US00RE47132E

(19) **United States**

(12) **Reissued Patent**

Gosling et al.

(10) **Patent Number: US RE47,132 E**

(45) **Date of Reissued Patent: *Nov. 20, 2018**

(54) **INTEGRATED RECONFIGURABLE WALL SYSTEM**

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(*) Notice: This patent is subject to a terminal disclaimer.

(21) Appl. No.: **14/305,819**

(22) Filed: **Jun. 16, 2014**

Related U.S. Patent Documents

Reissue of:

(64) Patent No.: **8,024,901**
Issued: **Sep. 27, 2011**
Appl. No.: **11/205,314**
Filed: **Aug. 17, 2005**

U.S. Applications:

(63) Continuation of application No. 14/032,931, filed on Sep. 20, 2013, which is an application for the reissue of Pat. No. 8,024,901.

(Continued)

(51) **Int. Cl.**

E04H 1/00	(2006.01)
E04B 1/00	(2006.01)
E04B 2/74	(2006.01)

(52) **U.S. Cl.**

CPC ***E04B 2/7424*** (2013.01); *E04B 2002/742* (2013.01); *E04B 2002/749* (2013.01);

(Continued)

(58) **Field of Classification Search**

USPC 52/239, 238.1, 479, 481.1, 481.2

See application file for complete search history.

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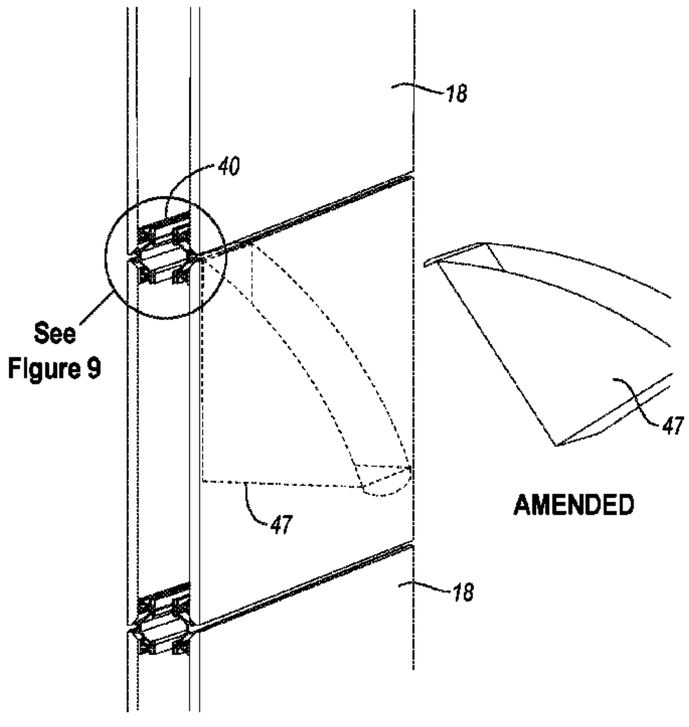
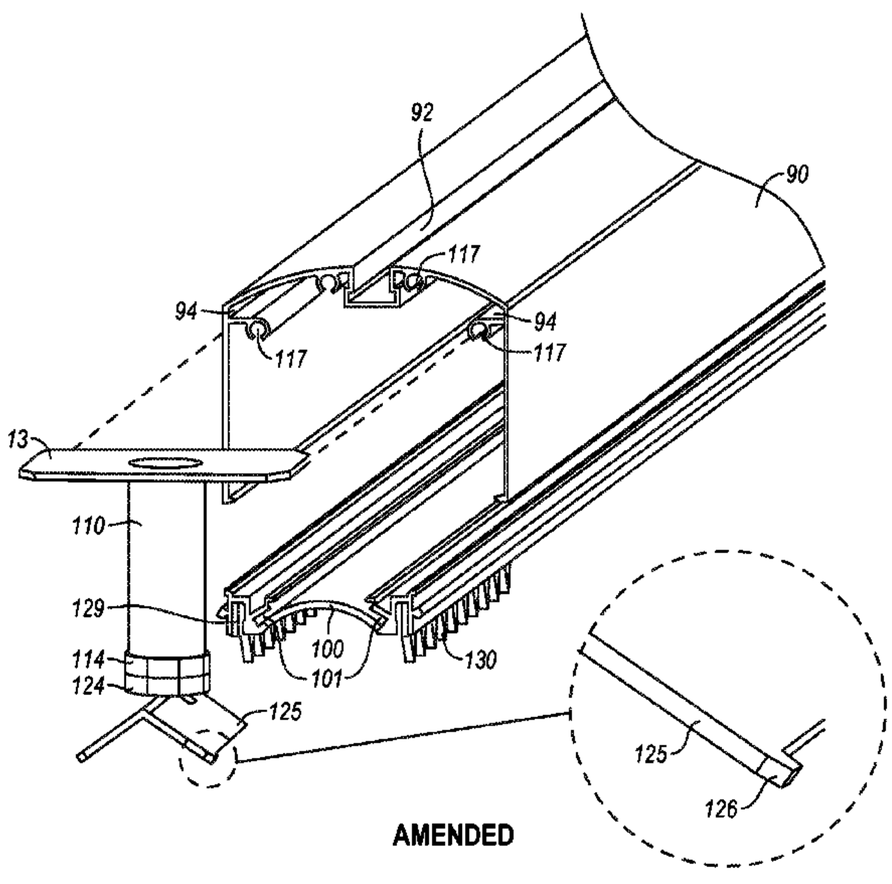
(57) **ABSTRACT**

A movable reconfigurable wall system having at least one module having a front and rear surface, the at least one module having: vertical end frames disposed at least at its side edges, each the vertical end frame having a vertically extending flange directed toward the front surface and a vertically extending flange directed toward the rear surface; a plurality of horizontal stringers affixed between the pair of vertical end frames; and an aesthetic surface affixed to the stringers; and a removable connecting strip, the connecting strip adapted to affix about one of the two flanges on one of the vertical end frames and join the one of the two flanges to a corresponding flange on one of a second module, a wall bracket, a finishing trim or a connection post.

35 Claims, 22 Drawing Sheets





Related U.S. Application Data

(60) Provisional application No. 60/601,985, filed on Aug. 17, 2004.

(52) **U.S. Cl.**
CPC *E04B 2002/7462* (2013.01); *E04B 2002/7483* (2013.01)

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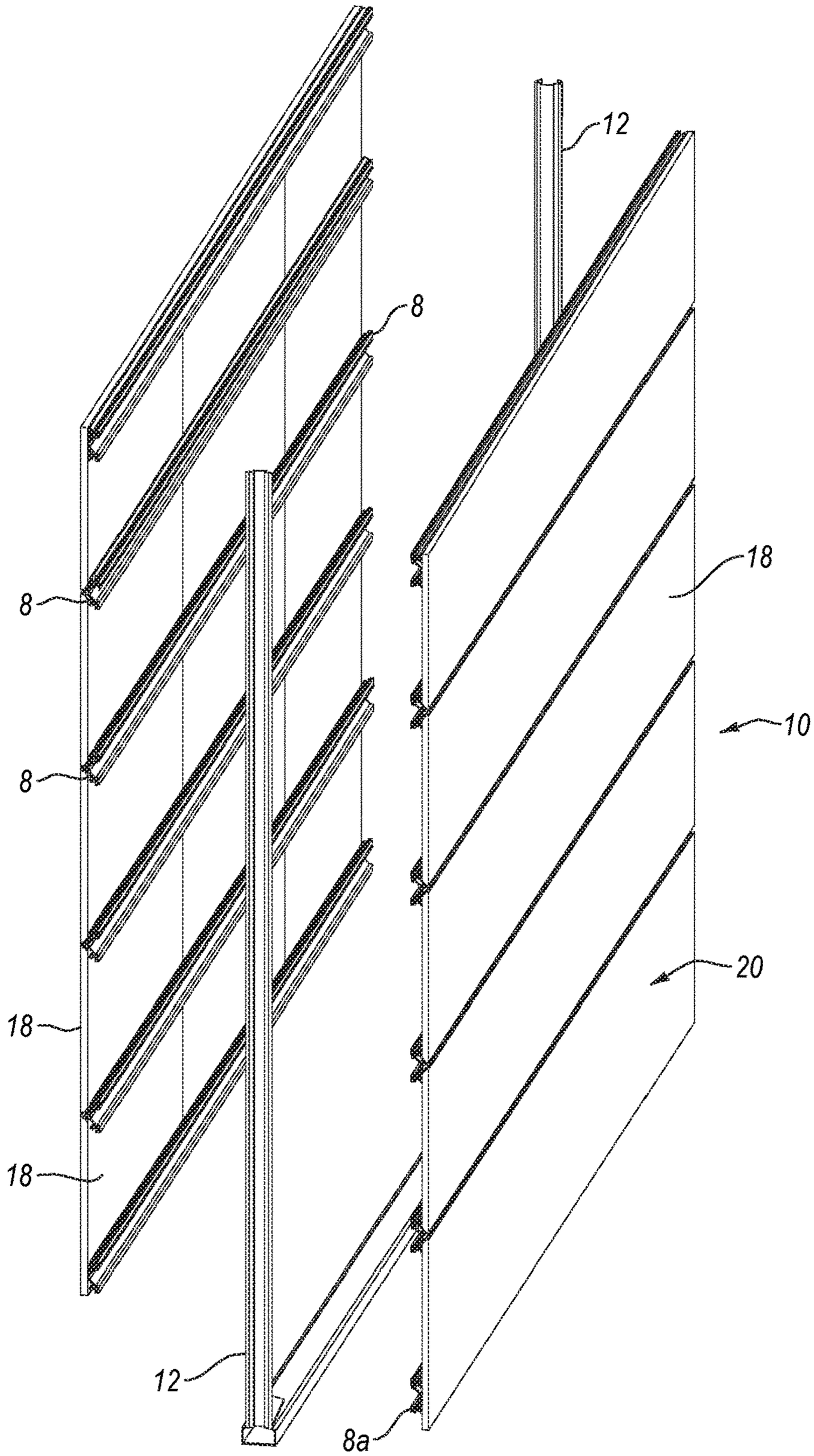

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Figure 1

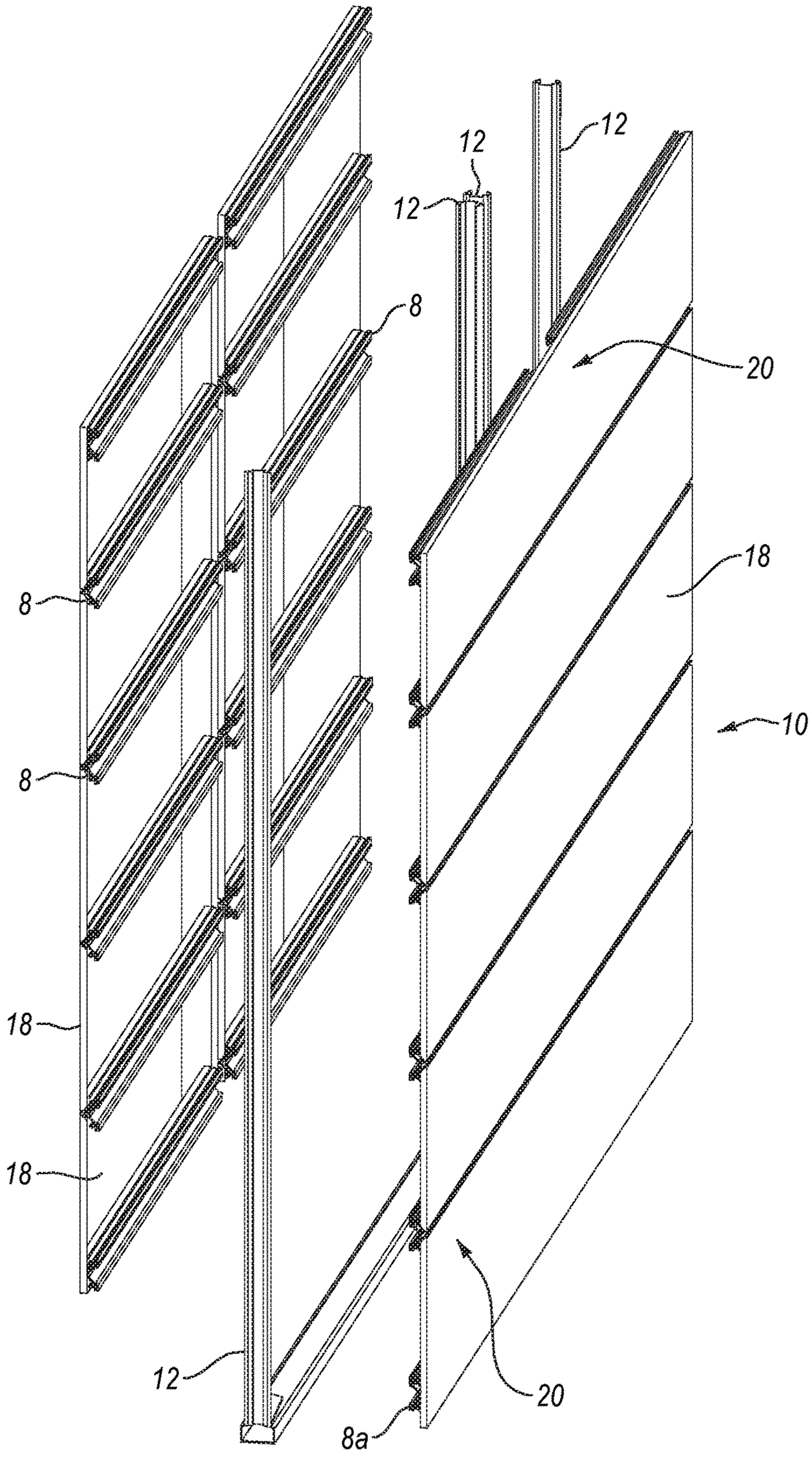

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Figure 1A

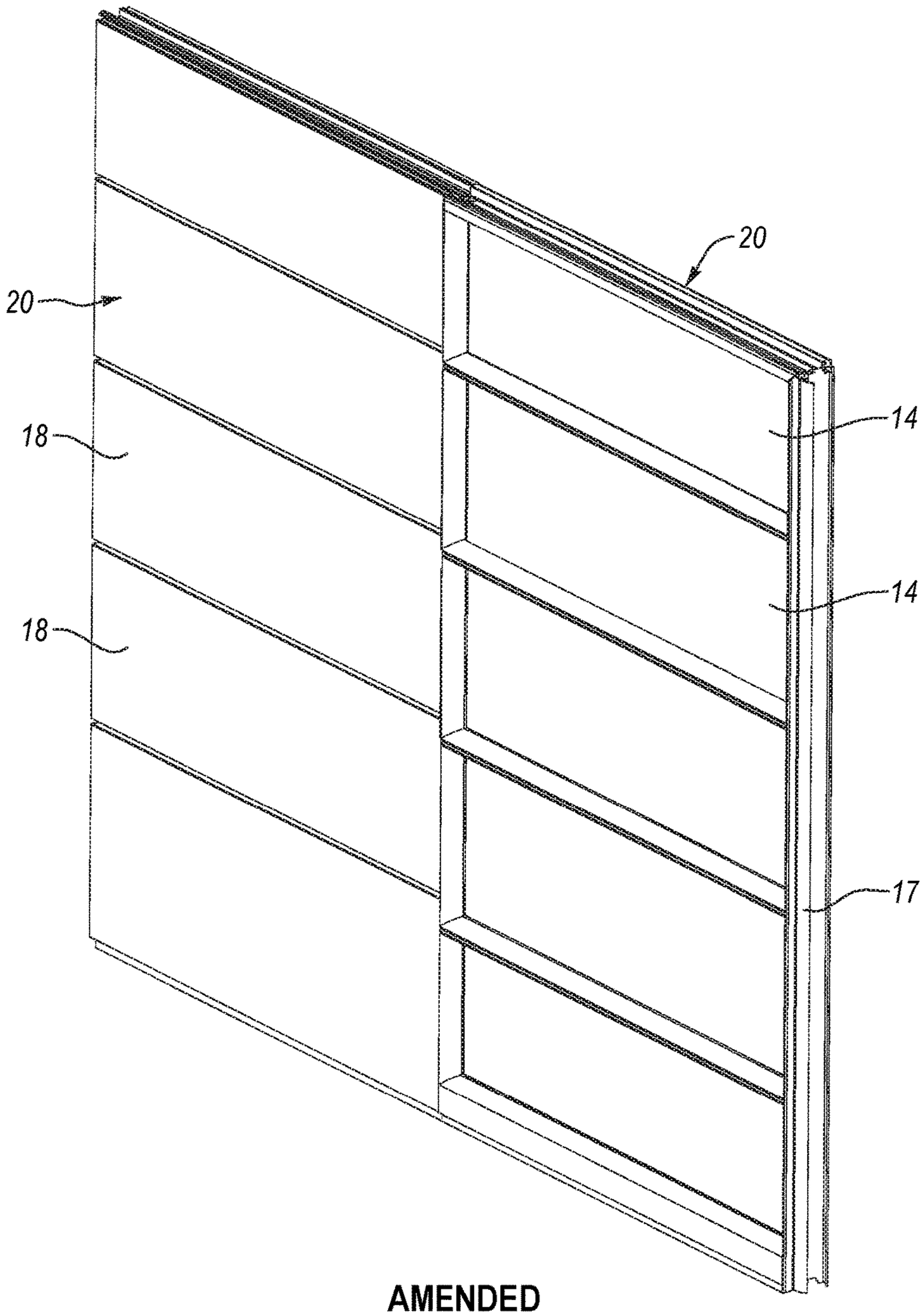

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Figure 2

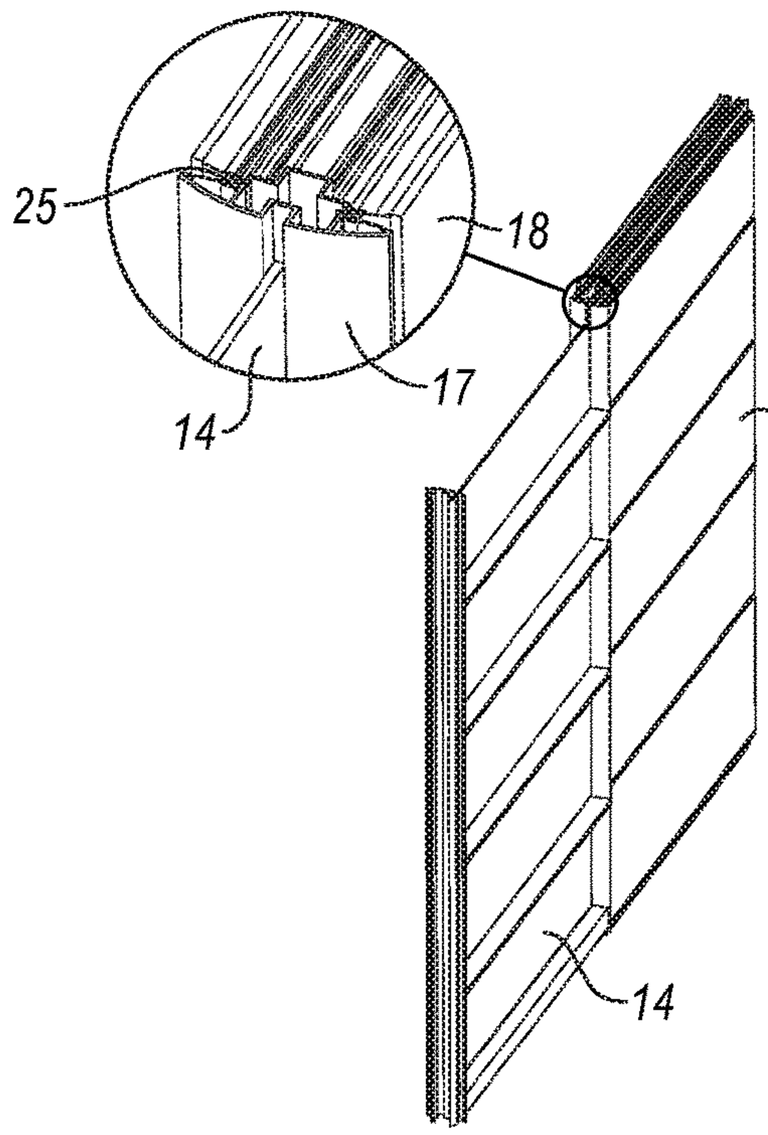
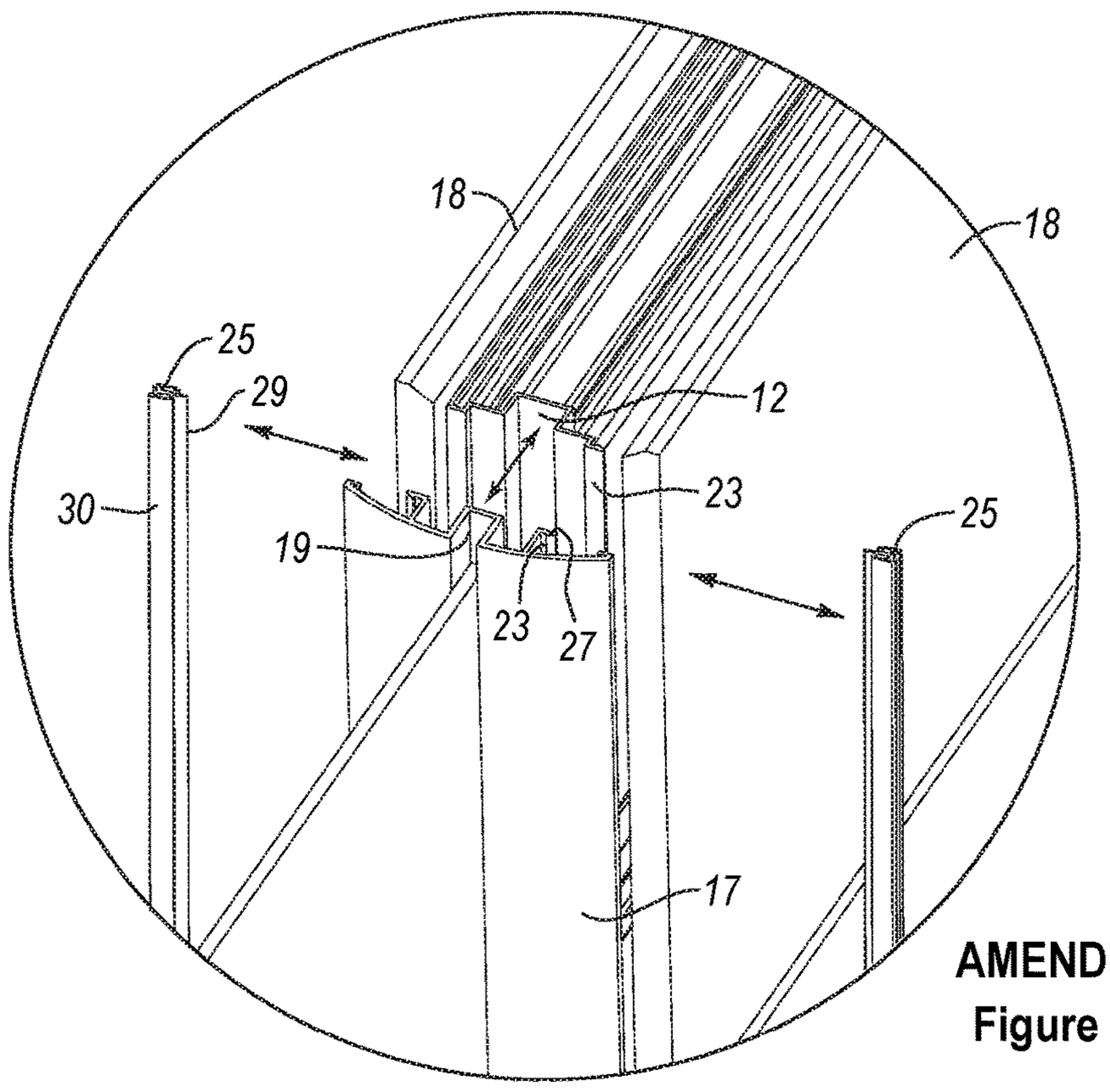


Figure 3



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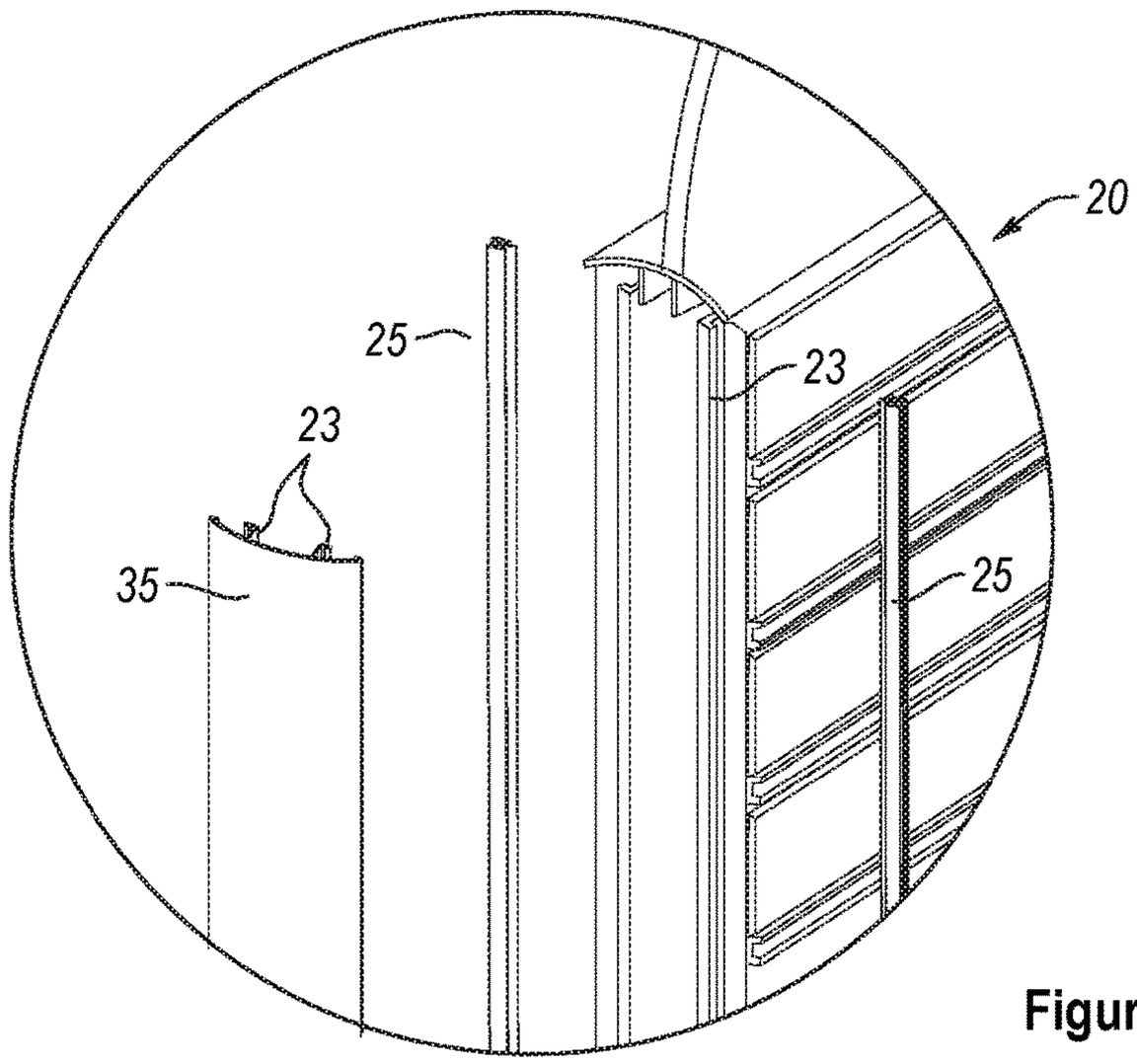
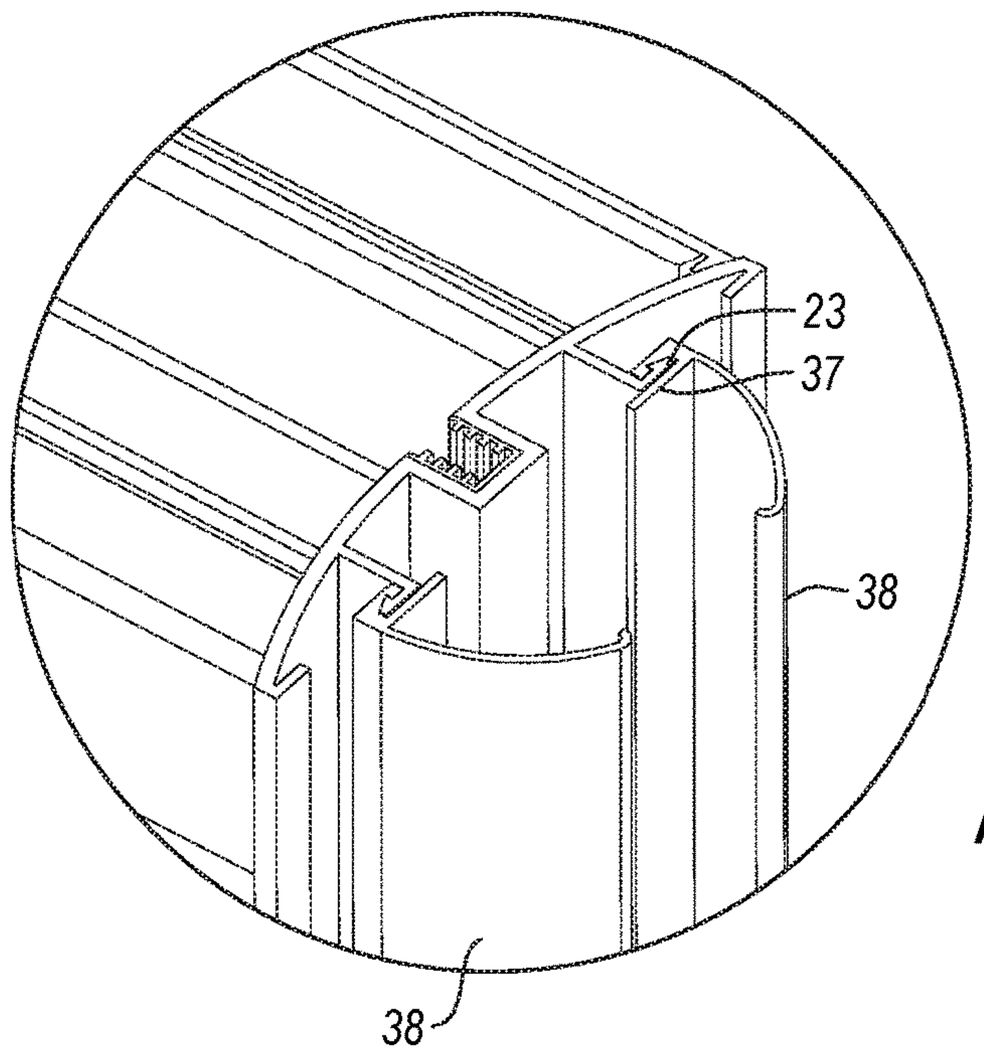


Figure 5



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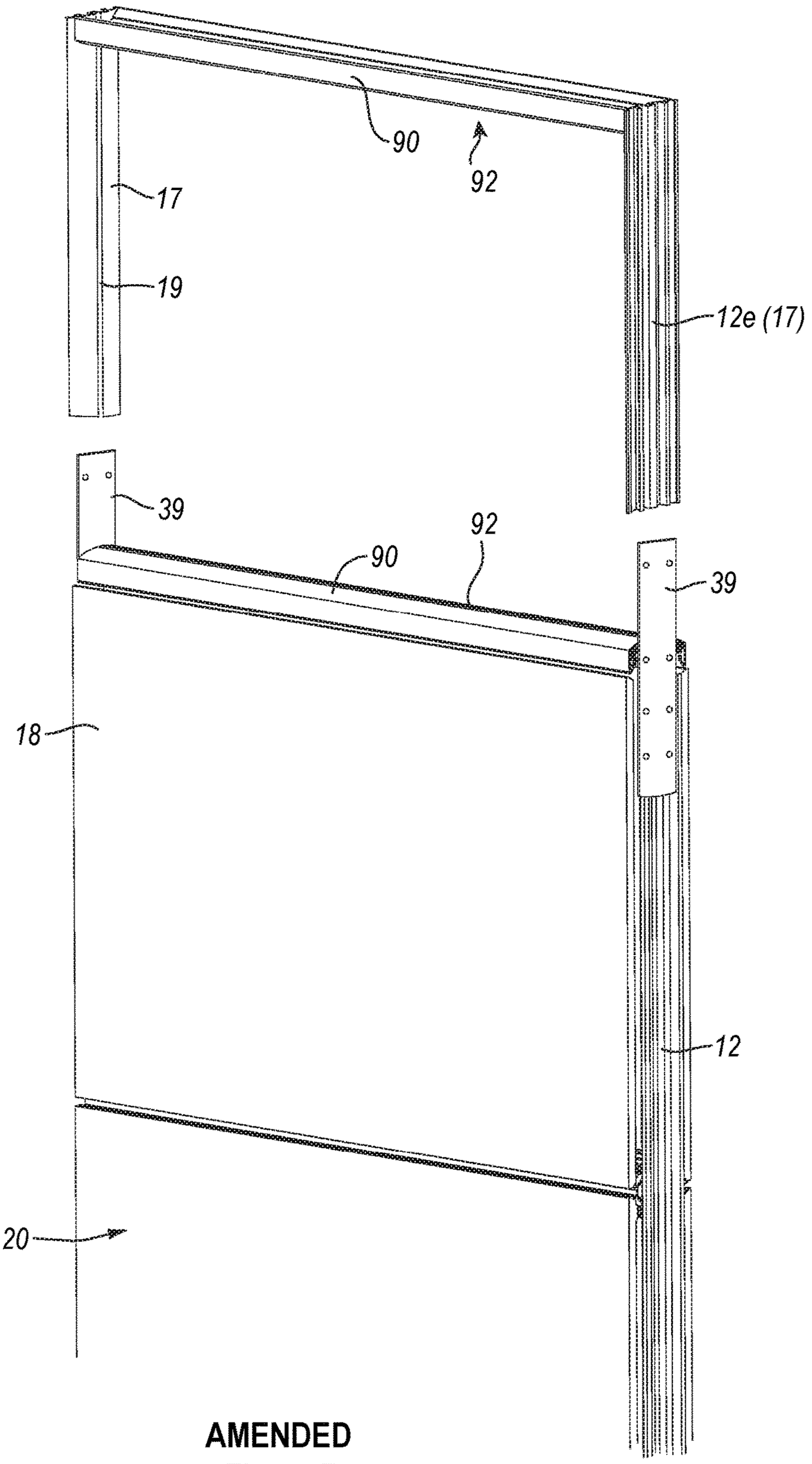

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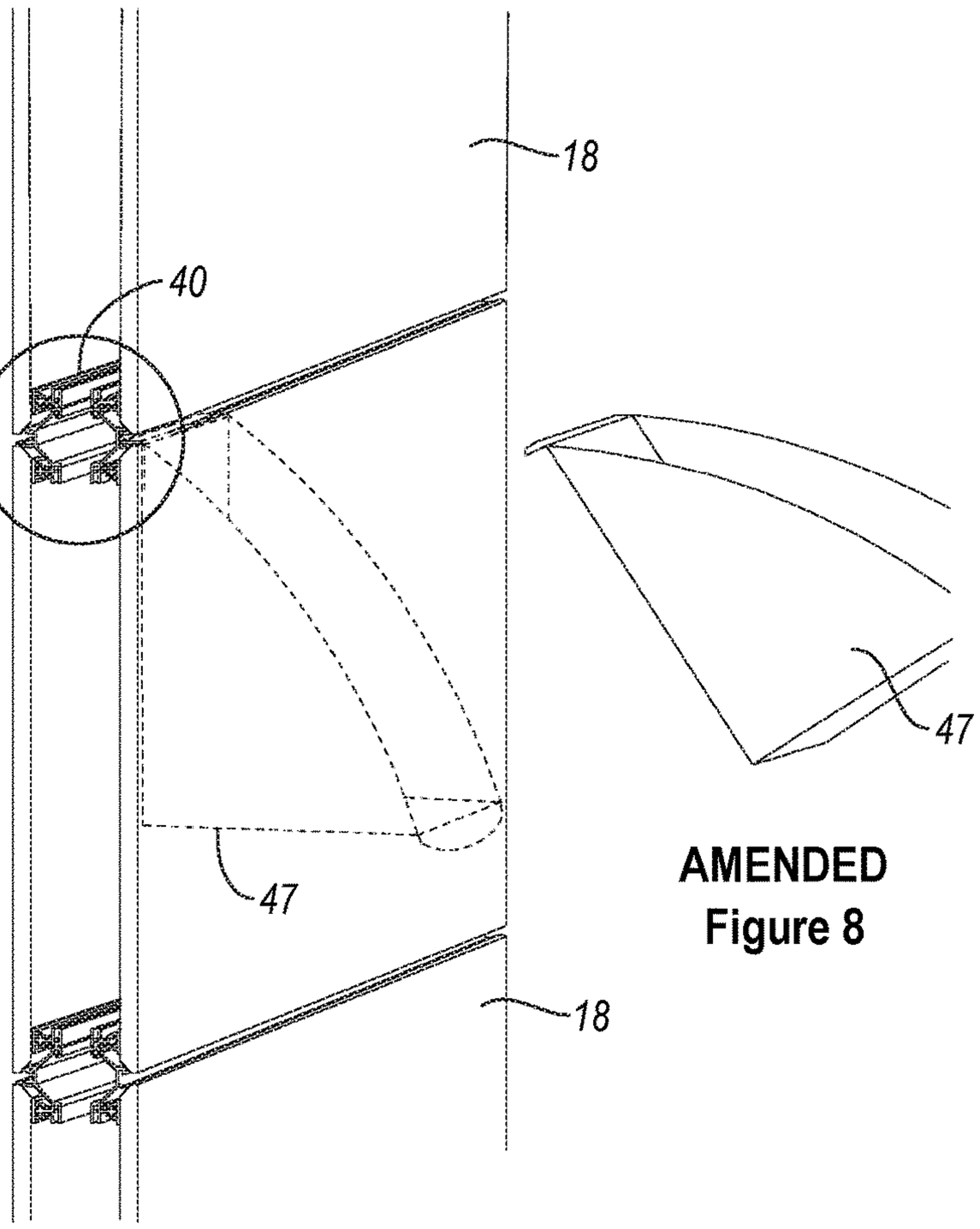
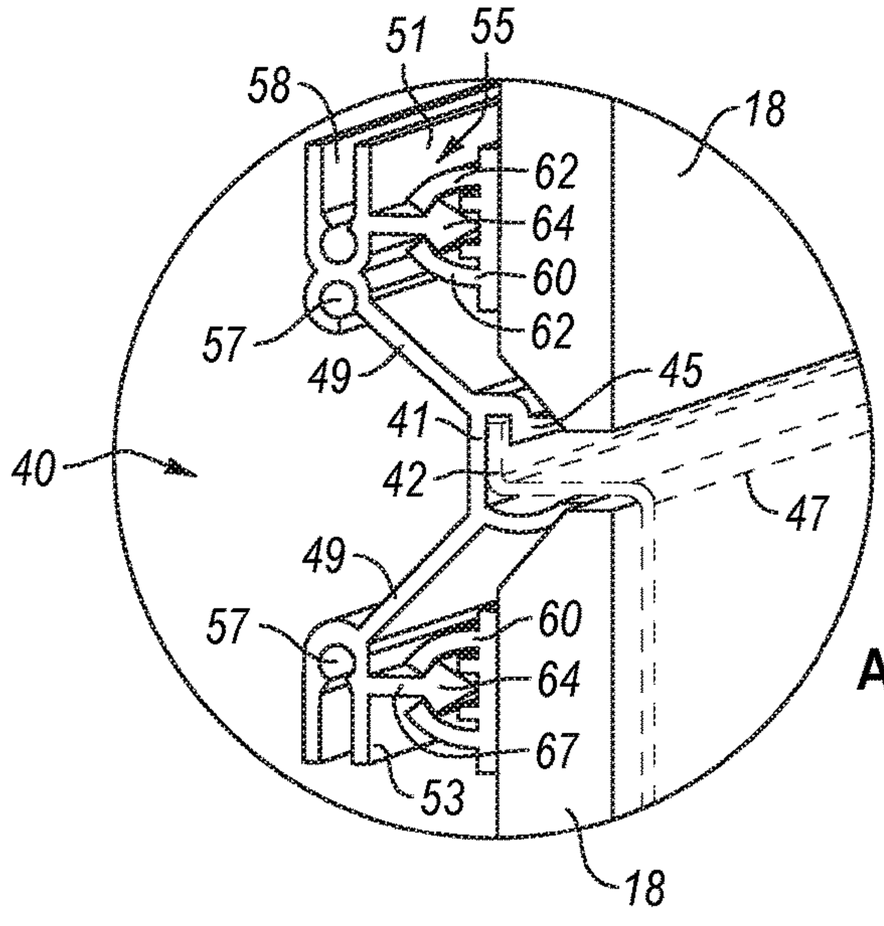
Figure 7

See Figure 9



AMENDED Figure 8



AMENDED Figure 9

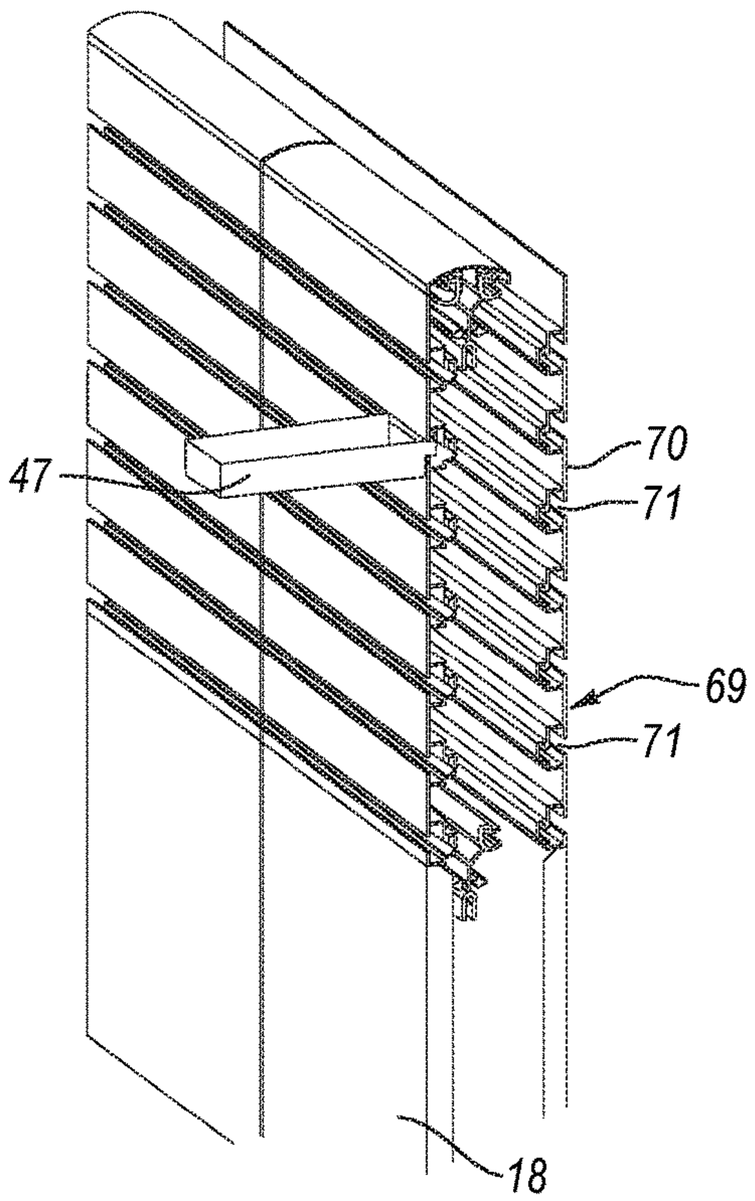


Figure 10

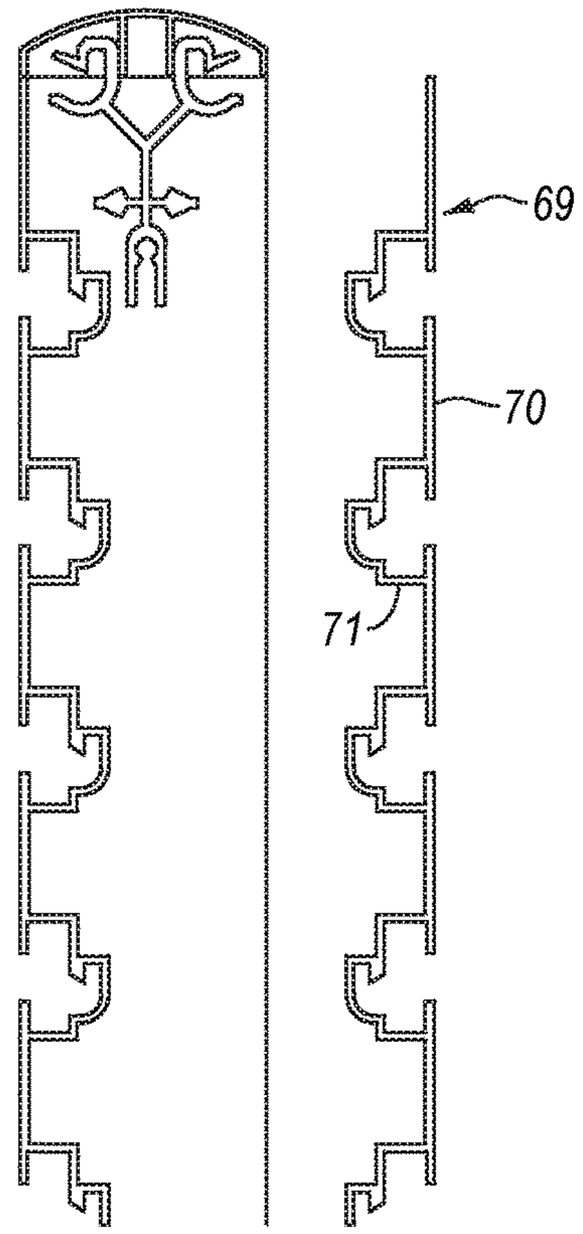


Figure 11

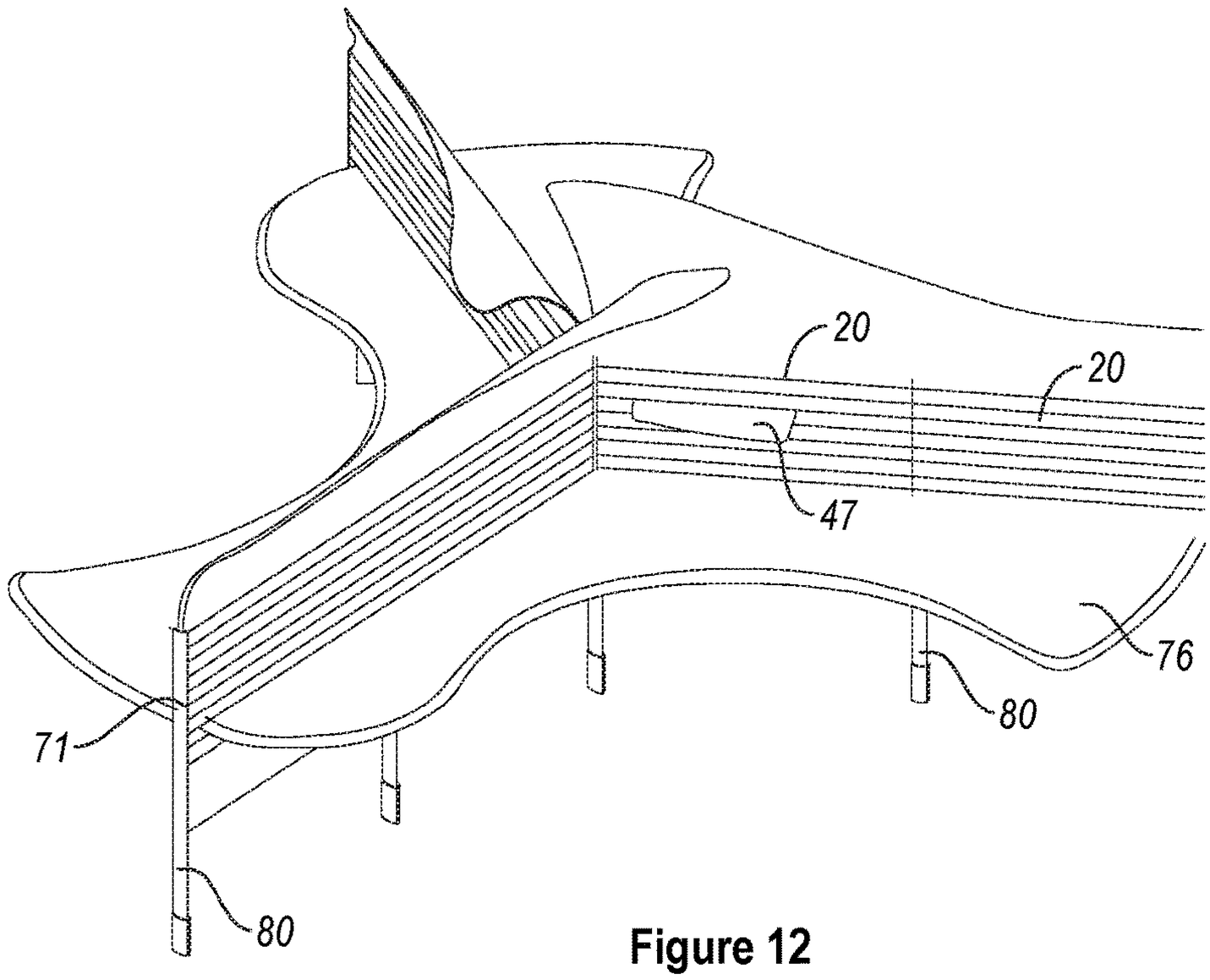
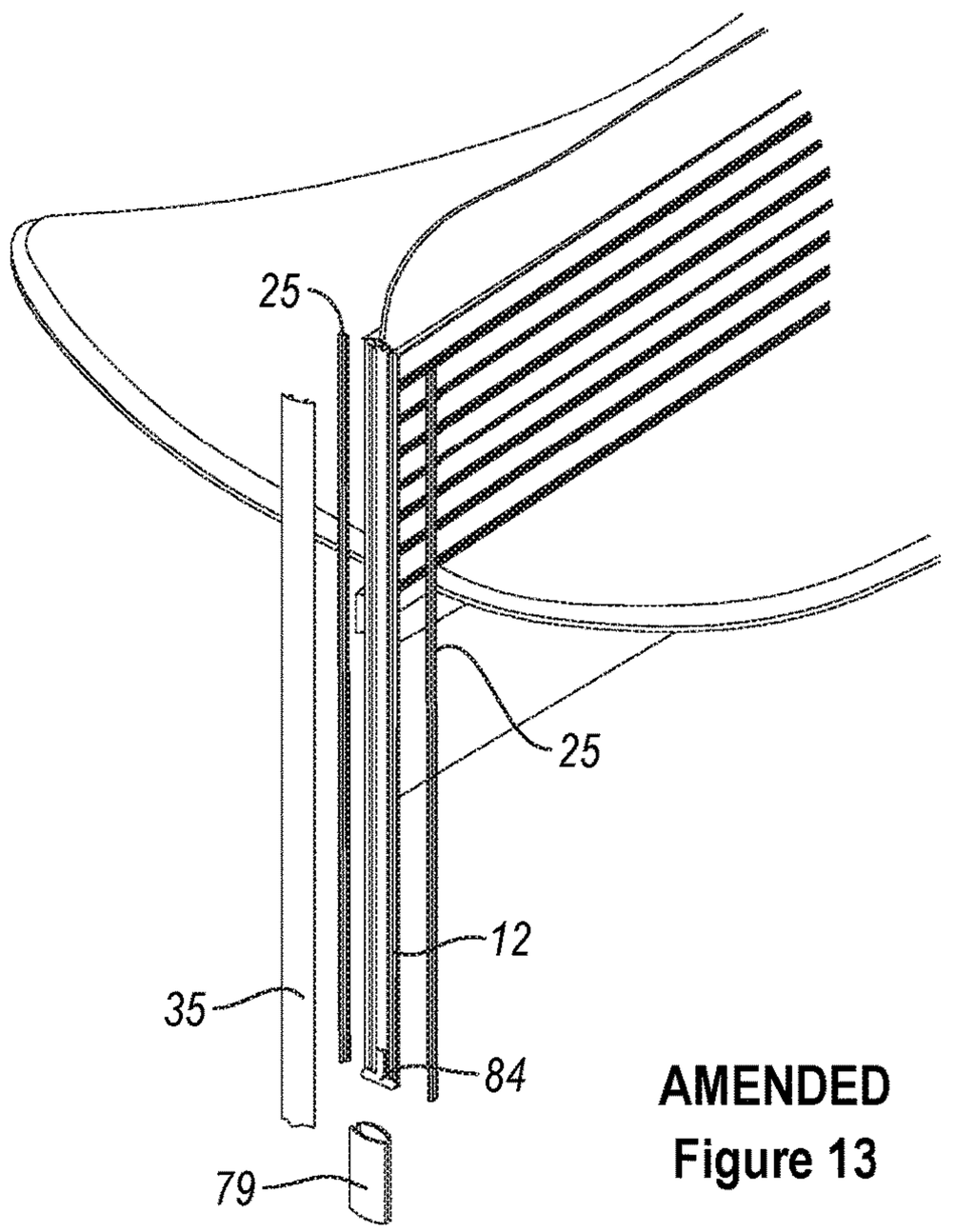


Figure 12



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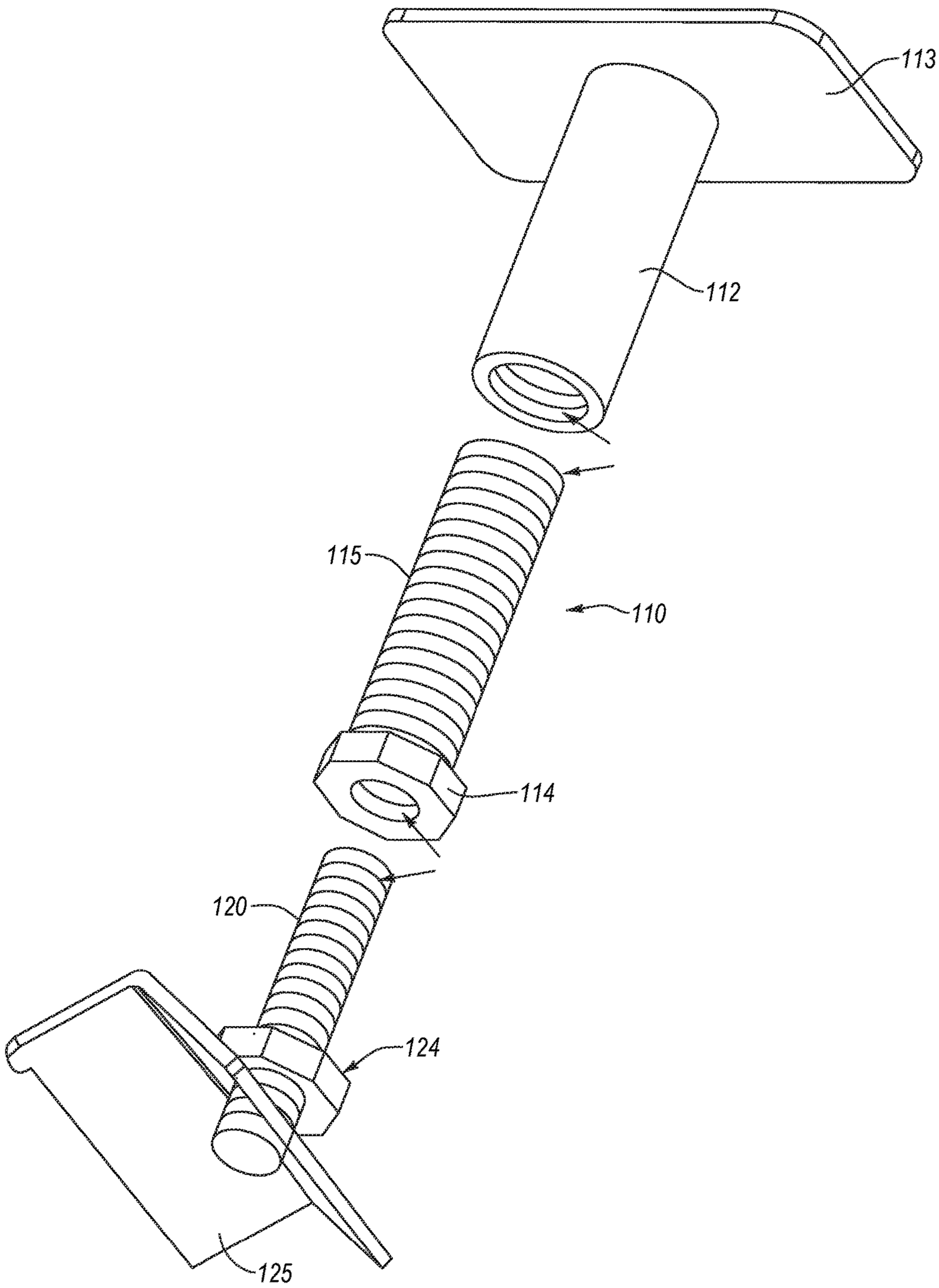
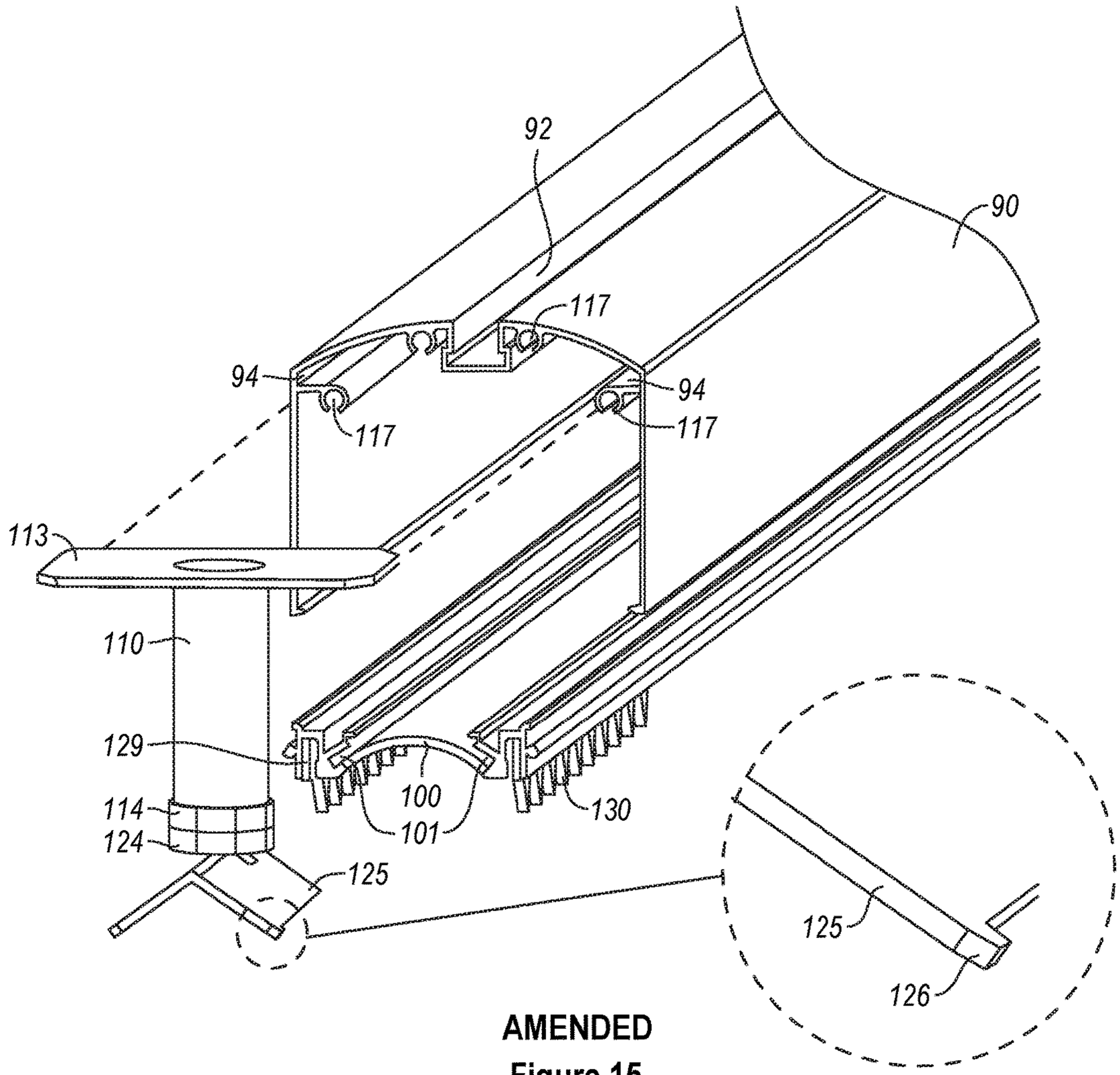


Figure 14



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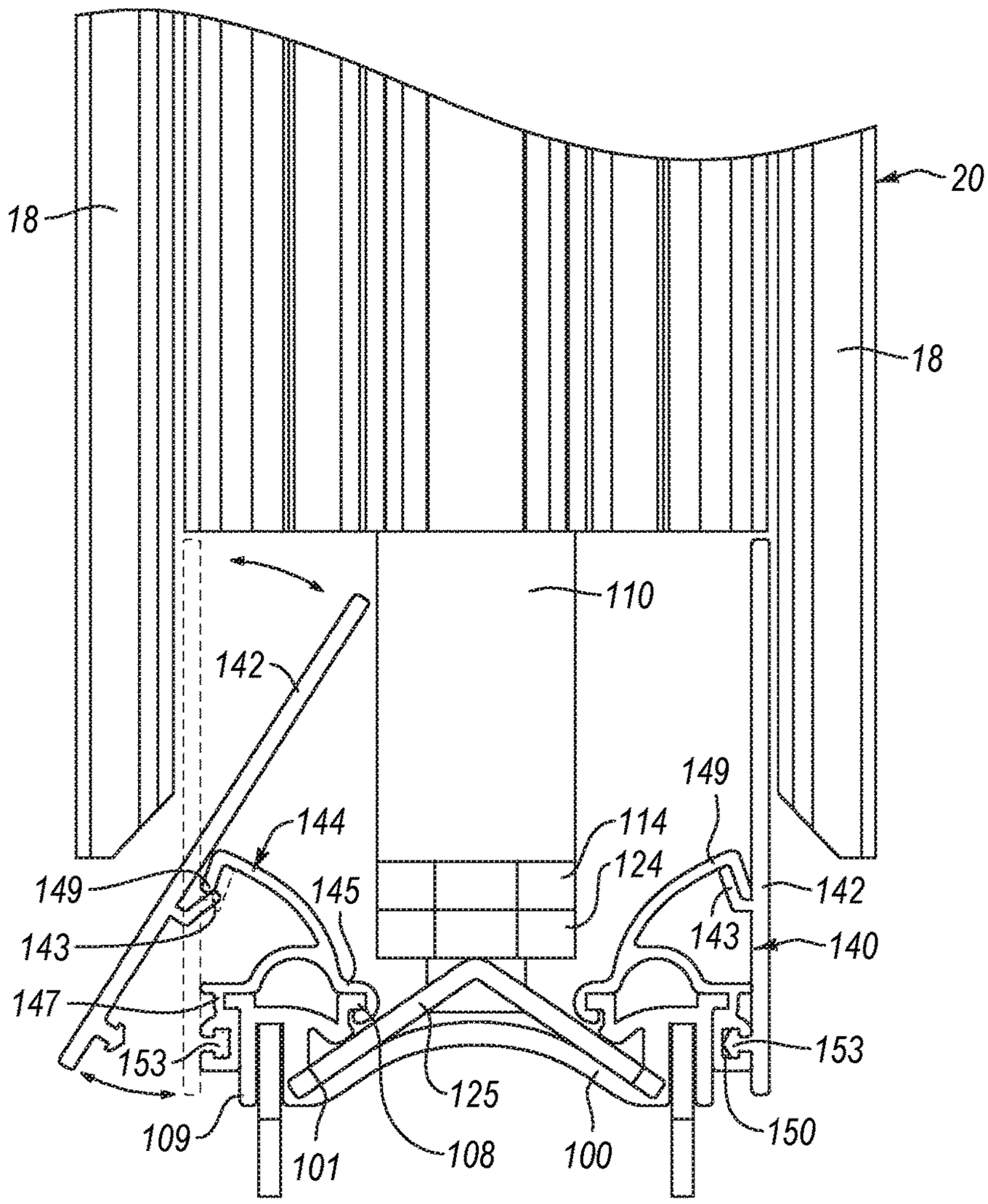

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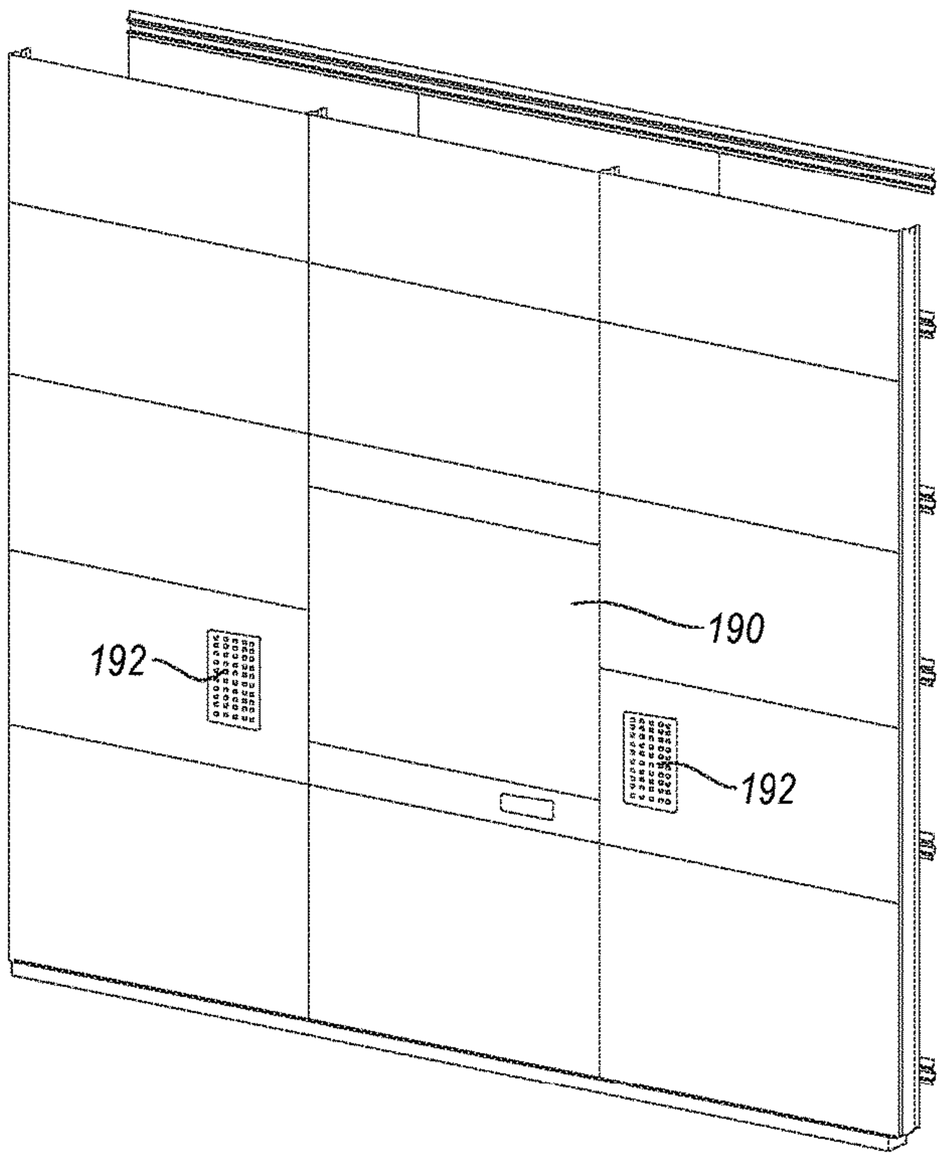

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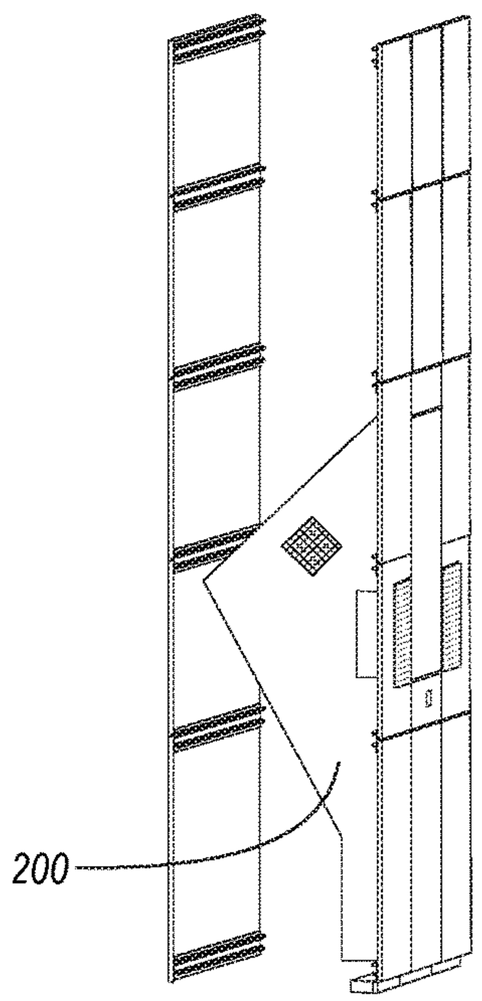

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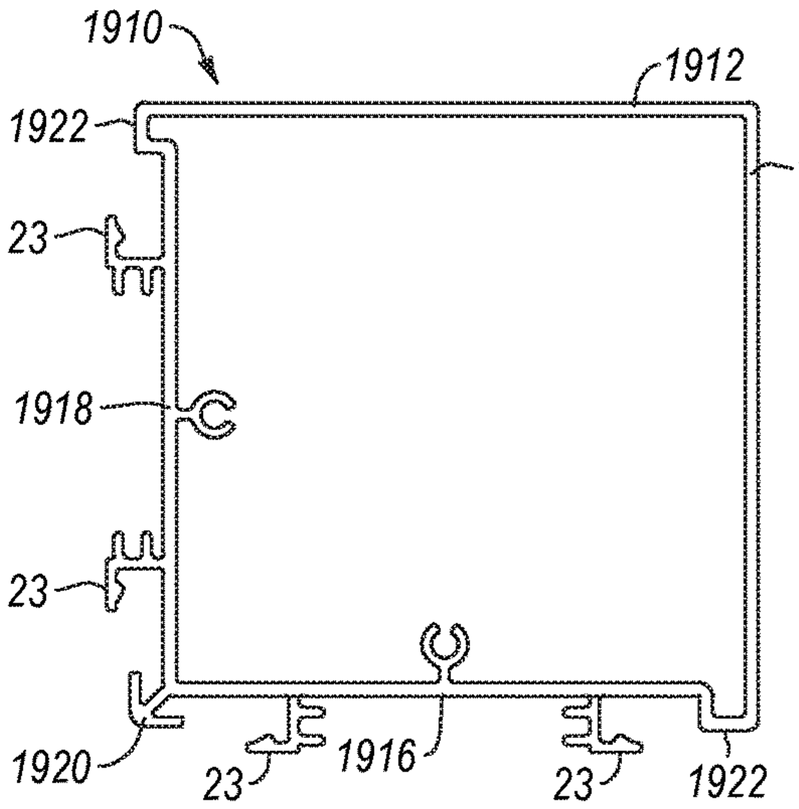
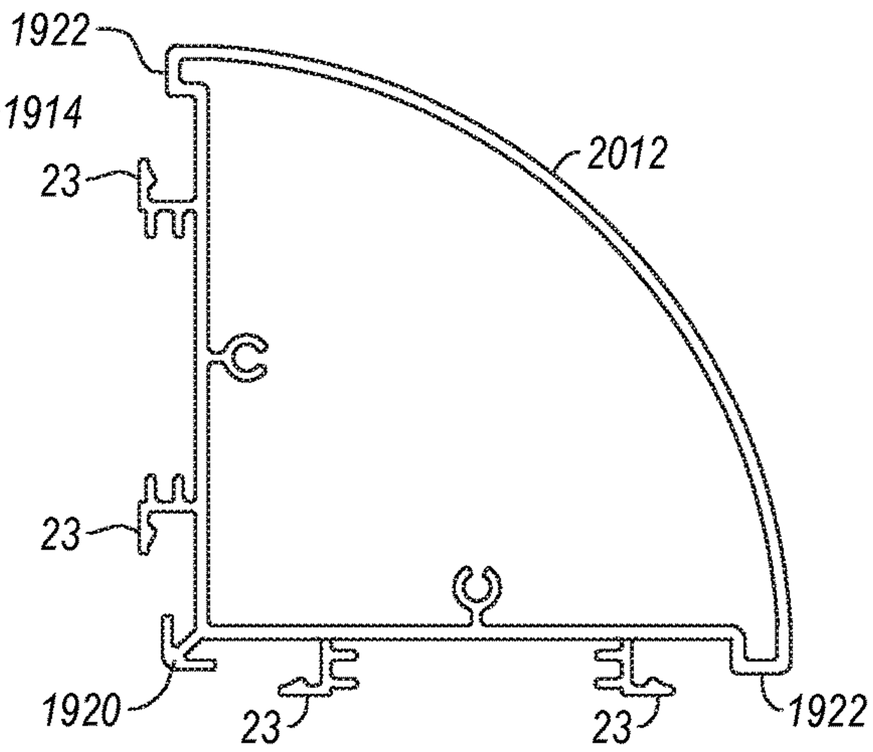


Figure 19



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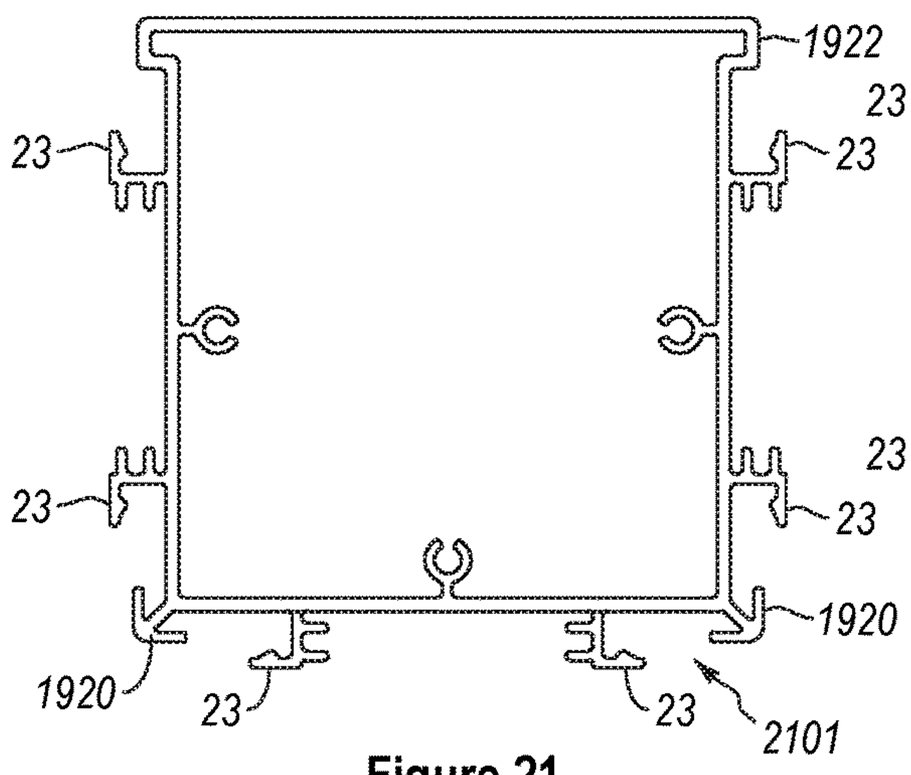

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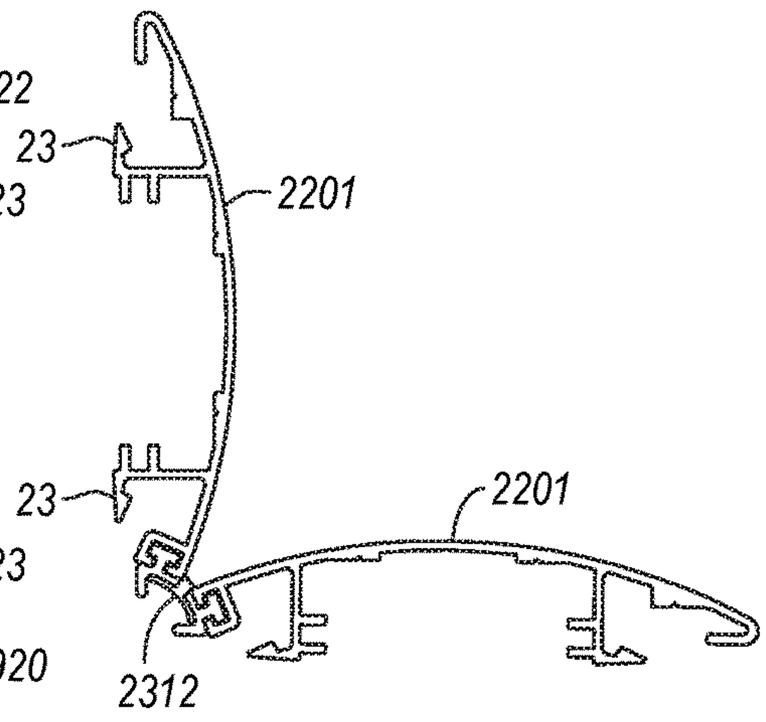


Figure 22

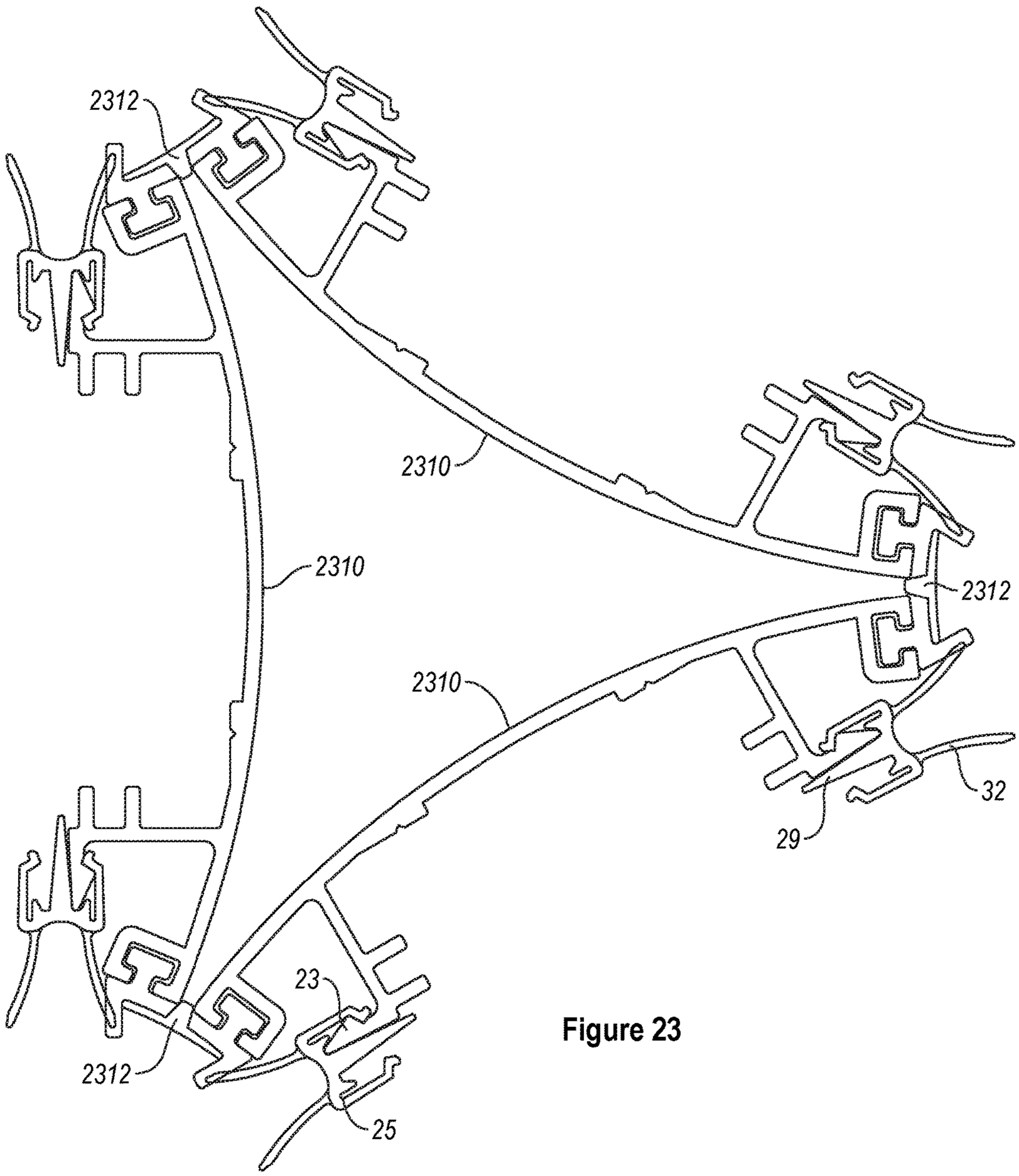
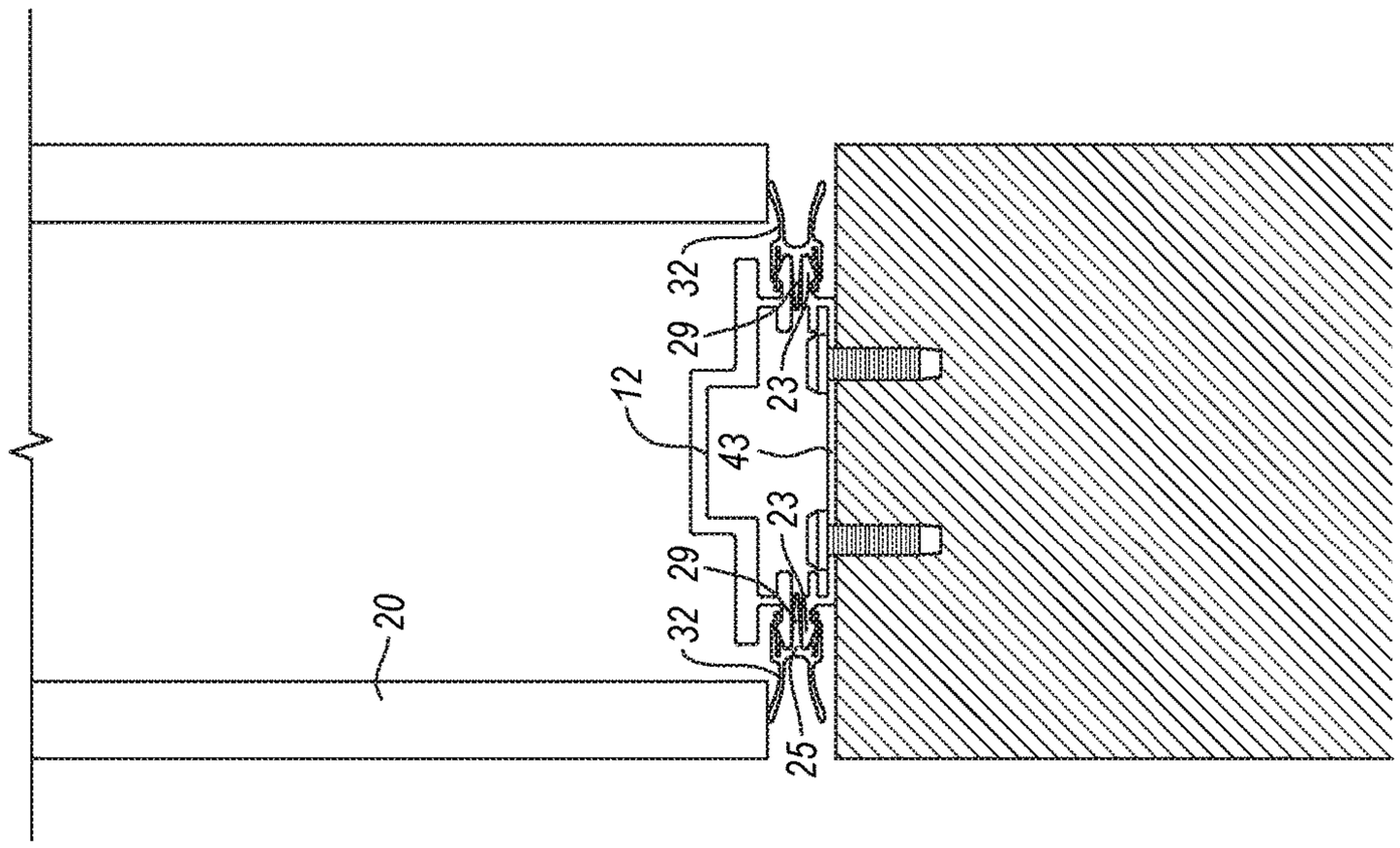


Figure 23



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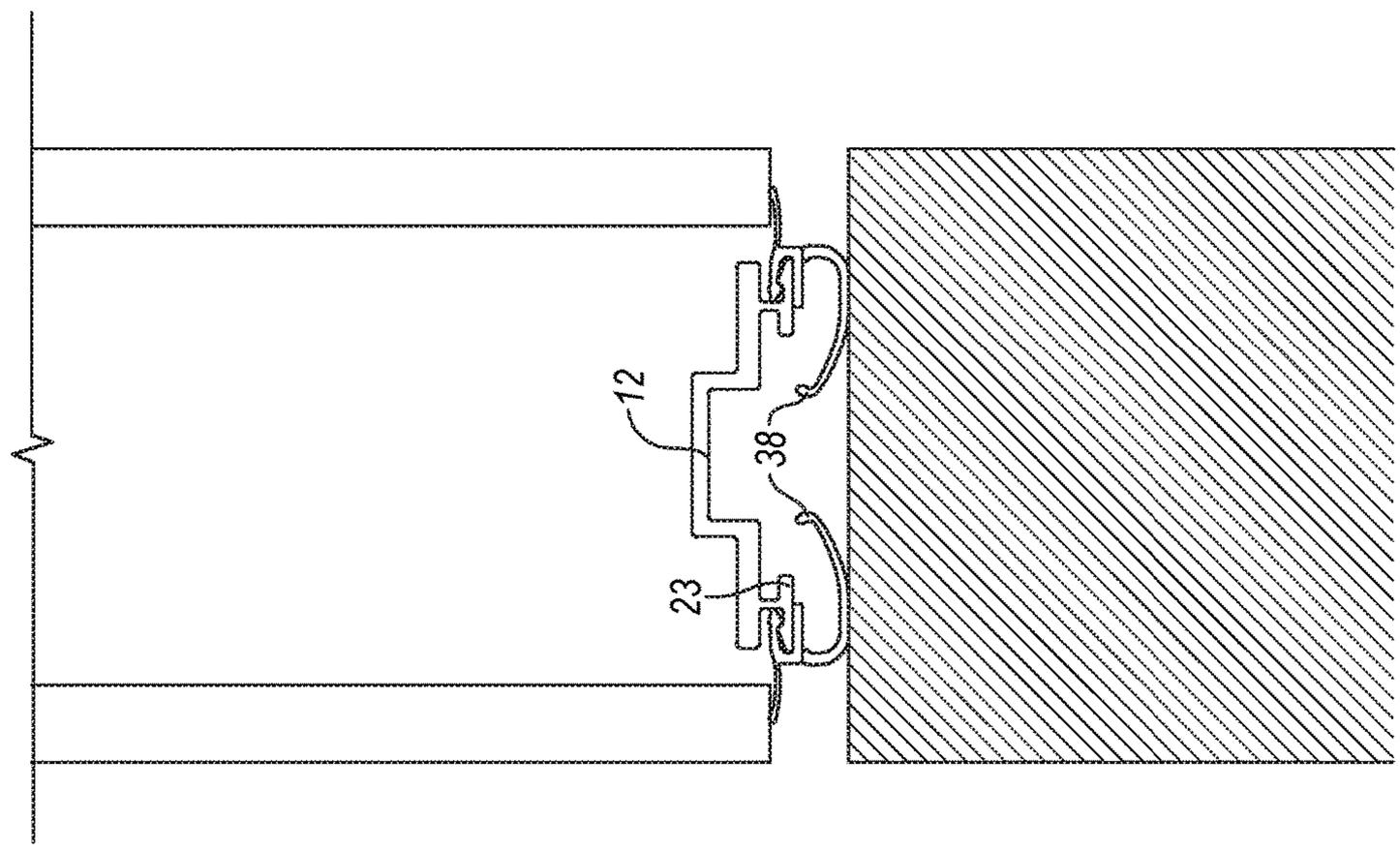

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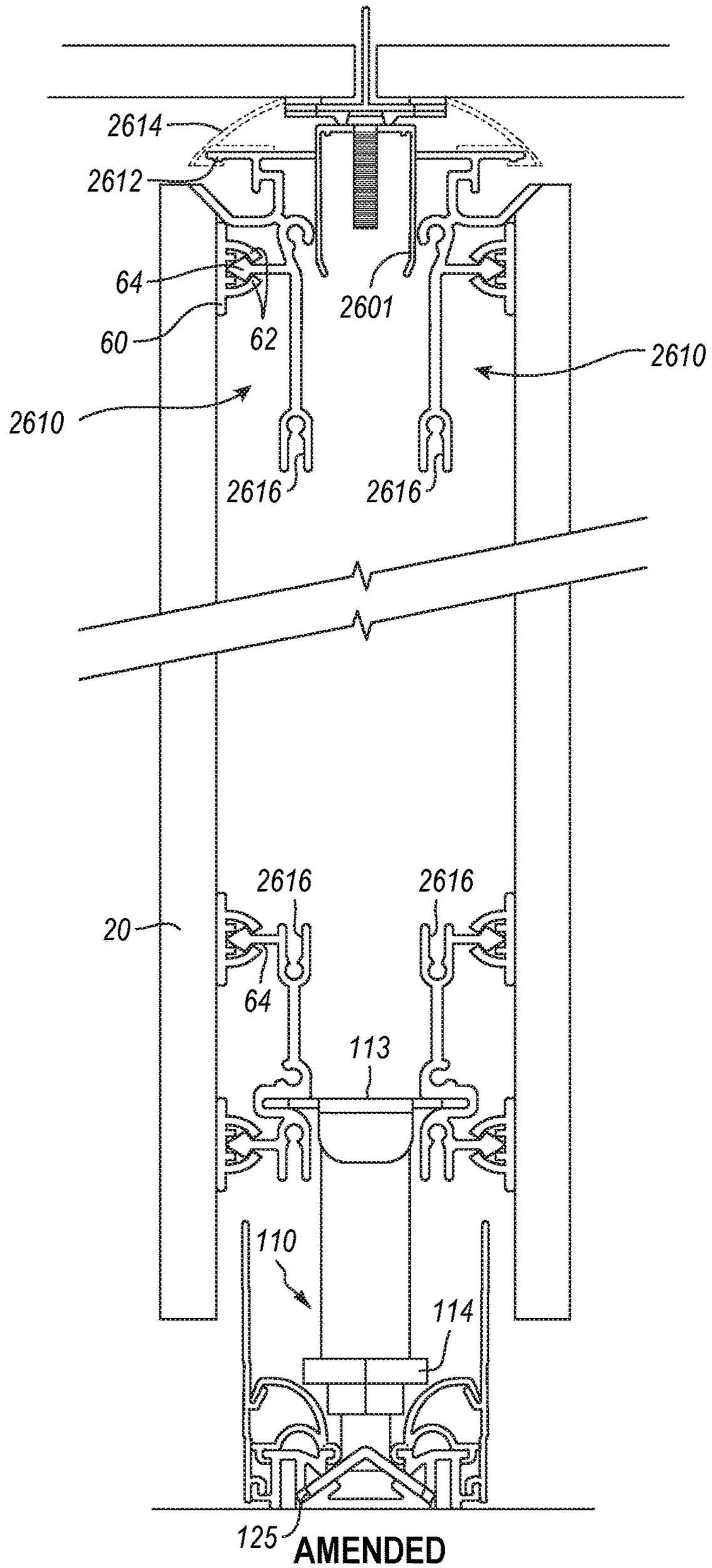

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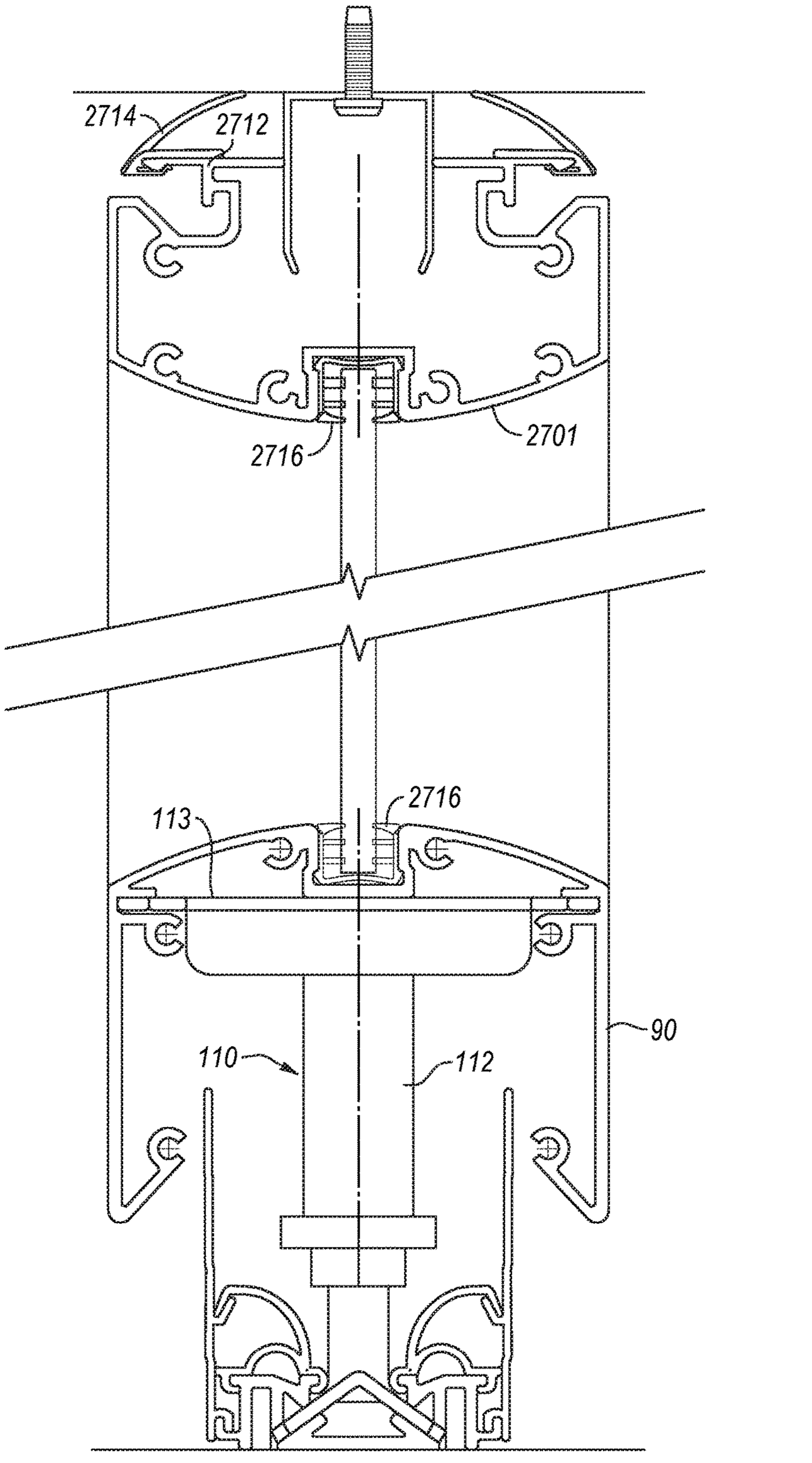
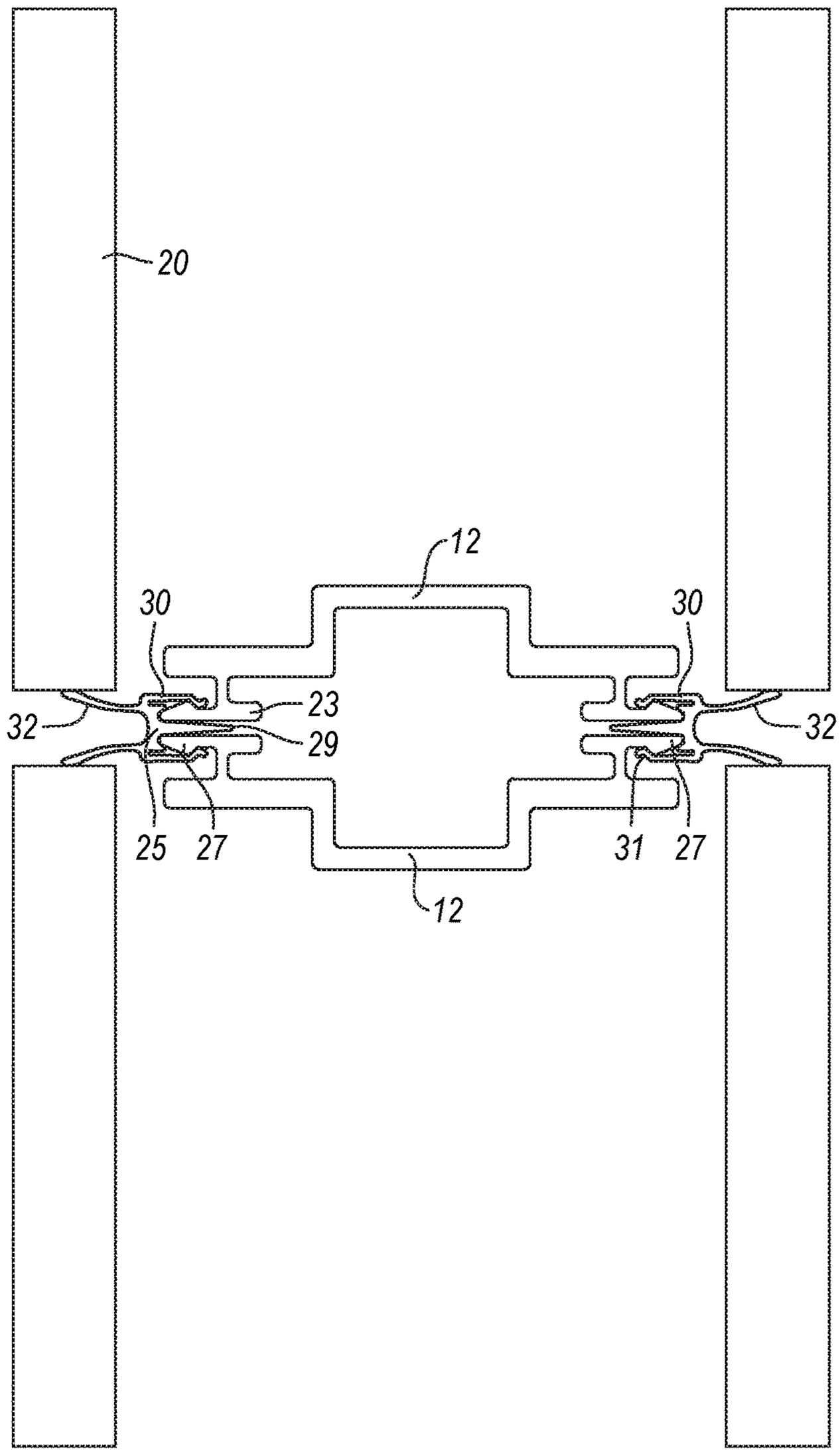


Figure 27



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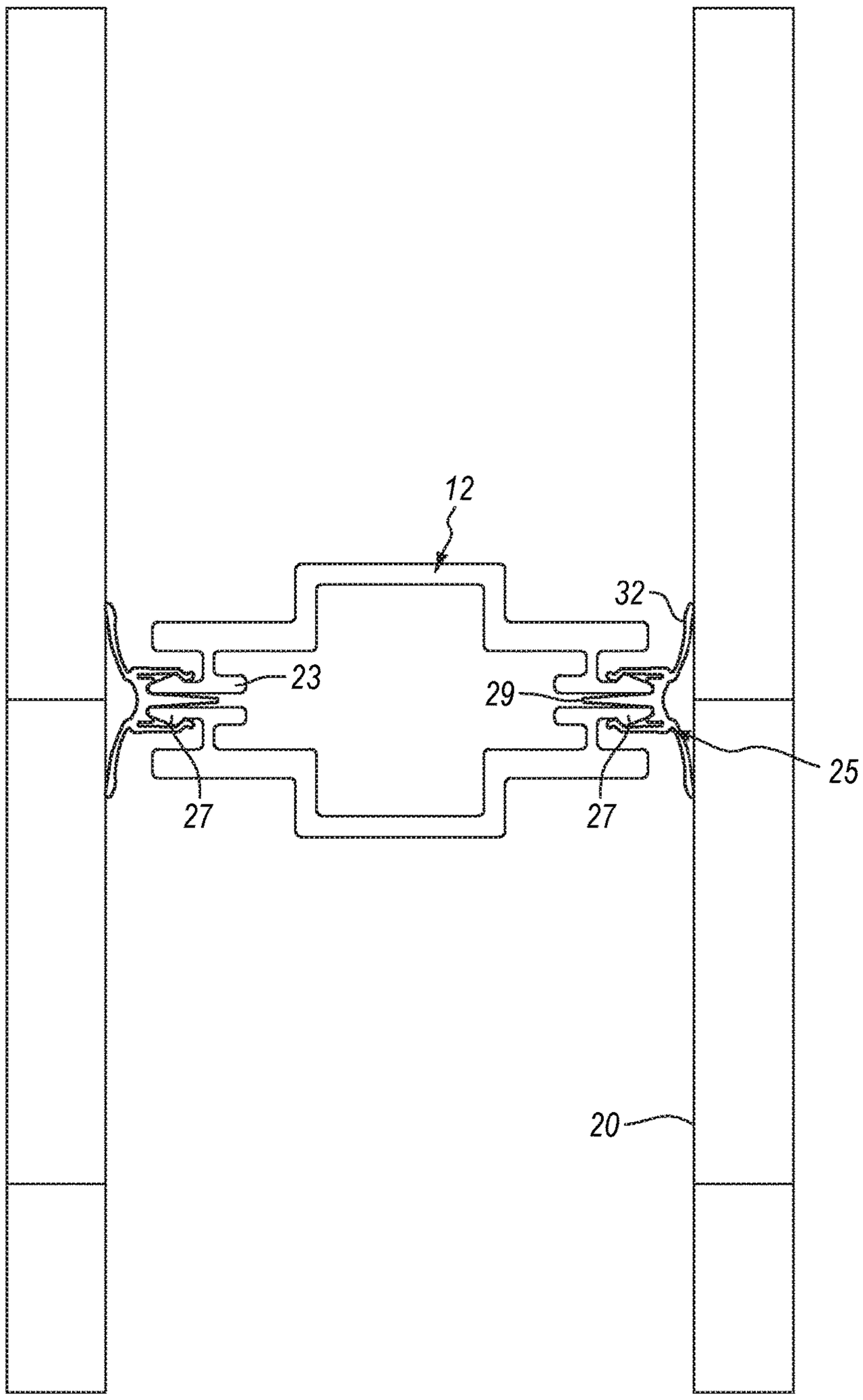

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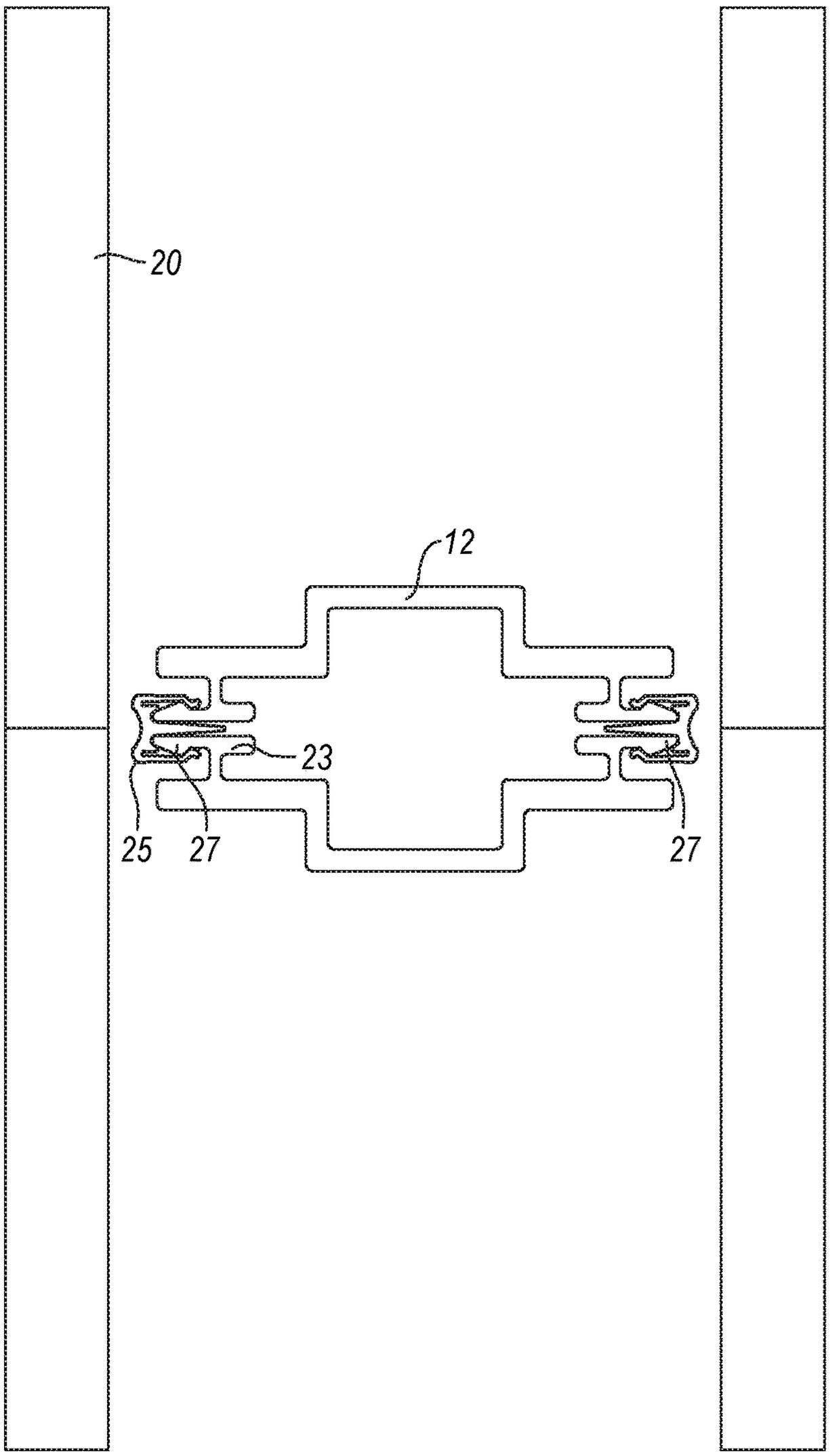

Figure 30

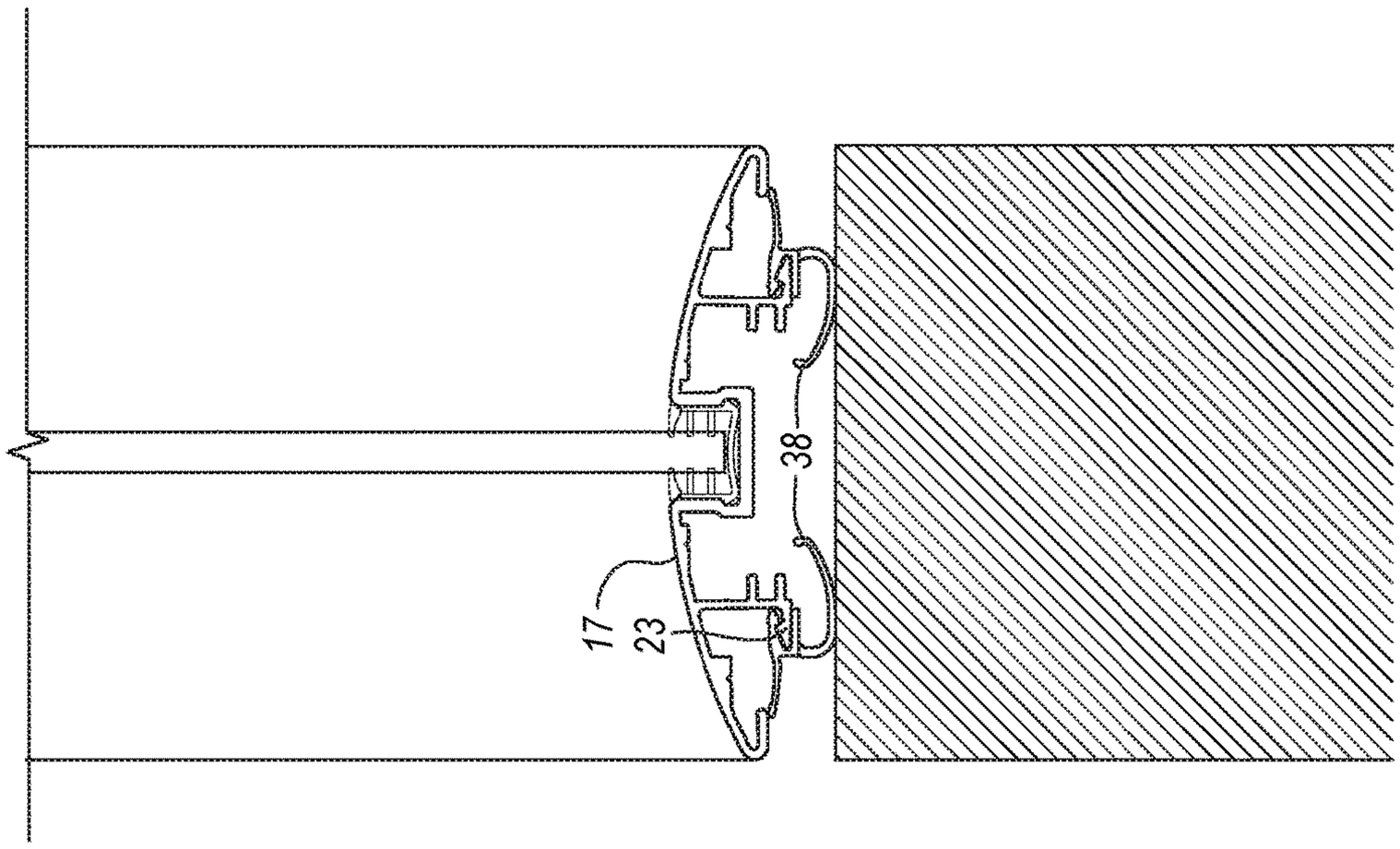

Figure 32

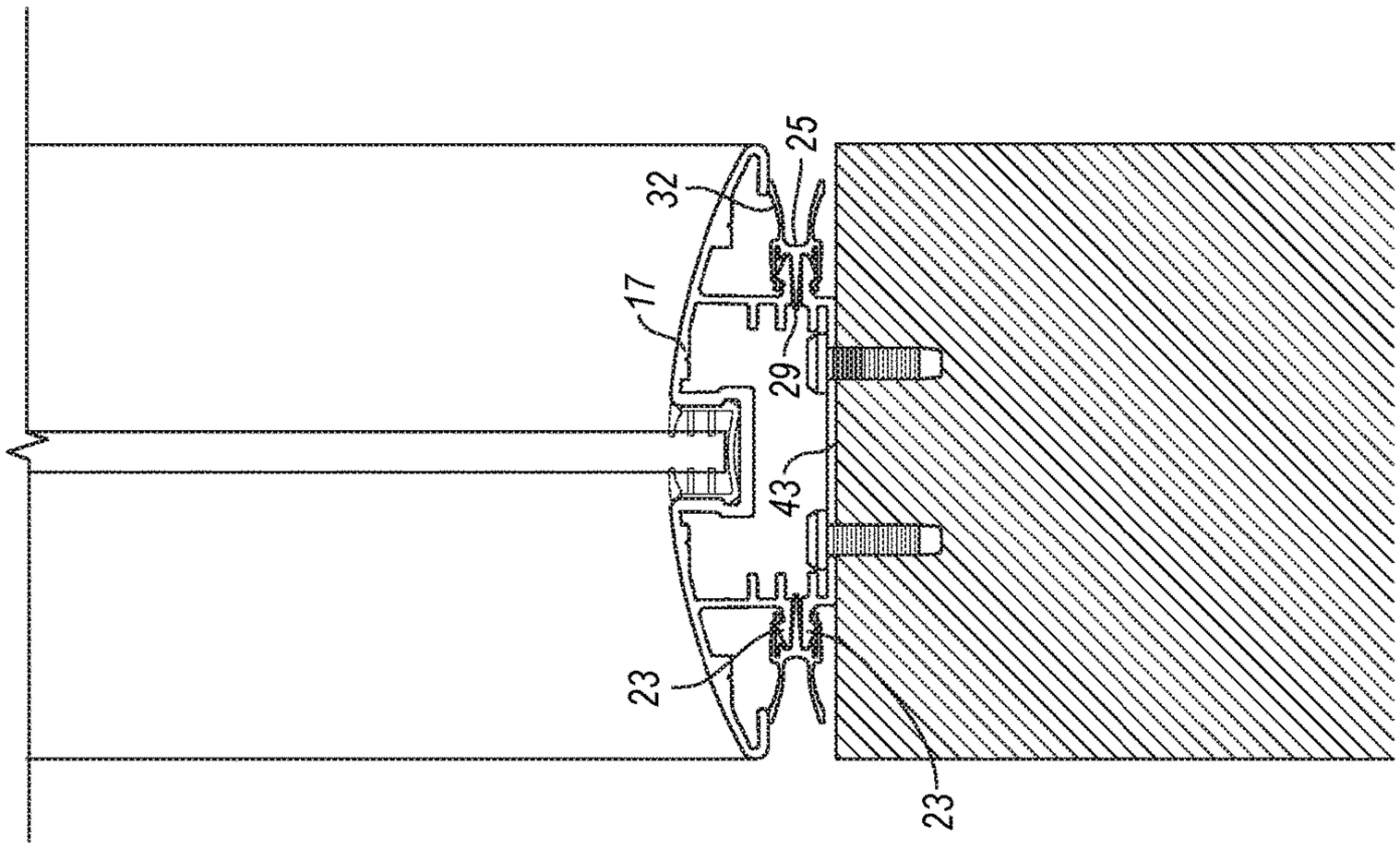

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Figure 31

INTEGRATED RECONFIGURABLE WALL SYSTEM

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue; a claim printed with strikethrough indicates that the claim was canceled, disclaimed, or held invalid by a prior post-patent action or proceeding.

CROSS-REFERENCE TO RELATED APPLICATIONS

[The present invention] *Notice: More than one reissue application has been filed for the reissue of U.S. Pat. No. 8,024,901. The reissue applications are the present application, Reissue application Ser. No. 14/032,931, Reissue Divisional application Ser. No. 14/681,874, and Reissue application Ser. No. 15/074,383. This application is a continuation reissue of application Ser. No. 14/032,931, entitled "INTEGRATED RECONFIGURABLE WALL SYSTEM", filed Sep. 20, 2013, which is an application for reissue of U.S. Pat. No. 8,024,901, which* claims the benefit of the filing date of U.S. Provisional Patent Application Ser. No. 60/601,985, entitled "INTEGRATED RECONFIGURABLE WALL SYSTEM", filed Aug. 17, 2004.

FIELD OF THE INVENTION

The present invention relates to a wall moveable system, and more particularly to a reconfigurable moveable wall system comprising reconfigurable components and design elements.

BACKGROUND OF THE INVENTION

Wall systems, or dividers as they are sometimes called, are used most commonly in an office environment to separate work areas and to give people privacy where permanent walls are lacking. It is beneficial to have a wall system that is easily movable and easily reconfigured given the ever changing needs and requirements in these environments. Another important aspect in an office is to maximize available space. Aesthetics are also important, including the ability to provide the aesthetic element independently of underlying structural componentry.

Previous wall systems have lacked some or all of these attributes. Some are difficult to reconfigure or to move without significant amounts of labour and dislocation. Most systems lack the flexibility to quickly change the height of a wall, or to use or substitute different types of panels, or replace a module in the middle of a wall without taking apart the entire wall. There also is a need to be able to use the wall system against an existing wall as a curtain wall for an integrated look and to provide the design flexibility needed in those spaces bordered by permanent walls.

SUMMARY OF THE INVENTION

In a preferred embodiment, the present wall system comprises at least one module, where each module includes a frame and a plurality of tiles mounted to the frame by means of a tile clip system. Clips are attached to the rear surface of each tile and the tile is then pressed into place, aligning the clips with a capture detail on the horizontal frame stringers. Tiles can span adjacent frames where required. Horizontal frame stringers may include a cantilever channel detail where desired to allow objects to be hung along the width. A single frame comprised of two verticals frame members and a plurality of horizontals stringers mounted to an existing wall by connecting the horizontal members to brackets attached to the existing wall allows tiles to be mounted as a curtain wall on the existing wall. Two frames may be supported back to back within a framework for modules used to divide adjacent work spaces. A spline is attachable to the top of the frame to extend the frame and allow for additional tiles to be added on to increase a module's height if so desired. The spline is also used to connect a different style of frame above the existing frame if so desired. For example, this allows a framed glass module to be attached above a framed wood substrate module. Two adjacent modules are connected using a removable zipper interface. The zipper contains two flexible gasket components. Where tiles will span adjacent frames or meet one another without a gap, the gaskets bend back behind the tiles. Where tiles do not span adjacent frames and a gap is wanted, the gaskets point outward from the frame, between the tiles. At the edge of a module where no other module is to be connected, a starter strip may be placed, wherein the starter strip includes an integral flexible gasket which conforms to the shape of the surrounding environment while providing both light and sound baffling. The cantilever channel between tiles allows for various accessories or mill work to be supported from the outside of the module at convenient locations and to be adjusted as needed.

The present wall system also includes a glass wall module, where each module includes a frame and a plurality of glass tiles mounted within the frame. The glass may be center mounted, front mounted or rear mounted. A channel within each end frame extrusion holds a full length gasket extrusion or notch. The glass is retained within the gasket extrusion, around the full perimeter of the glass tile. Extra horizontal or vertical extrusions are attached within the frame to further divide the module into smaller areas.

The present wall system also includes levelers. Levelers include upper, middle and lower sections. The upper section includes a hollow cylinder which is threaded along the interior, and a flat upper plated perpendicular to the leveler. The middle section is a hollow cylinder where the interior and exterior surfaces are threaded in opposite directions, with a fixed nut at one end of the middle section for adjustment. The lower section includes a solid cylinder threaded to correspond with the middle section, a fixed lower nut and an inverted V-shaped lower plate. The leveler is used by having the flat plate in the upper section engage a continuous channel in an the lowermost extrusion of a module's frame, and the lower plate engaging a continuous universal foot, located beneath each module. The V-shape of the lower plate distributes the weight of the wall in the direction of the connection channels of continuous universal foot. A leveler can be placed at any location along the width of the module, allowing for a plurality of levelers to be used if needed. Along the base of the universal foot is a plurality of grippers, which can be adapted for either carpet or hard flooring surfaces. The attachment of the leveler to the module is secure and without extra fastener requirement of any sort. Sliding the leveler plates into the extrusion channels, followed by the attachment of subsequent vertical members, secures the levelers in place.

A base trim is provided which, in one embodiment, can be removably secured to the universal foot to provide access to

the levelers when needed but which otherwise provides a finished look to the modules. The base trim can be modular, or span multiple frames.

Wall modules can be adapted to include integrated rear projection video systems or digital whiteboards. Front projection screens or whiteboards can be mounted within the frame confines, or spanning adjacent frames.

The present wall system provides for true curved walls. Curved wall frames are comprised of straight vertical extrusions and stretch formed horizontal extrusions which are curved to the required radius. Glass or other substrate tiles are curved to match the radius of the frame and mounted in the same manner as planar wall modules.

The present wall system can incorporate universal slat wall constructions which would accept all standard slat wall accessories. The slat wall component is a horizontal structural extrusion, interlocking above and below the cantilever channel horizontal member or other slat wall extrusions.

The present wall system can also support desktops and work surfaces using support brackets in the cantilever channel.

The present wall system also integrates completely with a related furniture panel system. A furniture panel system is comprised of a frame and plurality of tiles attached to the frame. The furniture panel system is designed to serve as cubicle type dividers or desk type units, rather than full height walls. The integration to the furniture panel system is seamless, as the zipper connection detail, tile clip capture detail and cantilever detail are identical to the wall system connection details. All components used in or on the wall system can also be used in or on the furniture panel system.

According to the present invention then, there is provided a movable reconfigurable wall system comprising: at least one module having a front and rear surface, said at least one module having: vertical end frames disposed at least at its side edges, each said vertical end frame having a vertically extending flange directed toward said front surface and a vertically extending flange directed toward said rear surface; a plurality of horizontal stringers affixed between said pair of vertical end frames; and an aesthetic surface affixed to said stringers; and a removable connecting strip, said connecting strip adapted to affix about one of said two flanges on one of said vertical end frames and join said one of said two flanges to a corresponding flange on one of a second module, a wall bracket, a finishing trim or a connection post.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the applicant's integrated reconfigurable wall system will now be described in greater detail and will be better understood when read in conjunction with the following drawings in which:

FIG. **1** is an exploded perspective view of a module representative of the present tile cladded wall system;

FIG. **2** is a perspective view of a wall system including two adjacent modules, one tile cladded and one glass wall;

FIG. **3** is an enlarged view of a portion of the wall system of FIG. **3** showing the connection between adjacent modules;

FIG. **4** is an exploded view of FIG. **3**;

FIG. **5** is a perspective view of a frame member including a finishing trim;

FIG. **6** is a perspective view of a frame member including a wall starter trim where a module meets an existing wall;

FIG. **7** is a perspective view of a height extension to an existing module;

FIG. **8** is a perspective view of a portion of a wall module showing the orientation of horizontal members with integrated cantilever channel;

FIG. **9** is an enlarged view of a portion of FIG. **8** showing cantilever bracket details and tile clip connection details;

FIG. **10** is a perspective view of a wall panel incorporating slat wall construction;

FIG. **11** is a side elevational view of the slat wall construction of FIG. **10**;

FIG. **12** is a perspective view of the related panel furniture system utilizing the same connectors and slat wall extrusion to support a work surface;

FIG. **13** is a perspective, partially exploded view showing the assembly of a leg used to support the panel furniture system, utilizing the same connection zipper as the wall components of FIG. **12**;

FIG. **14** is a perspective, exploded view of a leveller for use with the present wall system;

FIG. **15** is a perspective view of one embodiment of a leveller mounting system as it slides into the channel of a lower glass wall extrusion and universal foot extrusion;

FIG. **16** is a side elevational view of the base trim connection to the leveller assembly;

FIG. **17** is a perspective, schematic view of the present wall system including integrated media panels and storage areas;

FIG. **18** is a perspective, schematic view of the present wall system incorporating an integrated media center;

FIG. **19** is a plan view of a two-way rectilinear connector for the present wall system;

FIG. **20** is a plan view of an alternative (radial) two-way connector for the present wall system;

FIG. **21** is a plan view of a three-way connector for the present wall system;

FIG. **22** is a plan view of a variance of a 90 degree connector for the present wall system;

FIG. **23** is a plan view of a 120 degree connector for three merging walls according to the present wall system;

FIG. **24** is a plan view of an end vertical and gasket for abutting existing walls with the present wall system;

FIG. **25** is a plan view of a connector for connecting to existing walls according to the present wall system;

FIG. **26** is a side elevational view of a floor leveller and ceiling connector for a solid (tile clad) wall;

FIG. **27** is a side elevational view of a floor leveller and ceiling connector for a glass wall;

FIG. **28** is a plan view of two wall panels having a gap between adjoining panels;

FIG. **29** is a plan view of two wall panels directly abutting each other and being sealed with a zipper;

FIG. **30** is a plan view of two wall panels directly abutting each other and having a zipper with no fins;

FIG. **31** is a plan view of an end vertical and gasket for abutting existing walls with the present glass wall system; and

FIG. **32** is a plan view of a connector for connecting to existing walls according to the present glass wall system.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to FIG. **1**, the present invention is directed towards a wall system **10** made up of one or more modules **20**. Each module comprises a pair of vertical end frames **12** that will be spaced apart by the desired width of each module. Modules **20** may be clad with tiles **18** and can be one or two sided with a finished wall surface on both sides

or a finished wall surface on one side only. Tiles **18** can be made of wood, plastic, metal fabric glass or other material, and end frames **12** may be interconnected by a plurality of horizontal stringers **8** that will be described in greater detail below.

With reference to FIG. **2**, the next adjacent module **20** can be identical to its neighbour, or, as shown in this figure, may consist of two vertical end frames **17** and one or more dividers **14** which can be, for example, glass or plastic if transparency is desired. End frames **17** used for such dividers are shaped as shown most clearly in FIG. **4** and include a notch **19** that receives and holds the divider's vertical edge.

Stringers **8** are horizontally spaced apart at intervals along the height of the module for strength and rigidity. To support objects, cantilever channel stringers **40**, including a cantilever channel portion **41**, are used, as shown in FIGS. **8** and **9**. Stringers **8** that do not include channel portion **41** can be used anywhere structure is required but the channel portion is not required for supporting objects. For example, the lowest stringer **8**a may not include cantilever channel portion **41**. The stringers are connected to end frames **12** by fasteners, usually threaded screws, in a manner to be described below.

If the module will be visible from both sides, finishing tiles **18** can be connected to the stringers on both sides of module **20**. It is not necessary that the tiles on one side of the wall be at all like the tiles on the other. They can be different materials or even aligned differently as shown in FIG. **1**, in which the tiles on one side of the module are horizontally mounted and the tiles on the other side of the wall are vertically mounted for a different look. The tiles can also span adjacent modules, if required. *For example, FIG. 1A depicts finishing tiles 18 spanning adjacent modules 20.* If only one side of the module will be visible, which can be the case for example if the module is used as a curtain wall to cover an existing wall, **[**its**]** *it is* necessary to apply tiles **18** to only one side of the module as needed.

The depth or thickness of the module can be selected by varying the width of frame **12**. For example, as will be described below, the modules can house a rear projection or digital video system and the greater depth is needed to enclose the componentry.

With reference to FIGS. **3**, **4**, **5 28** and **29**, each end frame **12** and **17** includes a pair of rearwardly extending L-shaped flanges **23** that align vertically with correspondingly positioned and shaped flanges **23** on opposite end frame **12** or **17** so that frames **12** and **17** can be connected together by connecting strips ("zippers") **25**. If the adjacent module **20** itself comprises an end frame **12** as shown in FIGS. **28** and **29**, flanges **23** will abut and will be connected together in the same manner using zippers **25**. As shown most clearly in FIG. **28**, each of flanges **23** is formed with a bead **27**. Each zipper **25** is generally T-shaped in cross-sectional shape and includes a central spine **29** that fits between flanges **23** and a pair of arms **30** on opposite sides of the spine. Each arm includes a bead **31** that snap fits with beads **27** on flanges **23** for a secure but releasable connection. When two adjacent modules are connected together in this way, there is enough of a gap between them that the zippers can be accessed for removal, allowing an individual module to be removed should the need arise.

As illustrated in FIGS. **28** and **29**, each zipper can also include a pair of flexible extended fins **32** extending rearwardly from the spine **29**. Depending on the application, a user may wish adjacent modules to be abutted together completely or to have a gap between them. In FIG. **28**, a gap exists between the modules, and this gap is sealed using extending fins **32**. As will be appreciated by those skilled in the art, the width of the gap is variable since extensions **32** are flexible and can accommodate various widths.

If no gap is desired, or if tiles span adjacent modules, FIG. **29** illustrates an embodiment having adjacent panels. In this case extensions **32** are behind each panel, and the force of extensions **32** against the rearward side of the module creates an acoustic seal for the wall.

In an alternative embodiment illustrated in FIG. **30**, it is also possible to have a zipper **25** without extensions **32**. This may be desirable when modules **20** abut and an acoustical seal is not required.

As such, in various embodiments, the zipper 25 may be positioned in a recessed location within the wall system 10. The recessed zipper 25 may allow for a single tile 18 to span multiple modules 20 without interference from the zipper 25. Additionally, a recessed zipper 25 may allow for the free movement of accessories 47 between adjacent wall modules 20 within a cantilever channel 41.

FIG. **5** shows an end piece **35** similar to end frame **17** but lacking notch **19**. This end piece is therefore used to finish the vertical edge of module **20** using zippers **25** if no additional module is to be connected to it.

If either of frames **12** or **17** is to start, or end, at an existing wall, flexible starter strips **37** can snap-fit onto flanges **23** as shown most clearly in FIG. **6**. Starter strips **37** include curved flexible gaskets **38** which will conform to the shape of the existing wall and will provide sound and light barriers. This can also be seen in FIGS. **24** and **32**.

Alternatively, as illustrated in FIGS. **25** and **31**, a wall start **43** can be mounted to an existing wall to provide a start to a module. Wall start **43** is preferably an aluminum extrusion mounted vertically to an existing wall using known mounting techniques. The mounting technique of screws shown in FIG. **25** is not meant to be limiting.

Wall start **43** includes a flanges **23** and is connected to an end frame **12** or **17** using a zipper **25**. As indicated above, extensions **32** can provide a seal against the wall and panel.

To increase the height of an existing module **20**, or to combine a glass module above or below a tile-clad module, a spline **39** can be used to connect end frame **12** (or **17**) to an extension frame **12**e as shown most clearly in FIG. **7**. Actually, as shown in this figure, extension frame **12**e is a length of frame **17**, which allows the lower portion of the wall to be hung with standard tiles and the upper extended portion of the wall to be finished in a glass or plastic divider **14** (*within notch 19 of either frame 17*) for a combination of finished looks. The upper and lower extrusions **90** (*comprising notch 92, see also FIG. 15*), which complete the framing of divider **14**, will be described below in connection with a levelling system in which the same extrusion is used.

It is desirable that work surfaces, mill work and wall accessories such as trays or document holders be connectable to modules **20**. This can be easily achieved in the present system by using cantilever channel stringers **40** with channel brackets horizontally disposed in the channel between adjacent tiles **18** as shown most clearly in FIGS. **8** and **9**.

Each channel stringer **40** includes a central horizontally extending channel portion **41** with a generally L-shaped slot **42** formed along its length adapted to receive and engage a substantially L-shaped hook **45** formed on a wall accessory **47** such as the document holder shown in FIG. **8**. A pair of diagonally extending webs **49** connects channel portion **41** to upper and lower portions **51** and **53** respectively. Each portion includes a tile support **55** that is the connection point for the tiles **18** that are mounted above and below channel

portion **41**. More specifically, the upper and lower edges of tiles **18** are provided with a **[**connector strip **60]** *tile clip* (*connector strip 60*) *which is* attached by means of screws, adhesive or any other suitable fastening *to the rear surface of tile 18, as illustrated*. Each *connector* strip *60* includes a pair of opposed flexible arms **62** to snap-fit with a **[**generally**]** *protrusion* (*generally* arrow shaped bead **64** formed along the edge of flanges **[67]***67*) that **[**are**]** *is* formed on and **[**extend**]** *extends* the length of each upper and lower portion **51** and **53**. This allows individual tiles **18** to be removed or replaced without having to disassemble the entire wall. The flanges **23** formed on vertical end frames **12** and **17** that are connected together by zippers **25** are located sufficiently inwardly that the zippers will not interfere with the continuity of slot **42** from one module to the next so that wall accessories, mill work or work surfaces can be connected or moved between modules without interference.

The upper and lower edges of tiles **18** that abut *the* channel portion **41** of each channel bracket are camphored for clearance as seen most clearly in FIG. **9**.

The upper and lower portions **51** and **53** of the channel stringer **40** are advantageously formed with longitudinally extended circular recesses **57** and inner channels **58**. Recesses **57** are adapted to receive screws used to connect end frames **12** or **17** to channel stringers **40**. Channels **58** can be used to support mounting hardware for audio-video equipment mounted within the modules, cable management clips or any other hardware to be housed or contained in the module's interior. Channels **58** are also used to connect a single-sided tile clad module to brackets attached to existing wall surfaces.

With reference to FIG. **10**, another embodiment of the invention is shown incorporating a section of standard slat wall **69** including slats **70** and slat wall channels **71** for connection to all slat wall accessories **47**. Slat wall panels can make up some or all of the panels incorporated into any one module **20** and the modules themselves are configured for use with end frames **12** and zippers **25** so that the modules themselves can be connected together in any desired combination. Slat wall modules can be one (FIG. **11**) or two sided (FIG. **10**) for use as either dividing or curtain walls.

As shown in FIG. **12**, in the applicant's related panel furniture system, a work surface or desktop **76** can be connected to modules **20**. The desktop **76** can hook into either cantilevered channel stringers **40** or into slat wall channels **71** and otherwise the construction of the individual modules **20** is the same as described above for wall system **10**. Furniture legs **80** shown in the example of FIG. **12** consist of a vertical frame **12** zipper connected to a finishing end extrusion **35** using zippers **25** as shown in FIG. **13**, in the same manner as the wall system **10**. The lower end of each furniture leg **80** is finished with a concentric sleeve **79** which conceals a threaded bolt **84** in the lower end of each leg which can be used for levelling.

As illustrated in FIG. **23**, three vertical extrusions **2310** are connected to each other to create the connection point for the three wall systems, and each wall meets the others at an angle of 120 degrees.

In the case of modules having tiles that extend all the way down to the floor, applicant has developed a leveller mounting system that allows levellers to be placed anywhere along the length of a module and extra levellers to be added where needed. There are two variations of the leveller mounting system shown in FIGS. **15** and **16**, one to be used with modules comprising tiles **18**, and the other with modules using glass or plastic dividers.

Referring first to FIG. **15**, this is the levelling system to be used with modules having glass or plastic dividers extending down to floor level. This system includes a structural extrusion **90**, which is generally an inverted U-shaped channel with a notch **92** to engage the lower edge of the glass or plastic divider, and a universal foot **100**.

Extrusion **90** and universal foot **100** are interconnected by means of dual threaded levellers **110**, an example of which is shown in FIG. **14**.

Leveller **110** has three distinct sections, an upper section **112**, a middle section **115** and a lower section **120**. Upper section **112** is cylindrical in shape and is internally left or right hand threaded. A plate **113** is connected to the section's upper end for a permanent connection thereto. Middle section **115** is both internally and externally threaded. The external threads will match the direction of the internal threads on upper section **112** while the internal threads will be in the opposite direction to match the external threading of lower portion **120**. A fixed middle nut **114** is disposed at the lower end of middle section **115**. Nut **114** can be used to turn middle section **115** relative to the upper and lower sections of the leveller.

As mentioned, the lower section **120** of the leveller is externally threaded and the threading will be in the opposite direction to the internal threading of upper section **112**. In this way, each turn of nut **114** doubles the expansion or contraction of the leveller to halve the levelling time. The lower end of section **120** includes its own fixed adjustment nut **124** and an inverted V-shaped lower plate **125**.

FIG. **15** shows how leveller **110** is installed. Plate **113** aligns with channels **94** in extrusion **90** to be slidable along the length of the channel to any desired location. The V-shaped lower plate **125** aligns with and slides into grooves **101** in foot **100**. Those levellers that fit at the end of a foot are slightly modified to include tabs **126** at the outer corners of plate **125** which prevent the plate from moving inwardly. When vertical end frames **12** or **17** are attached to extrusion **90**, plate **113** is prevented from moving outwardly so that the leveller is held in its position at the very end of foot **100**. Frames **12** or **17** are connected to extrusion **90** by means of screws that thread into one or more of circular slots **117** in the extrusion.

If modules **20** are situated atop carpet, toothed carpet grippers **130** are inserted into slots **129** in foot **100**. If the modules are installed on hard surfaces, nonskid grippers can be inserted instead. The grippers can be placed precisely where needed to bear the modules weight and can be easily moved, replaced or switched over as needed.

FIG. **16** shows a leveller **110** installed on modules **20** and illustrates the installation of base trim **140** used to conceal the levellers **110** when they're not being adjusted. In this view, plate **113** is again slidingly received into channels formed in the module's lowermost extrusion and plate **125** is received into grooves **101** in foot **100**. The base trim **140** includes baseboards **142** and snap pieces **144**. Snap pieces **144** snap-fit onto foot **100** as shown with grooves **145** and **147** on the snap piece engaging flanges **108** and **109** on the foot. Each snap piece includes a longitudinally extending elevated hook **149** and a similarly longitudinally extending channel **150**. Each baseboard includes a hook **143** to engage hook **149** on the snap piece, and a bead **153** that snap fits into channel **150** to retain the baseboards in a vertical position to provide a finished look. Because the baseboards are installed usually after the modules have been assembled together, the boards can span multiple modules for longer runs and fewer seams.

Reference is now made to FIGS. **26** and **27**. As illustrated, besides the bottom connection with the leveller (as described with relation to FIGS. **15** and **16** above), a ceiling connection is also preferred.

FIG. **26** shows a ceiling connection for a solid wall, such as those described above having tile cladding. A ceiling track **2601** is affixed to the ceiling above the area for the desired wall. Each module includes two horizontal uppers **2610** abut thereto (on either side of the ceiling track), the horizontal upper including an upper flange **2612**. A ceiling trim **2614** is affixed to upper flange **2612**. Ceiling trim **2614** is flexible and allows variable spacing of the wall with the ceiling. Specifically, the trim **2614** will flex to allow the wall to move closer or further from the wall as required based on levelling needs.

Horizontal upper **2610** further includes a *protrusion* (bead **64**) as described above to attach a tile (*via the flexible arms of the illustrated tile clips*) to the horizontal upper. Further, recesses **2616** are used to attach horizontal uppers to frames **12** or **17**.

To affix a wall, an installer can first install ceiling track **2601** in the correct location. The wall is then created with levellers **110** in a lowermost position. The levellers **110** are then extended to level the wall and to further cause horizontal uppers **2610** to abut ceiling track **2601** on either side of ceiling track **2601**, as illustrated in FIG. **26**.

Alternatively, if a divider such as a glass panel is being used, a one piece upper **2701** can be used, as illustrated in FIG. **27**. The one piece upper **2701** comprises a flange **2712** to connect a ceiling trim **2714** to. Ceiling trim **2714** is preferably the same as ceiling trim **2614**. Upper **2701** further includes a channel **2716** for receiving a divider.

The present wall system **10** includes curved walls using curved aluminum stringers and extrusions and curved tiles **18**. In conventional systems, curved walls are constructed of faceted panels rather than true, radii arcs. A curved wall is illustrated in FIG. **19**.

With reference to FIG. **17**, a module **20** is shown in which a couple of tiles **18** have been replaced with an integrated media panel **190**. The panel can be a Fresnel lens, a plasma screen, an LCD screen or a digital whiteboard. Rear projection technology can be used to project images onto the Fresnel lens, or the digital whiteboard technology allows sketching, writing, layout or computer screen emulation. In the example shown, adjacent tiles **18** incorporate speakers **192** to provide sound. Tile **18** surrounding the screen area can be used for integrated storage areas.

With reference to FIG. **18**, there is shown schematically a module **20** with an integrated media center **200** suspended therein.

Various connectors are also provided to allow the present reconfigurable wall system to form corners. Reference is now made to FIGS. **19**, **20**, **21** and **22**.

FIG. **19** illustrates a two-way rectilinear connector **1910**. Connector **1910** includes a finished outer surface on sides **1912** and **1914**. Further, flanges **23** are provided on sides **1916** and **1918**. Flanges **23** can be used with zipper **25** to connect to end frames **12** or **17**. An extension **1920** extends between sides **1916** and **1918** to form a finished corner once modules **20** are connected to these sides. Further, sides **1912** and **1914** include an elongate end **1922** for hiding zipper **25** and creating a finished surface.

FIG. **20** is similar to FIG. **19**, with the principle difference being the radial finished outer surface **2012** replacing sides **1912** and **1914**. Otherwise similar reference numerals are used between FIGS. **19** and **20**.

FIG. **21** illustrates a three way connector for a "T" connection. Three modules **20** are connected to connector **2101**. Connector **2101** includes a finished outer surface **2112**. Flanges **23** are used to connect modules **20**. Extensions **1920** provide a finished look between adjacent modules **20**. Further, elongate end **1922** provides a finished look on the outside of the wall.

FIG. **22** illustrates an alternative 90 degree connector. In this case, an extrusion **2201** is affixed to the end of a module **20**. Two extrusions are connected using a connector **2312**. Since connector **2312** is flexible, an angle greater than or less than 90 degrees is possible. In a preferred embodiment, the swing on the connector is approximately 15 degrees.

The above-described embodiments of the present invention are meant to be illustrative of preferred embodiments and are not intended to limit the scope of the present invention. Various modifications, which would be readily apparent to one skilled in the art, are intended to be within the scope of the present invention. The only limitations to the scope of the present invention are set forth in the following claims appended hereto.

What is claimed is:

[1. A movable reconfigurable wall system comprising:

a) at least one wall module having a front and rear surface and top, bottom, right side and left side edges, said at least one wall module having:

i) a vertical end frame disposed adjacent to each of said right and left side edges, each vertical end frame having a first vertically extending flange and a spaced apart second vertically extending flange thereon, each of said first vertically extending flange and said second vertically extending flange having a beaded portion, the beaded portion on one of said first vertically extending flange or said second vertically extending flange extending toward the front surface of the wall module and the beaded portion on the other of said first vertically extending flange or said second vertically extending flange extending toward the rear surface of the wall module;

ii) a plurality of horizontal stringers affixed between said vertical end frames at said right and left side edges; and

iii) an aesthetic surface affixed to said stringers; and

b) a removable connecting strip having a pair of spaced apart flexible arms, each arm having a beaded portion thereon, the beaded portion of one of said arms being adapted to connect releasably to the beaded portion of one of said first vertically extending flange or said second vertically extending flange on said vertical end frame and the beaded portion of the other of said arms being adapted to connect releasably to the beaded portion of a corresponding opposed vertically extending flange on a separate vertical end frame of a second wall module, a wall bracket, a finishing trim or a connection post to hold one of said first vertically extending flange or said second vertically extending flange and said opposed vertically extending flange together, the beaded portions of said first vertically extending flange or said second vertically extending flange and said opposed vertically extending flange fitting inside the arms of said connecting strip to hold said first vertically extending flange or said second vertically extending flange and said opposed vertically extending flange together thereby releasably connecting said at least one wall module to the other of said second wall module, wall bracket, finishing trim or connection post.**]**

[2. The movable reconfigurable wall system of claim 1, wherein said connecting strip includes a spine adapted to fit between said first vertically extending flange or said second vertically extending flange and said opposed vertically extending flange.]

[3. The movable reconfigurable wall system of claim 2, wherein said connecting strip further includes a pair of flexible fin extensions extending opposite to said flexible arms for providing a seal.]

[4. The movable reconfigurable wall system of claim 1, wherein said aesthetic surface includes a tile panel on said front surface, said rear surface, or both said front surface and said rear surface.]

[5. The movable reconfigurable wall system of claim 4, wherein each said stringer includes one or more protrusions, said reconfigurable wall system further including tile clips for affixing tiles to said one or more protrusions.]

[6. The movable reconfigurable wall system of claim 1, wherein said aesthetic surface is a single divider selected from a group consisting of substrates consisting of glass, plastic, or wood and metal.]

[7. The movable reconfigurable wall system of claim 6, wherein said stringers and end frames include a channel for receiving said divider.]

[8. The movable reconfigurable wall system of claim 1, wherein said stringers include a cantilever channel stringer, said cantilever channel stringer having: a central horizontally extending channel portion with a generally L-shaped slot, said L-shaped slot adapted to receive and engage a substantially L-shaped hook formed on a wall accessory; an upper portion having a tile support; a lower portion having a tile support; and a pair of extending webs connecting said channel portion to said upper and a lower portion.]

[9. The movable reconfigurable wall system of claim 1, wherein said system further comprises an extension frame, said extension frame including a pair of vertical extension end frames and at least one stringer, said extension frame being affixed atop of said at least one module with a spline on each end of said end frame.]

[10. The movable reconfigurable wall system of claim 1, wherein said aesthetic surface includes a slat wall, said slat wall having slats and slat wall channels for connection to slat wall accessories.]

[11. The movable reconfigurable wall system of claim 1, said system further comprising a levelling system having: a universal foot; a leveller capable of engaging said universal foot; and a structural extrusion to engage surface of said at least one module, said structural extrusion connecting to said leveller, wherein said leveller provides the sole connection between said universal foot and said module.]

[12. The movable reconfigurable wall system of claim 11, wherein said leveller comprises: a cylindrical internally threaded upper section; an internally and externally threaded middle section, said external threads matching said internally threaded upper section; and an externally threaded lower section, said externally threaded lower section matching internal threads of said middle section, wherein said middle section can be twisted to extend or contract said leveller.]

[13. The movable reconfigurable wall unit of claim 11 further comprising a base trim, said base trim attaching to said universal foot.]

[14. The movable reconfigurable wall unit of claim 1 further comprising a ceiling connection, said ceiling connection including: a ceiling track affixed to a ceiling; a horizontal upper section affixed to said module, said horizontal upper section adapted to fit about said ceiling track; a flexible gasket affixed to said horizontal upper section and extending above said horizontal upper section to contact the ceiling.]

[15. The movable reconfigurable wall unit of claim 1, wherein said wall bracket comprises:

an extrusion for connection to an existing wall in alignment with said end frame; and

first and second flanges on said extrusion corresponding to said first vertically extending flange and said second vertically extending flange on said end frame and arranged in opposition thereto.]

[16. The movable reconfigurable wall unit of claim 1 further comprising a wall joint, said wall joint comprising a flexible gasket and a channel, said channel adapted to connect to a flange of said at least one module.]

[17. The movable reconfigurable wall unit of claim 1, wherein said at least one module includes curved stringers and curved aesthetic surfaces.]

[18. The movable reconfigurable wall unit of claim 1, wherein said connection post includes at least two sides having vertically extending flanges thereon corresponding to and arranged in opposition to said first and second flanges on said end frame.]

[19. The movable reconfigurable wall unit of claim 1, wherein said aesthetic surface includes a multimedia component.]

[20. The movable reconfigurable wall unit of claim 19, wherein said multimedia component is a video monitor.]

[21. The movable reconfigurable wall unit of claim 1, wherein said vertical end frame depth is extended to provide a deeper wall.]

[22. The movable reconfigurable wall unit of claim 21, wherein said deeper wall is adapted to accommodate a rear-projection video system.]

[23. The movable reconfigurable wall unit of claim 21, wherein said deeper wall is adapted to accommodate an integrated storage system.]

[24. The movable reconfigurable wall unit of claim 1, further comprising a wall mounted module for mounting to an existing wall face, said wall mounted module having:

a) vertical end brackets disposed at least at its side edges, each said vertical end frame having a vertically extending flange directed away from said existing wall face; b) a plurality of horizontal stringers affixed between said pair of vertical end brackets; and c) an aesthetic surface affixed to said stringers.]

[25. The movable reconfigurable wall unit of claim 1, further comprising a furniture system connectable to said at least one module, the furniture system having: a work surface, said work surface connectable to said stringers; and furniture legs, said furniture legs connecting to said work surface at a first end and connecting to a threaded bolt at a second end opposite said first end, said threaded bolt allowing levelling of said work surface.]

26. A reconfigurable wall system comprising:

a plurality of wall modules, each wall module being connectable to one or more other wall modules;

at least one wall module of the plurality of wall modules having front and rear surfaces and top, bottom, right side, and left side edges, the at least one wall module being configured to support and have coupled to at least one of the front and rear surfaces thereof one or more wall tiles;

at least another wall module of the plurality of wall modules having a front edge and a rear edge defined by opposing, visible outer surfaces of first and second vertical end frames, a top side edge, a bottom side

edge, a right side edge, and a left side edge, the at least another wall module comprising a divider between the front edge and the rear edge;

wherein:

the at least another wall module is selectively connectable to the at least one wall module such that the at least another wall module is positioned above or below the at least one wall module, and

the at least another wall module comprises a pair of spaced apart end frames, each end frame having a notch formed therein, wherein the divider is received and held within the notches; and

a leveling system having:

a foot;

a leveler engaging and supported by said foot and engaging and supporting a horizontal member a lowermost module of the at least one or at least another wall module;

wherein said leveler

(a) has a height that is capable of being adjusted and

(b) has a horizontal location that was established by sliding said leveler horizontally relative to, and while engaging said horizontal member and/or said foot.

27. The system as recited in claim 26, wherein the at least one wall module comprises a pair of spaced apart vertical end frames.

28. The system as recited in claim 27, wherein the pair of spaced apart vertical end frames are connected to one another by a plurality of stringers.

29. The system as recited in claim 28, wherein the plurality of stringers are configured to have the one or more wall tiles coupled thereto.

30. The system as recited in claim 26, wherein the top edge of the at least one wall module and the bottom edge of the at least another wall module are configured to enable the at least another wall module to be connected on top of the at least one wall module.

31. The system as recited in claim 26, wherein the top edge of the at least another wall module and the bottom edge of the at least one wall module are configured to enable the at least one wall module to be connected on top of the at least another wall module.

32. The system as recited in claim 26, wherein the at least one wall module and the at least another wall module each comprise a pair of spaced apart vertical end frames.

33. The system as recited in claim 32, wherein a vertical end frame of the at least one wall module is connectable to a vertical end frame of the at least another wall module to connect together the at least one wall module and the at least another wall module.

34. The system as recited in claim 33, wherein the vertical end frame of the at least one wall module is connectable to the vertical end frame of the at least another wall module with a spline.

35. The system as recited in claim 26, further comprising one or more wall tiles coupled to the at least one wall module.

36. The system as recited in claim 35, wherein the one or more wall tiles comprise wood, metal, fabric, or glass.

37. The system as recited in claim 26, further comprising another divider coupled to the at least another wall module.

38. The system as recited in claim 37, wherein each divider comprises glass or plastic.

39. The system as recited in claim 37, wherein each divider is transparent.

40. The system as recited in claim 37, wherein at least one of the dividers is held into place at least in part by a continuous notch in the bottom side edge that extends from the left side edge to the right side edge.

41. The system as recited in claim 26, wherein the at least one wall module and the at least another wall module have substantially equal widths.

42. A reconfigurable wall system comprising:

a first wall module comprising first and second tiles coupled to a stringer interconnecting one or more first vertical end frames to another of the one or more first vertical end frames, wherein the stringer comprises a continuous channel extending the length of the stringer; and

a second wall module comprising a first divider coupled to one or more second vertical end frames between a first front edge and a first rear edge of the first wall module, wherein the first wall module and the second wall module are selectively connectable to one another such that the second wall module may be positioned above or below the first wall module to selectively adjust the height of a reconfigurable wall;

wherein the continuous channel is configured to receive a wall accessory via a receiving feature;

wherein:

the continuous channel is accessible from outside of the first and second tiles;

the receiving feature comprises a first edge that aligns with an edge of the first tile and a second edge that aligns with an edge of the second tile.

43. The system as recited in claim 42, wherein the first and second tiles are connected to the one or more first vertical end frames by one or more stringers.

44. The system as recited in claim 43, wherein the one or more first vertical end frames comprise two spaced apart vertical end frames.

45. The system as recited in claim 44, wherein a plurality of stringers are coupled between the two spaced apart vertical end frames.

46. The system as recited in claim 42, wherein each of the one or more second vertical end frames comprises a notch configured to receive and hold the divider therein.

47. The system as recited in claim 42, wherein the second wall module further comprises one or more horizontal frame elements connected to the one or more second vertical end frames.

48. The system as recited in claim 47, wherein at least one of the one or more horizontal frame elements comprises a notch configured to receive and hold the divider therein.

49. The system as recited in claim 42, wherein at least one of the one or more first vertical end frames and at least one of the one or more second vertical end frames are configured to be secured together to connect the first wall module to the second wall module.

50. The system as recited in claim 49, wherein the at least one of the one or more first vertical end frames and the at least one of the one or more second vertical end frames are configured to be secured together with a spline.

51. The system as recited in claim 42, wherein the one or more tiles comprise wood, metal, fabric, or glass.

52. The system as recited in claim 42, wherein the divider comprises glass or plastic.

53. The system as recited in claim 42, wherein the divider is transparent.

54. The system as recited in claim 42, wherein at least one of the first wall module and the second wall module is

configured to be connected along a left or right vertical edge thereof to a vertical edge of a third wall module.

55. A reconfigurable wall system comprising:

a first wall module having a pair of spaced apart first vertical end frames, one or more stringers extending between and connected to the first vertical end frames, and one or more tiles connected to the one or more stringers on at least one of a front surface and a rear surface of the first wall module; and

a second wall module having a pair of spaced apart second vertical end frames, top and bottom horizontal frame elements extending between and connected to the second vertical end frames, and a divider mounted between the second vertical end frames and the top and bottom horizontal frame elements such that the divider is disposed between a front edge and a rear edge of the first wall module;

wherein:

the first wall module and the second wall module are selectively connectable to one another such that the second wall module may be positioned above or below the first wall module to selectively adjust the height of a reconfigurable wall formed, at least in part, by the first and second wall modules, and

a bottom edge of the divider is inset into the bottom horizontal frame element; and

a leveling system having:

a foot having one or more grooves formed therein, the foot providing an upwardly curved surface; and

a leveler engaging and supported by said foot, said leveler horizontally engaging and supporting a horizontal member of said lowermost of the first or second wall modules, wherein said leveler

(a) has a height that is capable of being adjusted and

(b) has a non-planar base that rests upon the upwardly curved surface of said foot.

56. The system as recited in claim 55, wherein the divider is transparent.

57. The system as recited in claim 55, wherein at least one of the second vertical end frames comprises a notch configured to receive and hold an edge of the divider.

58. The system as recited in claim 55, wherein at least one of the top and bottom horizontal frame elements comprises a continuous notch extending a length of the frame element configured to receive and hold an edge of the divider.

59. The system as recited in claim 55, wherein the first wall module and the second wall module are configured to be connected together with a spline.

60. The system as recited in claim 55, wherein at least one of the first wall module and the second wall module is configured to be connected along a left or right vertical edge thereof to a vertical edge of a third wall module.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : RE47,132 E
APPLICATION NO. : 14/305819
DATED : November 20, 2018
INVENTOR(S) : Gosling et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Specification

Under the heading "CROSS-REFERENCE TO RELATED APPLICATIONS," please replace the paragraph at Lines 15-27 (approx.), with the following:

NOTICE: More than one reissue application has been filed for the reissue of U.S. Patent No. 8,024,901 B2. The reissue applications are U.S. Reissue Patent Application Serial No. 15/074,383, filed on March 18, 2016, now U.S. Reissue Patent No. RE47,693 E, issued November 5, 2019, U.S. Reissue Patent Application Serial No. 14/681,874, filed on April 8, 2015, now U.S. Reissue Patent No. RE46,929 E, issued July 3, 2018, U.S. Reissue Patent Application Serial No. 14/305,819 (the present application), filed on June 16, 2014, now U.S. Reissue Patent No. RE47,132 E, issued November 20, 2018, which are a continuation reissue application, a divisional reissue application, a continuation reissue application, respectively, of U.S. Reissue Patent Application Serial No. 14/032,931, filed on September 20, 2013, which is a reissue application of U.S. Patent Application Serial No. 11/205,314, filed on August 17, 2005, now U.S. Patent No. 8,024,901 B2, issued on September 27, 2011, which claims the benefit of the filing date of U.S. Provisional Patent Application Serial No. 60/601,985, entitled "INTEGRATED RECONFIGURABLE WALL SYSTEM," filed August 17, 2004, now expired.

Signed and Sealed this
Twenty-third Day of March, 2021

Drew Hirshfeld
Performing the Functions and Duties of the
Under Secretary of Commerce for Intellectual Property and
Director of the United States Patent and Trademark Office