



US009271413B2

(12) **United States Patent**
Dahl et al.

(10) **Patent No.:** **US 9,271,413 B2**
(45) **Date of Patent:** ***Feb. 23, 2016**

(54) **SHELTER FOR PORTABLE ELECTRICAL INLETS/OUTLETS**

(56) **References Cited**

- (71) Applicant: **Trystar, Inc.**, Faribault, MN (US)
- (72) Inventors: **Frederick Alan Dahl**, Dundas, MN (US); **James Jerome Koebeg**, Morristown, MN (US); **Brian Allen Amacher**, Faribault, MN (US)
- (73) Assignee: **Trystar, Inc.**, Faribault, MN (US)
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 153 days.

This patent is subject to a terminal disclaimer.

U.S. PATENT DOCUMENTS

2,205,969 A	6/1940	Boenecke
2,732,581 A	1/1956	Heck
2,960,254 A	11/1960	Kiba
3,055,534 A	9/1962	Boenecke
3,086,676 A	4/1963	Dilatush
3,087,192 A	4/1963	Hertzke
3,144,506 A	8/1964	Gunthel, Jr.
3,333,726 A	8/1967	Belanger
4,229,616 A	10/1980	Hotchkiss
4,382,649 A	5/1983	Meyer
D284,465 S	7/1986	Epley
4,702,541 A	10/1987	Arnold
4,848,574 A	7/1989	Murphy et al.
5,211,302 A	5/1993	Tiramani
5,217,387 A	6/1993	Hull et al.
5,357,565 A	10/1994	Butler, III et al.
5,434,376 A *	7/1995	Hyatt et al. 200/293
5,529,205 A	6/1996	Corney et al.
5,551,888 A	9/1996	Rhodes, Sr.
5,562,208 A	10/1996	Hasler et al.
5,887,744 A	3/1999	Mejias
5,938,063 A	8/1999	Hoftman

(21) Appl. No.: **13/910,330**

(22) Filed: **Jun. 5, 2013**

(65) **Prior Publication Data**

US 2013/0264111 A1 Oct. 10, 2013

Related U.S. Application Data

(63) Continuation of application No. 12/967,729, filed on Dec. 14, 2010, now Pat. No. 8,476,540.

- (51) **Int. Cl.**
H01R 13/46 (2006.01)
H05K 5/02 (2006.01)
H02G 3/08 (2006.01)
H02G 9/00 (2006.01)

(52) **U.S. Cl.**
CPC *H05K 5/0247* (2013.01); *H02G 3/088* (2013.01); *H02G 9/00* (2013.01)

(58) **Field of Classification Search**
USPC 174/549, 50, 520; 248/906; 361/600; 439/367, 369

See application file for complete search history.

(Continued)

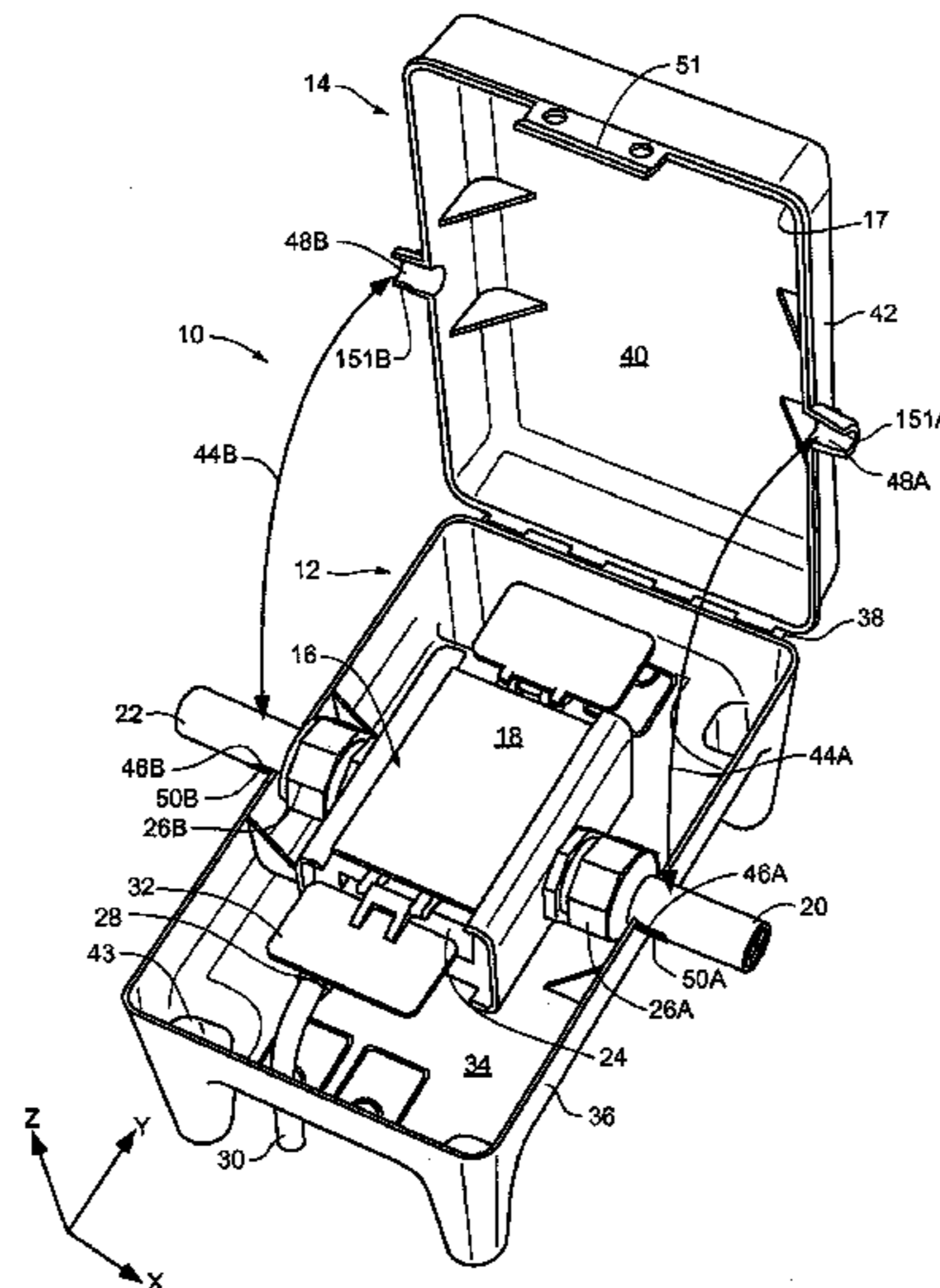
Primary Examiner — Dhirubhai R Patel

(74) *Attorney, Agent, or Firm* — Fredrikson & Byron, P.A.

(57) **ABSTRACT**

A shelter for protecting a portable electrical inlet/outlet (PEIO) includes a base and a cover. In some examples, the base includes a platform to support a body of the PEIO, and the platform is configured to segregate the PEIO body from water that may accumulate. In some examples, the cover configured to mate with the base to substantially enclose the platform. Upon being inserted into the shelter, the PEIO may be protected from unwanted elements, such as rain, snow, unintended contact by humans or animals, or the like.

18 Claims, 14 Drawing Sheets



(56)

References Cited

U.S. PATENT DOCUMENTS

6,000,550	A	12/1999	Simpson et al.	D481,361	S	10/2003	Barnes
6,099,340	A	8/2000	Florentine	D499,330	S	12/2004	Peato
6,250,946	B1	6/2001	Tardy	7,141,738	B2	11/2006	Marsac et al.
6,265,665	B1	7/2001	Zahnen	7,273,984	B2	9/2007	Murphy
6,555,748	B1 *	4/2003	Gul 174/59	7,285,725	B1	10/2007	Saman
				7,513,790	B2	4/2009	Keeven et al.
				7,553,181	B1	6/2009	Van Dalinda, III

* cited by examiner

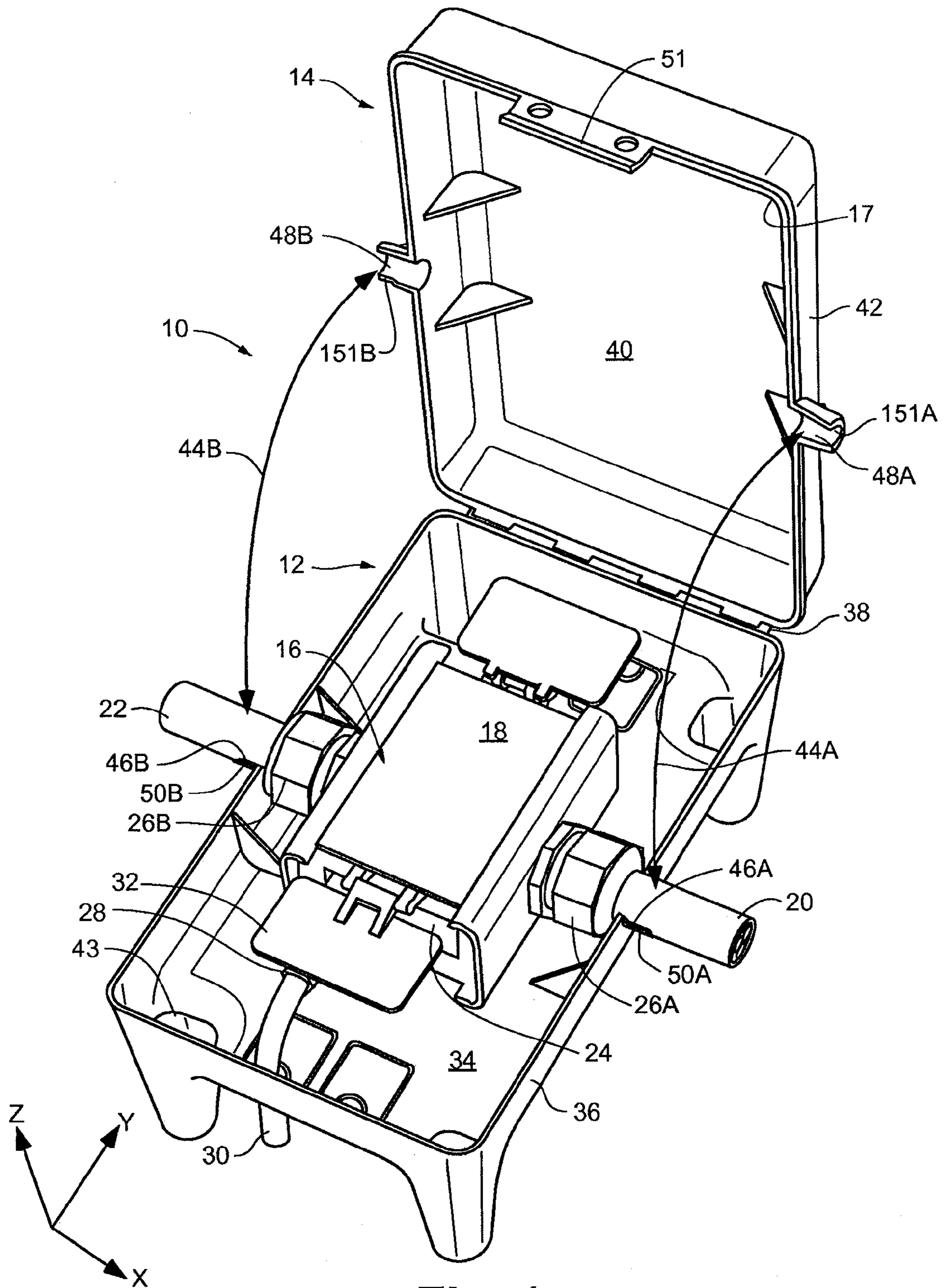
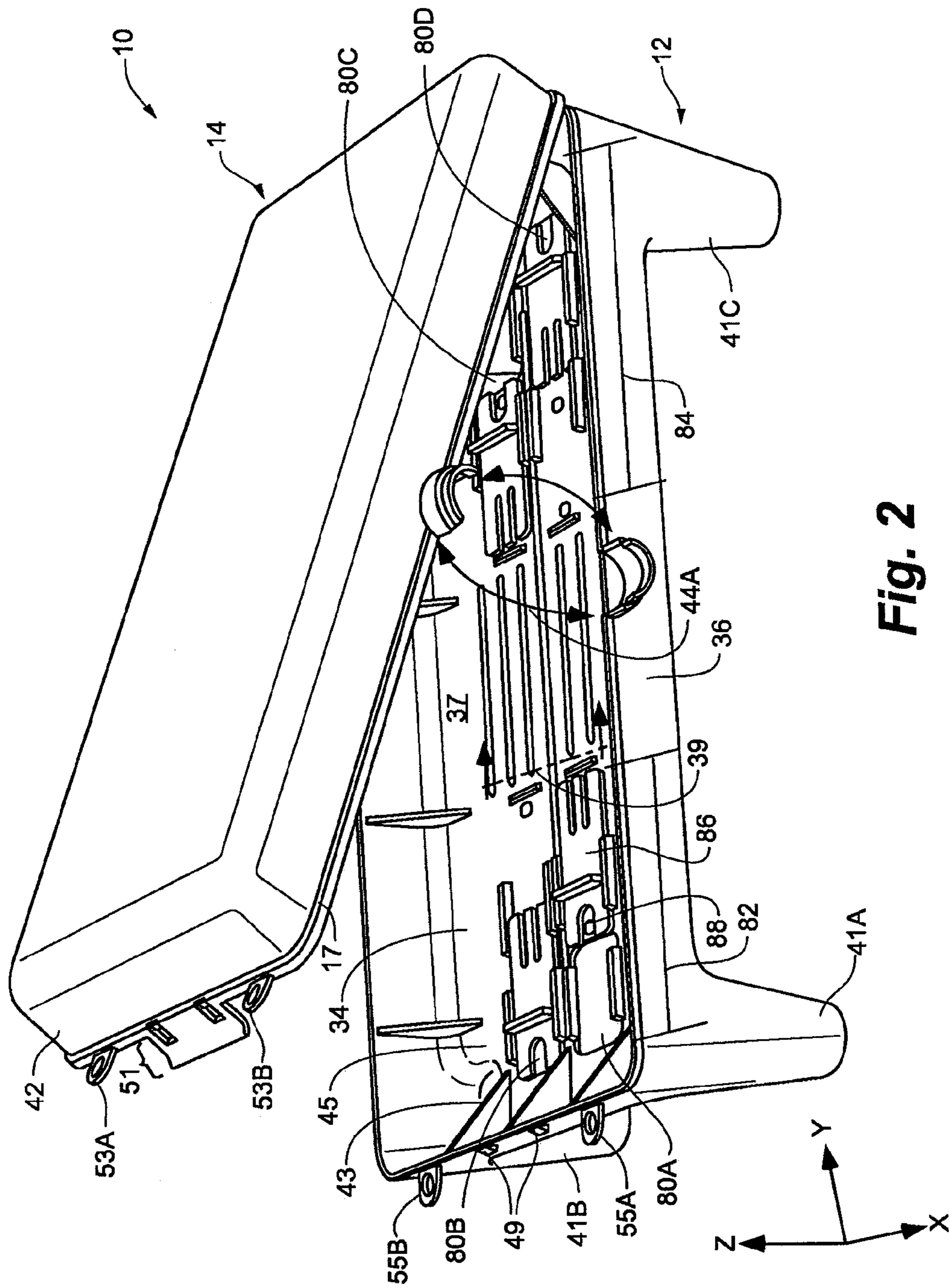


Fig. 1



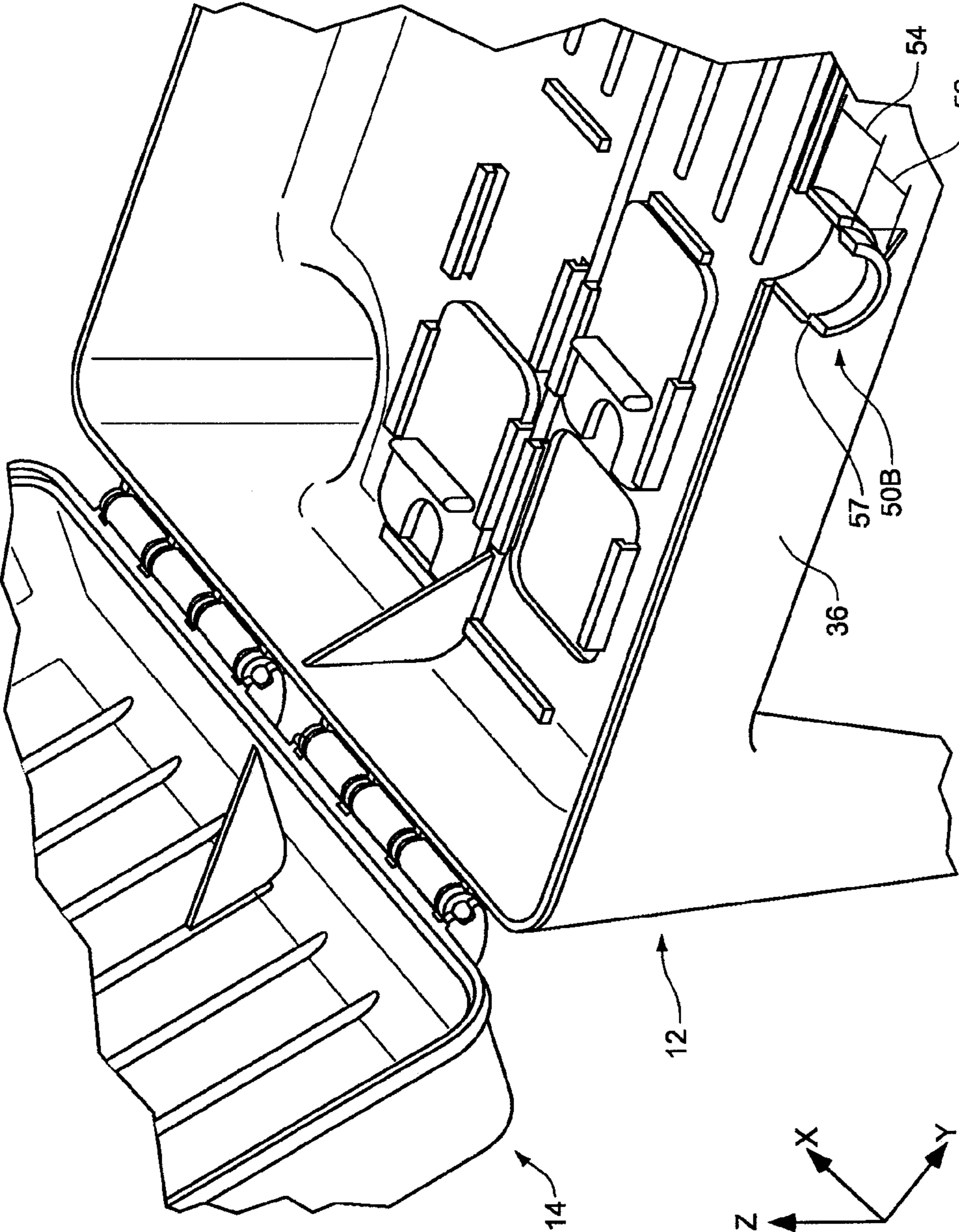


Fig. 3A

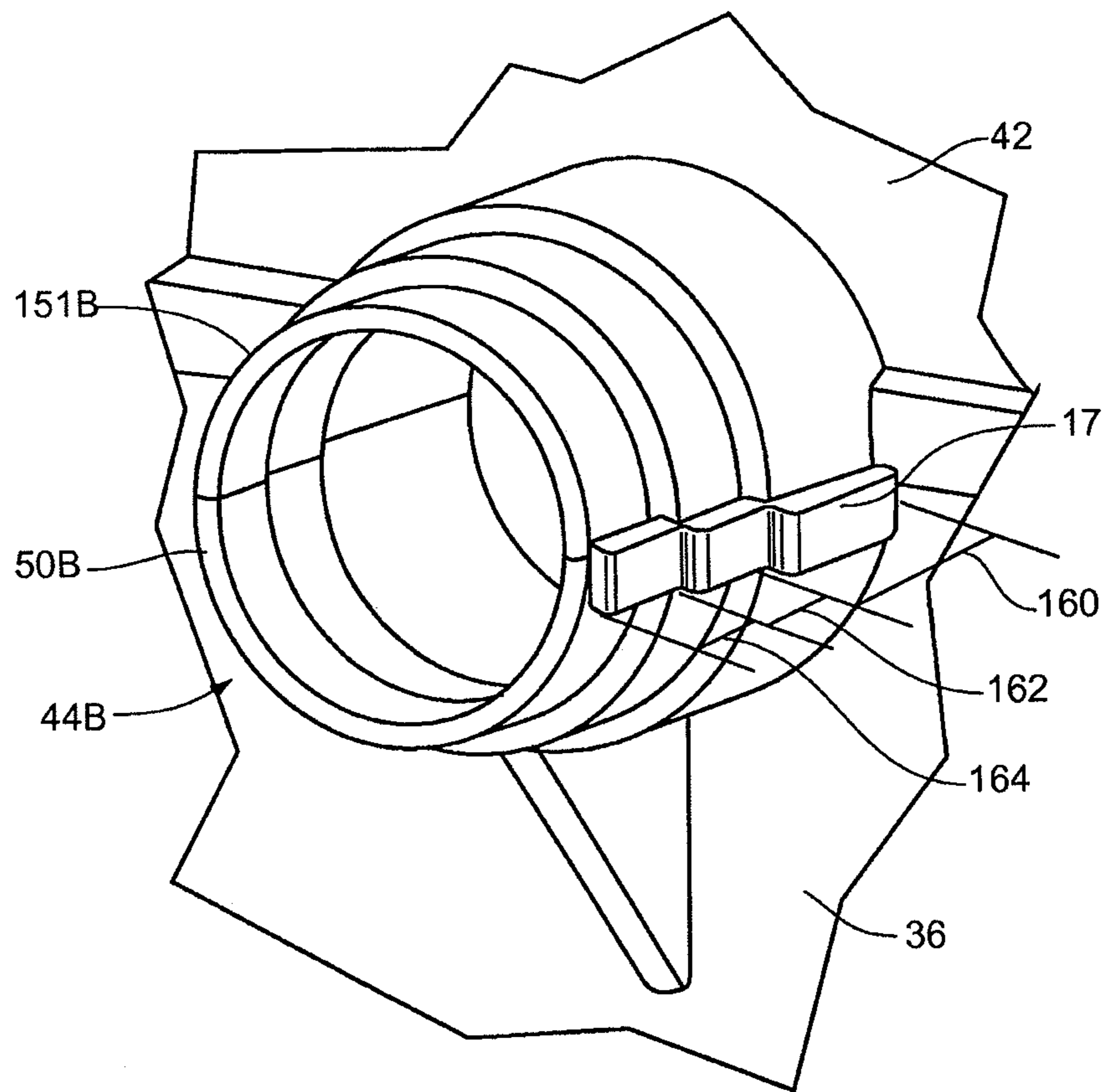


Fig. 3B

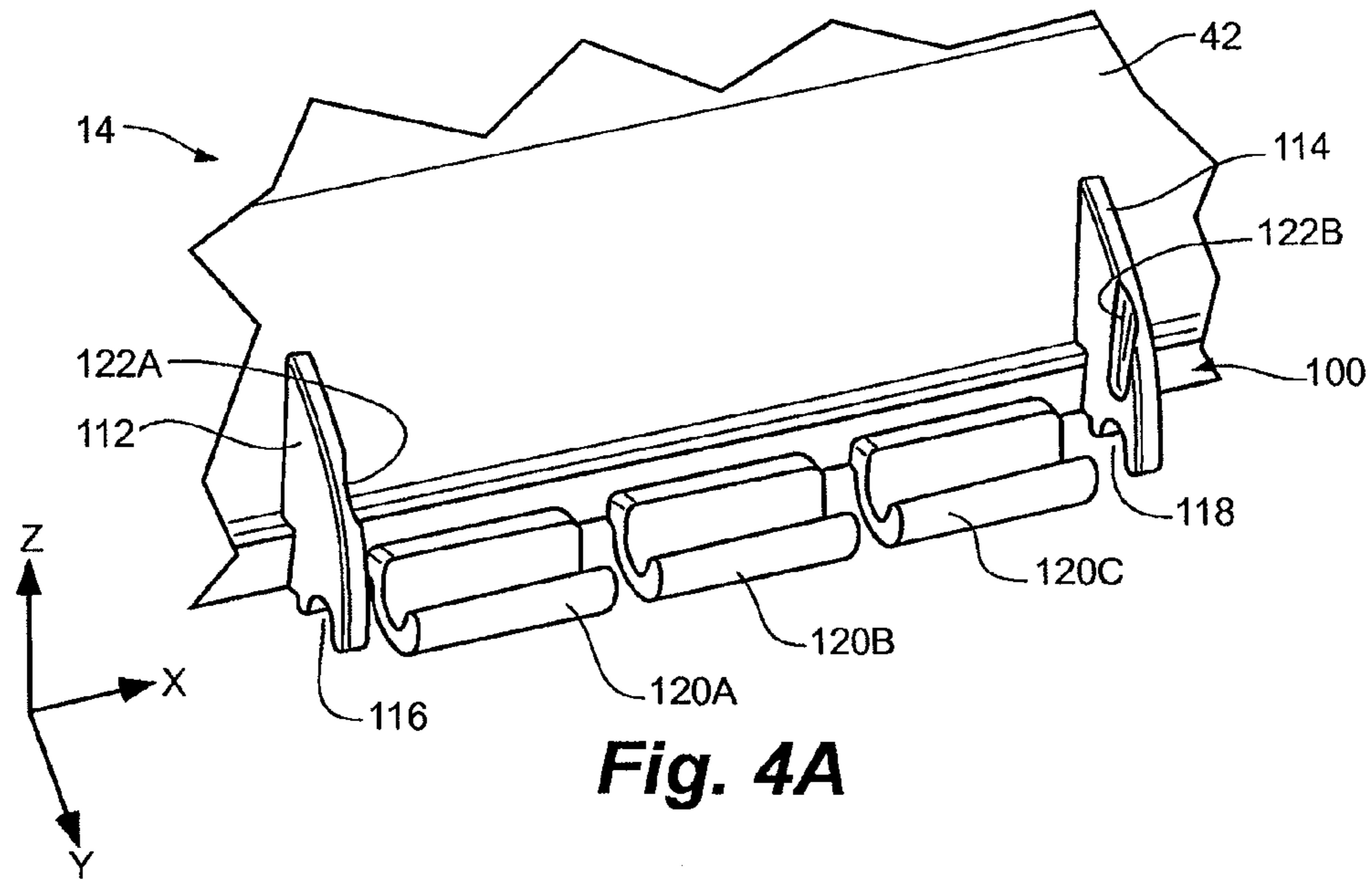


Fig. 4A

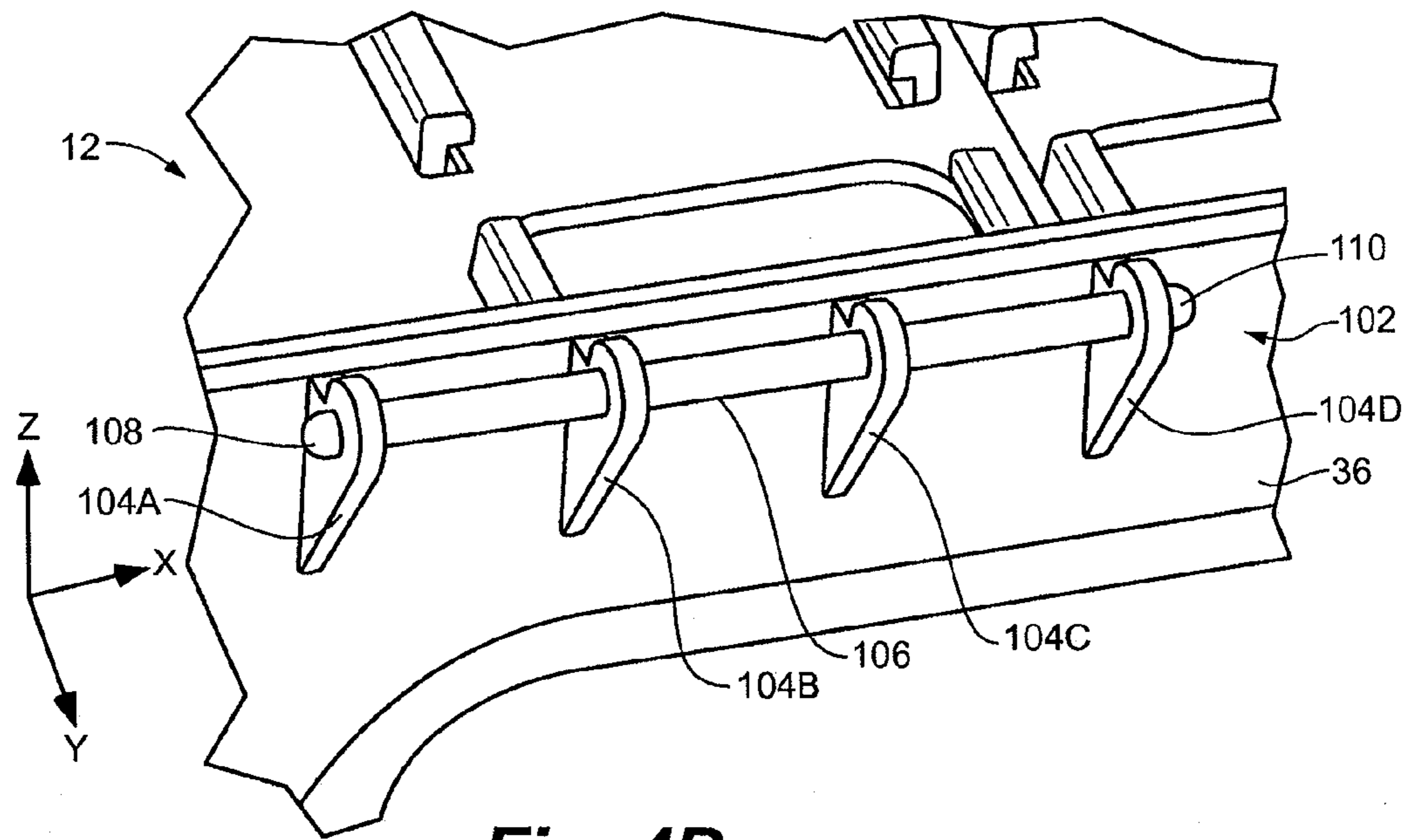


Fig. 4B

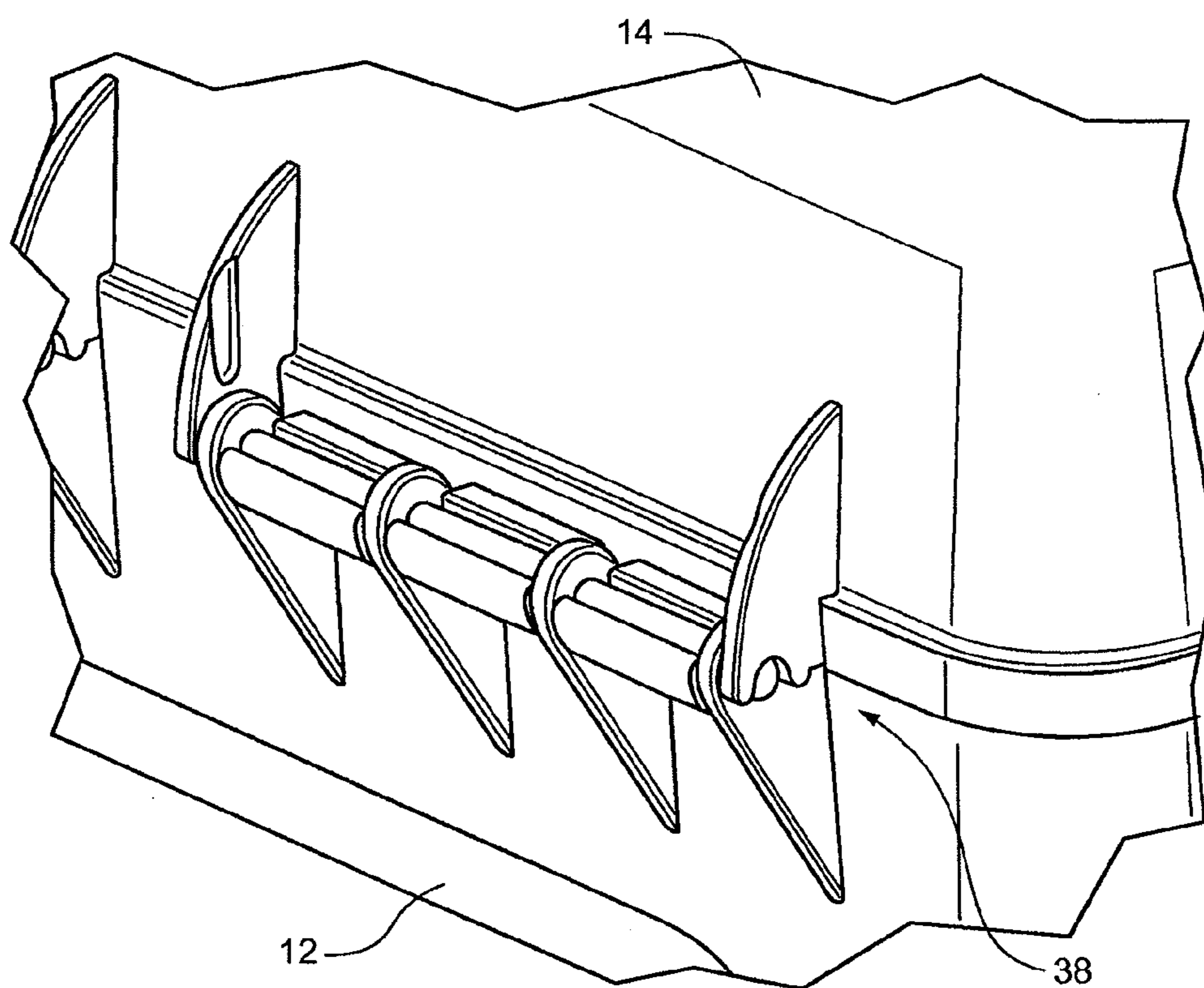


Fig. 5

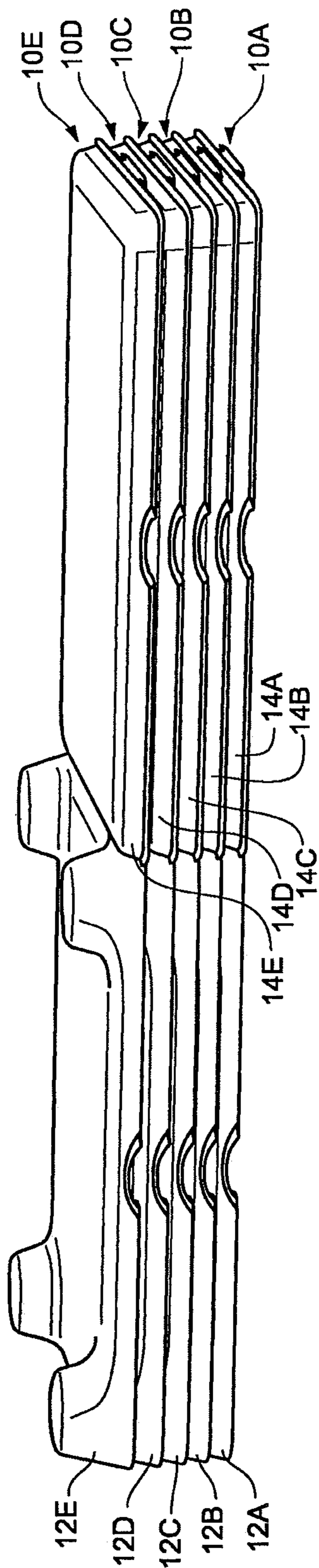


Fig. 6

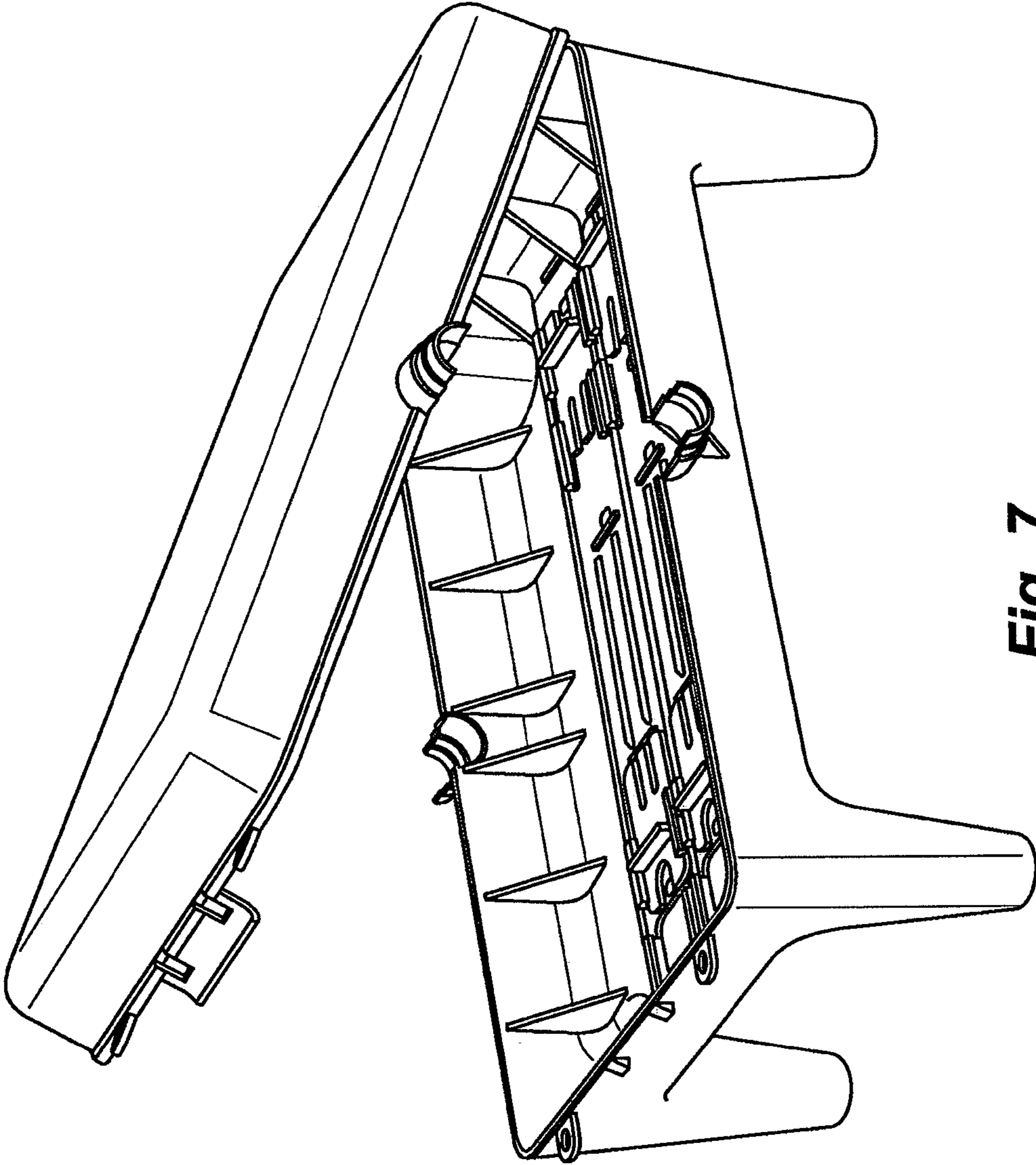


Fig. 7

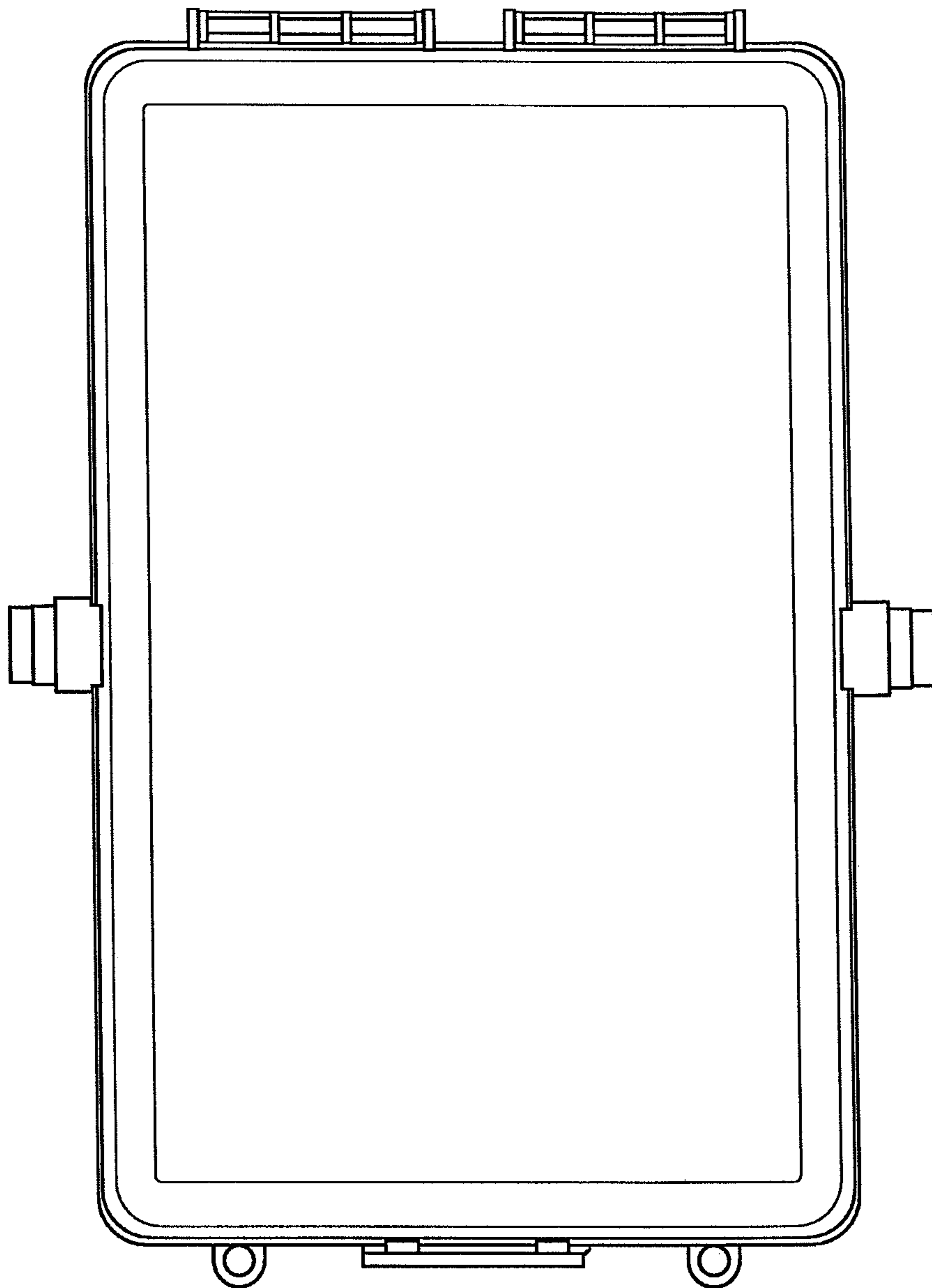


Fig. 8

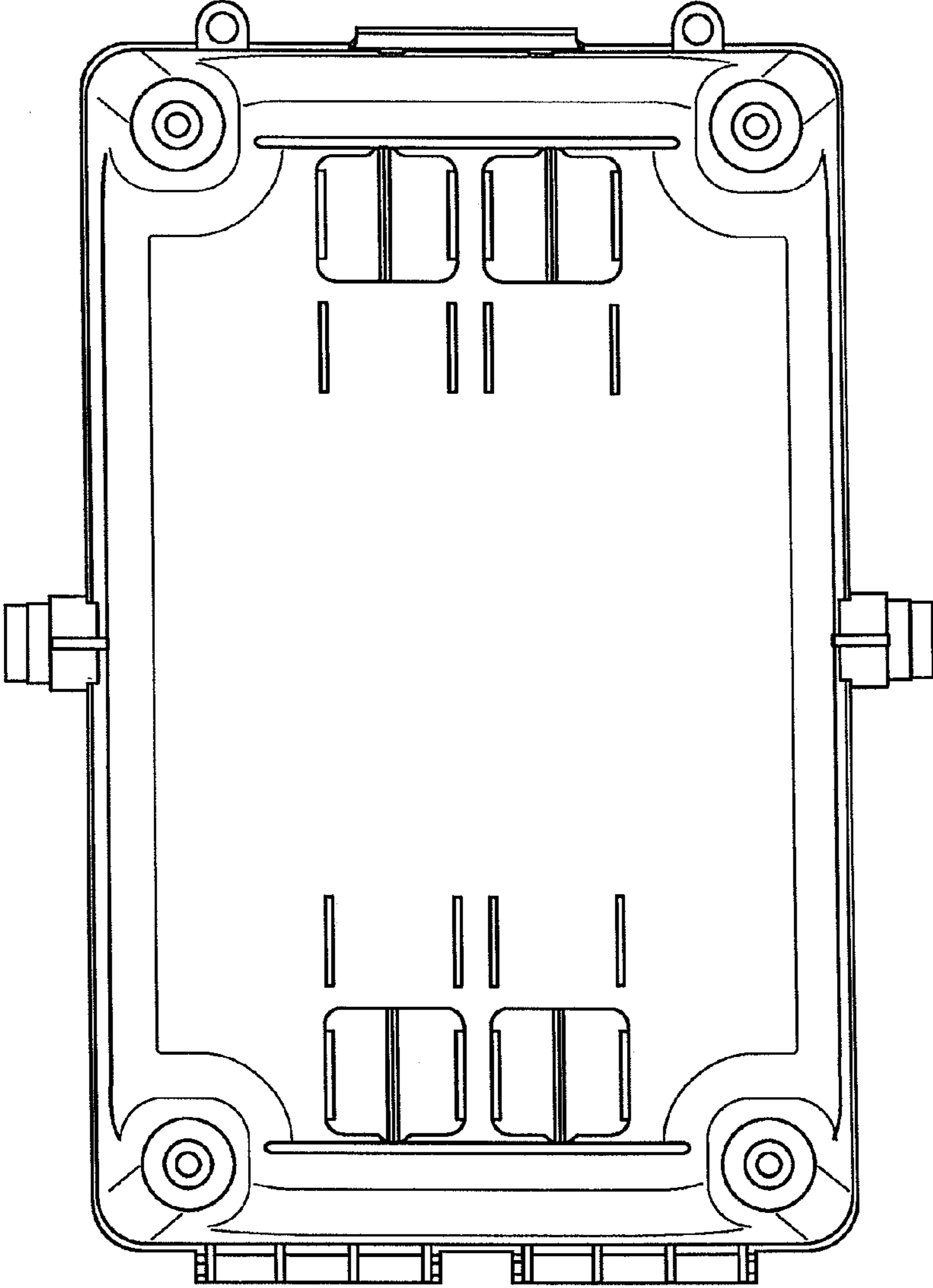


Fig. 9

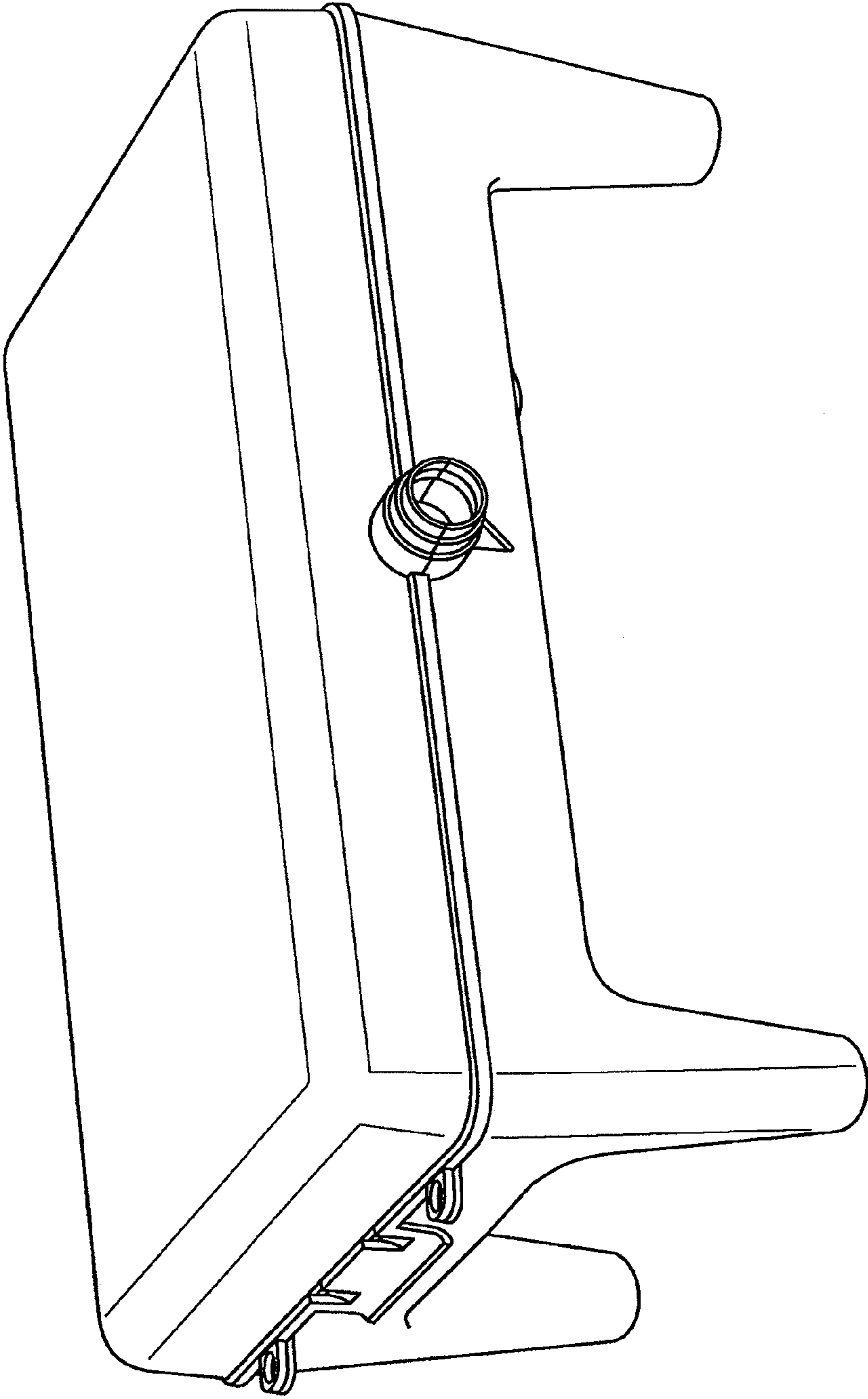


Fig. 10

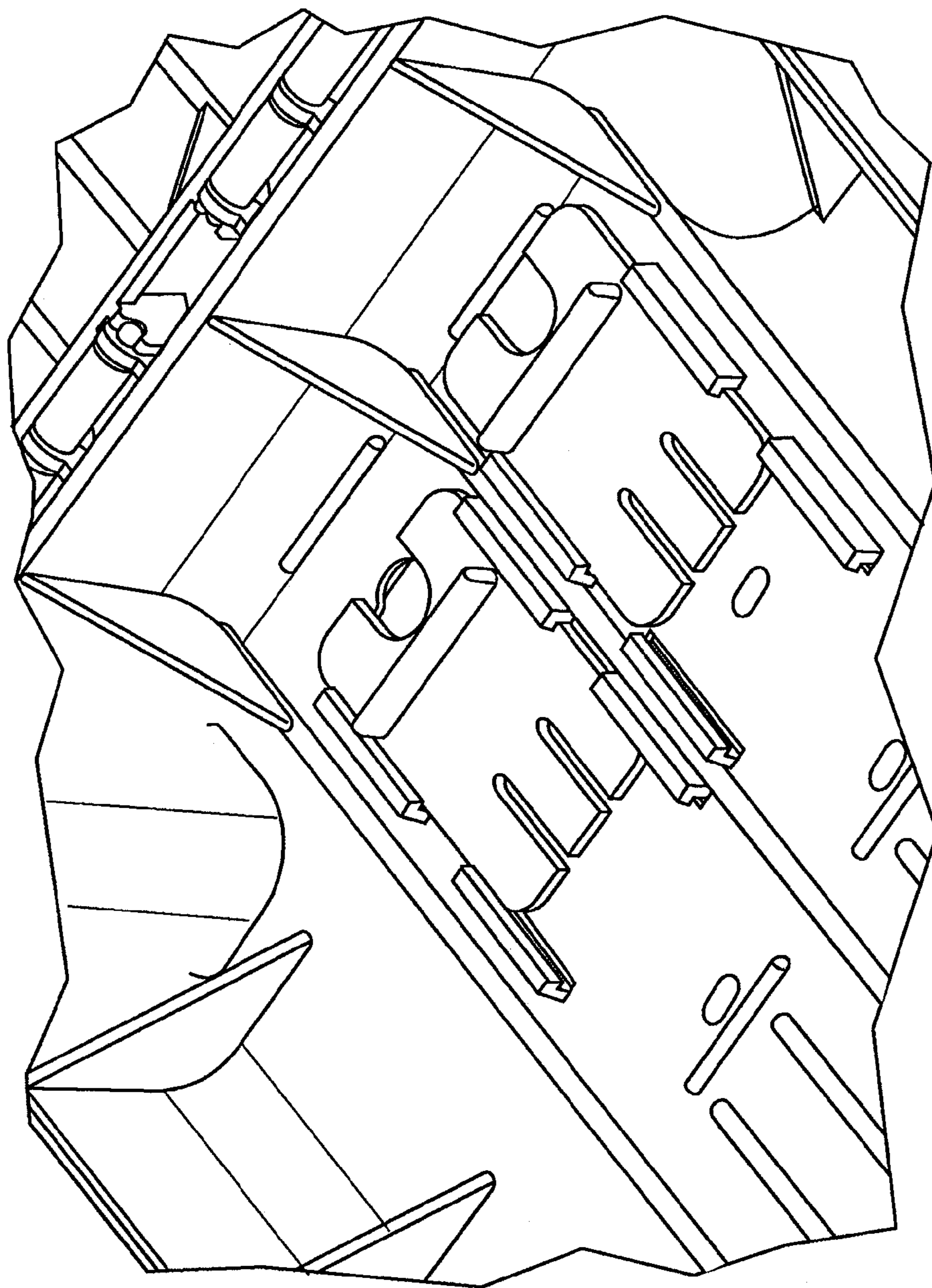


Fig. 11

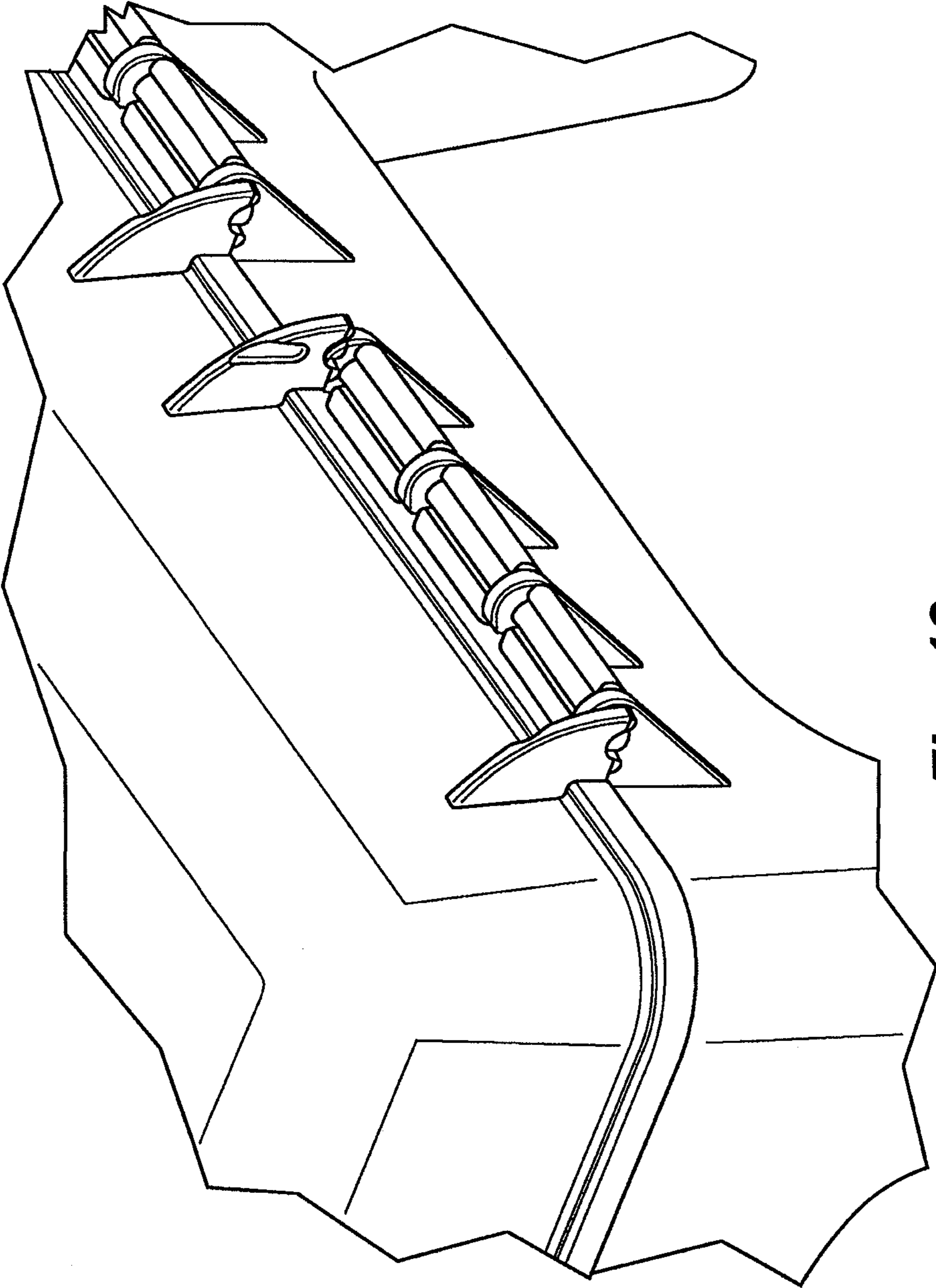


Fig. 12

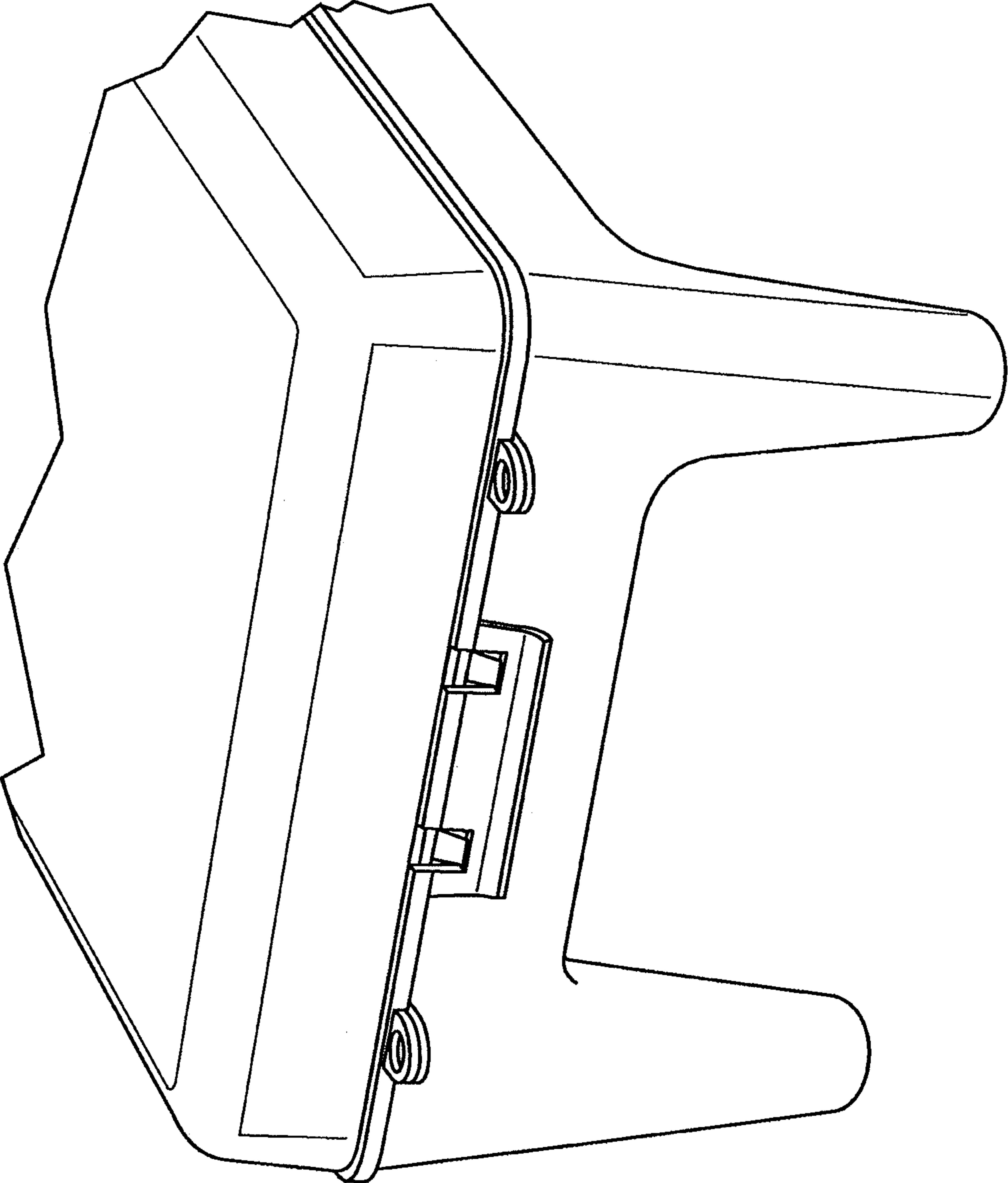


Fig. 13

1

SHELTER FOR PORTABLE ELECTRICAL INLETS/OUTLETS

CROSS REFERENCE TO RELATED APPLICATIONS

The present application is a continuation of U.S. patent application Ser. No. 12/967,729, filed Dec. 14, 2010 now U.S. Pat. No. 8,476,540, which application is incorporated herein by reference.

TECHNICAL FIELD

This disclosure relates to electrical connectors and, more particularly, to shelters for electrical connectors.

BACKGROUND

Portable electrical inlets/outlets (“PEIO”) are used in many settings in which access to electricity must be provided on a temporary basis. Examples of such settings include trade shows, concerts, and other similar events. During operation, a PEIO may supply electrical power from a readily available power source, such as a permanently mounted wall socket or a portable power generator, to one or more pieces of electrical equipment. For example, common types of PEIOs include extensions cords, power strips, and outlet splitters. An example of another type of PEIO used in some applications is a quad box. A quad box generally includes a power inlet cable, a power outlet cable, and one or more connectors for connecting electrical equipment to the quad box. In some applications, the power outlet cable of one quad box may function as the power inlet cable of another quad box to create a distributed power network.

PEIOs are often used in public settings, such as outdoor settings subject to inclement weather. Accordingly, a PEIO may be exposed to standing water, inclement weather, ground debris, kicking, and other deliberate or inadvertent physical contact during operation. Ensuring that a PEIO is kept clean, dry, and free from contact by people or animals may be useful for the safe and intended operation of a PEIO.

Prior attempts at sheltering PEIOs have been made. Examples can be found in the teaching of U.S. Pat. Nos. 6,250,946 and 4,702,541, and U.S. Design Pat. No. 284,465. Such attempts have been inadequate at suitably protecting PEIOs for a variety of reasons. Additionally, PEIOs that operate in an outdoor environment are often wrapped in a plastic bag (e.g., a garbage bag) that is taped in an attempt to protect the PEIOs from unwanted outdoor elements. This method of protection is not particularly effective nor is it especially aesthetically pleasing in a public setting.

SUMMARY

The disclosure is directed toward shelters for protecting PEIOs from unwanted elements such as, e.g., moisture, debris, and contact by people or animals. In some examples, the shelters protect a PEIO by physically encasing the PEIO in a material resistant to physical and environmental elements. In some additional examples, the shelters include legs, a stand, or other features that elevate the shelter (and hence a PEIO positioned in the shelter) above a surface on which the PEIO is set. These elevating features can protect the PEIO from water should water accumulate on the surface on which the shelter is set. In the event that water enters a shelter, the shelter may include features to segregate the PEIO from water that accumulated inside the shelter. For example, the shelter

2

may include features that elevate the PEIO above a floor of the shelter so that water passes around or under the PEIO without substantially contacting the water. As another example, the shelter may include a drain hole to drain accumulated water out of the shelter. The shelter may include additional or different features, as described herein.

In accordance with one example described herein, a shelter for protecting a PEIO from unwanted elements, where the PEIO includes a PEIO body, first and second PEIO cables, and at least two PEIO-component connectors is described. The shelter includes a base that includes a platform to support the PEIO body and at least one sidewall. The platform includes a main area and a raised rib structure configured to segregate the PEIO body from water that may accumulate in the main area. The at least one sidewall extends substantially around at least a portion of a perimeter of the platform. The shelter also includes a cover that is configured to mate with the base to substantially enclose the platform. According to the example, the shelter defines at least two PEIO-component-connector-cable holes configured to permit component cables to extend from an exterior of the shelter to the at least two PEIO-component connectors within the shelter. The shelter also defines a first PEIO-cable hole and a second PEIO-cable hole, the first and second PEIO-cable holes being configured to permit the first and second PEIO cables to extend from the PEIO body within the shelter to an exterior of the shelter.

In another example, a system includes a PEIO, a shelter, and a component cable. The PEIO includes a PEIO body, a first PEIO cable, a second PEIO cable, and at least two PEIO-component connectors. The shelter includes a base that includes a platform to support the PEIO body and at least one sidewall. The platform includes a main area and a raised rib structure that is configured to segregate the PEIO body from water that may accumulate in the main area. The at least one sidewall extends substantially around at least a portion of a perimeter of the platform. The shelter also includes a cover configured to mate with the base to substantially enclose the platform. The shelter defines a first PEIO-cable hole, a second PEIO-cable hole, and at least two PEIO-component-connector-cable holes. According to the example, the PEIO is positioned such that the PEIO body is adjacent the raised rib structure of the shelter, the first PEIO cable extends from the PEIO body through the first PEIO-cable hole to an exterior of the shelter, the second PEIO cable extends from the PEIO body through the second PEIO-cable hole to the exterior of the shelter, and the component cable extends from one of the at least two PEIO-component connectors through one of the at least two PEIO-component-connector-cable holes to the exterior of the shelter.

In another example, a method is described that includes providing a shelter that includes a base and a cover. The base includes a platform to support the PEIO body, the platform including a main area and a raised rib structure configured to segregate the PEIO body from water that may accumulate in the main area, and at least one sidewall extending substantially around at least a portion of a perimeter of the platform. The shelter also includes a first PEIO-cable hole, a second PEIO-cable hole, and at least two PEIO-component-connector-cable holes. According to the example, the method includes inserting a PEIO that includes a PEIO body, a first PEIO cable, a second PEIO cable, and at least two PEIO-component connectors into the shelter, and mating the cover of the shelter to the base of the shelter to substantially enclose the PEIO body within the shelter.

The details of one or more examples are set forth in the accompanying drawings and the description below. Other

features, objects, and advantages will be apparent from the description and drawings, and from the claims.

BRIEF DESCRIPTION OF DRAWINGS

The following drawings are illustrative of particular examples of the present disclosure and therefore do not limit the scope of the disclosure. The drawings are not to scale (unless so stated) and are intended for use in conjunction with the explanations in the following detailed description. Examples will hereinafter be described in conjunction with the appended drawings, wherein like numerals denote like elements.

FIG. 1 is a perspective view of an example portable electrical inlet/outlet and an example shelter configured to receive the portable electrical inlet/outlet in accordance with examples of the present disclosure.

FIG. 2 is a perspective view of an example of the shelter of FIG. 1 without the portable electrical inlet/outlet.

FIGS. 3A and 3B are perspective views of different example portions of the example shelter of FIG. 2.

FIGS. 4A and 4B are perspective views of example hinge features that may be used on shelters in accordance with examples of the present disclosure.

FIG. 5 is a perspective view of an example hinge assembled from the example features of FIGS. 4A and 4B.

FIG. 6 is a perspective view of multiple shelters in a stacked arrangement in accordance with examples of the present disclosure.

FIG. 7 is perspective view of an example of the shelter of FIG. 1 without the portable electrical inlet/outlet.

FIG. 8 is a perspective top view of the example shelter of FIG. 7.

FIG. 9 is a perspective bottom view of the example shelter of FIG. 7.

FIG. 10 is a perspective side view of the example shelter of FIG. 7.

FIG. 11 is a perspective view of an example portion of the example shelter of FIG. 7.

FIG. 12 is a perspective view of an example hinge on the example shelter of FIG. 7.

FIG. 13 is another perspective side view of the example shelter of FIG. 7.

DETAILED DESCRIPTION

The following detailed description is exemplary in nature and is not intended to limit the scope, applicability, or configuration of the invention in any way. Rather, the following description provides practical illustrations for implementing exemplary embodiments of the present invention. Examples of constructions, materials, dimensions, and manufacturing processes are provided for selected elements, and all other elements employ that which is known to those of skill in the field of the invention. Those skilled in the art will recognize that many of the examples provided have suitable alternatives that can be utilized.

PEIOs can distribute power from a readily available power source, such as a permanently mounted wall socket or a portable power generator, to one or more pieces of electrical equipment. For example, a PEIO may include a connector for electrically connecting to a power source as well as one or more component connectors (e.g., plug receptacles) to which electrical equipment can be electrically connected. Because a PEIO can be used for power distribution, PEIOs are often used at public events, such as trade shows, concerts, and other similar events. Depending on the type of event, a PEIO may

be used in an outdoor setting. Accordingly, a PEIO may be exposed to standing water, inclement weather, ground debris, kicking, scratching, and other inadvertent physical contact during operation.

This disclosure describes a shelter for a PEIO. The shelter may protect the PEIO from unwanted elements such as, e.g., debris and unintended contact by people or animals. The shelter may also protect the PEIO from moisture that could otherwise create a short circuit. For instance, in one example, the PEIO includes a platform that includes a raised rib structure that is capable of segregating the PEIO from water that may accumulate in a main area of the platform. In another example, the PEIO includes an elevating portion that extends downwardly from a platform and that is capable of elevating the platform from a surface on which the shelter is set. Upon inserting the PEIO into the shelter, the elevating portion can elevate the PEIO above a surface. Should water accumulate on the surface on which the shelter and the PEIO is positioned, the elevating portion may prevent the PEIO from being exposed to water.

In an additional example, the shelter includes a cover that can be mated with a base to substantially enclose a platform that supports the PEIO. Depending on the configuration of the shelter, the shelter may substantially enclose the PEIO within a confined space that is bounded on all sides by the shelter. In such a configuration, the shelter may help protect the PEIO from inadvertent physical contact, such as being kicked, being stepped on, or the like.

Different views of an example shelter will be described in greater detail with reference to FIGS. 2-6. However, an example PEIO and an example shelter will first be described with reference to FIG. 1.

FIG. 1 is conceptual view of an example shelter 10 in accordance with this disclosure. Shelter 10 includes base 12 and cover 14. Base 12 is configured to support PEIO 16. PEIO 16 can be positioned onto base 12, and cover 14 can be positioned over base 12 to substantially encase PEIO 16 within shelter 10. Shelter 10 may help protect PEIO 16 from a variety of unwanted elements including, e.g., unintended contact by people or animals, and inclement weather. For example, as described in greater detail below, shelter 10 may include features that help protect PEIO 16 from moisture that may otherwise short circuit PEIO 16. In one example, shelter 10 includes a rib structure (FIG. 2) that is configured to segregate PEIO 16 from water that may accumulate in a main area of base 12. In another example, PEIO includes an elevating portion (FIGS. 1 and 2) that extends downwardly and that is configured to elevate base 12 from a surface on which shelter 10 is set. Shelter 10 may include additional or different features, as described below.

Shelter 10 is configured to support PEIO 16. In general, PEIO 16 may be any device that includes a power inlet that is configured to electrically connect with a power source, and a power outlet that is configured to electrically connect with an electrical component. In the example of FIG. 1, PEIO 16 is generally illustrated in the style of a quad box. A quad box may be a junction box that electrically connects at least one electrical inlet to a plurality of different electrical outlets (e.g., two, three, four or more electrical outlets). In some examples, a quad box may include a plurality of modular PEIO-component connectors (described in greater detail below), each of which may be replaced, e.g., to repair or reconfigure the quad box.

Because PEIO 16 is generally illustrated in the style of a quad box in FIG. 1, the remainder of the present disclosure generally refers to an example configuration of shelter 10 that is designed to receive a quad box. However, other configura-

tions of shelter 10 are possible in accordance with the present disclosure and it should be appreciated that the disclosure is not limited to any particular type of PEIO. For example, PEIO 16 may be an extension cord, a power strip, or an outlet splitter, each of which can include a power inlet (e.g., male connector) and one or more power outlets (e.g., female connector).

In the example of FIG. 1, which generally depicts a quad box-style PEIO, PEIO 16 includes a PEIO body 18, a first PEIO cable 20, a second PEIO cable 22, and at least one PEIO-component connector 24, which in the example of FIG. 1 is illustrated as four PEIO-component connectors (collectively "connectors 24," only one of which is labeled for clarity). First PEIO cable 20 electrically connects PEIO body 18 to a power source such as, e.g., a permanently mounted wall socket or a portable power generator. First PEIO cable 20 may directly connect PEIO body 18 to a power source (e.g., without any intervening components) or indirectly connect PEIO body 18 to a power source (e.g., through another PEIO body). Second PEIO cable 22 electrically connects PEIO body 18 to another PEIO body (not illustrated) to create an in-line series of PEIO boxes connected to a common power source. Depending on the configuration of PEIO 16, first PEIO cable 20 and second PEIO cable 22 may each be permanently attached to PEIO body 18, or one or both of first PEIO cable 20 and second PEIO cable 22 may be detachable from PEIO body 18. For example, as seen in FIG. 1, first PEIO cable 20 and second PEIO cable 22 may be detachably connected to PEIO body 18 via threaded connectors 26A and 26B, respectively, although any suitable mechanical fixation element (e.g., clasp, bolt, screw) may be used to detachably connect first PEIO cable 20 and second PEIO cable 22 to PEIO body 18. For instance, PEIO body 18 may include male electrical connectors (e.g., two or three-prong electrical connectors) and first PEIO cable 20 and/or second PEIO cable 22 may include corresponding female electrical connectors which can be friction fit over the male connectors of PEIO body 18.

First PEIO cable 20 and second PEIO cable 22 can have any suitable dimensions and can be configured to carry any suitable amount and type of electricity. In different examples, first PEIO cable 20 and second PEIO cable 22 can carry single-phase alternating current (AC), three-phase AC, or direct current (DC). In some examples, first PEIO cable 20 and second PEIO cable 22 are each capable of electrically conveying at least conventional 110 volt/120 volt electricity from a standard wall socket. In some additional examples, first PEIO cable 20 and second PEIO cable 22 are each capable of electrically conveying higher voltages such as, e.g., 220 volt single-phase AC current, or 208 volt three-phase current. In yet additional examples, first PEIO cable 20 and second PEIO cable 22 are each configured to electrically convey less than or equal to approximately 600 volts.

PEIO 16 also includes PEIO-component connectors 24. Each component connector of PEIO-component connectors 24 is capable of electrically connecting to a component that operates on electrical energy. For instance, in the example of FIG. 1, each component connector of PEIO-component connectors 24 is a port defined by PEIO body 18 (e.g., a female connector) that is configured to receive a corresponding plug 28 (e.g., male connector) disposed at a distal end of a component cable 30. In some examples, each component connector of PEIO-component connectors 24 may be designed to receive a multi-prong plug such as, e.g., a two or three-prong electrical plug found on some standard extension cords, or a four or five-prong electrical plug found in some commercial applications. Each component connector of PEIO-component connectors 24 may be the same as each other component

connector of PEIO-component connectors 24, or at least one component connector of PEIO-component connectors 24 may be different than at least one other component connector of PEIO-component connectors 24. For example, as noted above, PEIO 16 may include modular PEIO-component connectors that can be reconfigured, e.g., by replacing one style of PEIO-component connector with a different style of PEIO-component connector. Other configurations of PEIO-component connectors 24 are contemplated, however, and any suitable PEIO-component connector may be used in accordance with the disclosure. For instance, in another example, each connector of PEIO-component connectors 24 may be a protruding connection extending from PEIO body 18 (e.g., a male connector configured to receive a corresponding female connector).

In the example of FIG. 1, PEIO 16 includes four PEIO-component connectors 24. Specifically, PEIO 16 includes two, outwardly-facing, side-by-side PEIO-component connectors arranged on one side of PEIO body 18 and two different, outwardly-facing, side-by-side PEIO component connectors arranged on an opposing side of PEIO body 18. As a result, PEIO 16 provides two sets of oppositely facing PEIO-component connectors. The number, type, and arrangement of PEIO-component connectors 24 may vary, e.g., based on the type of electrical components that PEIO 16 is intended to supply power for. For example, PEIO 16 may include fewer PEIO-component connectors (e.g., one or two), more PEIO-component connectors (e.g., five or more), or a different physical arrangement of PEIO-component connectors than illustrated in FIG. 1.

As seen in the example FIG. 1, in some applications, each PEIO-component connector or each set of PEIO-component connectors of PEIO 16 may include a cover 32 that rotates relative to PEIO body 18. Such cover 32 may protect each PEIO-component connector from dirt, debris, or the like when plug 28 is not inserted into the component connector.

Each PEIO-component connector of PEIO 16 may be electrically connected to a component cable, such as component cable 30. In general, component cable 30 is an electrically conductive cable that includes an electrically insulative exterior. Depending on the configuration of PEIO 16, component cable 30 may be a standard extension cord that plugs in to PEIO body 18 at one of PEIO-component connectors 24 and that extends to a component that operates on electrical energy, or component cable 30 may be non-standard cable that is capable of conducting electrical energy.

In operation, PEIO 16 can distribute power from a power supply to one or more electrically connected components. In one example, power enters PEIO body 18 via first PEIO cable 20 and is split between each PEIO-component connectors of PEIO-component connectors 24 and second PEIO cable 22. In such an example, PEIO body 18 may house various hardware to, e.g., split, step-up, and/or step-down the electricity entering PEIO body 18. In another example, first PEIO cable 20 encases electrically isolated wires that are separately electrically connected to each of PEIO-component connectors 24 and second PEIO cable 22. PEIO 16 may have other configurations as well.

To help protect PEIO 16 from unwanted elements, PEIO 16 may be positioned in shelter 10 in accordance with this disclosure. Shelter 10 can assume different configurations; however, in the example of FIG. 1, shelter 10 includes base 12 and cover 14. Base 12 includes platform 34 and sidewall 36. Platform 34 provides physical support for PEIO body 18 when PEIO 16 is inserted into shelter 10. Sidewall 36 extends substantially around the perimeter of platform 34 to define a cavity that is configured to receive PEIO 16. Cover 14 is

configured to mate with base **12** to substantially enclose platform **34**. Specifically, in the example of FIG. **1**, cover **14** is pivotally mounted to base **12** via hinge **38** and is configured to mate with an upper surface of sidewall **36**. Although in other examples, cover **14** may not be affixed to base **12** (e.g., via hinge **38**) but can instead be simply placed on top of base **12**. In FIG. **1**, PEIO **16** can be inserted into base **12**, and cover **14** can close over PEIO body **18** to help protect PEIO body **18** within a bounded cavity defined by platform **34**, sidewall **36**, and cover **14**. By positioning PEIO body **18** between base **12** and cover **14**, shelter **10** may provide protection to substantially the entire PEIO body, e.g., to prevent damage from dropping, scratches, or other physical abuse. Further, as will be described in greater detail with respect to FIG. **2**, shelter **10** may include various features to help prevent PEIO body **18** from being exposed to moisture during operation.

As shown in FIG. **1**, shelter **10** receives PEIO **16** by positioning PEIO body **18** on platform **34**. Platform **34** physically supports PEIO body **18** within shelter **10**. Platform **34** may define any suitable size and shape, and the size and shape of platform **34** may vary, e.g., based on the size and shape of PEIO body **18**. For example, platform **34** may define a planar surface or a non-planar surface, as described in greater detail below with respect to FIG. **2**. In some examples, PEIO **16** mechanically attaches to platform **34**, e.g., by mechanically attaching a bottom surface of PEIO body **18** to platform **34**. For instance, a mechanical fixation element such as, e.g., bolts, screws, adhesive, or the like may be used to mechanically attach PEIO **16** to platform **34**. In other examples, PEIO **16** is supported on platform **34** without being mechanically affixed to platform **34**. For instance, in the example shown in FIG. **1**, PEIO **16** is positioned on platform **34** and cover **14** may rotate closed over PEIO **16** to friction fit PEIO **16** between base **12** and cover **14**. Such an arrangement may prevent PEIO **16** from moving out of alignment with base **12** after PEIO **16** is positioned within shelter **10**.

In the example of FIG. **1**, base **12** includes at least one sidewall **36**, which is illustrated as four interconnected sidewalls that surround a substantially rectangular-shaped platform **34**. Sidewall **36** extends upwardly (i.e., in the Z-direction indicated on FIG. **1**) from platform **34**. Sidewall **36** may help protect the sides of PEIO body **18** from unintended contact and may also define a surface that can mate with cover **14**. In some examples, as illustrated in FIG. **1**, sidewall **36** extends around substantially the entire perimeter of platform **34** (i.e., in the X-Y plane indicated on FIG. **1**). In other examples, sidewall **36** extends around less than the entire perimeter of platform **34**. For example, base **12** may include a plurality of discrete sidewall segments that are physically separated from one another around platform **34**. In yet other examples, base **12** may not include sidewall **36**. In such an example, PEIO **16** may be positioned on platform **34** and cover **14** may be configured (e.g., sized and shaped) with a cavity that may be arranged over PEIO **16** such that cover **14** mates with base **12** around a perimeter of platform **34**.

While base **12** is illustrated as defining a substantially rectangular shape, in other examples base **12** can define other shapes. Base **12** can define any polygonal (e.g., square, hexagonal) or arcuate (e.g., circular, elliptical) shape, or even combinations of polygonal and arcuate shapes. The specific shape of base **12** may vary, e.g., based on the specific shape of PEIO **16**.

In operation, base **12** of shelter **10** may be placed on a surface that is exposed to unwanted elements from above (i.e., in the Z-direction indicated on FIG. **1**) such as, e.g., rain, snow, or inadvertent contact. For this reason, shelter **10** may include a cover that mates with base **12** to help protect PEIO

16 from above. Shelter **10** may include any suitable cover including, e.g., a cover that mates with base **12** such that there is substantially no separation gap between the cover and base **12**. Such a cover may prevent unwanted elements from entering shelter **10** from the sides of the shelter (i.e., in the X-Y plane).

In the example of FIG. **1**, cover **14** includes top surface **40** and at least one cover-sidewall **42**, which is illustrated as four interconnected cover-sidewalls that surround a substantially rectangular-shaped top surface. Cover-sidewall **42** extends downwardly (i.e., in the Z-direction indicated on FIG. **1**) from top surface **40**. Top surface **40** may be planar as illustrated in FIG. **1** or non-planar (e.g., domed, peaked, or the like). A non-planar top surface **40** may help repel unwanted elements from top surface **40** and may help prevent water or debris from collecting on top surface **40**.

As with sidewall **36** of base **12**, cover-sidewall **42** may help protect the sides of PEIO body **18** from unintended contact when PEIO **16** is inserted into shelter **10**. In some examples, as illustrated in FIG. **1**, cover-sidewall **42** extends around substantially the entire perimeter of top surface **40** (i.e., in the X-Y plane indicated on FIG. **1**). Cover **14** may define a size and shape that substantially corresponds to a size and shape of base **12**. In such an example, cover **14** may mate with base **12** when an edge of cover-sidewall **42** is positioned adjacent an edge of sidewall **36** of base **12**. In other examples, cover **14** does not include cover-sidewall **42**. For example, cover **14** may instead be a planar sheet. In such an example, top surface **40** of cover **14** may be positioned directly adjacent base **12** to encase PEIO **16** within shelter **10**.

In some examples, cover **14** may include a lip that extends over an edge of base **12** when cover **14** is mated to base **12**. For instance, in the example of FIG. **1**, cover **14** includes lip **17** (also illustrated in FIG. **2**) that extends around a perimeter of cover-sidewall **42** and that projects outward (i.e., in the X and Y-directions) and downward (i.e., in the Z-direction) from a bottom edge of cover-sidewall **42**. When cover **14** is mated with base **12**, lip **17** extends down over sidewall **36** of base **12** so that any rain that falls on cover **14** flows off cover-sidewall **42** without entering shelter **10** at the junction between cover **14** and base **12**.

As discussed above with respect to base **12**, cover **14** can define shapes other than the substantially rectangular shape illustrated in FIG. **1**. For example, cover **14** can define any polygonal (e.g., square, hexagonal) or arcuate (e.g., circular, elliptical) shape, or even combinations of polygonal and arcuate shapes. The specific shape of cover **14** may vary, e.g., based on the specific shape of PEIO **16** and/or the specific shape of base **12**.

The specific dimensions of shelter **10** may vary, e.g., based on the specific dimensions of PEIO **16**. That being said, in some examples, shelter **10** may include cover **14** that is between approximately 25 centimeters and approximately 45 centimeters long (i.e., in the Y-direction), such as approximately 35 centimeters, between approximately 16 centimeters and approximately 36 centimeters wide (i.e., in the X-direction), such as approximately 26.5 centimeters, and between approximately 1 centimeter and approximately 10 centimeters tall (i.e., in the Z-direction), such as approximately 4.5 centimeters. In some examples, shelter **10** may include base **12** that is between approximately 25 centimeters and approximately 45 centimeters long (i.e., in the Y-direction), such as approximately 35 centimeters, between approximately 16 centimeters and approximately 36 centimeters wide (i.e., in the X-direction), such as approximately 26.5 centimeters, and between approximately 1 centimeter and approximately 25 centimeters tall (i.e., in the Z-direction),

such as approximately 11.5 centimeters. These dimensions are merely examples, however, and other dimensions are both contemplated and possible.

Shelter **10** may be subject to different physical abuses during the service life of the shelter. At various times, shelter **10** may be dropped, kicked, scratched, abraded, or otherwise abused. Shelter **10** may protect PEIO **16** from these and other physical abuses. As such, shelter **10** may be constructed of a robust material able to withstand different physical forces without breaking. In various examples, shelter **10** may be constructed of a metal material (e.g., steel, aluminum, copper), a thermoplastic material (e.g., polystyrene, polyethylene, polypropylene, polyvinyl-based materials), a thermosetting plastic material (e.g., Bakelite, epoxy resin-based materials), or the like. In one example, shelter **10** is constructed of polypropylene, which may remain flexible and which may be substantially resistant to UV-radiation in outdoor applications. Other materials for shelter **10** are both possible and contemplated.

As described above, PEIO **16** includes first PEIO cable **20** and second PEIO cable **22**. When PEIO body **18** is positioned within shelter **10**, first PEIO cable **20** and second PEIO cable **22** may electrically connect PEIO body **18** to components located outside of shelter **10**. For this reason, shelter **10** may include one or more apertures that define openings for physically and/or electrically connecting PEIO body **18** to features located outside of shelter **10**. The number and arrangement of the different apertures may vary, e.g., based on the specific configuration of shelter **10** and the specific configuration of PEIO **16**. However, with respect to the example of FIG. **1**, shelter **10** defines a first PEIO-cable hole **44A** and a second PEIO-cable hole **44B** (which in FIG. **1** are denoted by labeled double-headed arrows, indicating that first PEIO-cable hole **44A** and second PEIO-cable hole **44B** are defined when cover **14** is mated to base **12**). First PEIO-cable hole **44A** is configured (e.g., sized and shaped) to permit first PEIO cable **20** to extend from PEIO body **18** to an exterior of shelter **10**, while second PEIO-cable hole **44B** is configured (e.g., sized and shaped) to permit second PEIO cable **22** to extend from PEIO body **18** to an exterior of shelter **10**.

First PEIO-cable hole **44A** and second PEIO-cable hole **44B** can be arranged at any suitable location on shelter **10**. In different examples, first PEIO-cable hole **44A** and/or second PEIO-cable hole **44B** may be defined entirely by base **12** of shelter **10**, entirely by cover **14** of shelter **10**, or in yet another location of shelter **10**. For instance, in the example of FIG. **1**, first PEIO-cable hole **44A** and second PEIO-cable hole **44B** are located at an interface between base **12** and cover **14**. Specifically, base **12** defines a first base-PEIO-cable partial-hole **46A** and a second base-PEIO-cable partial-hole **46B**, which are lesser portions of first PEIO-cable hole **44A** and second PEIO-cable hole **44B**, respectively. Cover **14** defines a first cover-PEIO-cable partial-hole **48A** and a second cover-PEIO-cable partial hole **48B** that correspond to first base-PEIO-cable partial-hole **46A** and second base-PEIO-cable partial-hole **46B**, respectively. First cover-PEIO-cable partial-hole **48A** and second cover-PEIO-cable partial hole **48B** are lesser portions of first PEIO-cable hole **44A** and second PEIO-cable hole **44B**, respectively. When cover **14** is mated with base **12** (e.g., brought into adjacent alignment) first base-PEIO-cable partial hole **46A** aligns with first cover-PEIO-cable partial hole **48A** to create first PEIO-cable hole **44A**, while second base-PEIO-cable partial hole **46B** aligns with second cover-PEIO-cable partial hole **48B** to create second PEIO-cable hole **44B**. With this arrangement, first PEIO cable **20** and second PEIO cable **22** can extend from PEIO body **18** to an exterior of shelter **10** through first PEIO-cable

holes **44A** and **44B**, respectively. Moreover, first PEIO cable **20** and second PEIO cable **22** may be friction fit between base **12** and cover **14** in such an arrangement, which may prevent PEIO **16** from moving out of alignment with respect to base **12** after PEIO **16** is positioned within shelter **10**.

Shelter **10** can define a first PEIO-cable hole **44A** and a second PEIO-cable hole **44B** of any suitable size and shape. In some examples, as described in greater detail with reference to FIGS. **3A** and **3B**, shelter **10** can define a first PEIO-cable hole **44A** and/or a second PEIO-cable hole **44B** that is adjustable to accommodate PEIOs with different size cables. An adjustable cable hole may provide a tighter fit between a cable and shelter **10** than a non-adjustable cable hole, which may reduce the ingress of unwanted elements into shelter **10** through the cable hole.

In some examples, shelter **10** includes a support surface adjacent to first PEIO-cable hole **44A** and/or second PEIO-cable hole **44B** that functions to support first PEIO cable **20** and/or second PEIO cable **22**, respectively. FIG. **1** illustrates an example of shelter **10** that includes example support surfaces.

In the example of FIG. **1**, shelter **10** includes base-PEIO-cable partial-support **50A** and **50B** (collectively “supports **50**”) that extend substantially orthogonally from sidewall **36** of base **12**. Base-PEIO-cable partial-supports **50** are aligned with first and second base-PEIO-cable partial-holes **46A** and **46B**, respectively. First PEIO cable **20** and second PEIO cable **22** can extend through first and second base-PEIO-cable partial-holes **46A** and **46B**, respectively, and be supported by base-PEIO-cable partial-supports **50** in the region of base **12** adjacent sidewall **36**.

When configured as shown in FIG. **1**, cover **14** includes complementary cover-PEIO-cable partial-supports **151A** and **151B** (collectively “supports **151**”) that extends substantially orthogonally from cover-sidewall **42** and that are aligned with first and second cover-PEIO-cable partial-holes **48A** and **48B**, respectively. When cover **14** is mated with base **12**, cover-PEIO-cable partial-supports **151A** and **151B** align with base-PEIO-cable partial-supports **50A** and **50B**. As a result, when first PEIO cable **20** is extended through first PEIO-cable hole **44A** and second PEIO cable **22** is arranged through second PEIO-cable hole **44B**, first and second PEIO cables **20** and **22** are supported in the negative Z-direction (i.e., downwardly) by base-PEIO-cable partial-support **50A** and **50B** and in the positive Z-direction (i.e., upwardly) by a cover-PEIO-cable partial-supports **151A** and **151B**. Such support may help reduce or eliminate cable chafing or cracking in the region adjacent cable connectors **26A** and **26B** over the service life of PEIO **16**.

While shelter **10** in the example of FIG. **1** includes support surfaces on both base **12** and cover **14**, it should be appreciated that in other examples according to the disclosure, a shelter may include support surfaces that extend only from base **12** or extend only from cover **14**. The arrangement and location of support surfaces in these examples may be dictated by the arrangement and location of PEIO-cable holes **44A** and **44B** on the shelter.

Shelter **10** may include a variety of different features that may help protect PEIO **16** from unwanted elements. For instance, in some applications, PEIO **16** may be used in an outdoor environment subject to inclement weather such as rain and snow. When PEIO **16** is exposed to moisture from inclement weather, the moisture may cause short circuits that reduce the electrical integrity of PEIO **16**. To reduce or eliminate water accumulation adjacent PEIO **16** in these applications, shelter **10** may include moisture management features.

11

FIG. 2 is a conceptual illustration of one example of shelter 10, generally described above with respect to FIG. 1, which includes example moisture management features. In FIG. 2, like reference numerals between FIGS. 1 and 2 refer to like elements. Further, for ease of description, PEIO 16 is not illustrated within shelter 10 in the example of FIG. 2.

In the example of FIG. 2, platform 34 of shelter 10 includes a main area 37 and a raised rib structure 39. Raised rib structure 39 may segregate PEIO 16 (FIG. 1) from moisture that may accumulate on main area 37. Raised rib structure 39 extends upwardly (i.e., in the Z-direction) from main area 37 of platform 34. Accordingly, PEIO body 18 (FIG. 1) can be positioned on raised rib structure to elevate PEIO body 18 above main area 37 of platform 34. Should water accumulate on main area 37 of shelter 10, raised rib structure 39 can segregate PEIO body 18 from the accumulated water, which may reduce or eliminate the possibility of a short circuit between PEIO body 18 and component cable 30.

Depending on the configuration of shelter 10, raised rib structure 39 may be a single rib (i.e., a single elevating feature that functions to elevate PEIO body 18 above main area 37), or a plurality of rib features. For instance, in the example of FIG. 2, raised rib structure 39 includes six ribs that are arranged in parallel alignment and that are substantially equally spaced from one another. It should be appreciated, however, that the disclosure is not limited in this respect, and other configurations of rib structure 39 are both possible and contemplated.

Independent of the specific configuration of rib structure 39, in some examples, rib structure 39 may elevate PEIO body 18 at least 2 millimeters above main area 37. When PEIO body 18 is elevated at least 2 millimeters above main area 37, the likelihood that PEIO body 18 will be immersed in water within shelter 10 may be reduced or eliminated. It should be appreciated though that rib structure 39 may elevate PEIO body 18 to heights other than 2 millimeters, and the disclosure is not limited to a rib structure that elevates a PEIO body to any particular height.

PEIO 16 may be placed on a surface that is subject to occasional standing water such as, e.g., a golf course, an outdoor concert venue, or the like. In these applications, the electrical integrity of PEIO 16 may be compromised if PEIO 16 is immersed in the standing water. For this reason, shelter 10 may include at least one elevating portion that can elevate PEIO 16 above the surface on which the shelter is placed. Should water thereafter accumulate on the surface, the elevating portion of the shelter may prevent PEIO 16 from being immersed in water.

In the example of FIG. 2, shelter 10 includes four legs 41A-41C (only three of which are labeled for clarity and which are collectively referred to as "legs 41") that function to elevate shelter 10 above a surface on which the shelter 10 is placed. Legs 41 extend downwardly (i.e., in the negative Z-direction) from platform 34 of base 12, and each leg of legs 41 is arranged adjacent a different corner of platform 34. Each leg of legs 41 is substantially the same height (i.e., in the Z-direction) such that legs 41 elevate platform 34 and maintain platform 34 in a generally parallel relationship with a surface on which shelter 10 is set.

While shelter 10 is illustrated as including four elevating legs 41, in different examples, shelter 10 may include more elevating portions (e.g., five or more legs), fewer elevating portions (e.g., three or less legs), or a different arrangement of elevating portions. For instance, in one example, shelter 10 may include three legs arranged in a tripod arrangement. In another example, shelter 10 may two legs arranged on opposing side of base 12. In yet another example, shelter 10 may

12

include a single elevating portion centered about raised rib structure 39 and extending downwardly from platform 34. It should be appreciated that the foregoing description of elevating portions are merely examples, and the disclosure is not limited to a shelter that includes any particular number or arrangement of elevating portions. Rather, any suitable feature or combination of features that function to elevate shelter 10 above a surface on which the shelter set may be used in accordance with the disclosure.

In some examples, the at least one elevating portion of shelter 10 may be configured to support a threshold amount of weight. For example, in different configurations, the at least one elevating portion of shelter 10 may support at least 50 pounds such as, e.g., at least 100 pounds, or at least 200 pounds. In the event that someone would stand on top of shelter 10 (e.g., when cover 14 is mated with base 12), the shelter may support that person's weight without breaking.

Independent of the specific arrangement of the at least one elevating portion of shelter 10, in some examples, the at least one elevating portion of shelter 10 may elevate platform 34 at least 3 inches above a surface on which the shelter is set. When platform 34 and, correspondingly PEIO body 18, is elevated at least 3 inches above a surface on which the shelter is set, the likelihood that PEIO body 18 will be immersed in standing water on the surface may be reduced or eliminated. For example, depending on the specific configuration of shelter 10 and PEIO 16, when platform 34 is elevated at least 3 inches above a surface on which the shelter is set, electrical connects to PEIO body 18 may be elevated at least 4 inches above a surface on which the shelter is set, further increasing the separation distance between the electrical contacts and any surface water that may accumulate.

In different examples, the at least one elevating portion of shelter 10 may elevate platform 34 more than 3 inches above a surface on which the shelter is set (e.g., at least 6 inches, at least 8 inches), or less than 3 inches above a surface on which the shelter is set (e.g., approximately 1 inch, approximately 2 inches), and the disclosure is not limited in this respect. For instance, in some examples, shelter 10 includes an adjustable at least one elevating portion (e.g., adjustable legs) that can be extended to a plurality of different heights depending on the specific application for shelter 10. Alternatively, shelter 10 can be set on a separate base if additional height is desired beyond the height of a fixed-height elevating portion.

When shelter 10 is configured with sidewall 36 as shown in FIG. 2, water may accumulate within base 12. To remove water from base 12, shelter 10 may include a drain aperture that allows accumulated water to flow out of base 12. The drain aperture may be separate from any cable apertures defined in shelter 10 so that water does not flow along the length of an electrical cable when flowing out of base 12.

In some examples, shelter 10 may include a drain aperture that is defined in sidewall 36 of base 12. In other examples, shelter 10 may include a drain aperture defined in platform 34 of base 12. For example, as illustrated in FIG. 2, each leg of legs 41 defines a lumen that is connected to a drain aperture 43 (only one of which is labeled for clarity) extending through platform 34. Should any water accumulate on platform 34, the water may flow through drain aperture 43 (which is also identified on FIG. 1 for ease of reference), though a lumen defined by one of legs 41, and out the bottom of the leg and onto the surface on which shelter 10 is set. In this manner, water may exit shelter 10 without substantially contacting electrical connections between PEIO body 18 (FIG. 1) and one or more of the cables electrically connected to PEIO body 18.

In some examples, at least a portion of platform 34 may be sloped toward drain aperture 43 to preferentially direct any water that may accumulate on platform 34 out of shelter 10. For example, platform 34 may be domed or peaked adjacent raised rib structure 39 so that when PEIO body 18 is placed on raised rib structure 39, water preferentially flows away from raised rib structure 39 toward drain aperture 43. In another example, as illustrated in FIG. 2, a region 45 of platform 34 that is directly adjacent to drain aperture 43 may be sloped toward drain aperture 43. In still other examples, platform 34 can be sloped in a different configuration than as illustrated in FIG. 2. The different configurations may be dictated by the shape of shelter 10, the configuration of an elevating portion of shelter 10, or different considerations including, e.g., the shape of PEIO body 18, which may be positioned in shelter 10.

As described above with respect to FIG. 1, shelter 10 may include a variety of different apertures that define openings for physically and/or electrically connecting PEIO body 18 to features located outside of shelter 10. Further, PEIO 16 in the example of FIG. 1 includes PEIO-component connectors 24 that are configured to be electrically connected to an electrical component located outside of shelter 10. For this reason, shelter 10 may include one or more apertures that define openings to extend component cable 30 from PEIO-component connectors 24 disposed within an interior of shelter 10 to an exterior of shelter 10.

In the example of FIG. 2, shelter 10 defines at least one PEIO-component-connector-cable hole, which in FIG. 2 is illustrated as four PEIO-component-connector-cable holes 80A-D (collectively “PEIO-component-connector-cable holes 80”). The PEIO-component-connector-cable holes 80 define openings that allow component cables to extend between a PEIO body positioned within shelter 10 and an electrical component located outside of shelter 10. For instance, during setup, PEIO body 18 (FIG. 1) may be positioned on platform 34. Component cable 30 can be introduced (e.g., from either the bottom or top of base 12) through one of PEIO-component-connector-cable holes 80 and connected to one of PEIO-component connectors 24. When arranged according to this example process, component cable 30 will be connected to one of PEIO-component connectors 24 and will extend through one of PEIO-component-connector-cable holes 80 to an exterior of shelter 10.

The number, size, and arrangement of PEIO-component-connector-cable holes 80 may vary, e.g., based on the specific configuration of shelter 10 and the specific configuration of PEIO 16. With respect to the example of FIG. 2, however, PEIO-component-connector-cable holes 80 are defined in platform 34 of base 12. Specifically, two PEIO-component-connector-cable holes 80A and 80B are defined in a first portion 82 of platform 34, and two different PEIO-component-connector-cable holes 80C and 80D are defined in a second portion 84 of platform 34, where the first portion 82 of platform 34 is separated from second portion 84 of platform 34 by raised rib structure 39. Such a configuration may allow component cables to be connected to PEIO-component connectors 24 on PEIO 16 (FIG. 1), which includes two, outwardly-facing, side-by-side PEIO-component connectors arranged on one side of PEIO body 18 and two different, outwardly-facing, side-by-side PEIO component connectors arranged on an opposing side of PEIO body 18. That being said, in different examples, PEIO-component-connector-cable holes 80 may be defined within sidewall 36 of base 12, within cover 14 of shelter 10, or yet another location of shelter 10.

Shelter 10 may include one or more features to adjust the dimensions of PEIO-component-connector-cable holes 80 (e.g., to increase or decrease the diameter of the holes). In some examples, each PEIO-component-connector-cable hole 80 may be adjusted after inserting a component cable through the hole until there is substantially no separation gap between the component cable and the PEIO-component-connector-cable hole. A smaller separation gap between a PEIO-component-connector-cable hole and a component cable may decrease the likelihood that unwanted elements (e.g., rain, snow) may enter an interior of shelter 10 through the separation gap.

In the example of FIG. 2, each PEIO-component-connector-cable hole is covered by a PEIO-component-connector-cable-hole cover 86 (only one of which is labeled for clarity). In use, PEIO-component-connector-cable-hole cover 86 can move between a first position in which a PEIO-component-connector-cable hole is open and a second position in which the PEIO-component-connector-cable hole is substantially closed. For example, with reference to FIG. 2, an operator can slide PEIO-component-connector-cable-hole cover 86 in the X-Y plane to an open position, extend component cable 30 (FIG. 1) from an interior of shelter 10 to an exterior of shelter 10, and slide PEIO-component-connector-cable-hole cover 86 in an opposing direction in the X-Y plane to a substantially closed position.

In a different example, PEIO-component-connector-cable-hole cover 86 may be hingedly mounted to base 12 instead of mounted to slide between an open and a closed position. A hingedly mounted PEIO-component-connector-cable-hole cover may rotate between an open position and a substantially closed position (e.g., in the Y-Z plane) to allow component cable 30 to be extended between an interior of shelter 10 and an exterior of shelter 10. Other configurations of PEIO-component-connector-cable-hole cover 86 are possible.

Independent of the specific arrangement of PEIO-component-connector-cable-hole cover 86, PEIO-component-connector-cable-hole cover 86 may define a cutout 88 (FIG. 2) that corresponds to a size and/or shape of component cable 30. Cutout 88 may help prevent component cable 30 from being compressed when PEIO-component-connector-cable-hole cover 86 is moved to a substantially closed position. In some examples, the portion of PEIO-component-connector-cable-hole cover 86 that defines cutout 88 may be positioned over platform 34 when PEIO-component-connector-cable-hole cover 86 is closed and there is no component cable extending through the PEIO-component-connector-cable hole. For example, in FIG. 2, the portion of PEIO-component-connector-cable-hole cover 86 that defines cutout 88 may slide beyond PEIO-component-connector-cable hole 80A (i.e., to the left of the illustration in the Y-direction) when moved in a closed position. This arrangement may prevent water or debris from entering shelter 10 when PEIO-component-connector-cable-hole cover 86 is closed and there is no component cable extending through cutout 88.

Upon placing PEIO body 18 (FIG. 1) on base 12 and positioning cover 14 over base 12, it may be useful to physically connect cover 14 to base 12, e.g., to form an integral assembly that resists detachment except with user assistance. Physically attaching cover 14 to base 12 may prevent PEIO body 18 from inadvertently coming out of shelter 10 during use or transport. For instance, in the example of FIGS. 1 and 2, cover 14 of shelter 10 includes a cover-latch member 51, and base 12 includes a complementary base-latch member 49. As shown, base-latch member 49 is a pair of protrusions that extend outwardly from sidewall 36 of base 12. Also as shown, cover-latch member 51 is a protrusion that extends outwardly

(e.g., in the X-Y plane) from cover-sidewall **42** and that defines a pair of holes that are configured to receive the protrusions defined by base-latch member **49**.

Cover **14** latches to base **12** when cover-latch member **51** is engaged with base-latch member **49** (e.g., when the protrusions of latch member **49** are inserted into the holes of latch member **51**). When engaged, latch members **49** and **51** may prevent cover **14** from detaching from base **12** until, e.g., a user applies sufficient force to overcome the resistance of the latch members. In different examples, different latch members may be used in addition to, or in lieu of, latch members **49** and **51**. In one example, a latch member like cover-latch member **51** is included on the base **12**, and a latch member like base-latch member **49** is included on the cover **14**. Additional examples of latch members may include, but are not limited to, screws, bolts, claps, or the like.

In some situations, it may be useful to lock cover **14** to base **12** in addition to or in lieu of frictionally latching the two components together. Locking cover **14** to base **12** may prevent a passerby from accessing PEIO **16** (FIG. 1) after the PEIO is locked in shelter **10**. In the example of FIG. 2, cover **14** is locked to base **12** on one side by hinge **38**. On the opposing side of hinge **38**, cover **14** includes cover-locking apertures **53A** and **53B**, and base includes base-locking apertures **55A** and **55B**. When cover **14** mates with base **12**, cover-locking apertures **53A** and **53B** align with base-locking apertures **55A** and **55B** to define two locking apertures extending through cover **14** and base **12**. A locking member can be inserted through one or both of the locking apertures to lock cover **14** and base **12** together. Example locking members may include padlocks, zip ties, and the like. In this manner, cover **14** can be locked to base **12**.

As briefly discussed above with respect to FIG. 1, shelter **10** may include an adjustable first PEIO-cable hole **44A** and/or an adjustable second PEIO-cable hole **44B**. In some examples, an adjustable cable hole may be adjusted (e.g., by increasing or decreasing the diameter of the cable hole) until there is substantially no separation gap between a PEIO cable and a PEIO cable hole when a PEIO cable is inserted into shelter **10**. A smaller separation gap between a PEIO cable and a PEIO-cable hole may decrease the likelihood that unwanted elements (e.g., rain, snow) may enter an interior of shelter **10** through the separation gap.

Shelter **10** can include any suitable feature that is capable of adjusting (e.g., increasing or decreasing) the dimensions of first PEIO-cable hole **44A** and/or second PEIO-cable hole **44B**. FIG. 3A shows an example of second base-PEIO-cable partial hole **46B**, which was described above with respect to FIG. 1. In the example of FIG. 3A, base-PEIO-cable partial-support **50B** defines a plurality of different sizes (i.e., diameters) at different distances away from away from sidewall **36** (i.e., in the X-direction). Specifically, base-PEIO-cable partial-support **50B** defines a first portion **54** that extends from directly adjacent sidewall **36** to a first distance **57** away from sidewall **36**. First portion **54** of base-PEIO-cable partial-support **50B** defines a first size. Base-PEIO-cable partial-support **50B** also a second portion **52** that extends from first portion **54**. Second portion **52** of base-PEIO-cable partial-support **50B** defines a second size less than the first size.

Cover-PEIO-cable partial-support **151B** (illustrated on FIG. 1) defines a plurality of different complementary sizes (i.e., diameters) at different distances away from cover-sidewall **42**, such that different sized PEIO-cable openings are defined at different distances away from cover-sidewall **42**. Accordingly, when cover **14** is mated with base **12**, cover-PEIO-cable partial-support **151B** and base-PEIO-cable partial-support **50B** define a first sized opening at a first distance

(i.e., in the X-direction) away from shelter **10** and a second sized opening at a second distance (again, in the X-direction) away from shelter **10**. The first sized opening is larger than the second sized opening.

In examples in which PEIO **16** includes a comparatively small second PEIO cable **22**, the cable can be inserted through the first and second sized openings defined, together, by cover-PEIO-cable partial-support **151B** and base-PEIO-cable partial-support **50B** so that the separation gap between the cable and the openings is defined as the difference between the cross-sectional size (e.g., in the Y-Z plane) of the cable and the cross-sectional size of the smaller second opening. By contrast, in examples in which PEIO **16** includes a comparatively larger second PEIO cable **22**, the portions of cover-PEIO-cable partial-support **151B** and base-PEIO-cable partial-support **50B** that define the second smaller opening can be removed, e.g., by cutting or breaking the portion, so that the cable opening is defined by the larger first sized opening. In this manner, shelter **10** can be configured with an adjustable PEIO-cable hole.

In some examples, cover-PEIO-cable partial-support **151B** and base-PEIO-cable partial-support **50B** may include a weakened portion between first portion **54** and second portion **52** (e.g., at weakened portion at distance **57** on FIG. 3A). A weakened portion may allow the second portion of the PEIO-cable hole to fracture from the first portion (e.g., upon application of hand pressure) without substantially affecting the length or diameter of the first portion.

FIG. 3B shows another example of second PEIO-cable hole **44B** with adjustable dimensions in accordance with the disclosure. In the example of FIG. 3B, base-PEIO-cable partial-support **50B** and cover-PEIO-cable partial-support **151B** define a plurality of different sizes (i.e., diameters) at different distances away from away from sidewall **36** and cover-sidewall **42**, respectively. Specifically, base-PEIO-cable partial-support **50B** and cover-PEIO-cable partial-support **151B** each define a first portion **160** that extends from directly adjacent sidewall **36** and cover-sidewall **42**, a second portion **162** that extends from first portion **160**, and a third portion **164** that extends from second portion **162**. First portion **160** defines a first size, second portion **162** defines a second size less than the first size, and third portion **164** defines a third size less than the second size. In use, a cable can be inserted through the first, second, and third sized openings defined by cover-PEIO-cable partial-support **151B** and base-PEIO-cable partial-support **50B** so that the separation gap between the cable and the openings is defined as the difference between the cross-sectional size of the cable and the cross-sectional size of the smallest (i.e., the third) opening. Alternatively, one or more portion of base-PEIO-cable partial-support **50B** and cover-PEIO-cable partial-support **151B** can be removed to define larger sized cable openings.

As illustrated in FIG. 3B, cover-PEIO-cable partial-support **151B** may include lip **17** (described above with reference to FIG. 1) that extends over base-PEIO-cable partial-support **50B** when cover **14** is mated to base **12**. Lip **17** may prevent water flowing off of cover **14** from entering shelter **10** at the junction between cover **14** and base **12**.

While the forgoing description of FIGS. 3A and 3B of an adjustable PEIO-cable hole was generally described with respect to second PEIO-cable hole **44B**, it should be appreciated that PEIO-cable hole **44A** of shelter **10**, or yet another aperture defined in shelter **10**, may be configured with one or more of the described features.

As previously described, shelter **10** in the example of FIG. 1 includes hinge **38**. Hinge **38** connects base **12** to cover **14** so that cover **14** can pivotally rotate relative to base **12**. FIGS. 4A

and 4B are exploded views of one example type of hinge that shelter 10 may use. In particular, FIG. 4A is an exploded view of an example hinge section 100 affixed to cover-sidewall 42 of cover 14, while FIG. 4B is an exploded view of corresponding example hinge section 102 affixed to sidewall 36 of base 12. As will be described, hinge section 100 of FIG. 4A is configured to receive hinge section 102 of FIG. 4B to create hinge 38. FIG. 5 is a conceptual illustration of hinge 38 after assembly.

When configured as shown in FIG. 4B, hinge section 102 includes at least one support structure, which in the example of FIG. 4B is illustrated as four support structures 104A-104C (collectively “support structures 104”), that connect hinge pin 106 to sidewall 36 of base 12. Support structures 104 permanently affix hinge pin 106 to sidewall 36 and align hinge pin 106 parallel to sidewall 36. Hinge pin 106 defines a first end projection 108 projecting from support structure 104A (i.e., in the X-direction) and a second end projection 110 projection from support structure 104D (i.e., in the X-direction opposite first end projection 108). Hinge pin 106 and first and second end projections 108 and 110 of hinge pin 106 can be inserted into hinge section 100 (FIG. 4A) to assemble hinge 38.

Hinge section 100 (FIG. 4A) defines at least one hinge pin receptacle for receiving hinge pin 106 during assembly, which, in the example configuration of FIG. 4A, is a plurality of hinge pin receptacles. Hinge section 100 includes a first hinge pin receptacle-support structure 112 and a second hinge pin receptacle-support structure 114. First hinge pin receptacle-support structure 112 defines a first projection receptacle opening 116. Second hinge pin receptacle-support structure 114 defines a second projection receptacle opening 118. Hinge section 100 also includes at least a third hinge pin receptacle interposed between first hinge pin receptacle-support structure 112 and second hinge pin receptacle-support structure 114, which in the example of FIG. 4A is illustrated as three additional hinge pin receptacle-support structures 120A-120C (collectively “support structures 120”).

First and second hinge pin receptacle-support structures 112 and 114 extend first and second projection receptacle openings 116 and 118, respectively, away from cover-sidewall 42. Further, first and second hinge pin receptacle-support structures 112 and 114 each orient first and second projection receptacle openings 116 and 118, respectively, in the negative Z-direction indicated on FIG. 4A. First hinge pin receptacle-support structure 112 is configured to receive first end projection 108 of hinge pin 106 (FIG. 4B) during assembly of hinge 38. Second hinge pin receptacle-support structure 114 is configured to receive second end projection 110 of hinge pin 106 (FIG. 4B) during assembly of hinge 38.

Hinge pin receptacle-support structures 120 define receptacle openings that open in the positive Z-direction indicated on FIG. 4A (i.e., in an opposite direction than first and second projection receptacle openings 116 and 118). Hinge pin receptacle-support structures 120 are configured to receive a portion of hinge pin 106 (FIG. 4B) extending between first end projection 108 and second end projection 110 of hinge pin 106 during assembly of hinge 38.

During assembly, hinge section 102 can be inserted in negative Z-direction indicated on FIG. 4A into hinge section 100 to create hinge 38. Specifically, first and second end projections 108 and 110 of hinge pin 106 can be inserted into first and second projection receptacle openings 116 and 118, respectively, while the portion of hinge pin 106 extending between first end projection 108 and second end projection 110 can be inserted into receptacle opening defined by hinge pin receptacle-support structures 120. Because first and sec-

ond projection receptacle openings 116 and 118 open in one direction while receptacle opening defined by hinge pin receptacle-support structures 120 open in an opposite direction, hinge pin 106 can be supported by opposing forces, which may prevent hinge section 100 from separating from hinge section 102.

Unlike hinge assemblies that require separate parts (e.g., a removable hinge pin) or tools to assemble, the example hinge 38 described with respect to FIGS. 4A and 4B may not require separate parts or tools to assemble. Instead, the pin and receptacle features of hinge 38 are permanently affixed to base 12 and cover 14, respectively, and can be inserted into one another without specialized tools. In applications where shelter 10 is assembled in the field, such an example hinge may save time and expense associated with complicated or laborious assembly.

In some examples, hinge 38 may include one or more features to assist assembly. For instance, in the example of FIG. 4A, first and second hinge pin receptacle-support structures 112 and 114 include assembly guides 122A and 122B, respectively. Assembly guides 122A and 122B define corresponding channels that taper (e.g., in the X and/or Y-directions) in the negative Z-direction. First and second end projections 108 and 110 of hinge pin 106 (FIG. 4B) can be inserted into assembly guides 122A and 122B, respectively, during assembly of hinge 38. As first and second end projections 108 and 110 are pressed in the negative Z-direction, the tapering on assembly guides 122A and 122B may cause first and second hinge pin receptacle-support structures 112 and 114 to be displaced in opposing directions (i.e., in opposing X-directions). In this manner, first and second end projections 108 and 110 can be inserted between first and second hinge pin receptacle-support structures 112 and 114 and into first and second projection receptacle openings 116 and 118, respectively.

While hinge 38 was described as being configured with hinge section 100 affixed to cover-sidewall 42 of cover 14 and hinge section 102 affixed to sidewall 36 of base 12, it should be appreciated that in other examples, hinge section 100 can be affixed to sidewall 36 of base 12 and hinge section 102 can be affixed to cover-sidewall 42 of cover 14. Other configurations and arrangements of the various features of hinge 38 are contemplated.

In some examples, hinge 38 is configured so that cover 14 can pivotally rotate at least 180 degrees relative to base 12 between an open position and a closed position. Such a configuration may provide ready access to platform 34 of base 12, e.g., for inserting and removing PEIO 16 from shelter 10.

A shelter in accordance with the disclosure can assume a variety of different configurations, as described above. In some examples, a shelter according to the disclosure may be configured to be stacked in a nested arrangement with a plurality of similarly configured shelters. When configured to be stacked in a nested arrangement, multiple shelters may be stored and/or transported within a confined space.

FIG. 6 is a conceptual drawing of an example stacked arrangement for shelters 10A-10E. Each shelter of shelters 10A-10E may define the configuration of shelter 10, described above with respect to FIGS. 1-5. As seen in the example of FIG. 6, covers 14A-14E of shelters 10A-10E are rotated open approximately 180 degrees relative to bases 12A-12E. Further the base of one shelter (e.g., 12A) is inserted into the base of another shelter (e.g., 12B), while the cover of one shelter (e.g., 14A) is inserted into the cover of another shelter (e.g., 14B). In this manner, each shelter of shelters 10A-10E is stacked on top of one another to define a nested stack of shelters. In some examples, this configuration

19

of shelters may allow multiple shelters to be stored and/or transported within a confined space.

FIGS. 7-13 illustrate several different views of an example shelter that includes features illustrated and described with respect to shelter 10 above. FIG. 7 is perspective view of the example shelter. FIG. 8 is a perspective top view of the example shelter of FIG. 7. FIG. 9 is a perspective bottom view of the example shelter of FIG. 7. FIG. 10 is a perspective side view of the example shelter of FIG. 7. FIG. 11 is a perspective view of an example portion of the example shelter of FIG. 7. FIG. 12 is a perspective view of an example hinge on the example shelter of FIG. 7. FIG. 13 is another perspective side view of the example shelter of FIG. 7.

In the foregoing detailed description, the invention has been described with reference to specific examples. However, it may be appreciated that various modifications and changes can be made without departing from the scope of the invention as set forth in the appended claims. Thus, some of the features of preferred embodiments described herein are not necessarily included in preferred embodiments of the invention which are intended for alternative uses.

What is claimed is:

1. A shelter for a portable electrical inlet/outlet (PEIO) comprising:

a base that includes a platform that physically supports a PEIO body, and

a cover that mates with the base to substantially enclose the platform and protect the PEIO body from unwanted elements,

wherein the shelter defines a first PEIO-cable hole and a second PEIO-cable hole, wherein the first PEIO-cable hole allows a first PEIO-cable to extend from the PEIO body within the shelter to an exterior of the shelter and the second PEIO-cable hole allows a second PEIO cable to extend from the PEIO body within the shelter to the exterior of the shelter,

wherein the shelter defines at least one PEIO-component-connector-cable hole that allows a component cable to extend from the exterior of the shelter to at least one PEIO-component connector carried by the PEIO body within the shelter, and

wherein the base further comprises at least a plurality of legs that extend downwardly from the platform, the plurality of legs elevate the platform and maintains the platform in a generally parallel relationship with a surface on which the shelter is set each of the legs having lumen defined therein, the lumen being connected to a drain aperture extending through the platform, such that the drain aperture drains water accumulating on the platform through the lumen out onto the surface on which the shelter is set.

2. The shelter of claim 1, wherein the platform further comprises a raised rib structure that segregates the PEIO body from any water accumulates on the platform.

3. The shelter of claim 2, wherein the raise rib structure comprises a single rib.

4. The shelter of claim 1, wherein the shelter comprises at least four legs extending downwardly from the platform.

5. The shelter of claim 1, wherein the at least one PEIO-component connector receives a multi-prong plug.

6. The shelter of claim 1, wherein the at one PEIO-component connector comprises at least two PEIO-component connectors.

7. The shelter of claim 1, wherein the base further comprises a sidewall extending substantially around a perimeter of the platform to define a cavity that receives the PEIO body.

20

8. The shelter of claim 1, wherein the cover rotates closed over the PEIO body to friction fit the PEIO body between the base and the cover.

9. The shelter of claim 1, wherein the first PEIO-cable hole and the second PEIO-cable hole are adjustable in size to accommodate different size PEIO cables.

10. The shelter of claim 9, wherein the shelter further comprises a first PEIO-cable support surface that supports the first PEIO cable and a second PEIO-cable support surface extending substantially orthogonally from the first PEIO-cable support surface and that supports the second PEIO cable, wherein the first PEIO-cable support surface and the second PEIO-cable support surface each have a first portion that defines a first diameter and a second portion that defines a second diameter, and wherein the second portion fractures from the first portion upon application of a force without substantially affecting a length or a diameter of the first portion.

11. The shelter of claim 1, wherein the base further comprise at least one sidewall extending upwardly from the platform, with a first base-PEIO-cable partial-hole and a second PEIO-cable partial hole being defined in the base-sidewall, and wherein the cover comprises at least one cover-sidewall extending downwardly, with a first cover-PEIO-cable partial-hole and a second cover-PEIO-cable partial-hole defined in the cover-sidewall, wherein when the cover mates with the base, the first cover-PEIO-cable partial-hole aligns with the first base-PEIO-cable partial-hole to create the first PEIO-cable hole and the second cover-PEIO-cable partial-hole aligns with the second base-PEIO-cable partial-hole to create the second PEIO-cable hole.

12. The shelter of claim 11, wherein the at least one PEIO-component-connector-cable hole is defined in the platform of the base.

13. A system comprising:

a portable electrical inlet/outlet (PEIO) that includes a PEIO body, a first PEIO cable, a second PEIO cable, and at least one PEIO-component connector;

a PEIO shelter that comprises:

a base that includes a platform and a plurality of legs, wherein the platform supports the PEIO body and the plurality of legs extend downwardly from the platform, the plurality of legs elevate the platform and maintain the platform in a generally parallel relationship with a surface on which the PEIO shelter is set, and

a cover that mates with the base to substantially enclose the platform and thereby protect the PEIO body from unwanted elements;

wherein the shelter defines a first PEIO-cable hole, a second PEIO-cable hole, and at least one PEIO-component-connector-cable hole; and

a component cable,

wherein the PEIO is positioned with the PEIO body supported on the platform, the first PEIO cable extending from the PEIO body through the first PEIO-cable hole to an exterior of the shelter, the second PEIO cable extending from the PEIO body through the second PEIO-cable hole to the exterior of the shelter, and the component cable extending from the at least one PEIO-component connector through the at least one PEIO-component-connector-cable hole to the exterior of the shelter and each leg having a lumen defined therein, the lumen being connected to a drain aperture extending through the platform, such that the drain aperture drains water accumulating on the platform through the lumen out onto the surface on which the shelter is set.

21

14. The system of claim 13, wherein the platform further comprises a raised rib structure that segregates the PEIO body from any water accumulates on the platform.

15. The system of claim 13, wherein the at least one PEIO-component connector comprises at least two PEIO-component connectors, each of the at least two PEIO-component connectors receiving a multi-prong plug, and the at least one PEIO-component-connector-cable hole comprises at least two PEIO-component-connector-cable holes.

16. The system of claim 13, wherein the base further comprises a sidewall extending substantially around a perimeter of the platform to define a cavity into which the PEIO body is inserted, and the cover is rotated closed over the PEIO body to frictional fit the PEIO body between the base and the cover.

17. The system of claim 13, wherein the shelter further comprises a first PEIO-cable support surface that supports the first PEIO cable and a second PEIO-cable support surface extending substantially orthogonally from the first PEIO-cable support surface and that supports the second PEIO cable, wherein the first PEIO-cable support surface and the

22

second PEIO-cable support surface each have a first portion that defines a first diameter and a second portion that defines a second diameter, and wherein the second portion fractures from the first portion upon application of a force without substantially affecting a length or a diameter of the first portion.

18. The system of claim 13, wherein the base further comprise at least one sidewall extending upwardly from the platform, with a first base-PEIO-cable partial-hole and a second PEIO-cable partial hole being defined in the base-sidewall, and wherein the cover comprises at least one cover-sidewall extending downwardly, with a first cover-PEIO-cable partial-hole and a second cover-PEIO-cable partial-hole defined in the cover-sidewall, wherein the cover is mated with the base, with the first cover-PEIO-cable partial-hole aligned with the first base-PEIO-cable partial-hole to create the first PEIO-cable hole and the second cover-PEIO-cable partial-hole aligned with the second base-PEIO-cable partial-hole to create the second PEIO-cable hole.

* * * * *