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**Anderson, Jr. et al.**

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- (54) **FLOOD VENT HAVING A PANEL**
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- (\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.  
  
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*E02B 7/20* (2006.01)  
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- (52) **U.S. Cl.**  
CPC ..... *E06B 9/00* (2013.01); *E06B 9/02* (2013.01); *E06B 2009/007* (2013.01)

- (58) **Field of Classification Search**  
CPC ... E02B 7/00; E02B 7/005; E02B 7/20; E02B 7/205; E04B 1/7076  
(Continued)

- (56) **References Cited**  
  
U.S. PATENT DOCUMENTS  
73,159 A \* 1/1868 Besse ..... E02B 7/205  
405/96  
100,623 A \* 3/1870 Hays ..... E04H 17/00  
49/10

(Continued)

**FOREIGN PATENT DOCUMENTS**

- AU 2008100183 5/2008
- DE 1659275 3/1971

(Continued)

**OTHER PUBLICATIONS**

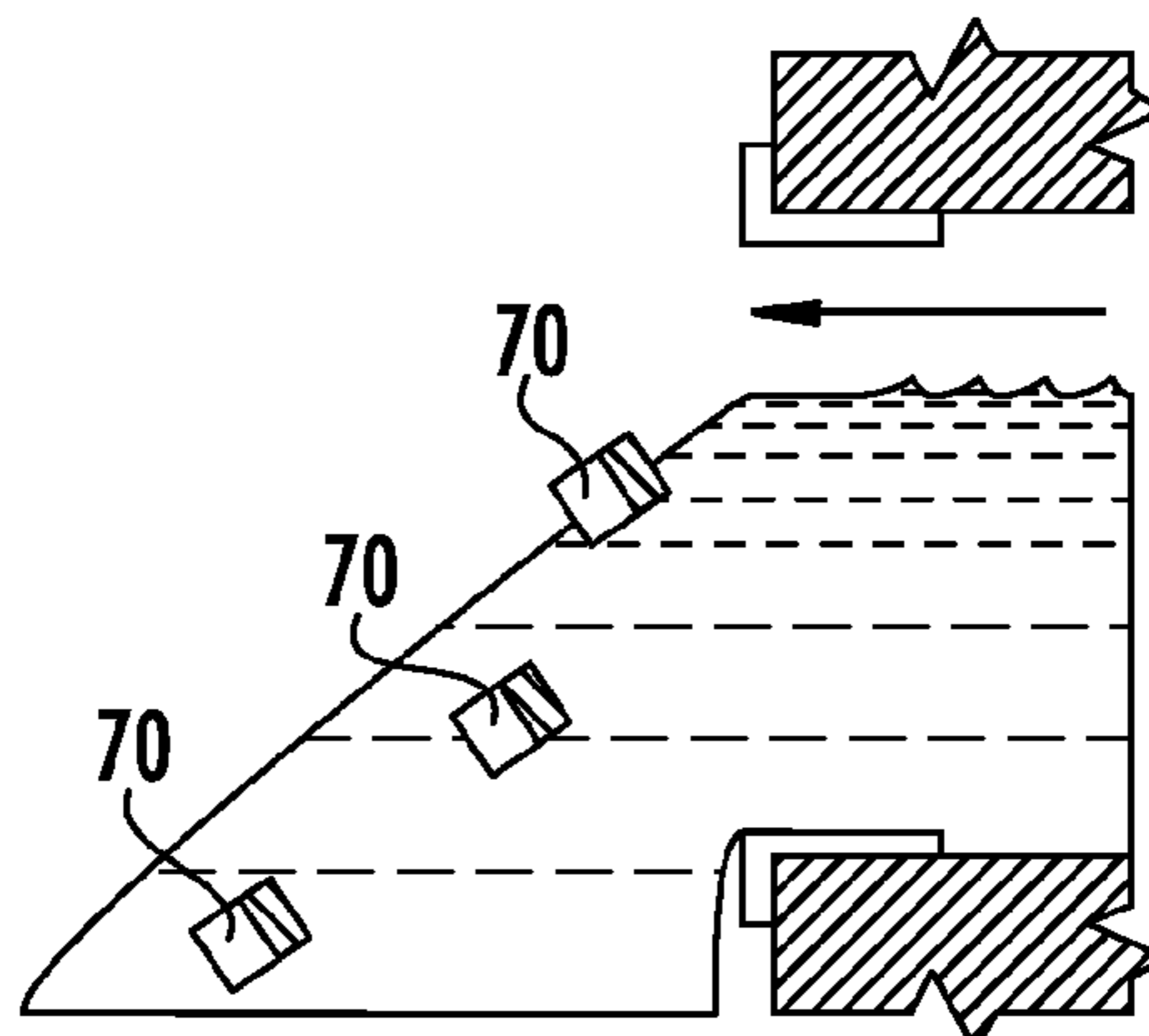
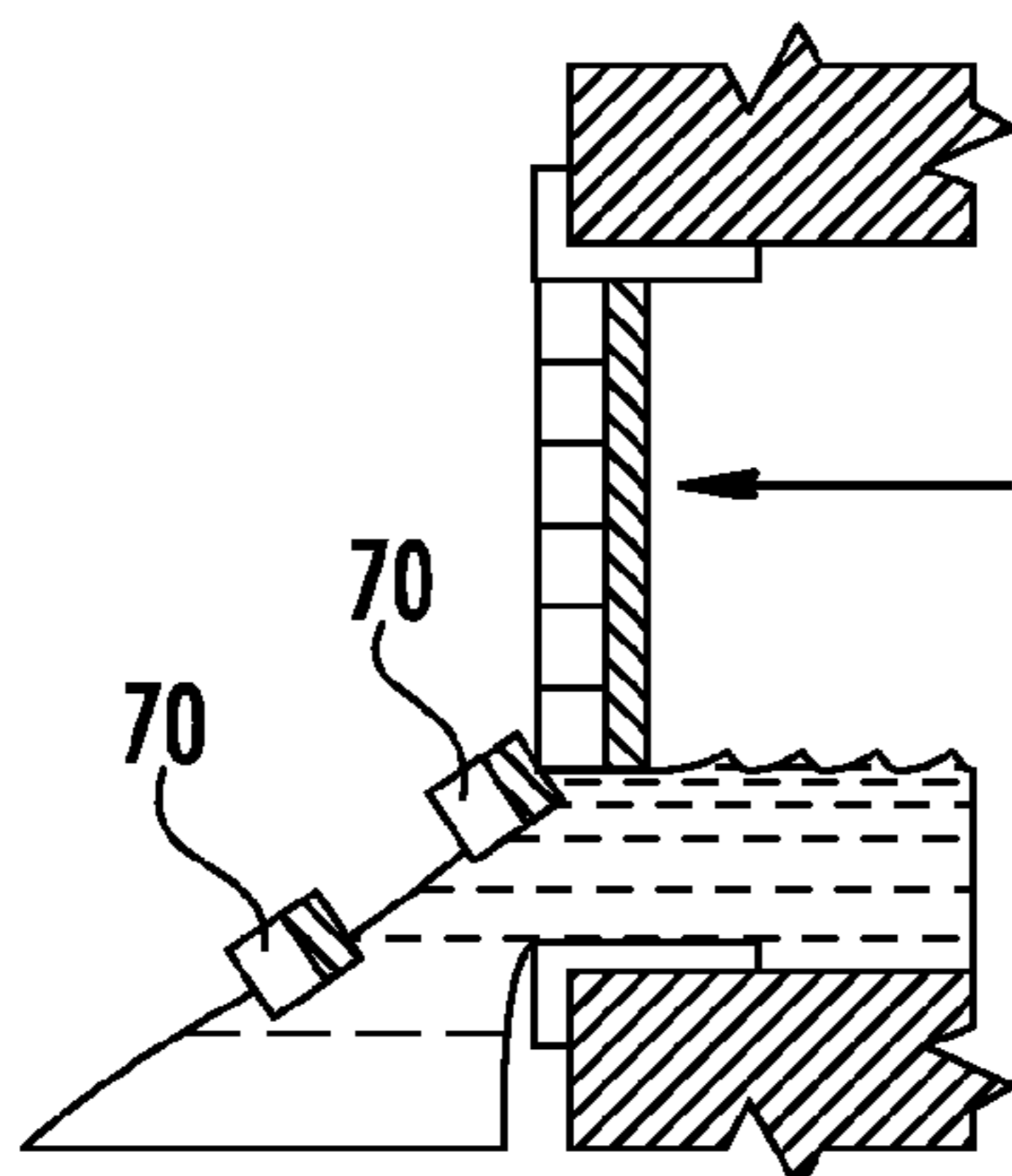
Smart Vent, web pages from www.smartvent.com, printed Apr. 6, 2015.

(Continued)

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- (57) **ABSTRACT**  
According to one embodiment, a flood vent panel includes a plurality of insulation pieces positioned together, and a panel frame surrounding the plurality of insulation pieces. The flood vent panel is configured to be coupled to a frame positionable into an opening in a structure, so as to at least partially block a fluid passageway through the opening in the structure. One or more of the plurality of insulation pieces are configured to uncouple from the flood vent panel when at least a predetermined amount of pressure is applied to a portion of the flood vent panel by one or more of a fluid or an object carried by the fluid, so as to reduce an amount of blockage of the fluid passageway provided by the flood vent panel.

**17 Claims, 10 Drawing Sheets**





(56)

**References Cited**

U.S. PATENT DOCUMENTS

2012/0266975 A1\* 10/2012 Kelly ..... E04B 1/7038  
 137/357  
 2013/0279986 A1\* 10/2013 Payne ..... E04B 1/70  
 405/98  
 2014/0109993 A1\* 4/2014 Kelly ..... E03F 5/042  
 137/409  
 2017/0167156 A1\* 6/2017 Anderson, Jr. .... E04H 9/145  
 2017/0234001 A1 8/2017 Anderson, Jr. et al.

FOREIGN PATENT DOCUMENTS

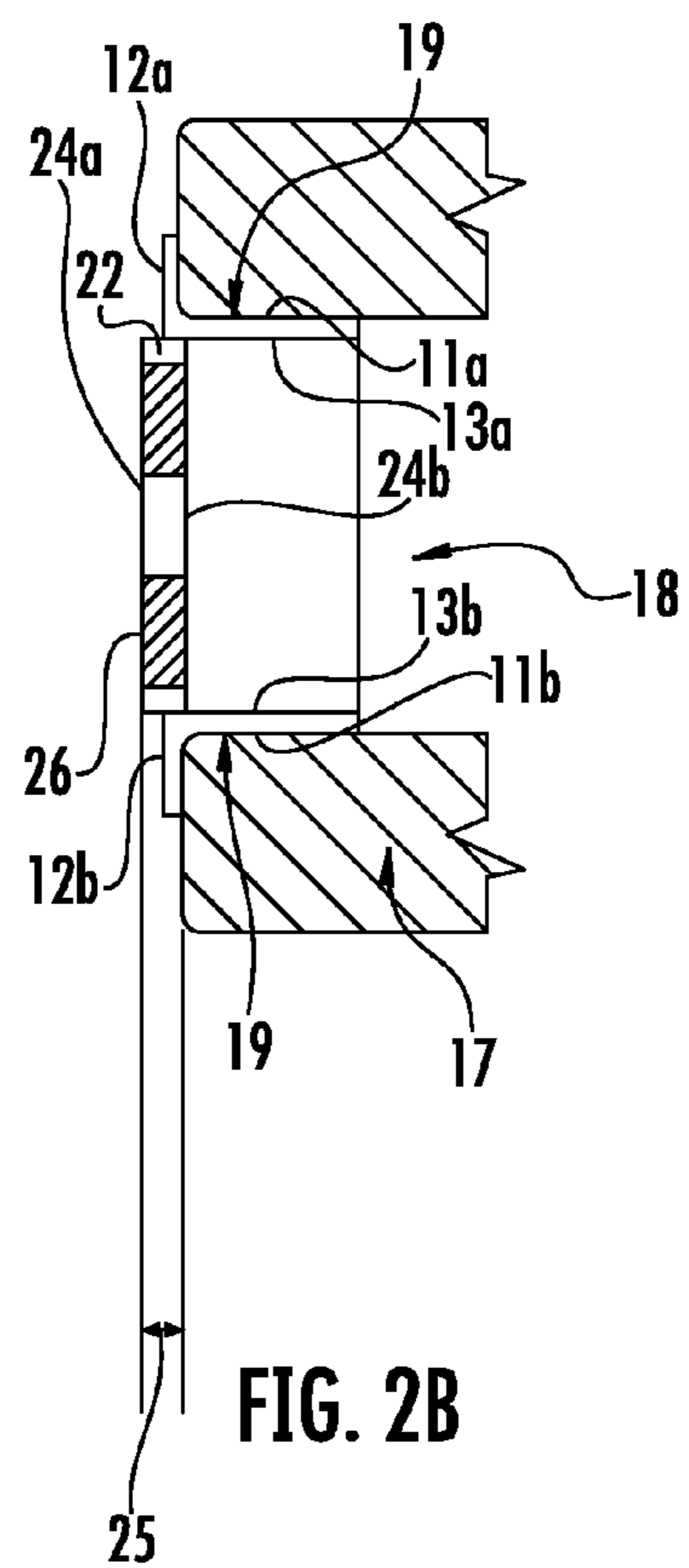
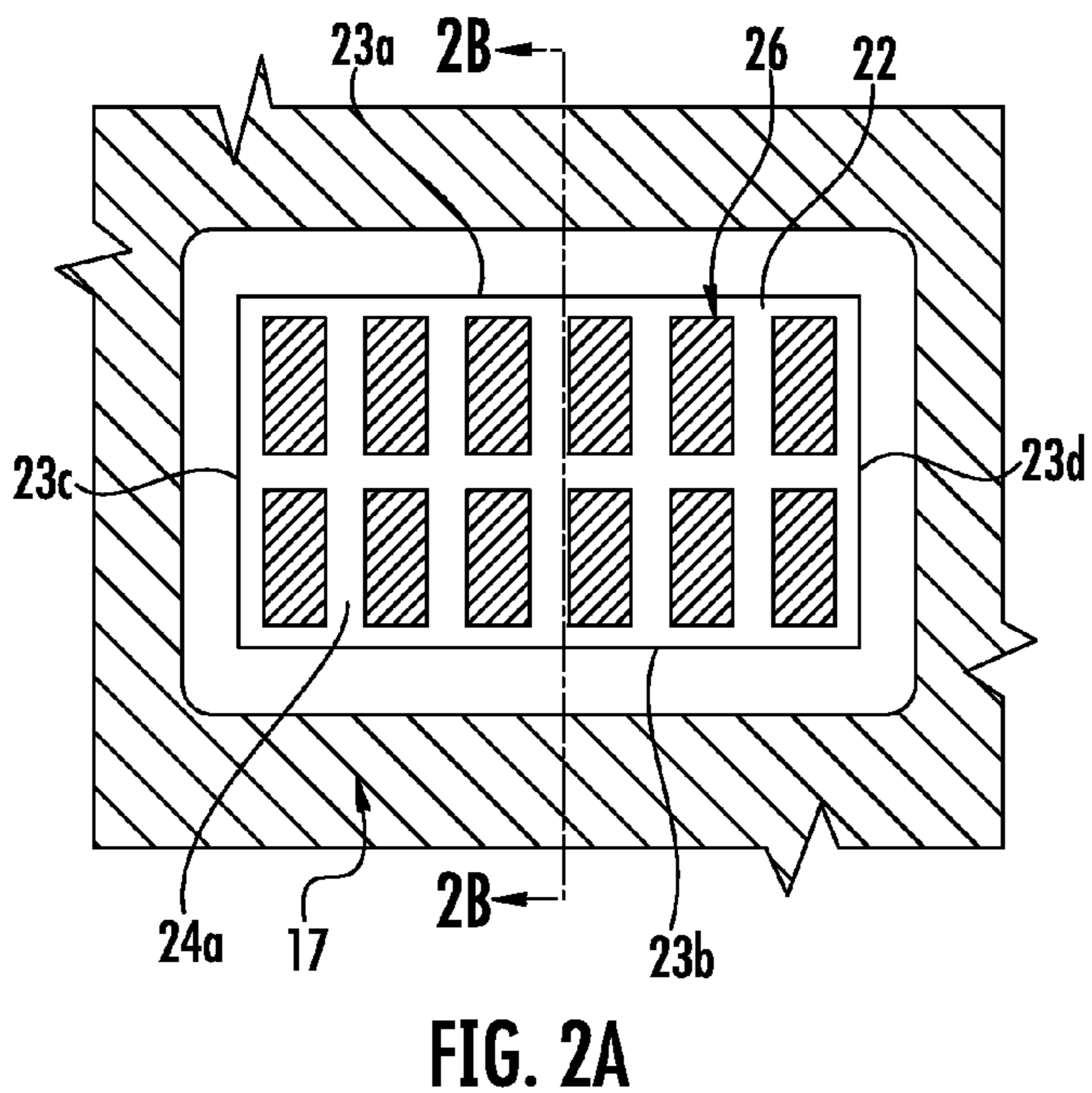
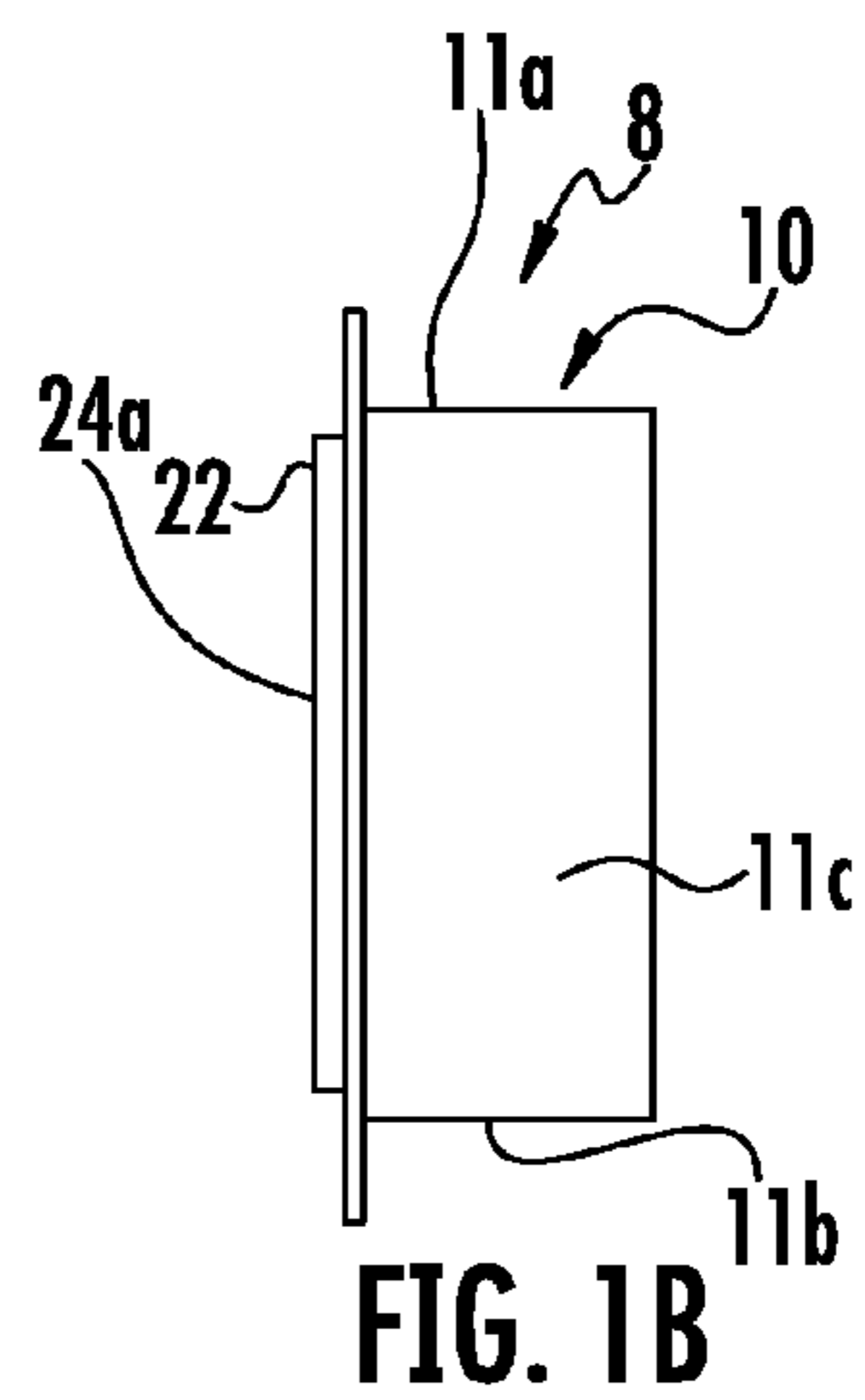
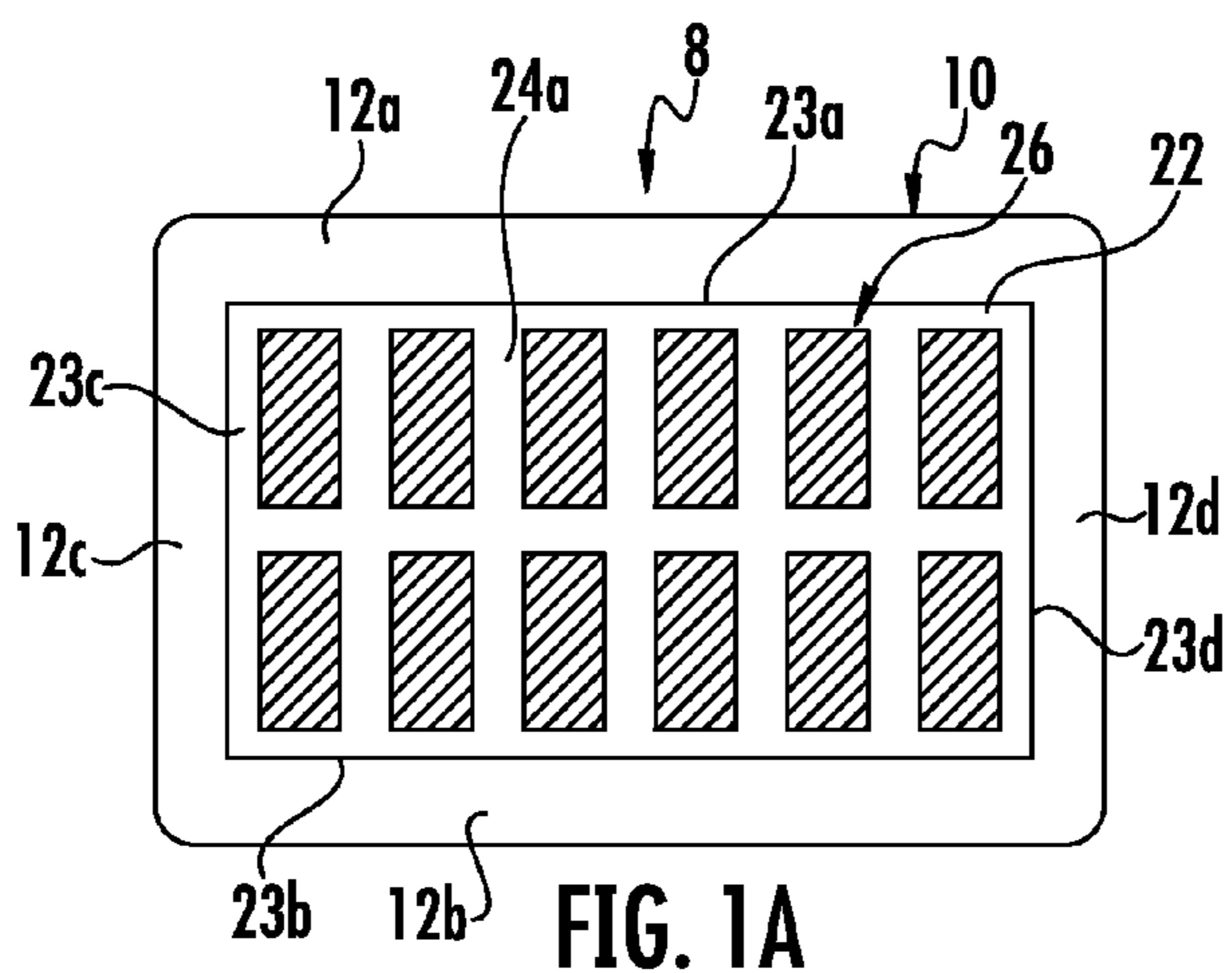
EP 2273056 1/2011  
 EP 2290188 3/2011  
 EP 2365134 9/2011  
 EP 2374981 10/2011  
 EP 2458092 5/2012  
 EP 2764192 4/2013  
 EP 2634328 9/2013  
 EP 2647888 10/2013  
 EP 2662512 11/2013  
 EP 2682687 1/2014  
 GB 1203527 8/1970  
 GB 2147933 5/1985  
 GB 2342948 12/1999

GB 2342948 A \* 4/2000 ..... E06B 9/00  
 GB 2397592 7/2004  
 GB 2461754 1/2010  
 GB 2466302 6/2010  
 GB 2498330 7/2013  
 JP 55-085720 6/1980  
 JP 04-203112 7/1992  
 WO 2015/051352 4/2015

OTHER PUBLICATIONS

Smart Vent, product literature “Smart Vent Foundation Flood Vents vs. Flood Flaps” printed Apr. 6, 2015.  
 Smart Vent, product literature “Family of Products” printed Apr. 6, 2015.  
 FEMA, Openings in Foundation Walls and Walls of Enclosures, Technical Bulletin, Aug. 1, 2008.  
 FEMA, Non-Residential Floodproofing, Technical Bulletin, Apr. 3, 1993.  
 Smart Vent, “Foundation Flood Vents” printed Apr. 6, 2015.  
 Smart Vent, Product Catalog printed Apr. 6, 2015.  
 Declaration of Michael J. Graham dated Nov. 7, 2016.  
 Search and Examination Report issued in GB 1621003.1, dated Feb. 23, 2017.

\* cited by examiner



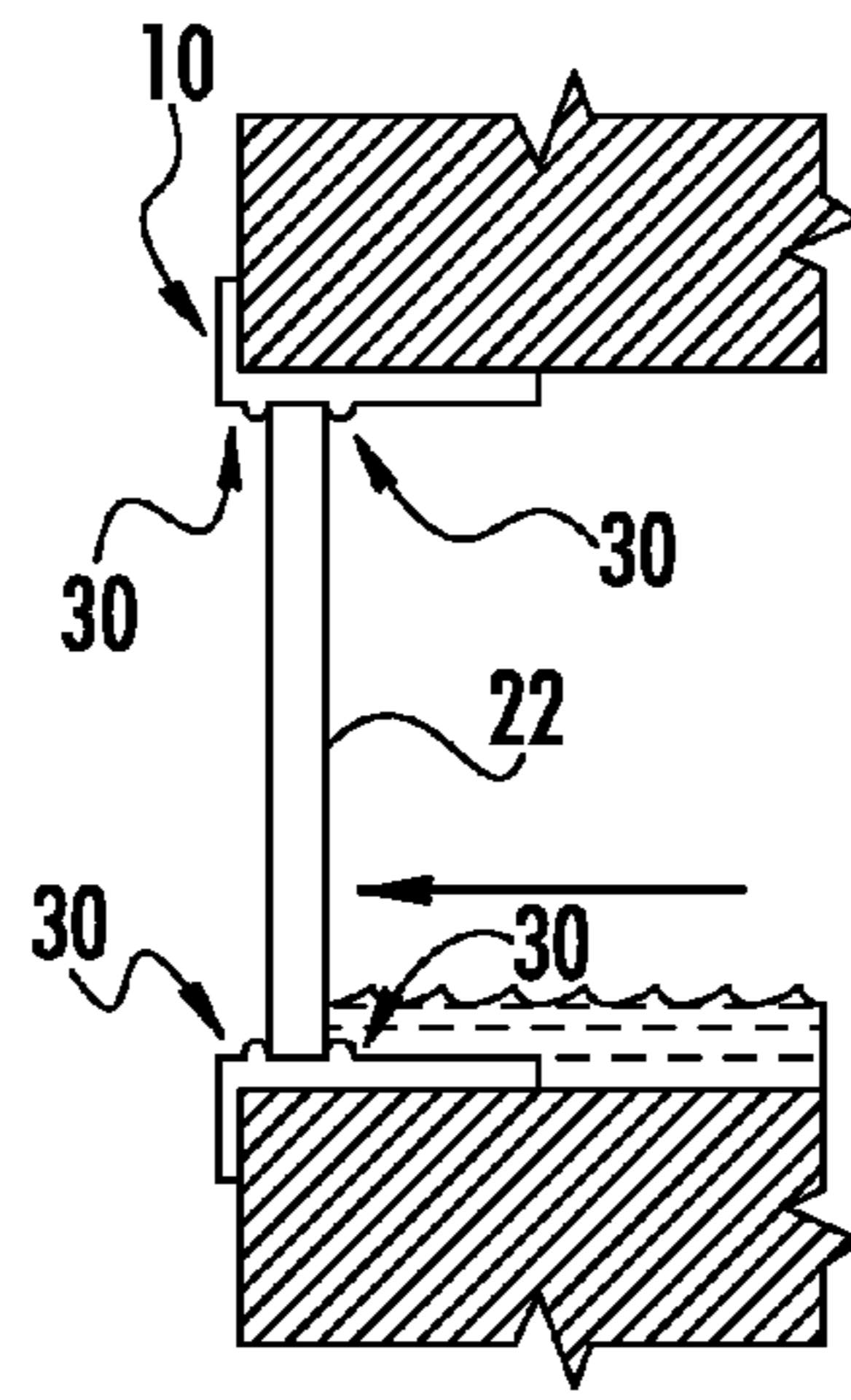


FIG. 3A

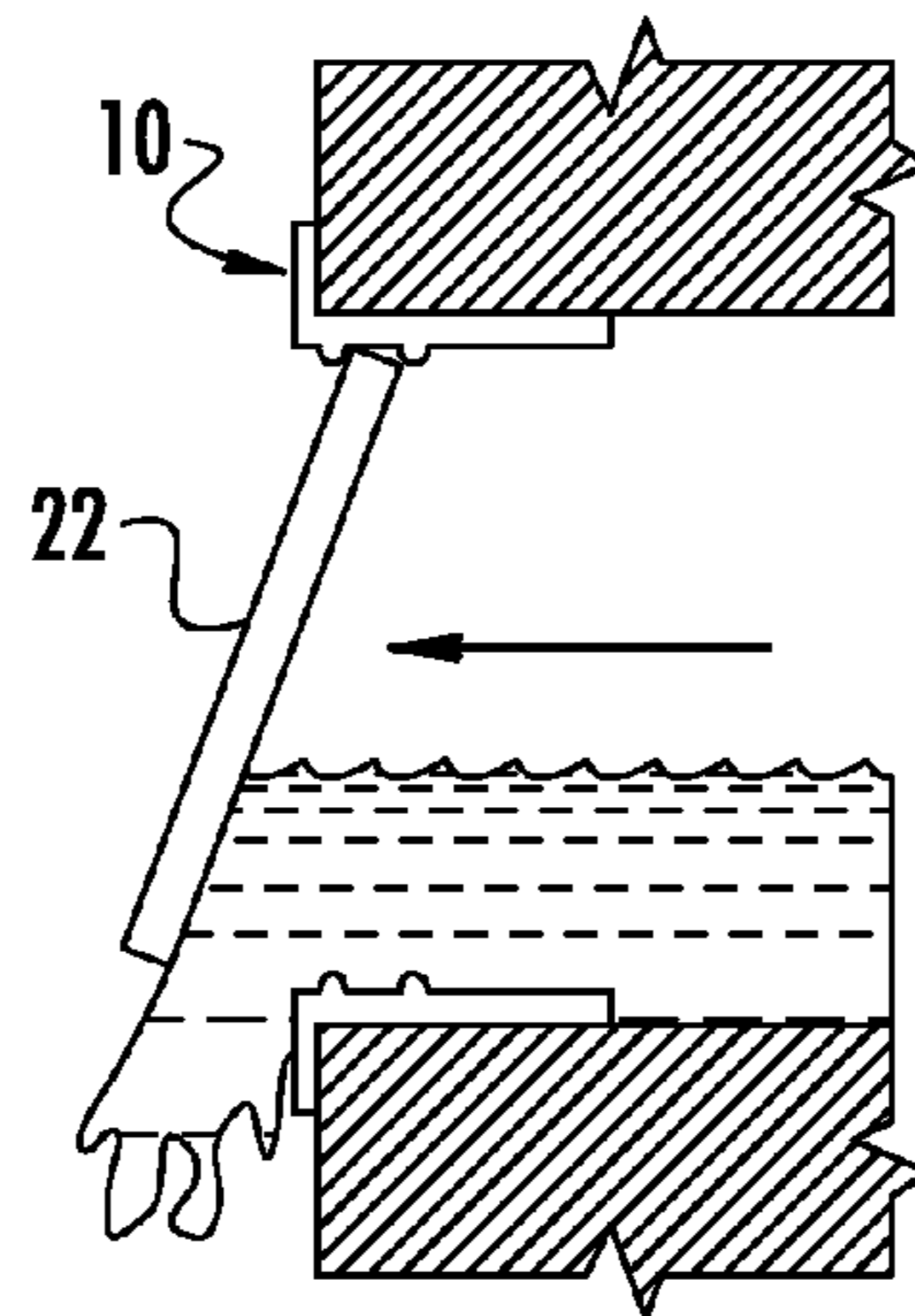


FIG. 3B

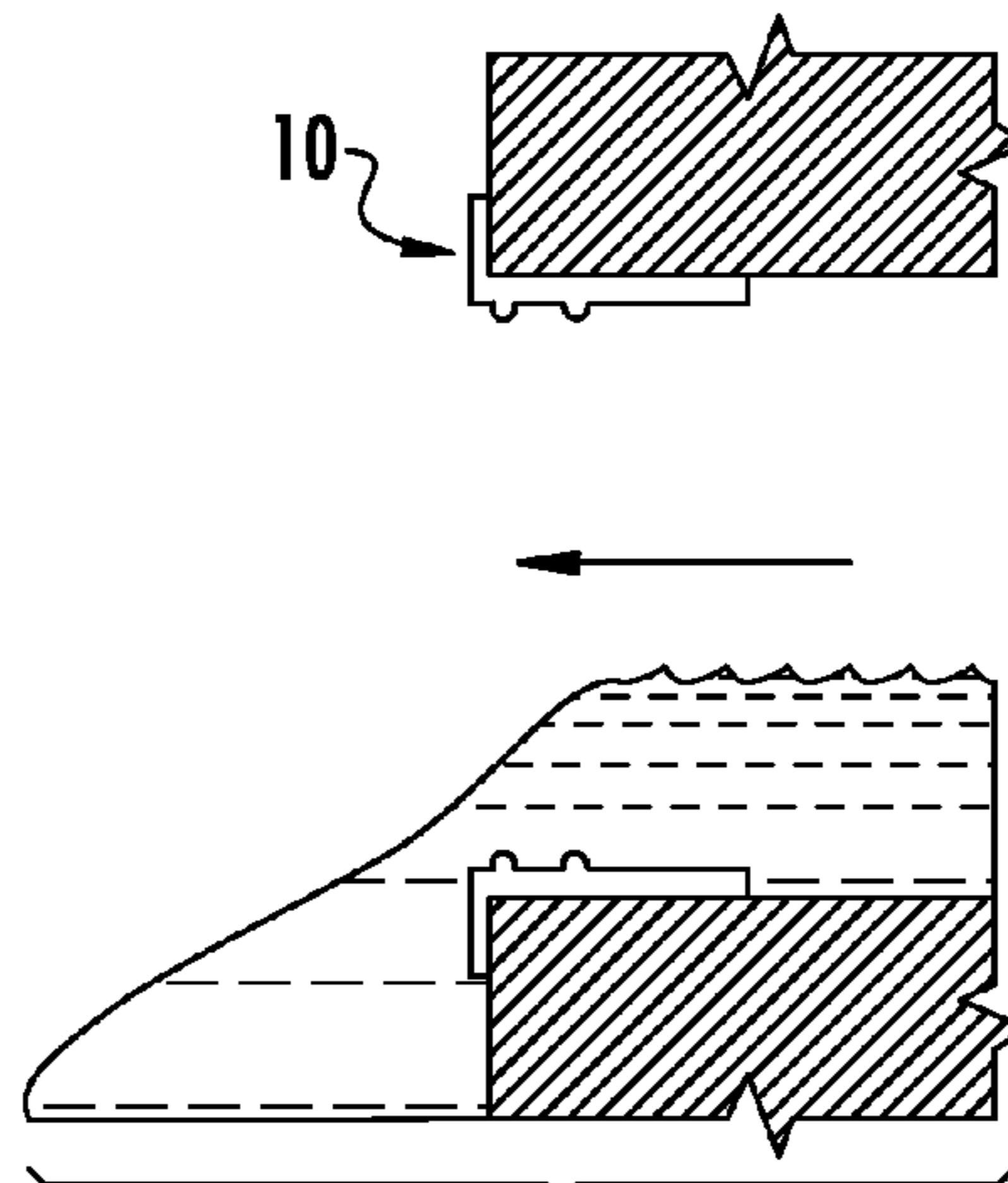


FIG. 3C

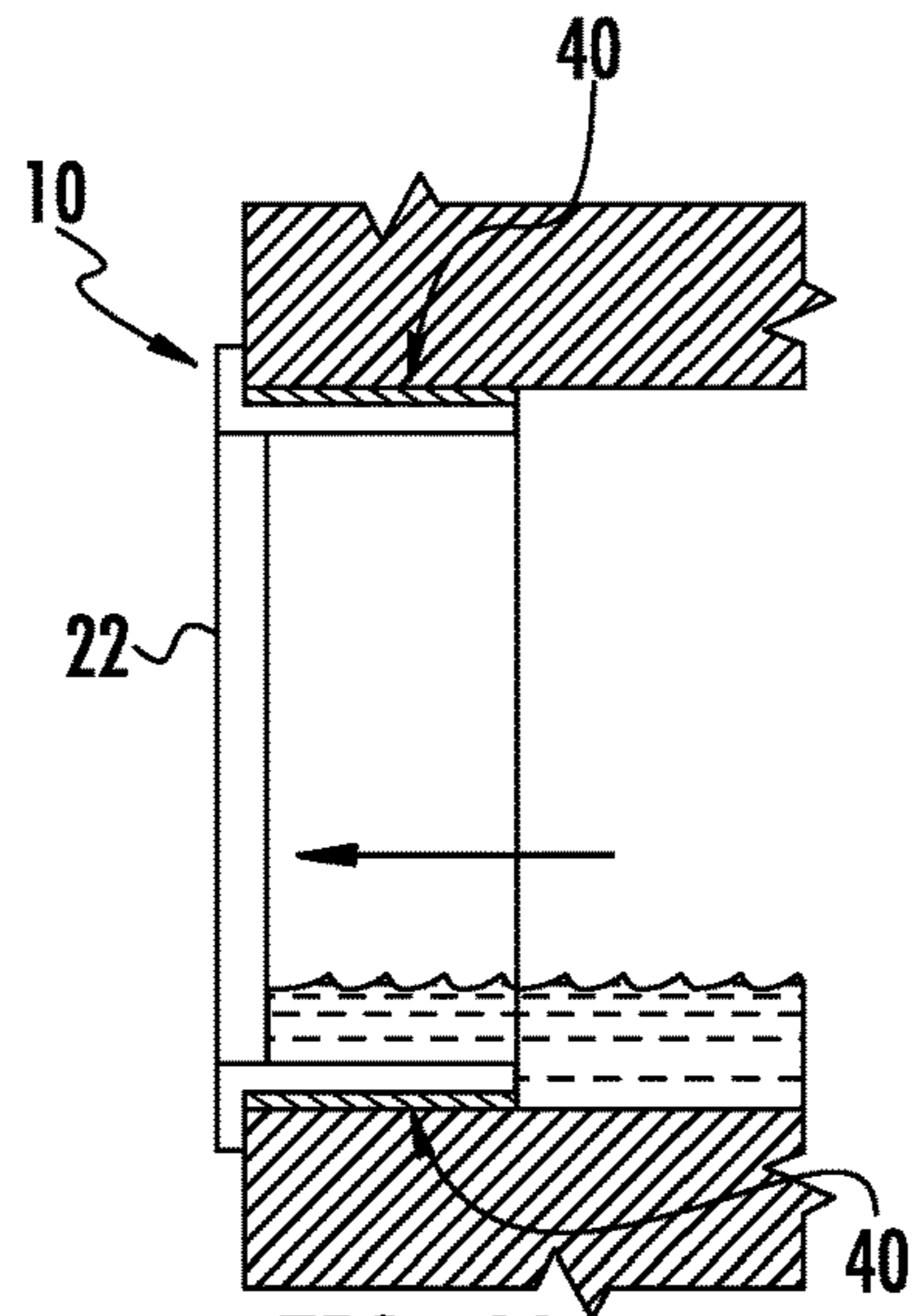


FIG. 4A

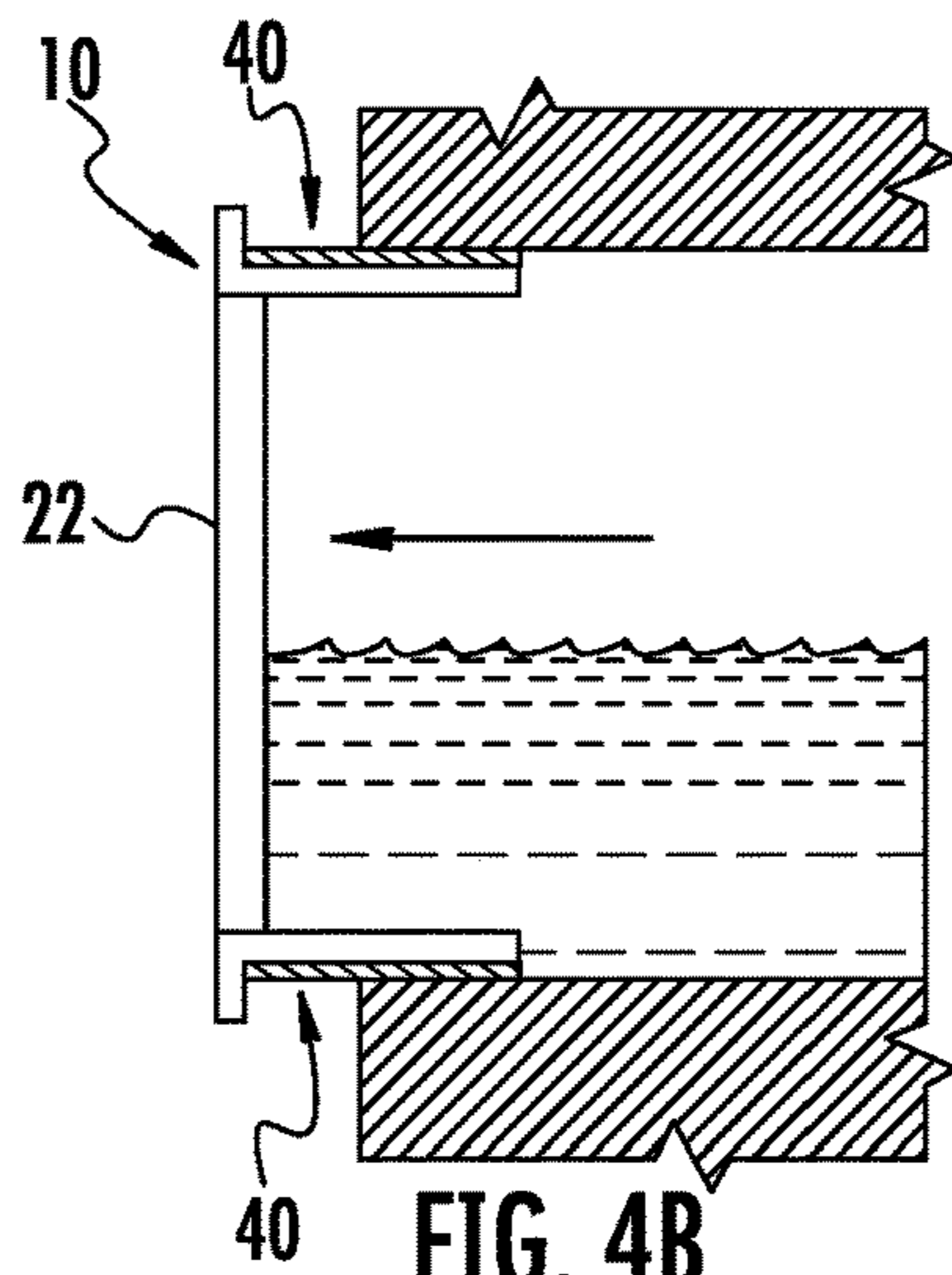


FIG. 4B

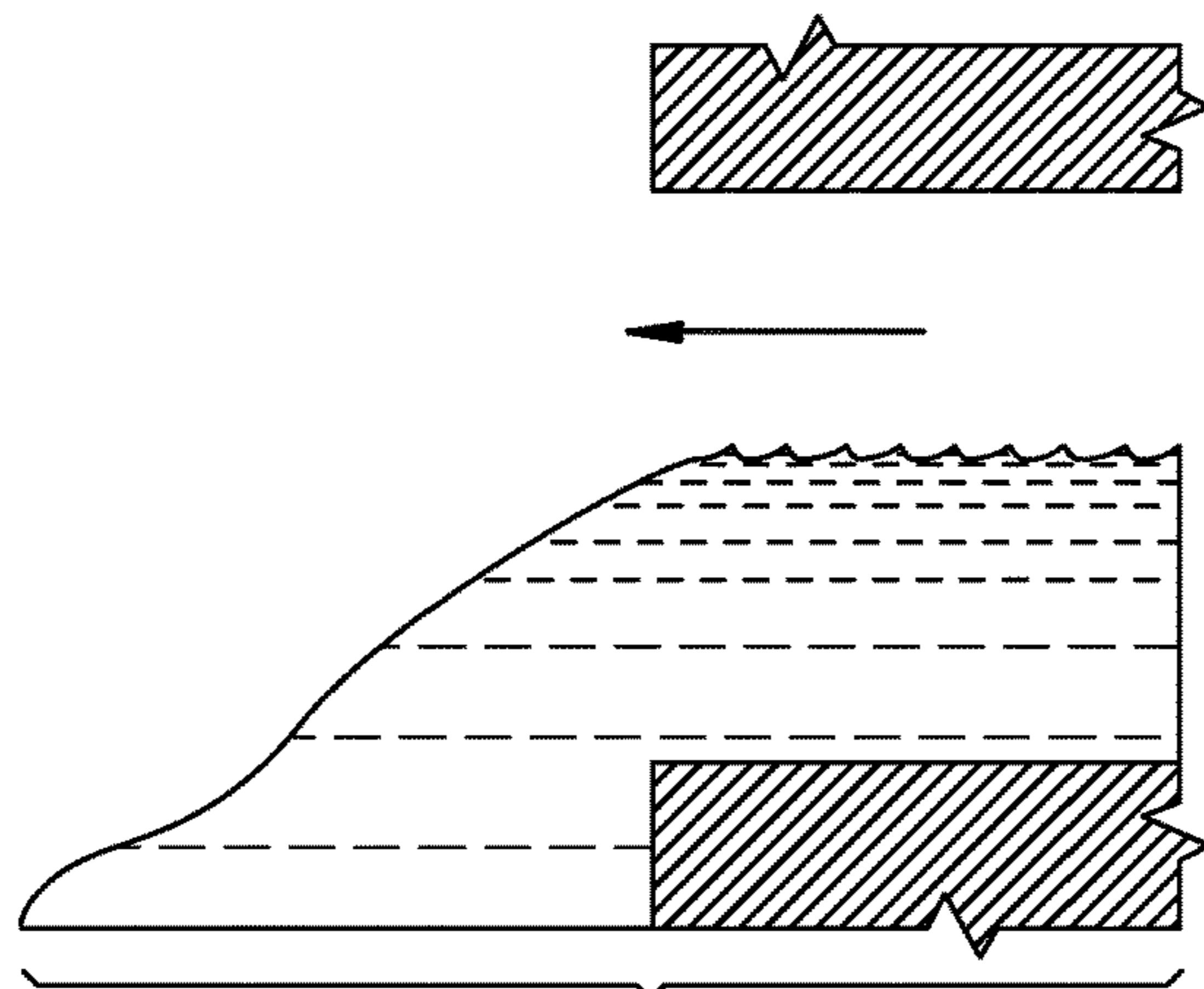


FIG. 4C

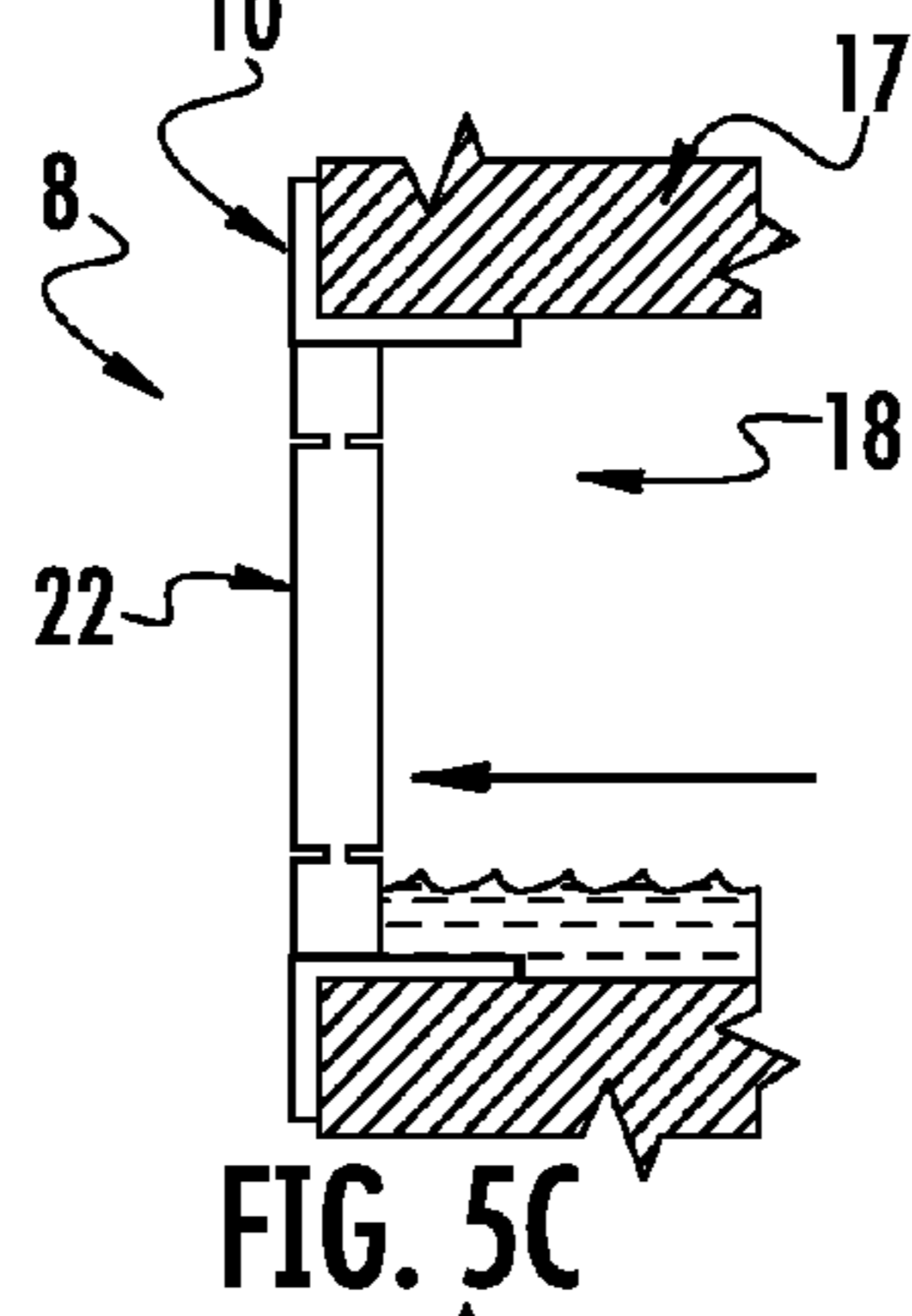
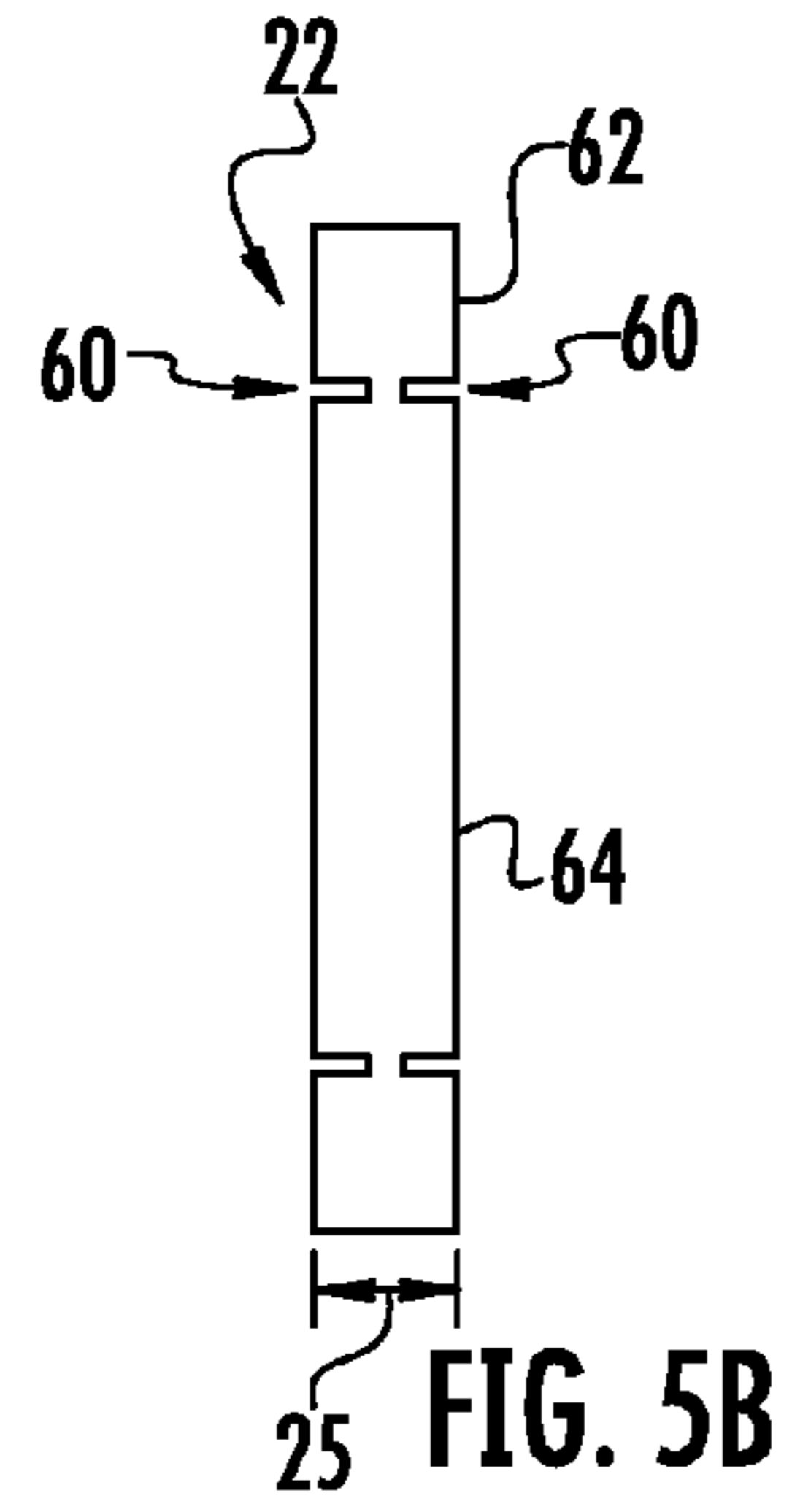
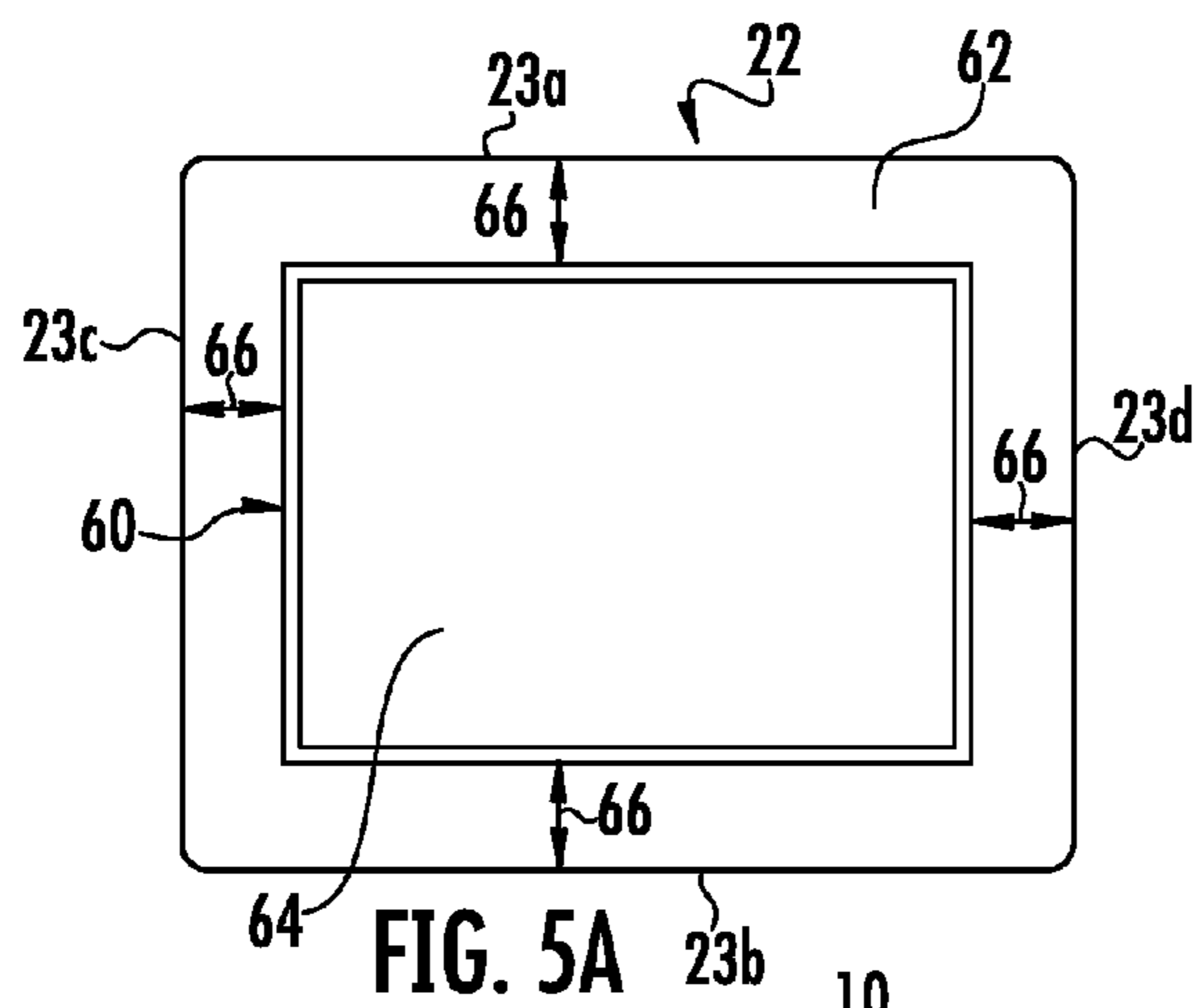


FIG. 5C

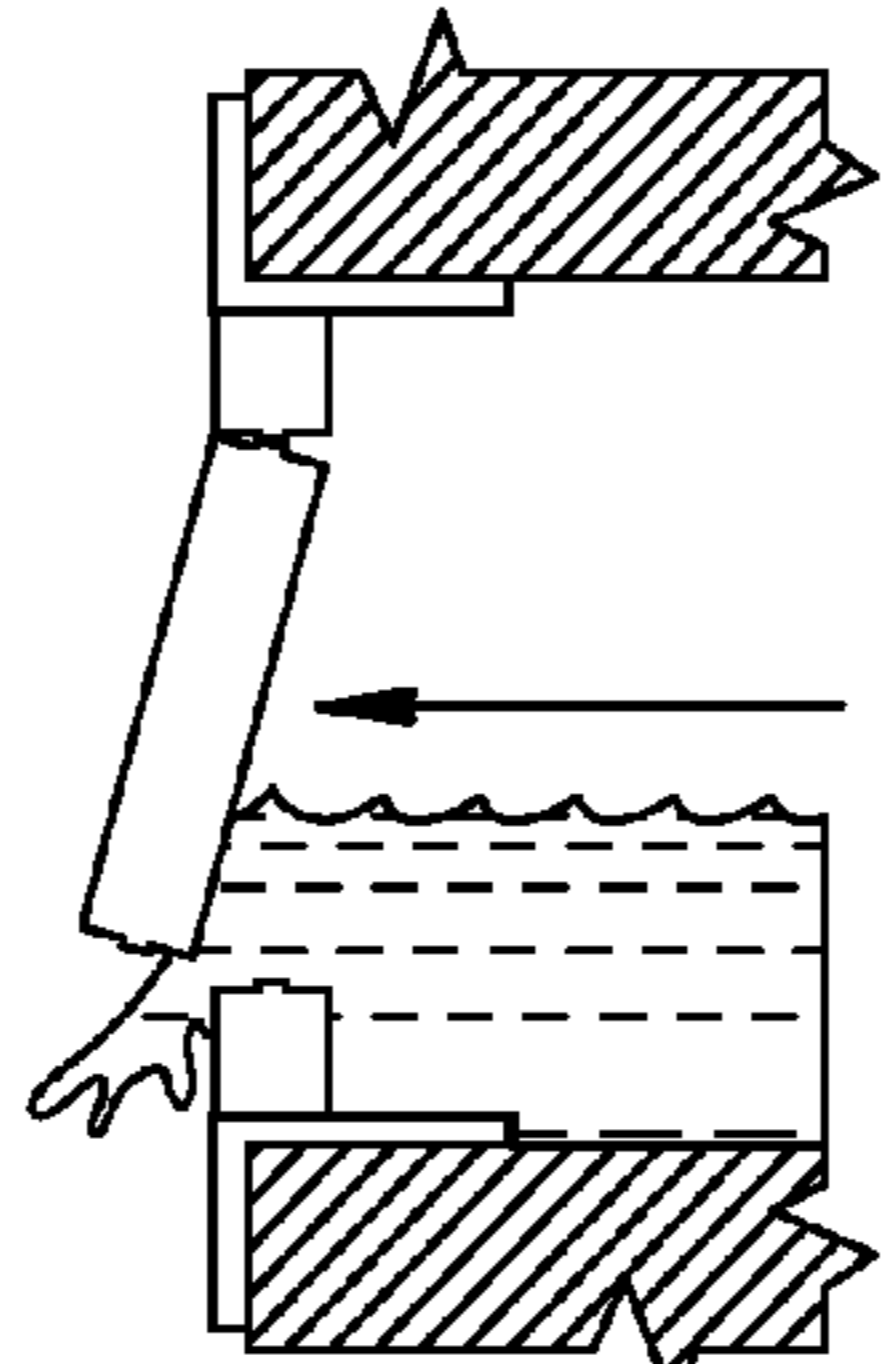


FIG. 5D

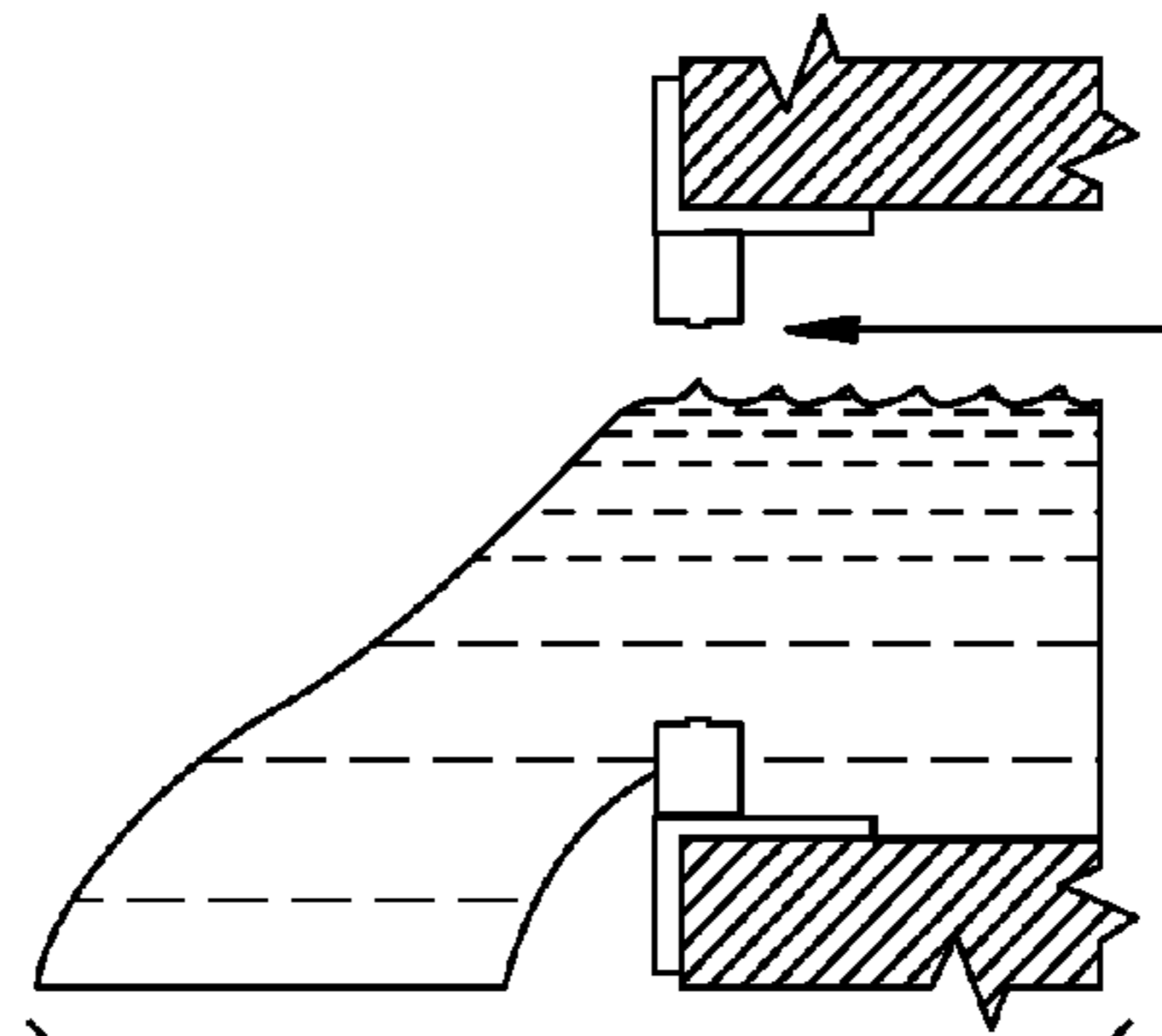


FIG. 5E

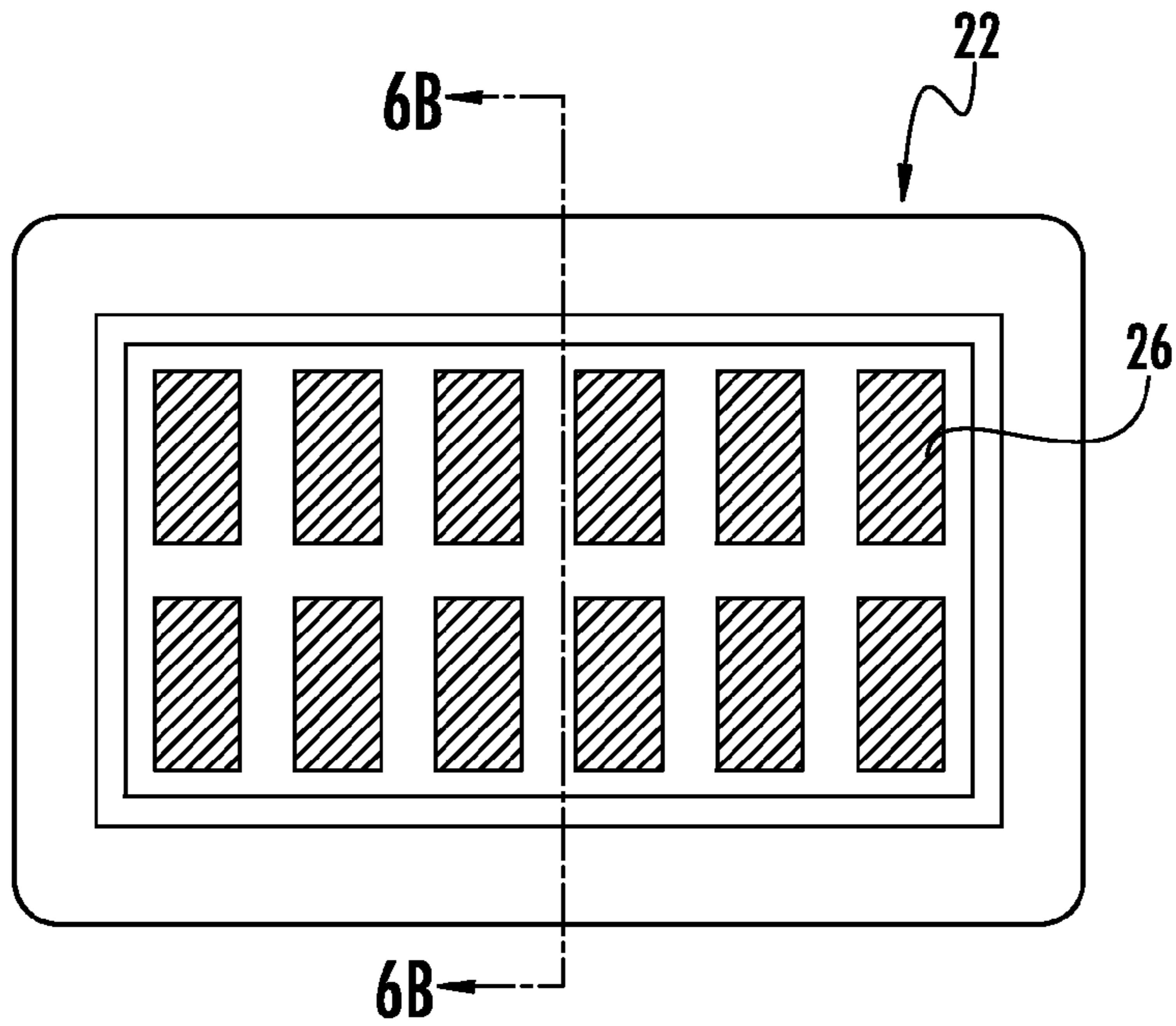


FIG. 6A

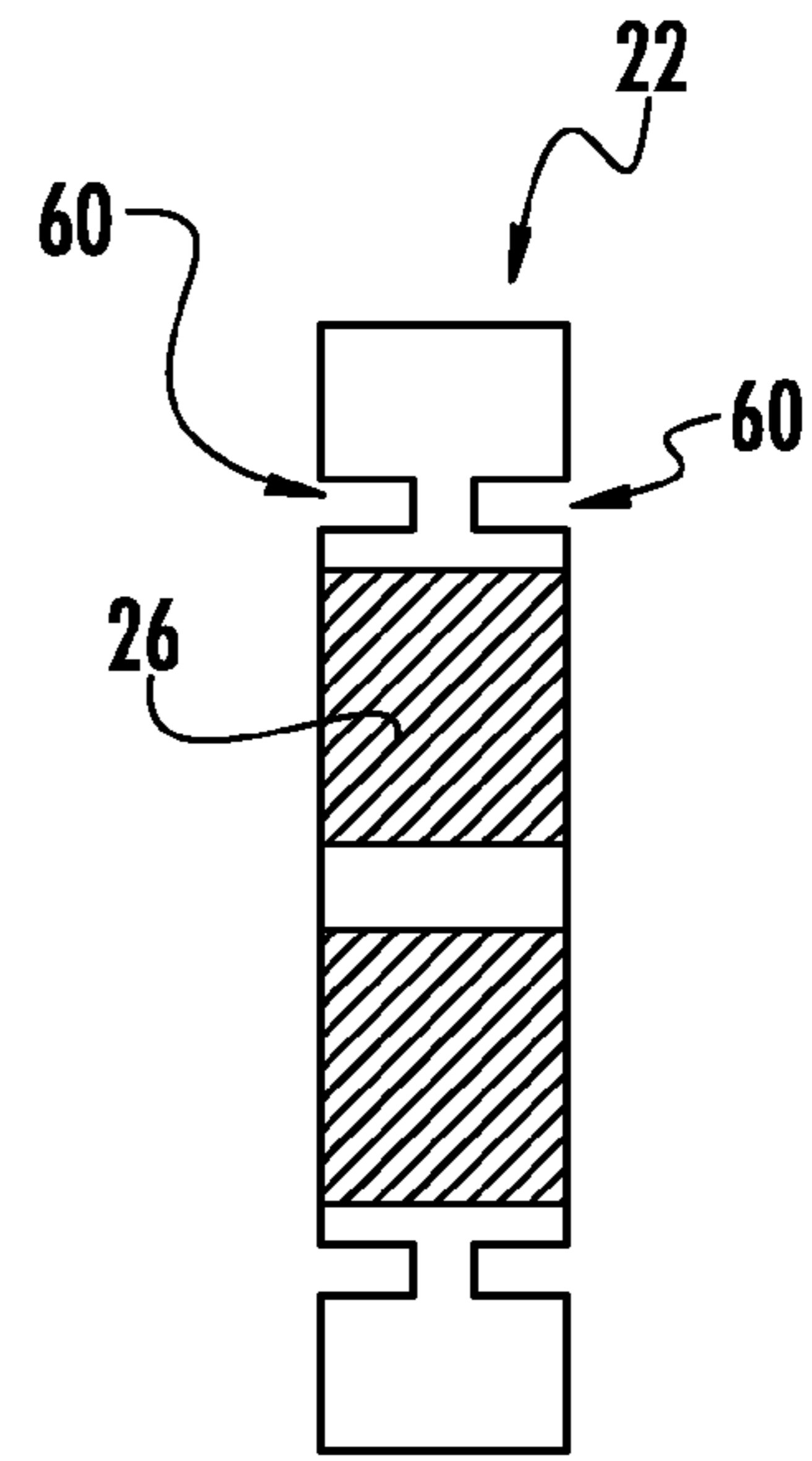


FIG. 6B

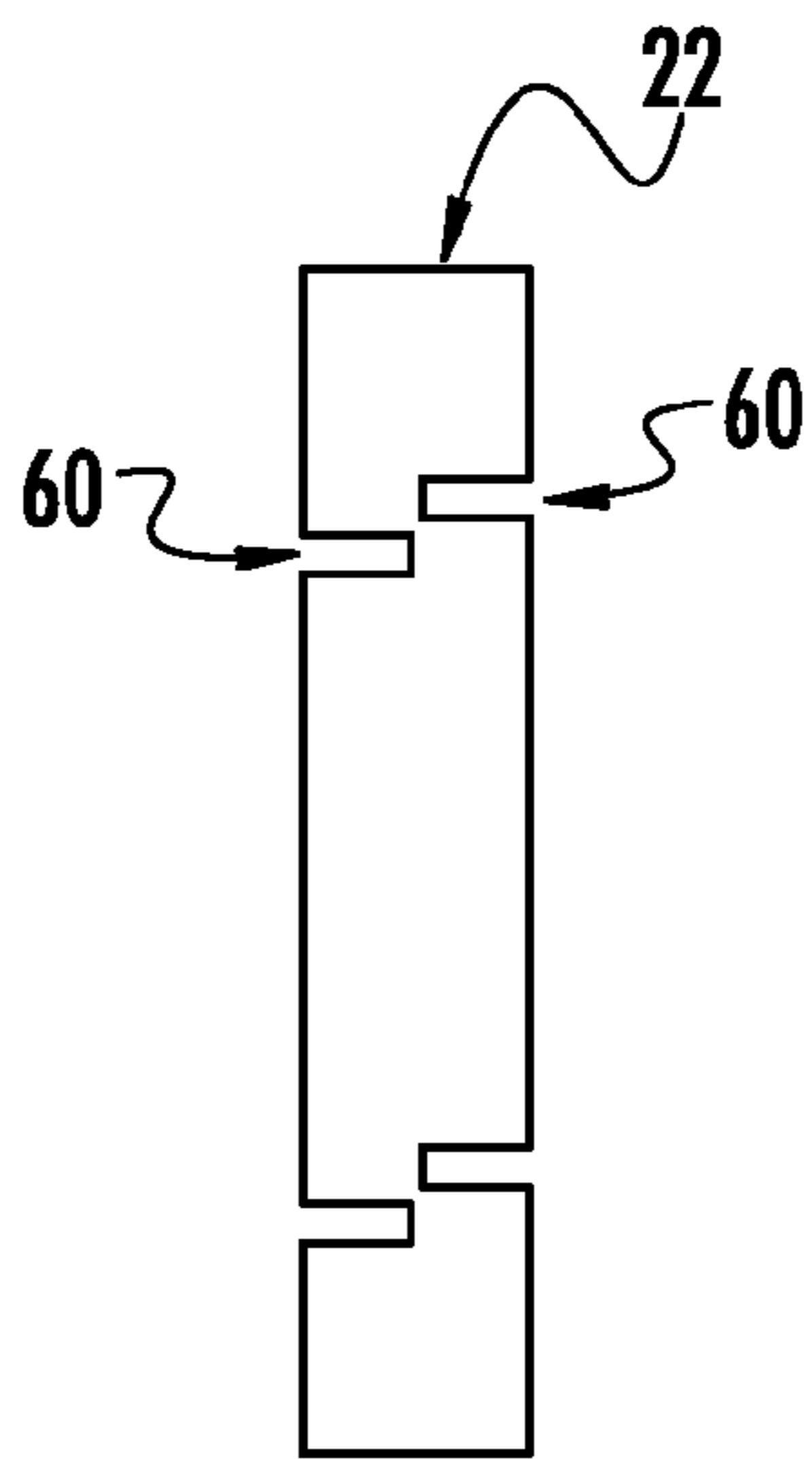


FIG. 6C



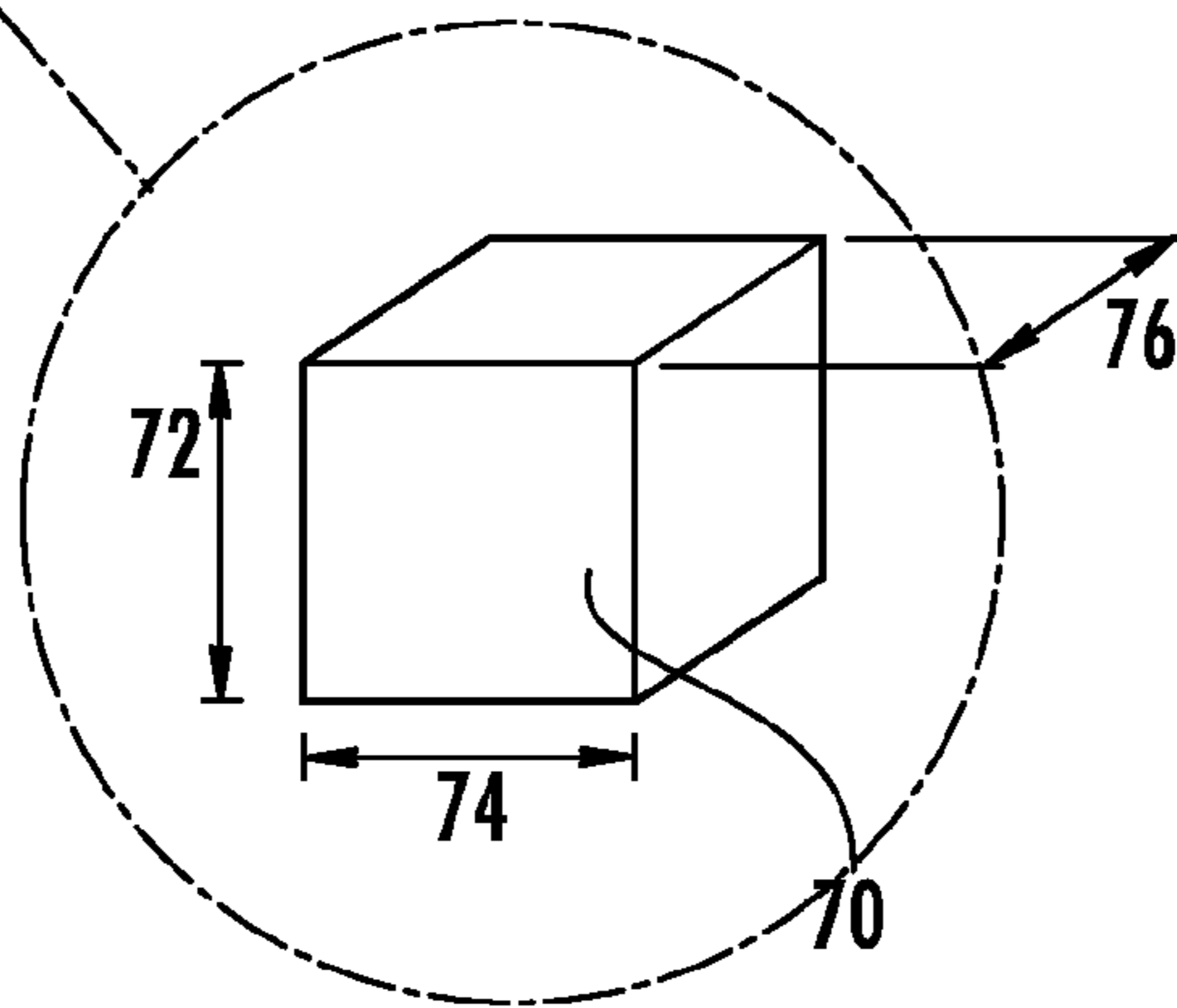
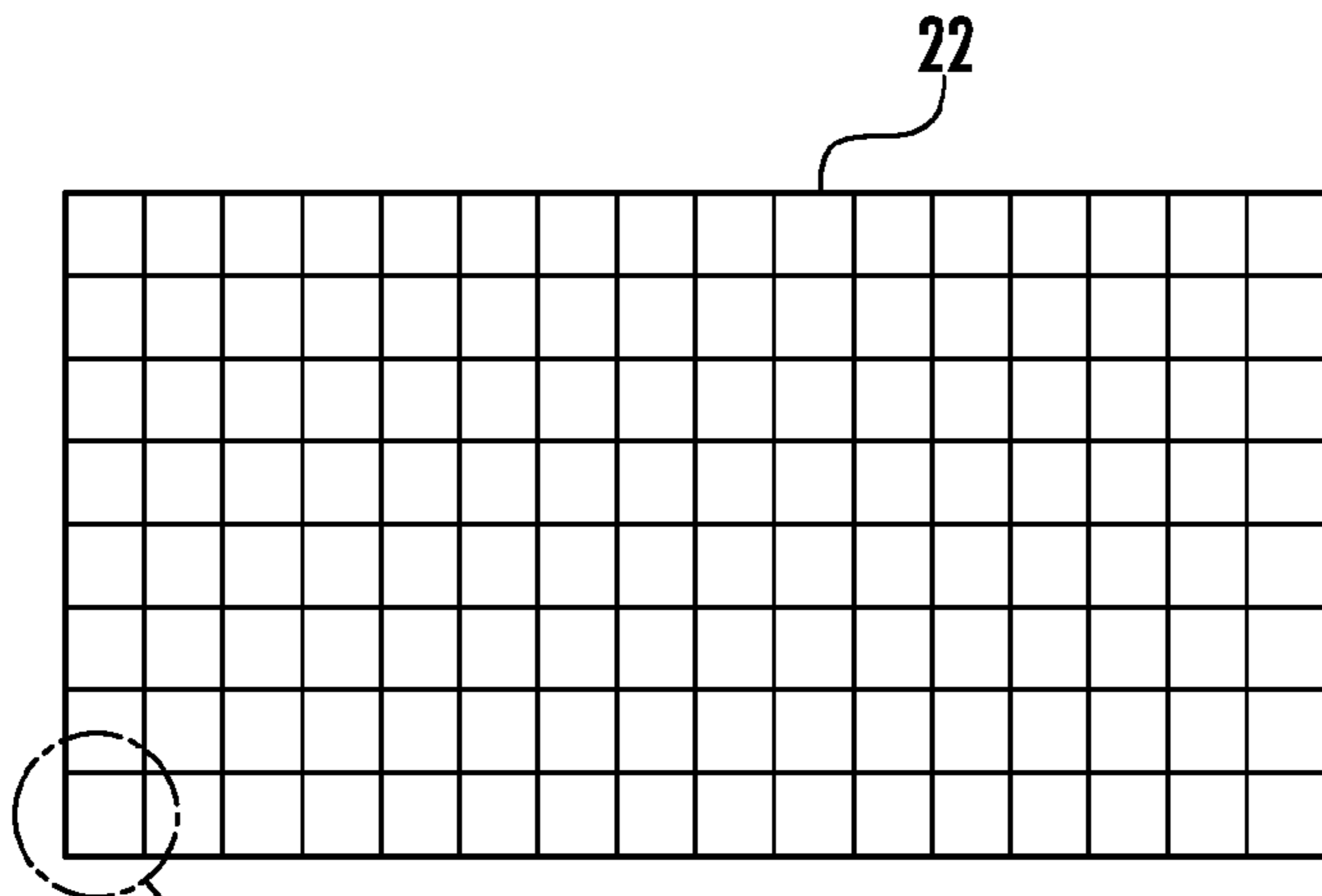


FIG. 7A

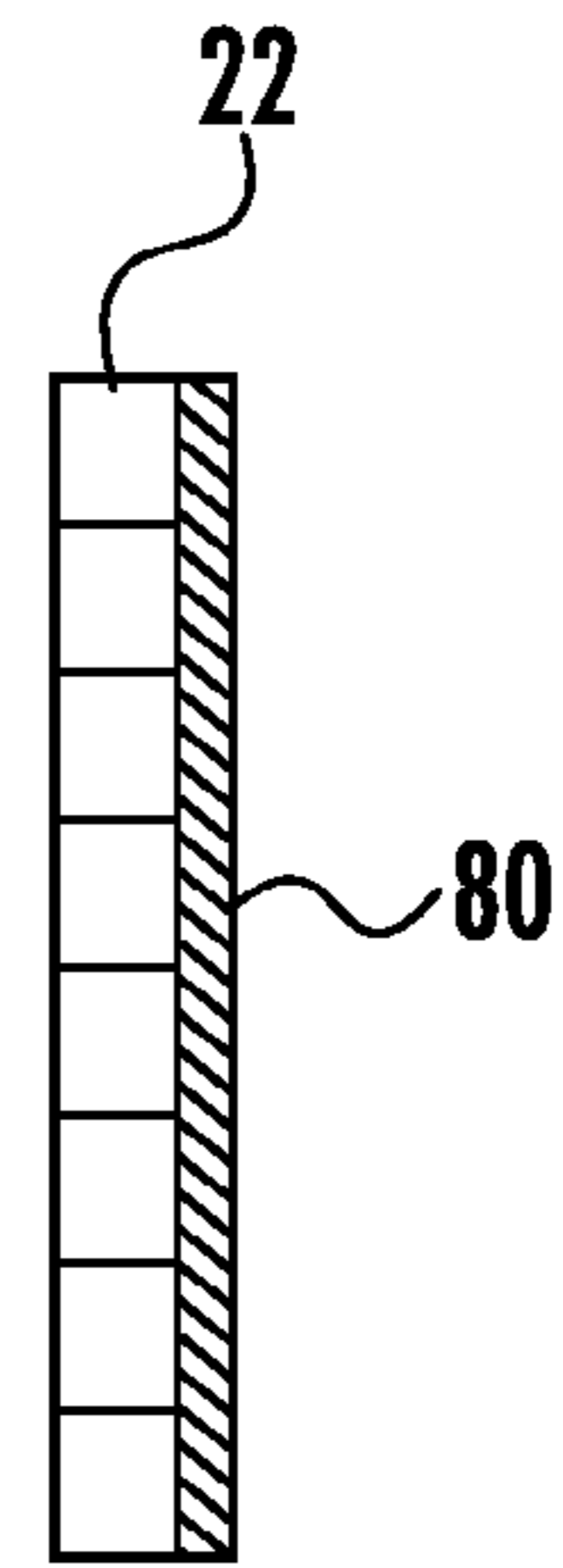
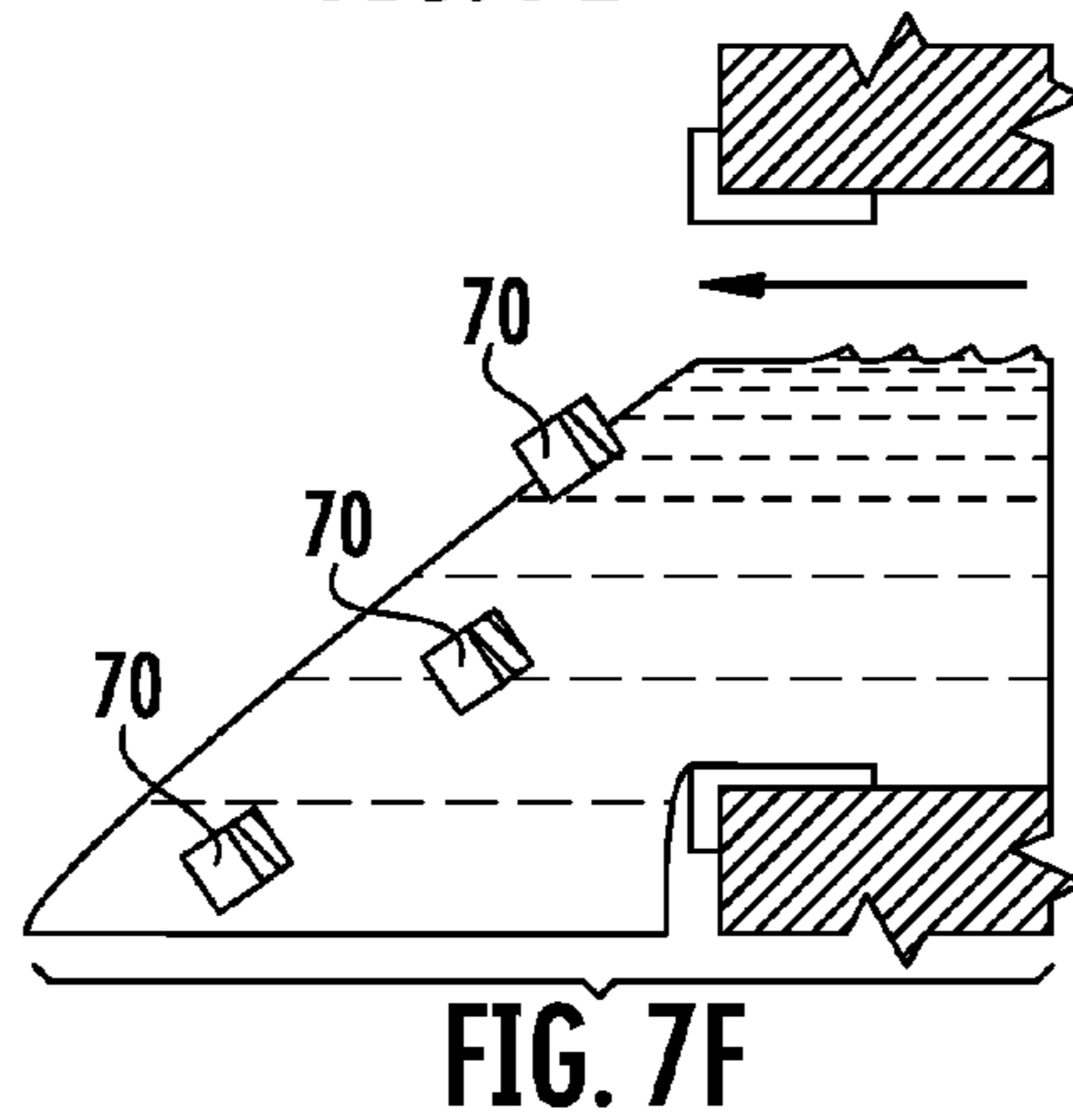
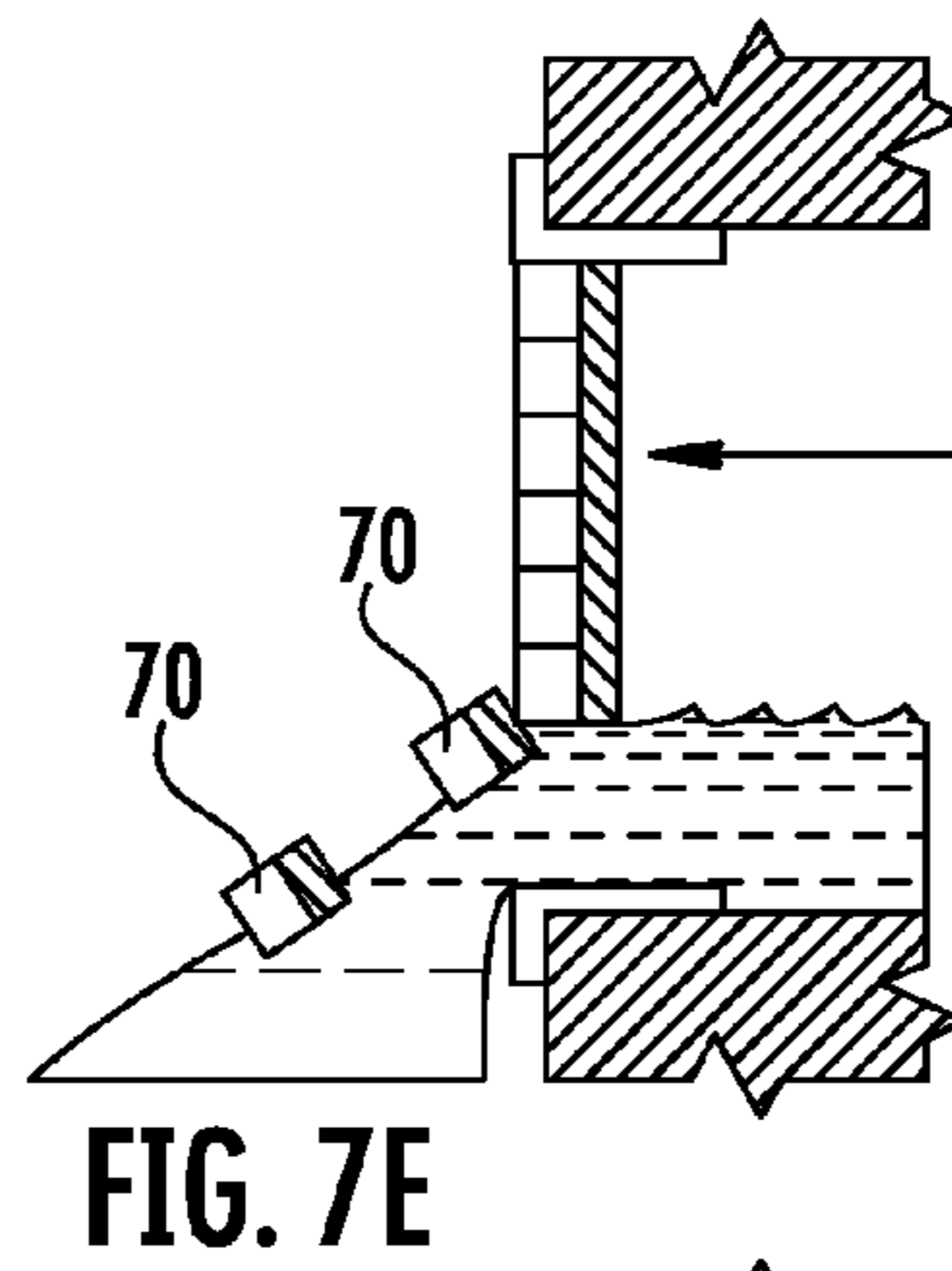
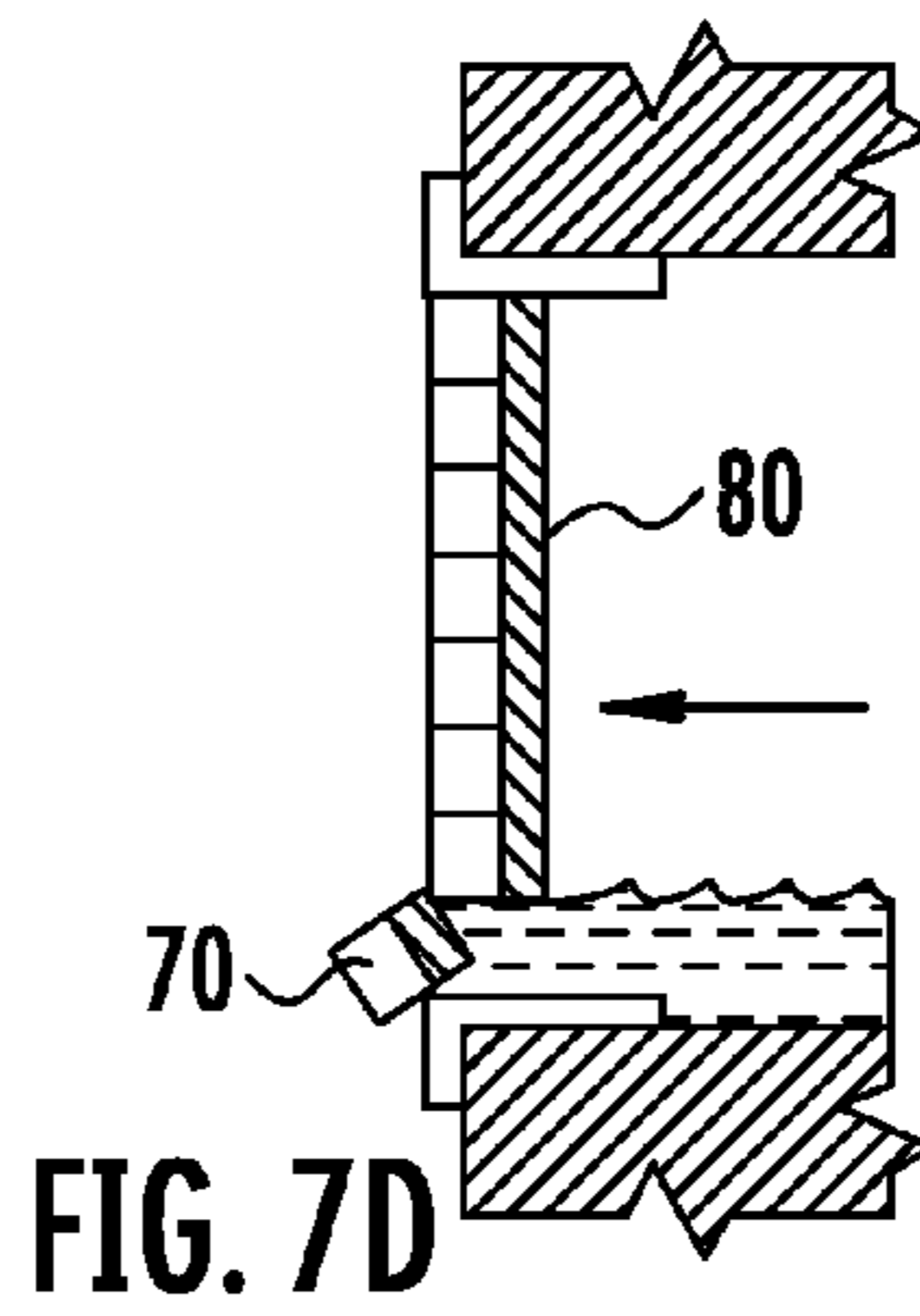
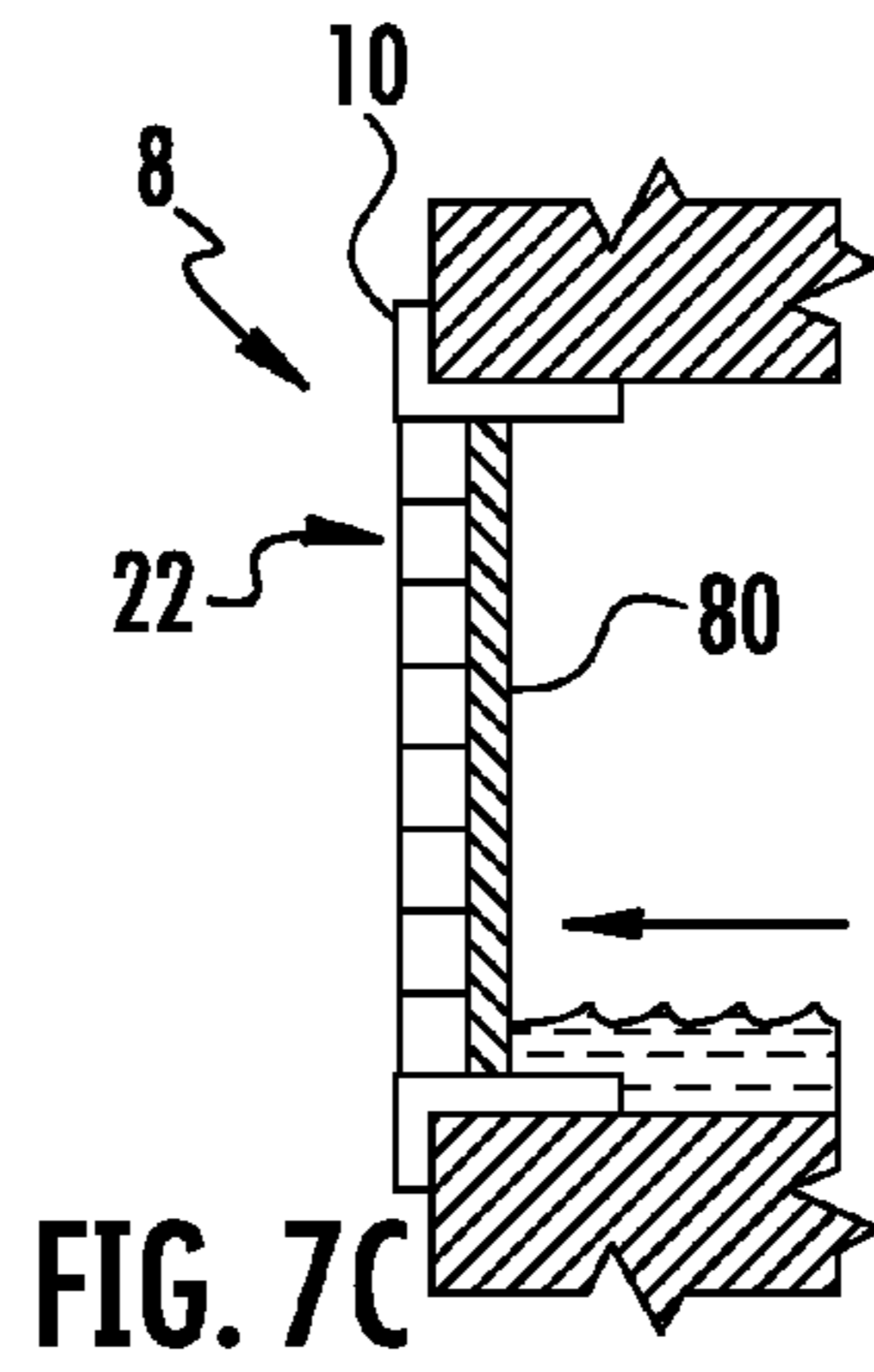


FIG. 7B



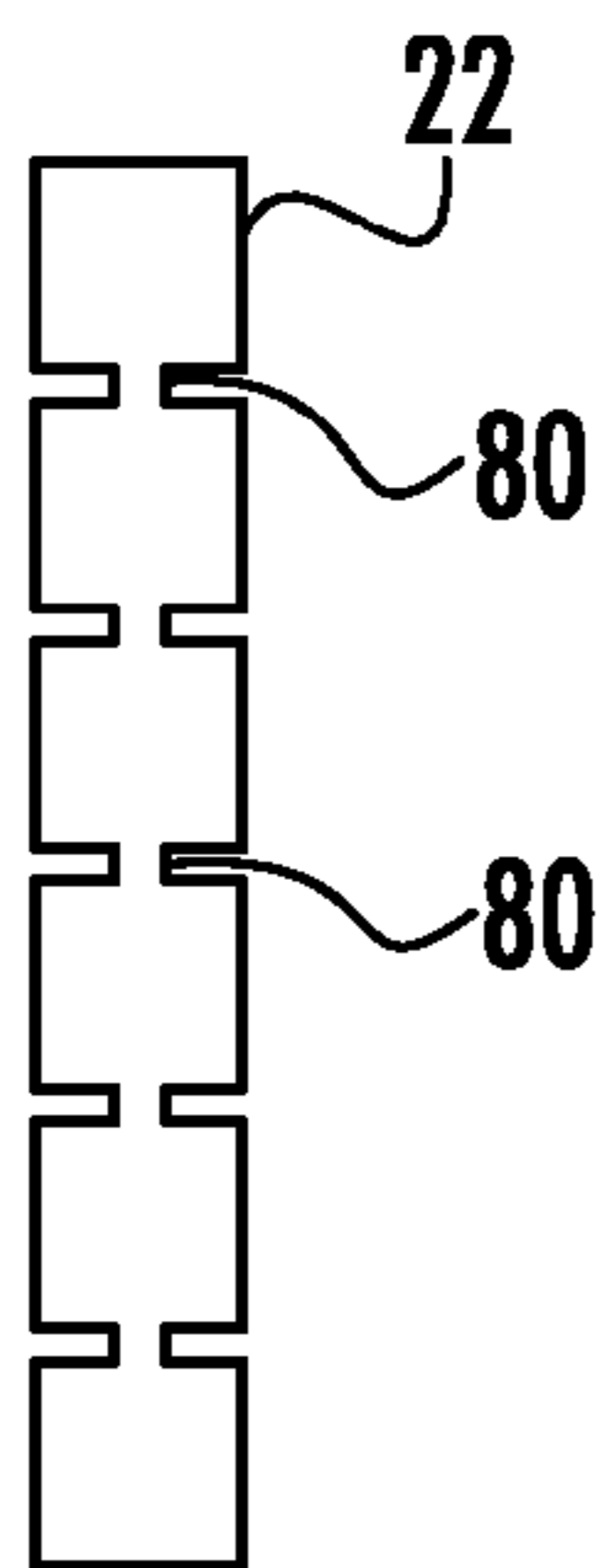


FIG. 7G

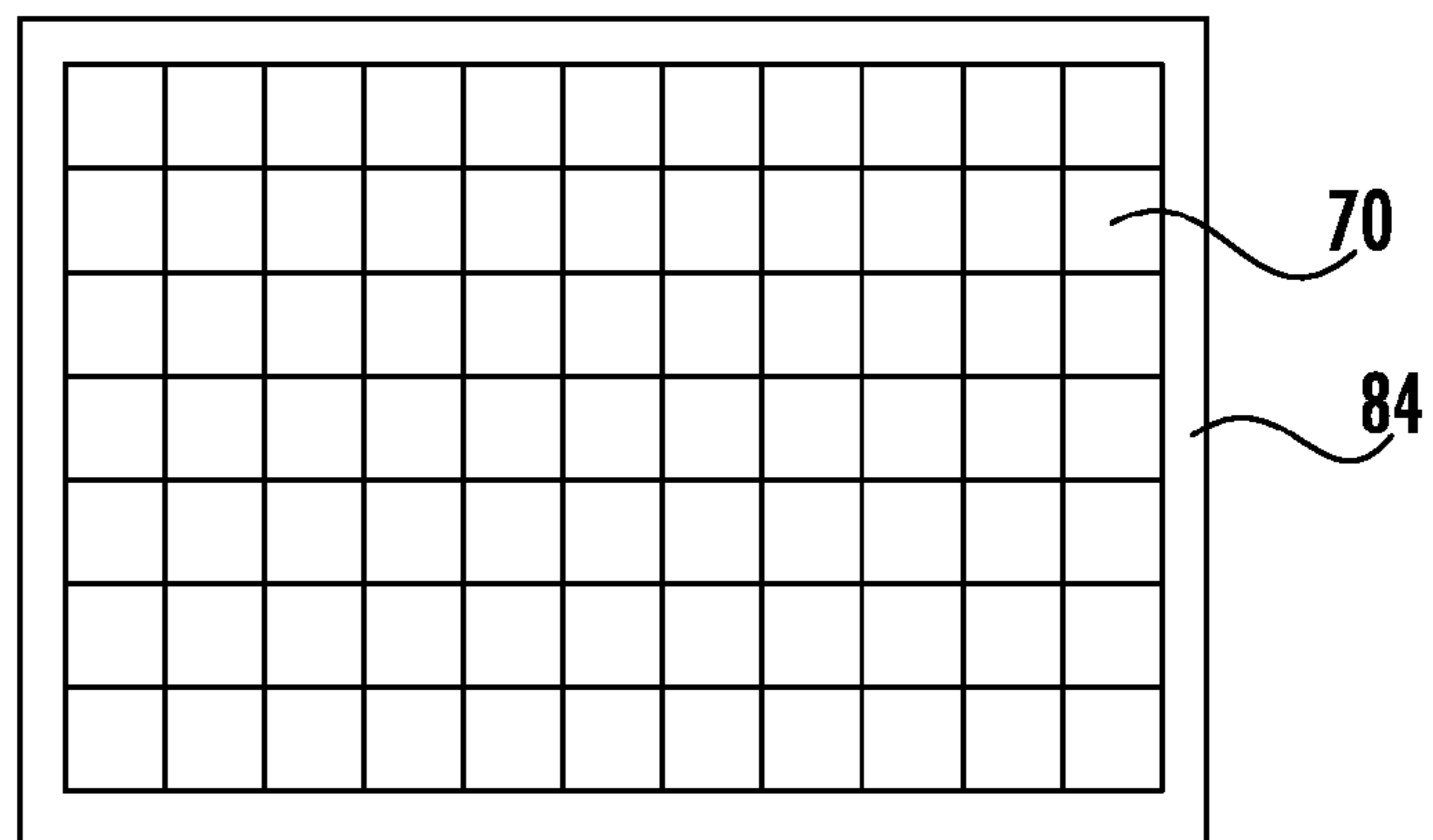
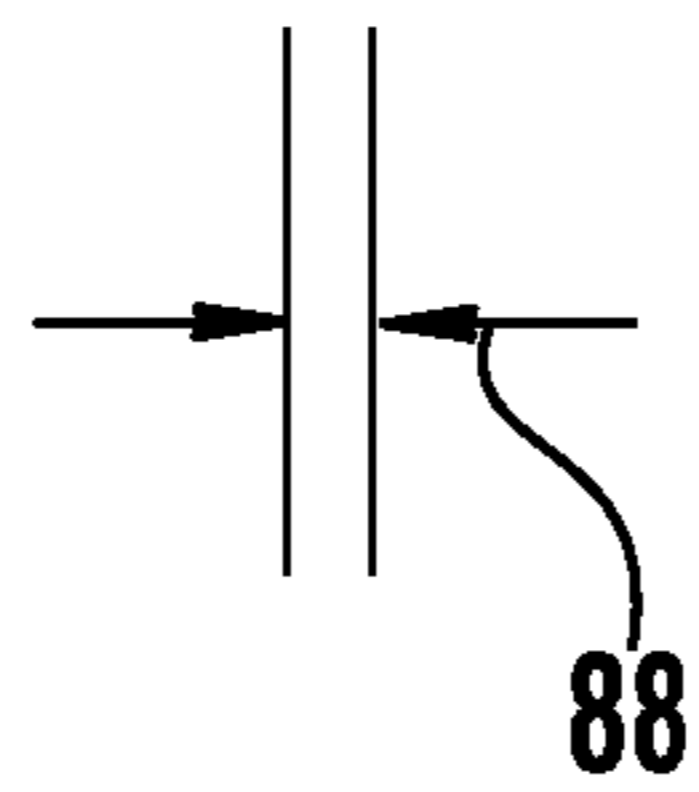


FIG. 7H



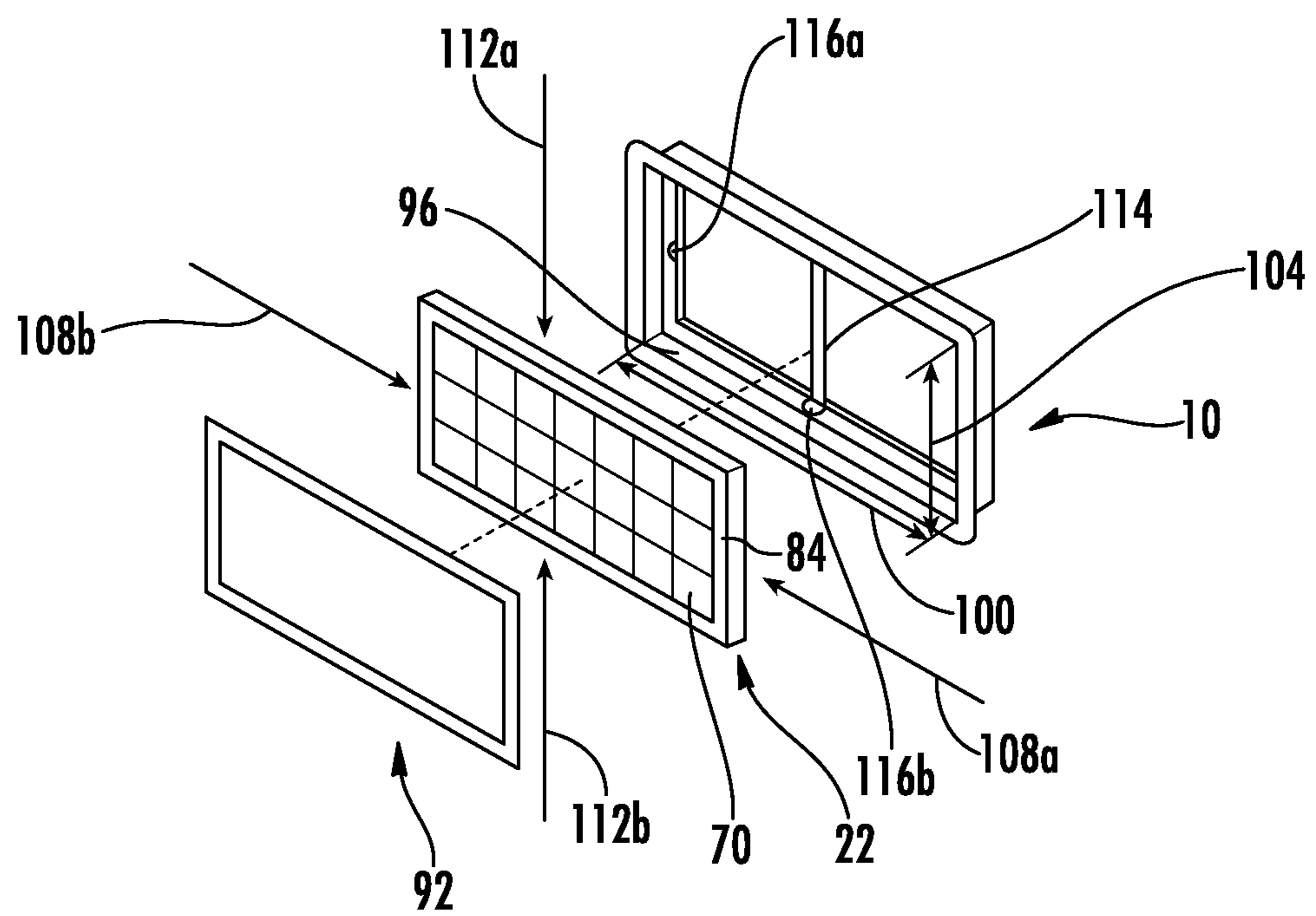


FIG. 8A

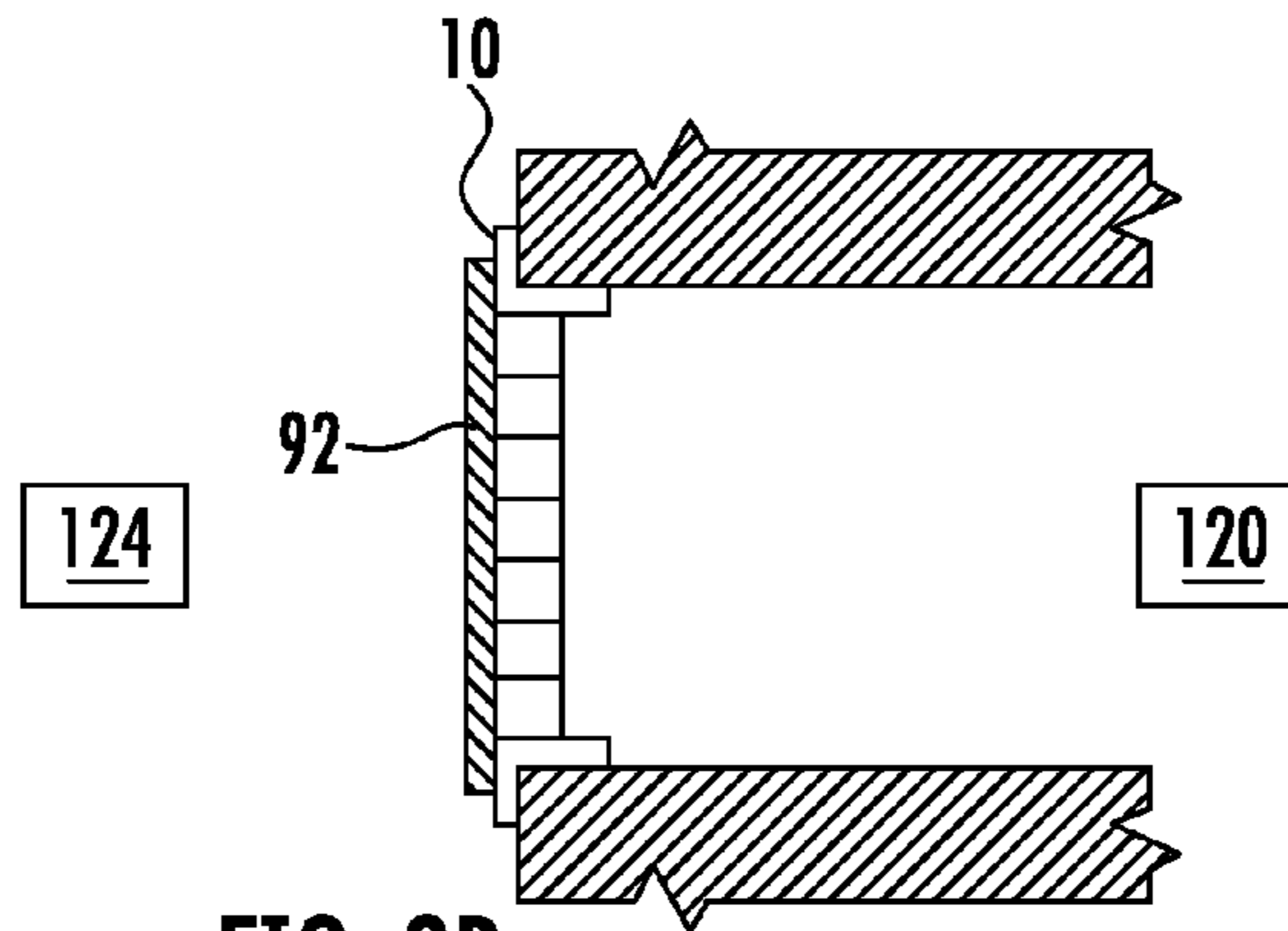


FIG. 8B

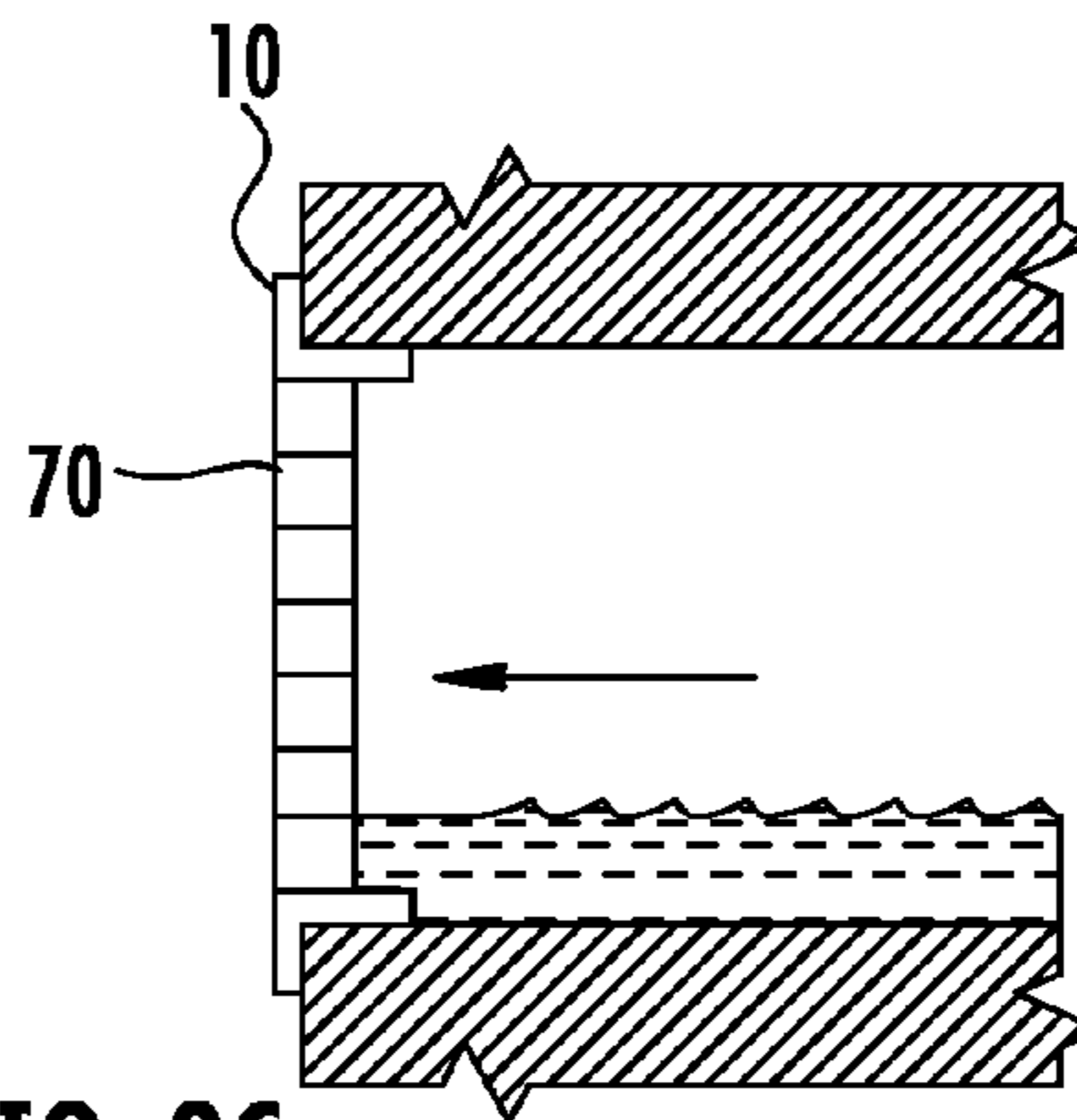


FIG. 8C

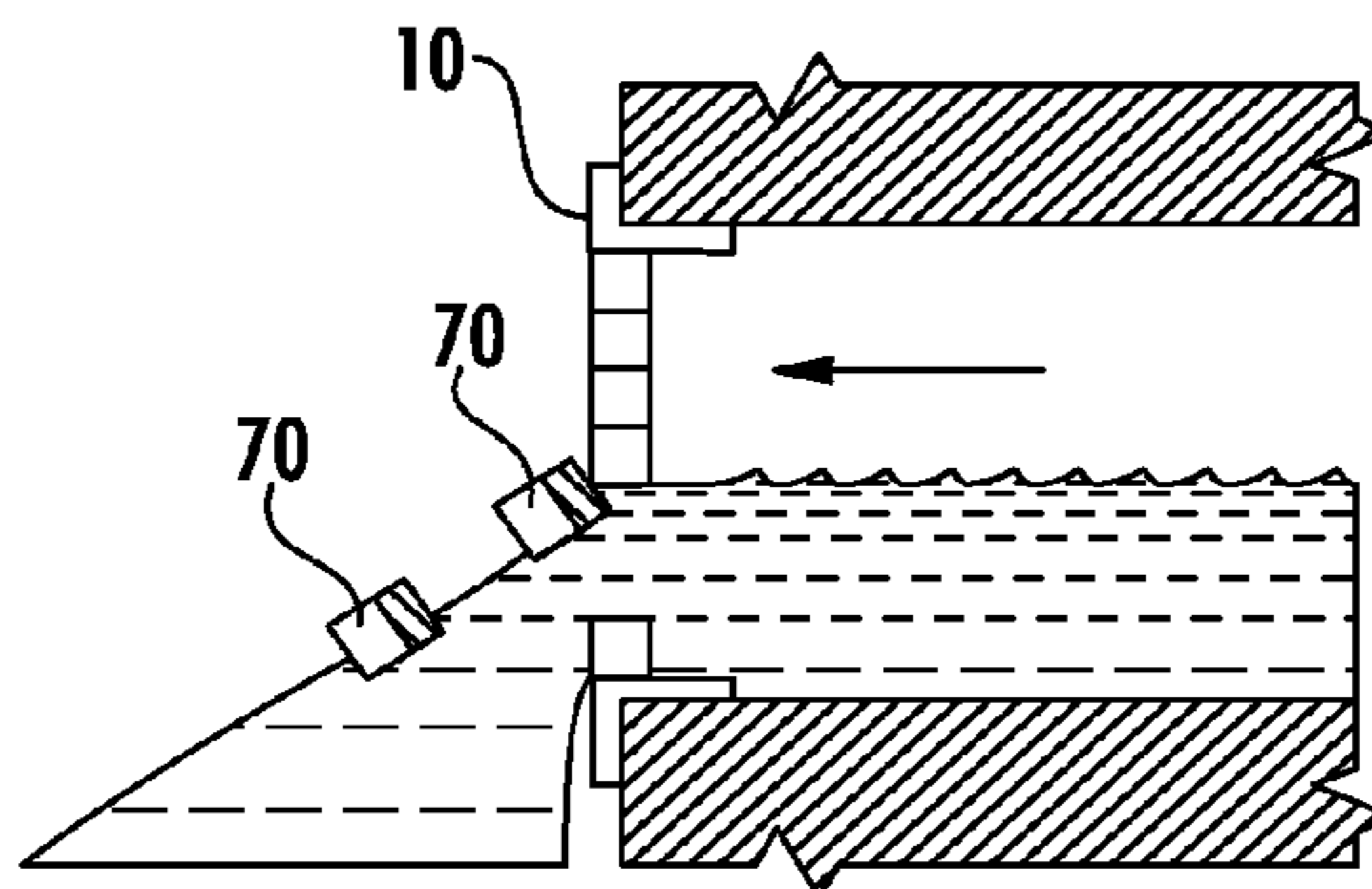


FIG. 8D

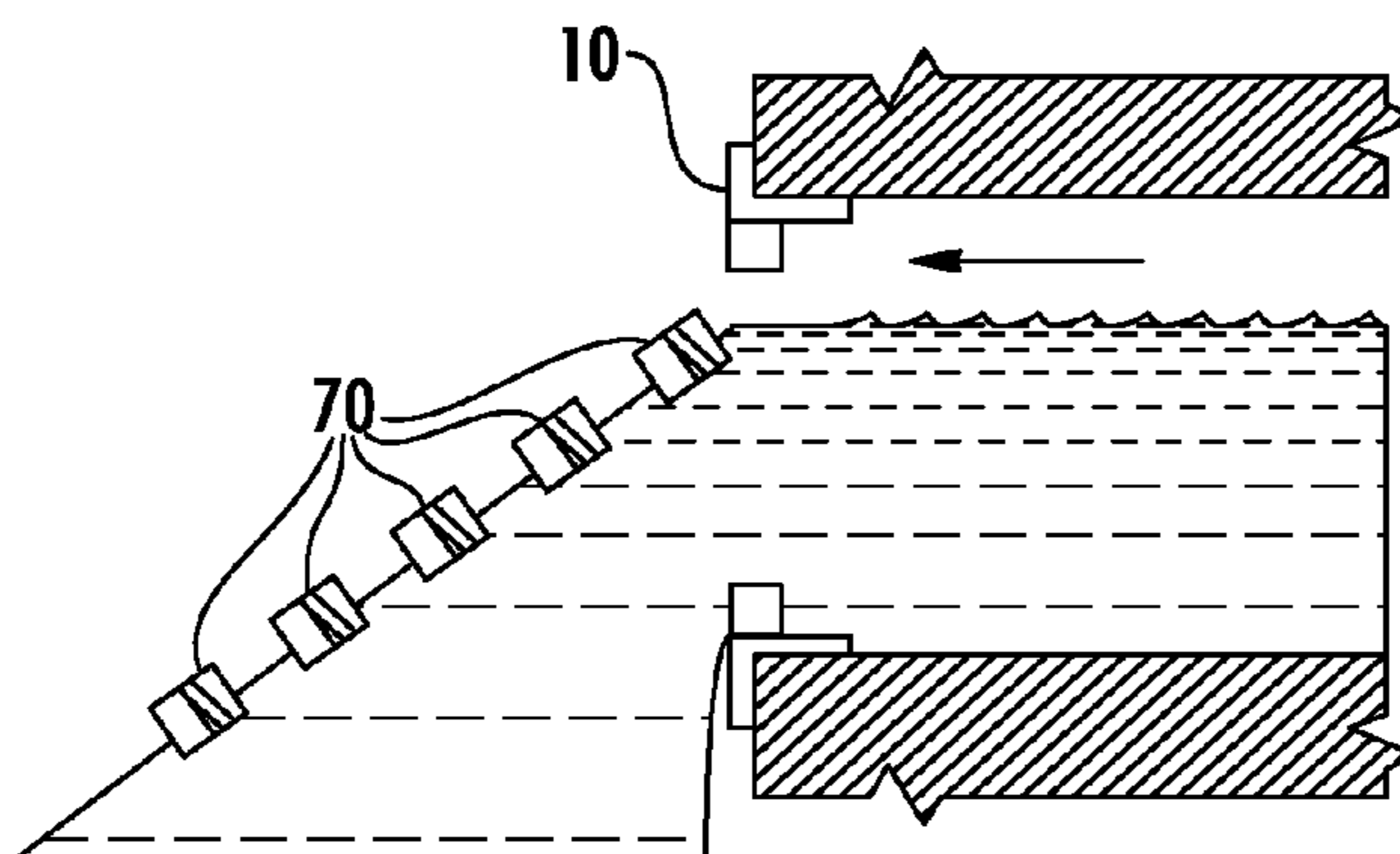


FIG. 8E

**FLOOD VENT HAVING A PANEL****CROSS REFERENCE TO RELATED APPLICATIONS**

This application is a continuation-in-part application that claims the benefit of the filing date under 35 U.S.C. § 120 of U.S. patent application Ser. No. 15/583,284, filed on May 1, 2017, which is a continuation application that claims the benefit of the filing date under 35 U.S.C. § 120 of U.S. patent application Ser. No. 14/965,360, filed on Dec. 10, 2015 and issued as U.S. Pat. No. 9,637,912, the entirety of both of which are incorporated herein by reference.

**TECHNICAL FIELD**

This disclosure relates generally to flood water control devices and more particularly to a flood vent having a panel.

**BACKGROUND**

Typically, one or more flood vents may be installed into an opening in a structure (such as a building) in order to provide for equalization of interior and exterior hydrostatic forces caused by flooding fluids, such as water. Such typical flood vents may include a screen or grille that may allow flooding fluids to pass into or out of the structure through the flood vent, but that may prevent animals or other pests from entering or exiting the structure through the flood vent. These typical flood vents, however, may be deficient.

**SUMMARY**

According to one embodiment, a flood vent panel includes a plurality of insulation pieces positioned together, and a panel frame surrounding the plurality of insulation pieces. The flood vent panel is configured to be coupled to a frame positionable into an opening in a structure, so as to at least partially block a fluid passageway through the opening in the structure. One or more of the plurality of insulation pieces are configured to uncouple from the flood vent panel when at least a predetermined amount of pressure is applied to a portion of the flood vent panel by one or more of a fluid or an object carried by the fluid, so as to reduce an amount of blockage of the fluid passageway provided by the flood vent panel.

Certain embodiments of the disclosure may provide one or more technical advantages. For example, the flood vent panel includes a plurality of insulation pieces positioned together. One or more of these insulation pieces are configured to uncouple from the flood vent panel when at least a predetermined amount of pressure is applied to a portion of the flood vent panel by one or more of a fluid or an object carried by the fluid (such as a tree limb or dirt). As such, in particular embodiments, the flood vent panel may prevent (or substantially prevent) objects and/or fluids from passing through the flood vent until a predetermined amount of pressure is applied to the panel. After the predetermined amount of pressure is applied to the panel, one or more of the insulation pieces of the panel may be uncoupled from the panel and may no longer prevent objects and/or fluids from passing through the flood vent (or the amount of blockage of the fluid passageway provided by the panel may be reduced). This may, in particular embodiments, allow the flood vent to provide for equalization of hydrostatic forces caused by, for example, flooding fluids, even when the flooding fluids carry objects (such as debris) that may clog the openings in the

panel, when the openings in the panel are too small to allow sufficient fluids to pass through the flood vent, when the openings in the panel are closed, and/or when the panel does not include any openings.

Certain embodiments of the disclosure may include none, some, or all of the above technical advantages. One or more other technical advantages may be readily apparent to one skilled in the art from the figures, descriptions, and claims included herein.

**BRIEF DESCRIPTION OF THE FIGURES**

For a more complete understanding of the present disclosure and its features and advantages, reference is now made to the following description, taken in conjunction with the accompanying drawings, in which:

FIG. 1A illustrates a front view of a door of an example flood vent.

FIG. 1B illustrates a side view of the door of FIG. 1A.

FIG. 2A illustrates a front view of an example flood vent inserted into an opening of a structure.

FIG. 2B illustrates a cross-sectional view of an example flood vent inserted into an opening of a structure, taken along section line 2B-2B of FIG. 2A.

FIGS. 3A-3C illustrate the flood vent of FIGS. 1-2 having a first example of connectors.

FIGS. 4A-4C illustrate the flood vent of FIGS. 1-2 having a second example of connectors.

FIGS. 5A-6C illustrate the flood vent of FIGS. 1-2 with a panel having example perforations.

FIGS. 7A-7H illustrate the flood vent of FIGS. 1-2 with a panel having a plurality of insulation pieces and one or more insulation piece connectors.

FIGS. 8A-8E illustrate the flood vent of FIGS. 1-2 with one example of an insulation piece connector.

**DETAILED DESCRIPTION**

Embodiments of the present disclosure are best understood by referring to FIGS. 1-8 of the drawings, like numerals being used for like and corresponding parts of the various drawings.

FIGS. 1-2 illustrate an example of a flood vent **8**. The flood vent **8** may be inserted (or otherwise installed) into an opening **18** in a structure **17**, such as an opening in a building, a wall, a foundation, a basement, a garage, a garage door, a foyer, an entry, any structure located below base flood plain levels, any other structure, or any combination of the preceding. The flood vent **8** may provide an entry point and/or exit point in the structure for flooding fluids, such as water. As such, the flood vent **8** may provide equalization of interior and exterior hydrostatic forces caused by the flooding fluids. In particular embodiments, the flood vent **8** may comply with various building code and federal government regulations that mandate that buildings with enclosed spaces located below base flood plain levels, such as crawl spaces, must provide for automatic equalization of interior and exterior hydrostatic forces caused by flooding fluids. According to these regulations, flooding fluids must be permitted to enter and exit the enclosed spaces freely using flood venting.

As illustrated, the flood vent **8** includes a frame **10** and a panel **22**. The frame **10** may be configured to be inserted into an opening **18** in a structure **17**, and may be further configured to form a fluid passageway through the opening **18** in the structure **17**, thereby allowing fluids to enter and/or exit the structure **17**. The frame **10** includes a top edge **11a**, a

bottom edge **11b**, and two side edges **11c** and **11d** (not shown). The edges **11** may define an outer perimeter of the frame **10**. The frame **10** further includes a top rail **12a**, a bottom rail **12b**, and two side rails **12c** and **12d**. When the flood vent **8** is inserted (or otherwise installed) in the opening **18** in the structure **17**, the edges **11** of the frame **10** may be positioned (entirely or partially) within the opening **18** of the structure **17** (as is seen in FIG. 2B), and the rails **12** may be positioned (entirely or partially) outside the opening **18** of the structure **17** (as is further seen in FIG. 2B). The frame **10** also includes a top interior edge **13a**, a bottom interior edge **13b**, and two side interior edges **13c** and **13d** (not shown). The interior edges **13** of the frame **10** may define an inner perimeter of the frame **10**. Furthermore, although the flood vent **8** is illustrated as including a single frame **10** and a single panel **22**, the flood vent **8** may include multiple frames **10** and/or multiple panels **22**. For example, the flood vent **8** may include two frames **10** (or two or more frames **10**) stacked on top of each other (and coupled together), along with one or more panels **22** attached to each frame **10** (or a single panel **22** attached to multiple frames **10**). As another example, the flood vent **8** may include two frames **10** (or two or more frames **10**) positioned horizontally next to each other (and coupled together), along with one or more panels **22** attached to each frame **10** (or a single panel **22** attached to multiple frames **10**). As a further example, the flood vent **8** may include two frames **10** (or two or more frames **10**) stacked on top of each other and two frames **10** (or two or more frames **10**) positioned horizontally next to each other (and these four or more frames **10** may be coupled together), along with one or more panels **22** attached to each frame **10** (or a single panel **22** attached to multiple frames **10**).

The frame **10** may have any shape. For example, the frame **10** may be rectangular-shaped. The frame **10** may also have any dimensions. For example, the top and bottom edges **11a** and **11b** may be approximately 16" long (16"±0.2"), and the side edges **11c** and **11d** may be approximately 8" long, thereby forming an 8"×16" rectangular outer perimeter. Furthermore, the top and bottom rails **12a** and **12b** may be approximately 17<sup>1</sup>/<sub>16</sub>" long, and the side rails **12c** and **12d** may be approximately 9<sup>1</sup>/<sub>16</sub>" long. Additionally, when two or more frames **10** are coupled together (as is discussed above), the flood vent **8** may have an outer perimeter of, for example, approximately 16"×16", 8"×32", 16"×32", or any other dimensions. The frame **10** may be formed (or made) of any material. For example, the frame **10** may be formed of a corrosion resistant material, such as stainless steel, spring steel, plastic, a polymer, cement, brick, any other corrosion resistant material, or any combination of the preceding.

The frame **10** may be configured to be inserted (or otherwise installed) into an opening **18** in any side of the structure **17**. For example, the opening **18** in the structure **17** may extend from the exterior of the structure **17** to the interior of the structure **17** (such as the interior of a building), thereby allowing fluids to enter and/or exit the structure **17**. The frame **10** of the flood vent **8** may be inserted (or otherwise installed) on the exterior side of the structure **17** (for an exterior frame **10** for an exterior flood vent **8**, for example) or on the interior side of the structure **17** (for an interior frame **10** for an interior flood vent **8**, for example). As illustrated in FIGS. 1-2, frame **10** is inserted on the exterior side of the structure **17**. Furthermore, frames **10** may be inserted (or otherwise installed) on both the exterior side of the structure **17** (for exterior frames **10**, for example) and the interior side of the structure **17** (for interior frames **10**, for example).

Additionally, in particular embodiments, a sleeve may be positioned in-between an interior frame **10** and an exterior frame **10**. The sleeve may be configured to connect to the exterior frame **10** at a first end of the sleeve, extend through the opening **18** in the structure **17** to the interior frame **10**, and connect to the interior frame **10** at a second end of the sleeve. The sleeve may form a portion of the fluid passageway through the opening **18** in the structure **17**. For example, fluid such as water may enter the opening **18** in the structure **17** through the exterior flood vent **8**, flow through the sleeve, and exit the opening **18** into the interior of the structure **17** (or vice versa). The sleeve may have any shape. For example, the sleeve may be a hollow rectangular sleeve. The sleeve may have any dimensions. For example, the sleeve may be sized to fit entirely within the opening **18**, connecting the exterior frame **10** to the interior frame **10**. The sleeve may be formed (or made) of any material. For example, the sleeve may be formed of a corrosion resistant material, such as stainless steel, spring steel, plastic, a polymer, cement, brick, any other corrosion resistant material, or any combination of the preceding.

The flood vent **8** further includes a panel **22**. The panel **22** may be configured to be coupled to the frame **10** (thereby coupling the panel **22** to the structure **17** indirectly). The panel **22** may be coupled to the frame **10** in any manner. For example, the panel **22** may be formed integral with the frame **10**, welded to the frame **10**, coupled to the frame **10** using an adhesive (such as glue, cement, and/or Lexel®), attached to the frame **10** using one or more pins that may be inserted or snapped into one or more channels or hooks in the frame **10**, attached to the frame **10** using one or more rivets, nails, and/or any other connector, attached to the structure **17** (and thus the frame **10**) using one or more rivets, nails, and/or any other connector, coupled to the frame **10** in any other manner, or any combination of the preceding. The panel **22** may be configured to be coupled to the frame **10** in the fluid passageway formed by the frame **10**. Additionally, when coupled to the frame **10**, the panel **22** may at least partially block the fluid passageway formed by the frame **10**, an example of which is seen in FIGS. 2A-2B. The panel **22** may block any portion of the fluid passageway formed by the frame **10**. For example, the panel **22** may block all of the fluid passageway (or completely block the fluid passageway) formed by the frame **10**, thereby preventing all (or substantially all) fluids (such as water and/or air) from passing through the panel **22**, as well as preventing objects (such as small animals) from passing through the panel **22**. As another example, the panel **22** may block only a portion of the fluid passageway, thereby preventing (or substantially preventing) objects (such as small animals) from passing through the panel **22**, but allowing fluids (such as water and/or air) to pass through the panel **22**.

The panel **22** may be any type of panel. For example, the panel **22** may include one or more openings **26** configured to allow fluids (such as water and/or air) to pass through the panel **22**, but prevent objects (such as small animals) from passing through the panel **22**. In such an example, the panel **22** may be a mesh grille panel, a grate, any other panel with one or more openings **26**, or any combination of the preceding. The openings **26** may have any size and/or shape. In particular embodiments, the size of the openings **26** may be sufficiently small to prevent (or substantially prevent) objects, such as small animals, from passing through the panel **22**. The panel **22** may include any number of openings **26**, such as one opening **26**, two openings **26**, three openings **26**, four openings **26**, eight openings **26**, ten openings **26**, or any other number of openings **26**. The openings **26** may be

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completely open, or the openings **26** may be screened to prevent (or substantially prevent) penetration by small animals and/or insects.

As another example, the panel **22** may be a solid panel that may prevent all (or substantially all) fluids (such as water and/or air) from passing through the panel **22**, as well as preventing (or substantially preventing) objects (such as small animals) from passing through the panel **22**. As a further example, the panel **22** may be a screen (such as a fine mesh screen) configured to prevent (or substantially prevent) penetration by small animals and/or insects. As another example, the panel **22** may include one or more louvers (such as, for example, four louvers, or any other number of louvers) that may be opened to allow air to pass through the panel **22** (e.g., during warmer temperatures), and closed to prevent (or substantially prevent) air from passing through the panel **22** (e.g., during colder temperatures). Additionally, the louvered panel **22** may be screened to prevent (or substantially prevent) penetration by small animals and/or insects. Further details regarding louvers (and the operation of such louvers) is included in U.S. Pat. No. 6,692,187 entitled "Flood Gate For Door," which is incorporated herein by reference.

The panel **22** includes a top edge **23a**, a bottom edge **23b**, and two side edges **23c** and **23d**. The edges **23** may define an outer perimeter of the panel **22**. The panel **22** further includes a first side **24a** and a second side **24b** positioned opposite of the first side **24a**. As is illustrated, the first side **24a** may be positioned to face the exterior of the structure **17**, and the second side **24b** may be positioned to face the interior of the structure **17**. However, the first side **24a** may face either the exterior of the structure **17** or the interior of the structure **17**, and the second side **24b** may face either the exterior of the structure **17** or the interior of the structure **17**. The panel **22** may have any shape, and may also have any dimensions. For example, the panel **22** may have the same (or substantially the same) shape and/or dimensions as the inner perimeter of the frame **10**. As such, in particular embodiments, the panel **22** may be flush against the inner perimeter of the frame **10**. As another example, the panel **22** may have larger dimensions (or a different shape) than the inner perimeter of the frame **10**. As such, in particular embodiments, the panel **22** may be coupled to the exterior of the frame **10** (such as coupled to the rails **12**) or to the structure **17**. As a further example, the panel **22** may have smaller dimensions (or a different shape) than the inner perimeter of the frame **10**. As another example, the panel **22** may have an outer perimeter of, for example, approximately  $7\frac{5}{8}'' \times 15\frac{3}{4}''$ . The panel **22** may also have any thickness **25**. For example, panel **22** may have a thickness **25** of 0.15", 0.25", 0.50", 1.0", 1.50", 2.0", 3.0", 4.0", or any other thickness **25**. The panel **22** may be formed (or made) of any material. For example, the panel **22** may be formed of a corrosion resistant material, such as stainless steel, spring steel, plastic, a polymer, cement, brick, any other corrosion resistant material, or any combination of the preceding.

As is discussed above, the flood vent **8** may be inserted (or otherwise installed) into an opening **18** in a structure **17**. The structure **17** may be any structure. For example, the structure may be a building, a wall, a foundation, a basement, a garage, a garage door, a foyer, an entry, any structure located below base flood plain levels, any other structure, or any combination of the preceding. The structure **17** may include one or more edges **19** that form an inner perimeter of the opening **18** in the structure **17**. The opening **18** may have any shape and/or dimensions for receiving the frame **10** (or frames **10**) of the flood vent **8**. For example, when the frame

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**10** has a rectangular outer perimeter of  $8'' \times 16''$ , the opening **18** may have a rectangular inner perimeter of  $8\frac{1}{4}'' \times 16\frac{1}{4}''$ . As another example, when the flood vent **8** has multiple frames **10** (as is discussed above) and a rectangular outer perimeter of  $16'' \times 32''$ , the opening **18** may have a rectangular inner perimeter of  $16\frac{3}{8}'' \times 33''$ . As such, the flood vent **8** may be inserted (or otherwise installed) into the opening **18** of the structure **17**. The opening **18** may be added to the structure **17** in any manner. For example, the opening **18** may be added (or cut into) the structure **17** after the structure **17** is already built. As another example, the opening **18** may be left in (or built into) the structure **17** as the structure **17** is being built. In such an example, the frame **10** of the flood vent **8** (or the entire flood vent **8**) may be built into the opening **18** of the structure **17** as the structure **17** is being built.

Modifications, additions, or omissions may be made to the flood vent **8** of FIGS. **1-2** without departing from the scope of the disclosure. For example, although the frame **10** of the flood vent **8** has been described above as including rails **12**, in particular embodiments, the frame **10** may not include any rails **12**. As another example, although the flood vent **8** has been described above as including a frame **10**, in particular embodiments, the flood vent **8** may not include a frame **10**. In such embodiments, the panel **22** may be configured to be coupled directly to the structure **17**. As such, in particular embodiments, the panel **22** may be inserted into (or installed on) the structure **17** (such as the opening **18** in the structure **17**) without the use of a frame **10**. Furthermore, in such embodiments, the opening **18** (itself) may form the fluid passageway through the structure **17**.

As is discussed above, a flood vent may typically include a screen or grille that may allow flooding fluids to pass into or out of the structure through the flood vent, but that may prevent animals or other pests from entering or exiting the structure through the flood vent. Unfortunately, such typical flood vents may be deficient. For example, although the screen or grille of the flood vent may prevent objects from entering the flood vent, the screen or grille may also prevent fluids from sufficiently passing through the flood vent. In particular, during a flood event, a large quantity of water may attempt to pass through the flood vent. If openings in the screen or grille are not large enough (or if the flood vent does not have any openings or if the openings in the flood vent are not open), the water may be prevented from quickly passing through the flood vent, which may disrupt the equalization of interior and exterior hydrostatic forces caused by flooding waters. Furthermore, the water may be carrying various pieces of debris (such as tree limbs and dirt) that may clog the openings, preventing the flood vent from allowing any (or most) of the water to pass through the flood vent. Conversely, if the openings are too large, the openings may not prevent objects (such as small animals) from entering the flood vent. Contrary to these typical flood vents, FIGS. **3-8** illustrate examples of flood vents that may provide one or more advantages.

FIGS. **3A-3C** illustrate the flood vent **8** of FIGS. **1-2** having example connectors **30**. Connectors **30** may be configured to couple the panel **22** to the frame **10**. Furthermore, the connectors **30** may be further configured to uncouple the panel **22** from the frame **10**. For example, the connectors **30** may be configured to uncouple the panel **22** from the frame **10** when a predetermined amount of pressure is applied to the panel **22**, such as by a fluid or an object (such as a tree limb or dirt) carried by the fluid. As such, in particular embodiments, the panel **22** of flood vent **8** may prevent (or substantially prevent) objects and/or fluids from



passing through the flood vent **8** until a predetermined amount of pressure is applied to the panel **22**; and after the predetermined amount of pressure is applied to the panel **22**, the panel **22** may be uncoupled from the flood vent **8** and may no longer prevent objects and/or fluids from passing through the flood vent **8** (or the amount of blockage of the fluid passageway provided by the panel **22** may be reduced). This may, in particular embodiments, allow the flood vent **8** to provide for equalization of hydrostatic forces caused by, for example, flooding fluids, even when the flooding fluids carry objects (such as debris) that may clog the openings **26** in the panel **22**, when the openings **26** in the panel **22** are too small to allow sufficient fluids to pass through the flood vent **8**, when the openings **26** in the panel are closed, and/or when the panel **22** does not include any openings **26**.

As is discussed above with regard to FIGS. **1-2**, the flood vent **8** includes a frame **10** and a panel **22**. The frame **10** may be configured to be inserted into an opening **18** in a structure **17**, and may be further configured to form a fluid passageway through the opening **18** in the structure **17**, thereby allowing the flooding fluids to enter and/or exit the structure **17**. The panel **22** may be configured to be coupled to the frame **10**. Furthermore, the panel **22** may be configured to be coupled to the frame **10** in the fluid passageway formed by the frame **10**. Additionally, when coupled to the frame **10**, the panel **22** may at least partially block the fluid passageway formed by the frame **10**, an example of which is seen in FIG. **3A**. The panel **22** may be coupled to the frame **10** by one or more connectors **30**. The panel **22** may be any type of panel. For example, as is illustrated in FIGS. **3A-3C**, the panel **22** may be a solid panel that may prevent all (or substantially all) fluids (such as water and/or air) from passing through the panel **22**, as well as prevent (or substantially prevent) objects (such as small animals) from passing through the panel **22**. As another example, the panel **22** may include one or more openings **26** configured to allow fluids (such as water and/or air) to pass through the panel **22**, but prevent objects (such as small animals) from passing through the panel **22**.

A connector **30** may be any type of connector that may couple the panel **22** to the frame **10**, and that may further uncouple the panel **22** from the frame **10** when, for example, a predetermined amount of pressure is applied to the panel **22**. As a first example, a connector **30** may be one or more raised bumps (or raised lips), as is illustrated in FIGS. **3A-3C**. The raised bumps may allow a panel **22** to be installed in the frame **10**, thereby coupling the panel **22** to the frame **10**, as is seen in FIG. **3A**. For example, an installer (such as a person) may push the panel **22** into the frame **10** with enough force to cause the panel **22** to move past the first set of raised bumps. In such an example, the panel **22** may then rest in a gap (or be sandwiched) in-between the first set of bumps and a second set of bumps (as is seen in FIG. **3A**), thereby coupling the panel **22** to the frame **10**. Furthermore, the raised bumps may continue to couple the panel **22** to the frame **10** until a predetermined amount of pressure is applied to the panel **22** by, for example, a fluid (such as flooding water). Once the predetermined amount of pressure is applied to the panel **22**, the panel **22** may be forced past a set of the raised bumps, as is seen in FIG. **3B**. This may uncouple the panel **22** from the frame **10**, causing the panel **22** to be completely separated from the frame **10**, and be carried away from the frame **10**, as is seen in FIG. **3C**. As such, in particular embodiments, the flood vent **8** may no longer prevent objects and/or fluids from passing through the flood vent **8** (or the amount of blockage of the fluid passageway provided by the panel **22** may be reduced).

As a second example, a connector **30** may be one or more pieces of velcro configured to couple the panel **22** to the frame **10**, and that may be further configured to uncouple the panel **22** from the frame **10** when, for example, a predetermined amount of pressure is applied to the panel **22**. The pieces of velcro may include, for example, one or more first pieces of velcro that are coupled to the frame **10** and/or the structure **17**, and one or more second pieces of velcro that are coupled to the panel **22**. The first pieces of velcro may be further coupled to the second pieces of velcro, thereby coupling the panel **22** to the frame **10** (and/or the structure **17**). Furthermore, the pieces of velcro may continue to couple the panel **22** to the frame **10** (and/or the structure **17**) until a predetermined amount of pressure is applied to the panel **22** by, for example, a fluid (such as flooding water). Once the predetermined amount of pressure is applied to the panel **22**, the coupling between the pieces of velcro may be broken. This may uncouple the panel **22** from the frame **10** (and/or the structure **17**), causing the panel **22** to be completely separated from the frame **10**, and be carried away from the frame **10**. As such, in particular embodiments, the flood vent **8** may no longer prevent objects and/or fluids from passing through the flood vent **8** (or the amount of blockage of the fluid passageway provided by the panel **22** may be reduced).

As a third example, a connector **30** may be one or more mechanical fasteners configured to couple the panel **22** to the frame **10**, and that may be further configured to uncouple the panel **22** from the frame **10** when, for example, a predetermined amount of pressure is applied to the panel **22**. The mechanical fasteners may include any one or more devices and/or objects that may mechanically fasten the panel **22** to the frame **10** (and/or the structure **17**), such as one or more nails, screws, rivets, nuts and bolts, rods and studs, anchors, pins, retaining rings and/or clips, any other devices that may mechanically fasten the panel **22** to the frame **10** (and/or the structure **17**), or any combination of the preceding. Furthermore, the mechanical fasteners may be configured to uncouple the panel **22** from the frame **10** when, for example, a predetermined amount of pressure is applied to the panel **22**. For example, the mechanical fasteners may be configured to break or otherwise uncouple from the panel **22** (and/or frame **10** and/or structure **17**) when, for example, a predetermined amount of pressure is applied to the panel **22**. In particular embodiments, the mechanical fasteners may be engineered and/or modified to break or otherwise uncouple from the panel **22** (and/or frame **10** and/or structure **17**) when, for example, a predetermined amount of pressure is applied to the panel **22**.

The mechanical fasteners may include one or more mechanical fasteners coupled to the panel **22**, the frame **10**, and/or the structure **17**, thereby coupling the panel **22** to the frame **10** (and/or the structure **17**). Furthermore, the mechanical fasteners may continue to couple the panel **22** to the frame **10** (and/or the structure **17**) until a predetermined amount of pressure is applied to the panel **22** by, for example, a fluid (such as flooding water). Once the predetermined amount of pressure is applied to the panel **22**, the mechanical fasteners may break or otherwise uncouple from the panel **22** (and/or frame **10** and/or structure **17**). This may uncouple the panel **22** from the frame **10** (and/or the structure **17**), causing the panel **22** to be completely separated from the frame **10**, and be carried away from the frame **10**. As such, in particular embodiments, the flood vent **8** may no longer prevent objects and/or fluids from passing through the flood vent **8** (or the amount of blockage of the fluid passageway provided by the panel **22** may be reduced).

As a fourth example, a connector 30 may be an adhesive configured to couple the panel 22 to the frame 10, and that may be further configured to uncouple the panel 22 from the frame 10 when, for example, a predetermined amount of pressure is applied to the panel 22. The adhesive may include any adhesive substance that may adhere the panel 22 to the frame 10 (and/or the structure 17), such as glue, cement, Lexel® adhesive, any other adhesive substance that may adhere the panel 22 to the frame 10 (and/or the structure 17), or any combination of the preceding. Furthermore, the adhesive may be further configured to uncouple the panel 22 from the frame 10 when, for example, a predetermined amount of pressure is applied to the panel 22. For example, the adhesive may be configured to peel off, break, or otherwise uncouple from the panel 22 (and/or frame 10 and/or structure 17) when, for example, a predetermined amount of pressure is applied to the panel 22. In particular embodiments, the adhesive may be engineered and/or modified to peel off, break, or otherwise uncouple from the panel 22 (and/or frame 10 and/or structure 17) when, for example, a predetermined amount of pressure is applied to the panel 22. In particular embodiments, the amount of adhesive used to adhere the panel 22 to the frame 10 (and/or frame 10 and/or structure 17) may be selected to cause the adhesive to peel off, break, or otherwise uncouple from the panel 22 (and/or frame 10 and/or structure 17) when, for example, a predetermined amount of pressure is applied to the panel 22.

The adhesive may include one or more portions of the adhesive coupled to the panel 22, the frame 10, and/or the structure 17, thereby coupling the panel 22 to the frame 10 (and/or the structure 17). Furthermore, the portions of the adhesive may continue to couple the panel 22 to the frame 10 (and/or the structure 17) until a predetermined amount of pressure is applied to the panel 22 by, for example, a fluid (such as flooding water). Once the predetermined amount of pressure is applied to the panel 22, the adhesive may peel off, break, or otherwise uncouple from the panel 22 (and/or frame 10 and/or structure 17). This may uncouple the panel 22 from the frame 10 (and/or the structure 17), causing the panel 22 to be completely separated from the frame 10, and be carried away from the frame 10. As such, in particular embodiments, the flood vent 8 may no longer prevent objects and/or fluids from passing through the flood vent 8 (or the amount of blockage of the fluid passageway provided by the panel 22 may be reduced).

As a fifth example, a connector 30 may be one or more pressure-based connectors configured to couple the panel 22 to the frame 10, and that may be further configured to uncouple the panel 22 from the frame 10 when, for example, a predetermined amount of pressure is applied to the panel 22. The pressure-based connectors may include any type of connector that may apply pressure (or otherwise utilize pressure) to couple the panel 22 to the frame 10 (and/or the structure 17). As an example, the pressure-based connectors may be a pressure-based clip (such as a spring clip) configured to fit in-between the edges 23 of the panel 22 and the inner edges 13 of the frame 10. In such an example, when the panel 22 is installed into the frame 10 (or the opening 18), the pressure-based connectors may be compressed by the edge 23 of the panel 22 and the edge 13 of the frame 10 (or the edge 19 of the opening 18), thereby causing the pressure-based connectors to push outward against the edge 13 of the frame 10 and inward against the edge 23 of the panel 22. Such pressure applied by the pressure-based connectors (along with friction, in particular embodiments) may at least couple the panel 22 to the frame 10. Furthermore, although the pressure-based connectors have been

described above as being a separate component from the panel 22, in particular embodiments, the pressure-based connectors may be the panel 22 (or part of the panel 22), itself. For example, the panel 22 may have dimensions larger than the inner perimeter of the frame 10. In such an example, inserting the panel 22 may cause the edges 23 and/or corners of the panel 22 to be bent in (or out) against the frame 10, thereby applying pressure that may couple the panel 22 to the frame 10 (or the structure 17). The pressure-based connectors may be further configured to uncouple the panel 22 from the frame 10 when, for example, a predetermined amount of pressure is applied to the panel 22. For example, the pressure-based connectors may be configured to break, slip off, or otherwise uncouple from the panel 22 (and/or frame 10 and/or structure 17) when, for example, a predetermined amount of pressure is applied to the panel 22. In particular embodiments, the amount of pressure applied by the pressure-based connectors may be configured to be overcome by the predetermined amount of pressure applied to the panel 22 by, for example, the fluid.

The pressure-based connectors may include one or more pressure-based connectors coupled to (and/or applying pressure to) the panel 22, the frame 10, and/or the structure 17, thereby coupling the panel 22 to the frame 10 (and/or the structure 17). Furthermore, the pressure-based connectors may continue to couple the panel 22 to the frame 10 (and/or the structure 17) until a predetermined amount of pressure is applied to the panel 22 by, for example, a fluid (such as flooding water). Once the predetermined amount of pressure is applied to the panel 22, the pressure-based connectors may break, slip off, or otherwise uncouple from the panel 22 (and/or frame 10 and/or structure 17). This may uncouple the panel 22 from the frame 10 (and/or the structure 17), causing the panel 22 to be completely separated from the frame 10, and be carried away from the frame 10. As such, in particular embodiments, the flood vent 8 may no longer prevent objects and/or fluids from passing through the flood vent 8 (or the amount of blockage of the fluid passageway provided by the panel 22 may be reduced).

As a sixth example, a connector 30 may be one or more permanent attachments configured to couple the panel 22 to the frame 10, and that may be further configured to break (or otherwise fail) so as to uncouple the panel 22 from the frame 10 when, for example, a predetermined amount of pressure is applied to the panel 22. The permanent attachment may include any one or more attachments that may permanently couple (and/or fixedly couple and/or couple in a manner that requires a break or a failure in order to uncouple) the panel 22 to the frame 10 (and/or the structure 17), such as a weld, the panel 22 being formed integral with the frame 10, any other attachment, or any combination of the preceding. Furthermore, the permanent attachments may be configured to uncouple the panel 22 from the frame 10 when, for example, a predetermined amount of pressure is applied to the panel 22. For example, the permanent attachments may be configured to break, fail, or otherwise uncouple from the panel 22 (and/or frame 10 and/or structure 17) when, for example, a predetermined amount of pressure is applied to the panel 22. In particular embodiments, the permanent attachments may be engineered and/or modified to break, fail, or otherwise uncouple from the panel 22 (and/or frame 10 and/or structure 17) when, for example, a predetermined amount of pressure is applied to the panel 22. For example, the permanent attachments (such as a weld) may include one or more engineered defects that may cause them to break or fail. As another example, a pressure (or stress) may be constantly applied to the permanent attachments, thereby

causing the additional predetermined amount of pressure to cause the permanent attachments to break or fail.

The permanent attachments may include one or more permanent attachments coupled to the panel 22, the frame 10, and/or the structure 17, thereby coupling the panel 22 to the frame 10 (and/or the structure 17). Furthermore, the permanent attachments may continue to couple the panel 22 to the frame 10 (and/or the structure 17) until a predetermined amount of pressure is applied to the panel 22 by, for example, a fluid (such as flooding water). Once the predetermined amount of pressure is applied to the panel 22, the permanent attachments may break, fail, or otherwise uncouple from the panel 22 (and/or frame 10 and/or structure 17). This may uncouple the panel 22 from the frame 10 (and/or the structure 17), causing the panel 22 to be completely separated from the frame 10, and be carried away from the frame 10. As such, in particular embodiments, the flood vent 8 may no longer prevent objects and/or fluids from passing through the flood vent 8 (or the amount of blockage of the fluid passageway provided by the panel 22 may be reduced).

The flood vent 8 may include any number of connectors 30. For example, the flood vent 8 may include one connector 30, two connectors 30, three connectors 30, four connectors 30, six connectors 30, eight connectors 30, ten connectors 30, or any other number of connectors 30. The connectors 30 may be attached or otherwise coupled to any portion of the panel 22, frame 10, and/or structure 17. For example, the connectors 30 may be attached to the edges 23 of the panel 22 and/or the edges 13 of the frame 10. As another example, the connectors 30 (such as screws) may be positioned through one or more holes (such as one or more screw holes) in side 24a (for example) of the panel 22, and inserted into one or more holes in the frame 10 and/or the structure 17, thereby coupling the panel 22 to the frame 10 and/or the structure 17. The connectors 30 may be added to (or otherwise coupled) to the panel 22 (and/or frame 10 and/or structure 17), the connectors 30 may be formed integral with (or formed as a part of) the panel 22 (and/or frame 10 and/or structure 17), or any combination of the preceding.

The connectors 30 may have any size and/or shape that may allow the connectors 30 to uncouple the panel 22 when a predetermined amount of pressure is applied to the panel 22. For example, the length of the connectors 30 (such as one or more mechanical fasteners) may be selected to cause the connectors 30 to break, fail, or otherwise uncouple the panel 22 when the predetermined amount of pressure is applied to the panel 22. The connectors 30 may be formed from any material that may allow the connectors 30 to uncouple the panel 22 when a predetermined amount of pressure is applied to the panel 22. For example, the connectors 30 may be formed from rubber, plastic, a polymer, a foam, a metal (such as aluminum, stainless steel, spring steel, a galvanized material, any other metal, or any combination of the preceding), any other material that may allow the connectors 30 to uncouple the panel 22 when a predetermined amount of pressure is applied to the panel 22, or any combination of the preceding. In particular, the connectors 30 (such as one or more mechanical fasteners) may be formed from a particular plastic (for example) that causes the mechanical fasteners to break or fail when the predetermined amount of pressure is applied to the panel 22.

As is discussed above, the connectors 30 may be configured to uncouple the panel 22 from the frame 10 (and/or structure 17) when, for example, a predetermined amount of pressure is applied to the panel 22. In particular embodiments, the predetermined amount of pressure may refer to

the lowest amount of pressure (or approximately the lowest amount of pressure) that would cause the panel 22 to prevent the equalization of interior and exterior hydrostatic forces caused by a fluid (such as flooding water) attempting to flow through the flood vent 8. As an example, the predetermined amount of pressure may be 0.5 PSI, 1 PSI, 1.5 PSI, 2 PSI, 2.5 PSI, 3 PSI, 3.5 PSI, 4 PSI, 4.5 PSI, 5 PSI, 6 PSI, 7 PSI, 10 PSI, approximately 0.5 PSI (i.e., 0.5 PSI $\pm$ 0.2 PSI), approximately 1 PSI, approximately 1.5 PSI, approximately 2 PSI, approximately 2.5 PSI, approximately 3 PSI, approximately 3.5 PSI, approximately 4 PSI, approximately 4.5 PSI, approximately 5 PSI, approximately 6 PSI, approximately 7 PSI, approximately 10 PSI, or any other amount of pressure that may prevent the equalization of interior and exterior hydrostatic forces caused by a fluid (such as flooding water) attempting to flow through the flood vent 8. As a further example, the predetermined amount of pressure may be a pressure range of 0.5 PSI-7 PSI, 0.5-5.0 PSI, 0.5-4.0 PSI, 0.5-3.0 PSI, 1.0-7.0 PSI, 1.0-5.0 PSI, 1.0-4.0 PSI, 1.0-3.0 PSI, 1.5-7.0 PSI, 1.5-5.0 PSI, 1.5-4.0 PSI, 1.5-3.0 PSI, 2.0-7.0 PSI, 2.0-5.0 PSI, 2.0-4.0 PSI, 2.0-3.0 PSI, or any other pressure range that may prevent the equalization of interior and exterior hydrostatic forces caused by a fluid (such as flooding water) attempting to flow through the flood vent 8.

In particular embodiments, the predetermined amount of pressure may be the lowest pressure at which the connectors 30 may be configured to uncouple the panel 22 from the frame 10 (and/or structure 17). For example, if an amount of pressure below the predetermined amount of pressure is applied to the panel 22, the connectors 30 may not uncouple the panel 22 from the frame 10 (and/or structure). On the other hand, if an amount of pressure equal to the predetermined amount of pressure (or above the predetermined amount of pressure) is applied to the panel 22, the connectors 30 may uncouple the panel 22 from the frame 10 (and/or structure 17).

The connectors 30 may be configured to uncouple the panel 22 from the frame 10 (and/or structure 17) if the predetermined amount of pressure is applied to any portion of the panel 22. For example, the connectors 30 may be configured to uncouple the panel 22 from the frame 10 (and/or structure 17) if the predetermined amount of pressure is applied to a bottom portion of the panel 22, a top portion of the panel 22, a left and/or right side portion of the panel 22, any other portion of the panel 22, or any combination of the preceding. In particular embodiments, the predetermined amount of pressure for causing the connectors 30 to uncouple the panel 22 from the frame 10 (and/or structure 17) may change based on (or be a function of) the portion of the panel 22 to which the predetermined amount of pressure is applied. For example, the predetermined amount of pressure may be greater if the predetermined amount of pressure is applied to the bottom portion of the panel 22 (which may be indicative of a less amount of flooding fluids, for example) than if the predetermined amount of pressure is applied to the top portion of the panel 22 (which may be indicative of a greater amount of flooding fluids, for example).

The predetermined amount of pressure for causing the connectors 30 to uncouple the panel 22 from the frame 10 (and/or structure 17) may change based on (or be a function of) the type of panel 22 included in the flood vent 8. For example, the predetermined amount of pressure may be less if the panel 22 is a panel without any openings 26 (or with openings that may be closed, using louvers, for example) than if the panel 22 includes openings 26 that may not be

closed (or if the panel 22 is a screen). In such an example, a panel 22 without openings 26 (when compared to a panel 22 with openings 26) may more easily (or quickly) prevent equalization of interior and exterior hydrostatic forces caused by a fluid, and therefore it may be advantageous to uncouple the panel 22 without openings 26 at a lower amount of pressure (when compared to a panel 22 with openings 26). As another example, the predetermined amount of pressure may be less if the panel 22 is a panel with less openings 26 (and/or with smaller openings 26) than if the panel 22 includes more openings 26 (and/or has bigger openings 26). In such an example, a panel 22 with less openings 26 (when compared to a panel 22 with more openings 26) may more easily (or quickly) prevent equalization of interior and exterior hydrostatic forces caused by a fluid, and therefore it may be advantageous to uncouple the panel 22 with less openings 26 at a lower amount of pressure (when compared to a panel 22 with more openings 26).

The connectors 30 may be configured to uncouple the panel 22 from the frame 10 (and/or structure 17) if the predetermined amount of pressure is applied to any side of the panel 22. For example, the connectors 30 may be configured to uncouple the panel 22 from the frame 10 (and/or structure 17) if the predetermined amount of pressure is applied to side 24b of the panel 22 (e.g., the side of the panel 22 facing the interior of the structure 17), thereby causing the panel 22 to be uncoupled from the frame 10 and be carried by the fluids, for example, outside of the structure 17, as is illustrated in FIGS. 3A-3C. In particular embodiments, this may cause panel 22 to be uncoupled from the frame 10 (and/or structure 17) when flooding fluids, for example, enter the flood vent 8 from inside the structure 17. As another example, the connectors 30 may be configured to uncouple the panel 22 from the frame 10 (and/or structure 17) if the predetermined amount of pressure is applied to side 24a of the panel 22 (e.g., the side of the panel 22 facing the exterior of the structure 17), thereby causing the panel 22 to be uncoupled from the frame 10 and be carried by the fluids, for example, inside of the structure 17 (e.g., in a direction from left-to-right in FIGS. 3A-3C). In particular embodiments, this may cause panel 22 to be uncoupled from the frame 10 (and/or structure 17) when flooding fluids, for example, enter the flood vent 8 from outside the structure 17. As a further example, the connectors 30 may be configured to uncouple the panel 22 from the frame 10 (and/or structure 17) if the predetermined amount of pressure is applied to either the side 24b of the panel 22 (e.g., the side of the panel 22 facing the interior of the structure 17) or the side 24a of the panel 22 (e.g., the side of the panel 22 facing the exterior of the structure 17). In particular embodiments, this may cause panel 22 to be uncoupled from the frame 10 (and/or structure 17) when flooding fluids, for example, enter the flood vent 8 from either inside the structure 17 or outside the structure 17.

Modifications, additions, or omissions may be made to the flood vent 8 of FIGS. 3A-3C without departing from the scope of the disclosure. For example, although the panel 22 has been described above as being entirely uncoupled from the frame 10 (and/or structure 17), in particular embodiments, only a portion of the panel 22 may be uncoupled from the frame 10 (and/or structure 17). In such an example, a first portion of the panel 22 (e.g., an inner area of the panel 22) may be uncoupled from the frame 10 (and/or structure 17) when the predetermined amount of pressure is applied to the panel 22 (and/or the first portion of the panel 22), while the second portion of the panel 22 (e.g., an outer area of the panel 22) may remain coupled to the frame 10 (and/or

structure 17). Furthermore, in such an example, connectors 30 may be configured to couple the first portion of the panel 22 to the second portion of the panel 22 (and/or the frame 10 and/or the structure 17). As another example, although the flood vent 8 has been described above as including a frame 10, in particular embodiments, the flood vent 8 may not include a frame 10. In such embodiments, the panel 22 may be configured to be coupled directly to the structure 17. As such, in particular embodiments, the panel 22 may be inserted into (or installed on) the structure 17 (such as the opening 18 in the structure 17) without the use of a frame 10, and the connector(s) 30 may couple the panel 22 directly to the structure 17.

FIGS. 4A-4C illustrate the flood vent 8 of FIGS. 1-2 having example connectors 40. Connectors 40 may be configured to couple the frame 10 to the structure 17. Furthermore, the connectors 40 may be further configured to uncouple the frame 10 from the structure 17. For example, the connectors 40 may be configured to uncouple the frame 10 from the structure 17 when a predetermined amount of pressure is applied to the panel 22 and/or the frame 10, such as by a fluid or an object (such as a tree limb or dirt) carried by the fluid. As such, in particular embodiments, the panel 22 of flood vent 8 may prevent (or substantially prevent) objects and/or fluids from passing through the flood vent 8 until a predetermined amount of pressure is applied to the panel 22 and/or the frame 10; and after the predetermined amount of pressure is applied to the panel 22 and/or the frame 10, the frame 10 (along with the panel 22) may be uncoupled from the structure 17 and the panel 22 may no longer prevent objects and/or fluids from passing through the opening 18 in the structure 17 (or the amount of blockage of the fluid passing through the opening 18 may be reduced). This may, in particular embodiments, allow the flood vent 8 to provide for equalization of hydrostatic forces caused by, for example, flooding fluids, even when the flooding fluids carry objects (such as debris) that may clog the openings 26 in the panel 22, when the openings 26 in the panel 22 are too small to allow sufficient fluids to pass through the flood vent 8, when the openings 26 in the panel are closed, and/or when the panel 22 does not include any openings 26.

As is discussed above with regard to FIGS. 1-2, the flood vent 8 includes a frame 10 and a panel 22. The frame 10 may be configured to be inserted into an opening 18 in a structure 17, and may be further configured to form a fluid passageway through the opening 18 in the structure 17, thereby allowing the flooding fluids to enter and/or exit the structure 17. The frame 10 may be coupled to the structure 17 using one or more connectors 40. The flood vent 8 further includes the panel 22. The panel 22 may be configured to be coupled to the frame 10. Furthermore, the panel 22 may be configured to be coupled to the frame 10 in the fluid passageway formed by the frame 10. Additionally, when coupled to the frame 10, the panel 22 may at least partially block the fluid passageway formed by the frame 10, an example of which is seen in FIGS. 4A-4B. The panel 22 may be coupled to the frame 10 in any manner. For example, the panel 22 may be formed integral with the frame 10, welded to the frame 10, coupled to the frame 10 using an adhesive (such as glue, cement, and/or Lexel®), attached to the frame 10 using one or more pins that may be inserted or snapped into one or more channels or hooks in the frame 10, attached to the frame 10 using one or more rivets, nails, and/or any other connector, coupled to the frame 10 in any other manner, or any combination of the preceding. The panel 22 may be any type of panel. For example, as is illustrated in FIGS. 4A-4B, the panel 22 may be a solid panel that may prevent all (or

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substantially all) fluids (such as water and/or air) from passing through the panel 22, as well as preventing (or substantially preventing) objects (such as small animals) from passing through the panel 22. As another example, the panel 22 may include one or more openings 26 configured to allow fluids (such as water and/or air) to pass through the panel 22, but prevent objects (such as small animals) from passing through the panel 22.

A connector 40 may be any type of connector that may couple the frame 10 to the structure 17, and that may further uncouple the frame 10 from the structure 17 when, for example, a predetermined amount of pressure is applied to the panel 22 and/or frame 10. As a first example, a connector 40 may be an adhesive configured to couple the frame 10 to the structure 17, and that may be further configured to uncouple the frame 10 from the structure 17 when, for example, a predetermined amount of pressure is applied to the panel 22 and/or the frame 10. The adhesive may include any adhesive substance that may adhere the frame 10 to the structure 17, such as glue, cement, Lexel® adhesive, any other adhesive substance that may adhere the frame 10 to the structure 17, or any combination of the preceding. Furthermore, the adhesive may be further configured to uncouple the frame 10 from the structure 17 when, for example, a predetermined amount of pressure is applied to the panel 22 and/or the frame 10. For example, the adhesive may be configured to peel off, break, or otherwise uncouple from the frame 10 and/or structure 17 when, for example, a predetermined amount of pressure is applied to the panel 22 and/or the frame 10. In particular embodiments, the adhesive may be engineered and/or modified to peel off, break, or otherwise uncouple from the frame 10 and/or structure 17 when, for example, a predetermined amount of pressure is applied to the panel 22 and/or the frame 10. In particular embodiments, the amount of adhesive used to adhere the frame 10 to the structure 17 may be selected to cause the adhesive to peel off, break, or otherwise uncouple from the frame 10 and/or structure 17 when, for example, a predetermined amount of pressure is applied to the panel 22 and/or the frame 10.

The adhesive may include one or more portions of the adhesive coupled to the frame 10 and/or the structure 17, thereby coupling the frame 10 to the structure 17, as is illustrated in FIG. 4A. Furthermore, the portions of the adhesive may continue to couple the frame 10 to the structure 17 until a predetermined amount of pressure is applied to the panel 22 and/or the frame 10 by, for example, a fluid (such as flooding water). Once the predetermined amount of pressure is applied to the panel 22 and/or the frame 10, the adhesive may peel off, break, or otherwise uncouple from the panel 22 and/or the structure 17, as is seen in FIG. 4B. This may uncouple the frame 10 from the structure 17, causing the frame 10 to be completely separated from the structure 17, and be carried away from the structure 17, as is seen in FIG. 4C. As such, in particular embodiments, the flood vent 8 may no longer prevent objects and/or fluids from passing through the opening 18 in the structure 17 (or the amount of blockage of the fluid passing through the opening 18 may be reduced).

As a second example, a connector 40 may be one or more raised bumps (or raised lips) in the opening 18 of the structure 17. The raised bumps may allow a frame 10 to be installed in the opening 18, thereby coupling the frame 10 to the structure 17. For example, an installer (such as a person) may push the frame 10 into the opening 18 with enough force to cause the frame 10 to move past the first set of raised bumps. In such an example, the frame 10 may then rest in

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a gap in-between (or sandwiched by) the first set of bumps and a second set of bumps, thereby coupling the frame 10 to the structure 17. Furthermore, the raised bumps may continue to couple the frame 10 to the structure 17 until a predetermined amount of pressure is applied to the panel 22 and/or the frame 10 by, for example, a fluid (such as flooding water). Once the predetermined amount of pressure is applied to the panel 22 and/or the frame 10, the frame 10 may be forced past a set of the raised bumps. This may uncouple the frame 10 from the structure 17, causing the frame 10 to be completely separated from the structure 17, and be carried away from the structure 17. As such, in particular embodiments, the flood vent 8 may no longer prevent objects and/or fluids from passing through the opening 18 in the structure 17 (or the amount of blockage of the fluid passing through the opening 18 may be reduced).

As a third example, a connector 40 may be one or more pieces of velcro configured to couple the frame 10 to the structure 17, and that may be further configured to uncouple the frame 10 from the structure 17 when, for example, a predetermined amount of pressure is applied to the panel 22 and/or the frame 10. The pieces of velcro may include, for example, one or more first pieces of velcro that are coupled to the frame 10, and one or more second pieces of velcro that are coupled to the structure 17. The first pieces of velcro may be coupled to the second pieces of velcro, thereby coupling the frame 10 to the structure 17. Furthermore, the pieces of velcro may continue to couple the frame 10 to the structure 17 until a predetermined amount of pressure is applied to the panel 22 and/or the frame 10 by, for example, a fluid (such as flooding water). Once the predetermined amount of pressure is applied to the panel 22 and/or the frame 10, the coupling between the pieces of velcro may be broken. This may uncouple the frame 10 from the structure 17, causing the frame 10 to be completely separated from the structure 17, and be carried away from the structure 17. As such, in particular embodiments, the flood vent 8 may no longer prevent objects and/or fluids from passing through the opening 18 in the structure 17 (or the amount of blockage of the fluid passing through the opening 18 may be reduced).

As a fourth example, a connector 40 may be one or more mechanical fasteners configured to couple the frame 10 to the structure 17, and that may be further configured to uncouple the frame 10 from the structure 17 when, for example, a predetermined amount of pressure is applied to the panel 22 and/or the frame 10. The mechanical fasteners may include one or more devices that may mechanically fasten the frame 10 to the structure 17, such as one or more nails, screws, rivets, nuts and bolts, rods and studs, anchors, pins, retaining rings and/or clips, any other devices that may mechanically fasten the frame 10 to the structure 17, or any combination of the preceding. Furthermore, the mechanical fasteners may be further configured to uncouple the frame 10 from the structure 17 when, for example, a predetermined amount of pressure is applied to the panel 22 and/or the frame 10. For example, the mechanical fasteners may be configured to break or otherwise uncouple from the frame 10 and/or structure 17 when, for example, a predetermined amount of pressure is applied to the panel 22 and/or the frame 10. In particular embodiments, the mechanical fasteners may be engineered and/or modified to break or otherwise uncouple from the frame 10 and/or structure 17 when, for example, a predetermined amount of pressure is applied to the panel 22 and/or the frame 10.

The mechanical fasteners may include one or more mechanical fasteners coupled to the frame 10 and/or the structure 17, thereby coupling the frame 10 to the structure

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17. Furthermore, the mechanical fasteners may continue to couple the frame 10 to the structure 17 until a predetermined amount of pressure is applied to the panel 22 and/or the frame 10 by, for example, a fluid (such as flooding water). Once the predetermined amount of pressure is applied to the panel 22 and/or the frame 10, the mechanical fasteners may break or otherwise uncouple from the frame 10 and/or structure 17. This may uncouple the frame 10 from the structure 17, causing the frame 10 to be completely separated from the structure 17, and be carried away from the structure 17. As such, in particular embodiments, the flood vent 8 may no longer prevent objects and/or fluids from passing through the opening 18 in the structure 17 (or the amount of blockage of the fluid passing through the opening 18 may be reduced).

As a fifth example, a connector 40 may be one or more pressure-based connectors configured to couple the frame 10 to the structure 17, and that may be further configured to uncouple the frame 10 from the structure 17 when, for example, a predetermined amount of pressure is applied to the panel 22 and/or the frame 10. The pressure-based connectors may include any type of connector that may apply pressure (or otherwise utilize pressure) to couple the frame 10 to the structure 17. As an example, the pressure-based connectors may be a pressure-based clip (such as a spring clip) configured to fit in-between the outer edges 11 of the frame 10 and the edges 19 of the opening 18. In such an example, when the frame 10 is installed into the opening 18, the pressure-based connectors may be compressed by the outer edges 11 of the frame 10 and the edges 19 of the opening 18, thereby causing the pressure-based connectors to push outward against the edges 19 of the opening 18 and inward against the outer edges 11 of the frame 10. Such pressure applied by the pressure-based connectors (along with friction, in particular embodiments) may at least couple the frame 10 to the structure 17. Furthermore, although the pressure-based connectors have been described above as being a separate component from the frame 10, in particular embodiments, the pressure-based connectors may be a part of the frame 10, itself. For example, the pressure-based connectors may be formed integral with (or as a portion of) the frame 10.

The pressure-based connectors may be further configured to uncouple the frame 10 from the structure 17 when, for example, a predetermined amount of pressure is applied to the panel 22 and/or the frame 10. For example, the pressure-based connectors may be configured to break, slip off, or otherwise uncouple from the frame 10 and/or structure 17 when, for example, a predetermined amount of pressure is applied to the panel 22 and/or the frame 10. In particular embodiments, the amount of pressure applied by the pressure-based connectors may be configured to be overcome by the predetermined amount of pressure applied to the panel 22 and/or the frame 10 by, for example, the fluid.

The pressure-based connectors may include one or more pressure-based connectors coupled to (and/or applying pressure to) the frame 10 and/or the structure 17, thereby coupling the frame 10 to the structure 17. Furthermore, the pressure-based connectors may continue to couple the frame 10 to the structure 17 until a predetermined amount of pressure is applied to the panel 22 and/or the frame 10 by, for example, a fluid (such as flooding water). Once the predetermined amount of pressure is applied to the panel 22 and/or the frame 10, the pressure-based connectors may break, slip off, or otherwise uncouple from the frame 10 and/or structure 17. This may uncouple the frame 10 from the structure 17, causing the frame 10 to be completely

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separated from the structure 17, and be carried away from the structure 17. As such, in particular embodiments, the flood vent 8 may no longer prevent objects and/or fluids from passing through the opening 18 in the structure 17 (or the amount of blockage of the fluid passing through the opening 18 may be reduced).

The flood vent 8 may include any number of connectors 40. For example, the flood vent 8 may include one connector 40, two connectors 40, three connectors 40, four connectors 40, six connectors 40, eight connectors 40, ten connectors 40, or any other number of connectors 40. The connectors 40 may be attached or otherwise coupled to any portion of the frame 10 and/or structure 17 (and/or the panel 22). For example, the connectors 40 may be attached to the edges 11 of the frame 10 and/or the edges 19 of the opening 18 of the structure 17. As another example, the connectors 40 (such as screws) may be positioned through one or more holes (such as one or more screw holes) in rails 12 (for example) of the frame 10, and inserted into one or more holes in the structure 17, thereby coupling the frame 10 to the structure 17. The connectors 40 may be added to (or otherwise be coupled to) the frame 10 (and/or structure 17 and/or the panel 22), the connectors 40 may be formed integral with (or formed as a part of) the frame 10 (and/or the panel 22), or any combination of the preceding.

The connectors 40 may have any size and/or shape that may allow the connectors 40 to uncouple the frame 10 when a predetermined amount of pressure is applied to the panel 22 and/or the frame 10. For example, the length of the connectors 40 (such as one or more mechanical fasteners) may be selected to cause the connectors 40 to break, fail, or otherwise uncouple the frame 10 when the predetermined amount of pressure is applied to the panel 22 and/or the frame 10. The connectors 40 may be formed from any material that may allow the connectors 40 to uncouple the frame 10 when a predetermined amount of pressure is applied to the panel 22 and/or the frame 10. For example, the connectors 40 may be formed from rubber, plastic, a polymer, a foam, a metal (such as aluminum, stainless steel, spring steel, a galvanized material, any other metal, or any combination of the preceding), an adhesive, any other material that may allow the connectors 40 to uncouple the frame 10 when a predetermined amount of pressure is applied to the panel 22 and/or the frame 10, or any combination of the preceding. In particular, the connectors 40 (such as one or more mechanical fasteners) may be formed from a particular plastic (for example) that causes the mechanical fastener to break or fail when the predetermined amount of pressure is applied to the panel 22 and/or the frame 10.

As is discussed above, the connectors 40 may be configured to uncouple the frame 10 from the structure 17 when, for example, a predetermined amount of pressure is applied to the panel 22 and/or the frame 10. In particular embodiments, the predetermined amount of pressure may refer to the lowest amount of pressure (or approximately the lowest amount of pressure) that would cause the panel 22 to prevent the equalization of interior and exterior hydrostatic forces caused by a fluid (such as flooding water) attempting to flow through the flood vent 8. As an example, the predetermined amount of pressure may be 0.5 PSI, 1 PSI, 1.5 PSI, 2 PSI, 2.5 PSI, 3 PSI, 3.5 PSI, 4 PSI, 4.5 PSI, 5 PSI, 6 PSI, 7 PSI, 10 PSI, approximately 0.5 PSI (i.e., 0.5 PSI $\pm$ 0.2 PSI), approximately 1 PSI, approximately 1.5 PSI, approximately 2 PSI, approximately 2.5 PSI, approximately 3 PSI, approximately 3.5 PSI, approximately 4 PSI, approximately 4.5 PSI, approximately 5 PSI, approximately 6 PSI, approximately 7 PSI, approximately 10 PSI, or any other amount of pressure

that may prevent the equalization of interior and exterior hydrostatic forces caused by a fluid (such as flooding water) attempting to flow through the flood vent 8. As a further example, the predetermined amount of pressure may be a pressure range of 0.5 PSI-7 PSI, 0.5-5.0 PSI, 0.5-4.0 PSI, 0.5-3.0 PSI, 1.0-7.0 PSI, 1.0-5.0 PSI, 1.0-4.0 PSI, 1.0-3.0 PSI, 1.5-7.0 PSI, 1.5-5.0 PSI, 1.5-4.0 PSI, 1.5-3.0 PSI, 2.0-7.0 PSI, 2.0-5.0 PSI, 2.0-4.0 PSI, 2.0-3.0 PSI, or any other pressure range that may prevent the equalization of interior and exterior hydrostatic forces caused by a fluid (such as flooding water) attempting to flow through the flood vent 8.

The predetermined amount of pressure may be the lowest pressure at which the connectors 40 may be configured to uncouple the frame 10 from the structure 17. For example, if an amount of pressure below the predetermined amount of pressure is applied to the panel 22 and/or the frame 10, the connectors 40 may not uncouple the frame 10 from the structure 17. On the other hand, if an amount of pressure equal to the predetermined amount of pressure (or above the predetermined amount of pressure) is applied to the panel 22 and/or the frame 10, the connectors 40 may uncouple the frame 10 from the structure 17.

The connectors 40 may be configured to uncouple the frame 10 from the structure 17 if the predetermined amount of pressure is applied to any portion of the panel 22 and/or frame 10. For example, the connectors 40 may be configured to uncouple the frame 10 from the structure 17 if the predetermined amount of pressure is applied to a bottom portion of the panel 22 (and/or the frame 10), a top portion of the panel 22 (and/or the frame 10), a left and/or right side portion of the panel 22 (and/or the frame 10), any other portion of the panel 22 (and/or the frame 10), or any combination of the preceding.

The predetermined amount of pressure for causing the connectors 40 to uncouple the frame 10 from the structure 17 may change based on (or be a function of) the portion of the panel 22 (and/or the frame 10) to which the predetermined amount of pressure is applied. For example, the predetermined amount of pressure may be greater if the predetermined amount of pressure is applied to the bottom portion of the panel 22 (and/or the frame 10) (which may be indicative of a less amount of flooding fluids, for example) than if the predetermined amount of pressure is applied to the top portion of the panel 22 (and/or the frame 10) (which may be indicative of a greater amount of flooding fluids, for example).

The predetermined amount of pressure for causing the connectors 40 to uncouple the frame 10 from the structure 17 may change based on (or be a function of) the type of panel 22 included in the flood vent 8. For example, the predetermined amount of pressure may be less if the panel 22 is a panel without any openings 26 (or with openings 26 that may be closed, using louvers, for example) than if the panel 22 includes openings 26 that may not be closed (or if the panel 22 is a screen). In such an example, a panel 22 without openings 26 (when compared to a panel 22 with openings 26) may more easily (or quickly) prevent equalization of interior and exterior hydrostatic forces caused by a fluid, and therefore it may be advantageous to uncouple the panel 22 without openings 26 at a lower amount of pressure (when compared to a panel 22 with openings 26). As another example, the predetermined amount of pressure may be less if the panel 22 is a panel with less openings 26 (and/or with smaller openings 26) than if the panel 22 includes more openings 26 (and/or has bigger openings 26). In such an example, a panel 22 with less openings 26 (when compared

to a panel 22 with more openings 26) may more easily (or quickly) prevent equalization of interior and exterior hydrostatic forces caused by a fluid, and therefore it may be advantageous to uncouple the panel 22 with less openings 26 at a lower amount of pressure (when compared to a panel 22 with more openings 26).

The connectors 40 may be configured to uncouple the panel 22 from the frame if the predetermined amount of pressure is applied to any side of the panel 22. For example, the connectors 40 may be configured to uncouple the panel 22 from the frame if the predetermined amount of pressure is applied to side 24b of the panel 22 (e.g., the side of the panel 22 facing the interior of the structure 17), thereby causing the frame 10 to be uncoupled from the structure 17 and be carried by the fluids, for example, outside of the structure 17, as is illustrated in FIGS. 4A-4C. In particular embodiments, this may cause the frame 10 to be uncoupled from the structure 17 when flooding fluids, for example, enter the flood vent 8 from inside the structure 17. As another example, the connectors 40 may be configured to uncouple the frame 10 from the structure 17 if the predetermined amount of pressure is applied to side 24a of the panel 22 (e.g., the side of the panel 22 facing the exterior of the structure 17), thereby causing the frame 10 to be uncoupled from the structure 17 and be carried by the fluids, for example, inside of the structure 17 (e.g., in a direction from left-to-right in FIGS. 4A-4C). In particular embodiments, this may cause the frame 10 to be uncoupled from the structure 17 when flooding fluids, for example, enter the flood vent 8 from outside the structure 17. Furthermore, in such embodiments, the frame 10 may not include rails 12 that may prevent the frame 10 from being carried inside of the structure 17. As a further example, the connectors 40 may be configured to uncouple the frame 10 from the structure 17 if the predetermined amount of pressure is applied to either the side 24b of the panel 22 (e.g., the side of the panel 22 facing the interior of the structure 17) or the side 24a of the panel 22 (e.g., the side of the panel 22 facing the exterior of the structure 17). In particular embodiments, this may cause the frame 10 to be uncoupled from the structure 17 when flooding fluids, for example, enter the flood vent 8 from either inside the structure 17 or outside the structure 17.

Modifications, additions, or omissions may be made to the flood vent 8 of FIGS. 4A-4C without departing from the scope of the disclosure. For example, the flood vent 8 of FIGS. 4A-4C may include one or more components of the flood vent 8 of FIGS. 3A-3C. In such an example, the flood vent 8 may include one or more connectors 30 that may be configured to uncouple the panel 22 from the frame 10 (and/or the structure 17) when a first predetermined amount of pressure is applied to the panel 22 (as is discussed above with regard to FIGS. 3A-3C), and may further include one or more connectors 40 that may be configured to uncouple the frame 10 from the structure 17 when a second predetermined amount of pressure is applied to the panel 22 and/or the frame 10. The first predetermined amount of pressure (which may uncouple the panel 22 from the frame 10 and/or structure 17) may be less than the second predetermined amount of pressure (which may uncouple the frame 10 from the structure 17). For example, the first predetermined amount of pressure may be a pressure range of 0.5 PSI-7 PSI (or any of the pressures or pressure ranges discussed above) while the second predetermined amount of pressure may be a pressure range of 1.5 PSI-8 PSI (or any of the pressures or pressure ranges discussed above and further being greater than the first predetermined amount of

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pressure). As such, if a fluid (such as flooding water) applies a first predetermined amount of pressure to the panel 22, the panel 22 may be uncoupled from the frame 10 and/or the structure (which may reduce the amount of blockage of the fluid passageway provided by the panel 22). Furthermore, in an example where the fluid (such as the flooding water) continues to rise and apply additional force, if the fluid applies the second predetermined amount of pressure to the frame 10 (and/or the remainder of the panel 22, if any), the frame 10 may be uncoupled from the structure 17 (which may further reduce the amount of blockage of the fluid). As such, the flood vent 8 may be able to further provide for equalization of interior and exterior hydrostatic forces caused by flooding waters.

FIGS. 5A-6C illustrate the flood vent 8 of FIGS. 1-2 with a panel 22 having example perforations 60. Perforations 60 may be configured to uncouple at least a portion of the panel 22 from the flood vent 8. For example, the perforations 60 may be configured to uncouple at least a portion of the panel 22 from the flood vent 8 when a predetermined amount of pressure is applied to the panel 22, such as by a fluid or an object (such as a tree limb or dirt) carried by the fluid. As such, in particular embodiments, the panel 22 of flood vent 8 may prevent (or substantially prevent) objects and/or fluids from passing through the flood vent 8 until a predetermined amount of pressure is applied to the panel 22; and after the predetermined amount of pressure is applied to the panel 22, the at least a portion of the panel 22 may be uncoupled from the flood vent 8 and may no longer prevent objects and/or fluids from passing through the flood vent 8 (or the amount of blockage of the fluid passageway provided by the panel 22 may be reduced). This may, in particular embodiments, allow the flood vent 8 to provide for equalization of hydrostatic forces caused by, for example, flooding fluids, even when the flooding fluids carry objects (such as debris) that may clog the openings 26 in the panel 22, when the openings 26 in the panel 22 are too small to allow sufficient fluids to pass through the flood vent 8, when the openings 26 in the panel are closed, and/or when the panel 22 does not include any openings 26.

As is discussed above with regard to FIGS. 1-2, the flood vent 8 includes a frame 10 and a panel 22. The frame 10 may be configured to be inserted into an opening 18 in a structure 17, and may be further configured to form a fluid passageway through the opening 18 in the structure 17, thereby allowing the flooding fluids to enter and/or exit the structure 17. The panel 22 may be configured to be coupled to the frame 10. Furthermore, the panel 22 may be configured to be coupled to the frame 10 in the fluid passageway formed by the frame 10. Additionally, when coupled to the frame 10, the panel 22 may at least partially block the fluid passageway formed by the frame 10, an example of which is seen in FIG. 5C. The panel 22 may be coupled to the frame 10 in any manner. For example, the panel 22 may be formed integral with the frame 10, welded to the frame 10, coupled to the frame 10 using an adhesive (such as glue, cement, and/or Lexel®), attached to the frame 10 using one or more pins that may be inserted or snapped into one or more channels or hooks in the frame 10, attached to the frame 10 using one or more rivets, nails, and/or any other connector, attached to the structure 17 (and thus the frame 10) using one or more rivets, nails, and/or any other connector, coupled to the frame 10 in any other manner, or any combination of the preceding. The panel 22 may be any type of panel. For example, as is illustrated in FIGS. 5A-5E, the panel 22 may be a solid panel that may prevent all (or substantially all) fluids (such as water and/or air) from passing through the

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panel 22, as well as prevent (or substantially prevent) objects (such as small animals) from passing through the panel 22. As another example, as is illustrated in FIGS. 6A-6B, the panel 22 may include one or more openings 26 configured to allow fluids (such as water and/or air) to pass through the panel 22, but prevent objects (such as small animals) from passing through the panel 22.

As illustrated, the panel 22 includes one or more perforations 60 configured to uncouple at least a portion of the panel 22 from the flood vent 8 when, for example, a predetermined amount of pressure is applied to the panel 22, such as by a fluid or an object (such as a tree limb or dirt) carried by the fluid. A perforation 60 may be any type of characteristic or feature of the panel 22 that may uncouple at least a portion of the panel 22 from the flood vent 8 when, for example, a predetermined amount of pressure is applied to the panel 22. For example, a perforation 60 may be any type of reduction in the thickness 25 (or any other dimension) of the panel 22 at one or more points on the panel 22, which may cause the panel 22 to break or fail at the perforation 60 when, for example, a predetermined amount of pressure is applied to the panel 22. In such an example, a perforation 60 may be a cut-out of the material of the panel 22 (as is illustrated in FIG. 5B), a stamp in the material of the panel 22, one or more channels in the panel 22, any other feature that may reduce the thickness 25 (or any other dimension) of the panel 22 at one or more points on the panel 22, or any combination of the preceding.

As another example, a perforation 60 may be one or more holes (or one or more rows of holes) in the panel 22, which may cause the panel 22 to break or fail at the perforation 60 when, for example, a predetermined amount of pressure is applied to the panel 22. As a further example, a perforation 60 may be a pre-stressed portion (or weak portion) of the panel 22, which may cause the panel 22 to break or fail at the perforation 60 when, for example, a predetermined amount of pressure is applied to the panel 22. As another example, a perforation 60 may be a pre-cut portion of the panel 22, which may cause the panel 22 to break or fail at the perforation 60 when, for example, a predetermined amount of pressure is applied to the panel 22. As a further example, a perforation 60 may be a combination of one or more (or all of) a reduction in the thickness 25 (or any other dimension) of the panel 22 at one or more points on the panel 22, one or more holes (or one or more rows of holes) in the panel 22, a pre-stressed portion (or weak portion) of the panel 22, a pre-cut portion of the panel 22, or any other characteristic or feature of the panel 22 that may uncouple at least a portion of the panel 22 from the flood vent 8.

The perforations 60 may be configured to uncouple any portion of the panel 22 from the flood vent 8. As a first example, the perforations 60 may be positioned so as to uncouple the entire panel 22 from the frame 10. In such an example, the perforations 60 may be positioned at any location that couples the panel 22 to the frame 10, such as at the edges 23 of the panel 22. The perforations 60 may couple the panel 22 to the frame 10 until a predetermined amount of pressure is applied to the panel 22 by, for example, a fluid (such as flooding water). Once the predetermined amount of pressure is applied to the panel 22, the perforations 60 may break or fail. This may uncouple the panel 22 from the frame 10, causing the panel 22 to be completely separated from the frame 10, and be carried away from the frame 10. As such, in particular embodiments, the flood vent 8 may no longer prevent objects and/or fluids from passing through the



opening 18 in the structure 17 (or the amount of blockage of the fluid passageway provided by the panel 22 may be reduced).

As a second example, the perforations 60 may be positioned so as uncouple a portion of the panel 22 from another portion of the panel 22. For example, as is illustrated in FIGS. 5A-5E, the panel 22 may include a first portion 62 of the panel 22 and a second portion 64 of the panel 22. Furthermore, perforations 60 may be located in-between the first portion 62 and the second portion 64. As such, the perforations 60 (and/or the area that includes the perforations 60) may couple the second portion 64 to the first portion 62 of the panel 22 until a predetermined amount of pressure is applied to the panel 22 (such as the second portion 64 of the panel) by, for example, a fluid (such as flooding water). Once the predetermined amount of pressure is applied to the panel 22, the perforations 60 may break or fail. This break or failure may uncouple the second portion 64 of the panel 22 from the first portion 62 of the panel 22, causing the second portion 64 to be completely separated from the first portion 62, and be carried away from the first portion 62, as is illustrated in FIGS. 5C-5E. As such, in particular embodiments, the flood vent 8 may no longer prevent objects and/or fluids from passing through the opening 18 in the structure 17 (or the amount of blockage of the fluid passageway provided by the panel 22 may be reduced).

The first portion 62 of the panel 22 may include any area of the panel 22, and the second portion 64 of the panel 22 may include any area of the panel. As one example, the first portion 62 of the panel 22 may be an outer area of the panel 22, and the second portion of the panel 22 may be an inner area of the panel 22 that is surrounded (at least partially) by the outer area of the panel 22, as is illustrated in FIGS. 5A-5B. As another example, the first portion 62 of the panel 22 may be an inner area of the panel 22, and the second portion of the panel 22 may be an outer area of the panel 22 that surrounds (at least partially) the inner area of the panel 22. As another example, the first portion 62 of the panel 22 may be a left-side area (or a right-side area, or a top-side area, or a bottom-side area) of the panel 22, and the second portion of the panel 22 may be a right-side area (or a left-side area, or a top-side area, or a bottom-side area) of the panel 22. The first portion 62 of the panel 22 may be any type of panel, and the second portion 64 of the panel 22 may be any type of panel. For example, the first portion 62 of the panel 22 may be a solid panel, and the second portion 64 of the panel 22 may include one or more openings 26, as is illustrated in FIGS. 6A-6B. As another example, the first portion 62 of the panel 22 may be a solid panel, and the second portion 64 of the panel 22 may be a screen. As a further example, both the first portion 62 and the second portion 64 of the panel 22 may be solid panels, screens, or panels with one or more openings 26.

The perforations 60 may be located at any position on the panel 22. In particular embodiments, the location of the perforations 60 may be based on the edges 23 of the panel 22. For example, the perforations 60 (or the portions of a perforation 60) may be located a perforation distance 66 from the respective edges 23. The perforation distance 66 may be any distance, such as 0.15", 0.25", 0.5", 0.75", 1", 1.5", 2", 3", 4", less than 0.5", less than 0.75", less than 1", less than 1.5", less than 2", less than 3", less than 4", or any other distance. The perforation distance 66 may be the same for each perforation 60 (or for each portion of a perforation

60), or the perforation distance 66 may be different for one or more of the perforations 60 (or for one or more portions of a perforation 60).

The flood vent 8 may include any number of perforations 60. For example, the flood vent 8 may include one perforation 60, two perforations 60, three perforations 60, four perforations 60, six perforations 60, eight perforations 60, ten perforations 60, or any other number of perforations 60. The perforations 60 may be included on a single side of the panel 22 (such as side 24a of the panel 22 or side 24b of the panel 22) or may be included on both sides of the panel 22 (such as on both sides 24a and 24b of the panel 22). Furthermore, when perforations 60 are included on both sides of the panel 22, the perforations 60 may be located in the same location of the panel 22 on both sides of the panel 22 (as is illustrated in FIGS. 5B and 6B), or the perforations 60 may be located in different locations of the panel 22 (or otherwise be off-center from each other), as is illustrated in FIG. 6C.

The perforations 60 may be positioned in any pattern on the panel 22. For example, the perforations 60 may completely surround the portion of the panel 22 that is uncoupled from the flood vent 8, as is illustrated in FIGS. 5A-5E. As another example, the perforations 60 may at least substantially surround the portion of the panel 22 that is uncoupled from the flood vent 8 (i.e., the perforations 60 may surround at least 90% of the portion of the panel 22 that is uncoupled from the flood vent 8). As a further example, the perforations 60 may surround any other amount of the portion of the panel 22, so as to cause the portion of the panel 22 to be uncoupled from the flood vent 8 when a predetermined amount of pressure is applied to the panel 22.

The perforations 60 may have any size and/or shape that may allow the perforations 60 to uncouple at least a portion of the panel 22 when a predetermined amount of pressure is applied to the panel 22. For example, the perforations 60 may be sized and/or shaped to reduce the thickness 25 of the panel 22 at one or more points of the panel 22 to a thickness that is less than the other portions of the panel 22. For example, if the thickness 25 of the panel 22 is, for example, 1 inch, the perforations 60 may have a reduced thickness, such as, for example, 0.75 inches, 0.5 inches, 0.4 inches, 0.33 inches, 0.3 inches, 0.25 inches, 0.2 inches, 0.1 inches, approximately 0.75 inches (i.e., 0.75 inches $\pm$ 0.1 inches), approximately 0.5 inches, approximately 0.4 inches, approximately 0.33 inches, approximately 0.3 inches, approximately 0.25 inches, approximately 0.2 inches, or any other thickness less than 1 inch. In particular embodiments, the reduction in the thickness 25 of the panel 22 at one or more points of the panel 22 may be selected to cause at least a portion of the panel 22 to uncouple from the flood vent 8 when a predetermined amount of pressure is applied to the panel 22.

As is discussed above, the perforations 60 may be configured to uncouple at least a portion of the panel 22 from the flood vent 8 when, for example, a predetermined amount of pressure is applied to the panel 22. In particular embodiments, the predetermined amount of pressure may refer to the lowest amount of pressure (or approximately the lowest amount of pressure) that would cause the panel 22 to prevent the equalization of interior and exterior hydrostatic forces caused by a fluid (such as flooding water) attempting to flow through the flood vent 8. As an example, the predetermined amount of pressure may be 0.5 PSI, 1 PSI, 1.5 PSI, 2 PSI, 2.5 PSI, 3 PSI, 3.5 PSI, 4 PSI, 4.5 PSI, 5 PSI, 6 PSI, 7 PSI, 10 PSI, approximately 0.5 PSI (i.e., 0.5 PSI $\pm$ 0.2 PSI), approximately 1 PSI, approximately 1.5 PSI, approximately

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2 PSI, approximately 2.5 PSI, approximately 3 PSI, approximately 3.5 PSI, approximately 4 PSI, approximately 4.5 PSI, approximately 5 PSI, approximately 6 PSI, approximately 7 PSI, approximately 10 PSI, or any other amount of pressure that may prevent the equalization of interior and exterior hydrostatic forces caused by a fluid (such as flooding water) attempting to flow through the flood vent 8. As a further example, the predetermined amount of pressure may be a pressure range of 0.5 PSI-7 PSI, 0.5-5.0 PSI, 0.5-4.0 PSI, 0.5-3.0 PSI, 1.0-7.0 PSI, 1.0-5.0 PSI, 1.0-4.0 PSI, 1.0-3.0 PSI, 1.5-7.0 PSI, 1.5-5.0 PSI, 1.5-4.0 PSI, 1.5-3.0 PSI, 2.0-7.0 PSI, 2.0-5.0 PSI, 2.0-4.0 PSI, 2.0-3.0 PSI, or any other pressure range that may prevent the equalization of interior and exterior hydrostatic forces caused by a fluid (such as flooding water) attempting to flow through the flood vent 8.

The predetermined amount of pressure may be the lowest pressure at which the perforations 60 may be configured to uncouple at least a portion of the panel 22 from the flood vent 8. For example, if an amount of pressure below the predetermined amount of pressure is applied to the panel 22, the perforations 60 may not uncouple at least a portion of the panel 22 from the flood vent 8. On the other hand, if an amount of pressure equal to the predetermined amount of pressure (or above the predetermined amount of pressure) is applied to the panel 22, the perforations 60 may uncouple at least a portion of the panel 22 from the flood vent 8.

The perforations 60 may be configured to uncouple at least a portion of the panel 22 from the flood vent 8 if the predetermined amount of pressure is applied to any portion of the panel 22. For example, the perforations 60 may be configured to uncouple at least a portion of the panel 22 from the flood vent 8 if the predetermined amount of pressure is applied to a bottom portion of the panel 22 (or a bottom portion of second portion 64), a top portion of the panel 22 (or a top portion of second portion 64), a left and/or right side portion of the panel 22 (or a left and/or right side portion of second portion 64), any other portion of the panel 22, or any combination of the preceding.

The predetermined amount of pressure for causing the perforations 60 to uncouple at least a portion of the panel 22 from the flood vent 8 may change based on (or be a function of) the portion of the panel 22 to which the predetermined amount of pressure is applied. For example, the predetermined amount of pressure may be greater if the predetermined amount of pressure is applied to the bottom portion of the panel 22 (or a bottom portion of second portion 64) (which may be indicative of a less amount of flooding fluids, for example) than if the predetermined amount of pressure is applied to the top portion of the panel 22 (or a top portion of second portion 64) (which may be indicative of a greater amount of flooding fluids, for example).

The predetermined amount of pressure for causing the perforations 60 to uncouple at least a portion of the panel 22 from the flood vent 8 may change based on (or be a function of) the type of panel 22 included in the flood vent 8. For example, the predetermined amount of pressure may be less if the panel 22 is a panel without any openings 26 (or with openings that may be closed, using louvers, for example) than if the panel includes openings 26 that may not be closed (or if the panel 22 is a screen). In such an example, a panel 22 without openings 26 (when compared to a panel 22 with openings 26) may more easily (or quickly) prevent equalization of interior and exterior hydrostatic forces caused by a fluid, and therefore it may be advantageous to uncouple the panel 22 without openings 26 at a lower amount of pressure (when compared to a panel 22 with openings 26). As another

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example, the predetermined amount of pressure may be less if the panel 22 is a panel with less openings 26 (and/or with smaller openings 26) than if the panel 22 includes more openings 26 (and/or has bigger openings 26). In such an example, a panel 22 with less openings 26 (when compared to a panel 22 with more openings 26) may more easily (or quickly) prevent equalization of interior and exterior hydrostatic forces caused by a fluid, and therefore it may be advantageous to uncouple the panel 22 with less openings 26 at a lower amount of pressure (when compared to a panel 22 with more openings 26).

The perforations 60 may be configured to uncouple at least a portion of the panel 22 from the flood vent 8 if the predetermined amount of pressure is applied to any side of the panel 22. For example, the perforations 60 may be configured to uncouple at least a portion of the panel 22 from the flood vent 8 if the predetermined amount of pressure is applied to side 24b of the panel 22 (e.g., the side of the panel 22 facing the interior of the structure 17), thereby causing at least a portion of the panel 22 to be uncoupled from the flood vent 8 and be carried by the fluids, for example, outside of the structure 17, as is illustrated in FIGS. 5C-5E. In particular embodiments, this may cause the at least a portion of the panel 22 to be uncoupled from the flood vent 8 when flooding fluids, for example, enter the flood vent 8 from inside the structure 17. As another example, the perforations 60 may be configured to uncouple at least a portion of the panel 22 from the flood vent 8 if the predetermined amount of pressure is applied to side 24a of the panel 22 (e.g., the side of the panel 22 facing the exterior of the structure 17), thereby causing at least a portion of the panel 22 to be uncoupled from the flood vent 8 and be carried by the fluids, for example, inside of the structure 17 (e.g., in a direction from left-to-right in FIGS. 5C-5E). In particular embodiments, this may cause at least a portion of the panel 22 to be uncoupled from the flood vent 8 when flooding fluids, for example, enter the flood vent 8 from outside the structure 17. As a further example, the perforations 60 may be configured to uncouple at least a portion of the panel 22 from the flood vent 8 if the predetermined amount of pressure is applied to either the side 24b of the panel 22 (e.g., the side of the panel 22 facing the interior of the structure 17) or the side 24a of the panel 22 (e.g., the side of the panel 22 facing the exterior of the structure 17). In particular embodiments, this may cause at least a portion of panel 22 to be uncoupled from the flood vent 8 when flooding fluids, for example, enter the flood vent 8 from either inside the structure 17 or outside the structure 17.

Modifications, additions, or omissions may be made to the flood vent 8 of FIGS. 5A-6C without departing from the scope of the disclosure. For example, the flood vent 8 of FIGS. 5A-6C may include one or more components of the flood vent 8 of FIGS. 3A-3C and/or FIGS. 4A-4C. In such an example, the flood vent 8 may include a panel 22 having one or more perforations 60 that may be configured to uncouple at least a portion of the panel 22 from the flood vent 8 when a first predetermined amount of pressure is applied to the panel 22, may further include one or more connectors 30 that may be configured to uncouple the panel 22 from the frame 10 (and/or the structure 17) when a second predetermined amount of pressure is applied to the panel 22 (as is discussed above with regard to FIGS. 3A-3C), and/or may further include one or more connectors 40 that may be configured to uncouple the frame 10 from the structure 17 when a third predetermined amount of pressure is applied to the panel 22 and/or the frame 10 (as is discussed above with regard to FIGS. 4A-4C). The first predetermined

amount of pressure (which may uncouple at least a portion of the panel 22 from the flood vent 8) may be less than the second predetermined amount of pressure (which may uncouple the remainder of the panel 22 from the frame 10), and the second predetermined amount of pressure may be less than the third predetermined amount of pressure (which may uncouple the frame 10 from the structure 17). For example, the first predetermined amount of pressure may be a pressure range of 0.5 PSI-7 PSI (or any of the pressures or pressure ranges discussed above), the second predetermined amount of pressure may be a pressure range of 1.5 PSI-8 PSI (or any of the pressures or pressure ranges discussed above and further being greater than the first predetermined amount of pressure), and the third predetermined amount of pressure may be a pressure range of 2.5 PSI-9 PSI (or any of the pressures or pressure ranges discussed above and further being greater than the second predetermined amount of pressure).

As such, if a fluid (such as flooding water) applies a first predetermined amount of pressure to the panel 22, at least a portion of the panel 22 may be uncoupled from the flood vent 8 (which may reduce the amount of blockage of the fluid passageway provided by the panel 22). Furthermore, in an example where the fluid (such as the flooding water) continues to rise and apply additional force, if the fluid applies the second predetermined amount of pressure to the remainder of the panel 22, the remainder of the panel 22 may be uncoupled from the frame 10 (which may further reduce the amount of blockage of the fluid). Additionally, in an example where the fluid (such as the flooding water) continues to rise and apply additional force, if the fluid applies the third predetermined amount of pressure to the frame 10, the frame 10 may be uncoupled from the structure 17 (which may further reduce the amount of blockage of the fluid). As such, the flood vent 8 may be able to further provide for equalization of interior and exterior hydrostatic forces caused by flooding waters.

As another example, the flood vent 8 of FIGS. 5A-6C may include a panel 22 having more than one portion of the panel 22 that may be uncoupled from the flood vent 8. In such an example, the panel 22 may include three or more portions separated by two or more perforations 60. For example, the panel 22 may have a first portion separated from a second portion by a first perforation 60 configured to uncouple the second portion from the first portion when a second predetermined amount of pressure is applied to the panel 22 (or to the second portion of the panel 22). Furthermore, the second portion of the panel 22 may be separated from a third portion of the panel 22 by a second perforation configured to uncouple the third portion from the second portion when a first predetermined amount of pressure is applied to the panel 22 (or to the third portion of the panel 22). The first predetermined amount of pressure (which may uncouple the third portion of the panel 22 from the flood vent 8) may be less than the second predetermined amount of pressure (which may uncouple the second portion of the panel 22 from the flood vent 8). For example, the first predetermined amount of pressure may be a pressure range of 0.5 PSI-7 PSI (or any of the pressures or pressure ranges discussed above) while the second predetermined amount of pressure may be a pressure range of 1.5 PSI-8 PSI (or any of the pressures or pressure ranges discussed above and further being greater than the first predetermined amount of pressure). As such, if a fluid (such as flooding water) applies a first predetermined amount of pressure to the panel 22, the third portion may be uncoupled from the flood vent 8 (which may reduce the amount of blockage of the fluid passageway provided by the

panel 22). Furthermore, in an example where the fluid (such as the flooding water) continues to rise and apply additional force, if the fluid applies the second predetermined amount of pressure to the remainder of the panel 22, the second portion of the panel 22 may be uncoupled from the flood vent 8 (which may further reduce the amount of blockage of the fluid passageway provided by the panel 22). As such, the flood vent 8 may be able to further provide for equalization of interior and exterior hydrostatic forces caused by flooding waters.

As a further example, although the flood vent 8 has been described above as including a frame 10, in particular embodiments, the flood vent 8 may not include a frame 10. In such embodiments, the panel 22 may be configured to be coupled directly to the structure 17. As such, in particular embodiments, the panel 22 may be inserted into (or installed on) the structure 17 (such as the opening 18 in the structure 17) without the use of a frame 10.

FIGS. 7A-7H illustrate the flood vent 8 of FIGS. 1-2 with a panel 22 having a plurality of insulation pieces 70 and one or more insulation piece connectors 80. The insulation pieces 70 may be configured to form the panel 22, so as to at least partially block the fluid passageway formed by the frame 10. The insulation piece connectors 80 may be configured to couple the insulation pieces 70 together to form the panel 22. Furthermore, the insulation piece connectors 80 may be further configured to uncouple one or more of the insulation pieces 70 from the panel 22. For example, the insulation piece connectors 80 may be configured to uncouple one or more of the insulation pieces 70 from the panel 22 when a predetermined amount of pressure is applied to the panel 22, such as by a fluid or an object (such as a tree limb or dirt) carried by the fluid.

As such, in particular embodiments, the panel 22 of flood vent 8 may prevent (or substantially prevent) objects and/or fluids from passing through the flood vent 8 until a predetermined amount of pressure is applied to the panel 22; and after the predetermined amount of pressure is applied to the panel 22, one or more of the insulation pieces 70 of the panel 22 may be uncoupled from the panel 22 and may no longer prevent objects and/or fluids from passing through the flood vent 8 (or the amount of blockage of the fluid passageway provided by the panel 22 may be reduced). This may, in particular embodiments, allow the flood vent 8 to provide insulative features to the flood vent (e.g., preventing cold air from escaping and hot air from entering the structure 17 through the flood vent 8 during summer, preventing hot air from escaping and cold air from entering the structure 17 through the flood vent 8 during winter, etc.). Furthermore, it may also allow the flood vent 8 to provide for equalization of hydrostatic forces caused by, for example, flooding fluids, even when the flooding fluids carry objects (such as debris) that may clog the openings 26 in the panel 22, when the openings 26 in the panel 22 are too small to allow sufficient fluids to pass through the flood vent 8, when the openings 26 in the panel 22 are closed, and/or when the panel 22 does not include any openings 26.

As is discussed above with regard to FIGS. 1-2, the flood vent 8 includes a frame 10 and a panel 22. The frame 10 may be configured to be inserted into an opening 18 in a structure 17, and may be further configured to form a fluid passageway through the opening 18 in the structure 17, thereby allowing the flooding fluids to enter and/or exit the structure 17. The panel 22 may be configured to be coupled to the frame 10. Furthermore, the panel 22 may be configured to be coupled to the frame 10 in the fluid passageway formed by the frame 10. Additionally, when coupled to the frame 10,

the panel 22 may at least partially block the fluid passageway formed by the frame 10, an example of which is seen in FIG. 7C.

The panel 22 may be coupled to the frame 10 in any manner. For example, the panel 22 may be coupled to the frame 10 using an adhesive (such as glue, cement, and/or Lexel®), attached to the frame 10 using one or more pins that may be inserted or snapped into one or more channels or hooks in the frame 10, attached to the frame 10 using one or more rivets, nails, and/or any other connector, attached to the structure 17 (and thus the frame 10) using one or more rivets, nails, and/or any other connector, coupled to the frame 10 in any other manner, or any combination of the preceding.

The panel 22 may be any type of panel. For example, as is illustrated in FIGS. 7A-7F, the panel 22 may be a solid panel that may prevent all (or substantially all) fluids (such as water and/or air) from passing through the panel 22, as well as prevent (or substantially prevent) objects (such as small animals) from passing through the panel 22. As another example, the panel 22 may include one or more openings 26 configured to allow fluids (such as water and/or air) to pass through the panel 22, but prevent objects (such as small animals) from passing through the panel 22.

The panel 22 includes a plurality of insulation pieces 70 configured to be coupled together to form the panel 22, so as to at least partially block the fluid passageway formed by the frame 10. An insulation piece 70 may be any type of object or piece that may be coupled together with other objects or pieces in order to form a panel 22, and that may be configured to at least partially prevent fluids (such as water and/or air) from passing through the insulation piece 70.

An insulation piece 70 may be formed from (or include) any type of material configured to at least partially prevent fluids (such as water and/or air) from passing through the insulation piece 70. For example, insulation piece 70 may be formed from (or include) rubber, plastic, a polymer, a foam, a metal (such as aluminum, stainless steel, spring steel, a galvanized material, any other metal, or any combination of the preceding), any other insulating material, any other material configured to at least partially prevent fluids (such as water and/or air) from passing through insulation piece 70, or any combination of the preceding. In particular embodiments, insulation piece 70 may be formed from (or include) a foam insulation, such as polyurethane, polyisocyanurate, polystyrene, polyethylene (such as cross linked polyethylene), icynene, air krete, teflon (PTFE), polyester, synthetic rubber, any other foam insulation, or any combination of the preceding. In particular embodiments, insulation piece 70 may be formed from (or include) a rubber or polymer, such as butyl, natural rubber, nitrile, ethylene propylene, polyurethane, silicone, any other rubber or polymer, or any combination of the preceding.

The panel 22 may include any number of insulation pieces 70. For example, the panel 22 may include two insulation pieces 70, three insulation pieces 70, four insulation pieces 70, ten insulation pieces 70, twenty insulation pieces 70, forty insulation pieces 70, fifty insulation pieces 70, 64 insulation pieces 70, 75 insulation pieces 70, 98 insulation pieces 70, 100 insulation pieces 70, 128 insulation pieces 70, 150 insulation pieces, 200 insulation pieces, 256 insulation pieces, or any other number of insulation pieces 70. As another example, the panel 22 may include at least two insulation pieces 70 (i.e., two or more insulation pieces 70), at least three insulation pieces 70, at least four insulation pieces 70, at least ten insulation pieces 70, at least twenty

insulation pieces 70, at least forty insulation pieces 70, at least fifty insulation pieces 70, at least 64 insulation pieces 70, at least 75 insulation pieces 70, at least 100 insulation pieces 70, at least 128 insulation pieces 70, at least 150 insulation pieces 70, at least 200 insulation pieces 70, or at least 256 insulation pieces 70. As another example, the panel 22 may include a range of insulation pieces 70, such as 2-10 insulation pieces 70, 10-20 insulation pieces 70, 10-50 insulation pieces 70, 50-100 insulation pieces 70, 64-128 insulation pieces 70, 100-256 insulation pieces 70, or any other range of insulation pieces 70.

An insulation piece 70 may have any size and/or shape. For example, an insulation piece 70 may have a height 72 of 0.15", 0.25", 0.50", 1.0" 1.50", 2.0", 3.0" 4.0", or any other height 72. As another example, an insulation piece 70 may have a length 74 of 0.15", 0.25", 0.50", 1.0" 1.50", 2.0", 3.0" 4.0", or any other length 74. As a further example, an insulation piece 70 may have a thickness 76 of 0.15", 0.25", 0.50", 1.0" 1.50", 2.0", 3.0" 4.0", or any other thickness 76. As another example, an insulation piece 70 may have a cross section that is rectangular-shaped, square-shaped (as is illustrated in FIG. 7A), circular-shaped, polygon-shaped, irregular shaped, or any other shape. In particular embodiments, the insulation piece 70 may have a height 72 and length 74 of 0.5" squared, 1.5" squared, 1.5" squared, 2" squared, 2.5" squared, 3" squared, 3.5" squared, or any other height 72 and length 74. In particular embodiments, the insulation piece 70 may have a height 72 and length 74 of approximately 0.5" squared (i.e., 0.5" squared+/-0.1" squared), approximately 1" squared, approximately 1.5" squared, approximately 2" squared, approximately 2.5" squared, approximately 3" squared, approximately 3.5" squared, or approximately any other height 72 and length 74.

In particular embodiments, the insulation piece 70 may have a volume (e.g., height 72, length 74, and thickness 76) of 0.5" cubed, 1" cubed, 1.5" cubed, 2" cubed, 2.5" cubed, 3" cubed, 3.5" cubed, or any other volume. In particular embodiments, the insulation piece 70 may have a volume of approximately 0.5" cubed (i.e., 0.5" cubed+/-0.1" cubed), approximately 1" cubed, approximately 1.5" cubed, approximately 2" cubed, approximately 2.5" cubed, approximately 3" cubed, approximately 3.5" cubed, or approximately any other volume.

In particular embodiments, the size and/or shape of the insulation piece 70 may assist flood vent 8 in providing for equalization of interior and exterior hydrostatic forces caused by a fluid (such as flooding water) attempting to flow through the flood vent 8. For example, the size and/or shape of the insulation piece 70 may allow the insulation piece 70 to uncouple from the panel 22 and be carried away from the flood vent 8 by the fluid without, for example, the insulation piece 70 becoming stuck in a portion of the flood vent 8, a portion of an adjacent flood vent 8 (e.g., the uncoupled insulation pieces 70 may float underneath an open panel 22 or other door in an adjacent flood vent 8 installed in the same opening 18 in the structure 17), and/or the opening 18 in the structure 17. As such, the flood vent 8, the adjacent flood vent 8, and/or the opening 18 in the structure 17 may not be clogged (or otherwise blocked) by the uncoupled insulation pieces 70, which may allow the flood vent 8 to further provide for equalization of interior and exterior hydrostatic forces caused by a fluid (such as flooding water) attempting to flow through the flood vent 8.

The panel 22 further includes one or more insulation piece connectors 80. An insulation piece connector 80 may include any type of one or more connectors configured to couple the insulation pieces 70 together to form the panel 22,

and further configured to uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22, such as by a fluid or an object (such as a tree limb or dirt) carried by the fluid. As a first example, an insulation piece connector 80 may be one or more pieces of lamination in contact with the insulation pieces 70. The one or more pieces of lamination may be configured to couple the insulation pieces 70 together to form the panel 22, and may be further configured to uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22. The pieces of lamination may include any type of laminate, such as one or more pieces of a plastic film, one or more pieces of a polymer film, any other laminate or film that may couple the insulation pieces 70 together to form the panel 22, or any combination of the preceding.

Furthermore, the one or more pieces of lamination may be further configured to uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22. For example, the one or more pieces of lamination may be configured to peel off, break, or otherwise uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22. In particular embodiments, the one or more pieces of lamination may be engineered and/or modified to peel off, break, or otherwise uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22. As one example, the one or more pieces of lamination may include rows of holes (or perforations) that may weaken the one or more pieces of lamination so as to break when a predetermined amount of pressure is applied to the panel 22. In particular embodiments, the amount of material used in the lamination may be selected to cause the one or more pieces of lamination to peel off, break, or otherwise uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22.

The pieces of lamination may be laminated to (or otherwise in contact) with each of the insulation pieces 70. For example, the insulation pieces 70 may be arranged together in the shape of the panel 22, and then the one or more pieces of lamination may be laminated to (or otherwise be put in contact with) each of the insulation pieces 70 on the side 24a of the panel 22, thereby coupling the insulation pieces 70 to each other and forming the panel 22. As a further example, the insulation pieces 70 may be arranged together in the shape of the panel 22, and then the one or more pieces of lamination may be laminated to (or otherwise be put in contact with) each of the insulation pieces 70 on the side 24b of the panel 22 (as is illustrated in FIG. 7B), thereby coupling the insulation pieces 70 to each other and forming the panel 22. As another example, the insulation pieces 70 may be arranged together in the shape of the panel 22, and then the one or more pieces of lamination may be laminated to (or otherwise be put in contact with) each of the insulation pieces 70 on both side 24a and side 24b of the panel 22, thereby coupling the insulation pieces 70 to each other and forming the panel 22.

The pieces of lamination may couple the insulation pieces 70 together (thereby forming the panel 22, as is seen in FIG. 7B) until a predetermined amount of pressure is applied to the panel 22 by, for example, a fluid (such as flooding water). Once the predetermined amount of pressure is applied to the panel 22, the pieces of lamination may peel off, break, or

otherwise uncouple from the insulation pieces 70 and/or panel 22, thereby uncoupling one or more of the insulation pieces 70 from the panel 22. This may cause one or more of the insulation pieces 70 to be completely separated from the panel 22 (and/or the remaining insulation pieces 70), and be carried away from the flood vent 8, as is illustrated in FIGS. 7C-7F. As such, in particular embodiments, the flood vent 8 may no longer prevent objects and/or fluids from passing through the opening 18 in the structure 17 (or the amount of blockage of the fluid passageway provided by the panel 22 may be reduced).

As a second example, an insulation piece connector 80 may be an adhesive configured to couple the insulation pieces 70 together to form the panel 22, and further configured to uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22. The adhesive may include any adhesive substance that may adhere the insulation pieces 70 together to form the panel 22, such as glue, cement, Lexel® adhesive, any other adhesive substance that may adhere the insulation pieces 70 together to form the panel 22, or any combination of the preceding. Furthermore, the adhesive may be further configured to uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22. For example, the adhesive may be configured to peel off, break, or otherwise uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22. In particular embodiments, the adhesive may be engineered and/or modified to peel off, break, or otherwise uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22. In particular embodiments, the amount of adhesive used to couple the insulation pieces 70 together to form the panel 22 may be selected to cause the adhesive to peel off, break, or otherwise uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22 and/or the frame 10.

The adhesive may include one or more portions of the adhesive coupled to each of the insulation pieces 70, thereby coupling the insulation pieces 70 to each other and forming the panel 22. The one or more portions of the adhesive may be coupled to any area of the insulation pieces 70, such one or more (or all of the) edges (or sides) of the insulation pieces 70, the side 24a of the panel 22, the side 24b of the panel 22, both the sides 24a and 24b of the panel 22, or any combination of the preceding. The portions of the adhesive may couple the insulation pieces 70 together (thereby forming the panel 22) until a predetermined amount of pressure is applied to the panel 22 by, for example, a fluid (such as flooding water). Once the predetermined amount of pressure is applied to the panel 22, the adhesive may peel off, break, or otherwise uncouple one or more of the insulation pieces 70 from the panel 22. This may cause one or more of the insulation pieces 70 to be completely separated from the panel 22 (and/or the remaining insulation pieces 70), and be carried away from the flood vent 8. As such, in particular embodiments, the flood vent 8 may no longer prevent objects and/or fluids from passing through the opening 18 in the structure 17 (or the amount of blockage of the fluid passageway provided by the panel 22 may be reduced).

As a third example, an insulation piece connector 80 may be one or more mechanical fasteners configured to couple the insulation pieces 70 together to form the panel 22, and

further configured to uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22. The mechanical fasteners may include any one or more devices and/or objects that may mechanically fasten the insulation pieces 70 together, such as one or more nails, screws, rivets, nuts and bolts, rods and studs, anchors, pins, retaining rings and/or clips, any other devices and/or objects that may mechanically fasten the insulation pieces 70 together, or any combination of the preceding. Furthermore, the mechanical fasteners may be configured to uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22. For example, the mechanical fasteners may be configured to break or otherwise uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22. In particular embodiments, the mechanical fasteners may be engineered and/or modified to break or otherwise uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22.

The mechanical fasteners may include one or more mechanical fasteners coupled to each of the insulation pieces 70, thereby coupling the insulation pieces 70 to each other and forming the panel 22. The mechanical fasteners may be coupled to any area of the insulation pieces 70, such one or more (or all of the) edges (or sides) of the insulation pieces 70, the side 24a of the panel 22, the side 24b of the panel 22, both the sides 24a and 24b of the panel 22, or any combination of the preceding. The mechanical fasteners may couple the insulation pieces 70 together (thereby forming the panel 22) until a predetermined amount of pressure is applied to the panel 22 by, for example, a fluid (such as flooding water). Once the predetermined amount of pressure is applied to the panel 22, the mechanical fasteners may break or otherwise uncouple one or more of the insulation pieces 70 from the panel 22. This may cause one or more of the insulation pieces 70 to be completely separated from the panel 22 (and/or the remaining insulation pieces 70), and be carried away from the flood vent 8. As such, in particular embodiments, the flood vent 8 may no longer prevent objects and/or fluids from passing through the opening 18 in the structure 17 (or the amount of blockage of the fluid passageway provided by the panel 22 may be reduced).

As a fourth example, an insulation piece connector 80 may be one or more integral connectors configured to couple the insulation pieces 70 together to form the panel 22, and further configured to uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22. The integral connectors may be portions of the insulation pieces 70, themselves, that couple the insulation pieces 70 together. For example, the insulation pieces 70 may be formed or otherwise manufactured in the form of the panel 22, with connector segments integrally formed in (or on) the insulation pieces 70 so as to protrude from the insulation pieces 70 and attach the insulation pieces 70 together (as is illustrated in FIG. 7G).

As another example, the panel 22 may be formed as a single solid piece, and the insulation pieces 70 and integral connectors may be formed from the solid piece (such as by stamping the solid piece, cutting-out portions of the solid piece, or any other means of removing material). As an example of this, a steel rule die (e.g., a steel rule die having one or more divots in the blade) may be used to stamp the solid-piece (such as a solid-piece of polyethylene foam), for

example. Such stamping may cut through almost the entire thickness (or other dimension) of the panel 22 in order to form the individual insulation pieces 70 in the panel 22, but may leave one or more un-cut connections or strands (e.g., hair-like strands) in-between each of the individual insulation pieces 70. These un-cut connections or strands may be the integral connectors configured to couple the insulation pieces 70 together to form the panel 22.

Furthermore, the integral connectors may be configured to uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22. For example, the integral connectors may be configured to break or otherwise uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22. In particular embodiments, the integral connectors may be sized (e.g., by the one or more divots in the blade of the steel rule die, for example) (or otherwise modified) to break or otherwise uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22.

The integral connectors may include one or more integral connectors coupled to (or formed in) each of the insulation pieces 70, thereby coupling the insulation pieces 70 to each other and forming the panel 22. The integral connectors may be coupled to (or formed in) any area of the insulation pieces, such one or more (or all of the) edges (or sides) of the insulation pieces 70, the side 24a of the panel 22, the side 24b of the panel 22, both the sides 24a and 24b of the panel 22, or any combination of the preceding. The integral connectors may couple the insulation pieces 70 together (thereby forming the panel 22) until a predetermined amount of pressure is applied to the panel 22 by, for example, a fluid (such as flooding water). Once the predetermined amount of pressure is applied to the panel 22, the integral connectors may break or otherwise uncouple one or more of the insulation pieces 70 from the panel 22. This may cause one or more of the insulation pieces 70 to be completely separated from the panel 22 (and/or the remaining insulation pieces 70), and be carried away from the flood vent 8. As such, in particular embodiments, the flood vent 8 may no longer prevent objects and/or fluids from passing through the opening 18 in the structure 17 (or the amount of blockage of the fluid passageway provided by the panel 22 may be reduced).

As a fifth example, an insulation piece connector 80 may be a connector frame configured to couple the insulation pieces 70 together to form the panel 22, and further configured to uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22. The connector frame may include any one or more devices and/or objects that may couple the insulation pieces 70 together by applying pressure to one or more of the insulation pieces 70. As an example of this, the connector frame may be a frame that includes an internal holding space. The insulation pieces 70 may be positioned into the internal holding space, and the internal holding space may apply pressure to one or more of the insulation pieces 70, coupling them together.

The connector frame may further be configured to uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22. For example, when a predetermined amount of pressure is applied to the panel 22, the predetermined amount of pressure may overcome the pressure provided by the connector frame, causing one or

more of the insulation pieces 70 to uncouple from the panel 22. This may cause one or more of the insulation pieces 70 to be completely uncoupled from the panel 22 (and/or the remaining insulation pieces 70), and be carried away from the flood vent 8. As such, in particular embodiments, the flood vent 8 may no longer prevent objects and/or fluids from passing through the opening 18 in the structure 17 (or the amount of blockage of the fluid passageway provided by the panel 22 may be reduced).

The connector frame may be the frame 10 of the flood vent 8. In such an example, the panel 22 may be coupled directly to the frame 10 (e.g., by being positioned in an internal holding space of the frame 10), and the frame 10, itself, may perform one or more of the functions of the connector frame (e.g., the frame 10 may couple the insulation pieces 70 together to form the panel 22 and/or may uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22.) In other examples, the connector frame may be a device and/or object that is different from the frame 10 of the flood vent 8. In such an example, the insulation pieces 70 may be positioned in the connector frame in order to form the panel 22. Then the connector frame may be coupled to the frame 10 (e.g., via one or more pins or other connectors) in order to couple the panel 22 to the frame 10. Further details regarding an example connector frame are discussed below with regard to FIGS. 8A-8E.

The flood vent 8 may include any number of insulation piece connectors 80. For example, the flood vent 8 may include one insulation piece connector 80, two insulation piece connectors 80, three insulation piece connectors 80, four insulation piece connectors 80, six insulation piece connectors 80, eight insulation piece connectors 80, ten insulation piece connectors 80, twenty insulation piece connectors 80, fifty insulation piece connectors 80, 64 insulation piece connectors 80, 100 insulation piece connectors 80, 128 insulation piece connectors 80, 256 insulation piece connectors 80, one insulation piece connector 80 for each insulation piece 70, two insulation piece connectors 80 for each insulation piece 70, or any other number of insulation piece connectors 80. The insulation piece connectors 80 may have any size and/or shape that may allow the insulation piece connectors 80 to uncouple one or more of the insulation pieces 70 from the panel 22 when a predetermined amount of pressure is applied to the panel 22.

As is discussed above, the insulation piece connectors 80 may be configured to uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22. In particular embodiments, the predetermined amount of pressure may refer to the lowest amount of pressure (or approximately the lowest amount of pressure) that would cause the panel 22 to prevent the equalization of interior and exterior hydrostatic forces caused by a fluid (such as flooding water) attempting to flow through the flood vent 8. As an example, the predetermined amount of pressure may be 0.5 PSI, 1 PSI, 1.5 PSI, 2 PSI, 2.5 PSI, 3 PSI, 3.5 PSI, 4 PSI, 4.5 PSI, 5 PSI, 6 PSI, 7 PSI, 10 PSI, approximately 0.5 PSI (i.e., 0.5 PSI $\pm$ 0.2 PSI), approximately 1 PSI, approximately 1.5 PSI, approximately 2 PSI, approximately 2.5 PSI, approximately 3 PSI, approximately 3.5 PSI, approximately 4 PSI, approximately 4.5 PSI, approximately 5 PSI, approximately 6 PSI, approximately 7 PSI, approximately 10 PSI, or any other amount of pressure that may prevent the equalization of interior and exterior hydrostatic forces caused by a fluid (such as flooding water) attempting to flow through the flood

vent 8. As a further example, the predetermined amount of pressure may be a pressure range of 0.5 PSI-7 PSI, 0.5-5.0 PSI, 0.5-4.0 PSI, 0.5-3.0 PSI, 1.0-7.0 PSI, 1.0-5.0 PSI, 1.0-4.0 PSI, 1.0-3.0 PSI, 1.5-7.0 PSI, 1.5-5.0 PSI, 1.5-4.0 PSI, 1.5-3.0 PSI, 2.0-7.0 PSI, 2.0-5.0 PSI, 2.0-4.0 PSI, 2.0-3.0 PSI, or any other pressure range that may prevent the equalization of interior and exterior hydrostatic forces caused by a fluid (such as flooding water) attempting to flow through the flood vent 8.

The predetermined amount of pressure may be the lowest pressure at which the insulation piece connectors 80 may be configured to uncouple one or more of the insulation pieces 70 from the panel 22. For example, if an amount of pressure below the predetermined amount of pressure is applied to the panel 22, the insulation piece connectors 80 may not uncouple one or more of the insulation pieces 70 from the panel 22. On the other hand, if an amount of pressure equal to the predetermined amount of pressure (or above the predetermined amount of pressure) is applied to the panel 22, the insulation piece connectors 80 may uncouple one or more of the insulation pieces 70 from the panel 22.

The insulation piece connectors 80 may be configured to uncouple one or more of the insulation pieces 70 from the panel 22 if the predetermined amount of pressure is applied to any portion of the panel 22. For example, the insulation piece connectors 80 may be configured to uncouple one or more of the insulation pieces 70 from the panel 22 if the predetermined amount of pressure is applied to a bottom portion of the panel 22, a top portion of the panel 22, a left and/or right side portion of the panel 22, any other portion of the panel 22, or any combination of the preceding.

Furthermore, the one or more insulation pieces 70 uncoupled from the panel 22 may be associated with the portion of the panel 22 to which the predetermined amount of pressure is applied. For example, if the predetermined amount of pressure is applied to a bottom portion of the panel 22, the one or more insulation pieces 70 uncoupled from the panel 22 may be insulation pieces 70 that were located in (and/or near) the bottom portion of the panel 22. Furthermore, in such an example, the insulation pieces 70 not located in (and/or near) the bottom portion of the panel 22 may not be uncoupled from the panel 22. Instead, the insulation pieces 70 not located in (and/or near) the bottom portion of the panel 22 may remain coupled to the panel 22 (and/or the remaining insulation pieces 70 in the panel 22) until the predetermined amount of pressure is applied to the portion of the panel 22 in which those insulation pieces 70 are located (and/or near where those insulation pieces 70 are located). Alternatively, in particular embodiments, once one or more insulation pieces 70 are uncoupled from the panel 22, the uncoupling may create a cascading effect that may uncouple all or a substantial portion (i.e., 90%) of the insulation pieces 70 from the panel 22.

The predetermined amount of pressure for causing the insulation piece connectors 80 to uncouple one or more of the insulation pieces 70 from the panel 22 may change based on (or be a function of) the portion of the panel 22 to which the predetermined amount of pressure is applied. For example, the predetermined amount of pressure may be greater if the predetermined amount of pressure is applied to the bottom portion of the panel 22 (which may be indicative of a less amount of flooding fluids, for example) than if the predetermined amount of pressure is applied to the top portion of the panel 22 (which may be indicative of a greater amount of flooding fluids, for example).

The predetermined amount of pressure for causing the insulation piece connectors 80 to uncouple one or more of

the insulation pieces 70 from the panel 22 may change based on (or be a function of) the type of panel 22 included in the flood vent 8. For example, the predetermined amount of pressure may be less if the panel 22 is a panel without any openings 26 (or with openings that may be closed, using louvers, for example) than if the panel 22 includes openings 26 that may not be closed. In such an example, a panel 22 without openings 26 (when compared to a panel 22 with openings 26) may more easily (or quickly) prevent equalization of interior and exterior hydrostatic forces caused by a fluid, and therefore it may be advantageous to uncouple the panel 22 without openings 26 at a lower amount of pressure (when compared to a panel 22 with openings 26). As another example, the predetermined amount of pressure may be less if the panel 22 is a panel 22 with less openings 26 (and/or with smaller openings 26) than if the panel 22 includes more openings 26 (and/or has bigger openings 26). In such an example, a panel 22 with less openings 26 (when compared to a panel 22 with more openings 26) may more easily (or quickly) prevent equalization of interior and exterior hydrostatic forces caused by a fluid, and therefore it may be advantageous to uncouple the panel 22 with less openings 26 at a lower amount of pressure (when compared to a panel 22 with more openings 26).

The insulation piece connectors 80 may be configured to uncouple the one or more of the insulation pieces 70 from the panel 22 if the predetermined amount of pressure is applied to any side of the panel 22. For example, the insulation piece connectors 80 may be configured to uncouple one or more of the insulation pieces 70 from the panel 22 if the predetermined amount of pressure is applied to side 24b of the panel 22 (e.g., the side of the panel 22 facing the interior of the structure 17), thereby causing the one or more insulation pieces 70 to be uncoupled from the flood vent 8 and be carried by the fluids, for example, outside of the structure 17, as is illustrated in FIGS. 7C-7F. In particular embodiments, this may cause the one or more insulation pieces 70 to be uncoupled from the flood vent 8 when flooding fluids, for example, enter the flood vent 8 from inside the structure 17. As another example, the insulation piece connectors 80 may be configured to uncouple one or more of the insulation pieces 70 from the panel 22 if the predetermined amount of pressure is applied to side 24a of the panel 22 (e.g., the side of the panel 22 facing the exterior of the structure 17), thereby causing the one or more insulation pieces 70 to be uncoupled from the flood vent 8 and be carried by the fluids, for example, inside of the structure 17 (e.g., in a direction from left-to-right in FIGS. 7C-7F). In particular embodiments, this may cause the one or more insulation pieces 70 to be uncoupled from the flood vent 8 when flooding fluids, for example, enter the flood vent 8 from outside the structure 17. As a further example, the insulation piece connectors 80 may be configured to uncouple one or more of the insulation pieces 70 from the panel 22 if the predetermined amount of pressure is applied to either the side 24b of the panel 22 (e.g., the side of the panel 22 facing the interior of the structure 17) or the side 24a of the panel 22 (e.g., the side of the panel 22 facing the exterior of the structure 17). In particular embodiments, this may cause the one or more insulation pieces 70 to be uncoupled from the flood vent 8 when flooding fluids, for example, enter the flood vent 8 from either inside the structure 17 or outside the structure 17.

The panel 22 may further have a frame 84 (e.g., a panel frame), as is illustrated in FIG. 7H. The frame 84 may be a portion of the panel 22 that surrounds the insulation pieces 70 and/or the insulation piece connectors 80. In particular

embodiments, the frame 84 may be a portion of the panel 22 that does not uncouple from the panel 22. For example, although the insulation pieces 70 may be uncoupled from the panel 22, the frame 84 may remain a portion of the panel 22. In such an example, the insulation pieces 70 may uncouple from the frame 84 (and the panel 22) when the predetermined amount of the pressure is applied to the insulation pieces 70. In particular embodiments, all of the insulation pieces 70 may be uncoupled from the frame 84 of the panel 22, leaving an opening in the panel 22 having the shape of the frame 84. Insulation pieces 70 may be coupled to the frame 84 by one or more insulation piece connectors 80, in particular embodiments.

The frame 84 may have any size and/or shape. For example, the frame 84 may have an edge sizing 88 of 0.15", 0.25", 0.375", 0.50", 1.0", 1.50", 2.0", 3.0", 4.0", or any other edge sizing 88. As another example, the frame 84 may be rectangular-shaped (as is illustrated in FIG. 7H), square-shaped, circular-shaped, polygon-shaped, irregular shaped, or any other shape.

The frame 84 may be foamed from (or include) any type of material configured to at least partially prevent fluids (such as water and/or air) from passing through the frame 84. For example, the frame 84 may be formed from (or include) rubber, plastic, a polymer, a foam, a metal (such as aluminum, stainless steel, spring steel, a galvanized material, any other metal, or any combination of the preceding), any other insulating material, any other material configured to at least partially prevent fluids (such as water and/or air) from passing through frame 84, or any combination of the preceding. In particular embodiments, the frame 84 may be formed from (or include) a foam insulation, such as polyurethane, polyisocyanurate, polystyrene, polyethylene (such as cross linked polyethylene), icynene, air krete, teflon (PTFE), polyester, synthetic rubber, any other foam insulation, or any combination of the preceding. In particular embodiments, the frame 84 may be formed from (or include) a rubber or polymer, such as butyl, natural rubber, nitrile, ethylene propylene, polyurethane, silicone, any other rubber or polymer, or any combination of the preceding. The frame 84 may be formed from the same material as insulation pieces 70, or may be formed from a different material.

In particular embodiments, the frame 84 may be formed simultaneously (or substantially simultaneously) with the insulation pieces 70 and insulation piece connectors 80. For example, the panel 22 may be formed as a single solid piece, and the frame 84, the insulation pieces 70, and the insulation piece connectors 80 may be formed from the solid piece (such as by stamping the solid piece, cutting-out portions of the solid piece, or any other means of removing material). As an example of this, a steel rule die (e.g., a steel rule die having one or more divots in the blade) may be used to stamp the solid-piece (such as a solid-piece of polyethylene foam), for example. Such stamping may cut through almost the entire thickness (or other dimension) of the panel 22 in order to form the frame 84 and the individual insulation pieces 70 in the panel 22, but may leave one or more un-cut connections or strands (e.g., hair-like strands) in-between each of the individual insulation pieces 70 and the frame 84. These un-cut connections or strands may be the insulation piece connectors 80 configured to couple the insulation pieces 70 together to form the panel 22.

Modifications, additions, or omissions may be made to the flood vent 8 of FIGS. 7A-7G without departing from the scope of the disclosure. For example, the flood vent 8 of FIGS. 7A-7G may include one or more components of the flood vent 8 of FIGS. 4A-4C. In such an example, the flood



vent **8** may include a panel **22** having a plurality of insulation pieces **70** and one or more insulation piece connectors **80** configured to couple the insulation pieces **70** together (thereby forming panel **22**), and further configured to uncouple one or more of the insulation pieces **70** from the panel **22** when a first predetermined amount of pressure is applied to the panel **22**, and may further include one or more connectors **40** that may be configured to uncouple the frame **10** from the structure **17** when a second predetermined amount of pressure is applied to the panel **22** and/or the frame **10**. The first predetermined amount of pressure (which may uncouple one or more of the insulation pieces **70** from the panel **22**) may be less than the second predetermined amount of pressure (which may uncouple the frame **10** from the structure **17**). For example, the first predetermined amount of pressure may be a pressure range of 0.5 PSI-7 PSI (or any of the pressures or pressure ranges discussed above) while the second predetermined amount of pressure may be a pressure range of 1.5 PSI-8 PSI (or any of the pressures or pressure ranges discussed above and further being greater than the first predetermined amount of pressure).

As such, if a fluid (such as flooding water) applies a first predetermined amount of pressure to the panel **22**, one or more insulation pieces **70** may be uncoupled from the panel **22** (which may reduce the amount of blockage of the fluid passageway by the panel **22**). Furthermore, in an example where the fluid (such as the flooding water) continues to rise and apply additional force, if the fluid applies the second predetermined amount of pressure to the frame **10**, the frame **10** may be uncoupled from the structure **17** (which may further reduce the amount of blockage of the fluid). As such, the flood vent **8** may be able to further provide for equalization of interior and exterior hydrostatic forces caused by flooding waters.

As another example, although the flood vent **8** has been described above as including a frame **10**, in particular embodiments, the flood vent **8** may not include a frame **10**. In such embodiments, the panel **22** may be configured to be coupled directly to the structure **17**. As such, in particular embodiments, the panel **22** may be inserted into (or installed on) the structure **17** (such as the opening **18** in the structure **17**) without the use of a frame **10**.

FIGS. **8A-8E** illustrate the flood vent of FIGS. **1-2** having one example of an insulation piece connector. As is illustrated, the flood vent **8** may include a frame **10** that operates as the insulation piece connector. In doing so, the frame **10** may couple a plurality of insulation pieces **70** together to form the panel **22**, and may further uncouple one or more of the insulation pieces **70** from the panel **22** when, for example, a predetermined amount of pressure is applied to the panel **22**. This may, in particular embodiments, allow the flood vent **8** to provide insulative features to the flood vent (e.g., preventing cold air from escaping and hot air from entering the structure **17** through the flood vent **8** during summer, preventing hot air from escaping and cold air from entering the structure **17** through the flood vent **8** during winter, etc.). Furthermore, it may also allow the flood vent **8** to provide for equalization of hydrostatic forces caused by, for example, flooding fluids, even when the flooding fluids carry objects (such as debris) that may clog the openings **26** in the panel **22**, when the openings **26** in the panel **22** are too small to allow sufficient fluids to pass through the flood vent **8**, when the openings **26** in the panel **22** are closed, and/or when the panel **22** does not include any openings **26**.

As is also illustrated, the flood vent **8** may also include a sheet **92** that may be coupled to the flood vent **8**, and that may prevent air from passing from a first side of the flood

vent **8** (and/or frame **10**) to a second side of the flood vent **8** (and/or frame **10**). As such, in particular embodiments, the flood vent **8** may prevent contaminants (e.g., contaminants carried in the air) from entering and/or exiting a structure **17** through the flood vent **8**. Furthermore, in particular embodiments, the sheet **92** may be removed from the flood vent **8** prior to a flood event, so as to allow the flood vent **8** to provide for equalization of hydrostatic forces caused by, for example, flooding fluids.

As is discussed above with regard to FIGS. **1-2**, the flood vent **8** includes a frame **10** and a panel **22**. The frame **10** may be configured to be inserted into an opening **18** in a structure **17**, and may be further configured to form a fluid passageway through the opening **18** in the structure **17**, thereby allowing the flooding fluids to enter and/or exit the structure **17**. The panel **22** may be configured to be coupled to the frame **10**. Furthermore, the panel **22** may be configured to be coupled to the frame **10** in the fluid passageway formed by the frame **10**. Additionally, when coupled to the frame **10**, the panel **22** may at least partially block the fluid passageway formed by the frame **10**, an example of which is seen in FIG. **8B**.

The panel **22** may be any type of panel. For example, as is illustrated in FIG. **8A**, the panel **22** may be a solid panel that may prevent all (or substantially all) fluids (such as water and/or air) from passing through the panel **22**, as well as prevent (or substantially prevent) objects (such as small animals) from passing through the panel **22**. As another example, the panel **22** may include one or more openings **26** configured to allow fluids (such as water and/or air) to pass through the panel **22**, but prevent objects (such as small animals) from passing through the panel **22**.

The panel **22** may include a plurality of insulation pieces **70** configured to be coupled together (or otherwise positioned together), so as to at least partially block the fluid passageway formed by the frame **10**. An insulation piece **70** may be any type of object or piece that may be coupled together (or otherwise positioned together) with other objects or pieces in order to form a portion of the panel **22**, and that may be configured to at least partially prevent fluids (such as water and/or air) from passing through the insulation piece **70**. Further details regarding the insulation pieces **70** are discussed above with regard to FIGS. **7A-7H**.

The panel **22** may further have a frame **84** (e.g., a panel frame). The frame **84** may be a portion of the panel **22** that surrounds the insulation pieces **70**. In particular embodiments, the frame **84** may be a portion of the panel **22** that does not uncouple from the panel **22**. For example, although the insulation pieces **70** may be uncoupled from the panel **22**, the frame **84** may remain a portion of the panel **22**. In such an example, the insulation pieces **70** may uncouple from the frame **84** (and the panel **22**) when the predetermined amount of the pressure is applied to the insulation pieces **70**. In particular embodiments, all of the insulation pieces **70** may be uncoupled from the frame **84** of the panel **22**, leaving an opening in the panel **22** having the shape of the frame **84**. Further details regarding the frame **84** are discussed above with regard to FIGS. **7A-7H**.

Although the panel **22** may include insulation pieces **70** and a frame **84**, the insulation pieces **70** may each be separated from each other (and/or the insulation pieces **70** may each be separated from the frame **84**). For example, the panel **22** may not include any material or adhesive (or other connector) that is physically attached to two or more insulation pieces **70**, or that is physically attached to an insulation piece **70** and the frame **84**. Instead, each insulation piece **70** (and/or frame **84**) may be a separate unit. In such

examples, pressure may be used to couple the insulation pieces **70** and frame **84** together to form the panel **22**, as is discussed below. The separation between each insulation piece **70** (and between each insulation piece **70** and the frame **84**) may be formed in any manner.

As a first example, each insulation piece **70** (and the frame **84**) may be formed individually, and then assembled together to form the panel **22**. In such an example, each piece would remain separate from the other pieces.

As a second example, the insulation pieces **70** and frame **84** may be formed from a single solid piece of material (e.g., by stamping the solid piece, cutting-out portions of the solid piece, or any other means of removing material). As an example of this, a steel rule die may be used to stamp the solid-piece (such as a solid-piece of polyethylene foam) to create a panel **22** having the insulation pieces **70** and frame **84**. Such stamping may cut entirely through the thickness (or other dimension) of the solid piece of material in order to form each individual insulation piece **70** (and/or the individual frame **84**) in the panel **22** as separate pieces. These separate pieces may form the panel **22**.

Similar to FIGS. 7A-7H, the flood vent **8** of FIGS. 8A-8E may include one or more insulation piece connectors that may couple the insulation pieces **70** (and the frame **84**) together to form the panel **22**, and that may further uncouple one or more of the insulation pieces **70** from the panel **22** when, for example, a predetermined amount of pressure is applied to the panel **22**. According to the illustrated embodiment, the insulation piece connector of FIGS. 8A-8E is the frame **10**, itself. As illustrated, the frame **10** may be configured to couple the insulation pieces **70** (and frame **84**) together to form the panel **22**, and may be further configured to uncouple one or more of the insulation pieces **70** from the panel **22** when, for example, a predetermined amount of pressure is applied to the panel **22**.

To couple the insulation pieces **70** (and frame **84**) together to form the panel **22**, the frame **10** may include an internal holding space **96**. The internal holding space **96** may be any space inside of (or attached to) the frame **10** into which all (or a portion) of the panel **22** may be positioned. As such, the internal holding space **96** may hold the panel **22** in the frame **10** when the panel **22** is positioned in the internal holding space **96**. The internal holding space **96** may have any size and/or shape that allows all (or a portion) of the panel **22** to fit within the internal holding space **96**.

In addition to holding the panel **22**, the internal holding space **96** may apply pressure to the panel **22** while it is holding the panel **22**. This pressure may couple the insulation pieces **70** (and frame **84**) together to form the panel **22**. For example, this pressure may squeeze the insulation pieces **70** (and the frame **84**) together, thereby preventing the insulation pieces **70** from being uncoupled from the panel **22** until, for example, a predetermined amount of pressure is applied to the panel **22**.

The internal holding space **96** may apply pressure to the panel **22** in any manner. As a first example, the internal holding space **96** may include one or more protrusions (e.g., bumps) that extend out of walls of the internal holding space **96**. When the panel **22** is positioned within the internal holding space **96**, these protrusions may apply pressure to portions of the panel **22**. As a second example, the internal holding space **96** may have a length **100** and/or height **104** (and/or other dimension) that is smaller than a corresponding length and/or height (and/or other dimension) of the panel **22**. For example, the internal holding space **96** may have a length **100** of 15.50 inches and/or a height **104** of 7.5 inches, while the panel **22** may have a corresponding length

of 16 inches and/or a corresponding height of 8 inches. As another example, the internal holding space **96** may have a length **100** that is smaller than the corresponding length of the panel **22** by less than  $\frac{1}{64}$  of an inch, and/or may have a height **104** that is smaller than the corresponding height of the panel **22** by less than  $\frac{1}{64}$  of an inch. In such examples, the internal holding space **96** may create a pressed fit for the panel **22**. When the panel **22** is positioned within the internal holding space **96**, this smaller size may apply pressure to portions of the panel **22**.

The internal holding space **96** may apply pressure to the panel **22** in any direction(s). As one example, the internal holding space **96** may apply pressure to the panel **22** in a direction that is parallel to the length of the panel **22**. Examples of this direction are illustrated as arrows **108a** and **108b**. As another example, the internal holding space **96** may apply pressure to the panel **22** in a direction that is parallel to the height of the panel **22**. Examples of this direction are illustrated as arrows **112a** and **112b**. As a further example, the internal holding space **96** may apply pressure to the panel **22** in both a direction that is parallel to the length of the panel **22** and also a direction that is parallel to the height of the panel **22**. In particular embodiments, by applying pressure in a direction that is parallel to the length (and/or height) of the panel **22**, the insulation pieces **70** (and frame **84**) may be squeezed together. Furthermore, although the directions have been described above as being parallel to the length and/or height of the panel **22**, in some examples the directions may be generally parallel (e.g., parallel+/-20 degrees in any direction) to the length and/or height of the panel **22**.

To further couple the insulation pieces **70** (and frame **84**) together to form the panel **22**, the frame **10** may also include a center rail **114**. The center rail **114** may be a support structure that extends from a first interior edge of the frame **10** (e.g., top interior edge **13a**) to an opposite interior edge of the frame **10** (e.g., bottom interior edge **13b**), as is illustrated in FIG. 8A. This may cause the center rail **114** to extend across a portion of the fluid passageway created by the frame **10**. In particular embodiments, the center rail **114** may provide strength to the panel **22**. For example, the center rail **114** may add stability to the panel **22** by preventing the panel **22** from bowing in or out. This may prevent the insulation pieces **70** from uncoupling from the panel **22** until the predetermined amount of pressure is applied to the panel **22** by, for example, a fluid (such as flooding water). Additionally, the center rail **114** may not impede the flow of fluids through the fluid passageway (or may not substantially impede the flow of fluids), and may not impede the ability for the insulation pieces **70** to be uncoupled from the panel **22** (or may not substantially impede the uncoupling). Furthermore, although the frame **10** of FIG. 8A is illustrated as including a center rail **114**, in some embodiments, the frame **10** may not include a center rail **114** at all.

The frame **10** (and the internal holding space **96**) may be further configured to uncouple one or more of the insulation pieces **70** from the panel **22** when, for example, a predetermined amount of pressure is applied to the panel **22**. For example, as is discussed above, the frame **10** may apply pressure to the panel **22** (via the internal holding space **96**, for example). The amount of pressure applied by the frame **10** may be configured to be overcome by at least a predetermined amount of pressure applied to the panel **22** by, for example, a fluid (such as flooding water). This pressure applied by the fluid (for example) may be applied in a direction that is orthogonal (or generally orthogonal) to the pressure applied by the frame **10**. Once this predetermined

amount of pressure is applied to the panel 22 by the fluid (for example), one or more of the insulation pieces 70 may be pushed out of their position in the panel 22, causing the insulation piece(s) 70 to completely uncouple from the panel 22 (and/or uncouple from the remaining insulation pieces 70), and further causing the insulation piece(s) 70 to be carried away from the flood vent 8. As such, in particular embodiments, the flood vent 8 may no longer prevent objects and/or fluids from passing through the opening 18 in the structure 17 (or the amount of blockage of the fluid passageway provided by the panel 22 may be reduced). An example of the uncoupling of the insulation pieces 70 from the panel 22 is illustrated in FIGS. 8C-8E.

As is discussed above, the amount of pressure applied by the frame 10 to the panel 22 may be configured to be overcome by at least a predetermined amount of pressure applied to the panel 22 by, for example, a fluid (such as flooding water). As an example of this, the amount of pressure applied by the frame 22 to the panel 22 may be increased, in some examples, so as to cause the amount of pressure (applied by a fluid, for example) needed to uncouple the insulation pieces 70 from the panel to also increase. This increase in pressure applied by the frame 22 to the panel 22 may be the result of decreasing the size of the internal holding space 96, for example. Alternatively, the amount of pressure applied by the frame 22 to the panel 22 may be decreased, in some examples, so as to cause the amount of pressure (applied by a fluid, for example) needed to uncouple the insulation pieces 70 from the panel to also decrease. This decrease in pressure applied by the frame 22 to the panel 22 may be the result of increasing the size of the internal holding space 96, for example.

As is discussed above, the frame 10 (and the internal holding space 96) may be configured to uncouple one or more of the insulation pieces 70 from the panel 22 when, for example, a predetermined amount of pressure is applied to the panel 22. In particular embodiments, the predetermined amount of pressure may refer to the lowest amount of pressure (or approximately the lowest amount of pressure) that would cause the panel 22 to prevent the equalization of interior and exterior hydrostatic forces caused by a fluid (such as flooding water) attempting to flow through the flood vent 8. As an example, the predetermined amount of pressure may be 0.5 PSI, 1 PSI, 1.5 PSI, 2 PSI, 2.5 PSI, 3 PSI, 3.5 PSI, 4 PSI, 4.5 PSI, 5 PSI, 6 PSI, 7 PSI, 10 PSI, approximately 0.5 PSI (i.e., 0.5 PSI $\pm$ 0.2 PSI), approximately 1 PSI, approximately 1.5 PSI, approximately 2 PSI, approximately 2.5 PSI, approximately 3 PSI, approximately 3.5 PSI, approximately 4 PSI, approximately 4.5 PSI, approximately 5 PSI, approximately 6 PSI, approximately 7 PSI, approximately 10 PSI, or any other amount of pressure that may prevent the equalization of interior and exterior hydrostatic forces caused by a fluid (such as flooding water) attempting to flow through the flood vent 8. As a further example, the predetermined amount of pressure may be a pressure range of 0.5 PSI-7 PSI, 0.5-5.0 PSI, 0.5-4.0 PSI, 0.5-3.0 PSI, 1.0-7.0 PSI, 1.0-5.0 PSI, 1.0-4.0 PSI, 1.0-3.0 PSI, 1.5-7.0 PSI, 1.5-5.0 PSI, 1.5-4.0 PSI, 1.5-3.0 PSI, 2.0-7.0 PSI, 2.0-5.0 PSI, 2.0-4.0 PSI, 2.0-3.0 PSI, or any other pressure range that may prevent the equalization of interior and exterior hydrostatic forces caused by a fluid (such as flooding water) attempting to flow through the flood vent 8.

The predetermined amount of pressure may be the lowest pressure at which the frame 10 may be configured to uncouple one or more of the insulation pieces 70 from the panel 22. For example, if an amount of pressure below the

predetermined amount of pressure is applied to the panel 22, the frame 10 may not uncouple one or more of the insulation pieces 70 from the panel 22. On the other hand, if an amount of pressure equal to the predetermined amount of pressure (or above the predetermined amount of pressure) is applied to the panel 22, the frame 10 may uncouple one or more of the insulation pieces 70 from the panel 22.

The frame 10 may be configured to uncouple one or more of the insulation pieces 70 from the panel 22 if the predetermined amount of pressure is applied to any portion of the panel 22. For example, the frame 10 may be configured to uncouple one or more of the insulation pieces 70 from the panel 22 if the predetermined amount of pressure is applied to a bottom portion of the panel 22, a top portion of the panel 22, a left and/or right side portion of the panel 22, any other portion of the panel 22, or any combination of the preceding. Furthermore, the one or more insulation pieces 70 uncoupled from the panel 22 may be associated with the portion of the panel 22 to which the predetermined amount of pressure is applied. For example, if the predetermined amount of pressure is applied to a bottom portion of the panel 22, the one or more insulation pieces 70 uncoupled from the panel 22 may be insulation pieces 70 that were located in (and/or near) the bottom portion of the panel 22. Furthermore, in such an example, the insulation pieces 70 not located in (and/or near) the bottom portion of the panel 22 may not be uncoupled from the panel 22. Instead, the insulation pieces 70 not located in (and/or near) the bottom portion of the panel 22 may remain coupled to the panel 22 (and/or the remaining insulation pieces 70 in the panel 22) until the predetermined amount of pressure is applied to the portion of the panel 22 in which those insulation pieces 70 are located (and/or near where those insulation pieces 70 are located). Alternatively, in particular embodiments, once one or more insulation pieces 70 are uncoupled from the panel 22, the uncoupling may create a cascading effect that may uncouple all or a substantial portion (i.e., 90%) of the insulation pieces 70 from the panel 22.

The predetermined amount of pressure for causing the frame 10 to uncouple one or more of the insulation pieces 70 from the panel 22 may change based on (or be a function of) the portion of the panel 22 to which the predetermined amount of pressure is applied. For example, the predetermined amount of pressure may be greater if the predetermined amount of pressure is applied to the bottom portion of the panel 22 (which may be indicative of a less amount of flooding fluids, for example) than if the predetermined amount of pressure is applied to the top portion of the panel 22 (which may be indicative of a greater amount of flooding fluids, for example).

The predetermined amount of pressure for causing the frame 10 to uncouple one or more of the insulation pieces 70 from the panel 22 may change based on (or be a function of) the type of panel 22 included in the flood vent 8. For example, the predetermined amount of pressure may be less if the panel 22 is a panel without any openings 26 (or with openings that may be closed, using louvers, for example) than if the panel includes openings 26 that may not be closed. In such an example, a panel 22 without openings 26 (when compared to a panel 22 with openings 26) may more easily (or quickly) prevent equalization of interior and exterior hydrostatic forces caused by a fluid, and therefore it may be advantageous to uncouple the panel 22 without openings 26 at a lower amount of pressure (when compared to a panel 22 with openings 26). As another example, the predetermined amount of pressure may be less if the panel 22 is a panel 22 with less openings 26 (and/or with smaller

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openings 26) than if the panel 22 includes more openings 26 (and/or has bigger openings 26). In such an example, a panel 22 with less openings 26 (when compared to a panel 22 with more openings 26) may more easily (or quickly) prevent equalization of interior and exterior hydrostatic forces caused by a fluid, and therefore it may be advantageous to uncouple the panel 22 with less openings 26 at a lower amount of pressure (when compared to a panel 22 with more openings 26).

The frame 10 may be configured to uncouple the one or more of the insulation pieces 70 from the panel 22 if the predetermined amount of pressure is applied to any side of the panel 22. For example, the frame 10 may be configured to uncouple one or more of the insulation pieces 70 from the panel 22 if the predetermined amount of pressure is applied to side 24b of the panel 22 (e.g., the side of the panel 22 facing the interior of the structure 17), thereby causing the one or more insulation pieces 70 to be uncoupled from the flood vent 8 and be carried by the fluids, for example, outside of the structure 17. In particular embodiments, this may cause the one or more insulation pieces 70 to be uncoupled from the flood vent 8 when flooding fluids, for example, enter the flood vent 8 from inside the structure 17. As another example, the frame 10 may be configured to uncouple one or more of the insulation pieces 70 from the panel 22 if the predetermined amount of pressure is applied to side 24a of the panel 22 (e.g., the side of the panel 22 facing the exterior of the structure 17), thereby causing the one or more insulation pieces 70 to be uncoupled from the flood vent 8 and be carried by the fluids, for example, inside of the structure 17 (e.g., as is seen in FIGS. 8B-8E). In particular embodiments, this may cause the one or more insulation pieces 70 to be uncoupled from the flood vent 8 when flooding fluids, for example, enter the flood vent 8 from outside the structure 17. As a further example, the frame 10 may be configured to uncouple one or more of the insulation pieces 70 from the panel 22 if the predetermined amount of pressure is applied to either the side 24b of the panel 22 (e.g., the side of the panel 22 facing the interior of the structure 17) or the side 24a of the panel 22 (e.g., the side of the panel 22 facing the exterior of the structure 17). In particular embodiments, this may cause the one or more insulation pieces 70 to be uncoupled from the flood vent 8 when flooding fluids, for example, enter the flood vent 8 from either inside the structure 17 or outside the structure 17.

In particular embodiments, the frame 10's ability to uncouple one or more of the insulation pieces 70 from the panel 22 may be assisted by the insulation pieces 70, themselves. For example, as is discussed above, the insulation pieces 70 may each be separated from each other (and/or the insulation pieces 70 may each be separated from the frame 84). This separation configuration may assist in uncoupling the insulation pieces 70 from the panel 22 when, for example, the predetermined amount of pressure is applied to the panel 22. For example, this separation may prevent the fluid (such as flooding water) from also having to break a physical connection between two or more of the insulation pieces 70. This may lower the amount of pressure required to uncouple the insulation pieces 70 from the panel, in particular embodiments. As such, the separation between the insulation pieces 70 (and/or the frame 84) may be one example of the insulation pieces 70 being configured to uncouple from the panel 22 when, for example, the predetermined amount of pressure is applied to the panel 22. Other examples may include the size of the insulation pieces 70, the material of the insulation pieces 70, the arrangement

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of the insulation pieces 70, any other feature of the insulation pieces 70, or any combination of the preceding.

In addition to coupling and uncoupling the insulation pieces 70, the frame 10 may further be configured to couple the panel 22 to the frame 10. For example, the frame 10 (and/or the internal holding space 96) may include one or more coupling elements 116 (e.g., tabs, pins, etc.) that extend out of the frame 10 (and/or the internal holding space 96). When the panel 22 is positioned within the internal holding space 96 of the frame 10, the coupling elements 116 may stick into or pierce the material of the panel 22. As an example, the coupling elements 116 may pierce the cross linked polyethylene material of the panel 22. This may further hold the panel 22 in position within the frame 10, preventing it from moving (or reducing the amount of movement) when it is coupled to the frame 10. The coupling elements 116 may stick into or pierce any portion of the panel 22. For example, the coupling elements 116 may stick into or pierce the frame 84 of the panel 22.

The coupling elements 116 (e.g., tabs) may have any size and/or shape that allows them to stick into or pierce the material of the panel 22. Furthermore, the coupling elements 116 may extend out of the frame 10 (and/or the internal holding space 96) at any angle that allows them to stick into or pierce the material of the panel 22. For example, the coupling elements 116 may extend out of the frame 10 (and/or the internal holding space 96) at a 30° angle, a 45° angle, a 90° angle, or any other angle that allows the coupling elements 116 to stick into or pierce the material of the panel 22. The frame 10 (and/or internal holding space 96) may have any number of coupling elements 116. For example, the frame 10 (and/or internal holding space 96) may have 1 coupling element 116, 2 coupling elements 116, 4 coupling elements 116, 5 coupling elements 116, or any other number of coupling elements 116. As is illustrated, the internal holding space 96 has four coupling elements 116: coupling element 116a, coupling element 116b, coupling element 116c (not shown), and coupling element 116d (also not shown).

The panel 22 may also (or alternatively) be coupled to the frame 10 using an adhesive (such as glue, cement, and/or Lexel®), coupled to the frame 10 using one or more pins that may be inserted or snapped into one or more channels or hooks in the frame 10, coupled to the frame 10 using one or more rivets, nails, and/or any other connector, coupled to the structure 17 (and thus the frame 10) using one or more rivets, nails, and/or any other connector, coupled to the frame 10 in any other manner, or any combination of the preceding.

To couple the panel 22 to the frame 10, the panel 22 may be positioned in the frame 10 (e.g., positioned in the internal holding space 96 of the frame 10). The panel 22 may be positioned in the frame 10 (and/or the internal holding space 96) in any manner. As an example, the panel 22 may be picked up, oriented to fit within the internal holding space 96, and pushed into the internal holding space 96. In such an example, the back edges of the internal holding space 96 and/or the center rail 114 may prevent the panel 22 from being pushed entirely through the frame 10. Instead, the panel 22 may rest against these portions of the frame 10 when the panel 22 is fully positioned within the frame 10. When the frame 10 includes the coupling elements 116, the act of pushing the panel 22 into the internal holding space 96 may cause the coupling elements 116 to slide into or pierce the material of the panel 22. In particular embodiments, the act of picking up the panel 22 may be complicated by the separation between the insulation pieces 70 (and/or frame 84), discussed above. To deal with this, a person picking up

the panel 22 may apply pressure to the top edge, bottom edge, and/or side edges of the frame 84 of the panel 22, in particular embodiments. This pressure may prevent the insulation pieces 70 from uncoupling from the panel 22 when the panel 22 is being picked up. Then, when the panel 22 is positioned within the frame 10, the frame 10 may begin providing pressure to the panel 22, as is also discussed above.

In particular embodiments, the panel 22 may be pre-installed in (or pre-coupled to) the frame 10. For example, the panel 22 may be pre-installed in the frame 10 by the manufacturer or seller of the panel 22 or the frame 10. This pre-installation of the panel 22 may prevent the insulation pieces 70 from uncoupling from the panel 22 when the panel 22 and frame 10 are installed in the flood vent 8.

According to the illustrated embodiment of FIGS. 8A-8E, the flood vent 8 may further include a sheet 92 coupled to the flood vent 8. When coupled to the flood vent 8, the sheet 92 may prevent air (or other fluids) from passing from a first side of the flood vent 8 to a second side of the flood vent 8. As such, in particular embodiments, when the sheet 92 is coupled to the flood vent 8, the flood vent 8 may prevent contaminants (e.g., contaminants carried in the air) from entering or exiting structure 17 through the flood vent 8.

The sheet 92 may be any covering that blocks the passage of air (or other fluids) through the sheet 92. For example, the sheet 92 may be a sheet, film, label, tarp, any other covering that blocks the passage of air through the sheet 92, or any combination of the preceding. The sheet 92 may be formed from (or include) any material that allows it to block the passage of air (or other fluids) through the sheet 92. For example, the sheet 92 may be formed from (or include) linear low density polyethylene plastic (LLDPE), low density polyethylene plastic (LDPE), high density polyethylene plastic (HDPE), polyethylene plastic (PE), polyethylene, any other plastic, or any combination of the preceding.

By blocking the passage of air (or other fluids), the sheet 92 may prevent air (or other fluids) from passing from a first side of the flood vent 8 to a second side of the flood vent 8. For example, as is shown in FIG. 8B, the sheet 92 may prevent air (or other fluids) from passing from an exterior side 120 of the flood vent 8 to an interior side 124 of the flood vent 8 (or vice versa). In some example, this may prevent contaminants (e.g., contaminants carried in the air) from entering or exiting structure 17 through the flood vent 8.

A contaminant may refer to any particle(s) or element(s) that may be undesirable. For example, a contaminant may refer to mold, bacteria, viruses, unwanted food particles, any other undesirable particles(s) or element(s), or any combination of the preceding. As an example of this, if the structure 17 in which the flood vent 8 is installed is being used for food manufacturing (e.g. a food manufacturing plant), the contaminant may refer to peanut-based particles. In such an example, the sheet 92 may prevent such peanut-based particles from entering the structure 17 and possibly contaminating the food being manufactured. By doing so, the sheet 92 may help prevent the manufactured food from causing allergic reactions to people who have peanut allergies.

The sheet 92 may have any size and/or shape that allows it to prevent air (or other fluids) from passing from a first side of the flood vent 8 to a second side of the flood vent 8. For example, as is illustrated, the sheet 92 may have a size large enough to extend over the entire panel 22 (e.g., extend over all of the insulation pieces 70 and frame 84) and further extend at least partially over portions of the frame 10 (e.g.,

extend over at least a portion of the rails of the frame 10). The sheet 92 may be opaque or translucent. By being translucent (or partially translucent), a user may be able to see through the sheet 92 in order to view the insulation pieces 70 of the panel 22. This may allow a user (e.g., an inspector) to see if any dirt, mold, liquid, or other contaminants have entered the flood vent 8 and made it past the panel 22. It also may allow a user to see if any of the insulation pieces 70 have accidentally uncoupled from the panel 22. When this occurs, the panel 22 may be replaced with a new panel 22 and the sheet 92 may be replaced with a new sheet 92, in particular embodiments. Furthermore, the remainder of the flood vent 8 may also be cleaned, so as to remove the contaminants.

As is illustrated, the sheet 92 may be coupled to the flood vent 8. The sheet 92 may be coupled to the flood vent 8 in any manner. For example, the sheet 92 may be coupled to the flood vent 8 using mechanical devices (e.g., screws, nails, clips, etc.), using adhesives (e.g., glue, cement, Lexel®, etc.), any other manner of coupling the sheet 92 to the flood vent 8, or any combination of the preceding. The sheet 92 may be coupled to any portion of the flood vent 8. For example, the sheet 92 may be coupled to the frame 10, the frame 84 of the panel 22, any other portion of the flood vent 8, or any combination of the preceding. In particular embodiments, the sheet 92 may be coupled directly to the structure, itself. As is illustrated, the sheet 92 is coupled to the frame 10 using an adhesive. In such an example, the sheet 92 may only be coupled to the frame 10 (as opposed to being coupled to the panel 22). This may prevent the sheet 92 from sticking to and pulling out the insulation pieces 70 when the sheet 92 is removed from the flood vent 8.

The sheet 92 may have a pre-applied adhesive that is included on the perimeter edges of the sheet 92 (e.g., on the back-side of the sheet 92). The sheet 92 may also have an adhesive cover that prevents the adhesive from being activated (or otherwise exposed). Before the sheet 92 is coupled to the flood vent 8, the adhesive cover may be removed, exposing the pre-applied adhesive. Then, the sheet 92 may be coupled to the flood vent 8 by pressing the back-side perimeter edges of the sheet 92 against the rails of the frame 10. Once the sheet 92 is coupled to the frame 10, the sheet 92 may prevent air (or other fluids) from passing from a first side of the flood vent 8 to a second side of the flood vent 8 (or vice versa).

The coupling of the sheet 92 to the flood vent 8 may be a removable coupling. This may allow the sheet 92 to be removed and replaced (e.g., when contaminants are visible in the flood vent 8). The removable coupling may also allow the sheet 92 to be removed prior to a flood event. For example, if a flood event is expected to occur, the sheet 92 may be removed (as is seen in FIG. 8C). When the sheet 92 is removed, fluids may pass through the flood vent 8 from a first side of the flood vent 8 to the second side of the flood vent 8 (or vice versa). Furthermore, these fluids may apply the predetermined amount of pressure to the panel 22, causing one or more of the insulation pieces 70 to uncouple from the panel 22, as is illustrated in FIGS. 8D-8E.

The sheet 92 may be removed at any time. For example, it may be removed after the panel 22 (or after the frame 10 and panel 22) is successfully installed in the flood vent 8. This may be beneficial in a residential setting, as the resident may not be concerned about possible contaminants. After installation, the sheet 92 may be removed. In particular embodiments, the sheet 92 may include a message (e.g., in large orange colored letters) that reminds the installer to

remove the sheet 92 (e.g., “peel off or cut off protective cover to expose insulation barrier after insulation”).

As another example, the sheet 92 may remain coupled to the flood vent 8 until a flood event is expected. Once this occurs, the sheet 92 may finally be removed. Such a configuration may be beneficial in a commercial setting, where contaminants may be a larger concern. In such a configuration, the sheet 92 may remain on the flood vent 8, continuing to prevent contaminants from entering the commercial structure through the flood vent 8 until a flood vent is expected. Then, the sheet 92 may be removed, so as to allow the flood vent 8 to equalize hydrostatic forces caused by, for example, flooding fluids. If the flooding fluids occur, the entire panel 22 and sheet 92 may be replaced (and the flood vent 8 may be cleaned). On the other hand, if the flooding fluids do not occur, a new sheet 92 may be coupled to the flood vent 8 again, so that it can prevent contaminants from entering the commercial structure through the flood vent 8. In particular embodiments, the sheet 92 may include a message (e.g., in large orange colored letters) that reminds a user to remove the sheet 92 (e.g., “peel off or cut off protective cover to expose insulation barrier prior to flood”).

In particular embodiments, the sheet 92 may also prevent the insulation pieces 70 from uncoupling from the panel 22 when the panel 22 and frame 10 are installed in the flood vent 8. For example, as is discussed above, the panel 22 may be pre-installed in (or pre-coupled to) the frame 10. In such an example, the sheet 92 may also be pre-installed on (or pre-coupled to) the frame 10. In such examples, the panel 22 may be sandwiched between the sheet 92 and a back portion of the frame 10. This sandwiching may prevent the insulation pieces 70 from uncoupling from the panel 22 until the sheet 92 is removed (e.g., after installation and/or prior to a flood event).

In particular embodiments, the sheet 92 may be cleanable. This may provide advantages in a situation where the sheet 92 is used to prevent contaminants from entering a structure. For example, at any time (e.g., at the end of a manufacturing cycle), cleaning products may be applied to the exposed side of the sheet 92. Then the sheet 92 may be wiped down with a sponge, cloth, or other material. This may allow the sheet 92 to be cleaned, thereby further decreasing the chance of contamination caused by the flood vent 8.

Modifications, additions, or omissions may be made to the flood vents 8 of FIGS. 8A-8E without departing from the scope of the disclosure. For example, although the flood vent 8 is described above as including a sheet 8 (e.g., a plastic sheet), in some examples the flood vent 8 may not include a sheet 92 at all.

As another example, the flood vent 8 of FIGS. 8A-8E may further include a frame 10 that has an air tight seal. The air tight seal frame 10 may not have any channels, gaps, holes, or openings that allow fluid (e.g., air, water, etc.) to pass through the material or body of the frame 10. Furthermore, the frame 10 may be coupled to the opening 18 of the structure 17 in an air-tight manner (e.g., using an adhesive that prevents air from passing through gaps in-between the structure 17 and the frame 10). As a result of this, fluids may only be able to pass into the structure 17 through the fluid passageway formed by the frame 10. Furthermore, as is discussed above, this fluid passageway may be blocked by the panel 22 and the sheet 92, until the predetermined amount of pressure is applied to the panel 22 by, for example, a flooding fluid. Such an air tight seal frame 10 may provide advantages when the sheet 92 is used to prevent contaminants from entering a structure.

Furthermore, modifications, additions, or omissions may be made to the flood vents 8 of FIGS. 1-8 without departing from the scope of the disclosure. For example, the panel 22 may be replaceable without, for example, replacing the entire flood vent 8. In particular, after all or a portion of the panel 22 has been uncoupled from the flood vent 8 (as a result of a predetermined amount of pressure being applied to the panel 22, for example), the panel 22 may be replaced by a new panel 22 (with the same features and capabilities discussed above with regard to FIGS. 1-8) that may be re-welded to the frame 10, re-coupled to the frame 10 using an adhesive (such as glue, cement, and/or Lexel®), re-coupled to the frame 10 using one or more pins that may be inserted or snapped into one or more channels or hooks in the frame 10, re-coupled to the frame 10 using one or more rivets, nails, and/or any other connector (e.g., coupling element 116), re-coupled to the structure 17 (and thus the frame 10) using one or more rivets, nails, and/or any other connect, re-coupled to the frame 10 in any other manner, or any combination of the preceding. As such, the flood vent 8 may continue to operate, without replacing the entire flood vent 8.

As another example, the disclosure of each of FIGS. 1-8 may be combined with one or more (or all) of any of the other disclosures of FIGS. 1-8. As one example of this, an opening 18 in a structure 17 may have a first flood vent (such as a flood vent 8 of FIGS. 8A-8E) installed on a first side of the structure 17 (such as the interior side of the structure 17), and may further have a second flood vent (such as a flood vent 8 of any of FIGS. 1-7, or any other flood vent, such as any flood vent included in U.S. Pat. No. 6,692,187 entitled “Flood Gate For Door”) installed on a second side of the structure 17 (such as the exterior side of the structure 17).

This specification has been written with reference to various non-limiting and non-exhaustive embodiments or examples. However, it will be recognized by persons having ordinary skill in the art that various substitutions, modifications, or combinations of any of the disclosed embodiments or examples (or portions thereof) may be made within the scope of this specification. Thus, it is contemplated and understood that this specification supports additional embodiments or examples not expressly set forth in this specification. Such embodiments or examples may be obtained, for example, by combining, modifying, or reorganizing any of the disclosed steps, components, elements, features, aspects, characteristics, limitations, and the like, of the various non-limiting and non-exhaustive embodiments or examples described in this specification. In this manner, Applicant reserves the right to amend the claims during prosecution to add features as variously described in this specification.

The invention claimed is:

1. A flood vent, comprising:

a frame configured to form a fluid passageway through an opening in a structure;

a panel configured to be coupled to the frame in the fluid passageway so as to at least partially block the fluid passageway through the opening in the structure, the panel comprising:

a plurality of insulation pieces positioned together; and  
a panel frame surrounding the plurality of insulation pieces; and

an insulation piece connector configured to couple the plurality of insulation pieces together, the insulation piece connector further configured to uncouple one or more of the plurality of insulation pieces from the panel when at least a predetermined amount of pressure is

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applied to a portion of the panel by one or more of a fluid or an object carried by the fluid, so as to reduce an amount of blockage of the fluid passageway provided by the panel, wherein the frame is the insulation piece connector.

2. The flood vent of claim 1, wherein the frame includes an internal holding space that is smaller than one or more dimensions of the panel, wherein the panel is positioned in the internal holding space of the frame to couple the panel to the frame.

3. The flood vent of claim 1, wherein the frame is a stainless steel frame.

4. The flood vent of claim 1, wherein the flood vent further comprises a plastic sheet coupled to the frame, the plastic sheet extending over each of the plurality of insulation pieces, wherein the plastic sheet is configured to prevent air from passing from a second side of the flood vent to a first side of the flood vent.

5. The flood vent of claim 1, wherein each of the plurality of insulation pieces is separated from the other insulation pieces.

6. The flood vent of claim 1, wherein each of the plurality of insulation pieces is separated from the panel frame.

7. The flood vent of claim 1, wherein the plurality of insulation pieces and the panel frame are both made of cross linked polyethylene.

8. The flood vent of claim 1, wherein the plurality of insulation pieces comprises at least 10 insulation pieces.

9. The flood vent of claim 1, wherein the plurality of insulation pieces comprises at least 50 insulation pieces.

10. The flood vent of claim 1, wherein the predetermined amount of pressure is 0.5-5.0 pounds per square inch.

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11. A flood vent panel, comprising:  
a plurality of insulation pieces positioned together; and  
a panel frame surrounding the plurality of insulation pieces;

5 wherein the flood vent panel is configured to be coupled to a frame positionable into an opening in a structure, so as to at least partially block a fluid passageway through the opening in the structure;

10 wherein one or more of the plurality of insulation pieces are configured to uncouple from the flood vent panel when at least a predetermined amount of pressure is applied to a portion of the flood vent panel by one or more of a fluid or an object carried by the fluid, so as to reduce an amount of blockage of the fluid passageway provided by the flood vent panel.

12. The flood vent panel of claim 11, wherein each of the plurality of insulation pieces is separated from the other insulation pieces.

13. The flood vent panel of claim 11, wherein each of the plurality of insulation pieces is separated from the panel frame.

14. The flood vent panel of claim 11, wherein the plurality of insulation pieces and the panel frame are both made of cross linked polyethylene.

15. The flood vent panel of claim 11, wherein the plurality of insulation pieces comprises at least 10 insulation pieces.

16. The flood vent panel of claim 11, wherein the plurality of insulation pieces comprises at least 50 insulation pieces.

17. The flood vent panel of claim 11, wherein the predetermined amount of pressure is 0.5-5.0 pounds per square inch.

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