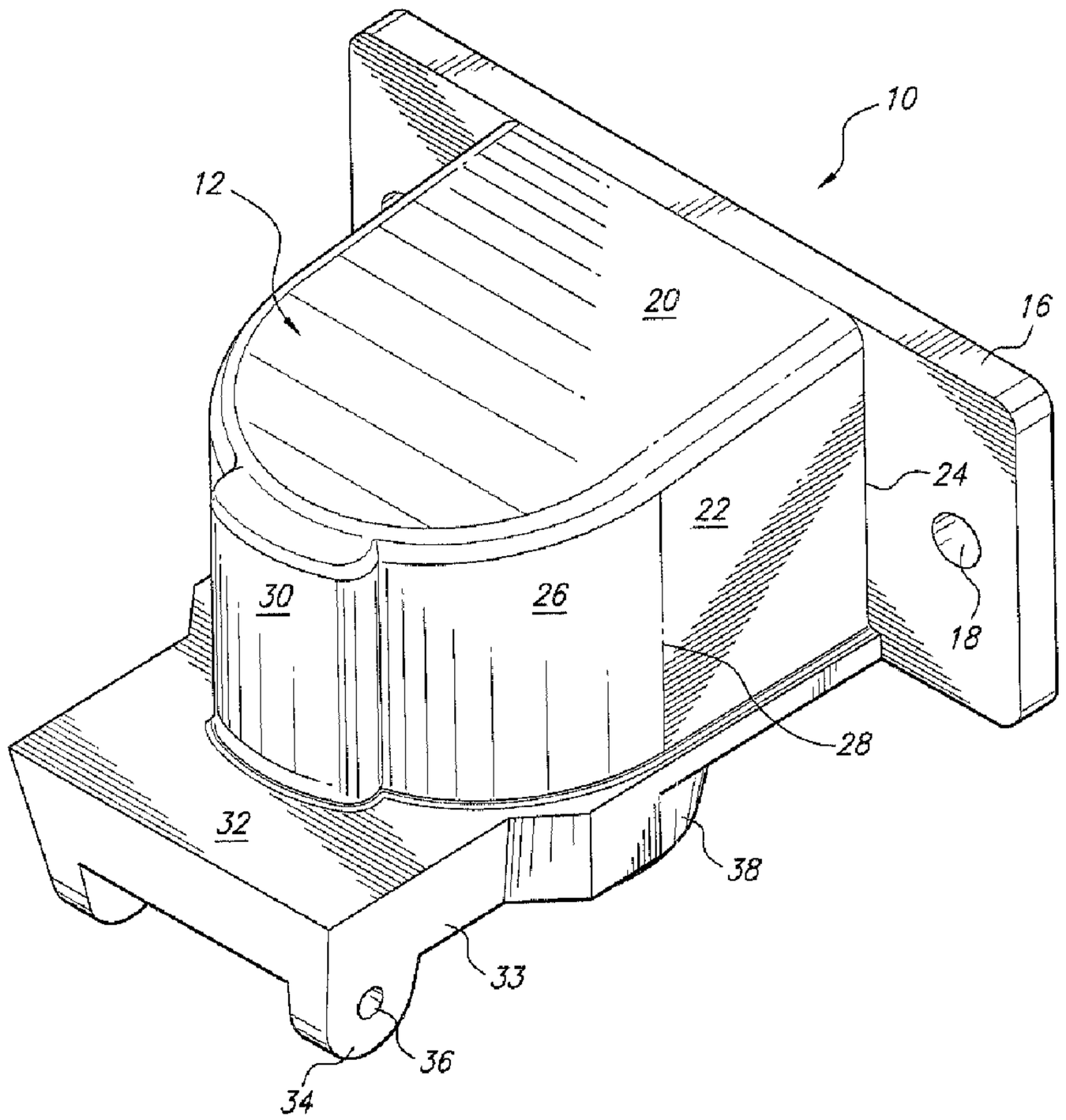
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(54) Titre : PROTECTEUR DE PRISE MALE POUR FAISCEAU DE FILS DE REMORQUE
(54) Title: MALE PLUG PROTECTOR FOR TRAILER WIRING HARNESS



(57) Abrégé/Abstract:
A male plug protector for trailer wiring harness connection plug simulating a female type receptacle and is vertically mounted on the hitch frame with the upper end closed for protecting a plug when not in use. In one embodiment the male plug end is cylindrical and

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(57) Abrégé(suite)/Abstract(continued):
is retained in the protector by the spring action of the cover and a protrusion on the interior of the cover corresponding to a projection located on the male plug wall. The user pulls back the cover to remove the plug. In another embodiment, the male plug is linear and retained in the protector by the spring action of the cover and a lower wall holding the base of the male plug and having a central opening for passage of the male plug electrical wiring harness closing over the male plug. The wiring harness plug's electrical connectors are protected when not in use.

ABSTRACT OF THE DISCLOSURE

A male plug protector for trailer wiring harness connection plug simulating a female type receptacle and is vertically mounted on the hitch frame with the upper end closed for protecting a plug when not in use. In one embodiment the male plug end is cylindrical and is retained in the protector by the spring action of the cover and a protrusion on the interior of the cover corresponding to a projection located on the male plug wall. The user pulls back the cover to remove the plug. In another embodiment, the male plug is linear and retained in the protector by the spring action of the cover and a lower wall holding the base of the male plug and having a central opening for passage of the male plug electrical wiring harness closing over the male plug. The wiring harness plug's electrical connectors are protected when not in use.

MALE PLUG PROTECTOR FOR TRAILER WIRING HARNESS

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

The present invention relates to electrical plug protectors. More particularly, the present invention relates to male plug protectors for trailer wiring harness connection plugs.

2. DESCRIPTION OF RELATED ART

When disconnecting a trailer from a towing vehicle, it would be helpful to provide a device mounted on the trailer in which the male plug of the trailer may be stored when the trailer is not in use. The device should provide a relatively snug fit while protecting the electrical plug from exposure to the weather, etc.

U.S. Patent No. 3,176,257, issued March 30, 1965 describes a bracket for holding trailer plugs of tractor-trailer vehicles. The plug holder '257 patent is designed to rotatably receive a specific type of plug, and the plug holder has no covering to keep out dust, etc.

U.S. Patent No. 3,482,203, issued December 2, 1969, to Whitright describes an electrical connector-storing device for trailers. This device has no cover for protection to keep out dust, etc. when not in use, and relies on a ring or bail to hold the male connector. The ring device requires a particular type of plug shape where it is attached to the wire conduit in order to maintain the plug in the hood or protector.

U.S. Patent No. 4,017,136, issued April 12, 1977 to Sasgen, describes a male plug holder for holding a plug for a locomotive control cable when not in use. The male plug holder is oriented

in a forward position, thus allowing rain or other environmental hazards into the plug. The plug holder of the '136 patent is designed for a particular plug for a train locomotive and would not be practical for vehicle-pulled trailer connectors.

U.S. Patent No. 4,738,641, issued April 19, 1988, to Eversol, Jr., describes a spring loaded trailer electrical connector protector device for protecting male trailer connectors when not in use. The '641 device requires wings which fit into notches at the lower end of the device which is an uncommon feature on trailer connectors.

U.S. Patent No. 4,770,644, issued September 13, 1988, to Feder, describes a typical trailer plug connector of the type contemplated by the present invention and a receiving female connector having a hinged spring cover.

U.S. Patent No. 5,380,209, issued January 10, 1995, to Donvers, Jr. et al. describes a trailer connector housing which has an upward opening lid and side slots to receive electrical wires, and, a screw-on protector and casing for attachment to the vehicle. The trailer connector housing of the '209 patent is subject to entrance of environmental rain or dust.

U.S. Patent No. 5,630,728, issued May 20, 1997, to Watters, Jr., describes a plug holder for trailers or towing vehicles. The '728 holder is vertically or horizontally mounted, allowing entrance of rain or mud, and is keyed to a particular connector.

U.S. Patent No. 5,722,854, issued March 3, 1998, to Geisler, describes a sleeve type trailer plug holder having an end cap for sealing the open end. The '854 device requires a snug fit between the plug holder and the trailer plug. The end cap must be inserted to assure protection from the elements. The end cap is subject to accidental removal, allowing the elements to enter the plug holder. The user may also forget to fasten the end cap securely.

U.S. Patent No. 5,800,188, issued September 1, 1998, to Barber et al., describes a trailer tow inter-connector having a spring-loaded cover similar to that of the present invention.

None of the above inventions and patents, taken either singly or in combination, is seen to describe the instant invention as claimed.

SUMMARY OF THE INVENTION

The present invention is a male plug protector for trailer wiring. The plug protector includes a vertically oriented, rectangular plug receiver having a front wall, opposing side walls, a closed top wall and a mounting plate opposing the front wall. The plug receiver is open at a lower end thereof for receiving a linear, generally rectangular male plug. There is a lower cover for covering the plug receiver lower end. A spring-biased hinge attaches the lower cover and the plug receiver lower end. The lower cover is rotatable at the spring-biased hinge between a vertical open position and a horizontal closed position. The cover is spring-biased to the closed position. The rectangular plug receiver and the lower cover are of such dimensions and configuration to receive a linear, generally rectangular male plug. The lower cover is rotated downward from the closed position to the open position by a user. The male plug is inserted upward into the plug receiver. The lower cover is allowed to close over the plug by the spring bias while allowing the wiring harness to extend downward from the closed cover.

Another embodiment of the male plug protector for trailer wiring has a rectangular plug receiver, a lower cover, and a spring-biased hinge as described above. The lower cover has an upper peripheral surface. The plug receiver has a lower peripheral surface corresponding with the lower cover upper surface for mating closure therewith. The lower cover upper peripheral surface has an inner lip for sealing against inner sides of the walls of the plug receiver lower peripheral surface forming a seal against entrance of dust or water into the male

plug protector when in a closed position. The plug receiver mounting plate has extension portions extending outward, horizontally from each respective plug receiver side walls. Each mounting plate defines a mounting bore therethrough for receiving a mounting screw. The lower cover portion has sidewalls and tabs extending outward from the cover side walls for the user to engage when opening the lower cover for insertion or removal of the plug. The lower cover is rotated downward from the closed position to the open position by a user. The male plug is oriented with the electrical contacts thereof pointing upward. The male plug is inserted upward into the plug receiver. The lower cover is allowed to close over the plug as a result of the spring bias while allowing the wiring harness to extend downward from the closed cover.

In another embodiment of the invention, the male plug protector for trailer wiring has a rectangular plug receiver, a lower cover, and a spring-biased hinge as described above. The plug receiver mounting plate has extension portions extending outward, horizontally from each respective plug receiver side wall. Each mounting plate defines a mounting bore therethrough for receiving a mounting screw. The plug receiver has a cover hinge housing extending outward and forward from a lower central portion of the front wall. The cover hinge housing has a common lower surface with the plug receiver lower peripheral surface and forms a front wall, an upper wall, and opposing side walls. Each side wall has outer hinge pin receiving portions of the hinge extending downward from the forward portion thereof. The cover has a hinge extension portion corresponding with the cover hinge housing. The hinge extension portion defines outer grooves for receiving the outer hinge pin receiving portions of the cover hinge housing. The hinge extension portion has inner hinge pin receiving portions extending upward from the forward portion thereof spaced so as to rotatably bear against the outer hinge pin receiving portions of the cover hinge housing. The outer and inner hinge pin receiving portions define a pin bore

having a hinge pin therethrough. The hinge pin has a biasing spring thereon extending between the inner hinge pin receiving portions. The biasing spring is so arranged as to form the spring-biased hinge connecting the plug receiver and the lower cover. The lower cover has shoulders extending outward from the hinge extension portion, outer side walls and an end wall. The end wall and the cover portion define the cutout for receiving the wiring harness. The lower cover is rotated downward from the closed position to the open position by a user. The male plug is inserted upward into the plug receiver. The lower cover is allowed to close over the plug by the spring bias while allowing the wiring harness to extend downward from the closed cover.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a male plug protector for trailer wiring harness according to the present invention with the lower lid removed.

Fig. 2 is a side view in elevation of the present invention shown with a male plug inserted therein.

Fig. 3 is a bottom rear view in perspective of the present invention with the lower cover closed.

Fig. 4 is a bottom rear view in perspective of the present invention, absent the lower lid.

Fig. 5 is a perspective view of the bottom lid of the present invention showing the axle and spring which forms a hinge with the receptacle portion of the plug protector.

Fig. 6 is an environmental perspective view of another embodiment of the plug protector of the present invention.

Fig. 7 is a section view taken along the line 7-7 of Fig. 6.

Fig. 8 is a perspective view of the plug protector of Fig. 6 with the cover closed over the plug.

Fig. 9 is an exploded view of the plug protector of Fig. 6.

Fig. 10A is a front elevation view of the plug protector of Fig. 6 with the cover in the closed position.

Fig. 10B is a front elevation view of the plug protector of Fig. 6 with the cover in the open position.

Fig. 11A is a rear elevation view of the plug protector of Fig. 6 with the cover in the closed position.

Fig. 11B is a rear elevation view of the plug protector of Fig. 6 with the cover in the open position.

Fig. 12A is a bottom view of the plug protector of Fig. 6 with the cover in the closed position.

Fig. 12B is a bottom view of the plug protector of Fig. 6 with the cover in the open position.

Similar reference characters denote corresponding features consistently throughout the attached drawings.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is a vertically oriented male plug protector for a trailer wiring harness connection plug having a female type receptacle with a spring-biased hinged cover at its lower end. The upper end is closed. The device has a back plate with mounting holes for mounting to a trailer near the hitch end or on the hitch frame. When the trailer is not in use, the cover is pulled back and the male wiring harness plug is inserted into the female receptacle. In one embodiment the male plug end is retained in the protector by the spring action of the cover and a protrusion on the interior of the cover corresponding to a projection located on the male plug wall. To remove the plug, the user pulls back the cover and removes the plug. In another embodiment, the male plug end is retained in the protector by the spring action of the cover and a lower curved wall corresponding to the base of the male plug and having a centrally disposed opening for passage of the male plug electrical wiring harness closing over the male plug. To remove the plug, the user pulls back the cover and removes the plug.

The electrical wiring harness plug is retained within the protector to prevent environment damage from occurring to the plug's electrical connectors when the trailer is not in use. The protector has no electrical connections.

Referring to Figs. 1-4, various perspective views of plug protector **10** are shown wherein plug protector **10** comprises vertically oriented male plug receptacle **12**, having a spring biased, hinged lower cover **14**(see Fig. 2). Receptacle **12** has a vertically oriented back plate **16** having mounting holes **18** for mounting on a sidewall of a trailer, etc. Plug receptacle **12** has a top portion **20** acting as a closed, fixed upper wall for receptacle **12** and extending to said back plate **16** for additional support.

Receptacle back plate support walls **22** are vertically oriented and normal to said back plate **16** and extend from support wall back plate connections **24** to respective tangential intersections **28** on vertically oriented receptacle cylindrical portion **26** at the respective ends of a diameter parallel to said back plate **16**, said support walls **22** connecting along cylindrical portion **26** at support wall cylindrical intersections **28**.

Receptacle top portion **20** covers said cylindrical portion **26** and extends between support walls **22** and said back plate **16**, thus forming an inverted "U"-shaped support between said cylindrical portion **26** and said back plate **16**. Cylindrical portion **26** of receptacle **12** has a groove portion **30** extending vertically along cylindrical portion **26** at a location opposite back plate **16**. Receptacle lower plate **32** defines the lower end of cylindrical portion **26**, and comprises lower plate extended portion **33** extending outward from said cylindrical portion **26** and which supports lower plate hinge portion **34** having axle receiver **36** for connection with spring biased, hinged cover **14**.

Receptacle lower plate **32** includes lower plate plug receiving portion **38** opposite hinge portion **34** and includes lower plate under portion **39**(see Fig. 4) extending from the

receptacle cylindrical portion **26** to back plate **16**, forming a boxlike structure with receptacle back plate support walls **22** and receptacle top portion **20**. Receptacle cylindrical portion **26** of lower plate **32** is cut away to form a semicircular portion extending from tangential intersections **28** to back plate **16**, thus forming under portion **39**. The lower plate plug receiving portion **38** of lower plate **32** serves as a lower extension of cylindrical portion **26** and forms lip **40** extending from bottom plate lower surface **41** at the lower opening inner cylindrical surface **42**. The outer surface plug receiving portion **38** is conically shaped in its semicircular portion, tapering inwardly from lower plate under portion **39** to lower surface **41**(see Fig. 4).

Referring particularly to Figs. 2 and 3, there is shown a side view in elevation of the inventive plug protector **10** with a male plug inserted therein, and a bottom rear view in perspective of the present invention with the bottom cover closed, respectively. Male plug **MP**, having male plug key **MPK**, is shown inserted into receptacle cylindrical portion **26** along inner cylinder surface **42**, having receptacle key receiver groove **44**, formed within groove portion 30 and is sized and configured so as to receive male plug **MP**. Protrusion **56** protrudes from cover **14**(see Fig. 5) and is so configured as to interlock with male plug projection **MPP**, located at the base of key **MPK**, when male plug **MP** is inserted upward into receptacle **12**(see Fig. 2). Inner cylindrical surface **42** (see Fig. 4) and inner cylinder top surface **43** provide clearance for male plug **MP**. A lip **48** on hinged cover **14**, forms an overlapping seal with cylindrical portion lip **40** when cover **14** is in the closed position.

Referring, particularly, to Fig. 4, there is shown a bottom rear view of the plug holder **10** of the present invention without the hinged cover **14** and wherein receptacle cylindrical portion **26** features receptacle inner cylinder **42**, having receptacle key receiver groove **44**. Inner cylinder **42** is of such dimensions as to receive standard male electrical plug **MP** having a male plug

key **MPK** and being useful for a trailer. Central support wall **60** is located parallel to back plate support walls **22** and extends between receptacle cylindrical portion **26**, receptacle top portion **20**, lower plate **29** and back plate **16**. For ease of construction, the portion of the back plate between support walls **22**, receptacle top portion **20** and lower plate **39** and receptacle cylindrical portion **26** may be deleted.

Referring to Figures 3 and 5, there are shown perspective views of the spring biased, hinged cover **14** of the present invention. Cover **14** is a generally flat plate having a plug receiver cover portion **50**, an extended portion **54** and a hinge portion **55** and having a lower surface **46** and an upper surface **47**, generally corresponding in shape to bottom plate lower surface **41**.

Plug receiver cover portion **50** is generally cylindrical, having an outer sidewall **52**. The cover upper surface **47** defines a lip **48** surrounding a recess within plug receiving cover portion **50** and extended portion **54** and shaped for receiving lip **40** of lower plate receiving portion **38**. The recess has inner end wall **62** at its base and is defined by hinged cover inner recess wall **64**. Inner end wall **62** supports centrally located hinged wall protrusion **56** protruding upward from inner end wall **62** and which is so configured as to interlock with male plug projection **MPP** when male plug **MP** is inserted into receptacle **12**(see Fig. 2). Axle **66** is fixedly mounted within axle receiver **36** of lower plate hinge portion **34** and for rotation within cover hinge portion **55**. Axle **66** is surrounded by hinge spring **68** and is so located and configured as to maintain a closing bias on hinged cover **14** in a known manner. Plug receiver cover portion outer sidewall **52** is conical in shape, tapering inwardly from cover upper surface **47** to lower cover outer wall **46**. Inner recess wall **64** may be conical in shape, corresponding to outer sidewall **52**. Pull tabs **58** are distributed around outer sidewall **52**, extending outward from lower cover lip **48**.

In operation, plug protector **10** is mounted in an appropriate place, such as a front wall of a trailer, by means of back plate **16** such that receptacle **12** may receive a standard male plug **MP** from below, i.e., receptacle cylindrical portion **26** is installed in a vertical orientation and spring biased, hinged cover **14** is hingedly attached at the base of the receptacle **12**. Hinged cover **14** is opened so as to rotate around the axle **66** by pulling on hinged wall pull tabs **58** against the force of spring **68** to a male plug insert and removal position. Male plug **MP** is inserted upwards within receptacle inner cylinder **42** and along receptacle key receiver groove **44** until male plug projection **MPP** passes hinged wall protrusion **56** of spring biased, hinged cover **14**. The bias from spring **68** allows projection **56** of cover **14** to close over male plug projection **MPP** to a male plug retention position, thus retaining male plug **MP** within the plug protector **10**.

When it is desired to remove male plug **MP** from plug protector **10**, spring biased, hinged cover **14** is pulled against the bias of spring **68** by means of pull tabs **58**, until protrusion **56** of cover **14** clears the male plug projection **MPP** of male plug **MP** at the male plug insert and removal position. The male plug **MP** may then be withdrawn for connection with the towing vehicle or other source of electricity. The spring **68** automatically closes cover **14** such that lower cover upper surface **47** closes against lower plate lower surface **41** and lip **48** of cover **14** closes over lip **40** of lower plate plug receiving portion **38** of receptacle **12**, thus sealing the protector against entry of dirt, etc.

Referring to Figs. 6-12B there are shown views of another embodiment of the present invention for receiving another conventional trailer wiring plug wherein the contacts are a line and they are embedded in a generally linear plug LP of a wiring harness WH. The plug is typically rounded at its ends and at its neck where the wiring harness WH enters the plug. Although four lead wires and contacts are shown, the inventive plug

receiver may accommodate similar plugs having more or fewer contacts and lead wires. The linear plug protector **100** is vertically disposed, being attached by screws **S** such as self tapping screws to a vertical surface such as hitch frame **HF** or a fifth wheel box (not shown) and includes a rectangular plug receiver **102** having a front wall **104**, side walls **106**, and a top wall **108** and being integral with a plug receiver mounting plate **110**, the bottom being open to receive plug **LP**.

Mounting plate **110** extends horizontally beyond sidewalls **106**, forming mounting plate extension portions **112** on each side of plug receiver **102**, each having at least one mounting bore **114** located therein for attaching the plug receiver **102** to hitch frame **HF**. As best seen in Fig. 7, top wall **108** slopes slightly forward to allow water to readily drain off the plug receiver.

Plug receiver **102** has a lower cover hinge housing **116** integral with and extending outward from the central portion of the lower end of front wall **104** and even with and sharing a lower end surface **160**(see figs. 7 and 12B). Hinge housing **116** is generally rectangular in shape and has a horizontal upper wall **118**, a front wall **120**, and sidewalls **122** and provides for hinged connection with hinged lower cover **124**. Lower cover **124** has a cover portion **126** for covering the lower end of plug receiver **102** and a hinge extension portion **128** for attachment of cover **124** to cover hinge housing **116**. Hinge extension portion **128** is spring biased (see Fig. 7) relative to hinge housing **116** so as to maintain cover **126** in a closed position and has hinge grooves **130** to receive hinge housing outer hinge members **132** at each side thereof. A hinge pin **134** extends through and is secured by outer hinges **132** and extends through cover inner hinges 144 (see Figs. 7 and 8).

Cover **126** has a cutout **136** in cover endwall **140** and extending inward along cover **126** for a distance adequate to receive wiring harness **WH**. Cover sidewalls **138** extend upward from cover end wall **140** to cover shoulders **141** which intersect with cover hinge extension portion **128**. The sidewalls **138**, end

wall **140** and shoulders curve downward to the lower surface of cover portion **126** and the sidewalls of cover hinge extension portion **128** slope downward to the lower surface thereof. Cover tabs **142** extend outward from each sidewall **138** to assist in opening cover **126** against the spring biased hinge for inserting and removing linear plug **LP**.

As seen in Figs. 9 and 11B spring **145** extends around hinge pin **134** between cover inner hinges **144** and is secured at one end and bears against a groove (not shown) in the end of hinge housing lower wall **148** of cover hinge extension portion **128** so as to exert closing force to cover **124**, to keep it closed against plug receiver lower surface **160**. The user may open the plug receiver **102** by pulling downward on tabs **142** to insert or remove plug **LP**. As seen in Fig. 7, hinge housing **116** has an inner upright wall **146** and a lower wall extending outward from inner wall **146**. As seen in Fig. 9, hinge pin **134** extends through outer hinge bores **150** and cover hinge bores **152**.

As best seen in Figs. 7 and 11B, cover portion **126** has a hollow inner side shaped to receive the plug **LP** defined by inner peripheral wall surface **156** surrounding inner cover surface 158 and has an upper wall surface **161** which closes against plug receiver lower surface **160**. Partial rims **139** extend upward from cover inner peripheral wall **156** at side walls **138**, end walls **140**, and shoulders **141** and extend upward along the inner walls of plug receiver **102** to form a dust barrier when cover **126** is in the closed position. As seen in the bottom view, Fig. 12B, plug receiver **102** has an upper wall surface 162 and a forward curving hinge housing inner wall **164**.

As best seen in Figs. 11A and 11B, mounting plate **110** preferably has reinforcing ridges R extending rearward from rear surface **154** surrounding the rear of the mounting plate and mounting bores **114**, and crossing the rear surface of the mounting plate for reinforcement while saving material and weight.

In operation, cover **126** is opened downward by pulling downward on tabs **142** to the open position against the bias of spring **145**. The linear plug **LP**, removed from the pulling vehicle socket, is pushed upward into the plug receiver **102** with the connectors pointing upwards. The spring biased cover is then allowed to close over the plug with the wiring harness WH extending downward through cover cutout **136**. The plug and electrical connectors are thus protected from dust and the elements when not in use. To remove the plug for use, the cover is pulled downward with tabs **142** and the plug removed, the spring biased cover, upon plug removal, closing upward against plug receiver **102** thus keeping dirt or other matter from entering the unused plug protector.

It is clear from the forgoing discussion that the 4/5 way plug protector can be used on both the tow vehicle and/or the trailer, and thus will accommodate both the male and female versions of the 4/5 way plug.

It is to be understood that the present invention is not limited to the sole embodiments described above, but encompasses any and all embodiments within the scope of the following claims.

CLAIMS

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A male plug protector for trailer wiring, comprising:

a vertically oriented, rectangular plug receiver having a front wall, opposing side walls, a closed top wall and a mounting plate opposing said front wall, said plug receiver being open at a lower end thereof for receiving a linear, generally rectangular male plug;

a lower cover for covering said plug receiver lower end;

and a spring-biased hinge attaching said lower cover and said plug receiver lower end;

said lower cover being rotatable at said spring-biased hinge between a vertical open position and a horizontal closed position, said cover being spring-biased to the closed position;

said rectangular plug receiver and said lower cover being of such dimensions and configuration to receive a linear, generally rectangular male plug;

whereby said lower cover is rotated downward from the closed position to the open position by a user, said male plug is inserted upward into said plug receiver, and said lower cover is allowed to close over the plug by said spring bias while allowing the wiring harness to extend downward from the closed cover.

2. The male plug protector of claim 1, wherein said lower cover defines a cutout therethrough for receiving said wiring harness.

3. The male plug protector of claim 2, wherein said lower cover has an upper peripheral surface and said plug receiver has a lower peripheral surface corresponding with said lower cover upper surface for mating closure therewith.

4. The male plug protector of claim 3, wherein said lower cover upper peripheral surface has an inner lip for sealing against inner sides of said walls of said plug receiver lower peripheral surface forming a seal against entrance of dust or water into said male plug protector when in a closed position.

5. The male plug protector of claim 2, said plug receiver mounting plate has extension portions extending outward, horizontally from each respective plug receiver side wall, each said mounting plate defining a mounting bore therethrough for receiving a mounting screw.

6. The male plug protector of claim 3, said plug receiver having a cover hinge housing extending outward and forward from a lower central portion of said front wall, said cover hinge housing having a common lower surface with said plug receiver lower peripheral surface and forming a front wall, an upper wall, and opposing side walls, each said side wall having outer hinge pin receiving portions of said hinge extending downward from the forward portion thereof.

7. The male plug protector of claim 6, said cover having a hinge extension portion corresponding with said cover hinge housing, said hinge extension portion defining outer grooves for

receiving said outer hinge pin receiving portions of said cover hinge housing and having inner hinge pin receiving portions extending upward from the forward portion thereof spaced so as to rotatably bear against said outer hinge pin receiving portions of said cover hinge housing.

8. The male plug protector of claim 7, wherein said outer and inner hinge pin receiving portions define a pin bore having a hinge pin therethrough, said hinge pin having a biasing spring thereon extending between said inner hinge pin receiving portions, said biasing spring being so arranged as to form said spring-biased hinge connecting said plug receiver and said lower cover.

9. The male plug protector of claim 7, wherein said plug receiver is greater in width than said cover hinge housing and said cover hinge extension portion of said lower cover is coextensive with said cover hinge housing, said lower cover having shoulders extending from each side of said cover hinge extension portion such that said cover portion is coextensive with said lower surface of said plug receiver.

10. The male plug protector of claim 9, wherein said lower cover is recessed, having an inner peripheral wall and an inner cover wall for the lower end of said plug.

11. The male plug protector of claim 9, wherein said lower cover has outer side walls extending outward from said shoulders and an end wall, said end wall and said cover portion defining said cutout for receiving said wiring harness.

12. The male plug protector of claim 11, lower cover portion having tabs extending outward from said cover side walls for the user to engage when opening said lower cover for insertion or removal of said plug.

13. A male plug protector for trailer wiring, comprising:

a vertically oriented, rectangular plug receiver having a front wall, opposing side walls, a closed top wall and a mounting plate opposing said front wall, said plug receiver being open at a lower end thereof for receiving a linear, generally rectangular male plug;

a lower cover for covering said plug receiver lower end; and

a spring-biased hinge attaching said lower cover and said plug receiver lower end;

said lower cover being rotatable at said spring-biased hinge between a vertical open position and a horizontal closed position, said cover being spring-biased to the closed position;

said rectangular plug receiver and said lower cover being of such dimensions and configuration to receive a linear, generally rectangular male plug;

said lower cover having an upper peripheral surface and said plug receiver having a lower peripheral surface corresponding with said lower cover upper surface for mating closure therewith;

said lower cover upper peripheral surface having an inner lip for sealing against inner sides of said walls of said plug receiver lower peripheral surface forming a seal against

entrance of dust or water into said male plug protector when in a closed position;

said plug receiver mounting plate having extension portions extending outward, horizontally from each respective plug receiver side walls, each said mounting plate defining a mounting bore therethrough for receiving a mounting screw;

said lower cover portion having sidewalls and tabs extending outward from said cover side walls for the user to engage when opening said lower cover for insertion or removal of said plug;

whereby said lower cover is rotated downward from the closed position to the open position by a user, said male plug is oriented with the electrical contacts thereof pointing upward, said male plug is inserted upward into said plug receiver, and said lower cover is allowed to close over the plug as a result of said spring bias while allowing the wiring harness to extend downward from the closed cover.

14. A male plug protector for trailer wiring, comprising:

a vertically oriented, rectangular plug receiver having a front wall, opposing side walls, a closed top wall and a mounting plate opposing said front wall, said plug receiver being open at a lower end thereof for receiving a linear, generally rectangular male plug;

a lower cover for covering said plug receiver lower end; and

a spring-biased hinge attaching said lower cover and said plug receiver lower end;

said lower cover being rotatable at said spring-biased hinge between a vertical open position and a horizontal closed position, said cover being spring-biased to the closed position;

said rectangular plug receiver and said lower cover being of such dimensions and configuration to receive a linear, generally rectangular male plug;

said plug receiver mounting plate having extension portions extending outward, horizontally from each respective plug receiver side wall, each said mounting plate defining a mounting bore therethrough for receiving a mounting screw;

said plug receiver having a cover hinge housing extending outward and forward from a lower central portion of said front wall, said cover hinge housing having a common lower surface with said plug receiver lower peripheral surface and forming a front wall, an upper wall, and opposing side walls, each said side wall having outer hinge pin receiving portions of said hinge extending downward from the forward portion thereof;

said cover having a hinge extension portion corresponding with said cover hinge housing, said hinge extension portion defining outer grooves for receiving said outer hinge pin receiving portions of said cover hinge housing and having inner hinge pin receiving portions extending upward from the forward portion thereof spaced so as to rotatably bear against said outer hinge pin receiving portions of said cover hinge housing;

said outer and inner hinge pin receiving portions defining a pin bore having a hinge pin therethrough, said hinge pin having a biasing spring thereon extending between said inner hinge pin receiving portions, said biasing spring being so arranged as to form said spring-biased hinge connecting said plug receiver and said lower cover;

said lower cover having shoulders extending outward from said hinge extension portion, outer side walls and an end wall,

said end wall and said cover portion defining said cutout for receiving said wiring harness;

whereby said lower cover is rotated downward from the closed position to the open position by a user, said male plug is inserted upward into said plug receiver, and said lower cover is allowed to close over the plug by said spring bias while allowing the wiring harness to extend downward from the closed cover.

15. The male plug protector of claim 14, said plug receiver being greater in width than said cover hinge housing and said cover hinge extension portion of said lower cover is coextensive with said cover hinge housing, said lower cover having shoulders extending from each side of said cover hinge extension portion such that said cover portion is coextensive with said lower surface of said plug receiver.

16. The male plug protector of claim 15, wherein said lower cover defines a cutout therethrough for receiving said wiring harness.

17. The male plug protector of claim 16, wherein said lower cover has an upper peripheral surface and said plug receiver has a lower peripheral surface corresponding with said lower cover upper surface for mating closure therewith.

18. The male plug protector of claim 17, wherein said lower cover upper peripheral surface has an inner lip for sealing against the inner sides of said walls of said plug receiver lower peripheral surface forming a seal against

entrance of dust or water into said male plug protector when in a closed position.

19. The male plug protector of claim 17, wherein said plug receiver mounting plate has extension portions extending outward, horizontally from each respective plug receiver side wall, each said mounting plate defining a mounting bore therethrough for receiving a mounting screw.

20. The male plug protector of claim 19, wherein said lower cover portion having side walls and tabs extending outward from said cover side walls for the user to engage when opening said lower cover for insertion or removal of said plug.

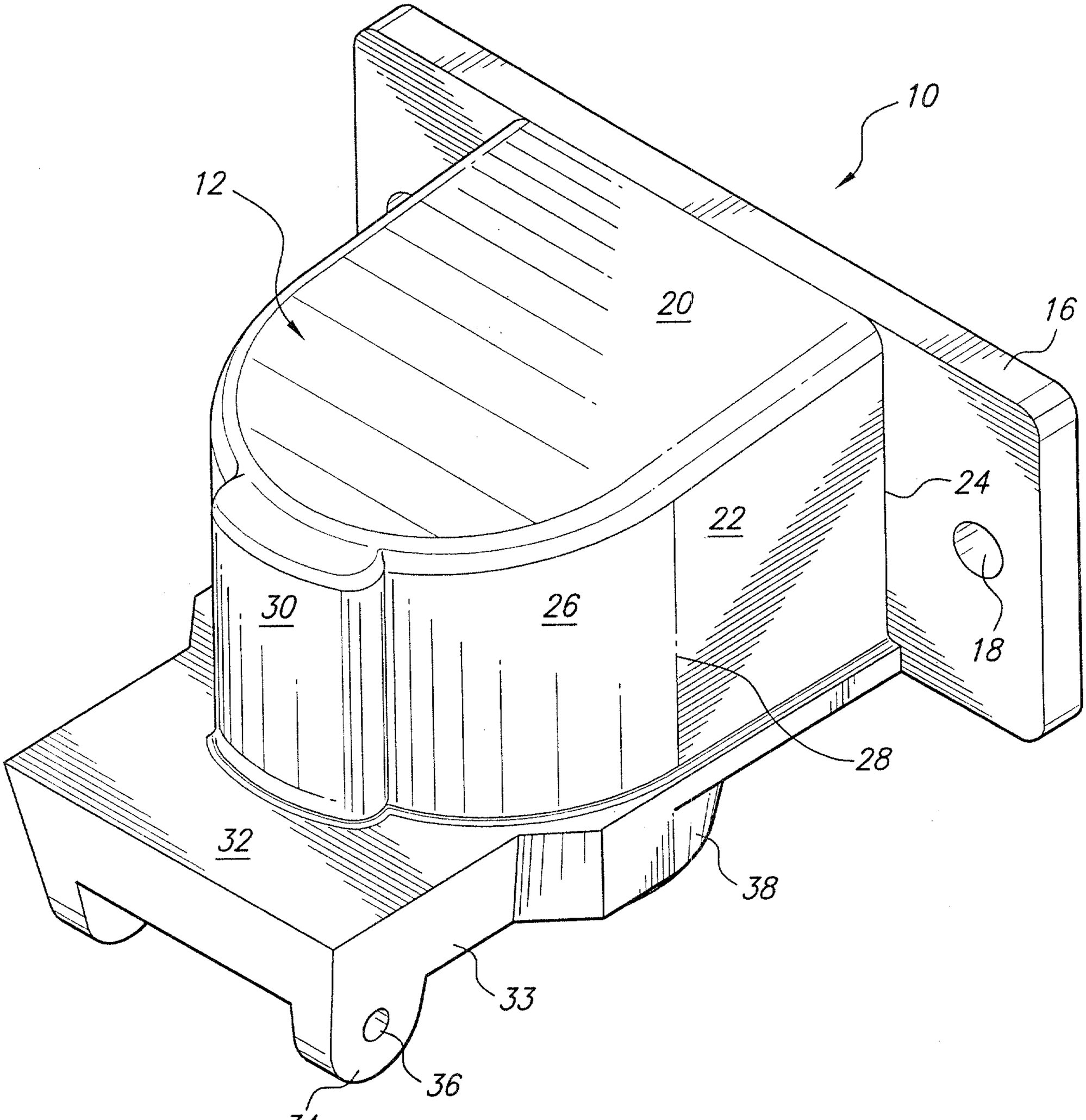


Fig. 1

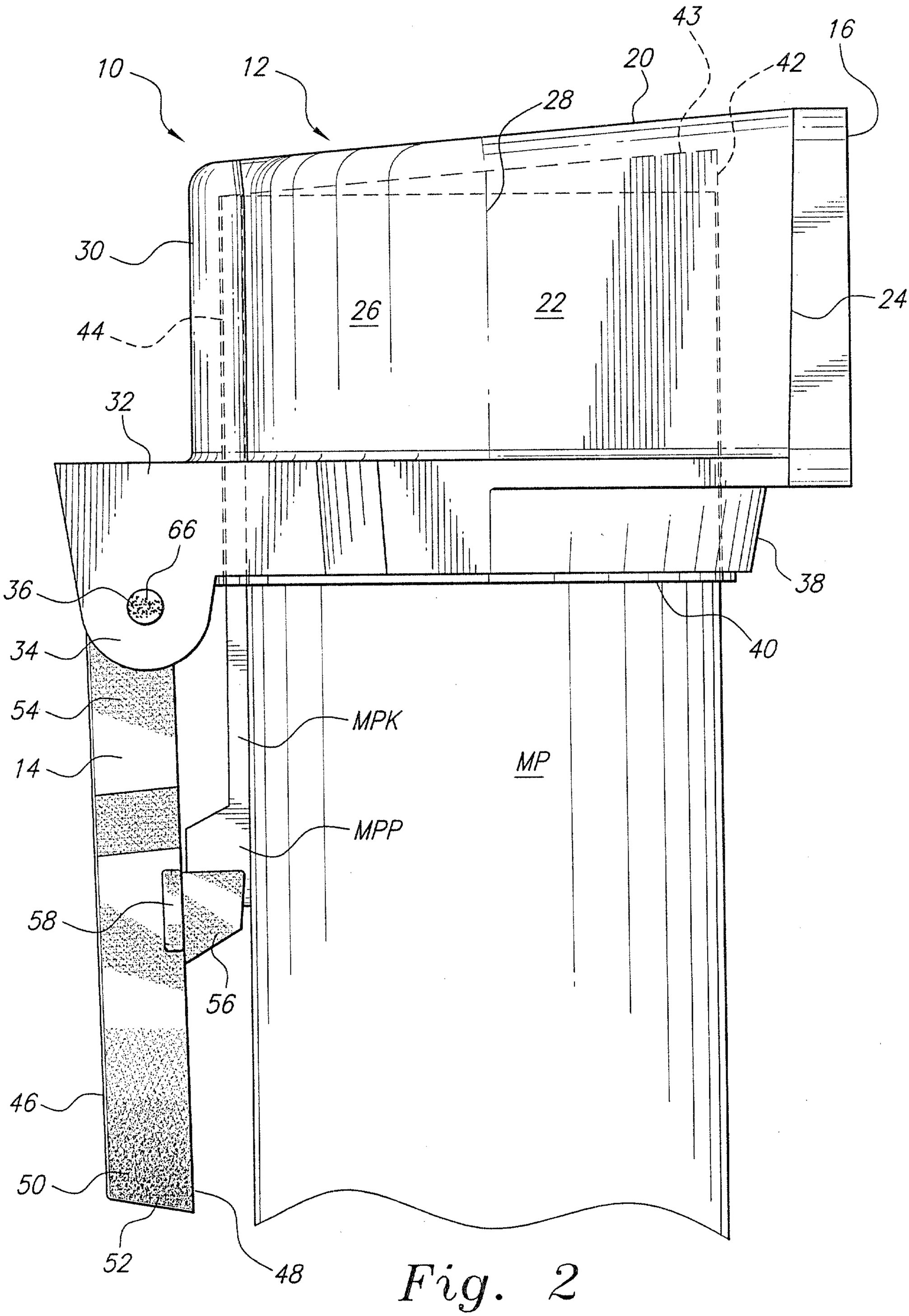

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Fig. 2

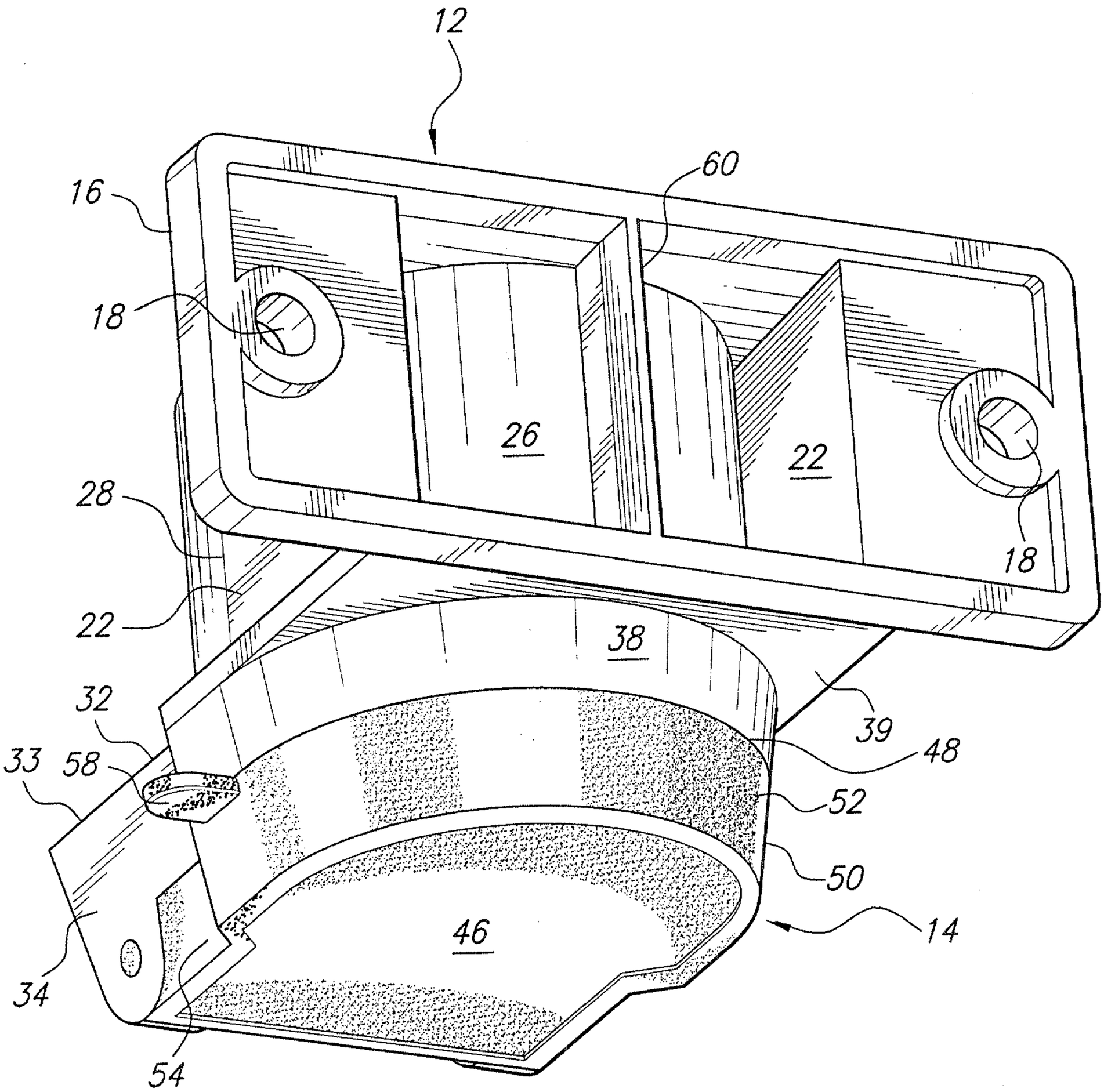


Fig. 3

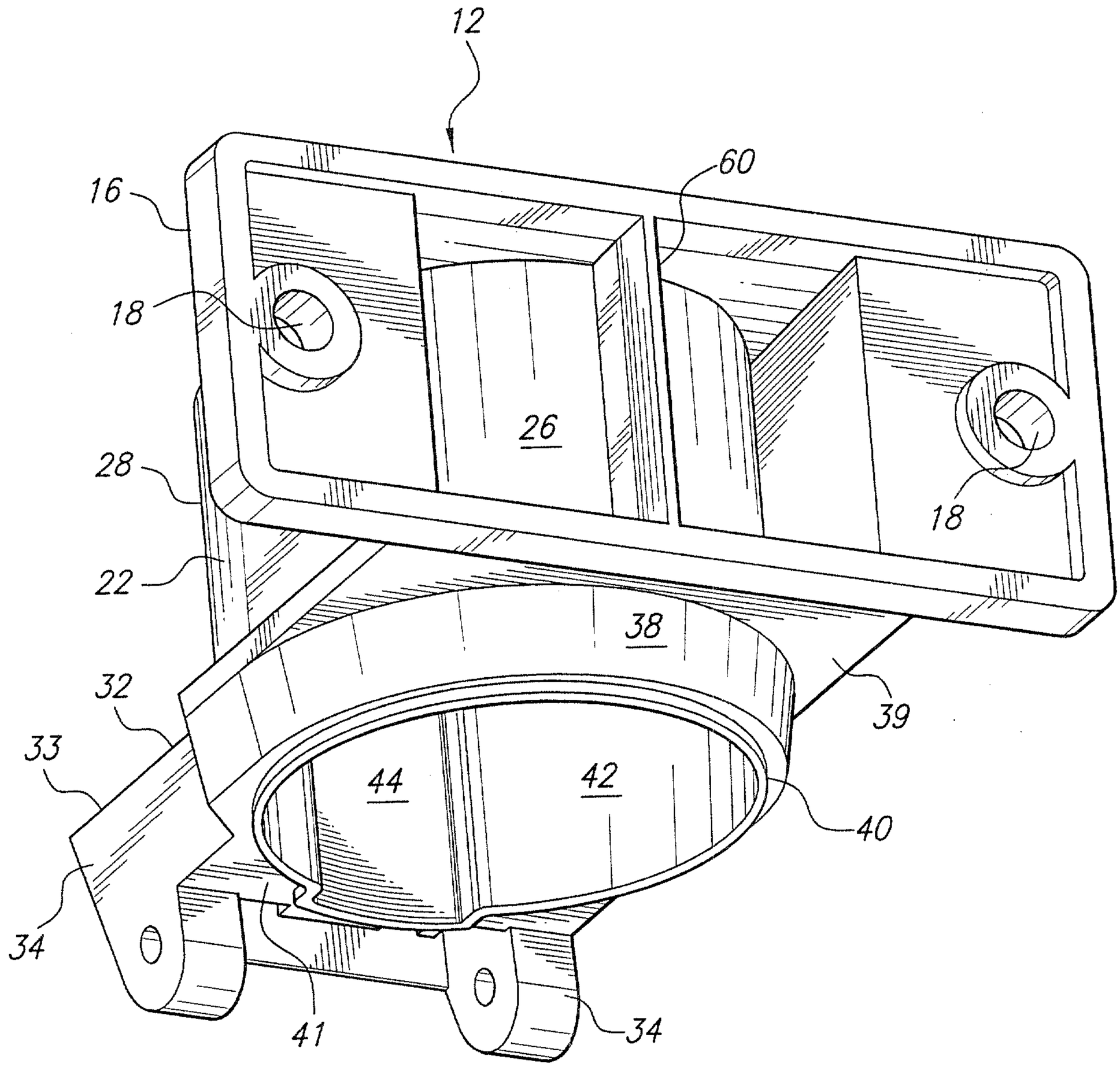


Fig. 4

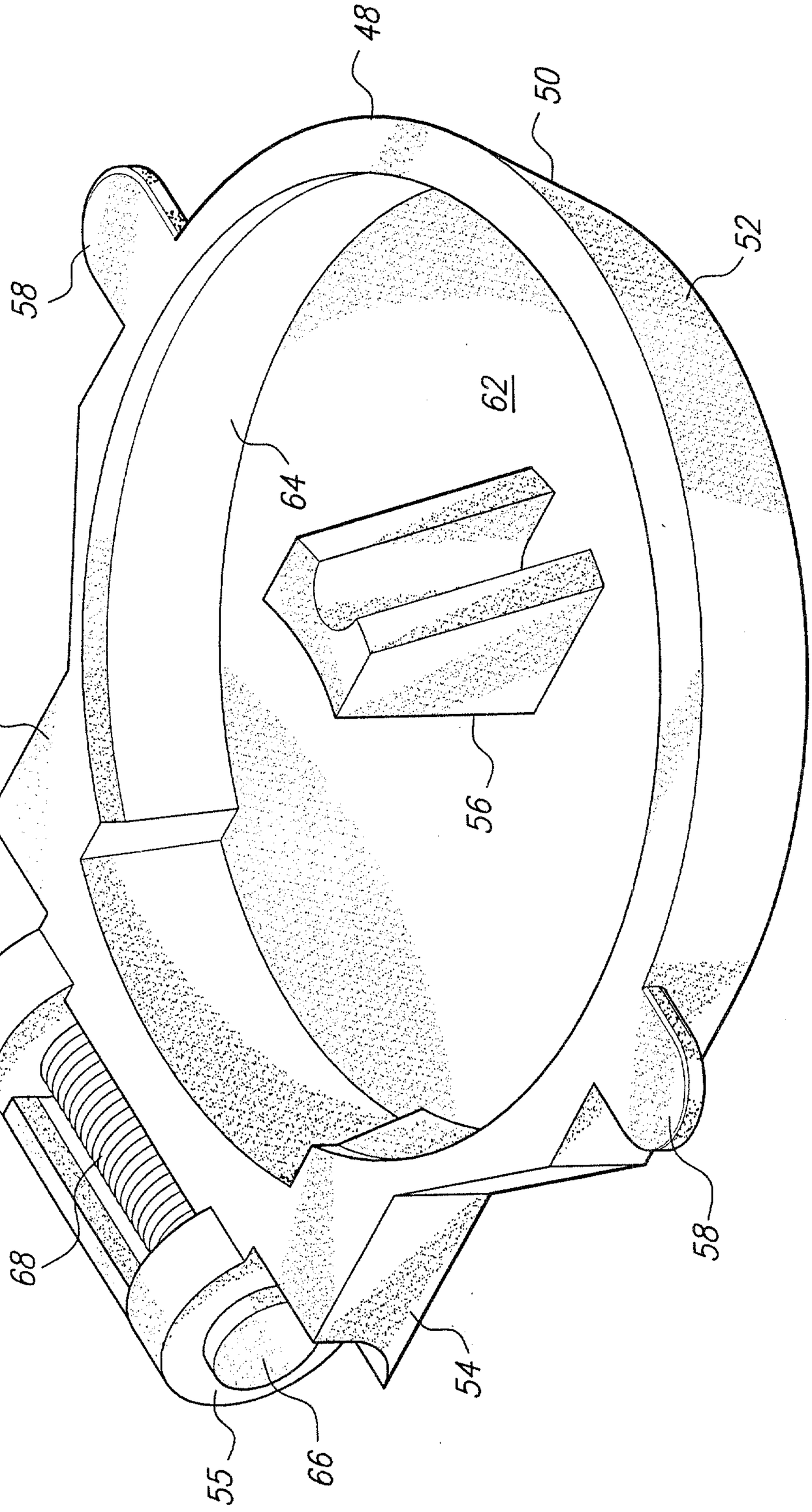


Fig. 5

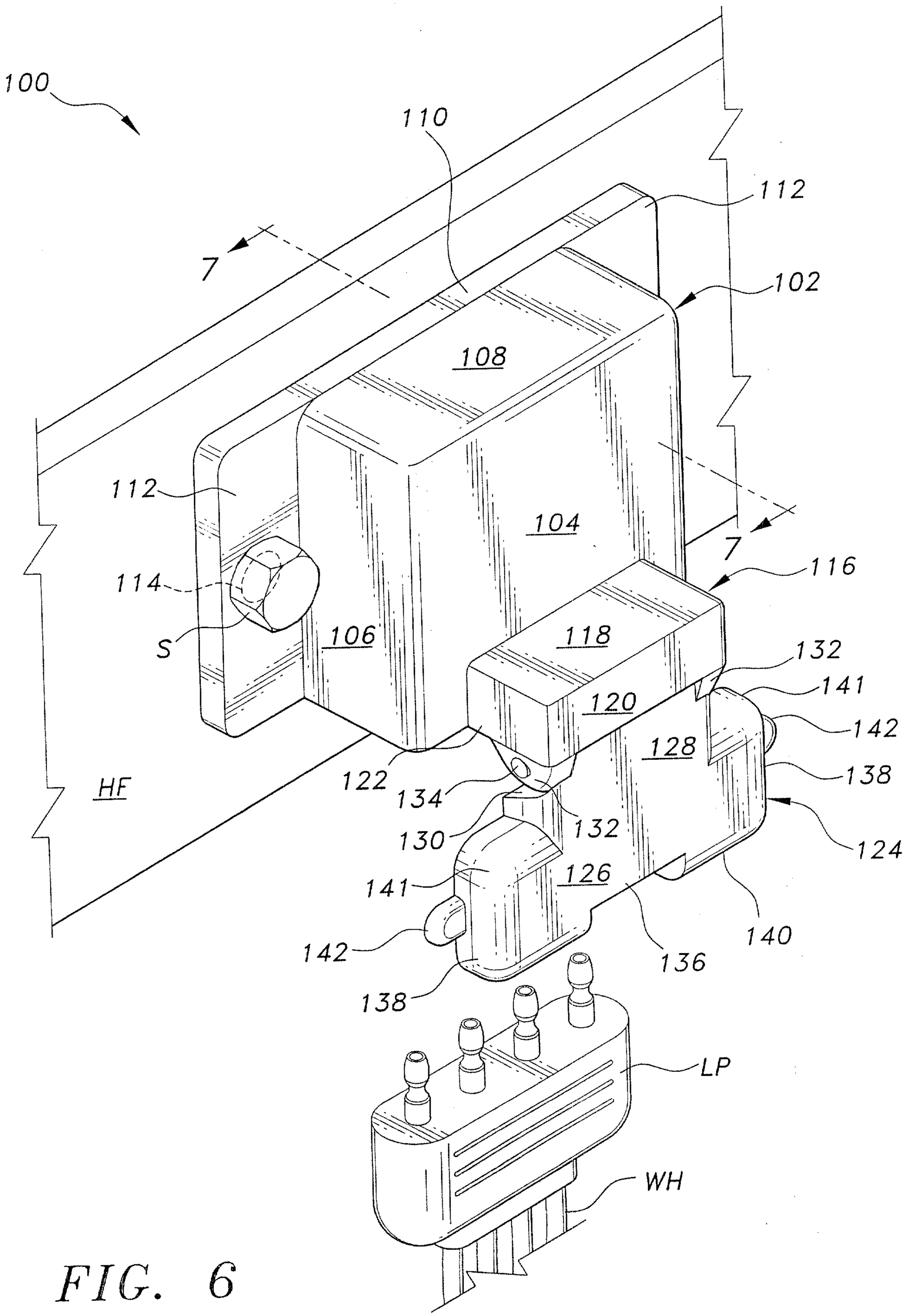

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FIG. 6

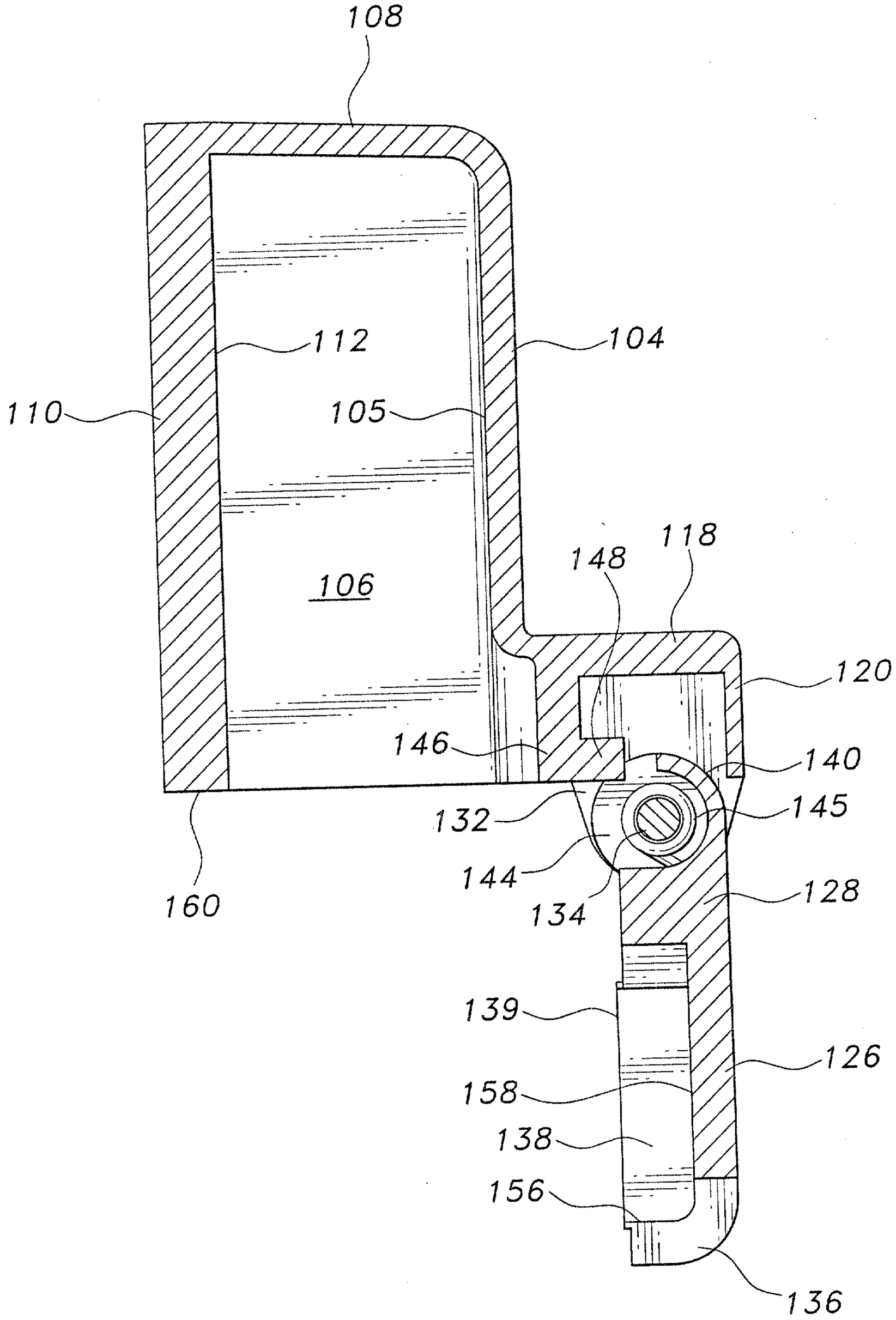

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FIG. 7

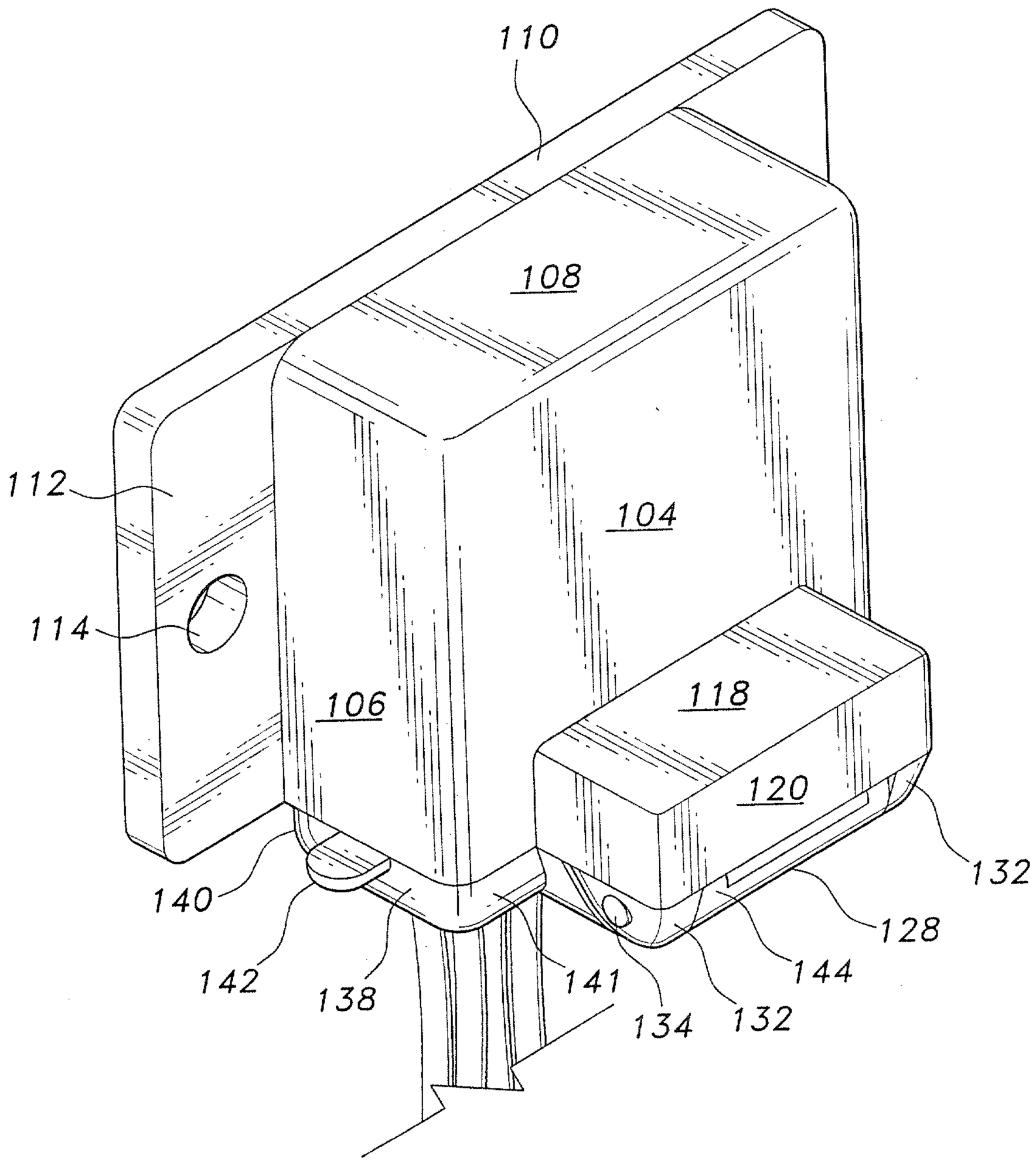

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FIG. 8

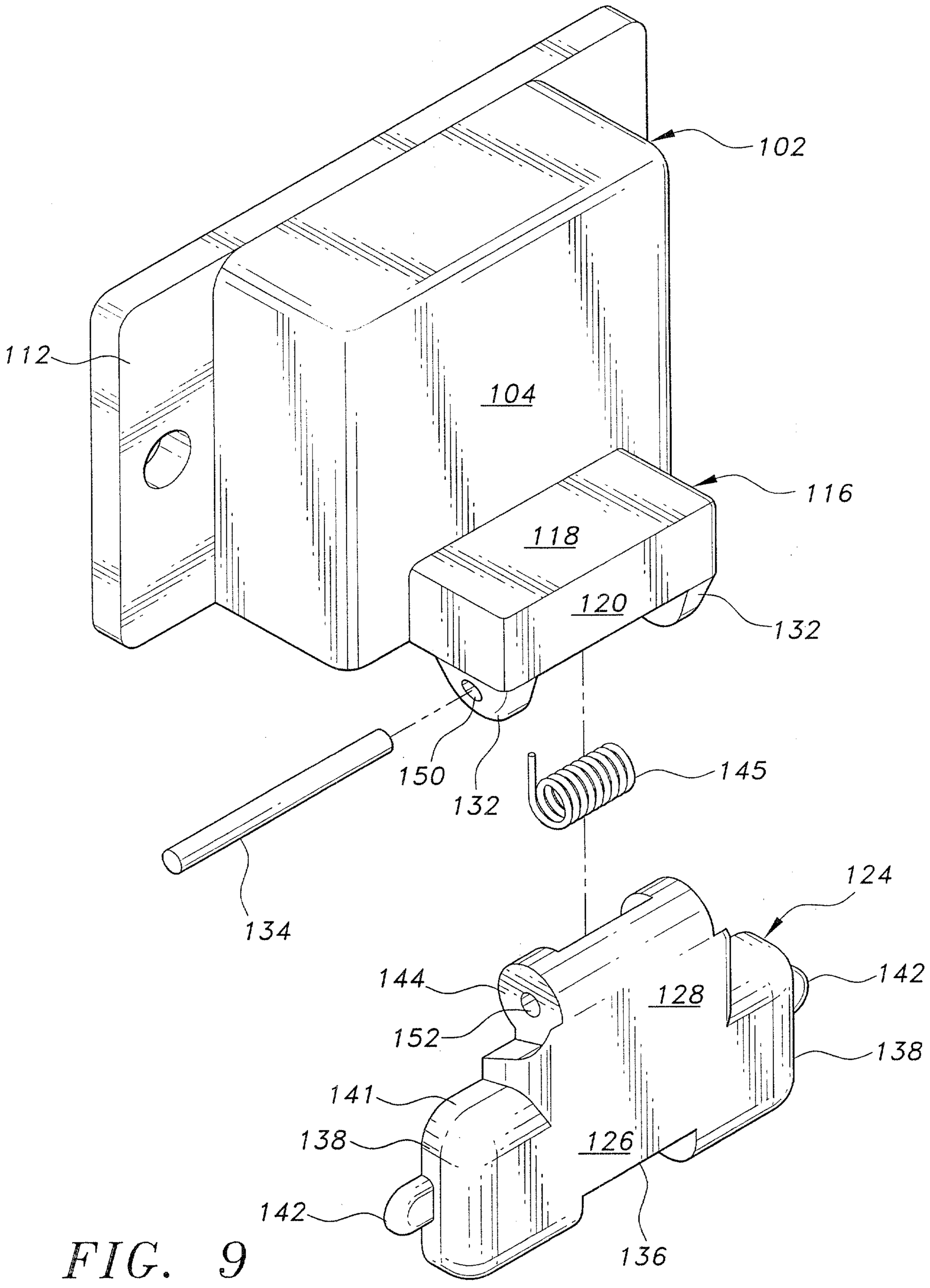

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FIG. 9

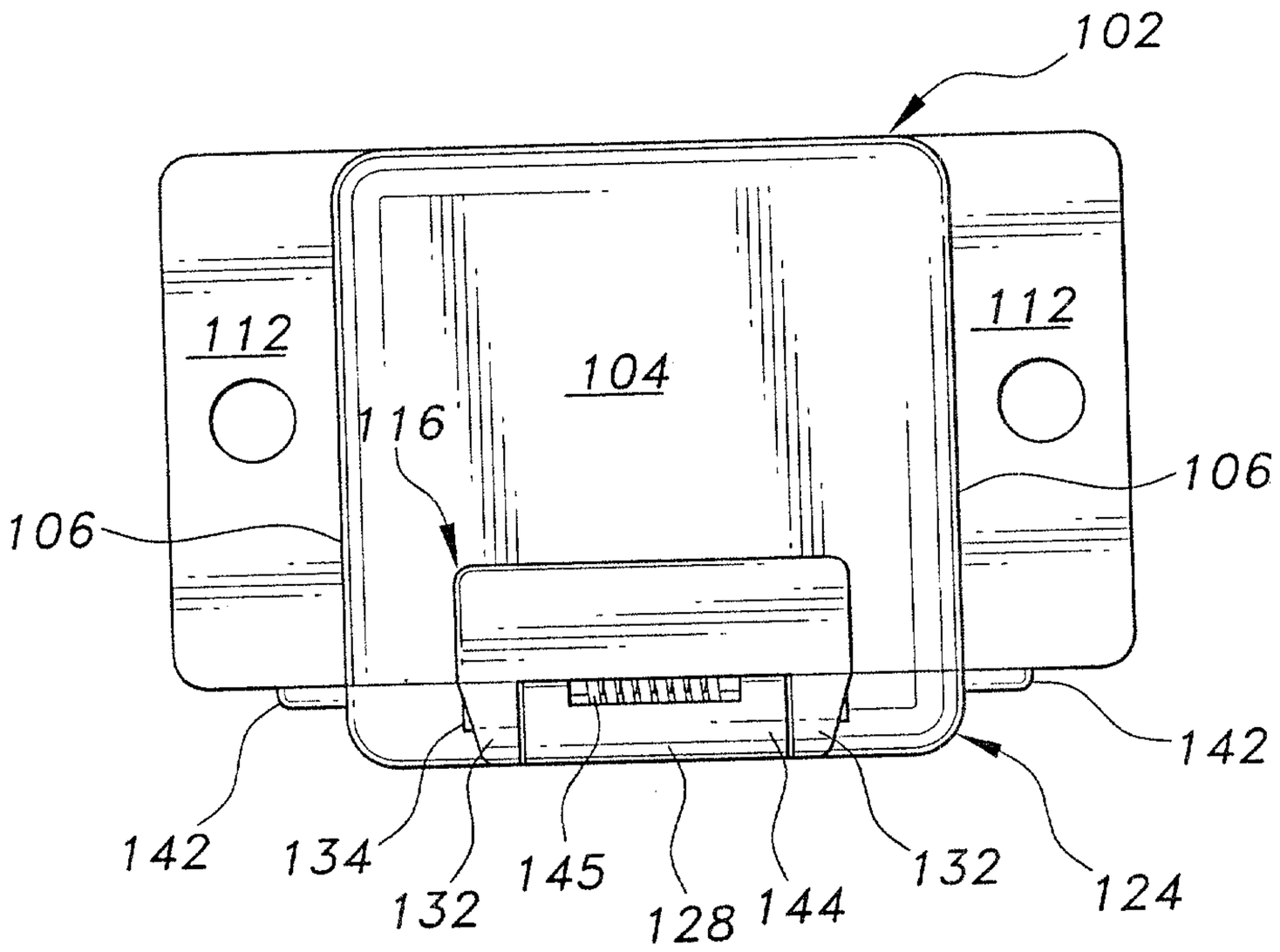


FIG. 10A

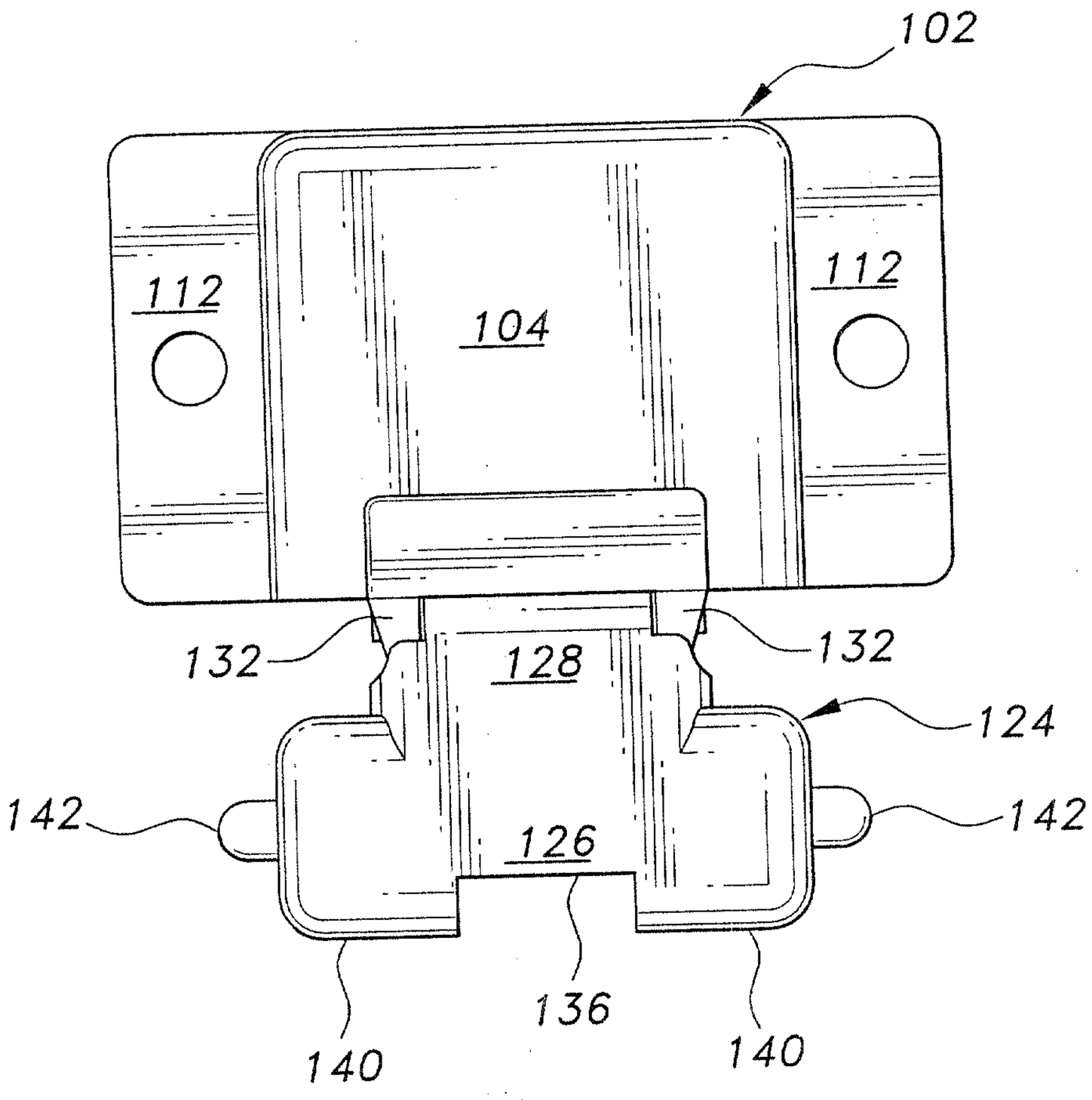


FIG. 10B

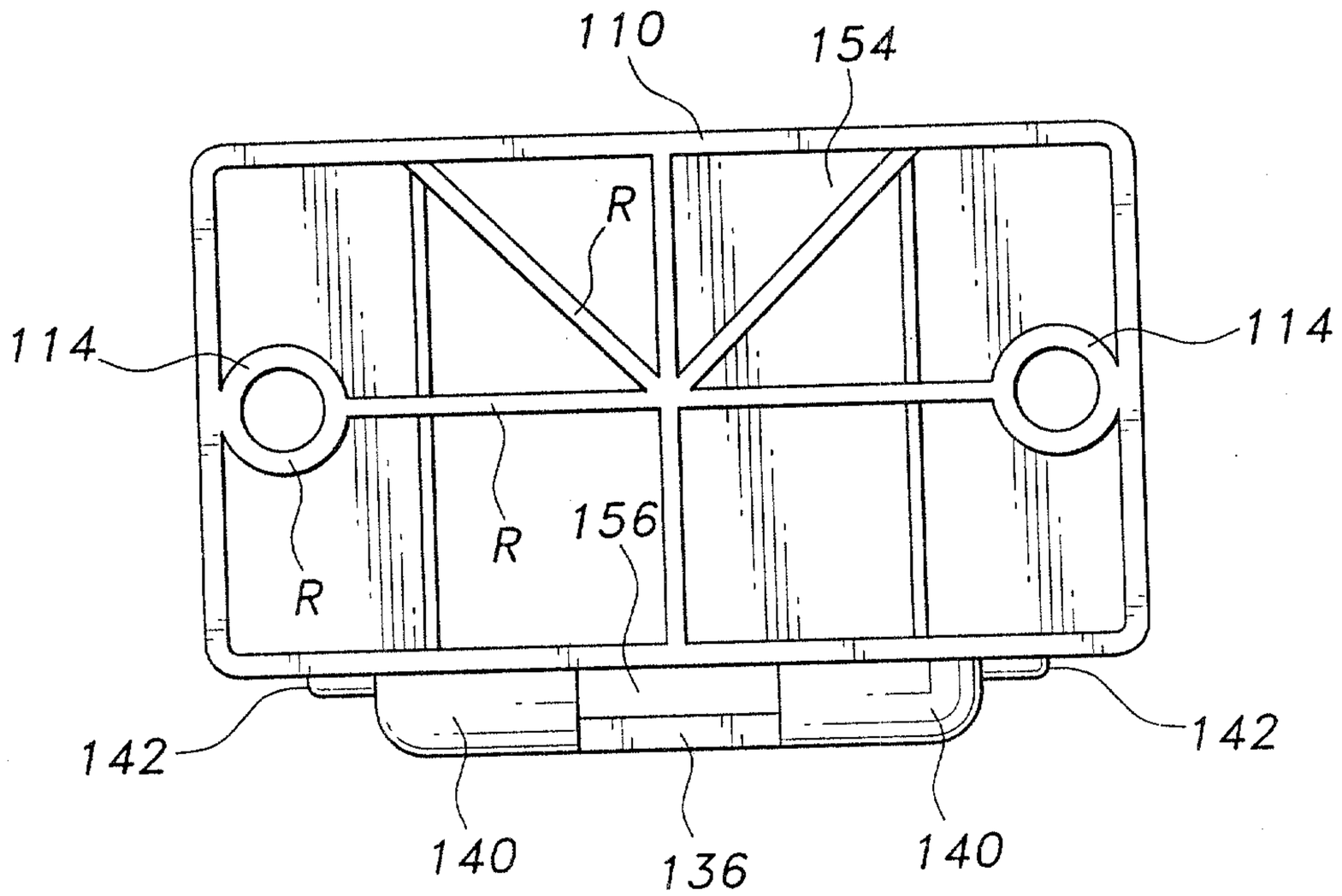


FIG. 11A

FIG. 11B

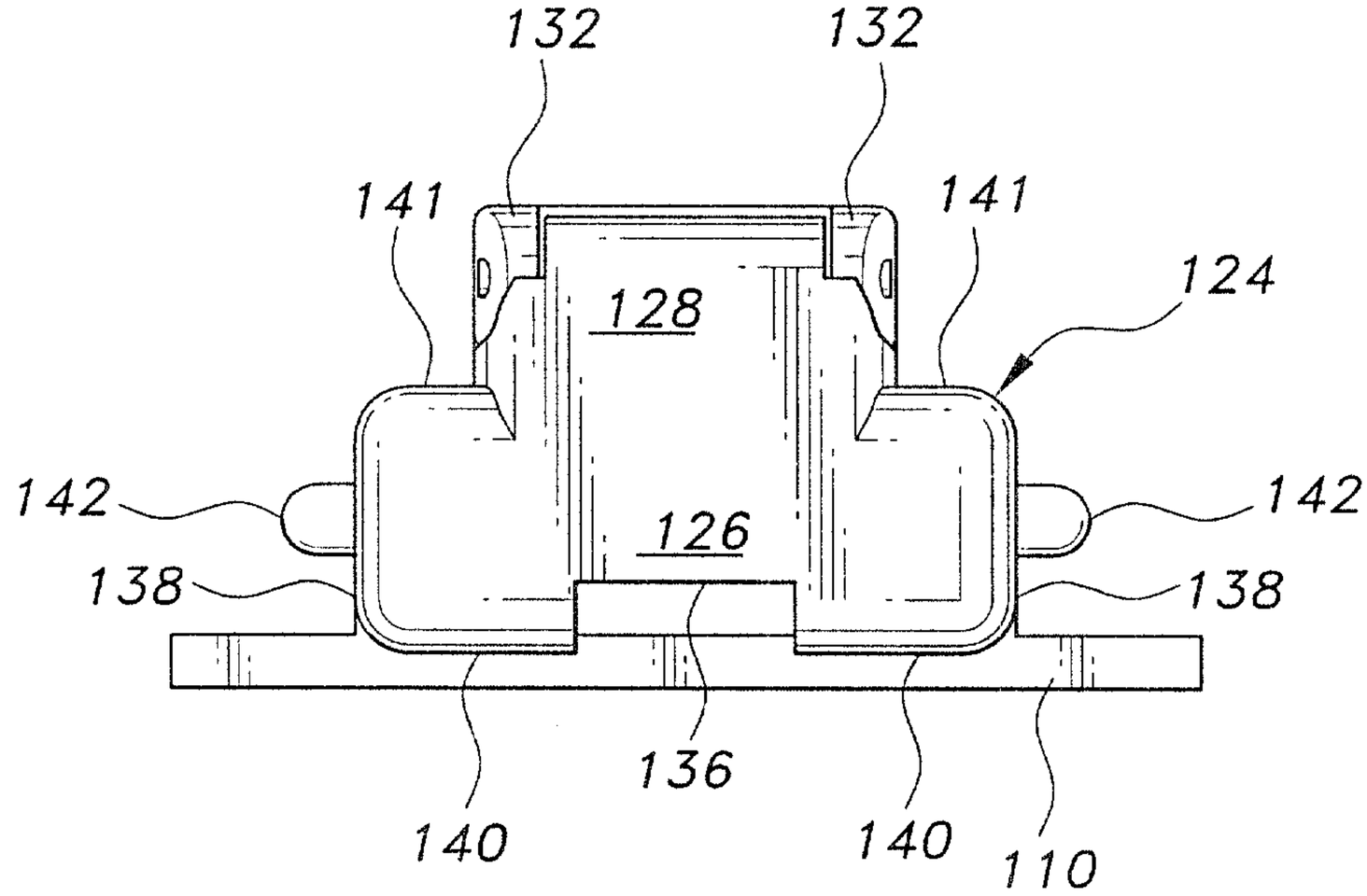


FIG. 12A

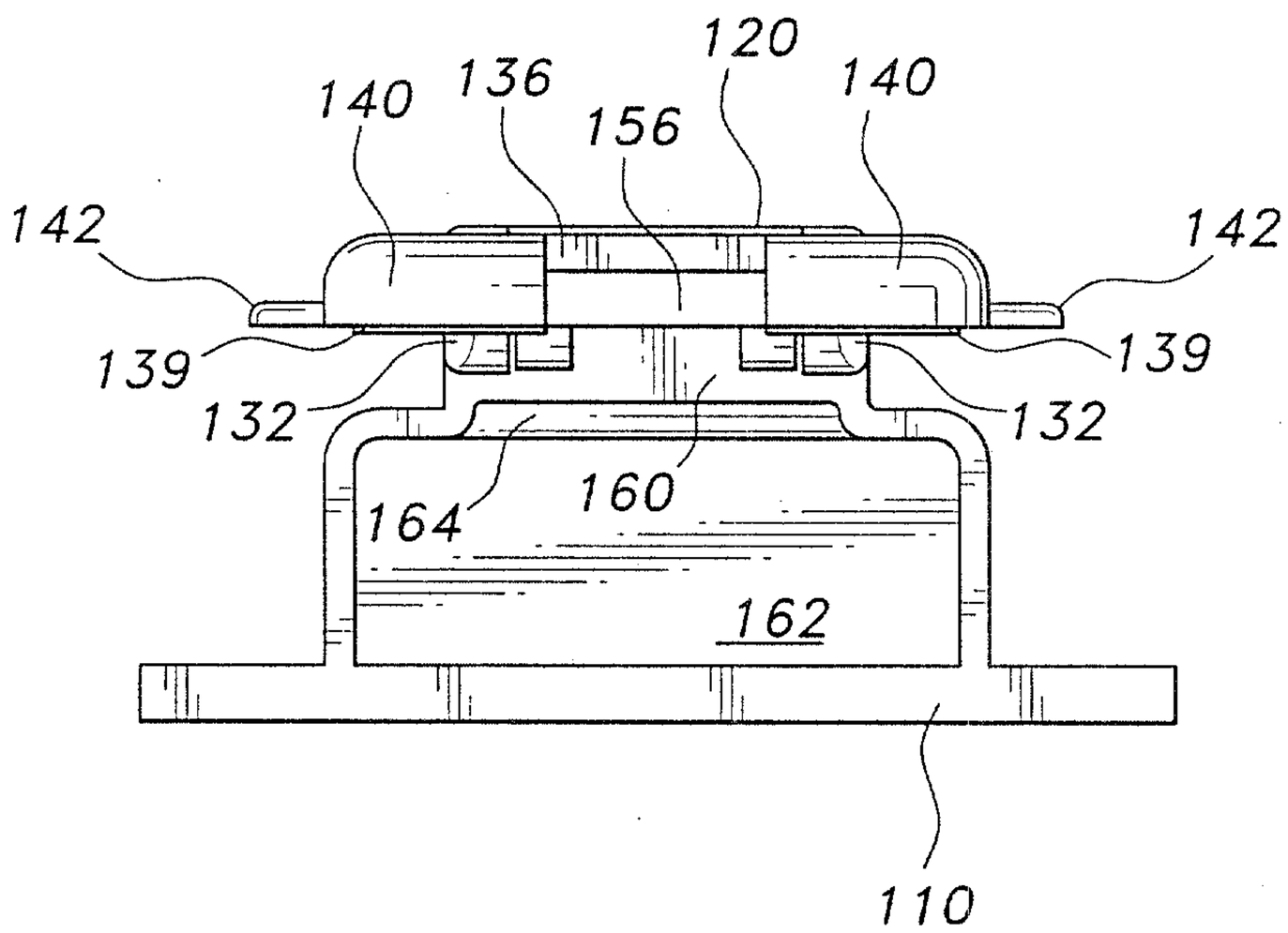
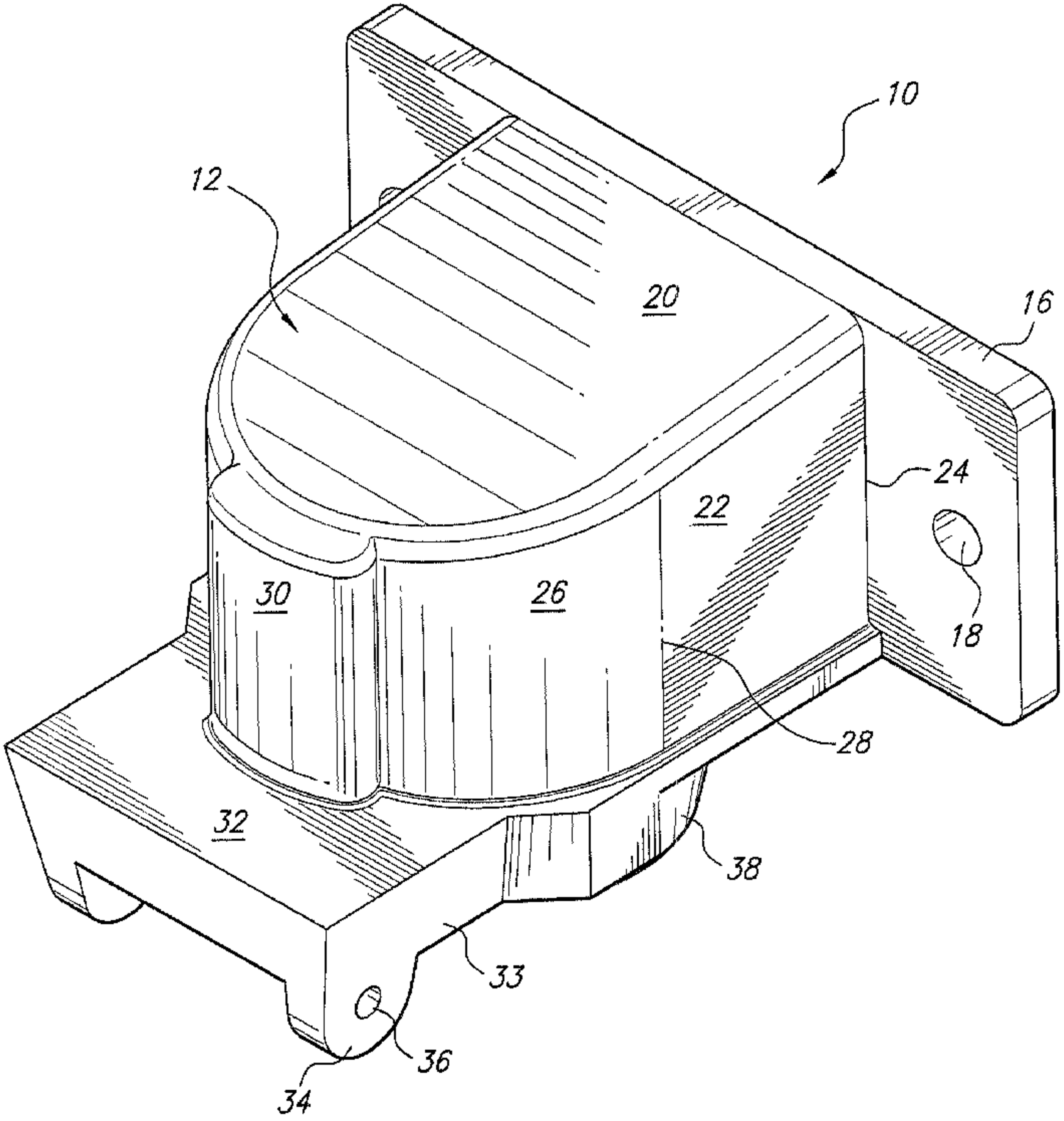


FIG. 12B


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